Nov. 7, 1950 H. M. COOK 2,528,820

MACHINE AND METHOD FOR PRODUCING BOWS AND POMPONS

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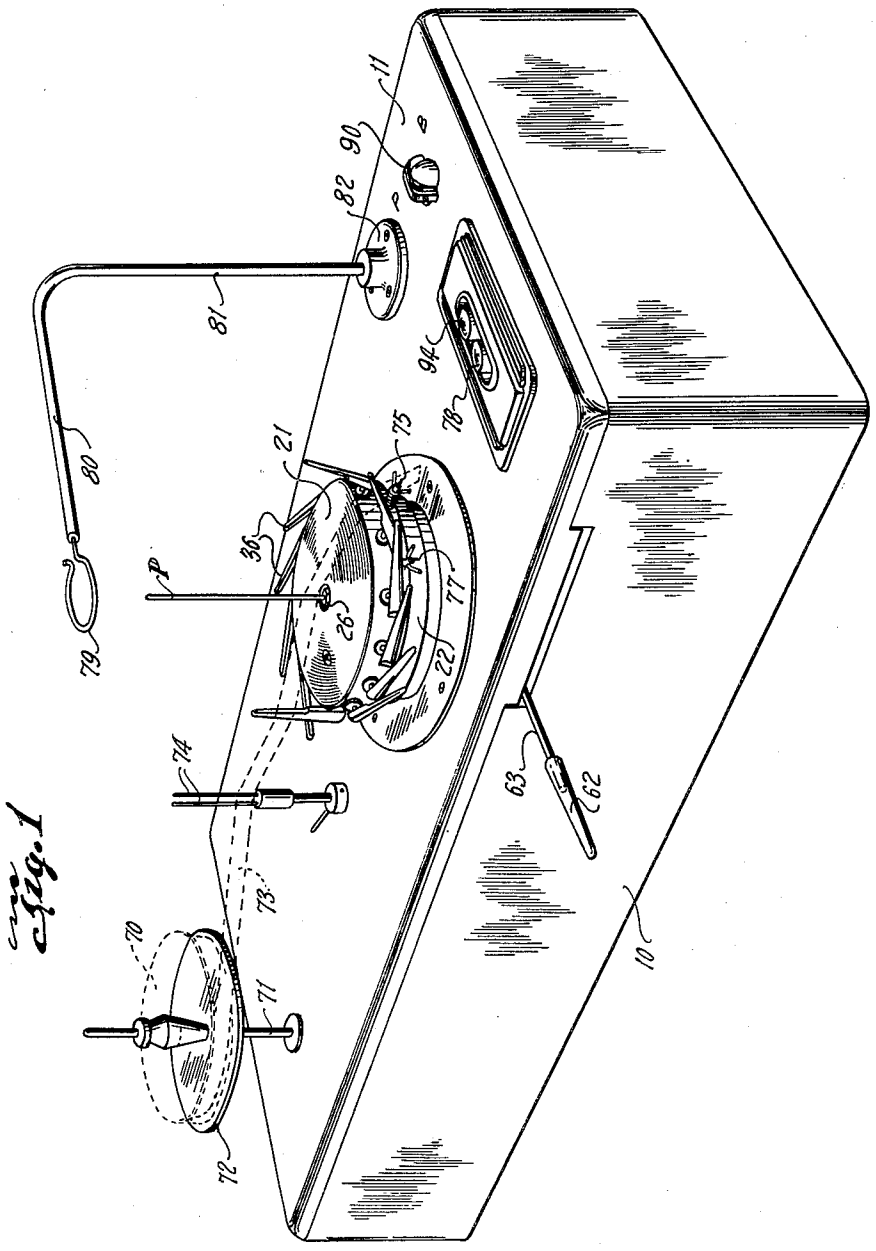


Fig. 1

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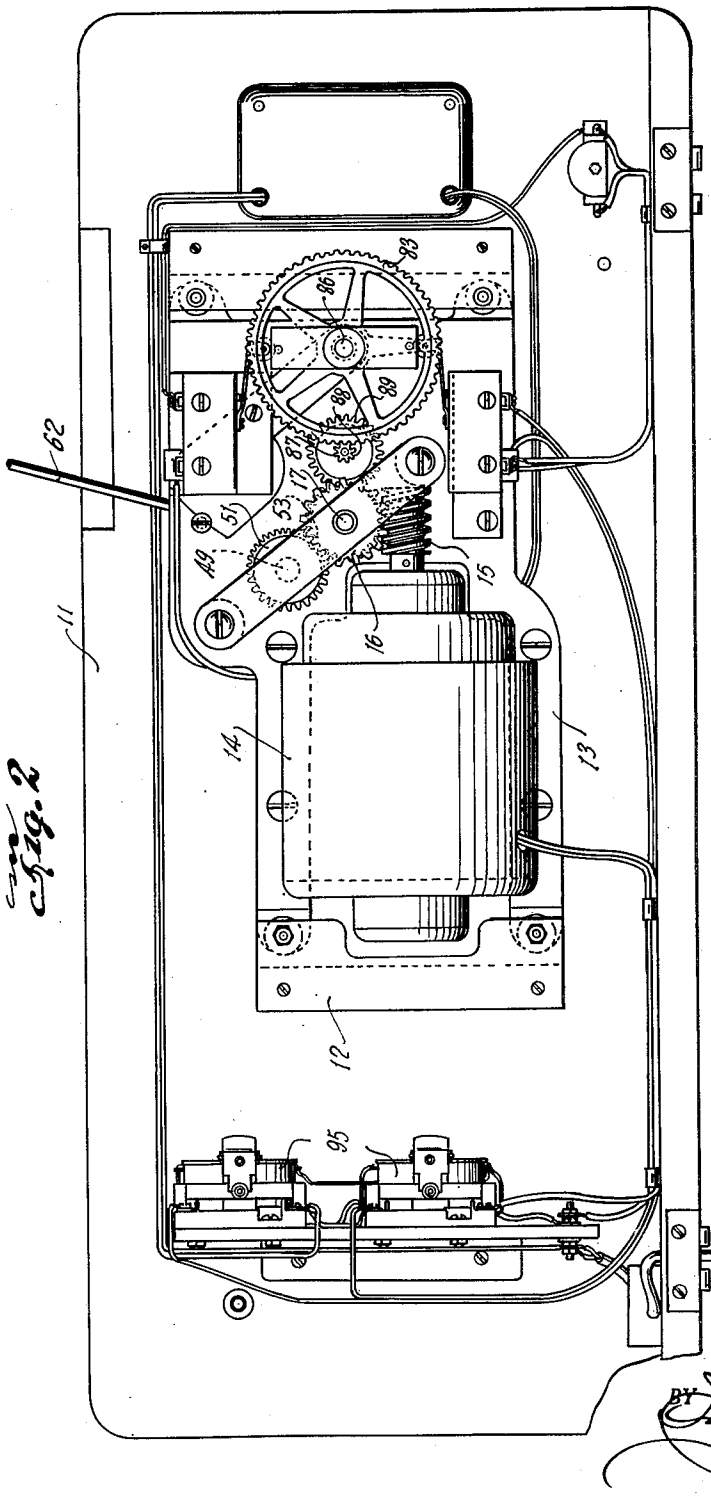


