Nov. 12, 1957 E. S. BEARD 2,812,568

TUBULAR FABRIC FEEDING AND ROLLING MACHINE

Filed Aug. 16, 1956 4 Sheets-Sheet 1

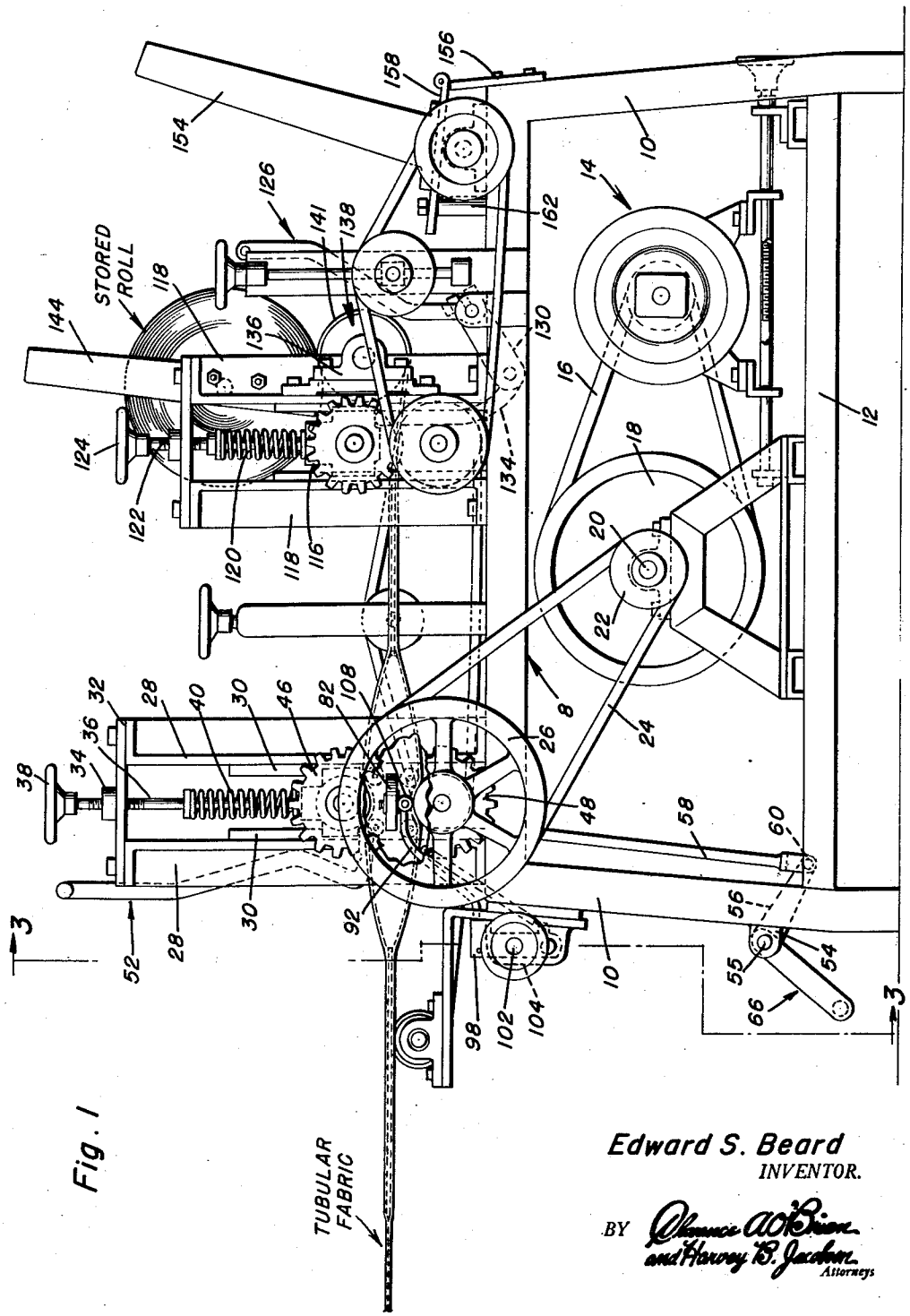


Fig. 1

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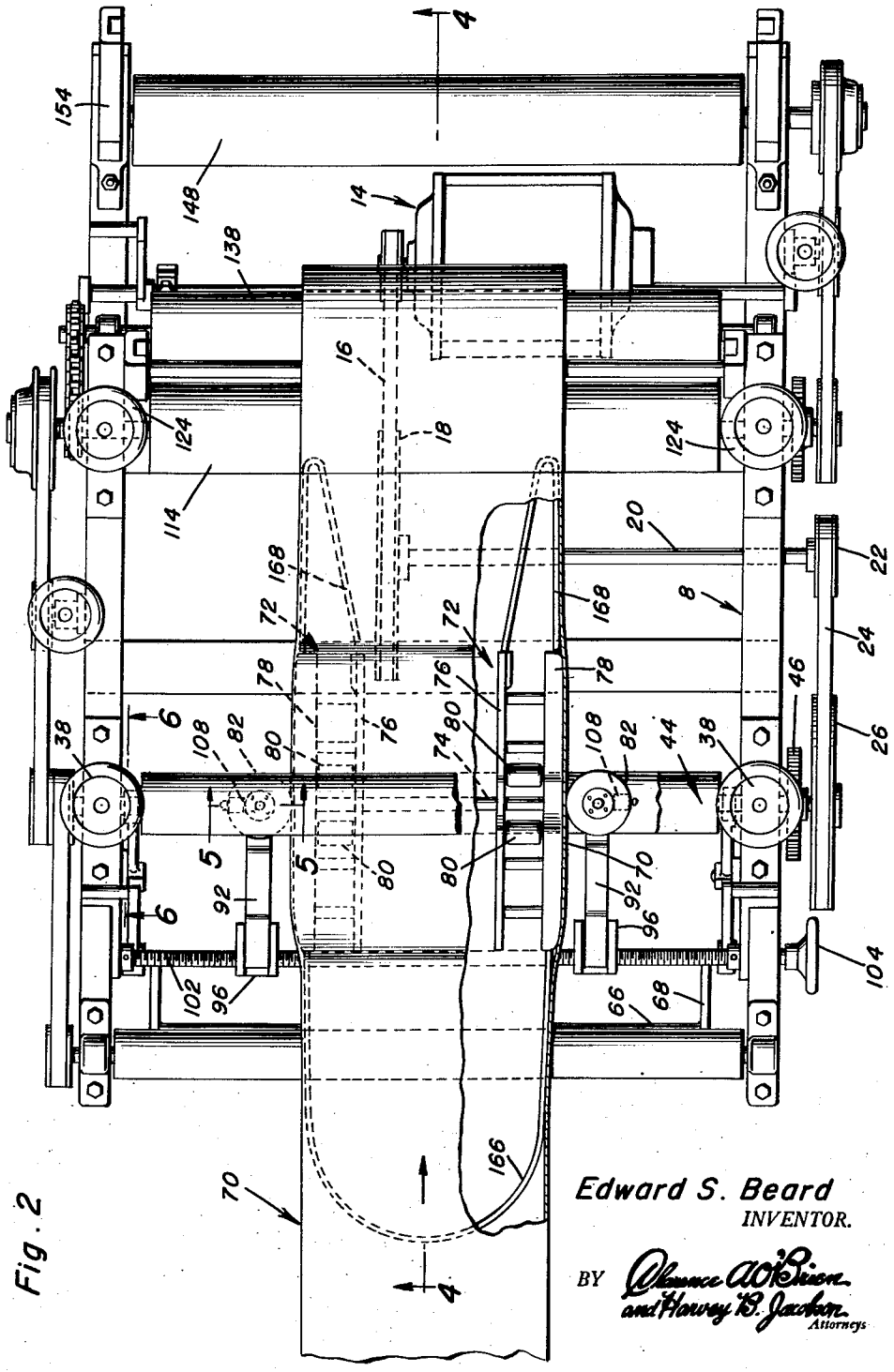


