Aug. 9, 1932. E. E. BERRY 1,870,225

PAPER WINDING APPARATUS

Filed Dec. 28, 1928 4 Sheets-Sheet 1

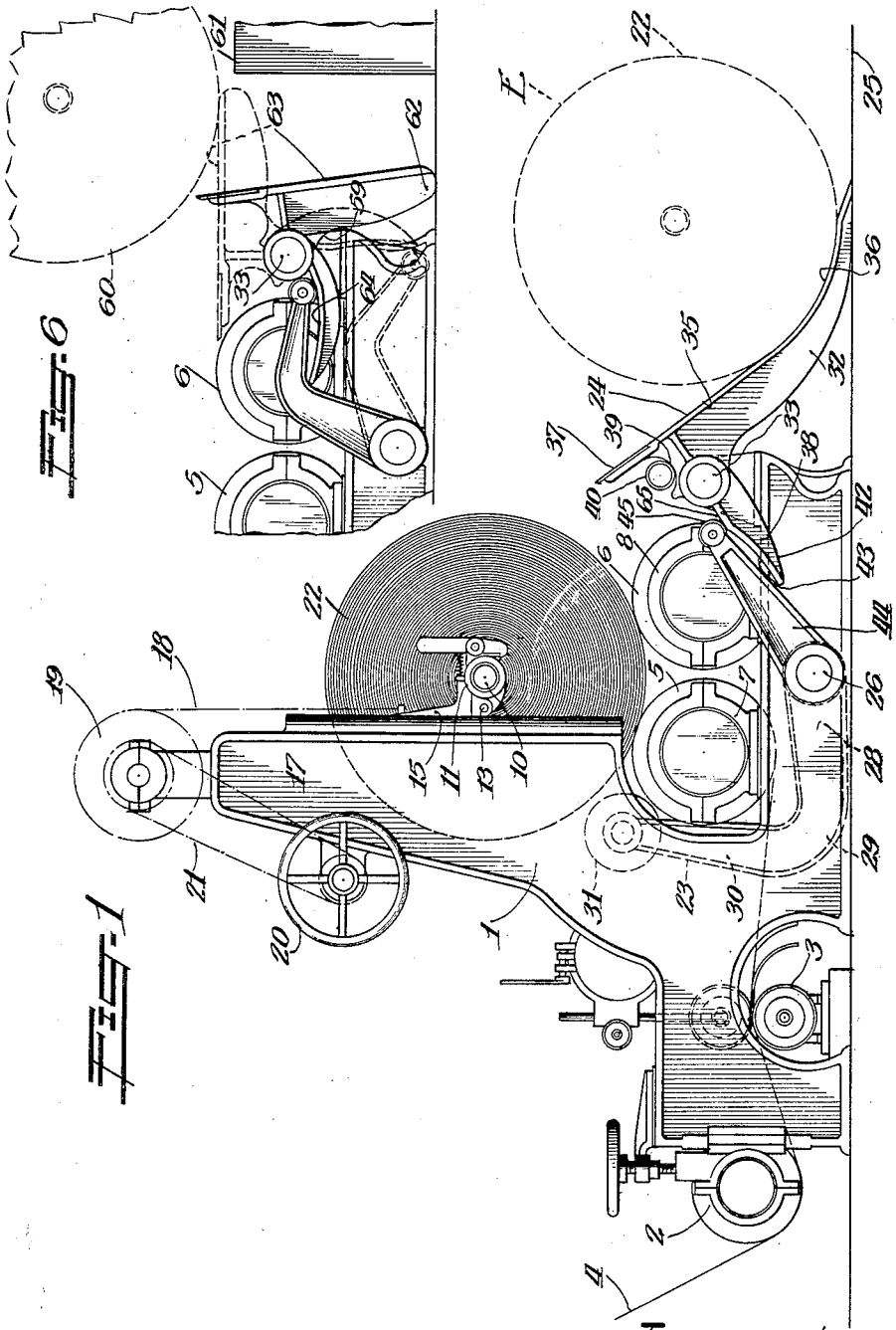