Fig. 2

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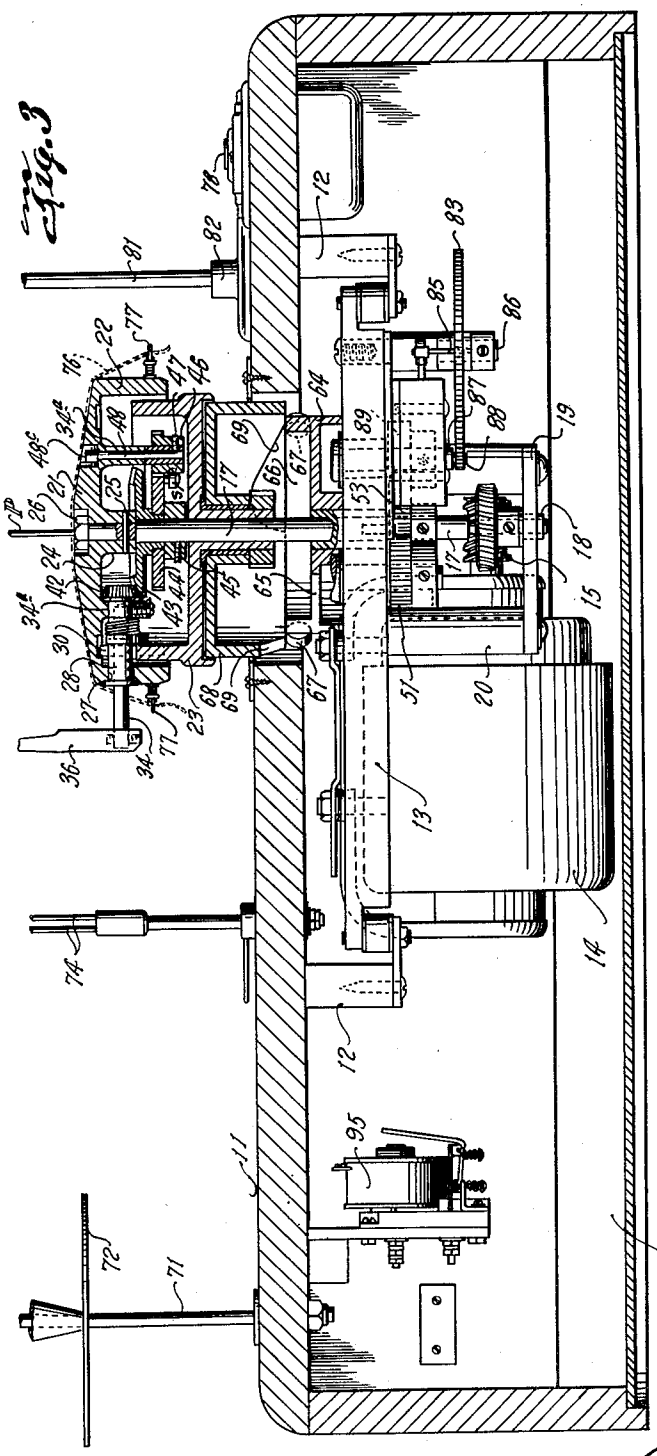


