April 19, 1949. L. HORNBOSTEL ET AL 2,467,554

SHAFT WINDER

Filed May 31, 1944 3 Sheets-Sheet 1

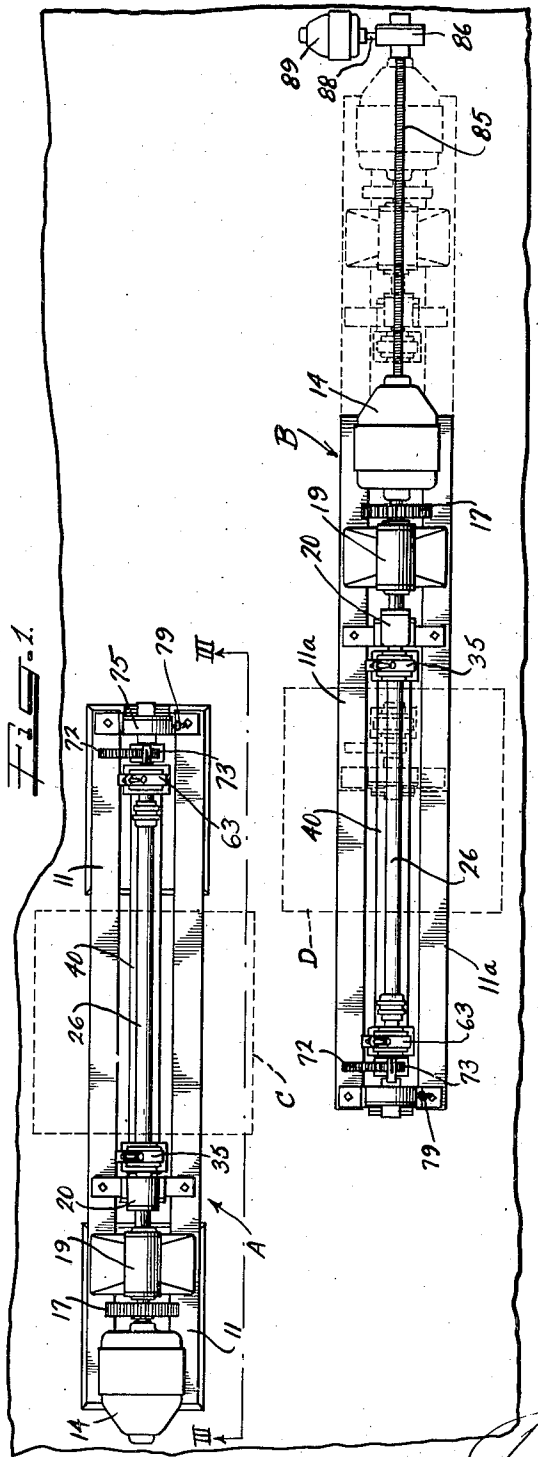


Fig. 1.

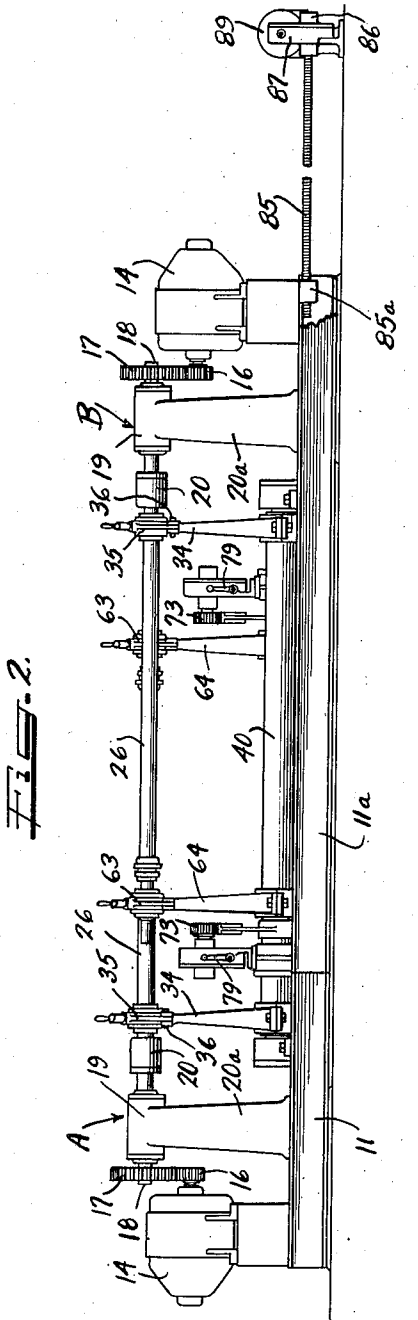


Fig. 2.