Fig. 1

Fig. 6

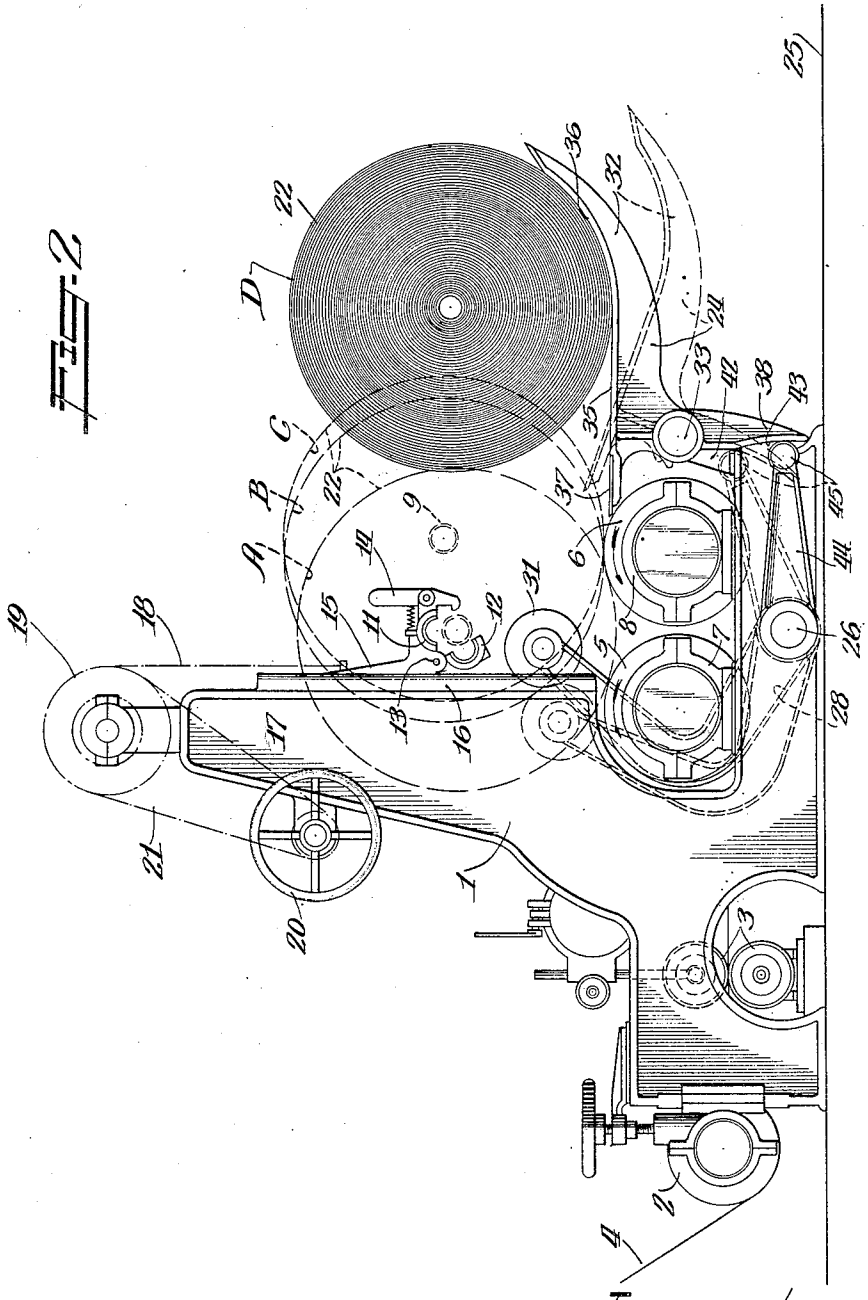
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PAPER WINDING APPARATUS