Fig. 3

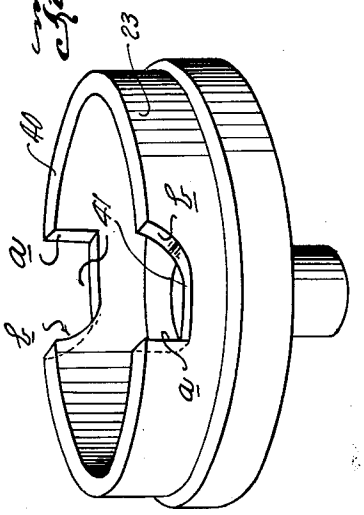


Fig. 3A

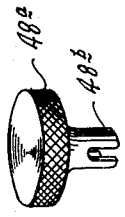


Fig. 3B

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Fig. 4

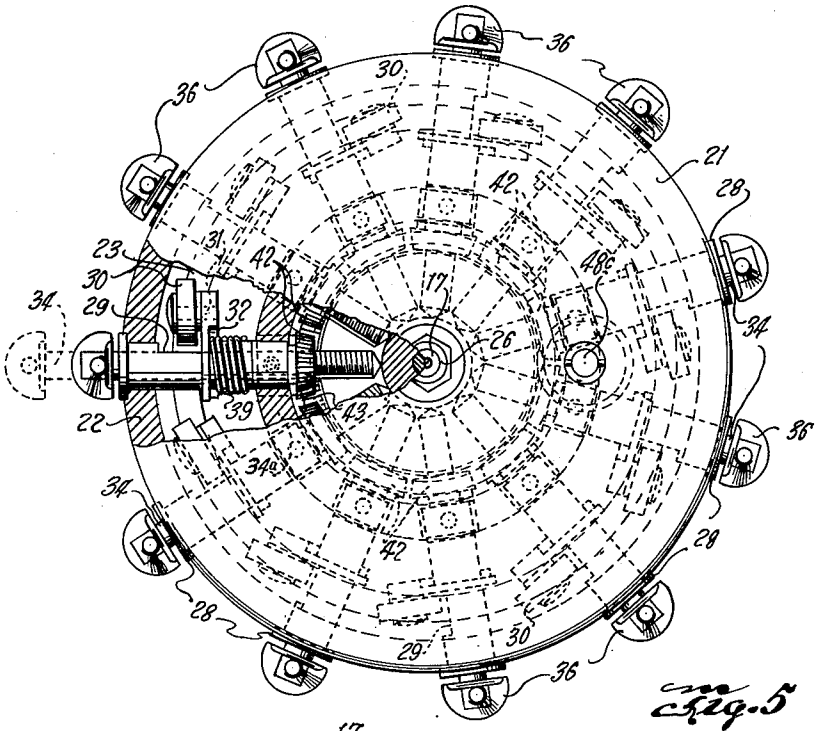
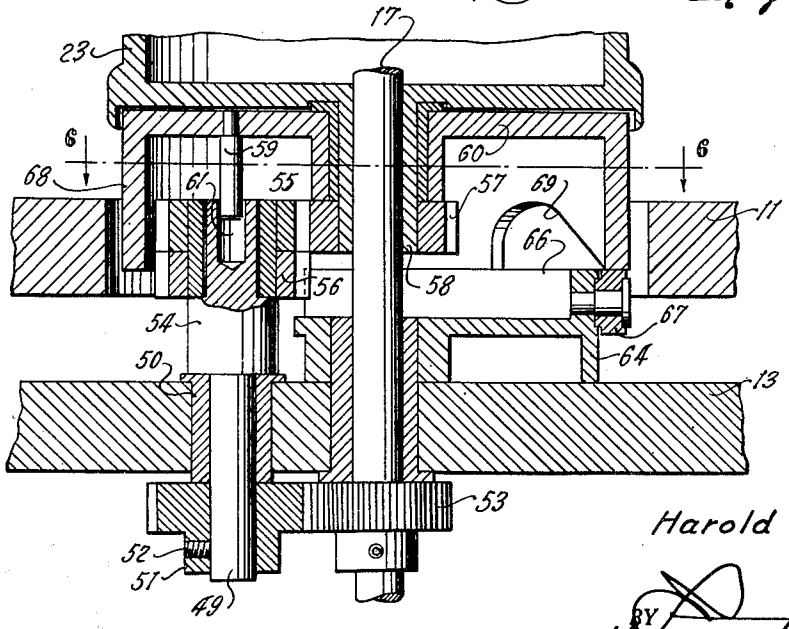


Fig. 5



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Fig. 6

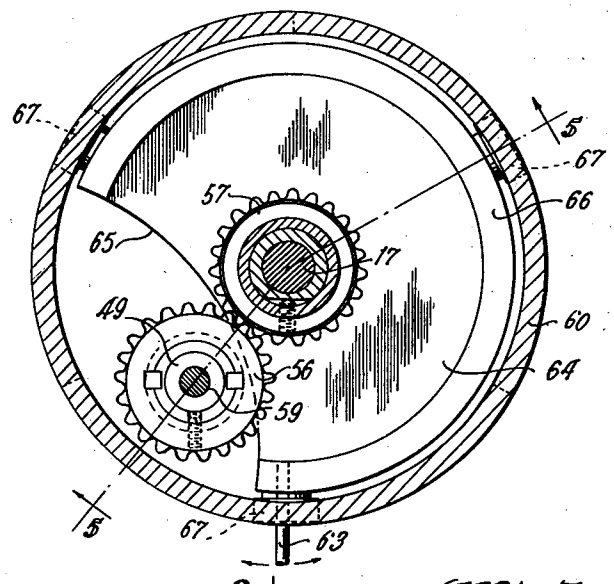


Fig. 7

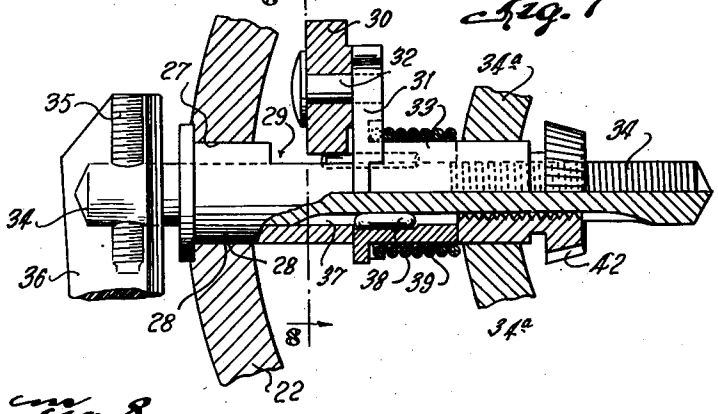
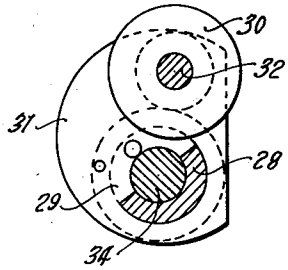