Inventors
LLOYD HORNBOSTEL.
EDWARD D. BEACHLER.

By Charles O. Hill Attys

April 19, 1949. L. HORNBOSTEL ET AL 2,467,554

SHAFT WINDER

Filed May 31, 1944 3 Sheets-Sheet 2

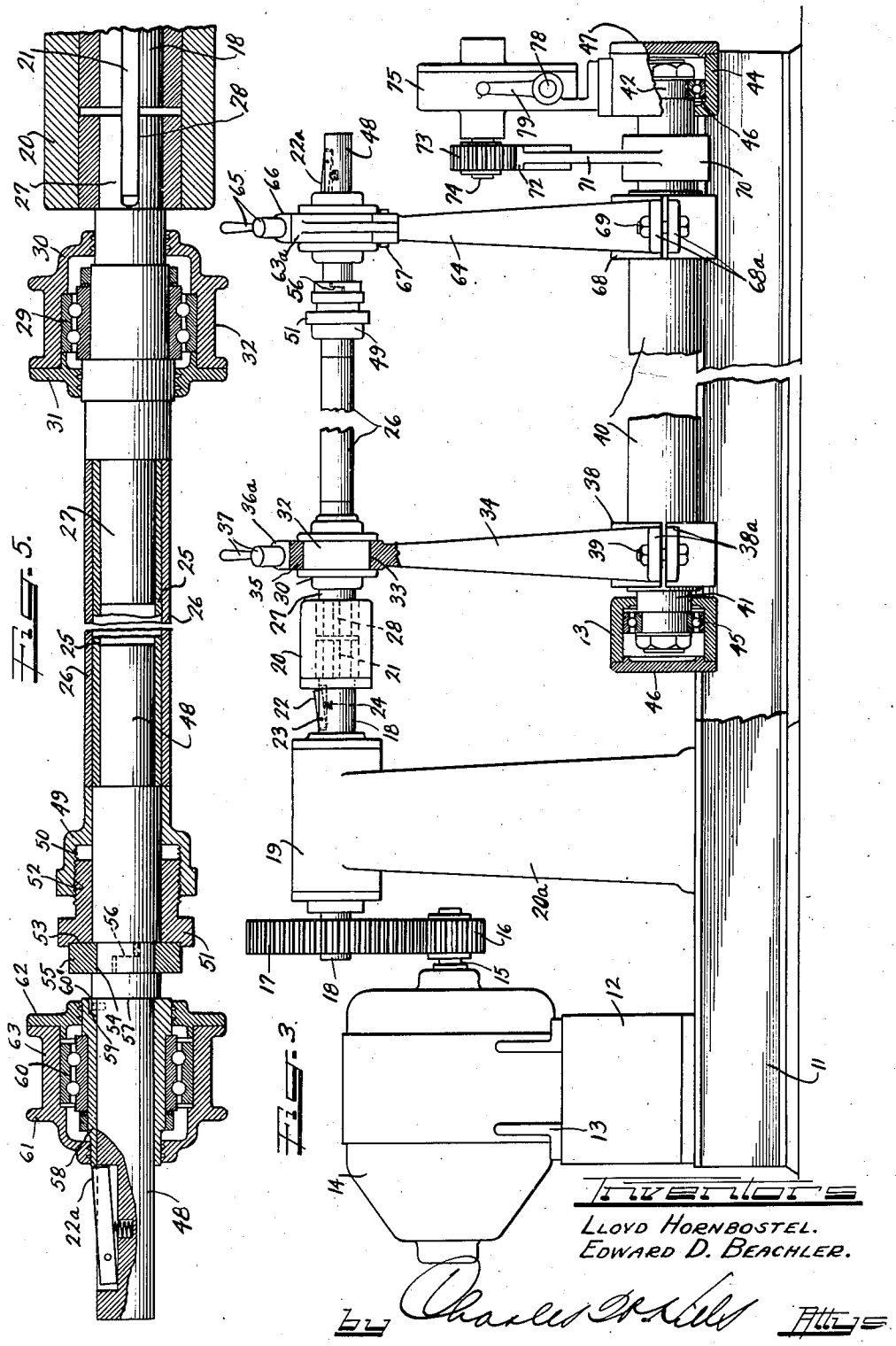


Fig. 5.