Fig. 2

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TUBULAR FABRIC FEEDING AND ROLLING MACHINE

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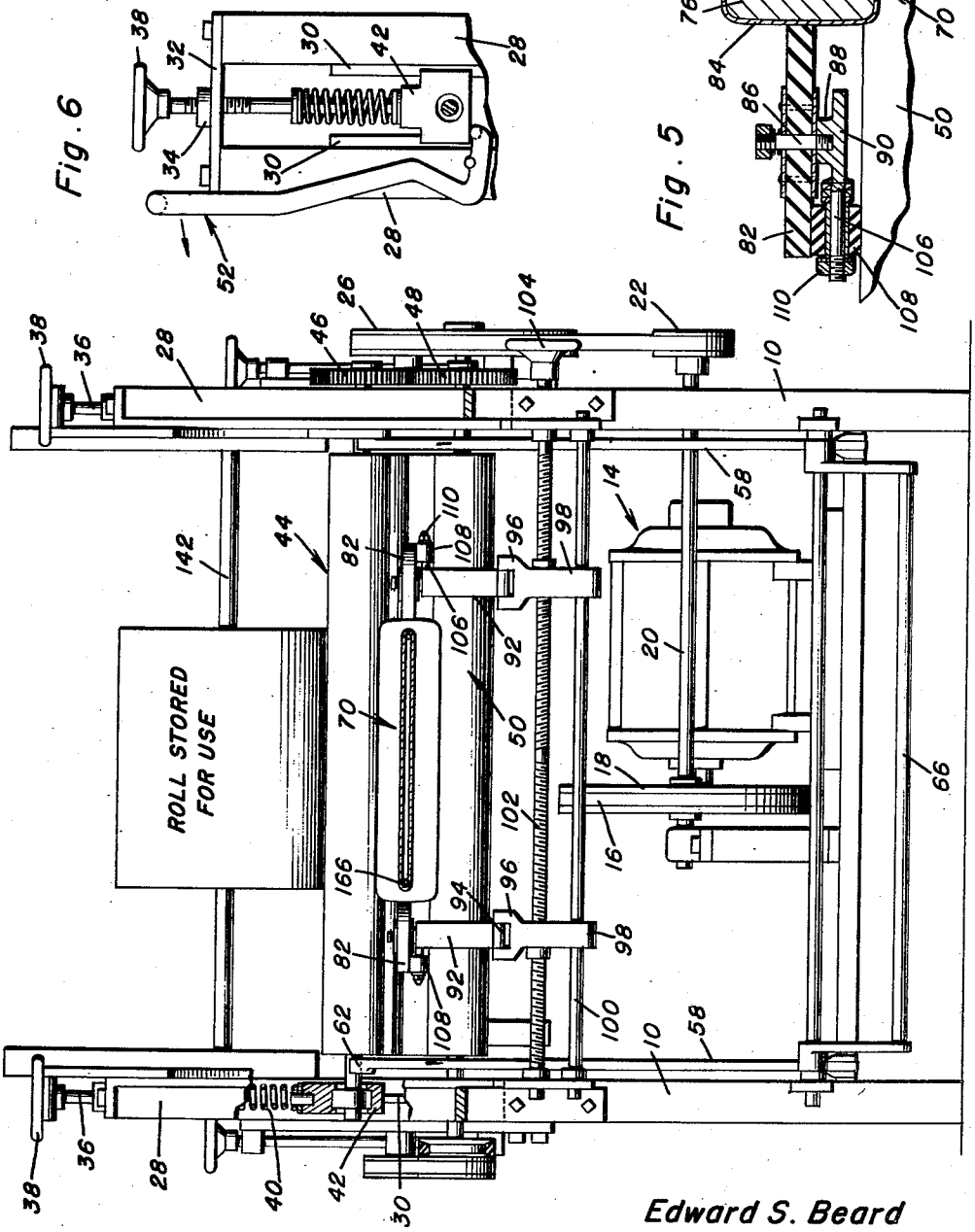