Fig. 8



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Fig. 9

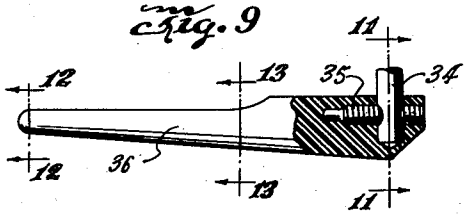


Fig. 11

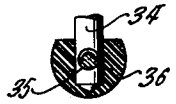


Fig. 12



Fig. 13



Fig. 10

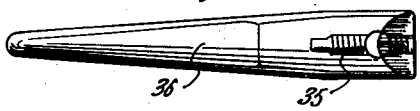


Fig. 14

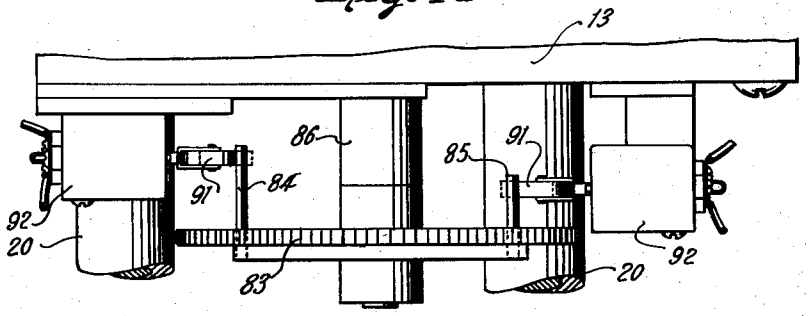
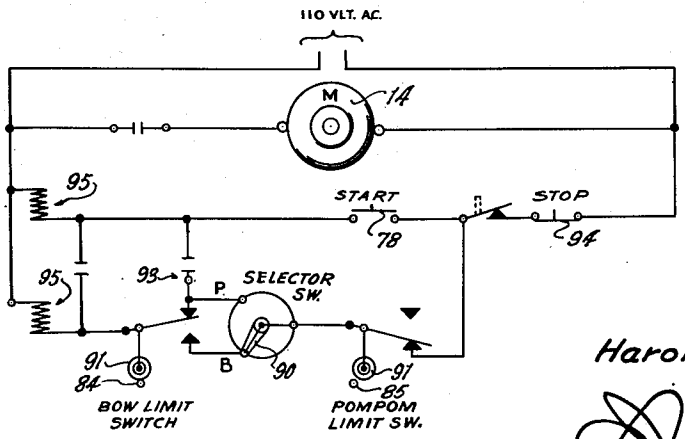


Fig. 15



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MACHINE AND METHOD FOR PRODUCING BOWS AND POMPONS

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Fig. 16

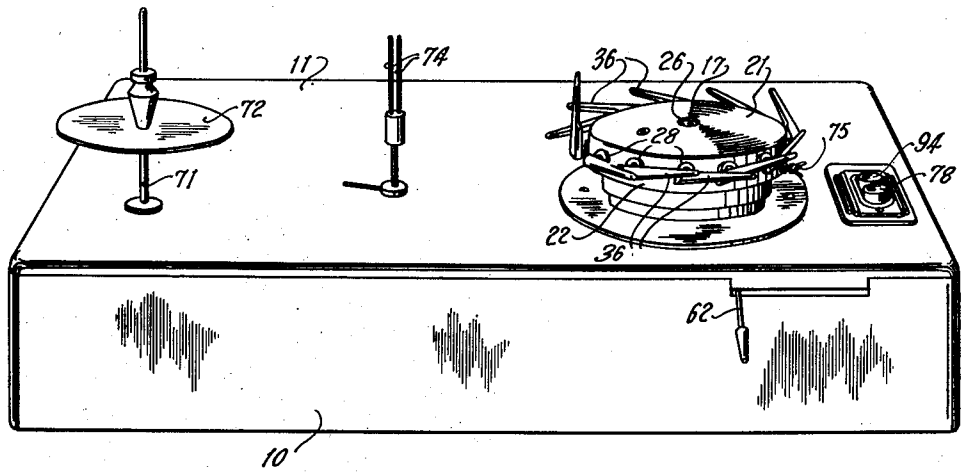


Fig. 17

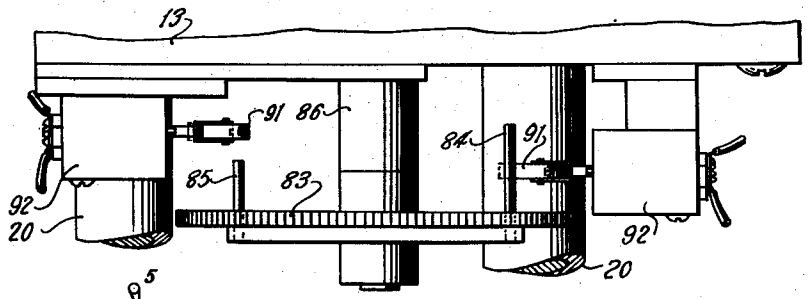
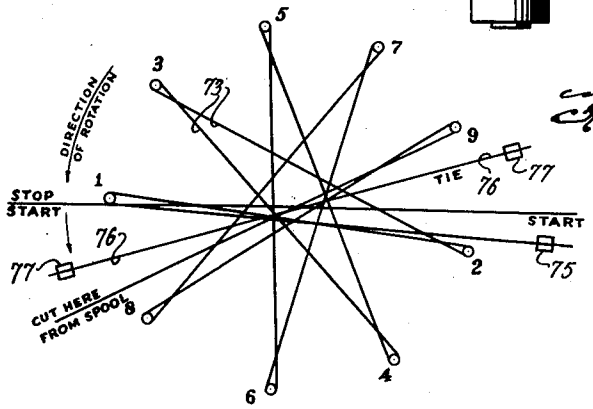


Fig. 18



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UNITED STATES PATENT OFFICE

2,528,820

MACHINE AND METHOD FOR PRODUCING BOWS AND POMPONS

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Application December 9, 1949, Serial No. 132,193

10 Claims. (Cl. 223—46)

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This invention relates to winding and reeling machines and it has particular reference to a machine and method for forming bows, rosettes and pompons from ribbon.

