Sept. 23, 1952 E. D. NYSTRAND 2,611,552

WEB WINDING MACHINE

Filed Nov. 9, 1951 3 Sheets-Sheet 1

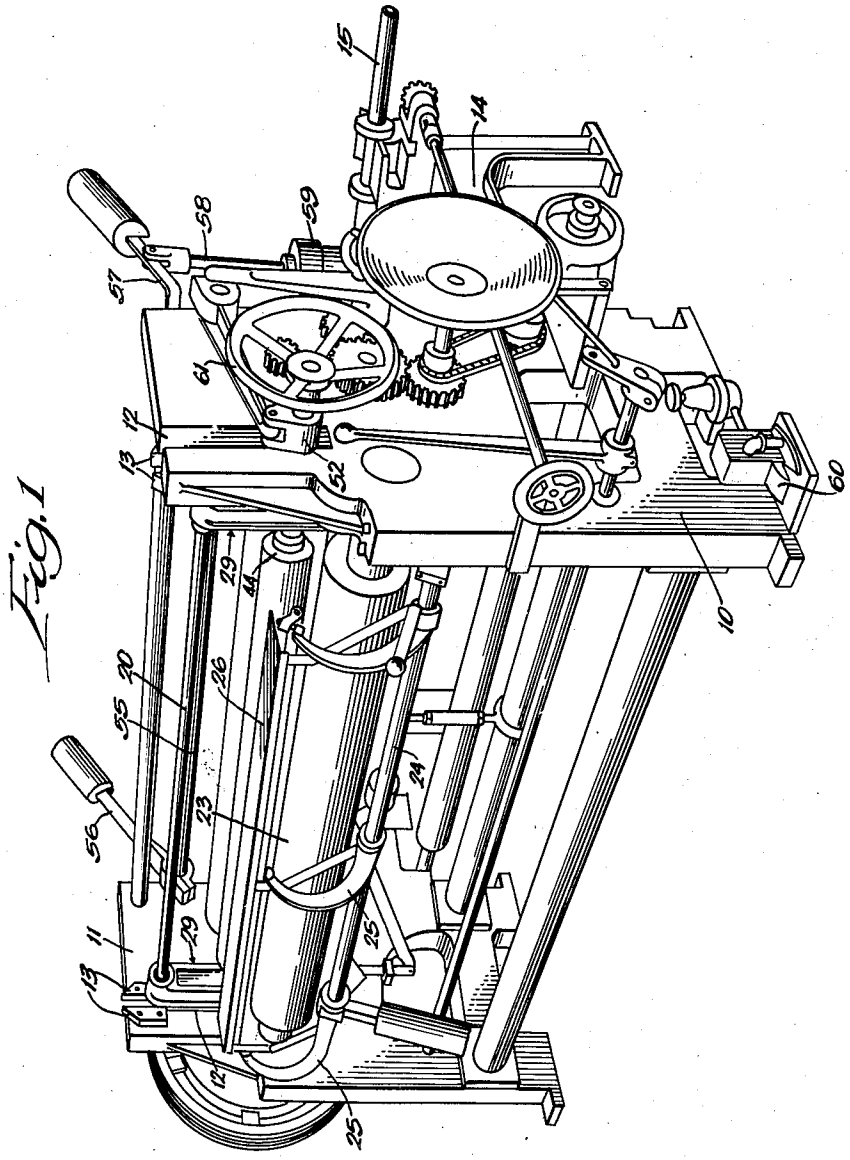


Fig. 1

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Filed Nov. 9, 1951 3 Sheets-Sheet 2

