

[54] **WINDING APPARATUS**

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[51] Int. Cl. **B65h 17/14**

[58] Field of Search **242/67.1 R, DIG. 3, 242/56 R, 66, 67.2, 67.3 R; 226/170-173**

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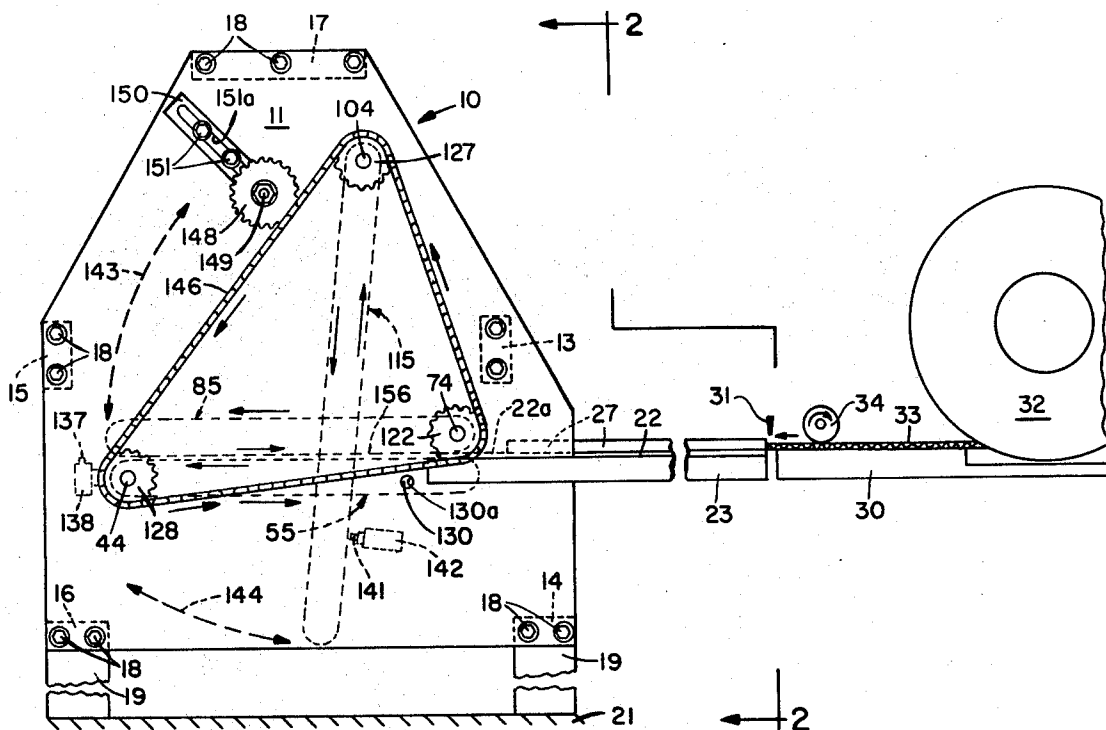
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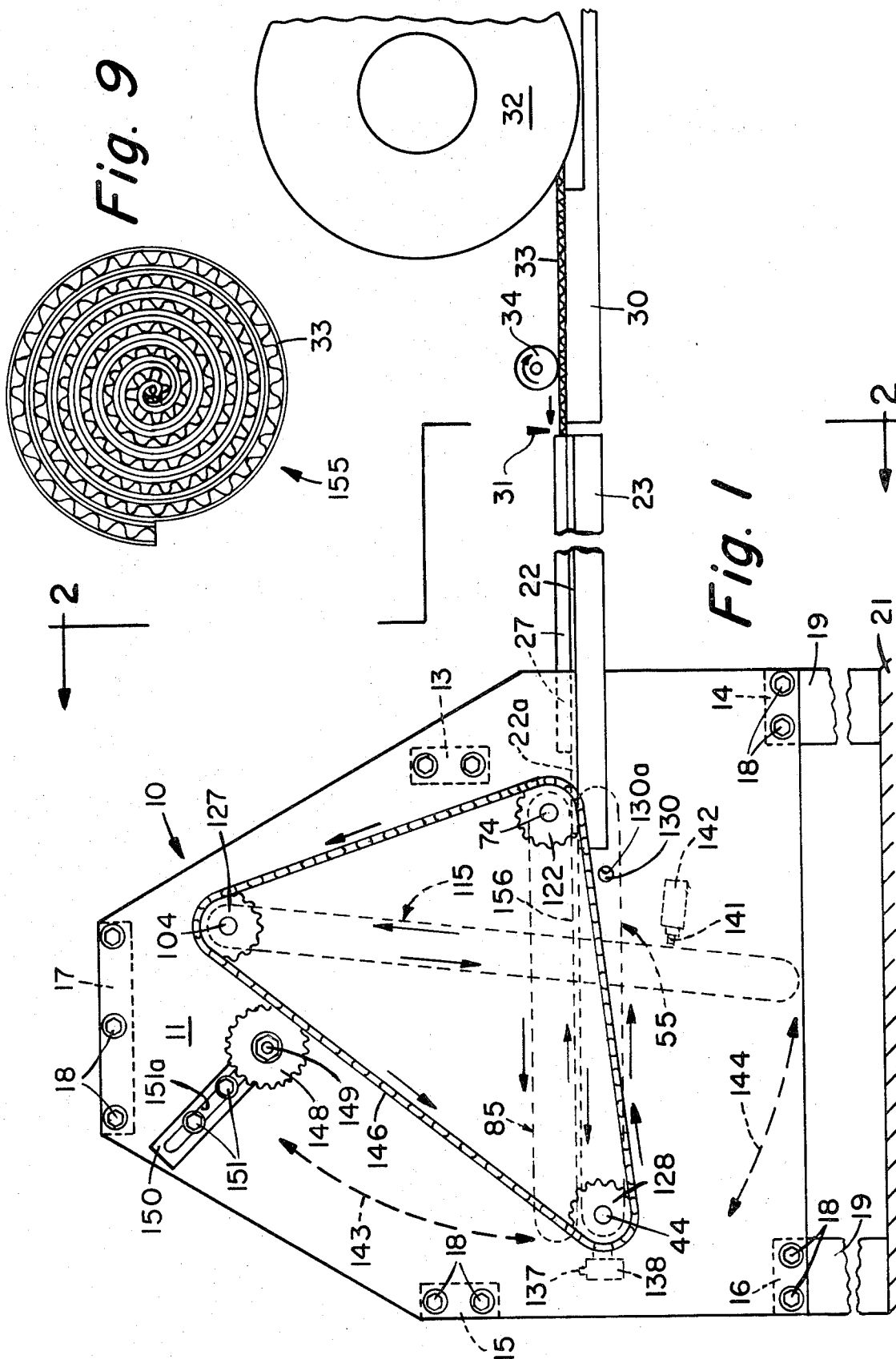
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ABSTRACT

