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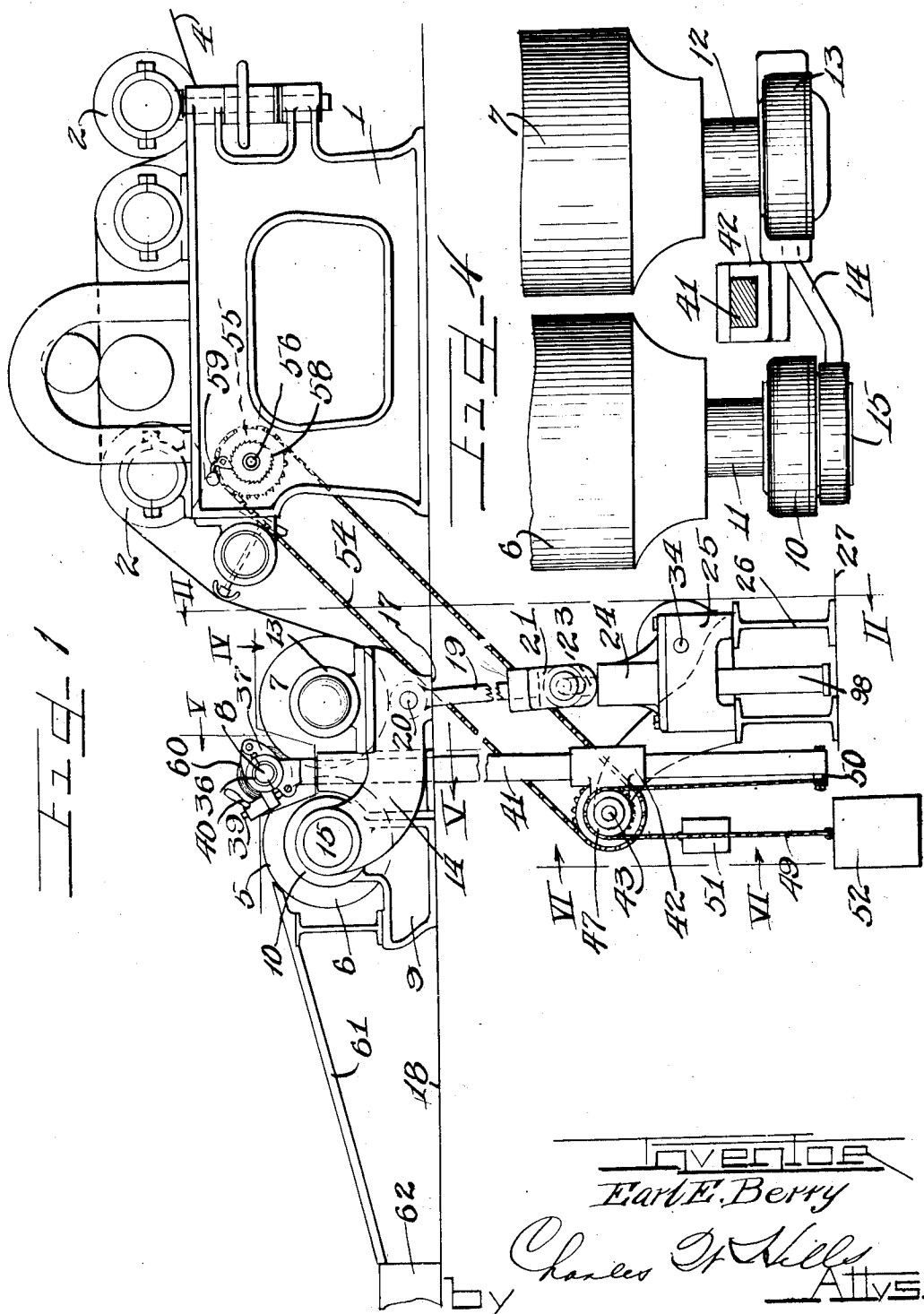
E. E. BERRY