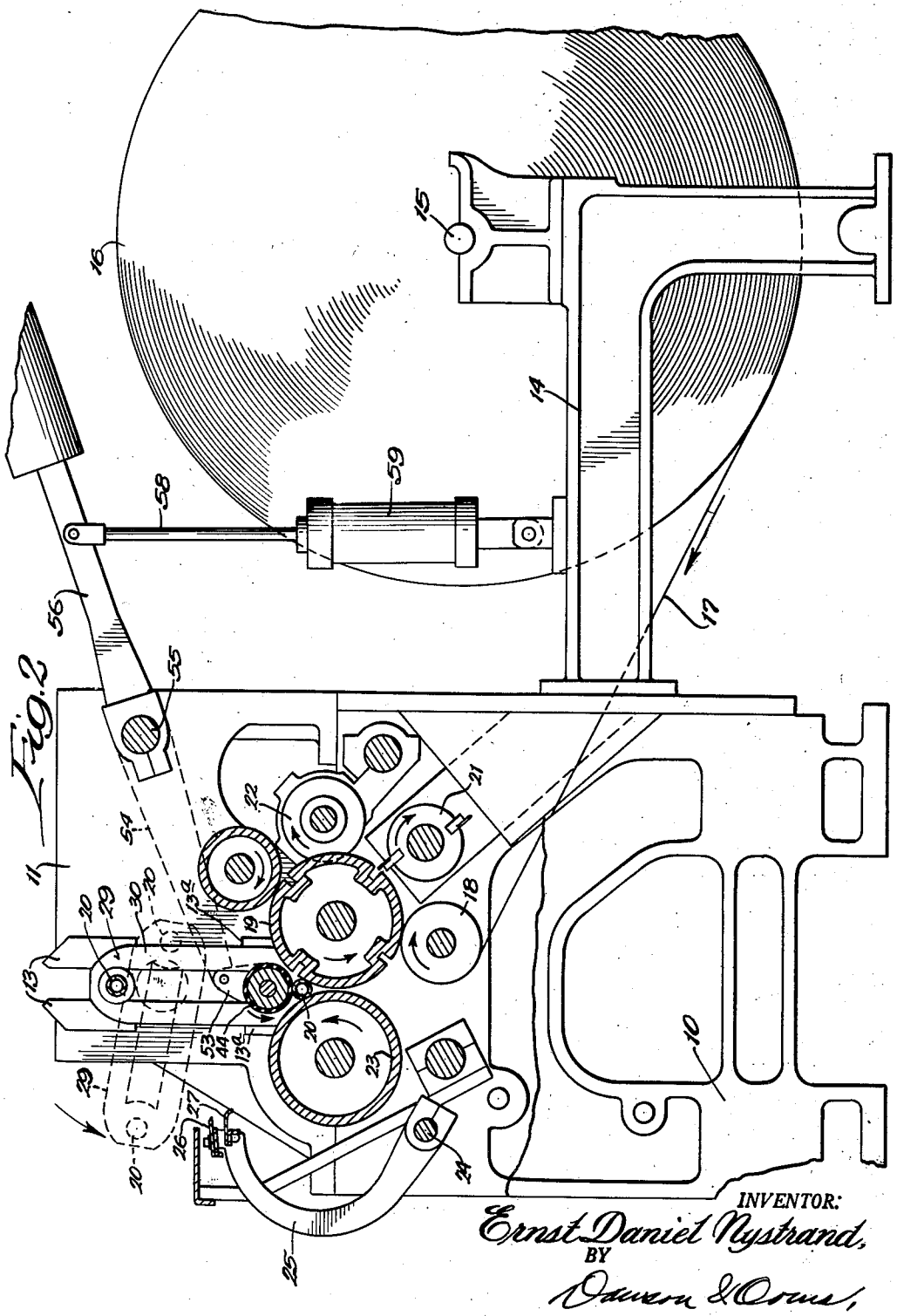


Fig. 2

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Sept. 23, 1952 E. D. NYSTRAND 2,611,552