Apparatus for winding a flexible strip or length of material into a coreless spiraled roll and including three sets of belts which are driven in corresponding directions through associated loop paths of travel, two of the paths generally paralleling each other and the third path crossing the other two paths at a variable angle. The strip of material is fed into a variable size winding space or cavity defined by the belts, and driven movement of the belts roll, form or wind the strip of material into a coreless spiraled roll thereof.

10 Claims, 9 Drawing Figures





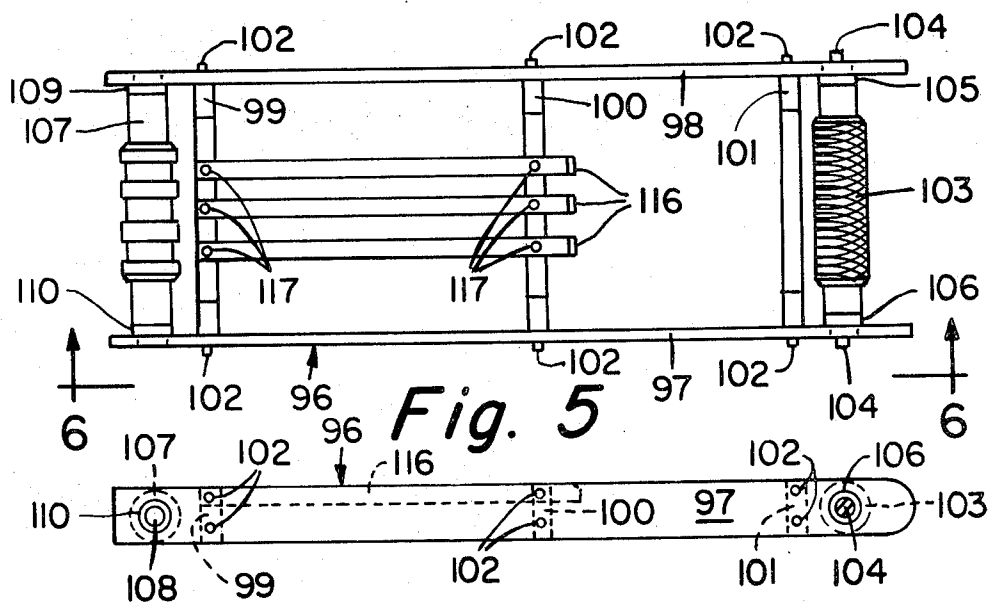


Fig. 6

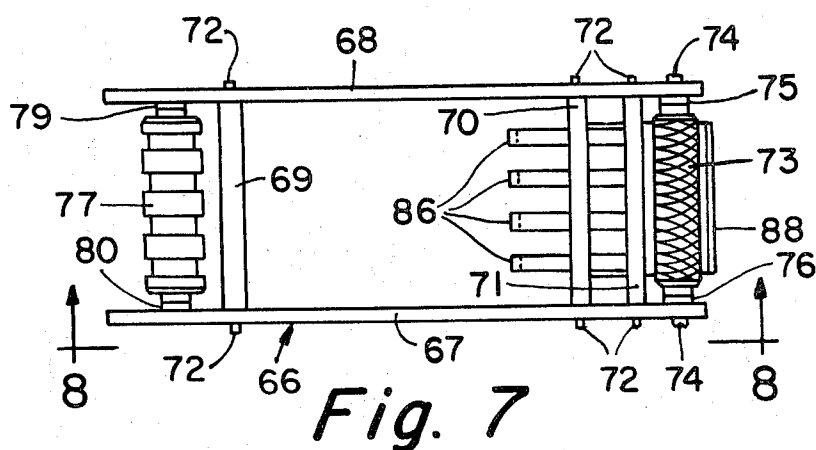


Fig. 7

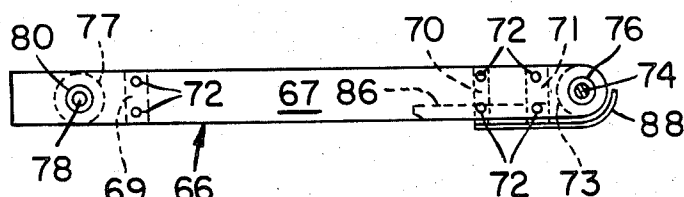


Fig. 8

WINDING APPARATUS

BACKGROUND OF THE INVENTION

Heretofore, strips, lengths or ribbons of flexible material generally have been wound or rolled into spiraled rolls of such material by winding such strips or ribbons on center or central cores or core members as is well known. The winding of rolls of material in such a manner is useful when the strips or ribbons of material are to be dispensed in the direction reverse from that in which they were previously formed, wound or rolled, as is readily apparent. However, oftentimes it is desirous or expedient to use rolls of material which do not have center or central cores or core members, or do not have center or central spaces which result when such cores or core members are removed following the winding or rolling of strips of material used to form the respective rolls of material. This is often true when the materials of the formed rolls are not to be dispensed as mentioned above. Accordingly, the apparatus of the present invention was developed for the purpose of forming, winding or rolling rolls of strip material without the use of cores or core members.

SUMMARY OF THE INVENTION

The invention is considered to be sufficiently summarized in the foregoing abstract of the disclosure and, therefore, in order to avoid repetition or redundancy, and for purposes of simplification and brevity to the extent possible, no further summary of the invention is believed necessary.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a side elevational view of the apparatus embodying the invention;