The principal object of the invention is to accomplish automatically the construction of multi-point bows, pompons and the like from ribbon, which have been hitherto formed by hand as aesthetic additions to the ribbon binding of gift packages, but not necessarily limited to such use.

It has long been the custom of department stores and other merchandising establishments to offer as an added service, the wrapping of purchases which requires the special training of persons of artistic talents. Such schooling is costly and time consuming and even the most skilled among the trained wrappers find it difficult to meet the demand for gift wrapped packages during the rush periods of special seasons. Hence the invention anticipates the need of merchants for a medium by which the decorative complement may be automatically produced, in the form of a multi-point bow, rosette or pompon, and these with a high degree of uniformity at a speed much greater than they can be formed manually.

Another object of the invention is to provide a machine consisting of a turntable about the perimeter of which is a series of circumferentially spaced pegs mounted on radial axes and, by virtue of a driving means and cam below the turntable, the latter is actuated to collectively rotate the pegs, during which the latter are selectively moved from a vertical to a substantially horizontal position for a predetermined number of revolutions. A ribbon drawn from a reel, overlying and fastened at one end to the turntable, is engaged by a lone vertical peg which gradually assumes a horizontal position in the direction of rotation, whereupon an opposite second peg is brought suddenly to vertical and ribbon engaging position to also gradually return to near horizontal position. This action is repeated by pairs of opposed pegs successively until the turntable has completed a predetermined number of revolutions, whereupon the pegs are collectively moved to vertical position to enable the bow or pompon, as the case may be, to be tied and released from the pegs in completed form.

Still another object of the invention is to provide a method of producing flat bows and pompons from tape, embodying the steps of holding an end of the tape in relation to a rotating field; in forming bights or loops in the tape and reeling the latter in intercrossing leads diametrically of said field while rotating the field; in interrupting

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rotation of the field; in severing the tape at the perimeter of said field; tying the leads of the tape at their point of intersection and finally in removing the completed article from the field.

Other objects will appear as the description proceeds, taken together with the accompanying drawings, wherein:

Figure 1 is a top perspective view of the invention showing attachments for producing pompons.

Figure 2 is a bottom plan view of the turntable supporting deck.

Figure 3 is a longitudinal sectional view of the complete machine.

Figure 3A is a perspective view of the peg actuating cam per se.

Figure 3B is a detail view of a key used to effect radial adjustment of the pegs.

Figure 4 is a top plan view of the turntable per se, partly broken away.

Figure 5 is a fragmentary view in vertical section, taken on line 5—5 of Figure 6 and showing the peg actuating cam, peg releasing cam ring and certain of the driving elements of the actuating cam and turntable.

Figure 6 is a transverse sectional view, taken on line 6—6 of Figure 5.

Figure 7 is a view in fragmentary section showing a peg shaft, roller, crank and torsion spring for holding the roller in engagement with the actuating cam.

Figure 8 is a sectional view, taken on line 8—8 of Figure 7.

Figure 9 is a detail view of one of the pegs, partly in section.

Figure 10 is a similar view, rotated 90°.

Figure 11 is a transverse sectional view, taken on line 11—11 of Figure 9.

Figure 12 is a sectional view taken on line 12—12 of Figure 9.

Figure 13 is a sectional view taken on line 13—13 of Figure 9.

Figure 14 is a fragmentary elevational view showing cycle limiting gear, pins and switches for the turntable.

Figure 15 is a wiring diagram.

Figure 16 is a top perspective view of the complete machine adapted for forming rosettes or bows.

Figure 17 is a view similar to Figure 14, showing the cycle limiting arrangement adapted for bows and rosettes, and

Figure 18 is a schematic diagram exemplifying the pattern formed by the ribbon as it is caught up by the pegs during rotation of the turntable.

Continuing with a more detailed description of

the drawing, reference is primarily made to Figure 1 wherein numeral 10 denotes a housing of any suitable design having preferably a top or deck 11, hinged along its longitudinal rear edge.

Suspended from the underside of the deck 11 by means of brackets 12 (Fig. 3) is a mounting plate 13 which is adapted to support the driving motor 14 and in this plate also is installed a series of bearings or bushings for the main and counter shafts transmitting driving torque to the turntable and peg actuating cam, which elements will be later identified and described in detail.

By referring to Figures 2 and 3, a worm 15 is shown as being mounted on the armature shaft of the motor 14 which engages and drives a worm gear 16, mounted on the main shaft 17, the lower end of the latter being journaled in a bushing 18 in a bearing plate 19, whose ends are suspended by stubs 20, depending from the mounting plate 13.

The turntable 21 has a slightly convex top and is provided with an annular flange 22 which embraces the upper portion of a peg actuating cam ring 23. A boss 24 (Fig. 3) is formed on the undersurface of the turntable 21 and is axially bored to receive the reduced upper end of the main shaft 17 and to which it is keyed by a transverse pin 25. The upper extremity of the shaft is threaded to receive a nut 26 which secures the turntable against upward displacement.

At points spaced circumferentially about the flange 22 of the turntable are apertures 27 (Fig. 7), in each of which is disposed a flanged bearing 28. The bushing is cut away at 29 to accommodate a roller 30 which latter is rotatably joined to a roller crank 31 by means of a pin 32.

Extending through the bearing 28 and the sleeve 33 of the roller crank 31 is a rod or shaft 34. This shaft is threaded on its inner end and continues through an annular boss 34*a* (Fig. 7), formed on and depending from the undersurface of the turntable, and to the outer end of the shaft is affixed, as by the screw 35 (Figs. 9 to 13) a peg 36. This peg is formed preferably of plastic material, as shown, primarily for the reason that this material will insure a smooth surface not likely to impose friction on the ribbon or tape engaged thereby or become tarnished and therefore soil the ribbon. The pegs are each half round and of diminishing cross-section towards their tips or free ends, which latter are rounded to insure against fouling the ribbon when it is released from the pegs in the manner to be explained in the course of the description of operation to follow presently.

