April 27, 1965 G. N. CARMICHAEL 3,180,542

BOW MAKING MACHINE

Filed April 19, 1963 3 Sheets-Sheet 1

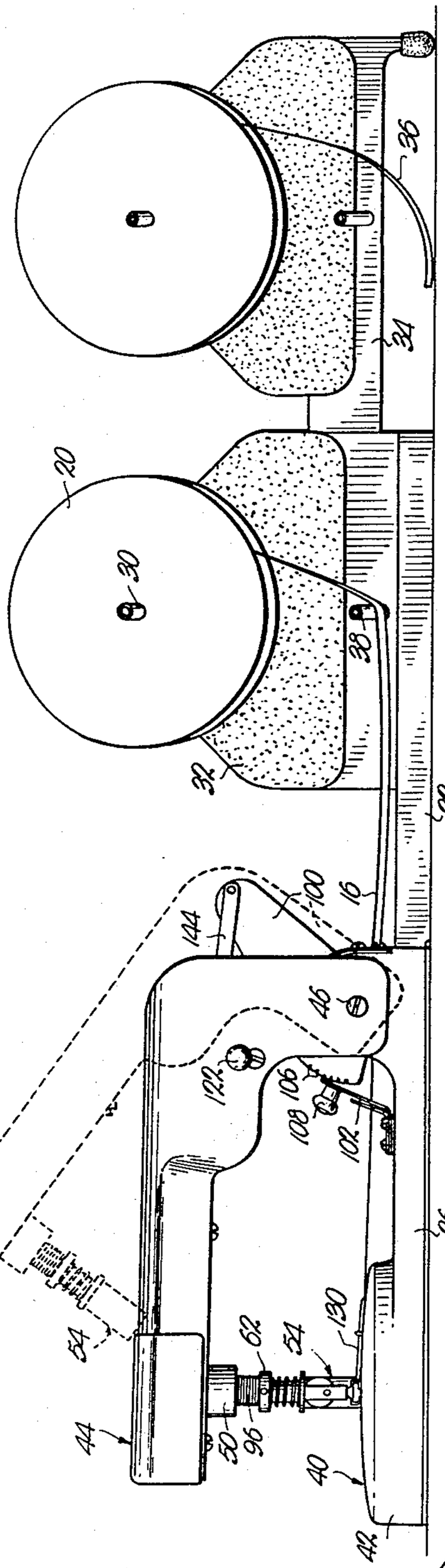

Fig. 1.

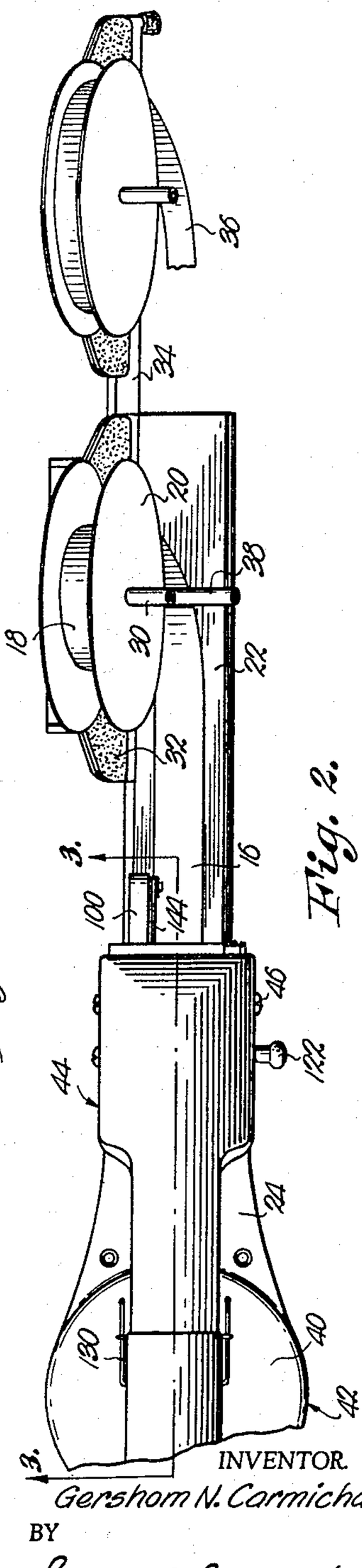

Fig. 2.