FIG. 2 is an end elevational view of the apparatus of FIG. 1, such view being taken generally along line 2—2 of FIG. 1;

FIGS. 3 through 8 comprise detail views of parts of the apparatus of FIGS. 1 and 2; and

FIG. 9 comprises an elevational view on an enlarged scale of a coreless spiraled roll of flexible strip or ribbon material wound, rolled or formed into such roll by the apparatus of the invention.

Similar reference characters refer to similar parts in each of the figures of the drawings.

PREFERRED EMBODIMENTS OF THE INVENTION

Referring to FIGS. 1 and 2, there is shown the winding apparatus 10 comprising a main support frame including a pair of vertical or upright sides or support plates 11 and 12 which are spaced from each other by a plurality of crosswise or horizontal spacers or spacer members 13 through 17 to the ends of which are secured plates 11 and 12 as by suitable threaded bolts such as 18 which extend through the plates and are screwed into cooperatively threaded holes in the ends of the spacers or spacer members. The upper ends of a set of feet such as 19 are attached, as by welding for example, to spacer members 14 and 16 and the lower ends of such feet rest on the floor or the top surface of a suitable platform or table 21.

A strip material guide platform 22 is secured in any convenient manner to the top edges of a pair of longitudinal support members 23 and 24 which are secured to

the outside surfaces of sides or support plates 11 and 12, respectively, as by welding thereto for example. Platform 22 includes an end portion 22a of a lesser width than the remainder of the platform and which extends between support plates or sides 11 and 12 a selected distance. A pair of longitudinal guide members 27 and 28 are secured to the top surface of platform 22, as by welding thereto for example, and such members extend between sides 11 and 12 for a substantial part of the length of the narrow end portion 22a of platform 22 (FIG. 1) as well as for the length of the wide part of the platform.

