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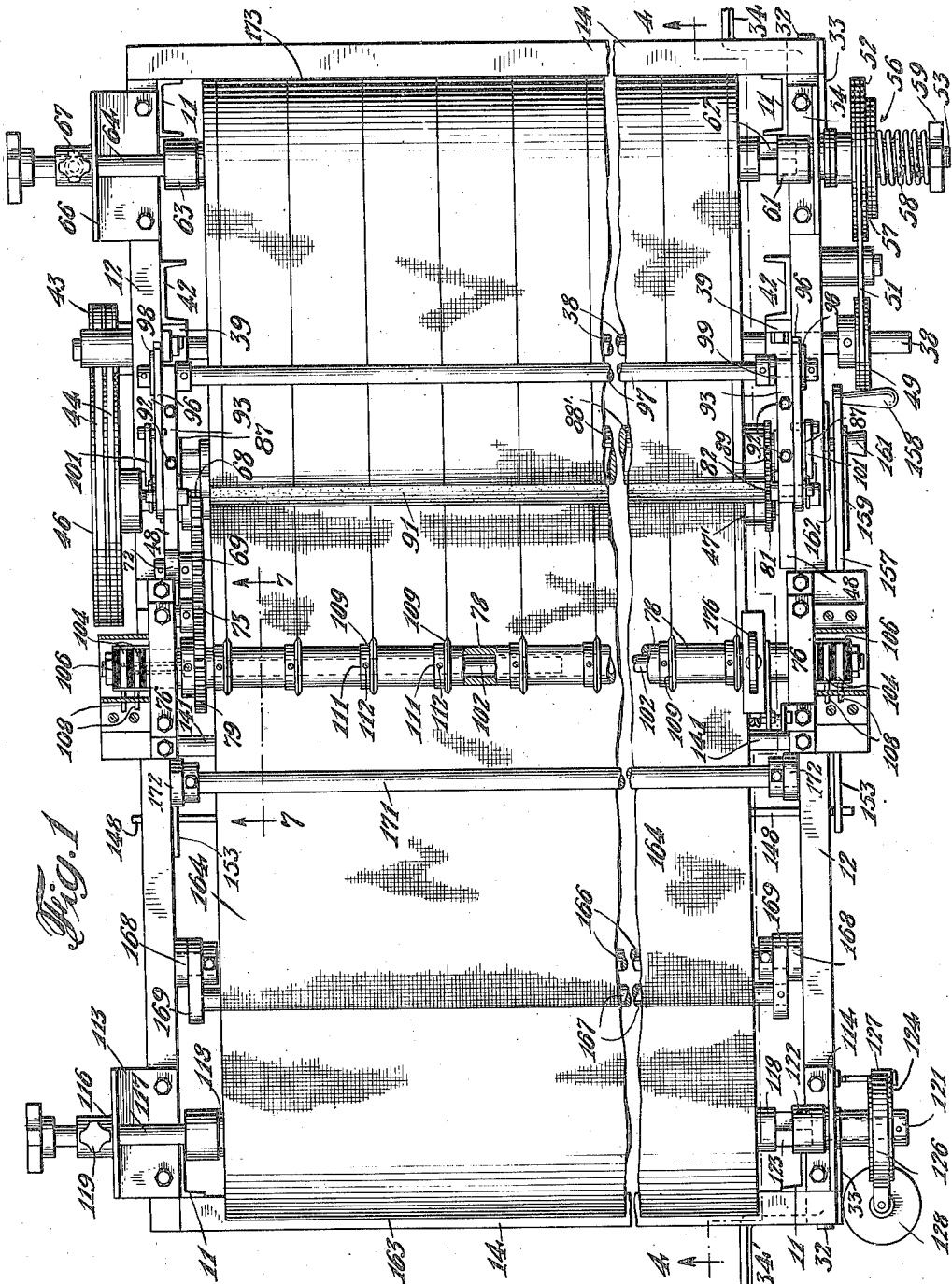
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2,251,282

RIBBON FORMING MACHINE

Filed Dec. 20, 1940

7 Sheets-Sheet 1



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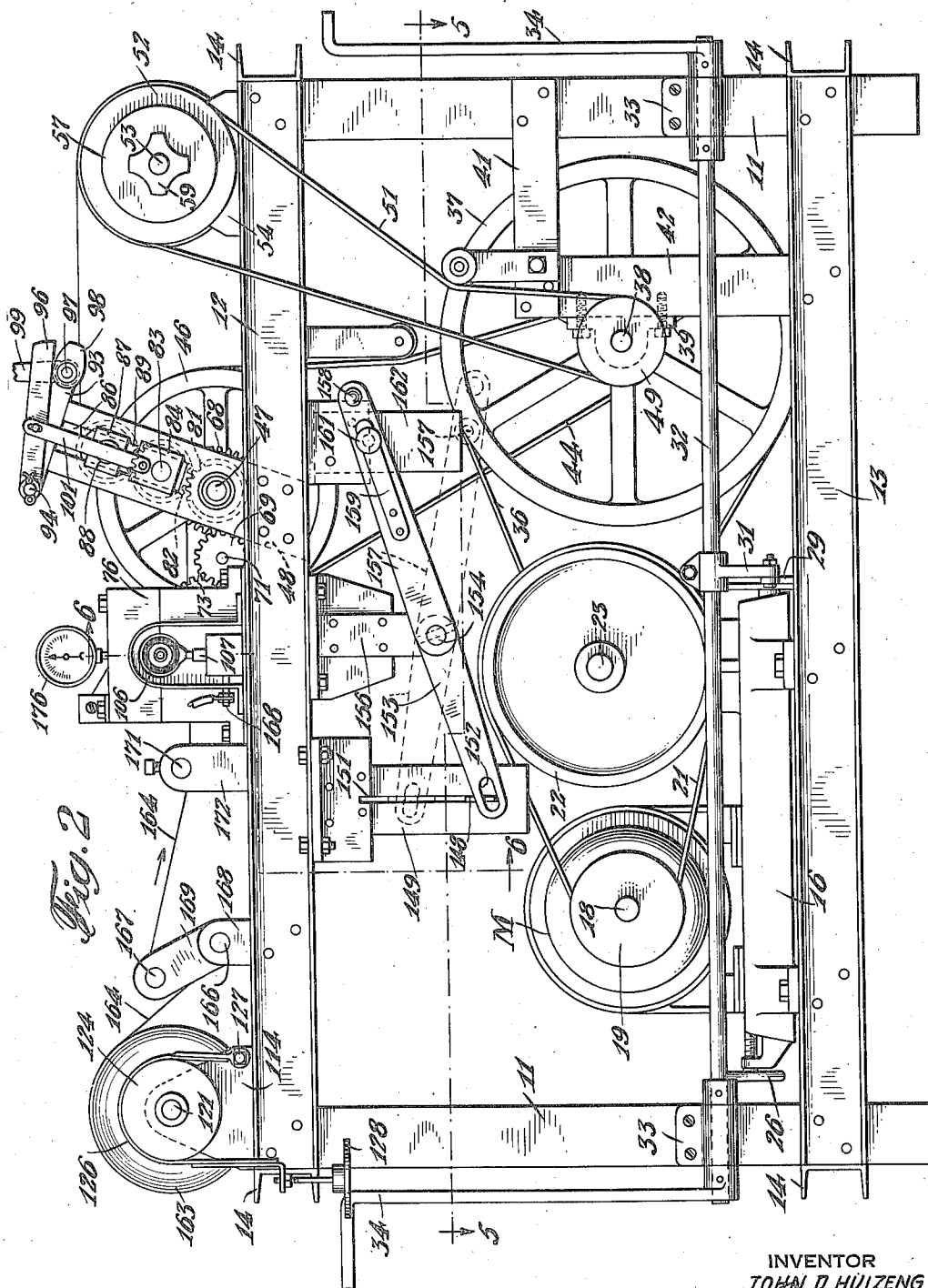
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RIBBON FORMING MACHINE