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Fig. 2



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PAPER WINDING APPARATUS

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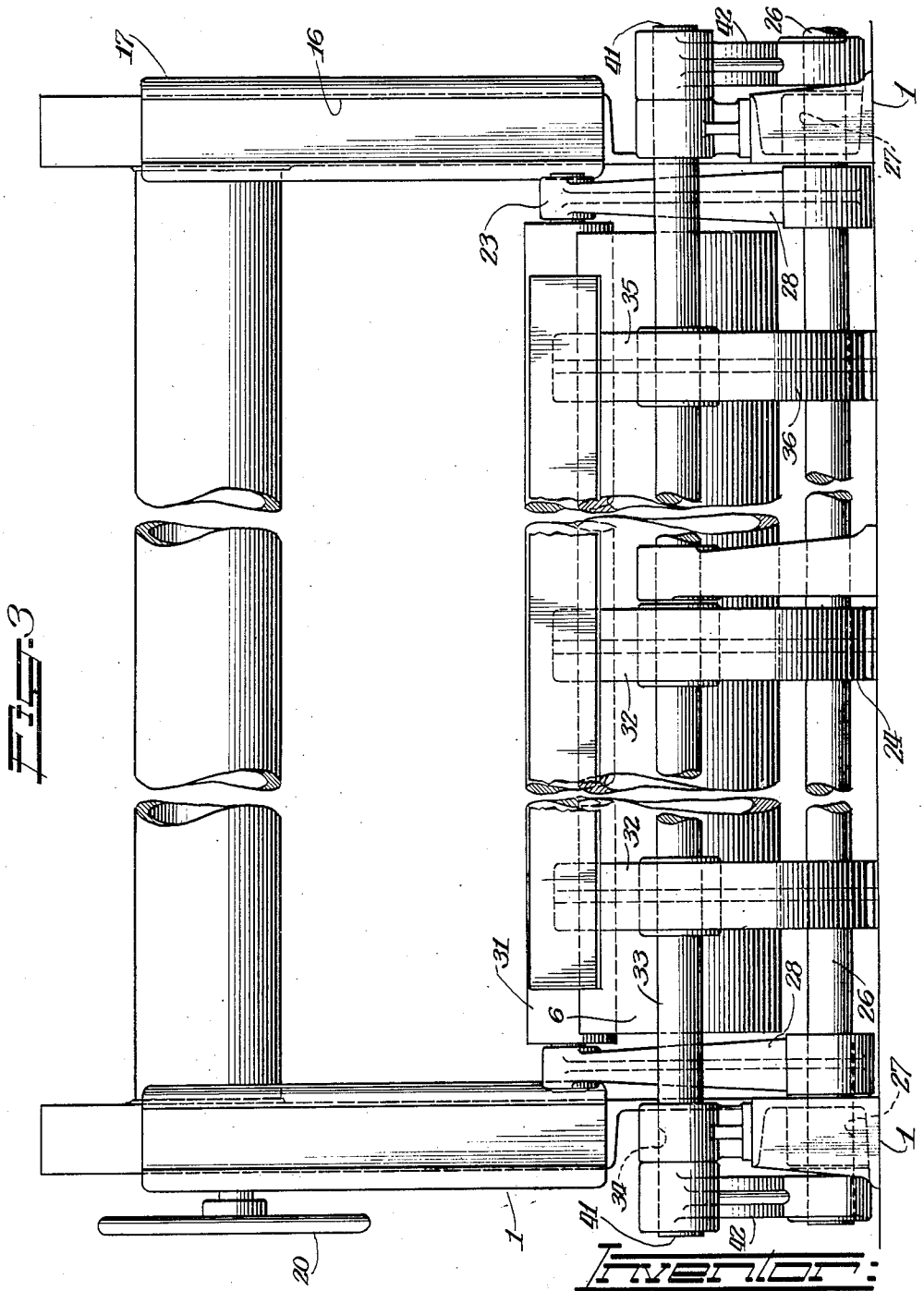