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BOW MAKING MACHINE

Filed April 19, 1963 3 Sheets-Sheet 2

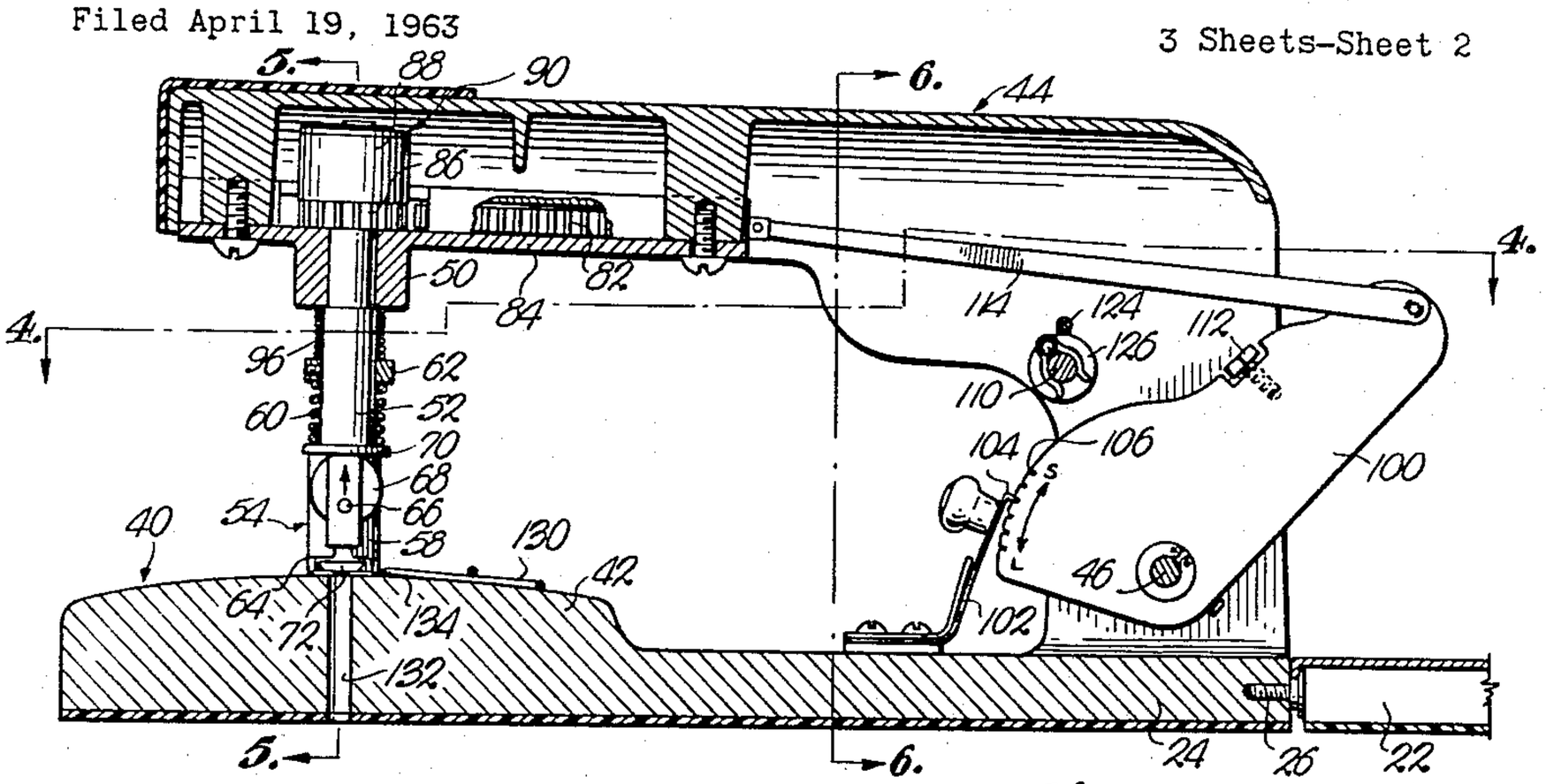

Fig. 3.

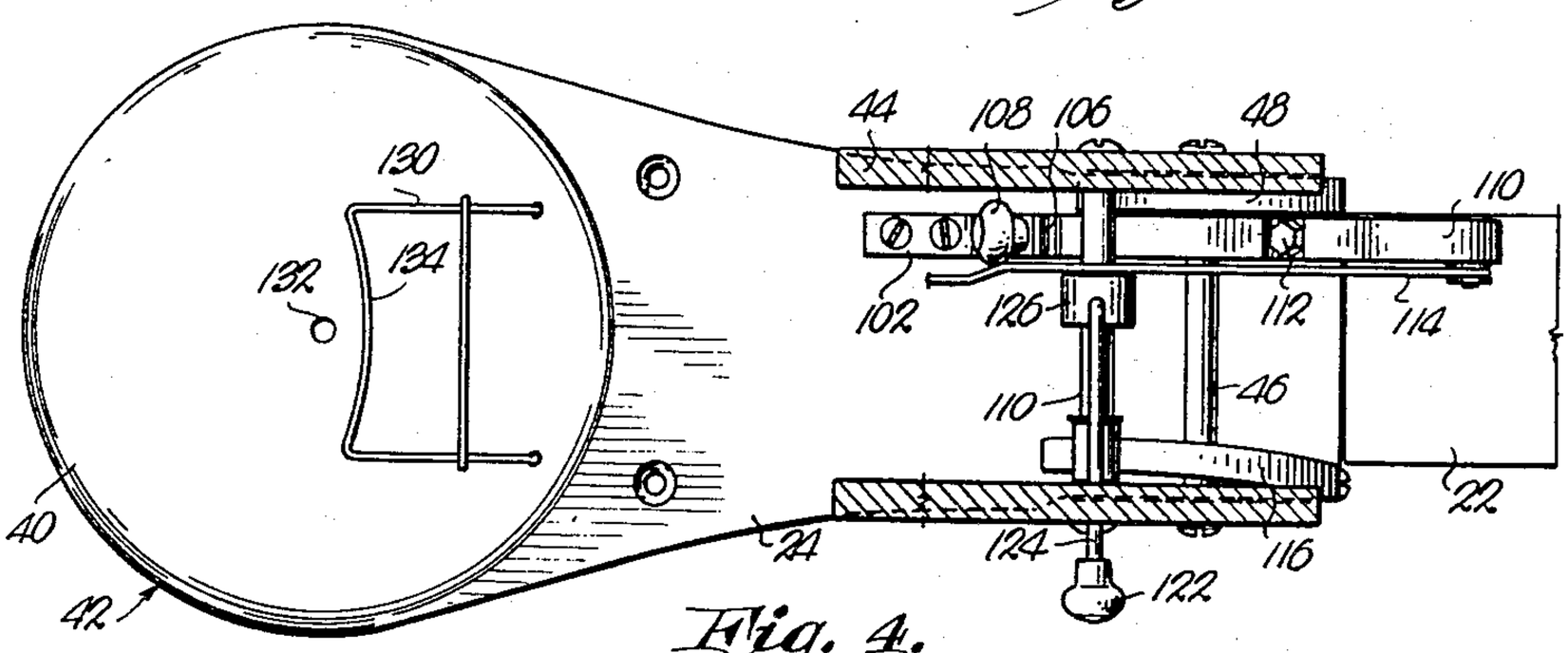

Fig. 4.