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7 Sheets-Sheet 2



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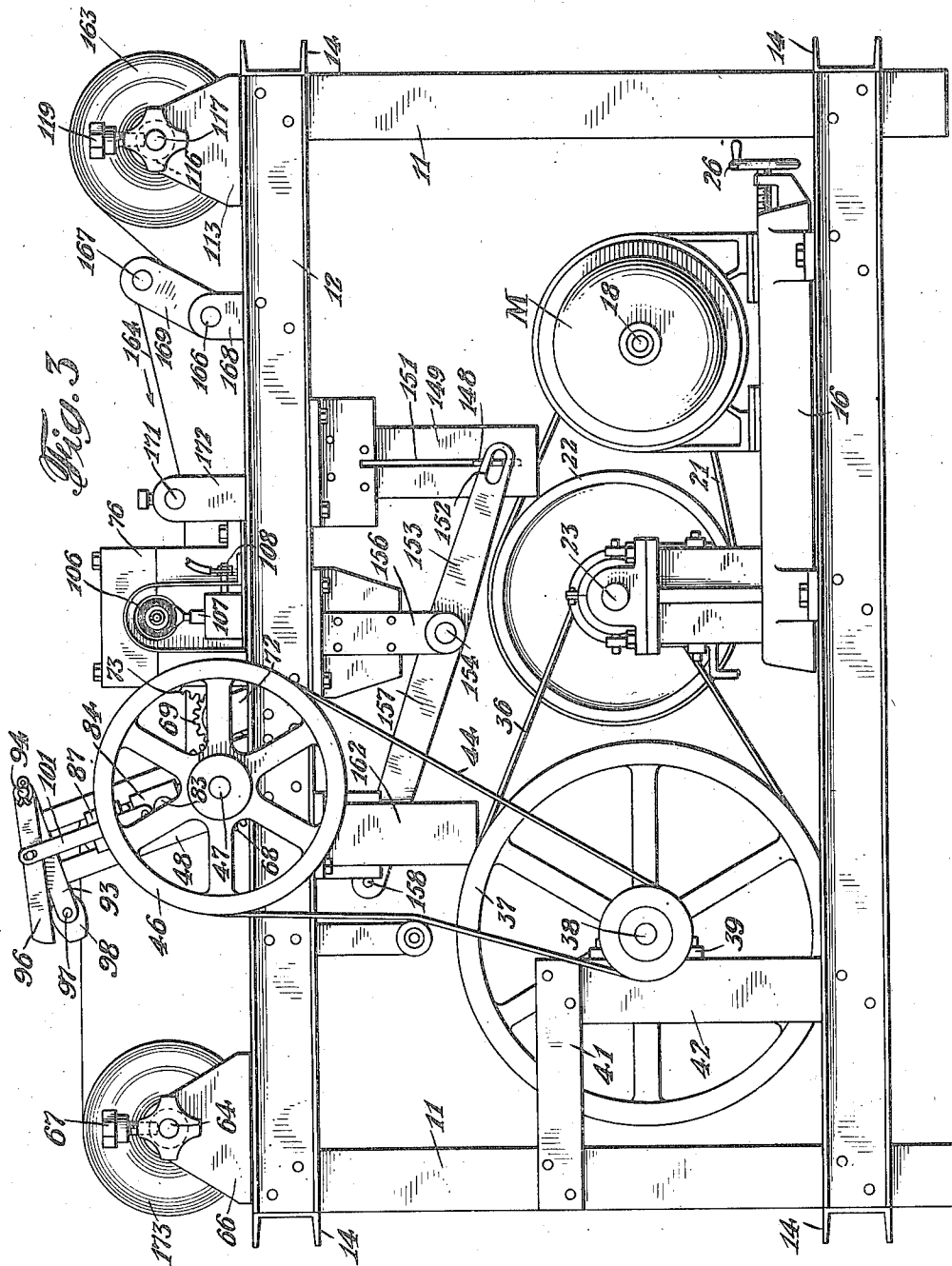
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RIBBON FORMING MACHINE

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7 Sheets-Sheet 3



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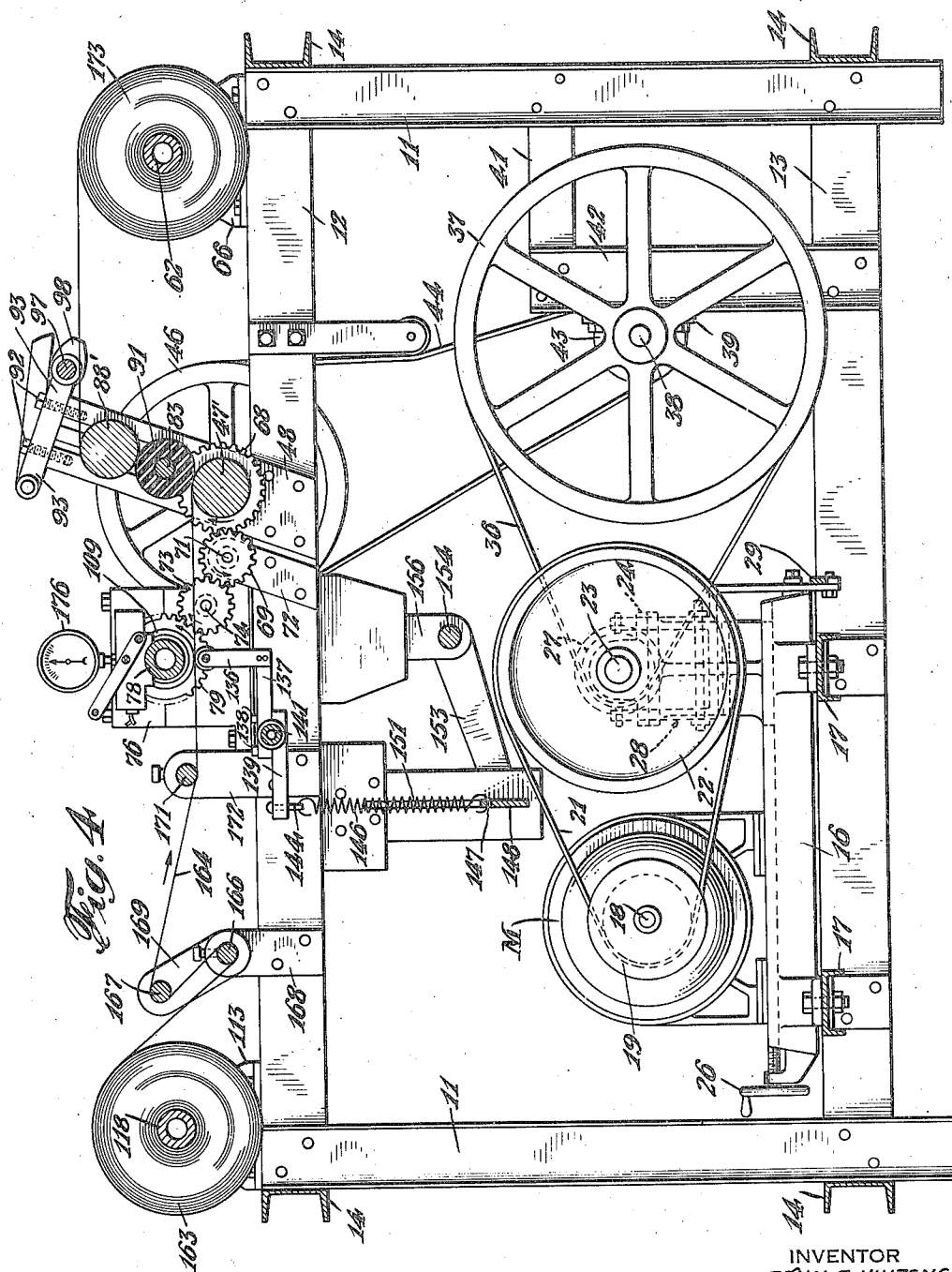
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RIBBON FORMING MACHINE