Fig. 3

Fig. 6

Fig. 5

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TUBULAR FABRIC FEEDING AND ROLLING MACHINE

Filed Aug. 16, 1956 4 Sheets-Sheet 4

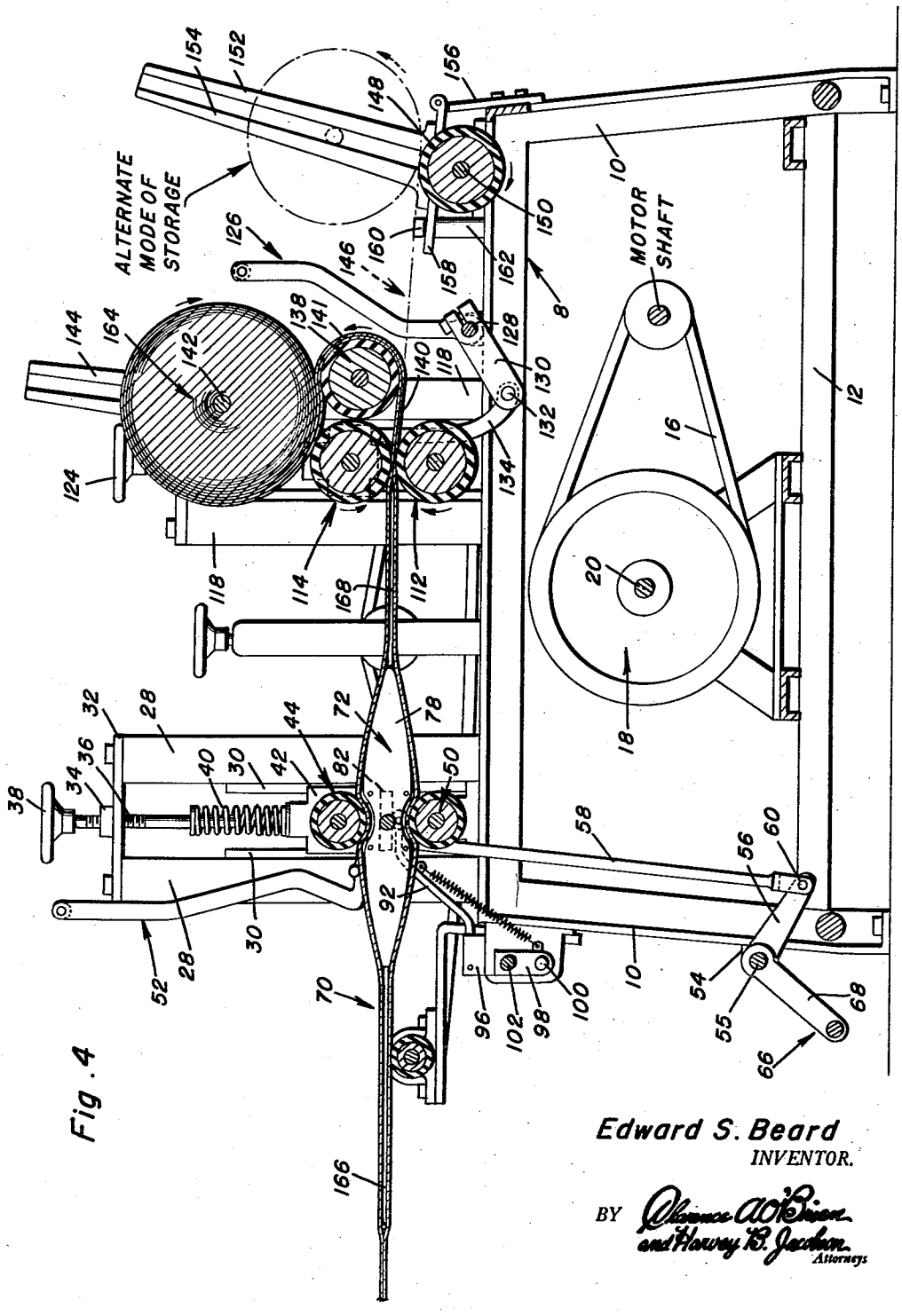


Fig. 4

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TUBULAR FABRIC FEEDING AND ROLLING MACHINE

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Application August 16, 1956, Serial No. 604,496

8 Claims. (Cl. 26—55)

The present invention relates to certain new and useful improvements in a motorized machine in which a stationary frame structure is equipped with expedient facilities adapted for use during the handling of tubular knitted fabrics and has reference to structurally novel means enabling the user to spread, flatten, stretch to desired widths and to apply weighting, sizing for finishing and to thereafter roll the thus handled fabric.

Machines for feeding tubular fabric and subjecting it to the width governing action of mechanical spreader means of one type or another are not new. The fact that there is a widespread need for steady and uniform movement or propulsion of the tubular fabric over the spreader, many inventors working in this field of endeavor are, more likely than not, attempting to solve the problem of better control of the fabric with a view toward guarding against slippage and the avoidance of sharp and sudden creasings of the fabric which tend to overstretch it and to otherwise handle it ineffectually and poorly. Reference may be made, for example, to recognized efforts of Samuel Cohn identified in connection with Patents 2,190,860 and 2,391,547 having to do with fabric feeding systems and adaptations. As has been recognized in the stated patents guiding and feeding of the tubular fabric is such as to permit the center portions of the flattened fabric to be drawn ahead at a faster rate while the friction at the edges retard the side portions and to apply special corrective adjustment to the edges of the fabric before it reaches the rolls. In the stated patents the internal rollers which engage the inner surface of the fabric and which have inclined surfaces at each side of a central radial plane are vertically disposed. There are external rolls or rollers engaging the outer surface of the fabric opposite the internal rollers and other appropriate structural achievements.

With a view toward advancing this line of endeavor, structural adaptations, similar in many respects to the subject matter of the instant invention, have been worked out by this applicant. More specifically reference is made to pending Serial No. 461,878 involving the use of so-called driven type spreaders, that is, spreaders which have idling rollers incorporated therein and with which power driven external type rollers would be adapted to cooperate. Briefly the subject matter in the copending application, reduced to its simplest form, pertains to a machine embodying stationary end frames or equivalent supports and between the upper end portions of these, horizontally disposed rollers are mounted for rotation. Journals on the lower roller are turnable in stationary bearings on uprights in a frame structure and the journals on the upper roller are so constructed and arranged that the upper roller may be moved toward and from the lower roller so as to allow the two rollers to be separated or parted and spaced sufficiently that the bodily insertable and removable spreader device may be readily sandwiched and wedged between the two rollers or withdrawn and removed therefrom whenever necessary or desired.