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PAPER WINDING APPARATUS

Filed April 26, 1926

3 Sheets-Sheet 1



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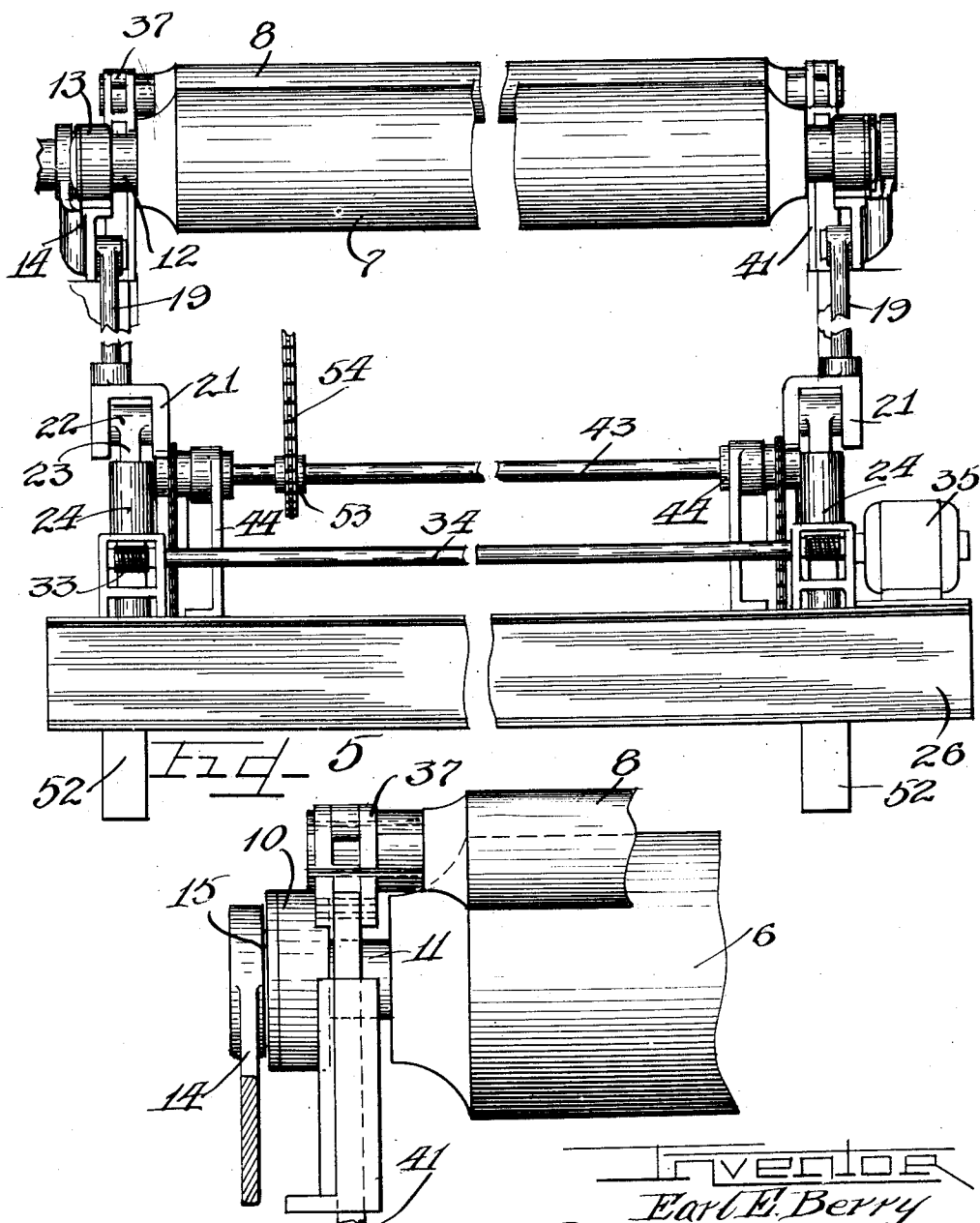
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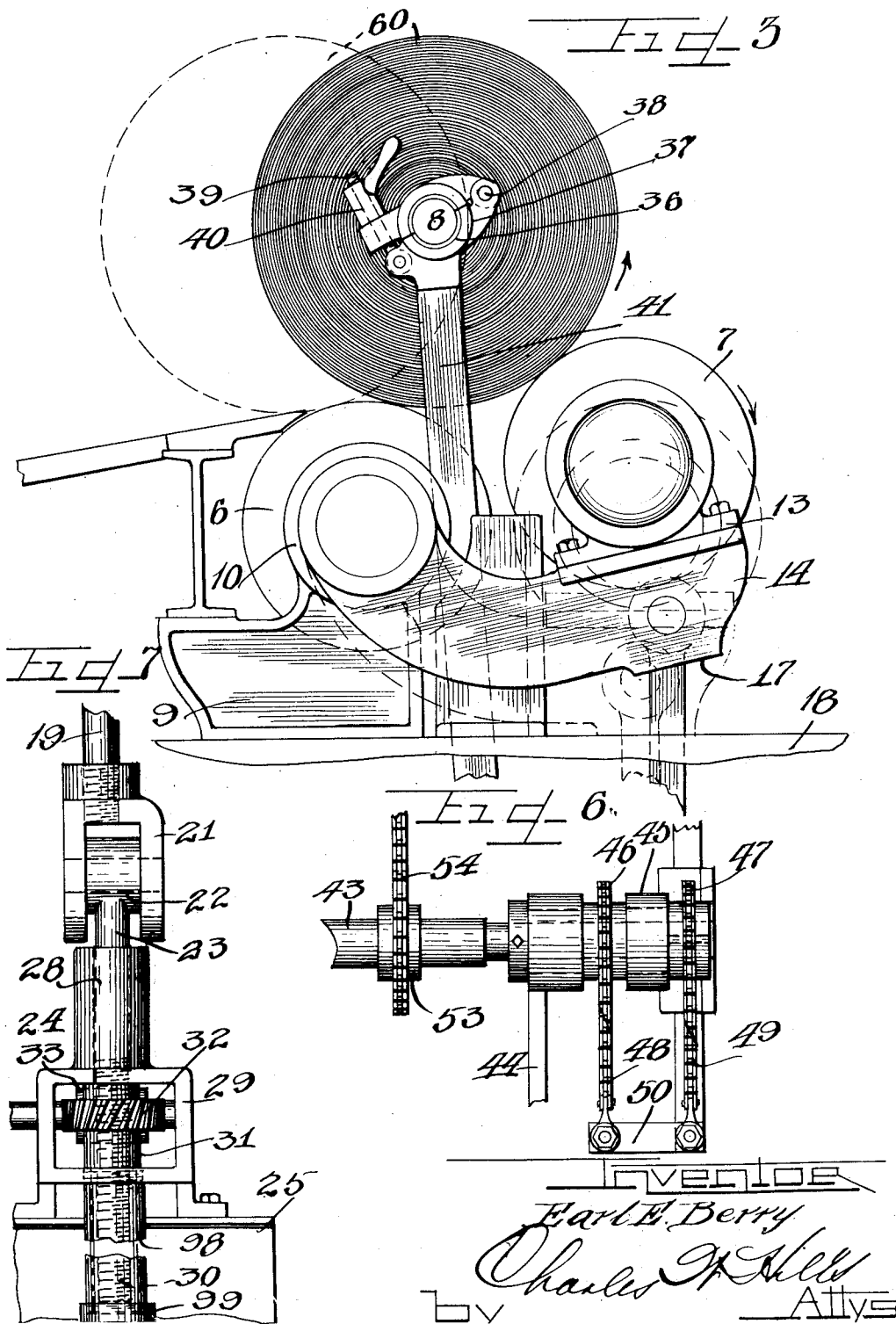
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