Each of the peg shafts 34 has a longitudinal keyway 37 (Fig. 7) in which reposes a key 38 which holds the sleeve 33 of the roller crank 31 operatively in relation to the shaft. A torsion spring 39 embraces the roller crank sleeve 33 and imposes a downward thrust on the roller 30, holding the same against the face 40 of the cam ring 23 (Fig. 3A). As will be explained in detail later, the cam ring 23 revolves in the same direction as but at a slower speed than the turntable 21 and, as may be seen in Figure 3A, the cam ring is provided with opposed recesses 41, each having an abrupt drop *a* and a gradual rise *b*. The rollers 30 are adapted to fall successively into these recesses as the turntable and cam ring revolve thus to abruptly raise the pegs 36 to vertical position in proper sequence of operation. As the cam ring and turntable continue to revolve, the rollers 30 travel up the inclined sides of the recesses 41 to slowly emerge from the recesses and as they do so, the pegs 36 gradually assume a near horizontal position.

A bevel gear 42 is mounted on the threaded inner end of each of the peg shafts 34 and this bevel gear engages a ring gear 43 (Fig. 3) mounted on the main shaft 17 below the boss 24 on the underside of the turntable 21. The object in mounting the bevel gear 42 on the threaded ends of the peg shafts 34 is to enable these shafts to be moved longitudinally outward, thus to provide adjustment in the radius of the circle described by the collective pegs 36, which determines the diameter of the bow or pompon produced. This adjustment is accomplished in a manner to become more apparent as the description proceeds.

The bevel ring gear 43 is not secured to the main shaft 17 but, as revealed in Figure 3, an axial boss thereon is press-fitted into the hub of a gear 44, below which is a collar 45, affixed to the main shaft 17. A pinion 46 is secured by means of a set screw 47 to the lower end of a shaft 48, operating in a bore made vertically in the annular boss 34*a* and this pinion 46 meshes with the teeth of gear 44. It is evident from the foregoing that by rotating the shaft 48, gear 43 will be rotated by pinion 46, causing rotation of bevel gear 42 which, in turn, effects longitudinal displacement of the peg shaft 34, by virtue of the threaded relationship between the gear 42 and said shaft 34. To rotate shaft 48, a knob 48*a* (Fig. 3B), provided with a slotted sleeve 48*b*, is applied to the cross-pin 48*c* (Fig. 3), which is exposed in a recess in the top of the turntable 21. In order to prevent overextension of the peg shafts 34, the gear 44 is provided with a stop pin S (Fig. 3) which comes up against the pinion 46 and precludes further rotation thereof.

In order to understand the behavior of the pegs 36 in the manner described, it must first be understood that the cam ring 23 makes one-half the number of revolutions as there are pegs on the turntable 21 in forming a bow, or the same number of revolutions as there are pegs in forming a pompon. For example, in forming an eleven point bow the cam ring makes five and one-half revolutions while the turntable makes 6 complete revolutions before it is automatically stopped, in the manner to be later explained.

To obtain the described speed ratio differential between the turntable and cam ring 23, a countershaft 49 (Fig. 5) is journaled in a bushing 50 in the mounting plate 13 and carries on its lower end a pinion 51 which is secured to the shaft by a set screw 52. This pinion meshes with a like pinion 53, secured to the main drive shaft 17, above the worm gear 16. Above the bearing of shaft 49, a boss 54 is formed thereon and a bushing 55 is pressed on the shaft above the boss 54. A gear 56 is mounted on the bushing 55 and engages a similar gear 57, mounted on the depending sleeve 58 which is integral with and forms the driving hub of the cam ring 23. A centering pin 59 is affixed in a cam ring supporting member 60 and depends into an axial bore 61 in the upper end of the counter shaft 49. The difference in the number of teeth in the described gears determines the relative speed thereof and the ratio is calculated to predetermine the difference in speed between the cam ring and turntable, as above set forth.

The cam ring support 60 is mounted for vertical reciprocation as a means for raising and lowering the cam ring 23. The pegs 36, being

actuated by the cam ring, are caused to be oscillated in the manner described and by virtue of automatic timing of the machine, one peg of the group remains in a vertical position as a lead peg until the machine is started.

Raising and lowering of the cam ring support or releasing member 60, as it may sometimes be referred to, is accomplished by means of an operating handle 62 which is accessible at the front of the machine, as exemplified in Figures 1 and 16. The handle 62 is attached to a rod 63 which extends inwardly and is secured to a support actuator 64 (Figs. 3 and 6) below the cam release member 60. The actuator 64 has an arcuate opening 65 as a clearance for the countershaft 49, as may be seen in Figure 5 and on the flange 66 of the actuator are circumferentially spaced rollers 67, on which rests the lower edge of the flange 68 of the cam support 60. The lower edge of the flange 68 is formed with three equidistantly spaced recesses 69 and, as the actuator 64 is moved by operating the handle 62, the recesses 69 will be moved into a position where the rollers 67 will fall thereinto, thereby lowering the support 60 and with it the cam ring 23. As the cam ring 23 recedes, it moves out of engagement with the rollers 30 of the pegs 36, whereupon the springs 39 (Fig. 7) function to turn the peg shafts 34, causing the pegs to move collectively to vertical or upright position, which position is assumed by the pegs when a complete bow or pompon is to be tied and removed, in the manner to be presently explained. It is to be understood that in forming a flat bow, the ribbon is fed onto the turntable in such manner that it will lie flat in intercrossing relationship on the turntable while the pompon requires that the leads of the ribbon lie more or less at right angles to the plane of the turntable and are thus supported by a center pin P (Figs. 1 and 3). In any case, the pegs 36, as they come into successive engagement with the ribbon, impose a 180° twist therein as the turntable revolves.