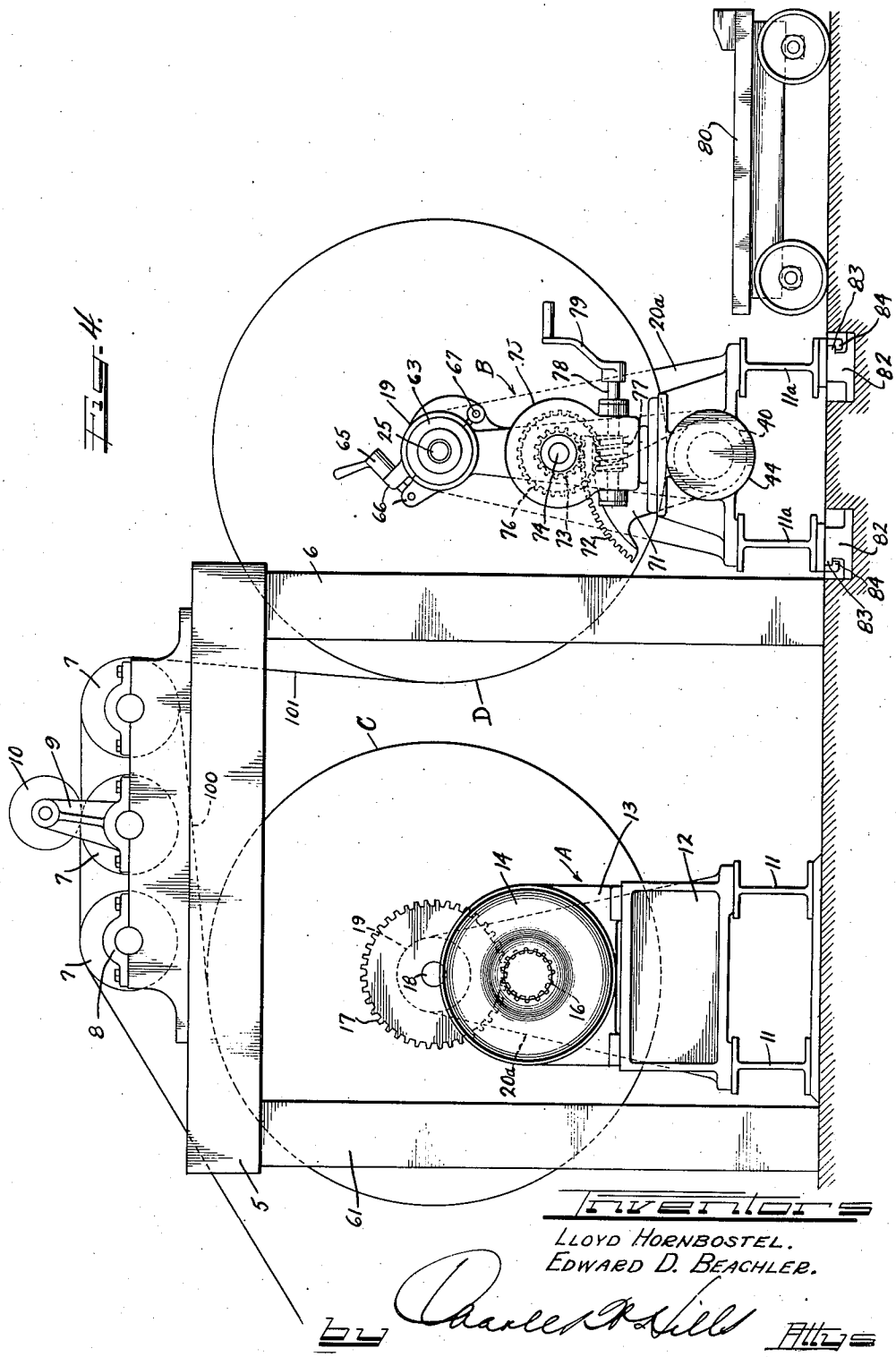
Fig. 3.