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PAPER WINDING APPARATUS

Application filed April 26, 1926. Serial No. 104,546.

This invention relates to paper winding apparatus.

In modern practice, with the tendency toward wider paper machines, the problem of handling the wide rolls on the paper machine rewinder has become increasingly difficult. It is apparent that the strain on a shaft 20 feet or more in length carrying one of these wide rolls must be considerable when the shaft is supported only from the ends, as in lifting the roll. While the shafts now in use on large machines are made of the strongest steel, yet it is impossible to make them sufficiently strong, without increasing their diameter, to support such heavy rolls without sagging.

The sheer weight of the wound or partially wound rolls of paper also makes it difficult to handle the rolls on the rewinder, especially when breaks occur and it becomes necessary to lift the partially wound roll to thread a fresh end of the web through the rewinder. Ordinarily such an operation involves the use of an overhead crane and a differential pulley and consumes a large amount of time and labor.

It is therefore an object of this invention to provide a paper winding apparatus wherein means are provided for automatically raising the winding shaft on which the paper is reeled by pressure equally applied throughout the entire length of the shaft and not concentrated at its ends as heretofore.

It is a further object of this invention to provide a paper or web winding apparatus having rotatable supports or drums for rotatably supporting the shaft on which the material is wound and to provide means for effecting movement of one of the supports relative to the other and to the shaft, both for the purpose of threading the material onto the shaft and for the purpose of discharging the reel of wound material.

Other and further important objects of this invention will be 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 machine embodying the principles of my invention.

Figure 2 is a broken fragmentary view taken substantially on the line II—II of Figure 1.

Figure 3 is an enlarged fragmentary view of a part of the machine, showing the operation in dotted lines.

Figure 4 is an enlarged fragmentary view taken substantially on the line IV—IV of Figure 1.

Figure 5 is an enlarged detail view taken substantially on the line V—V of Figure 1.

Figure 6 is an enlarged fragmentary view taken substantially on line VI—VI of Figure 1.

Figure 7 is an enlarged fragmentary view taken substantially on line VII—VII of Figure 1.

As shown on the drawings:

The reference numeral 1 indicates a supporting frame for carrying numerous guide rolls 2. This part of the paper winding apparatus, or as it is commonly known, "rewinder", may be of any standard construction, as it forms no part of the present invention. Rewinders may be used either directly in connection with a paper machine or as a subsequent separate operation for rewinding the parent or jumbo rolls into smaller rolls or counter rolls. In the present instance a web of paper 4 is indicated as coming from such a parent roll to the rewinder where it is threaded between and over the rolls 2. The web of paper 4 then passes to a winding mechanism 5, where it is wound up into a roll again. My invention concerns itself with the construction of the winding mechanism 5.

As is usual in mechanisms of this type, the winding mechanism 5 comprises a pair of rotatable under drums 6 and 7, and a winding shaft 8, rotatably supported by said drums 6 and 7, and adapted to wind up the paper into a roll 60 by contact with said revolving under drums 6 and 7. In the usual construction,

the under surface winding drums are stationary, and the winding shaft is provided at its ends with a vertical guide to accommodate the rise of the shaft as the reel of paper grows in diameter.

When a break occurs on a machine of the usual type it is necessary to raise the winding shaft in order to thread the web of paper between the under drum 7 and the winding shaft 8. The lifting of a partially wound reel of paper is often very troublesome, especially in the wider machines where the width of the reel may be as much as 20 feet or over, and where a ton or more of paper is often wound on a single shaft. Not only is the lifting of the winding shaft and reel of paper arduous, but the strain on the shaft due to the weight of paper in the reel is very likely to cause the shaft to sag and become permanently bent. To obviate these difficulties, I have provided a winding apparatus in which one of the under drums, such as the drum 7, is movable, and may be moved relative to the other under drum and to the winding shaft 8, whereby it is no longer necessary to manually lift the winding shaft 8 or to lift it by means of a crane. Furthermore the under drum 7 in its movement exerts a force that is equally distributed throughout the length of the winding shaft 8 and thus eliminates the possibility of the winding shaft 8 becoming distorted.