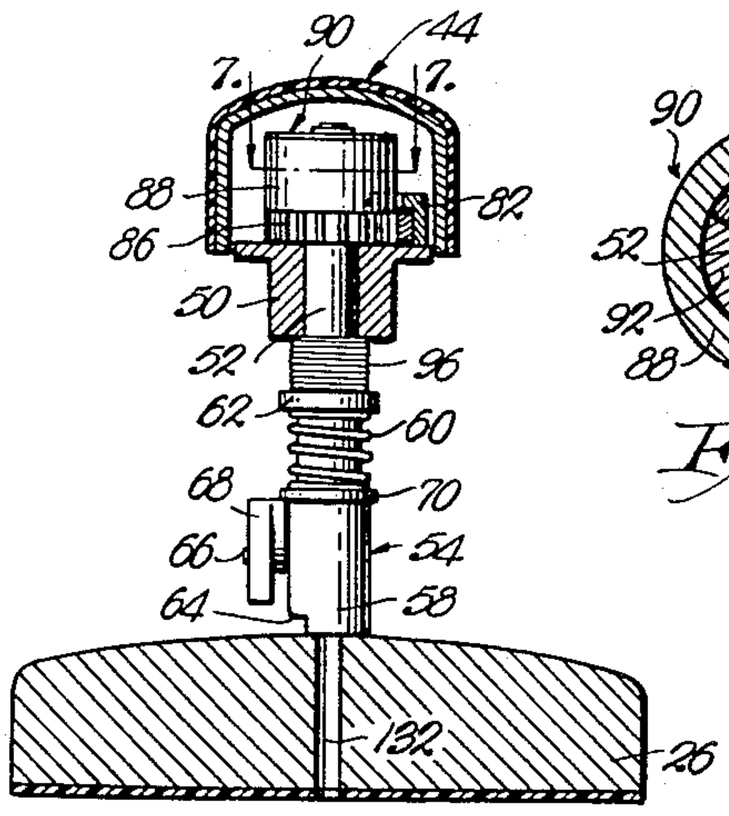

Fig. 5.

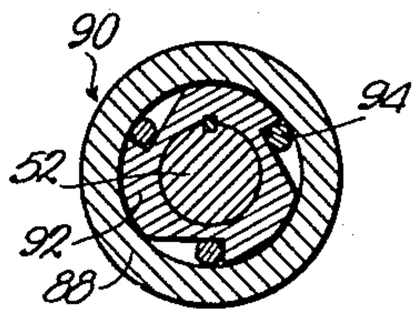

Fig. 7.

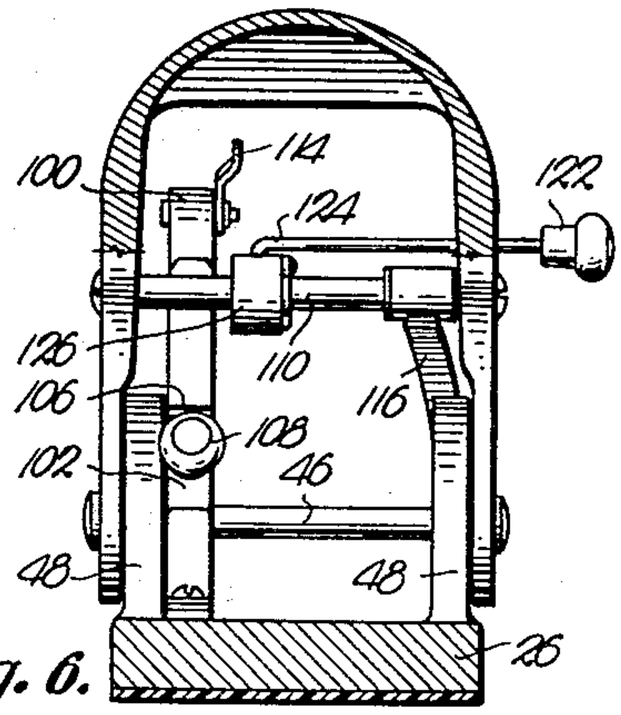

Fig. 6.

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April 27, 1965 G. N. CARMICHAEL 3,180,542