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7. Sheets-Sheet 4



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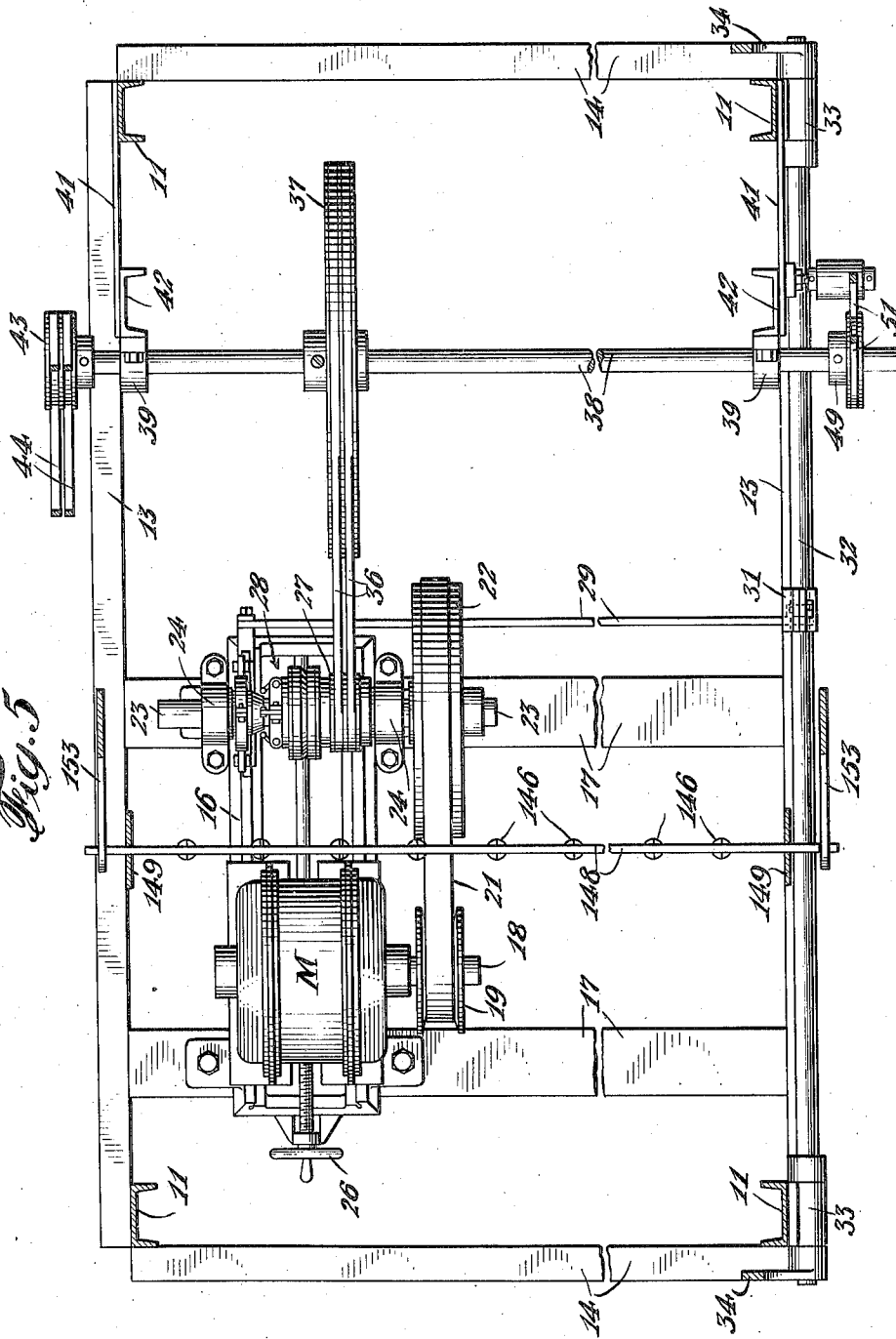
Fig. 5.

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Aug. 5, 1941.

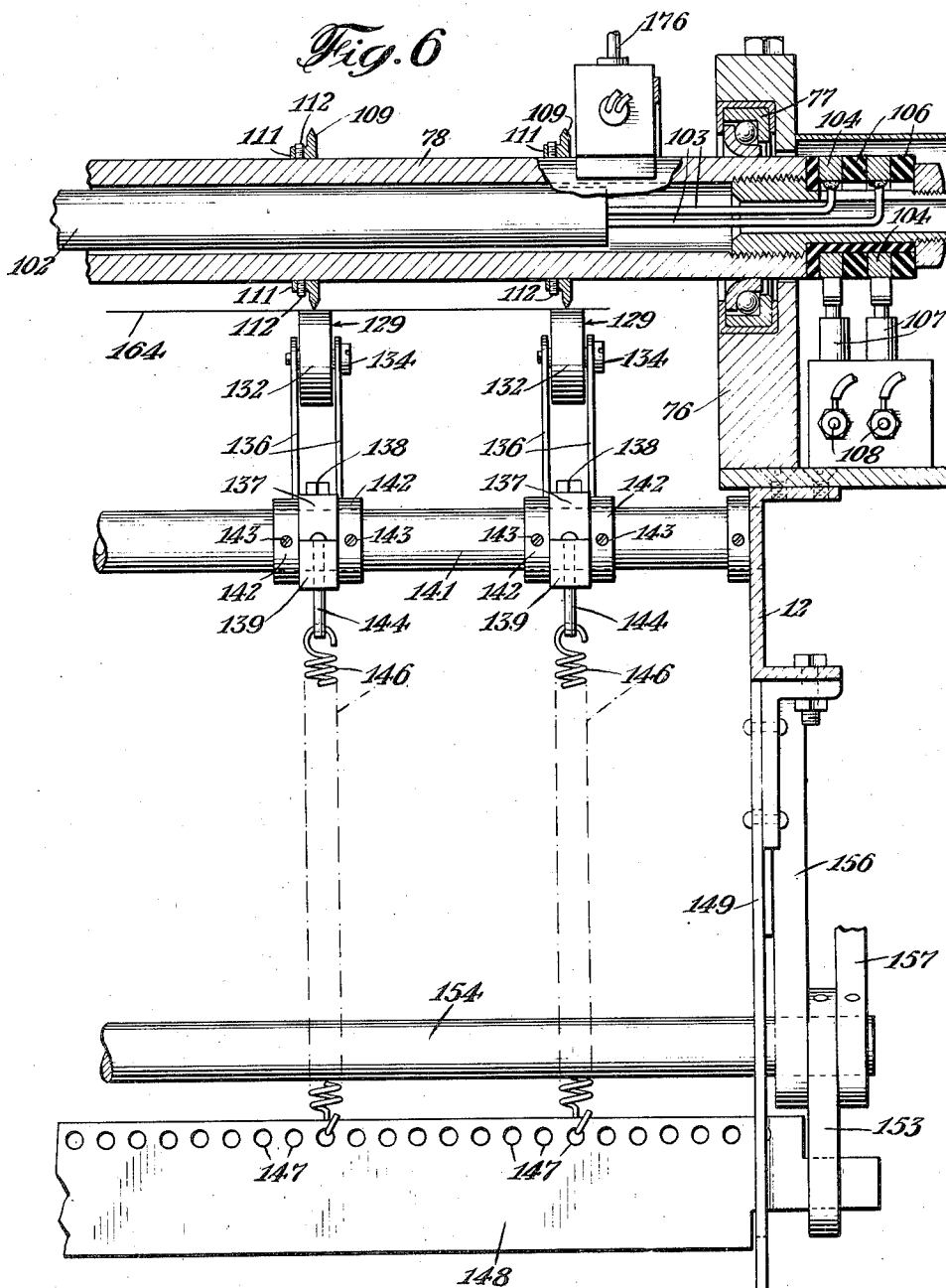
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RIBBON FORMING MACHINE