Inventors
LLOYD HORNBOSTEL.
EDWARD D. BEACHLER.
By Charles O. Wills Attys

April 19, 1949. L. HORNBOSTEL ET AL 2,467,554

SHAFT WINDER

Filed May 31, 1944 3 Sheets-Sheet 3



Inventors

LLOYD HORNBOSTEL.
EDWARD D. BEACHLER.

By Charles R. Hills Attys

Patented Apr. 19, 1949 2,467,554

UNITED STATES PATENT OFFICE

2,467,554

SHAFT WINDER

Lloyd Hornbostel and Edward D. Beachler, Beloit, Wis., assignors to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin

Application May 31, 1944, Serial No. 538,186

7 Claims. (Cl. 164—65)

1

This invention relates to a winder that is especially adapted for winding a plurality of bands of web material into separate rolls.

For the purpose of disclosing one of the applications of the winder, it is shown in connection with a paper slitter that receives the full width web and cuts it into a plurality of bands.

When winding paper or other web material that is to be supercalendered, it is desirable that the paper be loosely wound but without wrinkles and the like that may cause a rupture in the paper during its travel through the supercalender stack. Heretofore, it has been the practice to rewind the paper from the paper machine upon a multiple drum winder, but this has proven unsatisfactory due to the fact that where the paper is to be supercalendered, it should be wound loosely, yet free from wrinkles or corrugations. When the paper is wound conventionally on the drum type winder, the supercalender must be driven at a relatively low speed.

The present improvements contemplate slitting the paper while winding it on a center wind type of winder, or a plurality of such winders. The paper after being slit and wound into rolls is ready for delivery to the supercalender stack. This procedure has proven highly advantageous in that it is considerably safer because wrinkles are avoided, and further it is possible to operate the supercalender at a great deal faster speed than heretofore has been deemed advisable.

The center wind type, or shaft winders in the present instance are preferably mounted at each side of a slitter one in front of the other and in such relation to the slitter that there is the same draw on each band of paper being wound. Provision is made to bodily displace one of the winding machines in an endwise direction after its roll has been unloaded in order to clear the way for the unloading of the other roll. The shaft winders are both mounted in upper portions of suitable supporting frames that are fulcrumed at their lower ends to permit the wound rolls to swing in an arcuate outward and downward path to be unloaded. The winding shafts are coupled to and are actuated by individual motors that are adapted to be uncoupled when the rolls are being unloaded. Also the bearings of each winding shaft are of a demountable character to permit the removal of the bearings and the shaft from the core of the roll after the latter has been unloaded.

It is one of the principal objects of this invention to simplify the construction of a winder for bands of web material such as contemplated herein, and to improve the efficiency, operation and dependability of such winder.

It is also a principal object of this invention to provide a winder for bands of web material

2

that is adapted readily to unload the rolls from the winder device.

It is another object of this invention to provide a multiple center wind type of winder wherein a plurality of rolls of paper are wound thereon, one of the rolls being first unloaded and the winder then displaced to permit the removal or unloading of a roll on another winder back of the first winder.

A further object of this invention resides in providing a machine for winding a plurality of paper rolls and maintain the same draw on each of the bands being wound.

It is also an object hereof to provide a winder for bands of web material that are received direct from a slitter, and to maintain identical draw upon the several bands during the winding thereof.

Additional objects, aims and advantages of the present invention will be apparent to persons skilled in the art after the construction and operation of the present winder is understood from the within description. It is preferred to accomplish the numerous objects hereof and to practice the invention in substantially the manner hereinafter fully described and more particularly pointed out in the claims. Reference is now made to the accompanying drawings.

In the drawings:

Figure 1 is a plan view, somewhat diagrammatic in form, of a winding machine, such as contemplated herein, for a plurality of rolls from bands of sheet material.

Figure 2 is a longitudinal elevation of the structure shown in Figure 1;

Figure 3 is a vertical elevation of one of the winder units, the view being on the plane of line III—III on Figure 1 and drawn to an enlarged scale with parts in section.

Figure 4 is an end elevation looking at the left hand side of the structure shown in Figure 1 and drawn to an enlarged scale;

Figure 5 is an axial section showing details of a winder shaft, and parts immediately associated therewith.