BOW MAKING MACHINE

Filed April 19, 1963 3 Sheets-Sheet 3

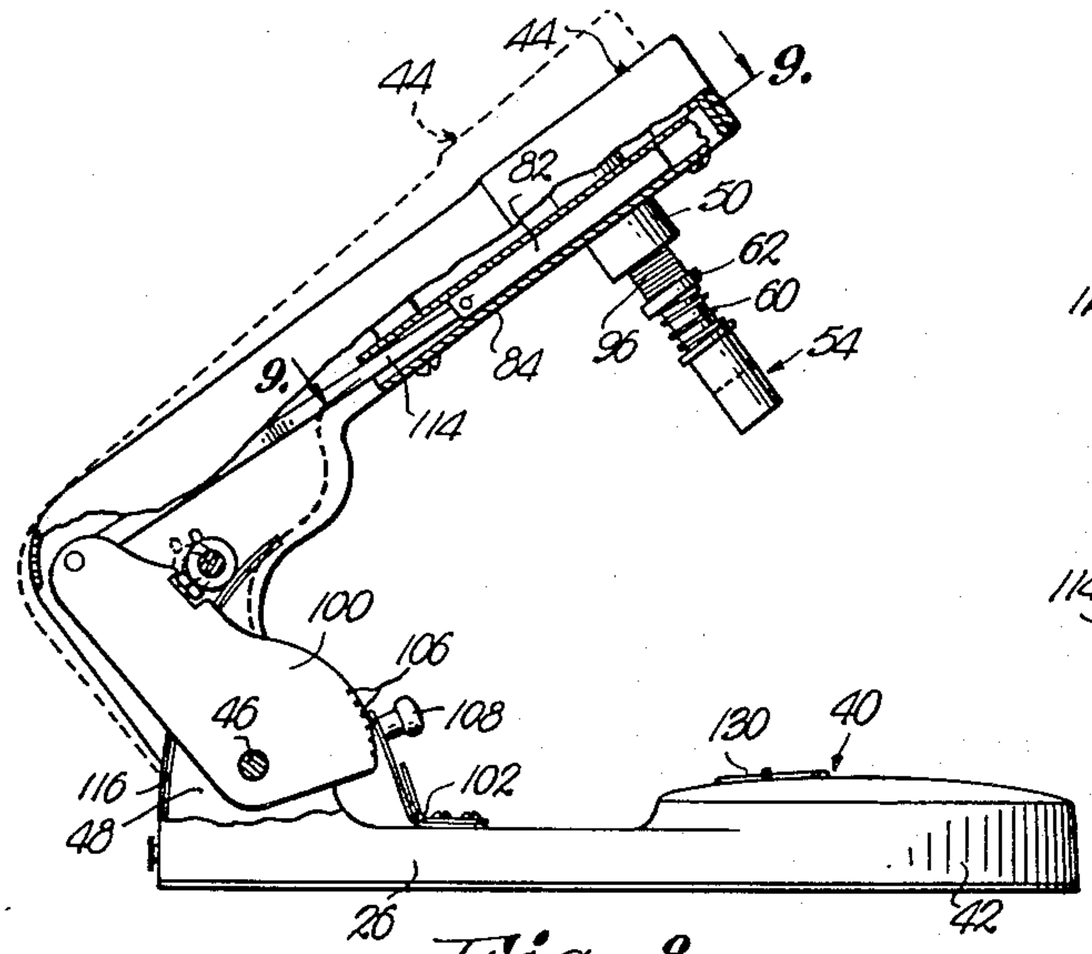

Fig. 8.

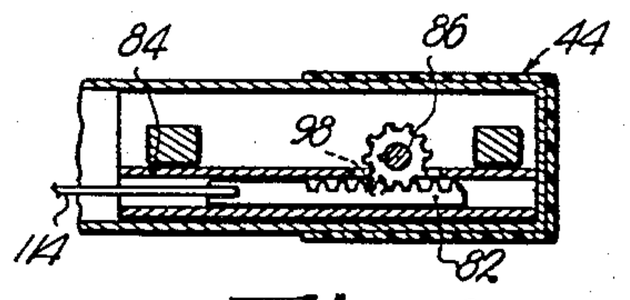

Fig. 9.

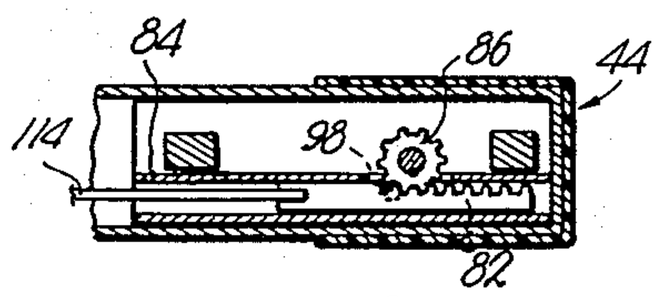

Fig. 10.

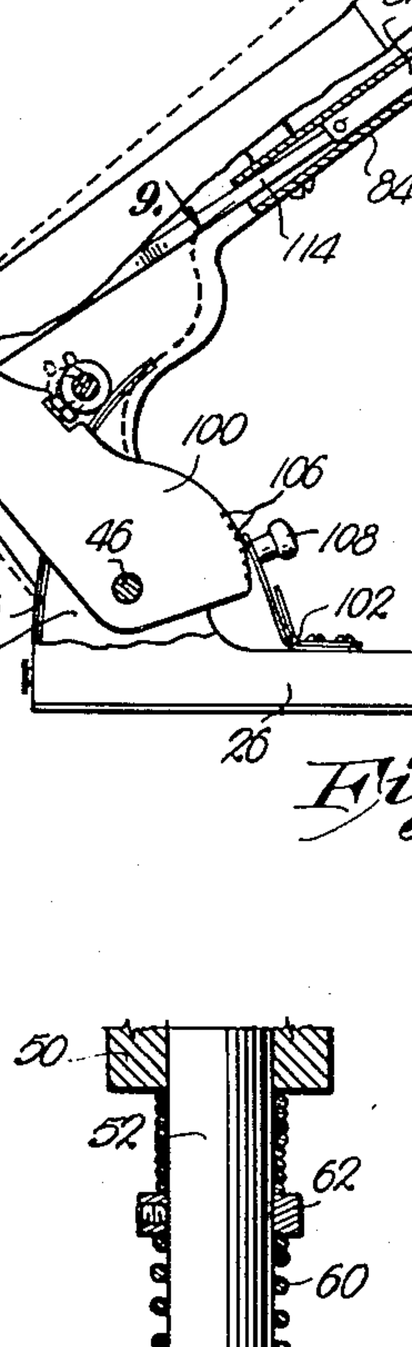

Fig. 11.

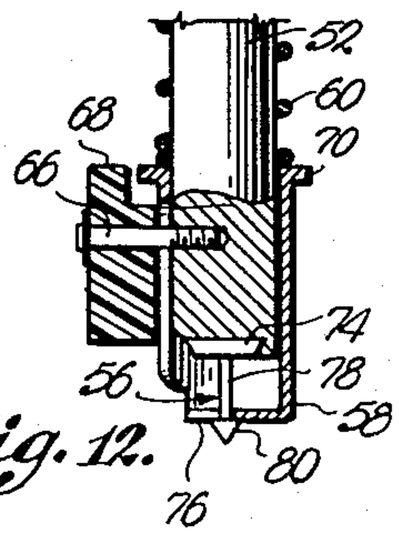

Fig. 12.