Fig. 3

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PAPER WINDING APPARATUS

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Fig. 4

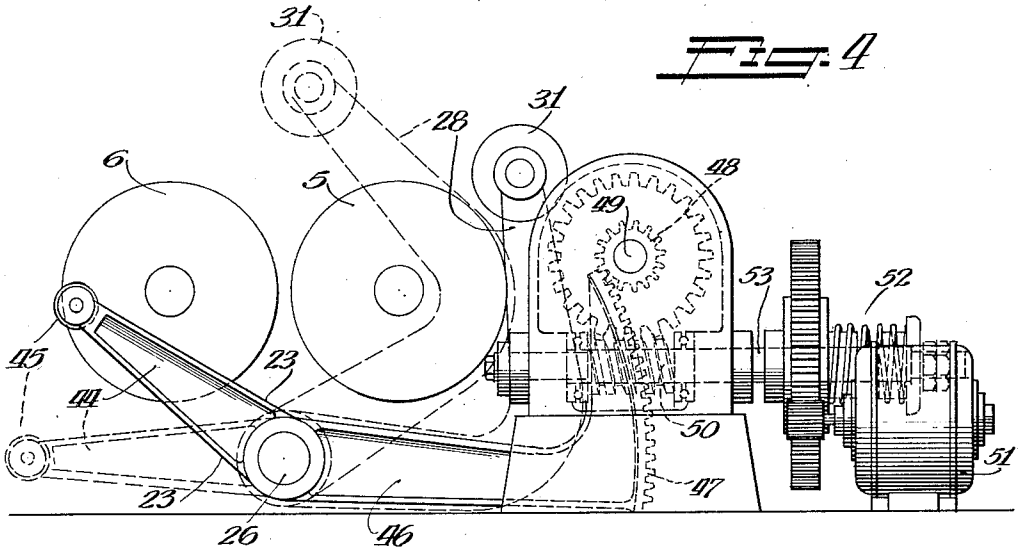
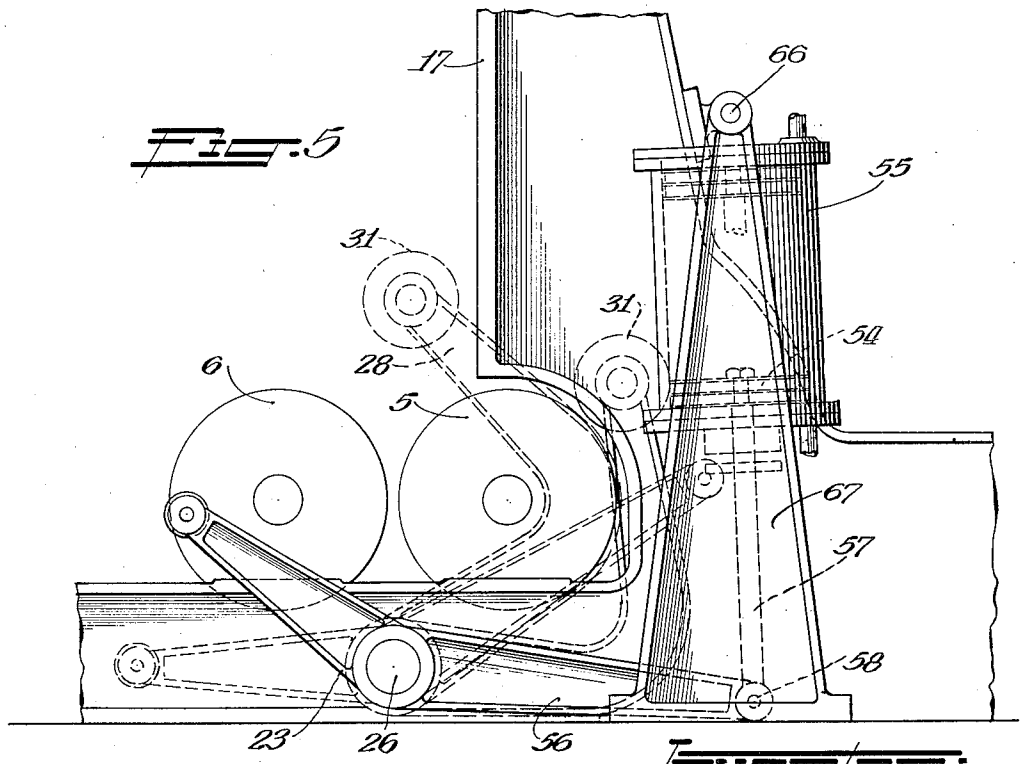


Fig. 5



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UNITED STATES PATENT OFFICE

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PAPER WINDING APPARATUS

Application filed December 28, 1928. Serial No. 328,919.