The drawings are to be understood as being more or less of a schematic character for the purpose of disclosing a typical or preferred form of the improvements contemplated herein, and in these drawings like reference characters identify the same parts in the different views.

A roll of sheet material such as paper and the like may be placed upon an unwinding stand (not shown) that is equipped with a suitable braking device, and the paper web is fed therefrom to a slitter structure that comprises a top or table 5 supported upon legs 6 and having a plurality of rollers 7 journalled in bearings 8 that are mounted upon the table 5. One of the bearings 8 is provided with upstanding arms 9

for journalling the spindle of the slitter 10 that comprises a disk having a knife edge opposing the adjacent roller 7. The other two rollers 7 at both sides of the disk respectively receive the paper web from the unwinding stand, and then deliver the slit bands to the winder machine that comprises two assemblies that are located one below the table or platform 5 and the other in front of the stand in the manner shown in Figure 4.

These winder assemblies, designated generally as A and B, are respectively fixed and mobile. In other words, the winder assembly A is mounted on a stationary support within the table or stand, while the mobile winder assembly B, is of a movable character and in normally operating position has a portion laterally overlapping the fixed assembly A. The mobile assembly B is adapted to be shifted endwise from in front of the slitter and the other winder after its roll has been unloaded to provide space to accommodate unloading of the stationary assembly A. It will be noted that the slitter is located so that it gives the same or approximately the same length of draw on the bands going to the winders. The winders are at a lower level than the slitter and are laterally offset with respect to each other, with portions of one overlapping laterally portions of the other. Each of the winders, as will be later explained has its own individual drive so arranged as to maintain constant tension on the webs as they are being simultaneously wound into the separate rolls on the winder assemblies A and B.

The details of the winder assembly A are shown in Figure 3, and the shaft, bearings and other details thereof are shown in enlarged longitudinal section in Figure 5. This assembly comprises elongated I-beams 11, 11 disposed in laterally spaced parallel relation to each other and at one end thereof there is a block 12 having a saddle 13 on its top for receiving and mounting an electric motor 14. The motor shaft 15 has a pinion 16 anchored to it for driving the gear 17 on the adjacent end of the driven shaft 18. This shaft has its end adjacent the gear 17 journalled in an elongated bearing 19 at the upper end of a pedestal 20a arising from the base rails 11. The other end of the shaft 18 receives a slidable coupling sleeve 20 that is rotatable with the shaft 18 by reason of a key and keyway connection 21 therewith. A latch bar 22 in a recess on shaft 18 maintains the sleeve against longitudinal movement toward the bearing 19 by the engagement of the end of bar 22 with the adjacent end face of the sleeve 20. A pin 23 fulcrums an end of the latch bar in its recess, and a spring 24 seated beneath it urges the movable end of the latch bar upward or outward radial to the shaft.

The structure that supports the roll being wound has operative connection with and is rotated by the shaft 18 through the medium of the collar 20. This winding structure comprises a long tubular winding shaft 25 that carries the core 26 for the paper roll. The end of the metal tube 25 nearest the motor end of the winder has the reduced end of a hub 27 inserted into it and secured thereto in any suitable manner preferably by a press fit. The other end of this hub 27 opposes but does not contact the adjacent end of the shaft 18 and it is provided with a longitudinal keyway 28 to receive the key of the keyway connection 21 between the collar and the shaft. Between the keyway and the outer

end of the tube, the hub is received in suitable antifriction bearings 29 carried in a cupped housing 30 surrounding the bearing and the hub. The open end of housing 30 is closed by a removable cap 31.

The bearing housing 30 has an annular recess 32 circumferentially of its cylindrical portion to fit it into a concave seat 33 in a boss at the upper end of rocker arm 34. A pivoted concave clamp yoke 35 engages around the upper portion of the bearing housing 30 and is fulcrumed at its lower end of a pin 36 (Figure 2). Opposing lugs 36a are formed on adjacent portions of the boss and the clamp yoke opposite the pin 36, and a hand operated clamping screw 37 engaging these lugs is adapted to draw the parts together for clamping the bearing housing 30 in the seat at the upper end of the arm 34.