As illustrated in FIG. 1, the left hand end of a platform 30 (viewing FIG. 1) is disposed near the right hand end of platform 22 with a space provided between the ends of such platforms for the movement of a cutting blade or knife 31 therebetween. A reel 32 of a flexible ribbon or strip material such as a corrugated paper 33, for example, is disposed adjacent the right hand end of platform 30 and strip material 33 is fed from such reel across the top surface of platform 30 by a roller 34 which contacts the top surface of material 33 and is periodically rotated in the direction indicated by the arrow on the roller. Material 33 is thereby also moved between guide members 27 and 28 and across the top surface of platform 22 in the left hand direction (viewing FIG. 1) as indicated by the arrow above the material 33 in FIG. 1. Material 33 and parts, components or devices 30, 31, 32 and 34 form, per se, no part of the present invention but are shown merely for the purpose of making the disclosure complete by providing for an operational example of the invention as hereinafter set forth.

Referring to FIGS. 3 and 4, taken in conjunction with FIG. 2, there is shown a frame member 36 comprising a pair of longitudinal side members 37 and 38 which are secured to the ends of spacers or spacer members 39, 40 and 41 as by bolts such as 42. A knurled roller 43 is rotatively mounted between side members 37 and 38 with the axle 44 of such roller extending through bushings or bearings 45 and 46 disposed in suitable holes provided in side members 37 and 38 adjacent first ends thereof. For purposes of simplification of the drawings, the ends of axle 44 are shown in FIG. 3 as broken off. A grooved roller 47 is rotatively mounted between side members 37 and 38 and the axle 48 (FIG. 4) of such roller extends through suitable bushings or bearings 49 and 50 disposed in suitable holes provided in side members 37 and 38 adjacent second ends thereof. Roller 47 is freely rotatable in said bushings.

The grooves of above-mentioned roller 47 are provided to receive a set of four flexible loop or endless belts which have teeth on the outer surface of the belts transverse to the loop length of the belts. Such types of belts are well known and, although the belts are not shown in FIG. 3, they are illustrated in FIG. 2 looping about roller 47 and are designated 51, 52, 53 and 54. Such belts are also intended to loop about knurled roller 43 in a driven relationship therewith. A normal loop path of travel for the set of belts is illustrated in FIG. 1 and is indicated by the reference character 55. The belts are arranged to be driven through said loop path of travel in the direction indicated by the arrows in FIG. 1. This will be further discussed hereinafter.

Frame member 36 further includes a plate member 56 preferably of a smooth plastic material such as nylon for example, such plate being secured to corresponding

recessed edges of spacers 40 and 41 by suitable belts or screws such as 57 as shown in FIGS. 3 and 4. Such plate member is a back-up member for the set of belts previously discussed and the plate includes extensions such as 57a each of which are located so as to provide a back-up for a respectively associated one of said set of belts. The spacers provided between the extensions 57a allow passage therebetween of the loop belts of another set thereof as will become apparent as the description proceeds. Such other set of belts comprises a set of three loop belts and will be hereinafter discussed. The sides 37 and 38 of frame member 36 also embody holes 37a and 38a, respectively, which extend through such sides and are provided for a purpose also to be hereinafter discussed.

Referring now to FIGS. 7 and 8, taken in conjunction with FIG. 2, there is shown a second frame member 66 comprising a pair of longitudinal side members 67 and 68 which are secured to the ends of spacers or spacer members 69, 70 and 71 as by bolts such as 72. A knurled roller 73 is rotatively mounted between side members 67 and 68 with the axle 74 of such roller extending through bushings or bearings 75 and 76 disposed in suitable holes provided in side members 67 and 68 adjacent first ends thereof. For purposes of simplification of the drawings the ends of axle 74 are shown in FIG. 3 as broken off. A grooved roller 77 is rotatively mounted between side members 67 and 68 and the axle 78 (FIG. 8) of such roller extends through suitable bushings or bearings 79 and 80 disposed in suitable holes provided in side members 67 and 68 adjacent second ends thereof. Roller 77 is freely rotatable in said bushings.

The grooves of above-mentioned roller 77 are provided to receive a set of four flexible loop belts which have teeth on the outer surface of the belts transverse to the loop length of the belts as with those previously mentioned. Although the belts are not shown in FIG. 7, they are illustrated in FIG. 2 looping about roller 73 in a driven relationship therewith and are designated 81, 82, 83 and 84. Such belts are also intended to loop about roller 77 in the grooves in such roller. An initial loop path of travel for the set of belts is illustrated in FIG. 1 and is indicated by the reference character 85. The belts are arranged to be driven through said loop path of travel in the direction indicated by the arrows in FIG. 1. This will be further discussed hereinafter.