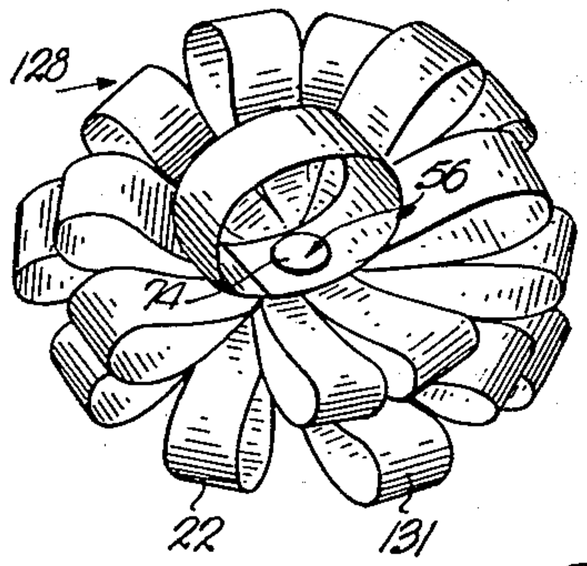

Fig. 13.

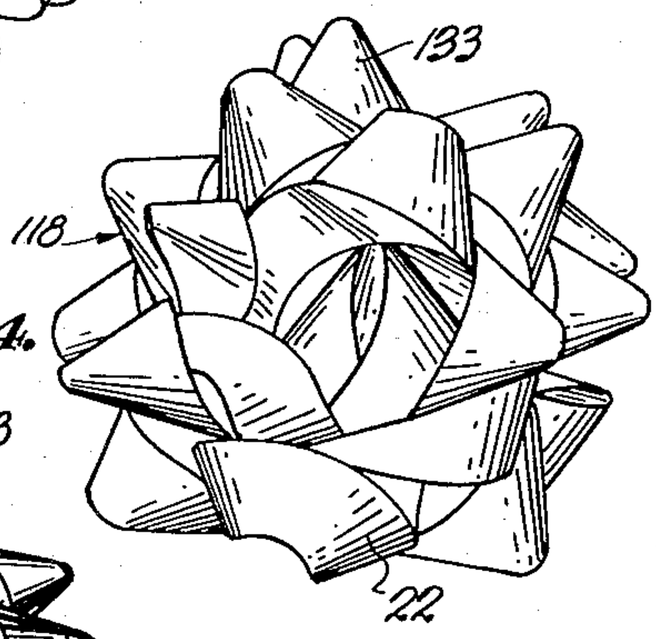

Fig. 14.

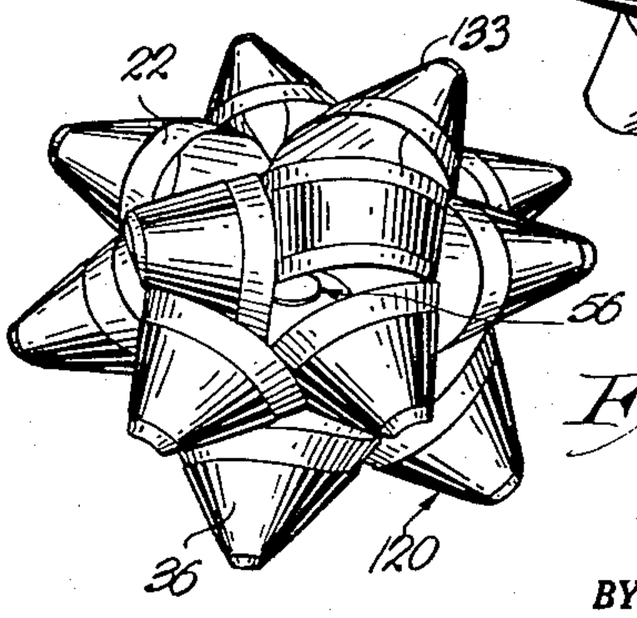

Fig. 15.

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United States Patent Office

3,180,542
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3,180,542

BOW MAKING MACHINE

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21 Claims. (Cl. 223—46)

This invention relates to a machine for making decorative bows substantially automatically from tape or ribbon in strip form, making it possible, if desired, to utilize a roll of the ribbon that is in turn carried by a reel rotatable on a stand. In making the bow a special stud or fastener is also employed having the characteristic of being able to pierce the ribbon and after piercing becoming attached thereto. The bow itself consists of a multitude of loops radiating outwardly from the centrally disposed fastener.

It is the most important object of the present invention to provide a bow machine that is economical and easy to use, experience having indicated that skilled operators are unnecessary and that within a very short period of time virtually any operator can be taught to properly use the machine in its intended manner.

It is another important object of the instant invention to provide a bow making machine that appreciably speeds up bow making operations and, here again, it has been found that through use of the instant invention the average operator is able to make up to 225 bows per hour.

Another important object of the instant invention is to provide a bow making machine that can be used to produce both star bows and pom-pom bows and to provide an almost endless number of combinations of design of both of such basic types.

A further important object of my present invention is the provision of a bow making machine that is especially adapted for use in retail stores to increase gift sales, and therefore higher profits, because of reduction in wrapping time, thereby releasing personnel for increased selling time.