A typical multipoint flat bow forming operation is revealed schematically in Figure 18, although for the sake of clarity, only nine pegs are shown instead of eleven as in the other figures of the drawing. These pegs are numbered from 1 to 9 for identification in sequence of their performance.

A spool 70 (Fig. 1) is mounted on a spindle 71 and is supported on a disc 72 whose top surface is roughened to provide sufficient friction to prevent spinning of the spool on the spindle and to maintain tension on the ribbon 73 which is passed between the pair of guide pins 74 disposed vertically on the deck 11 between the spindle 71 and turntable 21. First, a tie 76 (Fig. 3) is placed diametrically across the face of the turntable and fastened by similar points 77 on the periphery of the turntable, the tie serving as a medium for securing the loops of the bow, when finished, at their intersections. The ribbon 73 is then passed across the face of the turntable in advance of the lone upstanding peg, designated by the numeral 1 in Figure 18 and the end of the ribbon is pierced by a point 75, affixed to the periphery of the turntable, as shown in Figure 1. This point 75 holds the ribbon in position.

Following the foregoing preparations, the turntable is set in motion by pressing a starting button 78 on the deck 11 adjacent the turntable. As the turntable revolves, peg 1 (Fig. 18) engages the ribbon and, as explained in the foregoing, the peg gradually inclines towards the direction of rotation, and after approximately 300° of rotation, peg 1 will have reached a position nearly horizontal. Peg 2, which is opposite peg 1, snaps to a vertical position just before it reaches a point where it must engage the ribbon and carries the next loop around, at the same time inclining gradually as did the preceding peg, until it too assumes a horizontal position. This performance is repeated by the remaining pegs until after four and one-half revolutions when peg 9 has formed its loop and has also moved to a near horizontal position. At the end of the fifth or last revolution, peg 1 again snaps to a vertical position and the machine automatically stops.

To secure the loops of ribbon after forming the flat bow, the ends of the tie 76 are released from the points 77 and are brought together and securely tied in the center of the bow. Then the operating handle 62 is moved to the right, as viewed in Figures 1 and 16, whereupon the actuator 64 will lower the cam support 68 and cam ring 23, permitting all of the pegs 36 to move to upright position to enable the loops of the bow to be removed from the pegs. The ribbon is cut from the spool adjacent the bow as indicated in Figure 1. The finished bow is then ready to be attached to the binding ribbon of a package by means of the free ends of the tying string 76.

The operation for forming a pompon is the same as above described except that the turntable makes twice the number of revolutions as in the forming of a multipoint flat bow, in order that two loops instead of one are formed on each peg 36. Moreover the center pin P is inserted in a bore in the upper end of the main drive shaft 17, as shown in Figures 1 and 3, to extend above the turntable and functions to insure uniform distribution of the leads of the tape across the turntable. This pin is employed only in forming pompons as earlier described. When the pompon has been formed, the ends of the tie 76 are released from the points 77 and are tied loosely across the center of the pompon, after which the handle 63 is actuated to raise the pegs 36 to vertical position to release the pompon. The ends of the tie 76 are then pulled upward through a ring 79 (Fig. 1) centrally disposed above the turntable and supported by the horizontal arm 80 of a stand 81 which latter, in turn, is supported by a boss 82, affixed to the deck 11. As the ends of the tie 76 are pulled into the ring 79, the intercrossing leads of the loops of ribbon are likewise drawn into the ring to thrust the loops downwardly and thus form a more compact cluster, after which the knot in the tie is made more secure. The ribbon is then cut from the spool.

In Figure 15 is shown a wiring diagram and reveals the manner in which the circuit is energized in forming a bow and in forming a pompon. Figure 15 may be examined together with Figure 14 which shows a limit gear 83, the upper face of which carries diametrically opposed, long and short switch trip pins 84 and 85, respectively. The gear 83 turns on a stub shaft 86 whose upper end is rigidly secured in a boss in the mounting plate 13 and, as revealed in Figure 3, depends below the plate 13 in parallelism with the main shaft 17. Intermediate the shaft 86 and main shaft 17 is another stub shaft 87, on the lower end of which is mounted a pinion 88 which meshes with and drives the limit gear 83. The shaft 87, in turn, is driven from the main shaft 17, by means of the gear 53, shown and previously described as mounted on the main shaft 17

and which meshes with a gear 89, mounted on the stub shaft 87. It is therefore apparent that during operative periods of the turntable, the limit wheel or gear 83 is driven from the main shaft 17 through the gears 53, 89 and 88.

The gear 83 is called the limit gear because it determines the number of revolutions of the turntable 21 and consequently, the number of loops placed on the ribbon. In forming a bow having the same number of loops as there are pegs 36, a selector switch 90 (Figs. 1, 15 and 16) is moved to the position designated "B" in Figures 1 and 15. The starting switch 78 is pressed to energize the circuit to the motor 14 whereupon the limit gear 83 will revolve until the long pin 84 thereon moves into engagement with the trip roller 91 of a limit switch 92 (Figs. 14, 15 and 17). The schematic diagram shows the condition of the circuit when the machine is at rest with the long trip pin 84 holding the bow limit switch in its open position. The short trip pin misses the pompon limit switch roller hence its contact remains closed.

When the machine is set to make a flat bow, both switches 92 (Figs. 14, 15 and 17) are energized, hence both the long and the short pins 84 and 85, respectively, are effective to start and stop the machine. However, when the selector switch 90 is turned to "P" position to form a pompon, a momentary circuit is completed through the normally open contact 93 (Fig. 15) of the bow limit switch, causing the machine to run until the pompon limit switch is opened by engagement of the long trip pin 84 with the switch roller 91. This automatically sets the machine for making a pompon in case the previous bow cycle was completed by means of the bow limit switch being tripped by the long pin. Figure 14 reveals the relationship of the pins 84 and 85 with the contact 91 of switches 92 in forming simple bows while Figure 17 shows such relationship in forming pompons.