Frame member 66 further includes a series of belt back-up members such as 86 preferably of a smooth plastic material such as nylon for example, such members being secured to corresponding recessed edges of spacers 70 and 71 as by suitable belts or screws for example. Such members are back-up members for the second set of belts previously discussed and the members are each located so as to provide a back-up for a respectively associated one of the second set of belts. The spaces provided between the members allow passage therebetween of the loop belts of another set thereof as will become apparent as the description proceeds and as previously mentioned. Such other set of belts, as also previously mentioned, comprises a set of three loop belts and will be hereinafter discussed. A curved end plate member or guide 88 is secured in any suitable manner, such as by welding for example, to the bottom edges of spacers 70 and 71 (viewing FIG. 8). As shown in FIGS. 2 and 8, guide 88 curves upwardly about the outer periphery of roller 73 and is spaced

therefrom a distance just sufficient to permit the second set of belts to readily pass between the upper or inner surface of the guide and the outer periphery of roller 73. The lower surface of guide 88 is extremely smooth for possible sliding movement thereagainst of strips of flexible material being wound or rolled by the apparatus of the invention as hereinafter described.

Referring now to FIGS. 5 and 6, taken in conjunction with FIG. 2, there is shown a third frame member 96 comprising a pair of longitudinal side members 97 and 98 which are secured to the ends of spacers or spacer members 99, 100 and 101 as by bolts such as 102. A knurled roller 103 is rotatively mounted between side members 97 and 98 with the axle 104 of such roller extending through bushings or bearings 105 and 106 disposed in suitable holes provided in side members 97 and 98 adjacent first ends thereof. For purposes of simplification of the drawings the ends of axle 104 are shown in FIG. 5 as broken off. A grooved roller 107 is rotatively mounted between side members 97 and 98, and the axle 108 (FIG. 6) of such roller extends through suitable bushings or bearings 109 and 110 disposed in suitable holes provided in side members 97 and 98 adjacent second ends thereof. Roller 107 is freely rotatable in said bushings.

The grooves of above-mentioned roller 107 are provided to receive a set of three flexible loop belts which also have teeth on the outer surface of the belts transverse to the loop length of the belts. Such belts are illustrated in FIG. 2 looping about rollers 103 and 107 and are designated 111, 112 and 113. Such belts loop about knurled roller 103 in a driven relationship therewith. An initial loop path of travel for the third set of belts is illustrated in FIG. 1 and is indicated by the reference character 115. The belts are arranged to be driven through said loop path of travel in the direction indicated by the arrows in FIG. 1. This will be further discussed hereinafter.

Frame member 96 further includes three belt back-up members such as 116 preferably of a smooth plastic material such as nylon, such members being secured to corresponding recessed edges of spacers 99 and 100 by suitable bolts or screws such as 117 as shown in FIGS. 5 and 6. Such members are back-up members for the belts of the third set of belts previously discussed and the members are located so as to provide a back-up for a respectively associated one of the belts of said set of three belts. The spaces provided between the back-up members such as 116 allow passage therebetween of the loop belts of the first and second sets of belts previously discussed. This will also become apparent as the description proceeds.

As best illustrated in FIG. 2 taken in conjunction with FIG. 1, but also viewing FIGS. 7 and 8, frame 66 is mounted or supported between support plates or sides 11 and 12 of winding apparatus 10 by axle 74 of roller 73 extending through bushings or bearings 120 and 121 disposed in suitable holes provided in said sides 11 and 12, respectively. The left hand end of axle 74 (viewing FIG. 2) is provided with a sprocket wheel 122 which is keyed to such axle in a driving relationship therewith. (See also FIG. 1) Similarly, and viewing FIGS. 5 and 6 in conjunction with FIGS. 1 and 2, frame 96 is mounted or supported between support plates or sides 11 and 12 of winding apparatus 10 by axle 104 of roller 103 extending through bushings or bearings 126 and 127 disposed in suitable holes provided in said sides 11 and 12,

respectively. The left hand end of axle 104 (viewing FIG. 2) is provided with a sprocket wheel 127 which is keyed to such axle in a driven relationship therewith. A crank wheel 136 is keyed to the right hand end of axle 104 (viewing FIG. 2) in a driving relationship therewith.

Frame 36 is mounted or supported between support plates or sides 11 and 12 of winding apparatus 10 in a manner similar to that in which frames 66 and 96 are mounted, that is, with axle 44 (FIGS. 1, 3 and 4) extending through suitable bushings or bearings provided in said sides 11 and 12. However, for purposes of simplification of the drawings, the details of the manner in which axle 44 is supported are not shown, but it will be readily apparent from the foregoing description and illustration of the manner in which frame 66 is supported or mounted. A sprocket wheel 128 is keyed to the left hand end of axle 44 in a driving relationship therewith. (See FIGS. 1 and 2).