Filed Dec. 20, 1940

7 Sheets-Sheet 6



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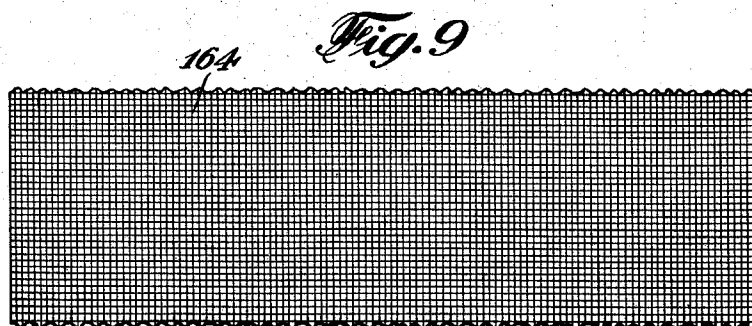
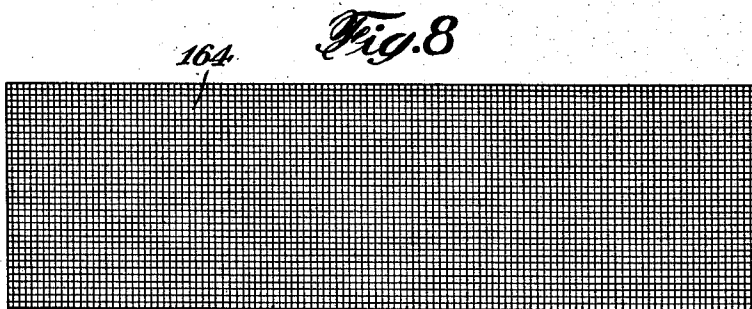
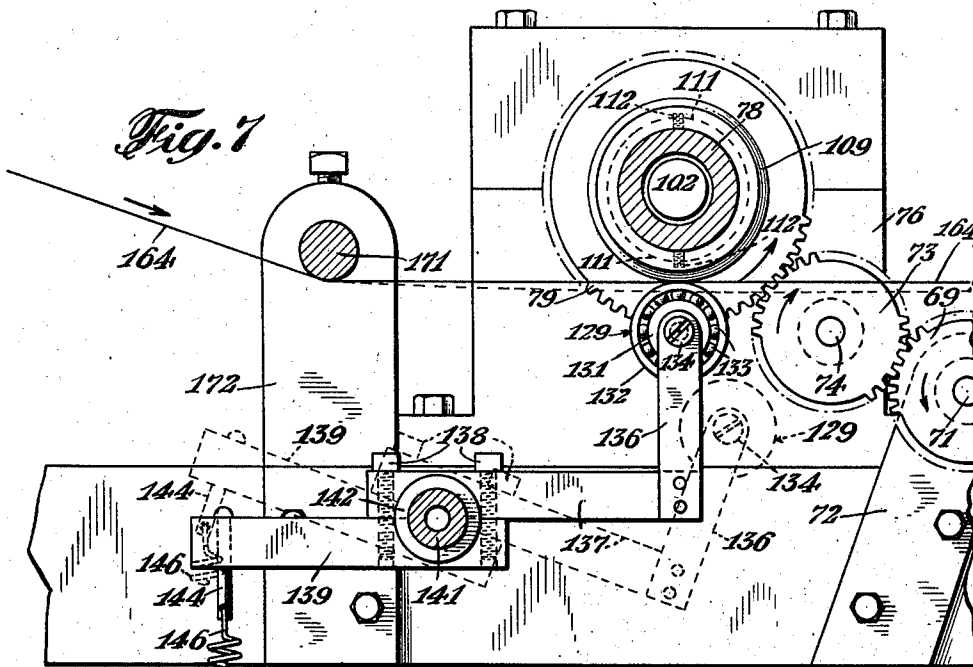
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RIBBON FORMING MACHINE

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7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE

2,251,282

RIBBON FORMING MACHINE

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Application December 20, 1940, Serial No. 370,928

12 Claims. (Cl. 164—65)

This invention relates generally to a ribbon cutting machine, and more particularly to a machine for forming, cutting or severing a plurality of substantially continuous strips or ribbons of relatively narrow width from a fabric web of substantial width containing or composed at least in part of a liquifiable material such as organic or thermoplastic derivatives of cellulose.

In the forming of ribbons of relatively narrow widths, as for example, in the neighborhood of one-half inch more or less, it has been found most economical to weave a web of substantial width and thereafter slit, cut or sever the web into the narrow ribbons or strips of the desired widths. Obviously, where ordinary woven or knitted fabrics made of fibers of materials such as cotton, wool or silk are cut by ordinary means such as by a knife or shearing means, the cut edges are susceptible to fraying or ravelling. This fraying or ravelling of the cut edges of the ribbons or strips can be eliminated by hemming the edges of the strips after being cut, but such a method has the decided disadvantage of adding to the thickness of the strips at the edges which is very undesirable and also increasing the cost of the finished ribbons to an exorbitant amount. However, fabrics composed at least in part of fibers of organic or thermoplastic derivatives of cellulose have been developed to a large extent in recent years, and it has been found that the edges of strips or ribbons formed at least in part from a web of such material may be prevented from ravelling or fraying by sealing or welding the ends of the yarns in such strips together. The preferred method of forming such ribbons is to cut the ribbons from a web of substantial width and simultaneously seal the edges of the ribbons by the employment of a severing means such as a hot knife moved relative to the fabric or by perforating the web with heated needles. The heated severing elements, in addition to cutting the fibers, melts or partially melts the ends of the cut fibers in the fabric of organic derivatives of cellulose and/or those fibers of such material lying parallel or near the cut edge so that when the edge of the cut strip subsequently cools, the melted or partially melted fibers fuse or are welded together with the unmelted fibers to form a sealed edge. In the heated knife method of cutting the fabric, the fabric is drawn against the knives and obviously has a tendency to pucker or wrinkle before the knives, which may result, among other things, in causing the edges of the strips to be uneven. The heated needle method has the disadvantage of not sever-

ing the fabric in an even manner and leaves the edge thereof somewhat jagged or ragged.

In view of the above, it is one of the primary objects of the present invention to provide an improved machine for forming ribbons of narrow widths from a full-width fabric containing at least in part organic derivatives of cellulose and simultaneously sealing or fusing the edges of the cut ribbons or strips together to prevent fraying or ravelling thereof.

Another object of the invention is to provide a machine wherein the cutting action on the fabric is effected without subjecting the fabric to substantially any distorting or abnormal tension thereat.

Still another object of the invention is to provide a machine of the above type during operation of which the fabric may readily be moved into and out of operative relation with the cutting means.

A still further object of the invention is to provide a machine of the above type wherein the cutting is effected by a rolling action and one wherein there is no drag on the fabric at the cutting point.

Still another object of the invention resides in the provision of means for varying the speed at which the fabric moves relative to the cutting means in order that the latter may operate at the maximum efficiency.

These and other objects of the invention will appear and be more apparent from the following detailed description thereof.

In accordance with the invention the fabric from which the ribbons or strips are to be made is adapted to be held in contact with a set of circular heated cutter discs by individual pressure rollers. The cutter discs in the preferred embodiment of the invention are power driven at such a speed that the peripheries thereof travel at the same speed as the fabric and in the same direction and, accordingly, the cutting action of the fabric is effected by rolling action which neither tends to advance nor retard the fabric as would be the case if there was relative movement between the peripheries of the cutters and the fabric. The fabric is arranged to be brought into cutting relation with the discs by the pressure rollers so that on withdrawal of the pressure roller from operative relation with the cutters, the fabric is also withdrawn from engagement with the cutters. Such an arrangement facilitates the initial threading of the fabric through the machine and also lessens or entirely eliminates the danger of scorching or otherwise

damaging the fabric by the heated cutters should the movement of the fabric through the machine be stopped for any reason.