In the event of fouling of the ribbon during the reeling thereof on the pegs 36 or for any other purpose, provision is made for stopping the machine at any time through the medium of a push button 94, adjacent the starting button 78, which deenergizes the starting relays 95.

Manifestly, the construction as shown and described is capable of some modification and such modification as may be construed to fall within the scope and meaning of the appended claims is also considered to be within the spirit and intent of the invention.

What is claimed is:

1. A machine for forming bows and pompons from tape, including a turntable having an annular flange, a plurality of radially disposed and longitudinally adjustable shafts rotatably journaled intermediate their ends in the flange of said turntable, a cam ring embraced by the flange of said turntable and underlying the inner ends of said shafts, said cam ring having diametrically opposed recesses therein, a roller crank on each of said shafts carrying a roller engaging said cam ring, a tape engaging peg affixed to the outer end of each of said shafts at right angles thereto, a tape reel support adjacent said turntable, means for holding an end of said tape across said turntable, and means for rotating said turntable and cam ring at differential speeds to effect, through the cooperation of said rollers and cam recesses, sudden upward and gradual downward displacement of pairs of pegs successively on alternate sides of said turntable to engage the tape on said pegs and dispose the same in intercrossing leads on the center of said turntable.

2. A machine for producing bows and pompons from tape, including a turntable, a cam ring under said turntable having recesses in its operative face, a radial series of longitudinally adjustable shafts carried by said turntable, each having a peg on its outer end at right angles thereto, means for rotating said turntable and cam at differential speeds, a tape reel support adjacent said turntable, means for holding the end of a length of tape across said turntable and means carried by each of said shafts and operated by said cam ring to actuate said shafts and cause said pegs to successively snap to upright position and gradually assume a horizontal position, whereby to engage and form loops in said tape whose leads intersect at the center of said turntable.

3. In a machine for producing bows and pompons from tape, a turntable, a tape reel adjacent said turntable, means for securing an end of the tape from said reel to the perimeter of said turntable, a radial series of shafts emerging from the periphery of said turntable, a right angular peg carried by the outer end of each of said shafts, a cam ring below said turntable, means for rotating said turntable at a speed slightly greater than that of said cam ring, means carried by each of said shafts and engageable by said cam ring to effect sudden movement of said pegs successively to vertical position and gradual movement thereof to horizontal position whereby to reel tape on said pegs with leads intercrossing at the center of said turntable.

4. In a machine for producing bows and pompons from tape, a circumferentially spaced group of pegs adapted for collective rotation and capable of successive displacement suddenly from the horizontal to the vertical plane, followed by a gradual return to the horizontal plane, a tape reel, means for holding an end of the tape from said reel for successive engagement by said pegs to form thereon loops and intercrossing leads intersecting at the rotative axis of said group of pegs, means for rotating said group of pegs and means to effect individual actuation thereof.

5. In a machine for forming multi-point bows and pompons from tape and the like, comprising a turntable, means for rotating said turntable, a group of pegs spaced circumferentially about the perimeter of said turntable and capable of successive displacement suddenly from a parallel to a perpendicular position in relation to the plane of said turntable and of gradually resuming parallelism therewith during rotation of said turntable, means for supplying tape with which said pegs successively engage in the perpendicular position to form therein loops and leads intersecting at the center of said turntable, means for predetermining the number of revolutions of said turntable, means for tying said leads at their intersection and means for collectively moving said pegs to perpendicular position with respect to said turntable to remove the completed article therefrom.

6. In a machine for producing bows and pompons from tape, comprising a turntable, means for fastening tape from a reel diametrically across said turntable, a series of pegs circumferentially spaced about the perimeter of said turntable on individual shafts disposed radially with respect to said turntable, means for rotating said turntable, cam means rotated at a differential speed with respect to said turntable and adapted to actuate said peg shafts to cause said pegs to

rise successively into engagement with said tape and to incline downwardly in the direction of rotation of said turntable and form said tape into loops with leads intercrossing at the center of said turntable, means for tying said tape at the intersection of said leads and means for collectively moving said pegs into upright position to release the loops from said pegs.

7. A machine for producing bows and pompons from ribbon including a turntable, a series of pegs spaced circumferentially about the perimeter of said turntable and displaceable arcuately between vertical and horizontal planes, means for feeding ribbon continuously between said pegs as said turntable revolves, to be intermittently engaged by selected pegs of said series, means for suddenly raising and gradually lowering opposite pegs of said series successively to impose a 180° twist in the leads of said ribbon as said leads intercross at the center of said turntable, means for stopping said turntable after a predetermined number of revolutions and means for collectively moving said pegs to a vertical position subsequent to the operation of tying the leads of said ribbon at their intersection.

8. The structure of claim 7, and means spaced above the center of said turntable through which the leads of the ribbon are partially drawn at the

point of intersection to converge the bights of the completed article into a cluster.

9. The process of producing bows and pompons from ribbon which comprises feeding the ribbon across a rotating field while intercepting and forming loops in the ribbon at circumferentially spaced points about the perimeter of the field, intercrossing the leads of the ribbon at the center of the field; imposing a twist in the leads of the ribbon between the loops thereof; tying the leads at their point of intersection and finally severing the ribbon at the perimeter of the field.

10. The process of producing bows and pompons from tape which comprises holding an end of the tape in relation to the perimeter of a rotating field, in forming bights or loops in the tape and reeling the latter in intercrossing leads substantially diametrically of the field while rotating the field, imposing a twist of substantially 180° in the leads of the tape between the bights or loops; interrupting rotation of the field after a predetermined number of revolutions, tying the leads together at their point of intersection; severing the tape at the perimeter of the field and finally removing the completed article from the field.

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No references cited.