In the drawings:

FIGURE 1 is a side elevational view of a bow making machine made pursuant to my present invention;

FIG. 2 is a top plan view thereof;

FIG. 3 is an enlarged fragmentary cross-sectional view taken on line 3—3 of FIG. 2;

FIG. 4 is a fragmentary cross-sectional view taken on the irregular line 4—4 of FIG. 3;

FIG. 5 is a vertical cross-sectional view taken on line 5—5 of FIG. 3;

FIG. 6 is a vertical cross-sectional view taken on line 6—6 of FIG. 3;

FIG. 7 is an enlarged cross-sectional view taken on line 7—7 of FIG. 5;

FIG. 8 is a fragmentary elevational view similar to FIG. 1 showing the opposite side of the machine, parts being broken away and in section for clearness;

FIG. 9 is a fragmentary cross-sectional view taken on line 9—9 of FIG. 8;

FIG. 10 is a cross-sectional view similar to FIG. 9 but showing certain parts in a different position;

FIG. 11 is an enlarged fragmentary elevational view of the fastener holder and its rotatable spindle illustrating the position of the holder when the fastener is initially inserted therein;

FIG. 12 is a view similar to FIG. 11 showing the position of the holder when the machine is ready for use;

FIG. 13 is a perspective view of a pom-pom bow made through use of the machine;

FIG. 14 is a perspective view of one type of star bow made through use of said machine; and

FIG. 15 is a perspective view of another type of star bow made by employing the bow making machine of the present invention.

As illustrated in FIGS. 1 and 2 of the drawings, ribbon 16 from which decorative bows (such as those illustrated in FIGS. 13, 14 and 15) may be made is unwound from a supply roll 18 that is in turn carried by a reel 20. A special stand 22 has releasable connection with a base 24 (see FIG. 3) as, for example, by one or more headed bolts or the like 26 received in slots in stand 22.

Stand 22 has an inclined plate 28 provided with an axle 30 rotatably receiving the reel 20. Such inclination, together with a facing 32 of frictionable material on the plate 28 and against which the reel 20 bears, operates to retard rotation of the reel 22 and, therefore, overrunning during operation of the bow making machine. The axle 30 is slanted downwardly, for example, about 5 degrees out of normal to plate 28 so that the reel 20 will always engage facing 32 below axle 30.

For reasons hereinafter to be made clear, any number of additional reel supporting stands may be provided; therefore, the stand 34 of similar nature is releasably attached to stand 22 when it is desired to use ribbon 36 in lieu of ribbon 16 or in combination therewith. FIGS. 1 and 2 also illustrate the ribbon 16 passing beneath a guide pin 38 and thence longitudinally of the base 24 thereabove onto a convex ribbon receiving surface 40 of an anvil 42, forming an integral part of the base 24.

Referring now more particularly to FIG. 3, the base 24 supports a member 44 that reciprocates about a horizontal axis through the medium of a shaft 46. The member 44 is in the nature of a substantially L-shaped arm swingable on the shaft 46, as illustrated in FIG. 1, the base 24 being provided with upstanding ears 48 that are traversed by the shaft 46.

Arm 44 has a bearing 50 that rotatably receives a spindle 52 which in turn supports a holder 54 as best seen in FIGS. 11 and 12, for a stud or fastener 56 which retains the loops of the bows, as will hereinafter be explained.

Holder 54 cooperates with the spindle 52 in supporting the stud 56 and includes a tube 58 that is reciprocable on the spindle 52 and yieldably biased toward the lower end of its path of travel by a spring 60 coiled about the spindle 52 between the tube 58 and a set collar 62 attached to spindle 52.

Tube 58 has a T-shaped slot 64 (see also FIGS. 3 and 5) which receives pivot pin 66 carried by spindle 52 and rotatably receiving a cam release 68 that is placed in use during insertion and removal of the stud 56. Pin 66 is eccentric to the circular cam edge of the release 68 so that when the latter is rotated to the position shown in FIGS. 3 and 11, tube 58 is raised with respect to spindle 52 against the action of spring 60 because of engagement of the release 68 with outturned flange 70 on tube 58. This places the lower end of the slot 64 in proper register with a recess 72 in the lower end of spindle 52 to permit insertion of head 74 of stud 56. A slot 76 in the bottom of tube 58 clears shank 78 of stud 56 but such slot 76 is n ot sufficiently large to clear the conical ribbon piercing boss 80 on the lower end of the shank 78. Hence, when the cam 68 is released, spring 60 forces tube 58

downwardly until the bottom of the latter engages the upper surface or shoulder of the boss 80, as seen in FIG. 12.

Rotation of the spindle 52 is responsive to swinging of the arm 44, and to this end an elongated rack device 82 (FIGS. 3, 5, 8, 9 and 10) is carried by the arm 44 for reciprocation relative thereto within a channel guide 84 (having bearing 50 integral therewith) releasably attached to the arm 44 therebelow. The guide 84 is cut away to clear a pinion 86 which meshes with the rack 82.

Pinion 86 is an integral part of a cylinder 88 which in turn forms a part of clutch means 90 provided to limit rotation of the spindle 52 in but one direction. Clutch means 90 includes also a cam wedge 92 (FIG. 7) keyed to the spindle 52 and recessed to receive a plurality of rollers 94 housed within the cylinder 88. In a well-known manner, the cylinder 88 is attached to spindle 52 for free rotation with respect thereto when the pinion 86, and therefore the cylinder 88, are rotated anticlockwise, viewing FIG 7. When, however, pinion 86 and cylinder 88 are rotated clockwise, rollers 94 bind between cam wedge 92 and the inner face of cylinder 88, causing spindle 52 to rotate therewith.

A drag is placed on spindle 52 to prevent anti-grade rotation, i.e., anticlockwise, by a spring 96 coiled on spindle 52 between bearing 50 and set collar 62. Additionally, a spring loaded ball detent 98 (FIGS. 9 and 10) in the bottom of the channel guide 84 engages the pinion 86 and partially seats between the teeth thereof, operating to hold the spindle 52 in its attained rotative position at the end of each stroke of the arm 44.