WEB WINDING MACHINE

Filed Nov. 9, 1951 3 Sheets-Sheet 3

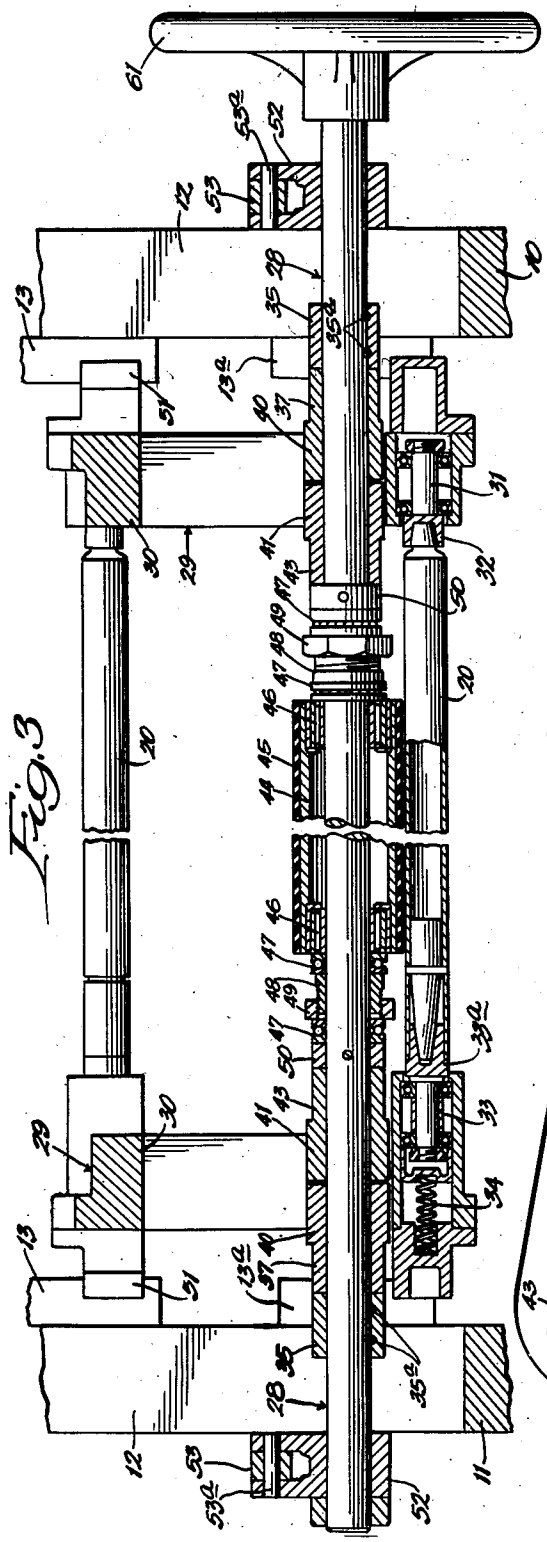


Fig. 3

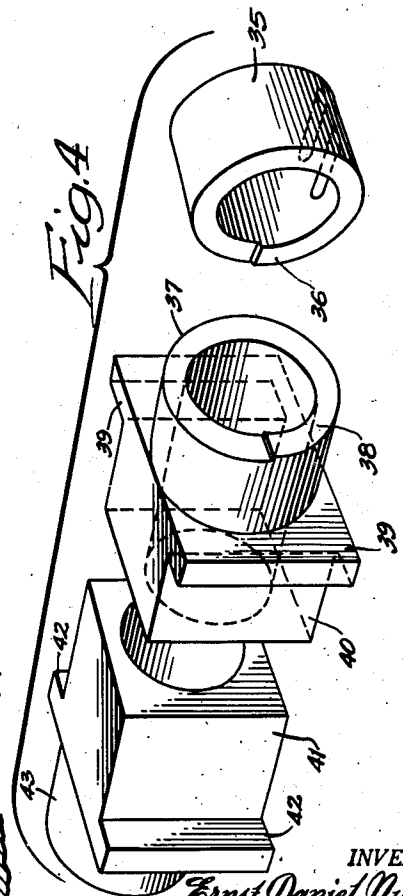


Fig. 4

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UNITED STATES PATENT OFFICE

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WEB WINDING MACHINE

Ernst Daniel Nystrand, Green Bay, Wis., assignor to Paper Converting Machine Co., Inc., Green Bay, Wis., a corporation of Wisconsin

Application November 9, 1951, Serial No. 255,693

12 Claims. (Cl. 242—64)

1

This invention relates to a paper winding machine. The invention is useful in connection with the winding of any kind of web material upon mandrels, etc. To simplify the description of the machine, the machine will be described as employed for the winding of paper in rolls.

An object of the invention is to provide a web or paper winding machine which greatly facilitates the removal of mandrels containing the wound material and the insertion of new mandrels, etc. A further object is to provide a structure in which a horizontal shaft is vertically movable through a mandrel supporting spider equipped with means for releasably securing the shaft to the spider at any desired elevation. A further object is to provide in such a structure means for elevating the spider and/or shaft structure and for rotating the same to move the filled mandrel to an elevated position for removal while directing an unfilled mandrel into position for winding the web thereon. Yet another object is to provide over a pair of parallel winding rolls a vertically guided floating shaft structure, movable vertically within a spider and adapted to be releasably clamped thereto, a rider roll being carried by said shaft and mandrels being carried between the ends of said spider. Yet another object is to provide with the above structure power means for elevating the shaft and the spider clamped thereto and for supporting the same in an elevated position for rotation well above said parallel rolls. Yet another object is to provide in such a structure guide means for maintaining said spider in a vertical position while paper is being wound upon the lowermost mandrel, elevating means being provided for lifting said spider free of said guide means to permit rotation of the spider upon the shaft clamped thereto. A still further object is to provide in a paper-winding machine spaced driven rolls for winding paper upon a floating mandrel and in combination with a severing device and a tucker for securing the paper about the winding mandrel, spider means being provided for raising the filled mandrel and inserting a new or unfilled mandrel in its place. Other specific objects and advantages will appear as the specification proceeds.