With a view toward improving on similarly constructed and performing prior patented constructions and also the generally satisfactory and effective adaptation in Serial No. 461,878, it is desirable, as herein revealed, to appropriate a number of structural and functional improvements. Stated more specifically, novelty is predicated on a suitable frame structure having uprights paired and operably supporting a first horizontally disposed roller to exteriorly contact and frictionally drive the bottom portion of the fabric tube. Above this and also horizontally disposed is a second roller and this is, of course, in spaced parallelism above the first roller and it likewise exteriorly contacts and frictionally drives the top portion of the fabric tube. Obviously, the rollers are of a length much greater than the width of the fabric tube and means is provided for simultaneously delivering power to and driving the rollers so that the fabric tube is propelled evenly between the adjacent surfaces of the roller at a desired speed movement. A spreader device is herein used which is similar to that disclosed in Serial No. 461,878 and as before touched upon it is removably mounted between the adjacent cooperating surfaces of the first and second or top and bottom rollers. The top roller is journaled in bearings which are spring biased to normally bring the rollers into operating relationship. Mechanical means which is foot controlled, and additional hand levers are provided at each end of the upper or second roller and, being at the disposal of the machine operator it becomes possible to lift either end of the upper roller or to lift the entire roller momentarily to permit uniform movement of the fabric tube and to obviate the likelihood that uneven feeding may result.

Structural means is provided in the present machine which makes possible an over-feed resulting in a small amount of shrinkage by reason of the fact that the fabric tube is not improperly stretched as it goes between the rollers. By using rubber covered top and bottom rollers the over and under-feed action desired is attained and this is important because in feeding and rolling a roll of stripped fabric and where one side may be feeding faster than the other side, all that is necessary is to employ the aforementioned hand levers or foot control means and to release the pressure on the over-feeding side and this allows the other side to advance to a point where it is readied for normal and satisfactory control and operation.

Another object of the invention is to provide properly paired horizontal rollers in the spreader construction which cooperate with the above mentioned first and second driven rollers and in addition to provide exteriorly disposed side driven friction rollers which turn in a horizontal plane on vertical axes and which contact and feed the cloth in a manner to prevent drag thereon. The use of idling, so-called side driven, rollers often makes undesirable marks on the fabric due to the drag on the fabric actually pulling and imparting rotation to the guide rollers.

Another aspect and objective of the instant concept is the provision of a machine in which facilities are provided without an over-feeding spreader, which will roll and finish a piece of tubular fabric in one operation. In fact the machine is so constructed as to finish two rolls of fabric in one operation which alone promotes greater production in the textile industry.

Another objective stated in terms of generalities is to improve upon and reduce the number of parts entering into the overall machine thereby not only increasing the efficiency of the structure as an entity, but also rendering the same less costly to manufacture, repair, and to otherwise simplify factors of assembling, handling and use.

Other objects, features and advantages will become more readily apparent from the following description and the accompanying sheet of illustrative, but not restrictive, drawings.

In the drawings wherein like numerals are employed to designate like parts throughout the same:

Fig. 1 is a side elevational view, with portions broken away, showing a tubular fabric feeding and rolling machine constructed in accordance with the principles of the present invention;

Fig. 2 is a top plan view of the same;

Fig. 3 is a view looking from left to right at the structure seen in Fig. 1 and taken on the irregular vertical line 3—3 of Fig. 1; and

Figs. 4, 5 and 6 are sections on the lines 4—4, 5—5 and 6—6, respectively, of Fig. 2.

The frame structure may, of course, vary in form. It is shown having a horizontal top frame 8 constructed of angle irons and also angle iron corner-positioned legs 10. The horizontal frame members 12 at the lower portion of the frame structure serve to accommodate an electric motor 14 operating a belt 16 transmitting motion to a larger pulley 18 mounted on a shaft 20 which transmits its motion to the smaller end pulley 22 and the second belt 24 and to a pulley 26 atop the top frame 8. It is to be stated here and now, however, that while this source of power and transmission means is illustrated in the drawings it is not to be dwelled on herein because any appropriate devices may be used to transmit motion to the featured improvements.