This invention relates to paper winding apparatus and more especially to means and mechanism associated therewith for the purpose of ejecting a reel of paper from the winding apparatus and discharging the same onto a receiving surface with a minimum of manual effort.

The tendency in modern paper making practice toward wider machines, often as wide as 20 feet and upward, has introduced new problems in the handling of the full wound reels of paper as they come from the machine and as they are re-formed on the paper winding apparatus, or "rewinder" as it is more commonly called. Such large reels of paper are necessarily very heavy and cumbersome to handle by the older methods, which all involve considerable manual labor. Furthermore, the handling of large rolls by the methods that have hitherto been commonly in practice, would put a considerable strain upon the core-shaft upon which the paper is wound and might easily result in a permanent distortion of the shaft.

It is therefore an object of this invention to provide a paper winding apparatus in which means and mechanism are provided for automatically effecting movement of the wound or partially wound reel of paper from its normal position in the winding apparatus onto a receiving surface.

It is a further object of this invention to provide an ejecting and discharging mechanism and means for properly coordinating said mechanism to effectuate the removal of a reel of paper from a winding apparatus in a substantially automatic manner.

Other and further important objects of this invention will become apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a side elevational view of a paper winding apparatus embodying the means and mechanism of this invention;

Figure 2 is a similar side elevational view showing the operation of the ejecting mechanism in dotted lines;

Figure 3 is a broken front elevational view with parts removed;

Figure 4 is a side elevational view showing the driving mechanism, with parts of the paper winding apparatus omitted;

Figure 5 is a side elevational view of a modified form of operating mechanism, with parts of the winding apparatus omitted; and

Figure 6 is a fragmentary side elevational view of a modified form of reel handling mechanism.

As shown on the drawings:

The reference numeral 1 indicates a supporting frame of a paper winding apparatus, commonly used in connection with a paper machine to rewind and slit the parent rolls of paper as they come from the machine into rolls of the required length and diameter. My invention is, however, equally applicable to apparatus or machines for winding any kind of web material, either in conjunction with another machine for making the web or as a separate operation.

The winding apparatus here shown includes an adjustable web guiding roll 2 mounted upon the rear of the supporting frame 1, a slitting mechanism 3, through which a web of paper 4 is adapted to be threaded and a pair of under drums 5 and 6 journalled in bearing brackets 7 and 8, respectively, secured to a portion of the frame 1. The web of paper 4 in its course through the winding apparatus passes under the winding drum 5 and is wound upon a core or plurality of cores 9 mounted upon a winding shaft 10, said winding shaft 10 being supported in the usual manner at its ends in quickly releasable bearing clamps 11.

Each of said bearing clamps 11 comprises a lower section 12 hinged as at 13 and an upper stationary section including a spring pressed pawl or dog 14 for engaging a lug formed on said lower hinged section 12.

Said bearing clamps 11 are formed with rearward extensions 15 adapted to slide in vertical guideways 16 formed on the front faces of upstanding side members 17 of the frame 1. Mechanism, including chains 18 se-

cured to each of the bearing clamps 11 and passing over pulleys 19 mounted on the top of said upstanding portion 17, together with hand wheels 20 connected to said pulleys 19 by means of chains 21, serve to raise and lower said bearing clamps 11 and to automatically take care of the increasing diameter of the reel 22 during the winding operation. This mechanism forms a part of standard winding apparatus and is not believed to require further explanation.

It will be understood that a suitable mechanism (not shown) may be used to drive the under-drums 5 and 6, both of these drums being driven in the same direction to wind the web of paper by surface contact upon the shaft 10. Up to this point, the winding apparatus described embodies no novel features over the standard types of rewinders in common use.

My invention, however, includes an ejecting mechanism, indicated as a whole by the reference numeral 23, and a reel receiving and discharging cradle 24 operatively associated with said ejecting mechanism and synchronized therewith. By means of these mechanisms, as will later be explained, the wound or partially wound roll of paper may be automatically rolled over the crown of the under-drum 6 and discharged upon a floor or other receiving surface 25.