The invention is shown in an illustrative embodiment by the accompanying drawings, in which—

Figure 1 is a perspective view of a machine embodying my invention; Fig. 2, a broken vertical sectional view; Fig. 3, a broken longitudinal sectional view; and Fig. 4, a perspective view of

2

the clamping parts shown in spaced-apart relation.

In the illustration given, 10 and 11 designate side walls for the machine, each of said side walls or frames being provided near its top with a vertical slot 12. Adjacent the top of the slot on the inner side of the side walls are short, spaced guides 13.

Much of the machine is of old and well-known construction and need be referred to but briefly. For example, the machine is provided at its rear with a base support 14, on which is mounted the shaft 15 supporting the paper supply roll 16, as shown more clearly in Fig. 2. The paper 17 from the roll 16 extends inwardly about a guide roll 18 and thence around a bedroll 19 and is wound about a mandrel 20. Cooperating with the bedroll 19 having longitudinal and annular recesses therein, are the perforating roll 21 and slitting roll 22. It will be understood that a variety of other operations may be carried on in connection with the bedroll 19 by various types of cooperating rolls, slitters, perforators, etc.

The mandrel 20 upon which the paper is wound is supported in a floating relation upon the roll 19 and a second roll 23 supported in parallel relation with roll 19 and driven in the same direction. The two parallel rolls 19 and 23 have their inner adjacent surfaces substantially aligned with the vertical slots 12 in the side walls 10 and 11 of the frame, and they serve as winding rolls for winding the paper about the floating mandrel 20. A rotatably-mounted shaft 24 is equipped with a curved arm 25, on which is mounted a knife 26 and a tucker 27. After the completion of the winding of paper upon the mandrel 20, the knife 26 is swung inwardly to sever the paper, and similarly when the paper is to be tucked about the mandrel 20, this is accomplished by the swinging forwardly of the tucker 27 on lever 25. Since the slitting, perforating, severing and tucking devices are old and well understood in the art, a detailed description herein is believed to be unnecessary.

A shaft 28 extends through the slots 12 of the side walls 10 and 11, as shown best in Fig. 3. A spider 29 is provided with vertically-slotted end walls 30 receiving the shaft 28. The end-plates 30 support at each end a mandrel 20, the lowermost mandrel being in a position for the winding of paper thereon as heretofore described. Any means for supporting the mandrel 20 rotatably upon the spider plate ends may be provided. In the specific illustration given, a bearing 31 is provided with a cup-like end 32 for

receiving one end of the mandrel 20, as shown more clearly in Fig. 3. The other pointed end of the mandrel is received within a recessed end 33a carried by the bearing 33 and the bearing is retractable against compression spring 34 for the release of the mandrel.

As above stated, the shaft 28 is vertically movable within the slots 12 of the frame walls 10 and 11, and also vertically movable within the slotted end walls 30 of the spider. I will now describe means which may be employed for releasably clamping the shaft 28 to the spider ends 30 so that the shaft 28 may be used as an axis for the rotation of the spider to bring about the elevation of the filled mandrel and the lowering of the unfilled mandrel.

Upon each end of the shaft 28 is a cam collar 35 which is fixed to the shaft 28 by pins 35a. The inner end of the collar 35, as shown more clearly in Fig. 4, is provided with a cam portion 36. A clamping collar 37 is similarly provided with a cam edge 38 and with a clamping flange 39 adapted to engage the edges of the spider end-plate 30. The inner portion 40 of the clamping collar 37 is preferably square and is slidably received within the slot of the spider end-plate 30. A similar clamping block 41 is provided with a clamping flange 42 adapted to engage the opposite side of the spider plate 30, and is provided with a cylindrical collar 43, as shown more clearly in Figs. 3 and 4.

Between the collar members 43 is mounted a rider roller 44 which is adapted to bear against the paper roll on the lower mandrel 20. The rider roller 44 may be provided with a resilient sleeve 45 and is supported freely upon the needle bearings 46.