The lower end of the arm 34 is provided with a slit boss 38 the parts of which are drawn together by bolts 39 engaged in lugs 38a to clamp the arm 34 rigidly to a rocker shaft 40 located in a horizontal plane adjacent the rails 11 of the base. The rocker shaft 40 has reduced end portions 41 and 42 that are received in bearing housings 43 and 44 respectively. Antifriction bearings 45 and 46 are interposed between the ends of the rocker shaft 40 and the respective bearing housings 43 and 44, and the bearing housings have open ends that are closed by removable plates 46 and 47 respectively, which are held in place by bolts or the like (Fig. 3).

The end of the metal tube 25 (Figure 5) that is remote to the coupling sleeve 20 receives a shouldered hub 48, the adjacent reduced portion of which is entered in said tube and is secured thereto in any suitable manner, preferably by a press fit. A bell-shaped sleeve 49 is loosely fitted upon the hub beyond the metal tube 25 and is arranged to have its end portion abutting the roll core 26. The flared-out portion of this sleeve is of greater diameter than the hub 48 and is provided with internal threads 50 while the exterior portion is of angular form to receive a wrench. This sleeve 49 limits longitudinal movement of the core upon the tube 25. Another sleeve 51, loosely mounted on the hub, has a threaded outer portion that is screwed into the first sleeve 49 and it has an angular flange to receive a wrench. The outer end of sleeve 51 has a recessed face 53 and the adjacent portion of the hub is provided with an annular channel 54 to receive a two-part stop ring 55, that forms an abutment on the hub. The proximate or opposing ends of the ring segments are shouldered as indicated at 56 in Figures 3 and 5. The seating of this ring or stop 55 in channel 54 prevents said stop moving longitudinally on the hub 48. By applying wrenches to the angular portions of the sleeves 49 and 51 they may be rotated with respect to each other to press the sleeve 51 against the stop ring 55 and the opposite end of the sleeve 49 against roll core 26, thus frictionally locking these parts together.

Beyond the stop ring 55 the hub 48 is reduced to provide a shoulder 57 and an annular bushing 58 surrounds the adjacent portion of the hub with its inner end portion engaged with the shoulder 57. An open ended slot 59 is made in bushing 58 that cooperates with a lateral pin 60' projecting from the hub to spline the hub and bushing together for rotation with each other and also to permit the bushing to be removed longitudinally endwise from the hub. Antifriction bearings 60 are interposed between the bushing 58 and a

cupped bearing housing 61 that has its open end closed by a removable plate 62. The cylindrical face of housing 61 has an annular channel 63 to receive the opposing members of a separable clamp device 63a carried at the upper end of a rocker arm 64, said clamp device being similar to the clamp at the other end of the winding tube. The parts of this clamp device 63 are drawn together by a hand operated screw member 65 that engages opposing ears 66 on the respective members of the clamp. The movable or swinging member of this clamp device is fulcrumed on a pin 67 to allow the clamp to be opened and swung downward when unloading the roll from the mounting frame. The lower end of the swinging arm 64 is provided with a two-part boss 68 surrounding the adjacent portion of the rocker shaft 40, the parts of this boss being drawn together around the shaft by clamping bolts 69 engaged in spaced ears 68a, in the same manner as the other swinging arm 34 is secured to the opposite end portion of the rocker shaft 40. A spring projected latch bar 22a, operating in a recess in the outer portion of hub 48, prevents longitudinal movement of the bushing and housing on the hub when the clamping device has been released and the roll unloaded.

Between its end bearing housing 44 and the boss 68 the rocker shaft 40 has a collar 70 secured to it and there is an arm 71 projecting from this collar having at its outer end a segmental rack 72, the teeth of which are meshed with a pinion 73 carried upon the outer end of a spindle 74 projecting from its bearing on a gear housing 75 rigidly mounted on the bearing housing 44. A large worm wheel 76 (Figure 4) is secured to shaft 74 inside the housing with its teeth meshed with a worm 77 on a rotatable operating shaft 78. An end of this shaft projects out of the housing where it is provided with a crank 79 for rotating it preferably by hand.