A more thorough and complete understanding of the invention may be had from the following detailed description thereof when taken in conjunction with the accompanying drawings, in the latter of which:

Fig. 1 is a plan view of the machine embodying the invention and shows the manner in which the same operates upon a fabric to form a plurality of ribbons;

Fig. 2 is a left side elevational view of the machine showing the various controls and driving mechanisms;

Fig. 3 is a right side elevational view of the machine;

Fig. 4 is a vertical sectional view taken substantially through the transverse center section of the machine, as indicated by line 4—4 of Fig. 1;

Fig. 5 is a horizontal sectional view taken on line 5—5 of Fig. 2, showing the driving mechanism of the machine;

Fig. 6 is an enlarged sectional view taken on line 6—6 of Fig. 2, showing the cutter discs, pressure rollers and the heating arrangement for the cutter discs;

Fig. 7 is an enlarged sectional view taken on line 7—7 of Fig. 1, showing the path of the fabric and the relation thereof to the operated and non-operated positions of the pressure rollers;

Fig. 8 is a face view of a section of ribbon as cut by the machine; and

Fig. 9 is a face view of a section of ribbon as cut by the electric needle method.

Referring first to Figs. 1, 2 and 3, the frame structure of the machine includes four vertical post members 11, one at each corner, which may be of channel construction with upper and lower channel members or side rails 12 and 13 respectively extending between the posts 11 on each side of the machine. The frame structure also includes horizontal members such as 14 extending between the sides and serves to connect the two sides of the machine together. The above described elements or members 11, 12, 13 and 14 comprise the main structural elements of the machine from which the various operating elements are supported. It will be obvious that the structural members of the machine could be readily made from castings instead of being built up of individual members.

The power for running the machine is derived from an electric motor M of suitable size, secured to a base 16 which is supported on transverse members 17 attached to the sections 13 of the frame structure. The shaft 18 of the motor M has secured thereto for rotation therewith a pulley 19 over which passes a belt 21 connecting the pulley 19 with a second pulley 22. The pulley 22 is fixed for rotation therewith to a shaft 23 journaled in bearings such as 24 which are supported from the motor mounting base 16.

The motor M in the preferred embodiment of the invention is of the constant speed type and the operating speed of the machine is varied by the employment of a Reeves variable speed driving mechanism which operates to change the effective diameter of the pulley 19 on the motor shaft 18. A hand wheel 26, Fig. 5, associated with the motor base 16 is effective to move the motor toward and away from the shaft 23. The pulley 19 consists of an assembly of two facing cone-shaped discs, one stationary and the other movable axially of the motor shaft 19, and a

compression spring (not shown) tending to force the movable disc toward the stationary disc. When the hand wheel 26 is turned so as to bring the motor M nearer the shaft 23, the Reeves belt 21 is at the largest arc of contact with the discs, running over their whole diameter, and maximum speed of the jack shaft 23 is attained. By turning the hand wheel 26 so as to move the motor M away from the shaft 23, the belt 21 runs over a smaller arc of contact between the discs forming the pulley 19, the sliding disc moving out laterally to accommodate the belt and the speed of the jack shaft 23 is reduced until minimum speed is reached with the motor at its greatest distance from the shaft 23. Although the above method of changing the speed of operation of the machine is employed, various other methods such as a variable speed motor could be used to change the speed of the machine.

Freely mounted on the shaft 23 is a double pulley 27 which may be coupled to the shaft 23 by means of a clutch indicated in general by reference numeral 28. The clutch 28 may be of any one of a well known type and is controlled by a link 29. The link 29 is connected to an arm 31, Fig. 2, extending downwardly from adjacent the center of a horizontal longitudinally extending shaft 32. The shaft 32 is journaled adjacent its ends in brackets 33 secured to the posts 11 and has at each end thereof upwardly extending hand levers 34. The hand levers 34 are located at each end of the machine and by the proper operation thereof effect engagement and disengagement of the clutch 28. A pair of belts 36, Figs. 2 to 5, connects the pulley 27 on the shaft 23 to a pulley 37 fixed for rotation therewith to a jack shaft 38. The shaft 38 is journaled in bearings 39 which are attached to structural members 41 and 42, Figs. 2, 3 and 4, attached to the main frame structure. The jack shaft 38 has secured to one end thereof for rotation therewith a double pulley 43 which is connected by belts 44, best shown in Fig. 3, to a pulley 46. The pulley 46 is secured to the end of a shaft 47 which is suitably journaled and supported in arms such as 48 extending upwardly from the longitudinal transverse members 12.

The shaft 47 controls the advancement of the fabric in a manner hereinafter pointed out while a third pulley 49 on the jack shaft 38 through a belt 51 drives a pulley 52. The pulley 52 is loosely mounted on a shaft 53 supported in a bearing bracket 54, Fig. 1, and tends to rotate the shaft 53 therewith through a friction clutch indicated in general by reference numeral 56 comprising a friction element 57, a compression spring 58 and a collar 59. The inner end of the shaft 53 has a recessed section 61 adapted to receive and drive the square-ended takeup reel shaft 62. The opposite end of the takeup reel shaft 62 is supported in the recessed end of a member 63 attached to a short shaft 64 supported in a bracket 66. The bracket 66 is secured to the longitudinal side rail 12 and has a clamping screw 67 which is adapted to clamp the shaft 64 in position. By unscrewing the clamping screw 67, the short shaft 64 may be moved into and out of engagement with the end of the shaft 62 of the takeup spool which facilitates removal and installation of the takeup spools in the machine.

The shaft 47, hereinbefore mentioned, which controls the advancement of the fabric through the machine has an enlarged section 47', best shown in Fig. 4, adjacent the center thereof which extends substantially the full width of the

machine. Fixed to the shaft 47 for rotation therewith is a spur gear 68 which meshes with an idler gear 69 pivotally supported on a stud 71 adjacent the upper end of an arm 72 extending from one of the side rails 12. The idler gear 69 also meshes with a second idler gear 73 pivotally mounted on a stud 74 extending horizontally from the lower half of a bearing block 76. There is a bearing block 76 secured to the upper side of each of the side rails 12, and each supports a roller bearing 77, Fig. 6. Journaled in the roller bearings 77 is a so-called cutter shaft 78 which extends between the two sides of the machine and rotatable therewith is a driving gear 79, Figs. 1 and 4, meshing with the above mentioned idler gear 73. Thus, through the above described gear train comprising gears 68, 69, 73 and 79, the cutter shaft 78 is rotated from the shaft 47.

Also attached to the shaft 47 to rotate therewith is a second gear 81, Figs. 1 and 2, adapted to mesh with a gear 82 located thereabove. The gear 82 is fixed to a shaft 83 which is journaled adjacent its ends in blocks such as 84. The arms such as 48 in which the shaft 47 is journaled have slots 86 extending downwardly from the upper ends thereof to a point adjacent the shaft 47. The blocks 84 in which the shaft 83 is journaled have grooves therein and are adapted, by means of the grooves, to slide in the slots 86. A second set of blocks 87 located above the blocks 84 are adapted to slide in the slots 86 and journaled therein is a shaft 88. The shaft 88 has a gear 89 thereon which meshes with the gear 82 on the shaft 83 and is driven therefrom. The shaft 83 has for substantially the entire distance between the arms 48 a covering of resilient material 91 which may be of rubber or similar material. The section of the shaft 88 extending between the arms 48 is of greater diameter than the sections in the blocks 87 and is hereinafter referred to by reference numeral 88'. The manner in which the fabric is threaded and adapted to engage the sections 47' and 88' of the shafts 47 and 88, respectively, together with the resilient material 91 will be pointed out hereinafter.