The under drum 6 is supported by a frame 9 on which bearings 10 for the journals 11 of said under drum 6 are adapted to be mounted. The journals 12 of the movable under drum 7 are mounted in bearing brackets 13 which are secured to curved, pivot arms 14. Said arms 14 are each pivotally mounted at one end upon extensions 15 formed on said bearings 10. Said arms 14 are further provided with a flattened lower face 17, adapted to rest upon a flooring or foundation 18 when the under drum 7 is in normal position. As is best shown in Figure 2, the journals 11 and 12 of said drums 6 and 7 are extended at the rear side of the machine and are provided with pinion gears and over which passes a link chain belt. The under drum 6 is driven from any suitable driving mechanism and the drum 7 is driven from the drum 6 through the gears and the chain by throwing in a clutch.

The mechanism for effecting movement of the under drum 7 includes bars 19, each pivotally mounted as at 20 to each of the pivot arms 14, and extending through the flooring 18. The lower end of each of said bars 19 is provided with a bifurcated bearing bracket 21, adapted to receive for pivotal movement the T shaped head 22 of a cylindrical bar 23. Each of said bars 23 is adapted to be loosely held for vertical movement in a guiding bracket 24 bolted to a frame 25. Said frame 25 in turn rests upon a plurality of I beams

26, supported directly on a foundation 27. The guiding brackets 24 each comprise a boss 28, through which the bar 23 is freely movable and a square shaped yoke member 29. Each of the bars 23 is provided with threads 30 extending substantially its entire length and each bar 23 is adapted to be threaded through an internally threaded hub 31 rotatably confined between the spaced sides of the yoke member 29. The lower threaded end of each of the bars 23 is adapted to be received in a stationary sleeve 98 having closure 99 at its bottom end. Said hubs 31 each carry a worm gear 32 which is adapted to be operated by means of a worm 33 on a shaft 34. Said shaft 34 extends the full width of the winding mechanism and is journaled at its ends in the frame 25. A reversible motor 35 is connected to one end of the shaft 34 to drive the same.

The winding shaft 8 is adapted to be inserted at each end into a bearing collar 36 forming a part of a bearing clamp 37. Said bearing clamp 37 comprises two pivotally hinged members pivoted as at 38, the lower of said members carrying a pivotally mounted bolt 39 adapted to be received in the slotted end of the upper clamping member and to be held in place by a hand operated nut 40. Each of said clamps 37 is secured to the end of a bar 41 which extends down through the flooring 18 and is slidably mounted in guiding brackets 42. Said guiding brackets 42 in turn are pivotally mounted upon a shaft 43 which extends the full width of the winding mechanism, and is journaled in brackets 44 from the I beams 26. At each end of said shaft 43 there is secured thereto a hub 45 carrying a pair of sprocket gears 46 and 47. Said sprocket gears 46 are loosely mounted on the hub 45 and sprocket gears 47 are keyed thereto for a purpose later to be explained. Chains 48 and 49 pass over said sprocket gears 46 and 47 respectively and are secured at one end to a cross head 50, bolted to the lower end of the bar 41. At the other end of said sprocket chains 48 and 49 are secured counterweights 51 and 52 respectively, counterweight 52 being considerably larger and heavier than the counterweight 51. There is also securely mounted on the shaft 43 another sprocket gear 53 around which passes a chain belt 54. Said chain belt 54, which passes up through the flooring 18, is looped at its upper end around a sprocket gear 55, said sprocket gear 55 being rigidly secured to a stub shaft 56 mounted from the frame 1. A cog wheel 58 is also keyed to the shaft 56 and is adapted to be locked or controlled by a weighted pawl 59 associated therewith.