The ejecting mechanism 23 comprises a shaft 26 journaled in the frame 1 as at 27 (Figure 3) beneath the under drums 5 and 6 and parallel thereto in equally spaced relation to their respective axes. An arcuate or bent lever arm 28 is keyed to said shaft 26 at each end thereof inside of the frame member 1. In normal position, as illustrated in Figure 1, each of said lever arms 28 comprises a portion 29 extending horizontally and rearwardly and an integral end portion 30 extending vertically with its free end slightly above and to the rear of the crown of the under drum 5. A roll 31 is suitably journalled at its ends in said free ends of the levers 28. In normal position, said roll 31 lies behind the reel of paper 22 and out of contact therewith but, as will later be explained, may be brought into contact with said reel 22 to serve to eject said reel from its normal position upon the under drums 5 and 6.

The cradle, indicated as a whole by the reference numeral 24, includes a plurality of cradle arms 32, the number of said cradle arms 32 depending upon the width of the winding apparatus, said cradle arms 32 being keyed, or otherwise secured to a shaft 33 extending through the side of the frame 1 and journalled therein as at 34.

Each of said cradle arms 32 is formed with a plane receiving surface 35 and a forwardly extending arcuate reel discharging surface 36, the reel 22 being shown in dotted lines in its discharge position in Fig. 1. When the cradle arms 32 are in reel receiving position (shown in full lines in Fig. 2) the plane receiving surfaces 35 bridge the gap between said cradle arms 32 and the under drum 6, guard plates 37 forming extensions of the plane receiving surfaces 35 for this purpose.

Beneath each of the guard plates 37, there is formed on the rear side of each of the cradle arms 32 a semicylindrical socket 39 for receiving an extra winding shaft 40 (Fig. 1).

On the extended ends 41 of the shaft 33 are mounted dependent arms 42, lying outside of the side members of the frame 1 and provided with rearwardly directed arcuate cam surfaces 43. With each of said dependent arms 42 is associated a cradle actuating arm 44, keyed to an end of the shaft 26 and provided at its free end with a roller 45 adapted to contact with and follow over the cam surface 43. The cam surfaces 43 are of such length and curvature that when the winding apparatus is in operation, winding up a reel of paper 22 (Fig. 1), the rollers 45 lie beyond said cam surfaces 43 against plane surfaces 65; the cradle 24 is in reel discharge position with the cradle arms 32 resting upon the floor or other receiving surface 25 and the ejector mechanism 23 is out of contact with the reel 22. On the other hand, when the cradle mechanism 24 is in reel receiving position (Fig. 2), the rollers 45 of the cradle actuating arms 44 contact the lower portions of the cam surfaces 43 to bring the cradle arms 32 into supported position with the guard plates 37 bridging the gap to the forward underdrum 6.

Suitable driving mechanism for rotating the shaft 26 to operate the ejecting and receiving mechanisms 23 and 24 respectively, are shown in Figs. 4 and 5 for mounting on the back or drive side of the machine. As illustrated in Fig. 4, an arm 46 is keyed at one end to the extended end of the shaft 26, said arm being provided at its free end with a segment gear 47. Said segment gear 47 is adapted to mesh with a pinion gear 48 mounted upon a shaft 49 driven through a gear and worm reducing mechanism, indicated as a whole by the reference numeral 50, from a motor 51. A friction safety device 52 is preferably associated with the drive of the worm shaft 53 in order to prevent damage to the driving mechanism due to careless operation.

As illustrated in Fig. 5, the driving mechanism may comprise a pneumatically, or hydraulically, operated piston 54, reciprocally mounted within a cylinder 55 and connected to the shaft 26 by means of a lever arm 56 and a piston rod 57, said arm 56 and rod 57 being pivotally connected as at 58. Said cylinder 55 is pivotally mounted upon a pin 66 from a supporting structure 67. Either of these mechanisms described, or other suitable

mechanisms, may be operated in an obvious manner to drive the ejecting and roll receiving mechanism of my invention.