After the roll has been wound on the tube and core of the winder assembly which has been described, the motor 14 is stopped and the clamps 35 and 63 are opened. The motor is then uncoupled from the hub 27 by depressing latch bar 22 and sliding the sleeve towards the drive shaft bearing 19 until the sleeve has cleared the previously engaged portion of hub 27. A wheeled truck or dolly 80 is placed in front of the roll supporting devices and the crank 79 is then rotated to operate the gearing which in turn moves the rack 72 to swing the arm 71 thereof outwardly toward the truck or dolly. This operation will rotate the rocker shaft 40 in a direction to move the roll supporting rocker arms 34 and 64 downward until the roll is resting on the dolly 80. After the roll has been deposited upon the truck or dolly the bearing housings 30 and 61 are removed endwise from the respective hubs 27 and 48. The core retaining sleeves 49 and 51 may then be rotated in a direction to release the tension or pressure between the core 26 and the stop or collar 55, whereupon the collar may be separated and the sleeves 49 and 51 may be slipped endwise from the housing. The structure is then reassembled by telescoping another core 26 upon the tubular shaft 25 and tightening it in place by means of the sleeves 49 and 51. The bearing housings 30 and 61 are then replaced and the crank rotated to operate the gearing and rock the shaft 40 in a direction to restore the tubular shaft 25 to its operating position in axial alinement with the driven shaft 18 to which it may then be coupled by sliding the collar 20 away from the bearing 19 to engage the key in the keyway 28 of the hub 27.

The foregoing description has been directed to the winder assembly designated as A. The winding assembly which is designated as B is identical with that described in connection with the assembly A with the exception that its components are arranged in opposite order with portions of the two winders overlapping each other in a lateral direction. For the purpose of simplicity, the same reference characters have been applied to corresponding portions of the assembly B as hereinbefore described with respect to the other assembly A.

Both motors 14 of the two assemblies A and B are constant horsepower motors and therefore maintain constant and equal tension in the separate draws 100 and 101 (Fig. 4) of the webs as they are being wound on the rolls C and D. As is obvious, more than two rolls could be simultaneously wound by merely adding other assemblies like assembly B.

In addition to being of the same construction as the assembly A, the assembly B is of a mobile type that is adapted to be moved endwise away from the slitter device after the assembly B has unloaded its roll. The assembly B is mounted upon longitudinally disposed I-beam rails 11a, 11a that rest on tracks 82, 82 embedded in the floor in front of the table. These tracks have oppositely projecting flanges 83 that are engaged by the inturned flanges 84 on the bottom of the rails 11a. An elongated screw or worm shaft 85 has threaded engagement with a nut 85a or other threaded element anchored to a suitable portion of the winder assembly B as shown in Figure 2. This screw shaft has its other end journalled in bearings 86 of a housing 87 that is in spaced relation to or removed a distance from the adjacent end of the assembly B. The spindle 88 of an electric motor 89 enters the housing 86 and has a suitable gear connection with the worm shaft 85 to rotate it.

In normal or winding position the winder assembly B is shown in full lines in Figures 1 and 2. After the roll has been unloaded from this winder assembly, the motor 89 is started and the entire assembly B is slid endwise to the position shown in dotted lines in Figure 1. This will displace it from overlapping relation to assembly A and will clear the space in front of the slitter table. A truck or dolly may then be moved into the proper position in front of the roll on the winder assembly A so that the roll may be unloaded onto said truck in the same manner as the other roll was unloaded from the assembly B.

The tubes 26 or winder shafts are long enough for the maximum width of any single roll that they may receive from the slitter. As will be seen in Figure 1 the dotted lines C and D on the respective winder assemblies indicate the respective rolls of paper that have been wound thereon and it will be noted that these rolls are offset with relation to each other, and the adjoining edges of the slit webs lie in substantially the same vertical plane. By referring to Figure 4 it will be noted that the slitter is so located with respect to the winders A and B as to give the same amount of draw to each of the webs being wound. The winders are disposed on each side of the axis of the slitter although the respective rolls C and D are offset with relation to each other. The motors 14 for driving the winder assemblies are preferably in series circuit which operate them in unison and synchronized with respect to each other so that the paper rolls are of uniform size and proportion.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

We claim as our invention:

1. A winder for receiving separate webs of paper to wind the webs into separate rolls comprising spaced winding reels of the center winder type disposed in offset overlapping relation to each other to receive webs having their adjoining edges lying in substantially the same vertical plane, individual driving means for said reels; coupling means detachably connecting said driving means to said reels; and vertically swingable supports for said reels adapted upon uncoupling of the driving means to move said reels out of their normal winding positions to unload the rolls therefrom.