The right hand end of frame 36 (viewing FIG. 1) is downwardly movable from the horizontal position of the frame, illustrated by the path of travel 55 of the belts of such frame, to a lower position for purposes hereinafter discussed. However, frame 36 is normally held or latched in its horizontal position shown in FIG. 2 by a latching means comprising a rod 130 which extends through previously mentioned holes 37a and 38a provided in sides 37 and 38, respectively, of frame 36 and also through cooperative holes such as 130a (FIG. 1) provided in sides 11 and 12 of winding apparatus 10. Rod 130 also extends through a cooperative hole 131a provided in an upright end portion 131b of a bracket 131 which is secured to the outside surface of side 12 by bolts such as 132 extending through a downwardly extending end portion 131c of bracket 131 and into suitably threaded holes provided in said side 12 of winding apparatus 10. A handle 133 is secured to the right hand end of rod 130 for handling of the rod for its removal from and replacement into said holes such as 37a, 38a, 130a and 131a. This will be further discussed hereinafter.

The left hand end of frame 66 (viewing FIG. 1) is movable in an upward direction from the horizontal position of the frame, illustrated by the initial path of travel 85 (FIG. 1) of the belts of such frame, to a higher or raised position between sides 11 and 12 of winding apparatus 10. When the apparatus is not in the process of winding a flexible strip of material, frame 66 is biased downwardly by gravity so that the lower edge of side 67 of frame 66 rests on the upper end of an adjustable stop comprising a threaded bolt 137 (FIGS. 1 and 2) screwed upwardly through a cooperatively threaded hole provided in a horizontal portion of a suitable inverted ell-shaped support bracket 138 secured in any convenient manner, such as by welding for example, to the inside surface of side 11 of winding apparatus 10. The lower end of frame 96 (viewing FIG. 1) initially or normally depends or hangs downwardly in an almost vertical direction as illustrated by the initial path of travel 115 (FIG. 1) of the belts in such frame, the frame initially or normally being biased to such position by gravity. When in such position the right hand edge of side 97 of frame 96 (viewing FIG. 1) rests against the end of an adjustable stop comprising a threaded bolt 141 screwed through a cooperatively threaded hole provided in a suitable support bracket 142 secured in any convenient manner, such as by welding for exam-

ple, to the inside surface of side 11 of winding apparatus 10. Stop or bolt 141 prevents frame 97 from assuming an entirely vertical position under the influence of gravity. As is apparent from the above description, the left hand end and the lower end of frames 66 and 96, respectively, are movable between sides 11 and 12 of winding apparatus 10 through arcuate paths indicated by the double-headed broken-line arrows 143 and 144, respectively, shown in FIG. 1. This will be further discussed hereinafter in an operational example of the invention.

There is also shown in FIGS. 1 and 2, a drive chain 146 which loops about previously mentioned sprockets or sprocket wheels 122, 127 and 128 in a driving relationship with sprockets 122 and 128, and in a driven relationship with sprocket wheel 127. By such arrangement it will be readily apparent that the manual cranking or rotation of previously mentioned crank wheel 136 imparts corresponding rotation of roller 103, axle 104 and sprocket 127 and, through chain 146, corresponding rotation of sprockets 122 and 128 which, in turn, rotate axles 74 and 44 and, thereby, rollers 73 and 43. Such rotation of rollers 43, 73 and 103 drives the respectively associated sets of belts on frames 36, 66 and 96 through their paths of travel 55, 85 and 115, respectively. An idler sprocket 148 (FIGS. 1 and 2) is rotatably mounted on a short stub axle 149 adjacent a free threaded end thereof and whose second end is affixed in any convenient manner to or in the lower end of an adjustable support member 150 which is adjustably fastened to the outside surface of side 11 of winding apparatus 10 as by threaded bolts such as 151 which extend through a slot 151a (FIG. 1) provided in support member 150 and into cooperatively threaded holes (not shown) provided in said side 11 of apparatus 10. The teeth of sprocket wheel 148 mesh with links of chain 146 and such chain may be tightened or loosened by turning and loosening of the bolts such as 151 and then sliding member 150 downwardly or upwardly, respectively, and retightening said bolts. Such arrangement will be readily apparent to those skilled in the art.

Referring to FIG. 9, there is shown, on an enlarged scale, a spiraled roll 155 of a strip of flexible and corrugated material such as corrugated paper 33 (FIG. 1) such roll being wound, rolled or formed by the apparatus of the invention. Such a roll is spirally wound by the apparatus in the manner discussed hereinafter.