I desire to provide thrust bearings at both ends of the rider shaft roll, and means at one end of the rider shaft roll for adjusting the clamping pressure so as to take up slack or wear in the shaft. In the specific illustration given, thrust bearings 47 at one end of the shaft are spaced apart by a threaded collar 48, on which is mounted a threaded adjustment ring 49. If desired, a collar 50 may be interposed between the member 43 and the thrust bearing structure described, as shown more clearly in Fig. 3.

The end-plates 30 of the spider are provided at either end with an outwardly-extending tongue 51 adapted to be received between the guide members 13 of the side walls 10 and 11. It will be observed that when the spider is in its lower position and when paper is being wound upon the lower mandrel 20, the guides 13 are effective in holding the spider in true vertical position. Should the spider, however, be elevated to a position above the guides 13, it may then be freely rotated. If desired, similar guides 13a may be placed on the frame to guide the lower portion of the spider.

I wish now to describe simple means for elevating the spider 29 to an elevated position at which it may be rotated upon the shaft 28 after the shaft has been clamped to the spider end-plates 30. At each end of the shaft 28 is secured a bracket member 52, as shown more clearly in Fig. 3, and the upper end of each member 52 is bifurcated to receive a link member 53 secured to the member 52 by a pin 53a. The link member 53 is secured to a lever arm 54 at each end of the machine, mounted upon a shaft 55 secured within the side walls 10 and 11, and the shaft 55 is provided at one end with an outwardly-extending weighted arm 56 and at the other end with an outwardly-extending weighted arm 57. Secured to the arm 57 is a vertically-extending piston stem 58 secured to a piston within cylinder 59, pivotally mounted upon the base 14, as shown more clearly in Fig. 2. Pressure fluid, such as compressed air, is supplied to the upper end of the cylinder 59 through connections (not shown), but controlled by the foot valve 60 to cause the weighted arm 57 to be drawn downwardly and the lever 54 to be raised so as to elevate shaft 28 and the spider which is clamped to it by the collar flanges 39 and 42 to the spider 29.

The shaft 28 is provided at one end with an operating wheel 61.

Operation

In the operation of the machine, paper 17 is fed from the rotatably-mounted roll 16 forwardly about roll 18 and thence about the bedroll 19. The parallel driven rolls 19 and 23 wind the paper about the mandrel 20 supported in the lower portion of the spider 29. As the paper roll about the mandrel 20 increases in size, the rider roll 44 rises, moving upwardly through the slot in the end-plates 30 of spider 29. After the desired amount of paper has been rolled upon the lower mandrel 20, the lever 25 is swung inwardly to sever the paper. The operator rotates wheel 61 so as to drive the clamping collars 35 inwardly and the sides of the spider end-plates 30 are gripped between the flanges 39 and 42 of the collars 37 and 43. The spider thus becomes anchored rigidly to the shaft 28 and is ready for rotation upon the shaft after the shaft has been elevated to a point where the parts may clear the rolls 19 and 23 and have cleared also the guides 13.

To elevate the shaft 28 and the spider 29 anchored thereto, the operator opens valve 60 to supply compressed air to the upper part of the cylinder 59 and the piston therein is forced down, drawing the stem 58 and the shaft 57 downwardly. The inwardly-extending lever arms 54 fixed to shaft 55 are thus caused to move upwardly, carrying with them the links 53 and the two ends of the shaft 28. The spider may thus be raised to the position shown in dotted lines in Fig. 2, and when in this position, the spider is free not only of the rolls 19 and 23 but also of the guides 13. The operator may then continue to rotate the wheel 61 to bring the filled mandrel 20 to an elevated position and the unfilled mandrel 20 downwardly toward filling position. The filled mandrel may then be removed and the parts restored to the initial starting position as illustrated in Fig. 2, the operator moving the wheel 61 in the opposite direction to free the shaft 28 from clamping engagement with the spider 29. The foregoing described operation may be repeated with the filled mandrel being raised each time after filling and the unfilled roller being swung downwardly into position for filling.

Any type of power means may be employed for the elevating operation, including also means for manual operation. Power means for operating the wheel 61 may be provided in lieu of the manual means shown. Considerable variation in the specific details shown may be obviously made.