Secured to the upper ends of the arms 48 by screws such as 98 are strips 93, one associated with each of the arms 48. The left hand ends of the strips 93, as shown in Figs. 2 and 4, have extending therefrom studs 94 upon which are pivoted the left hand ends of levers such as 96. Pivotally supported on the right hand ends of the strips 93 and extending from one side of the machine to the other is a rod 97 which has cams 98 fixed thereon located beneath the right hand ends of the levers 96. The rod 97 also has fixed thereto a hand lever 99 which, by movement thereof, rotates the rod 97 to bring the hump sections of the cams 98 into and out of operative association with the levers 96. Each of the levers 96 has pivotally attached adjacent the centers thereof depending links 101, the lower ends of which are pivotally secured to the blocks 84. Accordingly, by proper manipulation of the hand lever 99 the levers 96 can be raised which, through the links 101, elevates the blocks 84 carrying the shaft 83. The separation of the resilient element 91 on the shaft 83 from the section 47' of the shaft 47 facilitates the threading or the initial passage of the fabric between the said shafts.

The hereinbefore mentioned cutter shaft 78 journaled on the roller bearing 77 is hollow, as best shown in the enlarged sectional view there-

of in Fig. 6, and located within the hollow cutter shaft 78 are heating units such as 102. In the preferred embodiment of the invention the heating units 102 are of the electrical resistance type and have conductors such as 103 connecting the same to slip rings 104 at either end thereof. The slip rings 104 are insulatively supported in insulating material 106, such as Bakelite, and arranged to contact the outer peripheries of the slip rings are brushes 107. The brushes 107 have potentials applied thereto through the terminals 108 and serve to convey the potential from the terminals through the slip rings 104 to the heating elements 102. In the preferred embodiment of the invention the heating elements 102 are divided in order to reduce the current required to heat the cutter shaft and, accordingly, each end of the cutter shaft has slip rings 104 and associated brushes 107, each end of the cutter shaft being arranged as shown in Fig. 6.

Spaced along the cutter shaft 78 are a series of so-called cutter discs 109, each of which has flanges 111 formed integrally therewith. Extending through the flanges 111 are set screws such as 112 which serve to clamp the cutter discs 109 in the desired locations along the cutter shaft 78, it being obvious from such an arrangement that the locations of the cutter discs along the shaft 78 are readily changeable. The manner in which the fabric to be cut is brought into cutting association with the cutter discs 109 will be pointed out in the following paragraphs.

Located adjacent the upper sides of the left hand ends of the side rails 12 are brackets 113 and 114, Figs. 1, 2 and 4. The bracket 113 has a flanged section 116 through which extends a short shaft 117, the inner end of which is recessed and adapted to receive one of the ends of the shaft 118 of the supply spool or reel. A clamping screw 119 in the flanged section of the bracket 113 clamps the shaft 117 in position to prevent the shaft from moving longitudinally thereof. By unloosening the clamping screw 119 the shaft 117 may be moved outwardly to permit the removal of an empty supply spool and the installation of a new roll of fabric. The bracket member 114 at the opposite end of the supply spool shaft 118 pivotally supports a shaft 121 which has on the inner end thereof a recessed hub 122 adapted to receive the squared end 123 of the supply spool shaft 118. Accordingly, as the fabric is unwound from the shaft 118 the shaft 121 rotates. Fixed on the shaft 121 for rotation therewith is a pulley 124 which cooperates with a braking element 126, such as a leather strap, to create a drag on the shaft 121 and prevent excess unwinding of the fabric from the supply spool shaft 118. One end of the leather strap 126 is anchored to a stud 127 extending from the bracket 114, while attached to the other end of the strap is a weight carrying element 128. By varying the weight on the element 128, the amount of drag on a supply reel shaft 118 may be varied and, accordingly, the pull required to unwind fabric from the shaft 118 can be varied to insure that the fabric is at the proper tautness as it unwinds from the supply spool.

The apparatus for bringing the fabric into and out of cutting engagement with the cutter discs 109, Figs. 6 and 7, will now be described. This apparatus includes a set of rollers indicated in general by reference numeral 129, one roller being associated with each cutter disc. The rollers may be of the type commonly referred to as

roller bearings comprising an inner race 131 and an outer race 132 separated from the inner race by balls or rollers such as 133. The inner races of the rollers 129 are secured by screws such as 134 to the upper end of arms 136, an arm 136 being on each side of the rollers 129. The lower ends of the arms 136 are secured to the right hand ends of levers 137 and extend upwardly therefrom. The left hand end of the levers 137, as shown in Fig. 7, are secured by bolts 138 to the right hand ends of second levers 139. At the junction points of the levers 137 and 139 a section thereof is removed to form a circular opening so that the levers may be pivotally mounted on a rod 141. Collars such as 142 secured to the rod 141 by set screws 143 space the levers 137 and 139 predeterminedly along the rod 141 while at the same time permitting pivotal movement of the levers. The collars 142 are so adjusted on the rod 141 that the rollers 129 attached thereto are in alignment with the cutter discs 109 on the cutter shaft 78. Secured to the free left hand ends of the levers 139 by means of pins 144 are individual coiled springs 146. The lower ends of the springs 146 are anchored in holes such as 147 of an anchor bar 148 extending from one side of the machine to the other.

Secured to the under sides of the side rails 12 and depending therefrom are plates such as 149 which have formed therein vertical slots 151. The ends of the anchor bar 148 extend through the slots 151 so that the anchor bar is guided in vertical movement in a manner hereinafter pointed out. The extreme ends of the anchor bar 148 are substantially smaller than the center and extend through elongated slots such as 152 in the free ends, as shown in Fig. 2, of arms 153. The arms 153 are secured to a rod 154 pivotally mounted in the lower ends of projections 156 extending from the under sides of the side rails 12. Also attached to one end of the shaft 154, as shown in Fig. 2, and extending to the right therefrom is an operating lever 157. The right hand end of the operating lever 157 has a handle 158 extending therefrom to facilitate the operation of the lever as pointed out hereinafter.

A spring member 159 which may be a leaf spring is secured to the operating lever 157 and has at the free end thereof a pin 161 extending through a hole in the lever 157. The spring member 159 normally tends to keep the pin 161 extending through the hole in the lever 157 so that the pin extends an appreciable amount beyond the inner side of the lever 157. By withdrawing the pin 161 and moving the handle 158 of operating lever 157 from a position such as that shown by the full outline thereof in Fig. 2 to a position such as that shown by the dotted outline, and thereupon releasing the pin 161, the pin is effective to engage the under side of a projection 162 to hold the lever 157 in its down position. A hole (not shown) is also formed in the projection 162 which is adapted to cooperate with the pin 161 in the position of the lever 157 shown by the full outline thereof so that the operating lever 157 may be locked in this position. The arms 153 move up and down on movement of the operating lever 157 and by means of the slots 152 engaging the smaller ends of the anchor bar 148 move the latter up and down in the slots 151.

The length of the springs 146 are such that with the operating lever 157 in its down position as shown by the dashed outline thereof and the anchor bar moved to its upper position, substantially all tension is removed from the springs and

the springs permit the levers 137 and 139 to pivot to a position such as that shown in the dashed outline thereof in Fig. 7. With the levers 137 and 139 in such positions, the rollers 129 are removed from operative engagement with associated cutter discs 109 which facilitates threading of the fabric between the rollers and the cutter discs. By moving the operating lever 157, Fig. 2, to its upper position, the anchor bar 148 is moved in a downward direction to enable the springs 146 to pivot the levers 137 and 139 a sufficient amount to bring the rollers 129 into engagement with the discs 109. The movement of the anchor bar 148 is sufficient to stretch the springs 146 an appreciable amount after the rollers 129 engage the cutter discs 109 so that the rollers are resiliently held in engagement with the discs. Thus, by the proper manipulation of the operating lever 157, the rollers 129 are moved into and out of operative engagement with the cutter discs 109 and with the fabric passing between the rollers and the cutter discs and moving with the rollers, it also is moved into and out of engagement with the cutter discs.