In Fig. 6 is shown a slightly modified form of cradle 59 adapted to discharge a reel 60 upon a table 61 or other raised receiving platform. In this modified form, the cradle arms 62 are formed with upper plane surfaces 63 without the arcuate shaped extremities described above. The cradle arms 62 are shown in full lines in Fig. 6 in their normal inoperative position and in dotted lines in their reel receiving position, the operation of said cradles 59 being otherwise the same as previously described, except for the change in the curvature of the cam surfaces 64 rendered necessary by the modified form of cradle 59.

The operation of the ejector roll and cradle mechanisms will be best understood by reference to Figures 1 and 2. After the reel of paper 22 has grown to full size and/or is ready to be discharged from its winding position A (Fig. 2), the motor 51 or hydraulically (or pneumatically) operated piston 54, as the case may be, is started up to move the ejector roll 31 into its position in contact throughout its full length with the reel 22 to move said reel 22 up onto the crown of the under-drum 6 into position B (Fig. 2). Upon continued movement of the ejector roll 31, said reel 22 rolls over the crown of said under-drum 6 into position C.

The movement of the cradle mechanism 24 is so synchronized with the movement of the ejector mechanism 23 as to bring the cradle arms 32 into the full line position shown in Fig. 2 by the time the reel 22 reaches the position B. The rollers 45 are now moving downwardly over the curved cam surfaces 43 without effecting further movement of the cradle mechanism 24 during the continued movement of the ejector mechanism, but movement of the ejector roll 31 is continuous until the reel 22 passes through position C, after which said reel is caused by gravity to roll over the guard plates 37 onto the reel-receiving surfaces 35 and ultimately into the arcuate shaped reel discharge surfaces 36 of said cradle arms 32, as indicated by position D in Fig. 2.

The driving mechanism is then reversed to cause the cradle actuating arms 44 to move upwardly, with the rollers 45 moving up over the cam surfaces 43 until they are entirely off of said cam surfaces onto the plane surfaces 65. During this reverse movement of the actuating arms 44, the cradle arms 32 are gradually lowered into the position shown in Fig. 1, with the reel 22 in position E ready for discharge onto the receiving surface or floor 25. At the same time the ejector mechanism 23 moves into its rearward, inoperative position (Figure 1).

It will be apparent that the reel handling mechanism above described is adapted to handle partially wound or fully wound reels with a minimum of effort and manual labor on the part of the operator.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. In combination with a paper winding apparatus including a pair of under drums on which a reel of paper is adapted to be wound, a shaft rotatably mounted beneath said under drums, arcuate lever arms secured to said shaft extending behind said under drums, a transverse ejector roll mounted upon the free ends of said lever arms, a cradle for receiving and discharging the reel of paper pivotally mounted in front of said under drums, means secured to said shaft for coaction with said cradle to operate the same and means for operating said shaft to cause said ejector roll to move the reel of paper onto said cradle and to cause said cradle to discharge said reel.

2. In combination with a paper winding apparatus including a pair of under drums on which a reel of paper is adapted to be wound, a shaft rotatably mounted beneath said under drums, arcuate lever arms secured to said shaft extending behind said under drums, a transverse ejector roll mounted upon the free ends of said lever arms, a cradle for receiving and discharging the reel of paper pivotally mounted in front of said under drums said cradle having lower cam surfaces, means secured to said shaft for coaction with the cam surfaces of said cradle to operate the same and means for operating said shaft to cause said ejector roll to move the reel of paper onto said cradle and to cause said cradle to discharge said reel.

3. In combination with a paper winding apparatus including a pair of under drums on which a reel of paper is adapted to be wound, a shaft rotatably mounted beneath said under drums, arcuate lever arms secured to said shaft extending behind said under drums, a transverse ejector roll mounted upon the free ends of said lever arms, a cradle for receiving and discharging the reel of paper, said cradle comprising a plurality of spaced members having plane receiving surfaces and arcuate discharge surfaces and being pivotally mounted in front of said under drums, means secured to said shaft for coaction with said cradle to operate the same and means for operating said shaft to cause said ejector roll to move the reel of paper onto said cradle and to cause said cradle to discharge said reel.