2. A winder assembly for winding a plurality of separate rolls which comprises a roller for guiding side by side bands of sheet material; a rear winder machine rearwardly from and at a level below the roller for winding one band into a roll; a front winder machine in front of said roller for winding the other band into a roll; said machines having in operating position laterally overlapping portions to wind adjoining edges of the bands in the same vertical plane and being arranged with respect to the roller to effect identical draw on the respective bands; and means for moving the front winder machine out of overlapping relation with the rear winder machine to fully expose a roll on the rear winder machine for removal therefrom.

3. A winder apparatus for winding separate rolls from bands of web material which comprises a rotatable reel for winding one band into a roll; driving means coupled to the reel; a rocking frame supporting the reel in winding position while the driving means is coupled to the reel, said rocking frame being adapted upon the uncoupling of the driving means to move the reel into a position for unloading the roll; a second rotatable reel for winding another band into a roll; driving means coupled to the second reel; a rocking frame supporting the second reel in a winding position laterally overlapping a portion of the first reel, the second rocking frame being adapted upon the uncoupling of the second reel driving means to swing said reel into a position for unloading the second roll; the respective reels and rocking frames constituting separate assemblies; and means for shifting one of the assemblies to move the reel thereof out of overlapping relation to the other reel, whereby the rocking frame of the other assembly may be swung to unload the roll thereon.

4. A winder apparatus for winding separate rolls from separate bands of web material which comprises spaced assemblies, the first assembly comprising a rotatable reel for winding one band into a roll; a rock shaft beneath the reel; rocker arms carried by the rock shaft; demountable bearings at the swinging ends of said arms for journaling the reel; gearing for moving the rock shaft; a driving motor; a coupling detachably connecting the reel to the motor; said gearing operable upon the uncoupling of the motor, to actuate the rock shaft for imparting a swinging movement to the arms for effecting the unloading a roll on the reel; the second assembly comprising a rotatable reel for winding another band into a roll; a rock shaft beneath the reel; rocker arms carried by the rock shaft having demountable bearings at their swinging ends for journaling the reel; a driving motor detachably coupled to the reel; and gearing for moving the rockshaft, said gearing operable, upon the freeing of the reel from its motor, to actuate the rock shaft for swinging the reel out of its winding position to unload a roll on the reel; the two assemblies having normally overlapping portions, and one of the assemblies mounted for sliding movement out of overlapping relation with the other assembly to fully expose the roll on the other assembly; and power driven means for effecting the aforesaid sliding movement of the assembly.

5. A winder assembly comprising front and rear winders in horizontally overlapping relation, track means extending longitudinally of said winders slidably supporting one of said winders, an elongated screw rod in threaded engagement with the track-mounted winder, and a fixed electric motor driving said screw rod to positively control the longitudinal positions of the track-mounted winder relative to the other winder.

6. A winder for receiving webs of paper to wind the webs into separate rolls comprising adjacent winding reels each having a center winding shaft for receiving and simultaneously winding said webs, said winding reels having in operative position laterally overlapped portions to maintain adjacent edges of adjacent webs in the same vertical plane, individual driving means for said reels to maintain constant tension on the webs being wound, movable mounting means for one of said reels, and means for shifting said movable mounting means for endwise displacement of the entire reel to clear the space adjacent the other reel and permit easy access to the roll wound on said other reel.

7. A winder for receiving webs from a slitter to wind said webs into a separate roll, said winder comprising endwise offset and laterally overlapped winding reels for receiving and simultaneously winding said webs into separate rolls, said reels being so arranged with respect to said slitter as to maintain approximately the same length of draw of said webs between said slitter and each of said reels, and means for shifting one winding reel endwise of the other winding reel to facilitate unloading of the reels.

LLOYD HORNBOSTEL.
EDWARD D. BEACHLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,519,724	Ewell	Dec. 16, 1924
1,539,748	Laroche	May 26, 1925
1,720,118	Corey	July 9, 1929
1,737,127	Richey	Nov. 26, 1929
2,120,473	Shepherdson	June 14, 1938
2,141,315	Putman	Dec. 27, 1938
2,142,777	Berry	Jan. 3, 1939
2,346,903	Caffrey	Apr. 18, 1944
2,353,408	Larsen	July 11, 1944
2,390,001	Schindler	Nov. 27, 1945

FOREIGN PATENTS

Number	Country	Date
796,091	France	Jan. 17, 1936