Reference is now made to pairs of fixedly mounted uprights 28 spaced apart and having guides 30, the uprights being connected together at their upper ends by a bridge plate 32 centrally apertured and equipped with a nut 34 for the screw-threaded portion of an adjusting rod 36 provided on its upper end with a hand wheel 38. This rod serves to adjust the tension of the cooperating coil spring 40 connected with a bearing block 42 (Fig. 4) mounted for vertical adjustment on the guides 30. It is understood that this structure is duplicated at opposite sides of the machine. Also the journals on the cooperating ends of the upper rubber-covered feed roller 44 are mounted in these bearings. The journal at one end is provided with a gear 46 enmeshed with a cooperating gear 48 which gears receive motion from the aforementioned power transmission means and which serve to drive not only the first or top roller but also the underneath horizontal spaced parallel bottom or second roller 50, this being journaled at its end in appropriate bearing means provided therefor. Pivotally mounted on the paired uprights at the respective outer ends of the upper roller 44 are manually actuatable substantially L-shaped lift levers 52. With these levers if either lengthwise edge portion of the tubular fabric is found to be lagging or dragging a skilled operator can with the aid of the levers lift either end of the roller 44 to even up the friction drive of the fabric between the rollers. Foot pedal means is also provided to accomplish somewhat the same result. Reference is therefore made to brackets 54 on the lower portions of the front legs carrying rocker arms 56 to which vertical lifting or push rods 58 are hingedly connected as at 60 (see Fig. 4). The upper ends of these rods 58 are provided with saddles 62 (Fig. 3) which engage beneath the journals of the roller 44 making it possible to lift the roller as a unit especially when it is desired to push it upwardly against the tension of the spring biased bearing blocks for purpose of inserting and removing the fabric tube spreader device. A U-shaped member 66 with crank arms 68 serves as the pedal means for rotating the rocker shaft 55.

Not only is the lift control means for the roller 44 a significant improvement herein, the propelling of the fabric tube 70 is prominent. The insertable and removable spreader is not only placed between the rollers 44 and 50, the spreader itself assists in the driving or propulsion result. Note for example in Fig. 2 that the spreader embodies so-called adapters 72 connected together by a tie rod 74 and each adapter embodies inner and outer members 76 and 78 having relatively small idling rollers

80 mounted therein. These rollers 80—80 are so spaced and positioned that they cooperate with the larger upper and lower rollers 44 and 50. In other words they do the internal driving while the larger rollers 44 and 50 do the external driving of the top and bottom portions of the fabric tube. The edge portions are also driven. The drive means is the same on each side and it is believed a description of one will suffice for both. This drive means is characterized by a horizontally disposed rotatable disk which while it is also a "roller" will be referred to as a traction imparting "disk" 82 to assist in the description here. With respect to 82 and Fig. 5 the periphery of the disk acts on the marginal crease or fold of the fabric as at 84 and presses the same firmly against the cooperating rigid guide 78 of the spreader. The disk is removably mounted on a spindle 86 threaded into a socket 88 on an end portion 90 of a supporting arm 92. The arm extends downwardly toward the front end of the machine and beyond the front end where it is hingedly connected as at 94 to the yoke 96 (Fig. 3) on the upper end of a travelling bracket 98 operable on the horizontal guide rod 100 and also adjustable on the feed screw 102. This feed screw has left and right hand threads for the travelling brackets as is evident in Fig. 3 and on one end there is a hand wheel 104 whereby it may be turned in order to adjust the traction disks (sometimes called exterior side rollers) in relation to the spreader guides 78. As previously mentioned these disks do not idle but rather are actually driven. This is accomplished in the unique manner shown in Fig. 5 wherein it will be seen that the aforementioned end portion 90 of the arm is provided with an outstanding trunnion 106 on which a rubber traction and motion transmitting cylinder or roller 108 is mounted. This is held in place by the nut 110. It is in friction driven contact with the rubber surface of the aforementioned lower roller 50. So the motion from the roller 50 is transmitted to the roller 108 and then to the disk or roller 82 so that the latter rolling in contact with the edge 84 of the fabric tube cooperates in positively feeding the fabric tube. Thus the latter is propelled by the top and bottom or upper and lower rollers 42 and 50, the interiorly disposed idling rollers on the spreader means and also the side rollers 82. This arrangement plus the adaptation wherein the roller 44 can be raised and lowered but is normally spring pressed into operative position provides a highly practical and satisfactory powered propulsion means feeding the fabric tube.

In addition to the means so far described reference is now made to fabric tube rolling means. Here again a series of rollers, in fact, a cluster of three rollers is utilized. The lower main roller is referred to by the numeral 112 (Fig. 4) and this is suitably journaled at its ends and above it and parallel thereto is the upper main roller 114 and these are one above the other and the journals at the ends of the roller 114 are journaled in adjustable bearing blocks 116 mounted on guides between the pairs of uprights 118 as perhaps best shown in Fig. 1. Here again there is a tensioning spring 120 and an adjusting rod 122 and a hand wheel 124 for the rod whereby to put the bearing blocks under the desired degree of tension. These bearing blocks may be lifted too and this is done by the hand operated levers 126 (Fig. 4) which are rotatably bracketed and mounted at 128 at opposite ends on the upper frame means. Actually 128 is a rocker shaft carrying fixed rocker arms 130 hingedly connected at 132 to an upstanding link 134 at each end of the roller. This link is in turn joined with its cooperating bearing block so that the roller 114 may be lifted and lowered to govern and control the passage of the treated and spread fabric therebetween. Suitably arranged brackets 136 (Fig. 1) serve to support the journals on the ends of the third or what may be called the rearwardly disposed auxiliary roller 138. This makes it possible to bring the portion 140 of the fabric between the rollers 112 and 114 and to

then train it up and over the surface of roller **138** so that it may be wound on a rolling rod **142** with its end portions slidable in the angularly disposed fixedly mounted brackets or arms **144**.