As pointed out in more detail in following paragraphs, the fabric is so guided that when contacting the cutter discs 109 it is bowed a slight amount by the rollers 129 and hence on withdrawal of the rollers from engagement with the cutter discs 109, the fabric moves therewith for at least a part of the movement of the rollers. The amount of bowing in the fabric by the rollers 129 is slight and accordingly the tension in the fabric has substantially no effect in tending to withdraw the rollers from engagement with the cutter discs 109 in comparison to the force exerted by the springs 146 in holding the rollers in engagement with the cutter discs when the lever 157 is in its raised operating position. The cutter discs 109 are power driven at such a rate that the peripheral speed thereof is substantially the same as the rate of advancement of the fabric and in the same direction. Thus when the rollers 129 bring the fabric into engagement with the cutter discs 109, there is for all practical purposes no tendency of the cutter discs and rollers to increase or retard the rate of movement of the fabric. Accordingly, the cutting of the fabric, which is a rolling cutting action, does not have any tendency to wrinkle or distort the fabric, even the small force required to rotate the substantially frictionless rollers being derived entirely or almost entirely from engagement thereof with the rotating cutter discs.

By the employment of individual springs such as 146 to hold each roller 129 in engagement with an associated cutter discs 109, sufficient pressure is assured between each cutter disc and its associated roller to perform the cutting action. Such an arrangement is much more satisfactory than if the rollers 129 were all on a common pivot rod or shaft as proper engagement between each cutter disc and its associated roller if on a shaft common to each of the others would be very difficult to establish and practically impossible to maintain for any length of time.

In the operation of the machine the roll of fabric which is to be cut is placed in the brackets 113 and 114 with the shaft 118 of the supply spool supported from the shafts 117 and 121, Fig. 1, as pointed out hereinbefore. A spool or roll of fabric is indicated by reference numeral 163, in Figs. 1 to 4, with the fabric 164 arranged to unwind from the upper surface of the roll 163. As the fabric 164 leaves the roll 163, as best shown

in Fig. 4, it passes underneath and back over a rod 166 and thence over a second rod 167. The rod 166 is supported in arms such as 168 extending upwardly from the side rails 12 while the rod 167 is supported by links 169 adjustably secured to the rod 166. The angle at which the links 169 are set relative to the arms 168 may be varied so that the path of the fabric 164 may be varied within predetermined limits. The fabric in leaving the rod 167 next passes underneath a rod 171 supported in arms 172. The purpose of the rods 166, 167 and 171 is to control the movement of the fabric so that it feeds evenly and uniformly. Any one or all of the rods may have bends therein so as to tend to smooth any wrinkles out of the fabric prior to the time it encounters the cutting discs 109.

The fabric 164 in leaving the rod 171 next passes between the rollers 129 and the cutter discs 109 and thence between the enlarged section 47' of the shaft 47 and the resilient material 91 on the shaft 33. The shaft 33 may be elevated as hereinbefore described to facilitate the threading of the fabric between it and the shaft 47. The fabric in leaving the section 47' of the shaft 47 is passed between the shaft section 33' and the resilient material 91, substantially halfway around the shaft section 33' and then to the takeup reel 173. The shaft of the takeup reel 62 is frictionally driven through the frictional clutch 56 and winds the fabric up as it advances through the machine.

In the preferred embodiment of the machine the diameters of the shaft sections 47', 33' and the resilient member 91 are all equal, and as they are all power driven at the same speed, the advancement of the fabric is uniform. The peripheral speed of the cutter discs 109 relative to the speed of advancement of the fabric is such that the cutter discs do not tend to advance the fabric or retard the same. Hence there is no tendency to pucker the fabric at the cutter discs 109 and the cutting action is a rolling action.

After the fabric has been properly threaded through the machine, which may be accomplished by a "leader" as is the usual practice in such types of machines, the hand lever 34 is operated to begin the advancement of the fabric and soon after the operating lever 157 is operated to move the rollers 129 and the fabric 164 located thereabove into contact with the heated cutter discs 109. On the engagement of the fabric 164 with the heated cutter discs 109 by the pressure exerted on the underside of the fabric by the roller 129, the heated rollers melt or partially melt the liquifiable material such as the organic derivatives of cellulose in the fabric that come into engagement with the heated cutter so that the fabric is severed thereat. The cut strips of the fabric in leaving the cutter discs 109, with the edges thereof somewhat plastic, fuse or weld together so as to form strips, the edges of which will not fray or ravel. In fabrics composed of material not entirely made up of organic derivatives of cellulose, the cutting of the fibers is effected by the cutter discs 109 while the melted cellulose fibers fuse with these other fibers to form a sealed edge.

It will be apparent that for operation of the machine wherein the fabric moves at a relatively high rate, the cutter discs have to be raised to a comparatively high temperature in order that the cellulose fibers be properly melted. The discs may be at a temperature considerably above the scorching temperature of the fabric, in the neighborhood of 350° F., and the fabric advanced at a rate of approximately fifteen yards per minute.

It is also apparent that with fabrics of different weights and with the cutter discs at a given temperature, the advancement of the fabric past the cutters for best operation of the machine should be variable. The change in speed of the fabric is accomplished by proper manipulation of the hand wheel 26 associated with the motor M in the manner pointed out in the preceding paragraphs.

In the preferred embodiment of the invention a heat indicating unit 174 which may include a dial 176 is arranged to contact the cutter shaft 78, Fig. 6, so that the temperature of the cutter discs may be determined. The proper temperature of the cutters for best operation is determined from experience and depends upon, among other variables, the weight of the cloth and the rate of advancement thereof. The heat indicating unit 174 may be of the type that when a given temperature of the cutter shaft is reached, the circuit to the heating elements 102 is interrupted and when the temperature of the cutter shaft drops to a given temperature, the circuit to the heating elements is restored. Such arrangements are well known in the art and may be of the type employed in the common flatiron.

The edges of the cutter discs 109 may be relatively sharp so that the severing of the fabric may be accomplished in part by rolling cutting action of the cutter discs on the rollers 129 as would be the case when fibers composed of other than organic derivatives of cellulose are included in the fabric. The cutter discs 109 have very little surface in contact with the rollers 129 and hence the transfer of heat to the rollers 129 from the cutter discs is very slight and the rollers have little chilling effect upon the cutter discs. Hence the rollers 129 are maintained at a low temperature and have little or no tendency to heat the fabric.

By spacing the cutter discs 109 at various points along the cutter shaft 78 and by making similar adjustments of the spacings of the rollers 129 along the rod 141, ribbons of various widths can readily be formed from a web. Such an arrangement has a decided advantage over prior art machines wherein considerable difficulty was encountered when it was desired to change the width of the ribbons being formed. When a ribbon is cut by means of the cutter discs 109 operating in conjunction with rollers 129, it will be noted, as shown in Fig. 8, that the edges of the ribbon are even and uniform whereas in Fig. 9, showing a section of ribbon cut by prior art devices, such as by the electric needle method, the edges are inherently uneven.

It will be apparent that in operation of the machine it may at times become necessary to stop the advancement of the fabric for any one of a number of reasons and if the machine is stopped with fabric in contact with the heated cutter discs 109, scorching and other damage to the fabric is likely to result. Accordingly, by operating the lever 157, the fabric 164 may be withdrawn from engagement with the heated cutter discs. Also, it may be advantageous to move the fabric from out of engagement with the cutter discs 109 just before the end of the fabric encounters the cutter discs so that the ends of the several ribbons are all together, and the handling of the takeup reel 173 with the several rolls of ribbon thereon is less troublesome.

It will be obvious, of course, that various modifications of the invention other than those de-

scribed and shown in the drawings may be made without departing from the spirit or essential attributes thereof, and it is desired, therefore, that only such limitations be placed thereon as are imposed by the prior art or are specifically set forth in the appended claims.

What is claimed is:

1. In a device for severing sheet or web material composed at least in part of thermoplastics, a plurality of rotatable circular cutting elements normally out of cutting relation with said material, means for heating said cutting elements, means for advancing the material to be severed relative to the axis of rotation of said cutting elements, means for rotating said cutting elements with the peripheral speeds thereof in fixed relation to the rate of advancement of said material, a set of individual resilient members, a control means movable from a normal to an operated position and including said individual resilient members for moving said material into engagement with said heated cutting elements to be severed thereat, and means operative by said material advancing means on the movement of said control means from an operating to a normal position to withdraw said material from engagement with said cutting elements.