While, in the foregoing specification, I have set forth a specific structure in considerable detail for the purpose of illustrating one embodiment of the invention, it will be understood that such details of structure and means may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In a web winding machine, a frame having side walls provided with vertical slots, a pair of driven winding rolls having their adjacent sides aligned generally with said slots, a shaft extending through the slots of said side walls, a spider having vertically slotted end walls receiving said shaft, a rider roll mounted upon said shaft, spaced mandrels carried by the ends of said spider, and means associated with said shaft and spider for releasably clamping said shaft upon said spider, whereby upon rotation of said shaft said spider will rotate with said shaft as its axis.

2. In a web winding machine, a frame having side walls provided with vertical slots, a pair of driven winding rolls rotatably supported in said machine with their adjacent sides aligned generally with said slots, a shaft extending through the slots of said side walls, a spider having vertically-slotted end walls receiving said shaft, a rider roll mounted upon said shaft, spaced mandrels carried by the ends of said spider, means associated with said shaft and spider for releasably clamping said shaft upon said spider, and means for supporting said shaft independently of said driven winding rolls for the rotation of said shaft thereon.

3. In a web winding machine, a frame having side walls provided with generally vertical slots, a pair of driven winding rolls mounted for rotation and having their adjacent sides aligned generally with said slots, a shaft extending through the slots of said side walls, a spider having vertically-slotted end walls receiving said shaft, a rider roll mounted upon said shaft, mandrels carried by the ends of said spider, clamping means for releasably connecting said shaft to said spider, and means for elevating said shaft and for supporting the same for rotation in an elevated position.

4. In a web winding machine, a frame having side walls provided with generally vertical slots, a pair of driven winding rolls mounted for rotation and having their adjacent sides aligned generally with said slots, a shaft extending through the slots of said side walls, means for rotating said shaft, a spider having vertically-slotted end walls receiving said shaft, clamping members on said shaft for engaging said spider and actuated by the rotating of said shaft for connecting said shaft to said spider, mandrels carried by the ends of said spider, and means for rotatably supporting said shaft in an elevated position.

5. The structure of claim 4, in which said rider roll is mounted upon bearings carried by said shaft.

6. The structure of claim 4, in which said clamping members include collars mounted upon said shaft and in which said collars are spaced from said rider roll by thrust bearings.

7. The structure of claim 4, in which said clamping members include collars carried by said shaft and in which thrust bearings are interposed between said collars and said rider roll, threaded means being provided about the shaft for varying the pressure exerted upon said thrust bearings.

8. In a web winding machine, a frame having side walls provided with vertical slots, a pair of driven winding rolls mounted for rotation within said machine and having their adjacent sides aligned generally with said slots, a shaft extending through the slots of said side walls, a spider having vertically-slotted end walls receiving said shaft, a rider roll mounted upon said shaft, mandrels carried by the ends of said spider, means upon said shaft for clamping said shaft to said spider, support means rotatably engaging the ends of said shaft, and means for support of said shaft in an elevated position.

9. In a web winding machine, a frame having side walls provided with vertical slots, guide members on either side of said slots at the upper ends thereof, a pair of driven winding rolls having their adjacent sides aligned generally with said slots, a shaft extending through the slots of said side walls, a spider having vertically-slotted end walls receiving said shaft, mandrels carried by the ends of said spider, and means for releasably clamping said spider upon said shaft, means for elevating said shaft with the spider clamped thereto to free said spider from said guide means, whereby said spider may be rotated upon said shaft as its axis.

10. In a web winding machine, a frame having side walls provided with vertical slots, guide members about each of said slots at the upper ends thereof, a shaft extending through the slots of said side walls, a spider having slotted end walls receiving said shaft and having longitudinal extensions at each end thereof engageable with said guides, means for clamping said shaft upon said spider, and means for raising said shaft to an elevated position for the free rotation of said spider upon said shaft.

11. In a web winding machine, a pair of horizontal rolls therein mounted for rotation, a spider having slotted ends, mandrels mounted in the ends of said spider with one of the mandrels resting upon said rolls, a floating shaft extending through the slotted ends of said spider, means for releasably clamping said shaft upon said spider, and elevating means for supporting the ends of said shaft for rotation thereon.

12. The structure of claim 11, in which said clamping means includes a collar fixed to said shaft and a movable collar having a flange engageable with a side of said spider, said collars being provided at their adjacent edges with cam means whereby upon rotation of the shaft said movable collar is thrust inwardly with its clamping flange against said spider.

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No references cited.