The operation of the winding machine is substantially as follows:

The web of paper 4 is first threaded through the portion of the winding mecha-

nism provided with the rolls 2 and then underneath the under drum 7 and between said drum 7 and the shaft 8 upon which the paper is to be wound. Before starting up the rewinder the web of paper 4 is wrapped around cores on the shaft 8 in the direction in which the shaft 8 revolves and the shaft is then securely clamped by means of the clamping mechanism 37 at its ends. At this stage the pawl 59 will be in engagement with the cog wheel 58 so that the shaft 43 will be held against rotation in a direction such that the bars 41 could be lowered. The counterweights 52 on the chains 49, however, will be operative to exert an upward force upon the bars 41, since the pawl 59 operates only to prevent rotation of the shaft 43 in the one direction aforesaid. The small counter weights 51 on the chains 48 likewise exert an upward force on the bars 41, and such upward force is exerted at all times, whether the pawl 59 is in engagement with the cog wheel 58 or not, since the sprocket gears 46 are loose upon said shaft 43 and therefore free to turn. The combined weight of the counter weights 51 and 52 is such as to partially counterbalance but not overbalance the weight of the bars 41 and the empty shaft 8. The counter weights 52 more particularly serve, however, to hold the chains 49 trained over the sprockets 47 so that in cooperation with the cog wheel 58 and pawl 59 the bars 41 may be held against dropping, as will be more fully explained further on.

The winding mechanism is now started up and the web of paper 4 is wound upon the shaft 8 to form a roll of paper 60. As the roll 60 grows in size it gradually lifts the bars 41 which are freely slidable in the guiding brackets 42 and pivotal about the shaft 43. If during the winding of the web 4 a break in the web occurs, or when the roll of paper 60 has reached the desired size, it becomes necessary to remove the roll 60 and to replace the shaft 8 to wind a new roll.

In either of these cases, a fresh end of the web 4 must be threaded under the under drum 7 and between said drum 7 and the shaft 8. If the break occurs when the roll 60 is partially wound it would be necessary in the ordinary rewinder to unclamp the clamping members 37 and to lift the paper roll 60 in order to thread the new end of the web 4 between the under drum 7 and the shaft 8. However, in the case of my present invention, it is merely necessary to start the motor 35 and automatically raise the under drum 7. It will be noted that with the pawl 59 in engagement with said cog 58, the shaft 43 is free to turn in the direction required to permit the bars 41 to be raised. Accordingly, the counterweights 51 and 52 act as auxiliary forces to the motor in raising the roll 60. As the under drum 7 is raised it also, of course, raises the shaft 8 and the roll of paper 60 on

said shaft, causing said roll 60 to be rolled (Figure 3) over the surface of the other under drum 6.

If the reel 60 is to be completely discharged, the clamping members 37 are released (Figure 3), and the reel 60 raised by the mechanism described until said reel rests upon the crown of the drum 6, as shown in dotted lines. The roll 60 is allowed to roll off over an inclined platform 61 onto a stand 62.

In case the roll 60 is not to be discharged, as where a break occurs before said roll is of the desired diameter, the partially wound roll is raised slightly by the mechanism described and locked in the slightly raised position against lowering while the drum 7 is lowered by reversing the motor 35. It will be apparent that with the pawl 59 in engagement with the cog wheel 58, the shaft 43 is prevented from turning and consequently the chains 49 which pass over the sprocket gears 47 secured to said shaft 43 are also prevented from moving in the direction necessary for the bars 41 to drop down. The partially wound reel of paper is thus held against the surface of the under drum 6 while the drum 7 is being lowered out of contact with said reel. While the drum 7 is in lowered position, a new end of the paper web may be threaded under said drum 7 and between said drum 7 and the raised, partially wound roll of paper 60. After the end of the web 4 has been pasted to the end of the roll 60 the under drum 7 is again brought up to support the roll 60 and the cog wheel 58 unlocked by raising the pawl 59. The drum 7 is now lowered into its normal position, the roll 60 and shaft 8 following by virtue of their weight. The rewinder is again started in motion and the winding of the paper continued.