2. In a device for forming a plurality of strips or ribbons from a web or sheet of fabric material containing yarns, threads or filaments of organic derivatives of cellulose, a set of heated circular knife-edged cutting discs, means for rotating said cutting discs, a set of individually operable pressure rollers one for each of said cutting discs, individual resilient means for operating said pressure rollers to hold said material in engagement with said cutting discs, means for advancing said material relative to said pressure rollers and said cutting discs, and means including said cutting discs and pressure rollers for severing said material as the same is moved relative to said cutting discs and pressure rollers by said advancing means.

3. In a device for forming a plurality of strips or ribbons from a web or sheet of fabric material containing yarns, threads or filaments of organic derivatives of cellulose, a set of heated circular knife-edged cutting discs, means for rotating said cutting discs, a set of individually operable pressure rollers one for each of said cutting discs, individual resilient means for operating said pressure rollers to hold said material in engagement with said cutting discs, means for advancing said material relative to said pressure rollers and said cutting discs, means including said cutting discs and pressure rollers for severing said material as the same is moved relative to said cutting discs and pressure rollers by said advancing means, and means for advancing said material at such a rate relative to the peripheral speed of said cutting discs that said cutting discs and pressure rollers have substantially no effect on the advancement of said material.

4. In a device for forming a plurality of strips or ribbons from web or sheet material containing at least in part yarns, threads or filaments of thermoplastics or organic derivatives of cellulose, a plurality of heated circular knife-edged cutting elements, means for moving said material in a direction substantially perpendicular to the rotative axis of said cutting elements, resilient means, a set of pressure rollers one individual to each of said cutting discs operated by said resilient means for pressing said material into knife-

edge engagement with said cutting discs, and means including said heated cutting discs and said pressure rollers for severing said material as the same is moved relative thereto by said material moving means.

5. In a device for forming a plurality of strips or ribbons from web or sheet material containing at least in part yarns, threads or filaments of thermoplastics or organic derivatives of cellulose, a plurality of heated circular knife-edged cutting elements, means for moving said material in a direction substantially perpendicular to the rotative axis of said cutting elements, a set of pressure rollers one individual to each of said cutting discs for pressing said material into knife-edge engagement with said cutting discs, means independent of said material for driving said cutting discs and pressure rollers, means including said heated cutting discs and said pressure rollers for severing said material by a rolling severing action as the same is moved relative thereto by said material moving means and means for advancing said material at such a rate relative to the direction and peripheral speed of said cutting discs that said rotating cutting discs have substantially no effect on the advancement of said material.

6. In a device for forming a plurality of strips or ribbons from web or sheet material containing at least in part yarns, threads or filaments of thermoplastics or organic derivatives of cellulose, a plurality of heated knife-edged severing elements, means for moving said material relative to said severing elements and means operative during the advancement of said material by said last mentioned means to bring the same into only knife edge engagement with said severing elements to be severed thereby.

7. In a device for forming a plurality of strips or ribbons from web or sheet material containing at least in part yarns, threads or filaments of thermoplastics or organic derivatives of cellulose, a plurality of heated rotatable circular knife-edged severing discs, means for moving said material relative to said severing discs, individual resiliently operable means associated with each of said severing discs and means including said last mentioned means for holding said material in engagement with only the knife edges of said severing discs to be severed thereby during advancement thereof by said material moving means.

8. In a device for forming a plurality of strips or ribbons from web or sheet material containing at least in part yarns, threads or filaments of thermoplastics or organic derivatives of cellulose, a plurality of heated knife-edged cutting discs, said discs being maintained at a temperature above the scorching temperature of said thermoplastics or organic derivatives of cellulose in said material, resiliently operated means for bringing said material into only knife edge engagement with said cutting discs and advancing the same therepast at such a rate as to prevent scorching of said material by said heated cutting discs, and means including said heated cutting discs upon engagement with said material for severing the same by cutting action of the yarns, threads or filaments in said material of other than thermoplastics or organic derivatives of cellulose if present and by melting and cutting action of said yarns, threads or filaments of thermoplastics or organic derivatives of cellulose in said material.

9. In a device for forming a plurality of strips

or ribbons from web or sheet material containing at least in part yarns, threads or filaments of thermoplastics or organic derivatives of cellulose, a plurality of heated knife-edged cutting discs, said discs being maintained at a temperature above the scorching temperature of said thermoplastics or organic derivatives of cellulose in said material, an independently pivotable member associated with each of said cutting discs, means including said members for bringing said material into only knife edge engagement with said cutting discs and advancing the same therepast at such a rate as to prevent scorching of said material by said heated cutting discs, and means including said heated cutting discs upon engagement with said material for severing the same by cutting action of the yarns, threads or filaments in said material of other than thermoplastics or organic derivatives of cellulose if present and by melting and cutting action of said yarns, threads or filaments of thermoplastics or organic derivatives of cellulose in said material.

10. In a device for severing a web of substantial width composed at least in part of thermoplastic material into a plurality of ribbons or strips of narrow width, a set of circular rotatable knife-edged cutting discs adjustably arranged along a common axis, means for heating said cutting discs, individual pressure rollers one associated with each of said cutting discs carried on individual arms pivotally and adjustably mounted on a common axis substantially parallel to the axes of said cutting discs, individual resilient means for biasing said arms to hold said pressure rollers in engagement with associated cutting discs, means for advancing the web to be severed relative to said pressure rollers and cutting discs and in a direction substantially perpendicular to the axes thereof, means comprising said pressure rollers for holding the web in knife edge engagement with said cutting discs whereby said discs perform a cutting action on said web and liquify the thermoplastic material adjacent the individual edges of the severed strips, and means for rotating said discs at such a speed relative to the rate of advancement of said web that the engagement of said web with said discs is a rolling engagement.

11. In a device for severing a web of substantial width composed at least in part of thermoplastic material into a plurality of ribbons or strips of narrow width, a set of circular rotatable knife-edged cutting discs adjustably arranged along a common axis, means for heating said cutting

discs, individual pressure rollers one associated with each of said cutting discs carried on individual arms pivotally and adjustably mounted on a common axis substantially parallel to the axes of said cutting discs, individual resilient means for biasing said arms to hold said pressure rollers in engagement with associated cutting discs, means for advancing the web to be severed relative to said pressure rollers and cutting discs and in a direction substantially perpendicular to the axes thereof, means comprising said pressure rollers for holding the web in knife edge engagement with said cutting discs whereby said discs perform a cutting action on said web and liquify the thermoplastic material adjacent the individual edges of the severed strips, means for rotating said discs at such a speed relative to the rate of advancement of said web that the engagement of said web with said discs is a rolling engagement, and means including the adjustment of said pressure rollers and cutting discs along their respective axes for severing strips of various widths from said web.

12. In a device for severing a web of substantial width composed at least in part of thermoplastic material into a plurality of ribbons or strips of narrow width, a set of circular rotatable knife-edged cutting discs adjustably arranged along a common axis, means for heating said cutting discs, individual pressure rollers one associated with each of said cutting discs carried on individual arms pivotally and adjustably mounted on a common axis substantially parallel to the axes of said cutting discs, individual resilient means for biasing said arms to hold said pressure rollers in engagement with associated cutting discs, means for advancing the web to be severed relative to said pressure rollers and cutting discs and in a direction substantially perpendicular to the axes thereof, means comprising said pressure rollers for holding the web in knife edge engagement with said cutting discs whereby said discs perform a cutting action on said web and liquify the thermoplastic material adjacent the individual edges of the severed strips, means for rotating said discs at such a speed relative to the rate of advancement of said web that the engagement of said web with said discs is a rolling engagement, and means for pivoting the arms carrying said pressure rollers to move the same and said web out of severing engagement with said cutting discs irrespective of the operation of said web advancing means.

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