There may be times wherein instead of training the tubular fabric or fabric tube between rollers **112** and **114** and over roller **138**, the fabric instead will be drawn or fed rearwardly to the dotted line position shown at **146** in Fig. 4. Here the free end of the fabric will be wound on the single roller **148** having its shaft portion **150** terminating in journals which are mounted for self-levelling rotation in the channels **152** of the cooperating rearwardly and upwardly inclined brackets **154** provided therefor. If desired these brackets may be mounted on hinges. One hinge leaf at each end is denoted at **156** and is attached to the frame structure in the manner seen in Fig. 4 and the other hinge leaf **158** is fastened and held as at **160** on the upper end of a fixed post **162**.

As was mentioned at the introductory portion of the description of the details, it seems unnecessary to specifically describe the special arrangement of gears, pulleys and belts which serve to transmit motion from the motor to the forward feeder and fabric propelling rollers **44** and **50** and from these to the fabric moving and roll building and storing facilities, for example, the rolled fabric **164** illustrated in Fig. 4.

The operation of the machine has been touched upon in the course of describing the various structural components of the over-all machine. As for example, the rollers **112** and **114** plus the companion auxiliary roller **138** and self-levelling rod **142** just described which seem to be sufficient to clarify the operation of these several rollers and also the functioning of the hand levers **126** at the ends of the rocker shaft **128** which are employed to lift and lower the bearing blocks for the journals on the ends of roller **114**.

It is also evident that as the description has gone forward the selectively usable hand levers **52** at opposite ends of the forward portion of the frame structure which lift the spring biased bearing blocks **142** have been set forth sufficiently that their operation is clear. The rocker shaft **55** with its rocker arms **56** and the lifting rods **58** and foot pedal arrangement **66** appears to be sufficiently well covered to mention that the primary purpose of this arrangement is to not only lift the entire roller **44** in a horizontally level manner but also to assist in controlling uniform friction feeding of the fabric tube, and, more importantly, the spreading apart of the two rollers **44** and **50** making it possible to insert or remove the spreader. Coming back to the spreader, however, it will be seen in Fig. 2 that the customary U-shaped spreader member **166** pilots the fabric tube while the trailing V-shaped fingers **168** serve to keep the given width uniform as the fabric tube spans the space between the forward and rearward portions of the frame and before it enters the rollers **112** and **114**.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. Mechanical means for spreading, flattening and propelling tubular knitted fabric to apply weighting, sizing and for handling comprising, in combination, a lower horizontally disposed roller mounted for rotation in stationary bearings and having means whereby power of rotation is transmitted thereto, an upper roller also horizontally disposed and situated in parallelism directly above the lower roller so that the fabric may be caused to pass between the adjacent cooperating portion of said rollers, means for spring biasing the upper roller toward the lower roller slidably mounted, means whereby said upper roller may be lifted upwardly against the spring bias means in a common plane from end to end or whereby either end individually may be lifted up, a spreader having adapters removably mounted between said rollers, having a U-shaped spreader member at the forward end, and guide fingers at the rearward end of the adapters, each adapter having a rigid guide member over which the longitudinal edge portion of the fabric tube tracks, idling rollers carried by said spreader and contacting interior portions of the fabric and disposed in a horizontal plane, and a mechanically driven friction contacting horizontally disposed rotatably mounted disk at the respective longitudinal sides of the spreader and having its peripheral portion in friction feeding contact with the fabric tube whereby the powered upper and lower rollers, idling rollers on the spreader, and disks collectively feed the fabric tube with requisite constancy and uniformity and said liftable and lowerable upper roller is capable of adjustment to minimize unevenness in feed and drag.

2. The structure defined in claim 1, said disk in each instance being journaled on a vertical journalling pin carried on an arm, said arm having an outstanding trunnion, a rubber roller mounted for idling on said trunnion and having driving contact with one surface of the disk and a cooperating adjacent surface of the lower roller.

3. Mechanical means for spreading, flattening and propelling tubular knitted fabric comprising, in combination, a frame structure, a horizontally disposed power driven feeder roller mounted for rotation on said frame structure, an upper horizontally disposed feeder roller disposed in parallelism above the first named roller and spring biased toward the first named roller but shiftable away from the first named roller so that the two rollers may be spread apart to insert or remove a fabric spreader, arms adjustably mounted on said frame structure, each arm having an upstanding journal, horizontally disposed friction feeding disks mounted on said journals, each arm being provided with a trunnion, a rubber roller mounted for idling on said trunnion and simultaneously contacting the adjacent underneath side of said disk and a traction surface of the first named roller.