Such stroke of arm 44 is, of course, limited in a downward direction by the anvil 42, as will hereafter be explained, and is limited in the opposite or upward direction by a shiftable element 100 best seen in FIGS. 3, 4 and 6. Such stroke varying means 100 has a common support in the shaft 46 with the arm 44 that is normally held against swinging movement about the axis of shaft 46 by a spring latch means 102 carried by the base 24. Latch 102 has a lateral lip 104 insertable in any one of a number of notches 106 in element 100 arranged in an arcuate row concentric with shaft 46. The rotative position of the element 100 may be changed simply by pulling on a knob 108 of latch 102 so as to withdraw the lip 104.

Arm 44 has a transverse fixture 110 in the nature of a pin disposed to engage the element 100 when arm 44 is swung to the upper end of its path of travel. More particularly, the fixture 110 engages an extensible abutment 112 constituting a stud bolt in the element 100, permitting fine adjustment.

The element 100 also forms a part of the mechanism for imparting rotative movement to the spindle 52 because the rack 82 is pivotally connected therewith through the medium of a link 114 (see FIG. 3). Arm 44 is yieldably biased toward the upper end of its path of travel by leaf spring 116 mounted on base 24 and bearing against the fixture 110 therebeneath (see FIGS. 4 and 6).

In the event the operator desires to make pom-pom bows 128, shown in FIG. 13, a knob 122 (FIGS. 4 and 6) on lever 124 is pushed inwardly to slide a spacer 126 along fixture 110 to a position interposed between the abutment 112 and the fixture 110, thereby controlling the rotation of spindle 52, as is about to be explained. The star bows 118 and 120 shown in FIGS. 14 and 15 are produced when the rotation control spacer 126 is positioned as illustrated in FIGS. 4 and 6 where it will not strike the abutment 112 when the arm 44 is in the dotted line position shown in FIG. 1.

Prior to placing the machine in operation, ribbon 16 is threaded across the surface 40 of anvil 42 beneath a spring guide 130 and over an opening 132 in the anvil 42 for clearing the stud 56. The guide 130 is mounted

on the anvil 42, yieldably biased downwardly against the surface 40 and has an arcuate, wire end 134 operating to maintain the ribbon 16 in proper alignment with the opening 132 during upward swinging movement of the arm 44, and therefore, while the ribbon 16 is pulled from the roll 18.

Assuming the ribbon 16 to be in place on the surface 40, held thereon by the end 134 of guide 130 and overlapping the opening 132, and assuming the fastener 56 to be in place as illustrated in FIG. 12, arm 44 is swung downwardly about the axis of shaft 46. The boss 80 of stud 56 pierces the ribbon 16 midway of its longitudinal edges and then continues into the opening 132 as the holder 54, i.e., the tube 58, engages the anvil 42. Continued downward movement of the spindle 52 with respect to the tube 58 assures complete piercing of the ribbon 16 until the latter is disposed between the boss 80 and the bottom of the tube 58.

Hence, as the arm 44 is swung upwardly, the pressure on spring 60 is released, causing the tube 58 to be extended to a position where the ribbon 16 is gripped between the lower end of the tube 58 and the upper face of the boss 80, the ribbon 16 then, of course, being threaded on the shank 78 of the stud 56.

Consequently, as upward swinging movement of the arm 44 is continued, a predetermined length of the ribbon 16 will be stripped from the roll 18 as the reel 20 rotates on axle 30 and as the ribbon 16 slides along the guide pin 38, along the surface 40 and thence upwardly along the concave surface of end 134 of spring guide 130. End 134 tends to yield upwardly, relieving the drag of tape 16 on surface 40. It also serves the very important function of rendering tape 16 self centering with respect to surface 40, particularly opening 132.

It can now be seen that the size of each of the loops 131 of bow 128, and therefore the diameter of the latter, is determined by the extent of upward swinging movement of arm 44 which in turn determines the amount of ribbon 16 stripped from the roll 18 during each stroke of the arm 44. Upward movement of arm 44 is in turn determined by fixture 110 striking abutment 112; accordingly, positioning of the element 100 through use of latch 102 determines the diameter of the bow 128.

It is to be noted at this juncture that the connection of rack 82 with element 100 through link 114 is, in effect, a connection of rack 82 with the base 24 because the element 100 is in turn attached to the base 24 through the latch 102. It follows, therefore, that when the arm 44 swings, the channel member 84 shifts with respect to the rack 82, causing rotation of the pinion 86 in both directions. However, on the upstroke of the arm 44 cylinder 88 rotates freely without imparting rotative movement to the spindle 52. As arm 44 is swung downwardly, rack 82 imparts rotative movement to the spindle 52 through the clutch 90 until the rack 82 is no longer in mesh with the pinion 86, whereupon, during continued downward movement of the arm 44, spindle 52 remains stationary with respect to arm 44. Hence, there is an assurance that holder 54 does not rotate while the tape 16 is being pierced and while the spring 60 is being compressed, avoiding improper deflection or distortion of tape 16.

The first loop 131 is, therefore, formed, whereupon the stud 56 again pierces the ribbon 16 and the operation is repeated. It should be noted at this juncture that the number of loops 131 which can be provided in a single bow 128 is determined in part at least by the length of shank 78 which in turn determines the number of overlapping layers of the tape 16 that can be pressed between head 74 and boss 80.

When the spacer 126 is in the position shown in FIGS. 4 and 6, fixture 110 engages the abutment 112; therefore, arm 44 moves to the dotted line position shown in FIG. 8. FIG. 10 of the drawings illustrates the relative

positions of the rack 82 and the pinion 86 when the arm 44 is in the dotted line position shown in FIG. 8. On the other hand, when the spacer 126 is shifted to a position where it will engage the abutment 112 on the upstroke of arm 44, the limit of such stroke will be as shown in full lines in FIG. 8. And, under such conditions, the relative positioning of the rack 82 and pinion 86 will be as illustrated in FIG. 9. This simply means that the amount of rotation of the spindle 52 on the downstroke of arm 44 is decreased when the spacer 126 is positioned in alignment with the abutment 112 because of the fact that only a portion of the rack 82 becomes effective to rotate the pinion 86 before rack 82 and pinion 86 are out of intermeshing relationship.