It is pointed out that the crossing of the three sets of belts provides a winding space or cavity which is designated by the reference character 156 in FIG. 1 and which is defined by the upper and lower outer surfaces of the sets of belts on frame members 37 and 67, respectively, and the right hand outer surface (viewing FIG. 1) of the set of belts on frame member 96. Such space or cavity is of variable size, initially being at its minimum size and assuming a triangular shape or cross-sectional areal configuration of an increasing size or area as a roll of material is wound, rolled or formed by the apparatus of the invention.

Referring to FIG. 1, it will be assumed that the leading edge of strip material 33 is being fed in the left hand direction as previously discussed and such leading edge moves or slides across the top surface of platform 22 and between guides 27 and 28 (FIG. 2) to contact the curved end of plate member or guide 88. Such plate member holds the strip material against the set of belts 51, 52, 53 and 54 on frame 37 to cause such strip to be

moved to the left without interference from the set of belts 81, 82, 83 and 84 on frame 66. An operator rotates crank wheel 136 in a direction to move chain 146 in the direction indicated by the arrows in FIG. 1 and the sets of belts on frames 36, 66 and 96 are thereby moved through their loop paths of travel 55, 85 and 115, respectively. When the leading edge of the strip of material contacts the set of belts on frame 36, such material is further urged by such belts in a left hand direction until said leading edge contacts the set of belts 111, 112 and 113 on frame 96. At such time, the belts on frame 96 urge the leading edge of the strip of material in an upward direction so that such edge contacts the outer toothed surface of the set of belts on frame 66. The latter set of belts urges the leading edge of the strip of material back upon the upper surface of the part of the strip of material which is then being moved in the left hand direction by the set of belts on frame 36 and the leading edge is then again urged in a left hand direction to complete the center of the spiraled roll such as 155 being wound or formed. Roller or feeder 34 (FIG. 1) may then be moved out of contact with the upper surface of the strip of material such as 33 since the sets of belts of the winding apparatus will now cause the further feeding or movement of the strip of material. The sets of belts of the winding apparatus continue to spirally wind or roll the strip of material such as 33 as long as crank wheel 136 is continued to be rotated. During the continued winding or rolling of the strip of material, the left hand end of frame 66 is moved upwardly by the enlargement of the roll being wound while the lower end of frame 96 is moved to the left by such enlargement of the roll. However, the toothed outer surfaces of the belts of frame members 66 and 96 are gravitationally maintained in contact with the outer surface of the roll of material as it is formed or wound, and the previously mentioned winding space or cavity 156 bounded by the toothed outer surfaces of the belts of frames 36, 66 and 96 and in which the roll is being formed increases in size or area along with the spiraling enlargement of the roll.

When the spiraled roll approaches its desired size, or approaches the size which is the maximum that can be formed or wound by the winding apparatus, knife or cutting blade 31 is actuated to cut or sever the strip of material 33 and, thereafter, crank wheel 136 needs to be turned or rotated only sufficiently to wind or spiral the remaining linear portion of the severed strip upon the part of the spiraled roll already formed and thereby complete the spiraled roll. Following such completion of the spiraled roll and the termination of the rotation or turning of crank wheel 136, rod 130 is removed from or pulled out of the aforementioned holes such as 37a, 38a and 130a provided in sides 37 and 38 of frame 36 and in sides 11 and 12 of the winding apparatus 10 to thereby release or unlatch frame 36. This permits the lowering of the right hand end (viewing FIG. 1) of frame 36 to remove the completed roll such as 155 (FIG. 9) from the open bottom of the winding apparatus. Subsequent to the removal of the spirally wound roll as just described, frame 36 is again raised to its horizontal position and rod 130 reinserted in the holes such as 130a in sides 37 and 38 of frame 36 to hold or latch the frame in the horizontal position thereof. Roller 34 (FIG. 2) may now be again lowered against the upper surface of strip material 33 to again feed such material into the apparatus of the invention and form,

wind or roll a strip or length of such material into a spiraled roll.

It is pointed out that although the winding apparatus 10 is shown and described as including a crank wheel such as 136 (FIG. 2) for driving the sets of belts of the invention, it is readily apparent that a suitable pulley or sprocket wheel could be used in place of the crank wheel and such pulley or sprocket could be rotatively driven from the output shaft of suitable motor means connected through a drive belt or chain to said pulley or sprocket. Furthermore, axle 104 could be directly coupled to the output shaft of suitable motor means in a driven relationship therewith, as is also readily apparent.

Although there is herein shown and described only one form of apparatus embodying the invention, it will be understood that various changes and modifications may be made therein within the purview of the appended claims without departing from the spirit and scope thereof.