It will be apparent to those skilled in the art of paper making that my present invention constitutes a marked improvement over the old type of rewinder. In the first place, the shifting or discharging of a full roll of paper is accomplished automatically and quickly, thereby saving the labor and time involved in removing said roll of paper as formerly by means of an overhead crane. In the second place, since the lifting force applied to the roll of paper and winding shaft is distributed equally along the length of the shaft there is no tendency of the shaft to bend when the roll is lifted. In the third place when breaks occur in the rewinder it is no longer necessary on rewinders of my construction to lift the partially wound roll either manually or by means of a crane in order to thread a new end of the paper web between the under drum and the winding shaft. The only manual labor involved in operating the mechanism for moving the par-

tially wound roll of paper in my construction is that required to operate the pawl 59.

While I have described my winding apparatus in connection with winding paper it will be understood that the apparatus is also adapted for use in winding any web material.

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 a paper winder machine, a pair of under drums, one of said drums being pivotally mounted with respect to the axis of the other of said drums for bodily movement out of the horizontal plane of said axis, and a paper receiving shaft cooperatively associated with said under drums and adapted to be revolved thereby whereby the web of paper is caused to be wound upon said receiving shaft.

2. In a paper winder machine, a pair of under drums, one of said drums being pivotally mounted with respect to the other of said drums, and a paper receiving shaft cooperatively associated with said under drums and adapted to be revolved thereby whereby the web of paper is caused to be wound upon said receiving shaft, and means for moving said pivotally mounted drum to move the reel of paper on the receiving shaft up over the other drum.

3. In a machine for winding web material, a pair of driven drums, one of said drums being pivotal about the horizontal axis of said other drum, a web receiving shaft adapted to be revolved by coaction with said drums to wind up a reel of said web material, and means for moving said pivotally mounted drum out of the horizontal plane of said other drum to displace the reel from its normal position.

4. In a machine for winding web material, a pair of driven drums mounted in spaced parallel relation, one of said drums being pivotal about the axis of said other drum, a web receiving shaft adapted to be revolved by coaction with said drums to wind up a reel of said web material, and a power actuated bar pivotally connected to said movable drum for moving said pivotally mounted drum to displace the reel from its normal position.

5. In a web winding machine, rotatable driven drums, a web receiving shaft rotatably supported on said drums to wind the web, and means for effecting movement of one of said drums pivotally with respect to the axis of said other drum to move said shaft over the surface of the other of said drums.

6. In a web winding machine, rotatable

driven drums, a web receiving shaft rotatably supported by said drums, supporting means connected to said shaft and movable therewith, means for locking said means and shaft in any position against lowering, and means for effecting movement of one of said drums relative to said shaft when said shaft is so locked in position.

7. In a web winding machine, rotatable driven drums, a web receiving shaft rotatably supported by said drums, supporting means connected to said shaft and movable therewith, means for locking said means and shaft in any position against lowering, means for effecting movement of one of said drums relative to said shaft when said shaft is so locked in position, and means for releasing said first mentioned means from said shaft to remove the shaft.

8. In a web winding machine, rotatable drums, a web receiving shaft rotatably supported thereby, and means for effecting movement of one of said drums to roll said shaft over the other drum and thereby to discharge said shaft.

9. In a web winding machine, rotatable drums, a web receiving shaft rotatably supported thereby, and power operated means for effecting movement of one of said drums to roll said shaft over the other drum and thereby to discharge said shaft.

10. In a web winding machine, a stationary driven drum, a second drum pivotally connected thereto and driven therefrom, means on which the web may be wound rotatably supported by said drums, and means for effecting movement of said pivotally connected drum.

11. In a web winding machine, rotatable supports, means on which material may be wound rotatably supported thereby, means for effecting movement of one of said supports toward and away from said means, and means for supporting said first mentioned means when said support is moved away.

12. In a web winding machine, rotatable supports, means on which material may be wound rotatably supported thereby, means for effecting movement of one of said supports toward and away from said means, and pivotally mounted extensible means for supporting said first mentioned means when said support is moved away.

13. In a web winding machine, rotatable supports, means on which material may be wound rotatably supported thereby, means for effecting movement of one of said supports toward and away from said means, pivotally mounted extensible means for supporting said first mentioned means when said support is moved away, and locking means associated with said pivotally mounted means.