4. Mechanical means for spreading, flattening and propelling tubular knitted fabric comprising, in combination, a frame structure, a horizontally disposed power driven feeder roller mounted for rotation on said frame structure, an upper horizontally disposed feeder roller disposed in parallelism above the first named roller and spring biased toward the first named roller but shiftable away from the first named roller so that the two rollers may be spread apart to insert or remove a fabric spreader, arms adjustably mounted on said frame structure, each arm having an upstanding journal, horizontally disposed friction feeding disks mounted on said journals, each arm being provided with a trunnion, a rubber roller mounted for idling on said trunnion and simultaneously contacting the adjacent underneath side of said disk and a traction surface of the first named roller, a feed screw mounted for rotatable operation on said frame structure and having a hand wheel for turning and adjusting the said feed screw, a pair of brackets mounted for adjustment on said feed screw, there being a pair of the stated arms and the lower ends of said arms being hingedly connected with their respective brackets.

5. In a machine for spreading, flattening and propelling tubular knitted fabric, a frame structure, a lower horizontally disposed rotatably mounted fabric contacting and feeding roller mounted on said frame structure, a manually regulable feed screw mounted on said frame structure, at least one bracket adjustably mounted on said feed screw, an arm hingedly attached at its lower end to said bracket, a horizontally disposed disk mounted for rotation on a vertical axis on the upper end of said arm, a motion transmitting roller mounted for idling between the surface of said first named roller and underneath the sur-

face of said disk, an upper roller disposed in parallelism and horizontally above said first named roller and in a plane above the top of said disk, and manually actuatable mechanical means for raising and lowering said upper roller in a plane perpendicular to the horizontal plane of said frame structure.

6. The structure defined in claim 5 and in combination, a horizontally disposed spreader interposed removably between said upper and lower rollers and having horizontally disposed idling rollers for contact with the interior surface of cooperating portions of the tubular fabric, said spreader being in the plane relative to the plane of said disk so that the marginal edge of the latter is cooperable with a portion of the fabric which is propelled over said spreader by way of said upper and lower rollers.

7. In a machine of the class described, a frame structure having upper and lower cooperating tubular fabric contacting and feeding rollers on an intake end portion of the frame structure, a second lower roller horizontally disposed for rotation in relatively stationary bearings, a second upper roller paralleling the second lower roller and vertically adjustable toward and from the same, and an auxiliary roller rearwardly of and paralleling the second named upper roller and having its lowermost surface portion disposed in a plane slightly below the plane where the adjacent tread surfaces of the second upper and lower rollers normally cooperate with each other, a pair of upstanding brackets mounted on said frame structure and having guide channels therein, and a rod having its end portions mounted in the respective guide channels, said rod being adapted to permit the end of the tubular fabric which has been passed between the second upper and lower rollers and trained over the third roller to be wound and stored thereon.

8. For use in spreading, flattening and propelling tubular fabric, a machine embodying a frame structure, a horizontally disposed lower roller mounted for rotation on said frame structure in a manner to exteriorly contact and frictionally drive a cooperating bottom portion of the fabric, an upper roller in spaced parallelism above the lower roller and likewise horizontally disposed and extending transversely across the fabric to exteriorly contact and frictionally drive the cooperating top portion of the fabric, means for powering and simultaneously driving said rollers so that the fabric is propelled between their adjacent cooperating surfaces at the desired speed of movement, foot controlled means on said frame structure for bodily raising said upper roller and lifting it to a position spaced above the lower roller sufficient to allow the insertion of a removable spreader, and a removable spreader sandwiched between said rollers, a pair of individually operable manually usable levers supported on said frame structure and having end portions operatively connectable with the respective end portions of said upper roller and permitting said upper roller to have either end raised in a manner to permit regulation and control of the respective longitudinal edge portions of said fabric, said upper roller being provided with journals, said frame structure embodying uprights having spring biased vertical sliding bearing blocks mounted thereon, said journals being journaled for rotation in their respective bearing blocks, said levers being substantially L-shaped and having lower end portions hingedly mounted and operatively connected with their respective bearing blocks so that the latter may be pried and caused to slide upwardly against the tension of their coacting springs, said spreader being provided with longitudinal rigid guide members against which the longitudinal creased portions of the tubular fabric slide, and a horizontal exteriorly arranged disk driven from the lower roller, turnable on a vertical axis in a horizontal plane and having friction driving contact with the portion of the fabric moving in relation thereto.

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