In the invention as illustrated, and by way of example only, when the lever 124 is positioned as illustrated in FIGS. 4 and 6, the total rotation of the spindle 52 during each downward stroke of the arm 44 is in the order of 210 degrees. On the other hand, when spacer 126 is shifted so as to operate as a stop for the arm 44 the rotation of the spindle 52 is in the order of 150 degrees. If the rotation of spindle 52 is greater than 180 degrees, the resulting bow 118 will consist of a number of loops 133, each having a twist which differentiates the star bow 118 over the pom-pom bow 128. In other words, if the rotation of the spindle 52 is less than 180 degrees, the loops 131 of the resulting bow 128 will not have the twist that is shown in the loops 133 of bow 118.

It can now be appreciated that a rather large number of combinations can be selected. For example, the length of the loops 131 of each layer may be progressively decreased simply by releasing latch 102 and swinging the element 100 clockwise viewing FIG. 3 so as to permit arm 44 to swing farther in its upstroke, thereby pulling a greater length of ribbon 16 from roll 18.

Another variation, by way of example only, is to first produce one or more layers or courses of loops 131 and thereupon actuate knob 122 to produce additional layers of loops 133, thereby presenting a combination pom-pom and star bow. And, all the while, the operator may change the size of the loops 131 and/or 133 simply by manipulating the latch 102.

Still another variation is to use the ribbons 16 and 36 simultaneously, threading the same beneath the wire end 134 in overlapping relationship, whereupon the stud 56 will pierce both tapes. The result is illustrated in the bow 120 wherein the loops 133 are made up of both ribbons 16 and 36, the latter being narrower than the ribbon 16, if desired, to produce an unusual and attractive effect, particularly if the ribbons 16 and 36 are of contrasting colors.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. In a machine for making a decorative bow, having a number of radial loops, from a supply of ribbon in strip form and from a loop-retaining fastener adapted to pierce and become attached to the ribbon:

means presenting a ribbon-receiving surface;

a reciprocable member having a holder for said fastener rotatably carried thereby and disposed for movement toward and away from said surface as the member is reciprocated, said surface having an opening for clearing the fastener after the latter has pierced the ribbon in response to movement of the holder toward said surface;

a guide for retaining the ribbon as the holder is moved away from said surface to pull a predetermined stretch of the ribbon from said supply, whereby to form a loop in the ribbon each time the member moves toward said surface; and

mechanism for rotating the holder a predetermined amount in response to reciprocation of the member.

2. The invention of claim 1, and stroke varying means for said member to provide loops of differing sizes.

3. The invention of claim 1, and means limiting the extent of movement of the member away from said surface whereby the stretches are of equal lengths and the loops are equal in size.

4. The invention of claim 1, and means for varying the amount of rotation of said holder by said mechanism whereby to produce a twist in each loop.

5. The invention of claim 1, said guide having means for maintaining the ribbon in alignment with said opening as the ribbon is pulled.

6. The invention of claim 1, and a base provided with an anvil, said surface being on the anvil, said opening being in the anvil, said member being swingable on the base.

7. The invention of claim 1, and a base reciprocably supporting the member, said mechanism including a device carried by the member for reciprocation therewith, said device and said member being relatively movable; means connecting the device with said base for moving the device and the member relatively as the latter is reciprocated; and means operably coupling the device with the holder for rotating the latter as the device and the member move relatively.

8. The invention of claim 1, and a shiftable element within the path of travel of said member for controlling the extent of movement of the latter away from said surface whereby to vary the lengths of said stretches, and thereby the size of each loop and the diameter of the bow.

9. The invention of claim 8, and a support common to the member and the element, said member being reciprocable on the support and said element being shiftable on the support.

10. The invention of claim 8, a base having means thereon common to the member and the element swingably supporting the same; and latch means engageable with the element for holding the latter in any one of a number of preselected positions within its swingable path of travel.

11. The invention of claim 8, said mechanism including a device carried by the member for reciprocation therewith, said device and said member being relatively movable; means connecting the device with said element for moving the device and the member relatively as the latter is reciprocated; and means operably coupling the device with the holder for rotating the latter as the device and the member move relatively.

12. The invention of claim 10, and an abutment on said element disposed for engagement by said member, said abutment being extensible for varying the stroke of said member separately from said latch means.

13. The invention of claim 8, said mechanism including a rack reciprocably carried by the member for swinging movement therewith, a spindle supporting the holder, and a pinion on the spindle in mesh with the rack; and means connecting the rack with said element for holding the rack as the member is swung whereby the rack and member shift relatively as the member swings.

14. The invention of claim 13, said mechanism having clutch means for limiting rotation of the spindle to one direction of swinging movement of the member.

15. The invention of claim 13, and including a spacer shiftably mounted for positioning between the member and the element.

16. The invention of claim 13, and latch means on the base engageable with the element for holding the latter in any one of a number of preselected positions within its swingable path of travel.

17. The invention of claim 16, said member having a fixture engageable with the element, and including a spacer shiftable on the fixture to and from a position engageable with the element.

18. The invention of claim 1, wherein said guide is carried by said surface means adjacent said opening.

19. The invention of claim 1, wherein said guide is movable toward and away from said surface, and including means biasing the guide toward said surface to bias

the stretch disposed between the guide and said surface toward the latter as the holder moves away therefrom.

20. The invention of claim 19, wherein said guide includes a ribbon-engaging wire end normally in juxtaposition to said surface.

21. The invention of claim 20, wherein said wire end is arcuate in configuration to effect the centering of the stretch with respect to said opening.

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