I claim:

1. An apparatus for winding a flexible strip of material into a coreless spiraled roll, such apparatus comprising, in combination;

I. a main support frame;

II. a first set of parallel and spaced-apart belts mounted on said frame and movable through a first closed loop path of travel;

III. a second set of parallel and spaced-apart belts mounted on said frame and movable through a second closed loop path of travel with the outer faces of the set of belts of such loop facing the outer surface of said first set of belts, such second set of belts mounted on said frame for movement away from and towards said first set of belts and biased towards the first set of belts to a position spaced from such first set a distance slightly greater than the thickness of said strip of material;

IV. a third set of parallel and spaced-apart belts mounted on said frame and movable through a third closed loop path of travel normally crossing the paths of travel of said first and second sets of belts at a selected angle thereto, such third set of belts mounted on said frame for movement away from and towards one end of said first set of belts and biased towards said one end, the belts of such third set thereof extending through the spaces between the belts of said first and second sets thereof and defining in conjunction with such first and second sets of belts a variable size winding cavity for initial receipt of a leading end of a strip of said material therein and initial and subsequent winding of such material into said spiraled roll;

V. means for guiding the leading edge of said strip of material between said facing surfaces of said belts of said first and second sets thereof and into said winding cavity; and

VI. means for driving said sets of belts in corresponding directions through their respective loop paths of travel to wind said strip of material into said coreless spiraled roll thereof.

2. Apparatus in accordance with claim 1 and further including latching means for normally holding said first set of belts in said first loop path of travel and actuatable to an unlatched condition for lowering such set of belts for removal of a completed roll of said material.

3. Apparatus for winding a strip or length of flexible ribbon material into a spiraled roll and without the use of a core member, such apparatus comprising, in combination;

I. a main support frame including a pair of spaced-apart upright support plates;

II. a first longitudinal frame member including a pair of side members supporting a first set of flexible and spaced-apart parallel belts for movement through a closed loop paralleling such side members, such frame member normally supported between said support plates for movement of the set of belts thereon through a first selected loop path of travel between such support plates;

III. a second longitudinal frame member including a pair of side members supporting a second set of flexible and spaced-apart parallel belts for movement through a closed loop paralleling such side members, such second frame member supported between said support plates for movement of the set of belts thereon through a second selected loop path of travel between said support plates and initially paralleling said first selected path of travel with the outer surfaces of said second set of belts facing the outer surfaces of said first set of belts, a first end of such second frame member movable between said support plates away from and towards a corresponding first end of said first frame member;

IV. a third longitudinal frame member including a pair of side members supporting a third set of flexible and spaced-apart parallel belts for movement through a closed loop paralleling such side members, such third frame member supported between said support plates for movement of the set of belts thereon through a third selected loop of travel between said support plates and initially crossing said first and second paths of travel at a selected angle thereto and with the belts of such third set thereof extending through the spaces between the belts of the first and second sets of belts to define a winding cavity, one end of such third frame member movable between said support plates away from and towards the second ends of said first and second frame members;

V. means for driving said sets of belts in corresponding directions through their respective selected paths of travel between said support plates; and

VI. means for guiding the leading edge of said strip of ribbon material into said winding cavity for

winding thereof into said spiraled roll.

4. Apparatus in accordance with claim 3 and in which said flexible belts have teeth on the outer surfaces thereof and which are transverse to the length of the belts.

5. Apparatus in accordance with claim 3 and in which said second and third frame members are biased towards initial positions between said support plates to initially position the respective sets of belts supported thereon in their said initial relationships with each other and with said first set of belts.

6. Apparatus in accordance with claim 4 and in which said second and third frame members are biased towards initial positions between said support plates to initially position the respective sets of belts supported thereon in their said initial relationship with each other and with said first set of belts.

7. Apparatus according to claim 3 and further including latching means for latching said first frame member in its said normally supported position between said support plates, such latching means being actuable for unlatching the first frame member and lowering one end thereof for removal of the wound roll of the strip of ribbon material from the winding apparatus.

8. Apparatus in accordance with claim 4 and further including latching means for latching said first frame member in its said normally supported position between said support plates, such latching means being actuable for unlatching the first frame member and lowering one end thereof for removal of the wound roll of the strip of ribbon material from the winding apparatus.

9. Apparatus in accordance with claim 5 and further including latching means for latching said first frame member in its said normally supported position between said support plates, such latching means being actuable for unlatching the first frame member and lowering one end thereof for removal of the wound roll of the strip of ribbon material from the winding apparatus.

10. Apparatus in accordance with claim 6 and further including latching means for latching said first frame member in its said normally supported position between said support plates, such latching means being actuable for unlatching the first frame member and lowering one end thereof for removal of the wound roll of the strip of ribbon material from the winding apparatus.

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