4. In combination with a paper winding

apparatus including a pair of under drums on which a reel of paper is adapted to be wound, a shaft rotatably mounted beneath said under drums, arcuate lever arms secured to said shaft extending behind said under drums, a transverse ejector roll mounted upon the free ends of said lever arms, a cradle for receiving and discharging the reel of paper pivotally mounted in front of said under drums, levers secured to said shaft, rollers mounted on the free ends of said levers for coaction with said cradle to operate the same and means for operating said shaft to cause said ejector roll to move the reel of paper onto said cradle and to cause said cradle to discharge said reel.

5. In combination with a paper winding apparatus including a pair of under drums on which a reel of paper is adapted to be wound, a shaft rotatably mounted beneath said under drums, arcuate lever arms secured to said shaft extending behind said under drums, a transverse ejector roll mounted upon the free ends of said lever arms, a cradle for receiving and discharging the reel of paper pivotally mounted in front of said under drums, said cradle having lower cam surfaces, levers secured to said shaft, rollers mounted on the free ends of said levers for coaction with the cam surfaces of said cradle to operate the same and means for operating said shaft to cause said ejector roll to move the reel of paper onto said cradle and to cause said cradle to discharge said reel.

6. In combination with a paper winding apparatus including a pair of under contact drums on which a reel of paper is adapted to be wound, a shaft rotatably mounted beneath said drums parallel thereto, arcuate lever arms keyed to said shaft and extending to the side of and behind said under drums, an ejector roll mounted on the free ends of said lever arms, a second shaft rotatably mounted in front of said under drums, cradles mounted on said second shaft, each cradle having a plane roll receiving surface and an arcuate roll discharging surface, dependent member secured adjacent the ends of said second shaft and having cam surfaces, actuating lever arms secured to said first shaft, the free ends of said lever arms being in contact with said cam surfaces, and means for revolving said first shaft to cause said ejector roll to move said reel of paper over one of said under drums onto said cradles and to effect a discharge of said paper reel from said cradles.

7. In combination with a pair of drums adapted jointly to support a reel of material, reel ejecting means, reel receiving and discharging means and power operated driving mechanism for operating said reel ejecting means to roll said reel out of supported relation with respect to said drums over the surface of one of said drums onto said reel receiving and discharging means and synchronously actuating said latter means to discharge said reel.

8. In a winding apparatus, the combination with a pair of under drums for winding a paper web into a reel, of means for pushing said reel over one of said drums, means located in a horizontal plane adjacent the plane of the crown of said drum for receiving the reel from off said drum and movable to effect a gravity discharge of the reel and means operatively associated with both of the aforesaid means and actuated by said first mentioned means to synchronously move said second mentioned means to discharge said roll.

9. In a winding apparatus, the combination with a pair of under drums for winding a paper web into a reel, of pivoted means for pushing said reel over one of said drums and other pivoted means interconnected with said first means so as to be movable therewith to receive the reel from off said drum and to lower said reel to an elevation below said drum.

10. In a winding machine having a pair of under drums for winding a web of paper into a reel, of means for pushing said reel over one of said drums, pivoted means having a flat surface adapted to be moved into a horizontal plane adjacent the plane of the crown of said drum to receive the reel from off said drum and then into a vertical plane to effect a gravity discharge of said reel and means operatively associated with both of the aforesaid means and actuated by said first mentioned means to synchronously move said second mentioned means to discharge said roll.

11. In a web winding machine having a pair of under drums for winding a paper web into a reel, of pivoted means swingable against said reel to effect a continuous push thereagainst whereby the reel is moved completely over one of said drums, and other pivoted means having a flat surface and interconnected with said first means whereby said flat surface is swung into a horizontal plane to receive the roll from off said drum as said first means pushes said reel over said drum and into a vertical plane to effect a gravity discharge of said reel as said first means moves back to its starting position.

In testimony whereof I have hereunto subscribed my name at Chicago, Cook County, Illinois.

EARL E. BERRY.