14. In a paper winder, a pair of rotatable under drums, a paper winding shaft rotatably supported by said drums, and means for

effecting pivotal movement of one of said drums about the other.

15. In a paper winder, a pair of rotatable under drums, a paper winding shaft rotatably supported by said drums, and means for effecting pivotal movement of one of said drums about the other and relative to said winding shaft.

16. In a web winding machine, rotatable drums, a web winding shaft rotatably supported thereby, extensible means pivotally mounted and releasably connected to said shaft, counterweighting means connected to said means, means for effecting movement of one of said drums relative to said other drum and to said shaft, and means for locking said extensible means against lowering.

17. In a web winding machine, a pair of rotatable supports, material receiving means rotatably supported thereby, means including one of said supports for applying an equally distributed force against said receiving means to effect movement thereof, and means for arresting reverse movement of said receiving means when the direction of said force is reversed.

18. In a paper rewinder machine a pair of rotatable under drums, a paper winding shaft adapted to be rotatably supported on said drums for winding a roll of paper by surface contact therewith, means for driving one of said drums, the second of said drums being pivotally mounted with respect to the axis of said first drum, and means for effecting pivotal movement of said second drum to roll said paper winding shaft or reel over the surface of said first drum.

19. In a paper rewinder machine, a pair of rotatable under drums, a paper winding shaft adapted to be rotatably supported on said drums for winding a reel of paper by surface contact therewith, means for driving one of said drums, the second of said drums being pivotally mounted with respect to the axis of said first drum, means for effecting pivotal movement of said second drum to roll said paper winding shaft or reel over the surface of said first drum, a pivotally mounted extensible member releasably engaged with said winding shaft and means for locking said member in position to support said winding shaft in removed position.

20. In a paper rewinder machine, a pair of rotatable under drums, a paper winding shaft adapted to be rotatably supported on said drums for winding a reel of paper by surface contact therewith, means for driving one of said drums, the second of said drums being pivotally mounted with respect to the axis of said first drum, means for effecting pivotal movement of said second drum to roll said paper winding shaft or reel over the surface of said first drum, a pivotally mounted extensible member releasably engaged with said winding shaft, means for locking said

member in position to support said winding shaft in removed position, and a counterweight secured to said member and operative to partially support said member and winding shaft.

21. In a web winding apparatus, spaced surface winding drums normally positioned with their axes lying in a substantially horizontal plane, a winding shaft on which the web is wound by coaction with said drums, one of said drums being pivotally mounted with respect to the axis of the other drum and means for moving said pivotally mounted drum to effect the discharge of said winding shaft from operative position.

22. In a web winding apparatus, rotatable surface winding under drums, a winding shaft on which the web is adapted to be wound rotatably supported by said drums and means for effecting movement of one of said drums to a position of different elevation from said other drum to thereby cause said winding shaft to be discharged from said drums.

23. In a web winding machine, surface winding under drums, a web winding shaft rotatably supported by said under drums, means for effecting a change in the relative elevation of said drums and means for maintaining said winding shaft in changed position against one of said drums when the other of said under drums is again brought into normal position.

24. In a web winding apparatus, driven surface winding under drums, a web winding shaft normally jointly supported by said drums, means for bodily moving one of said drums to effect movement of said shaft over the face of said other drum, and means for holding said winding shaft in removed position while said movable under drum is returned to normal position.

25. In a web winding machine, surface winding drums, a web winding shaft rotatably supported by said drums, supporting means releasably connected to said shaft and movable therewith, means for locking said means and shaft against lowering, and means for effecting bodily movement of one of said drums about the axis of said other drum to change the position of said shaft.

26. In a web winding machine in combination, means for receiving the web, means acting to support and also to rotate said web receiving means and means for so varying the position of said supporting and rotating means as to move the web receiving means from its operative position in the machine.

27. In a web winding machine, a fixed driven drum, a second drum pivoted thereto, a web receiving shaft supported between and rotated by said drums, a vertically movable arm secured beneath said pivoted drum and means for raising said arm to cause said pivoted drum to swing about its pivot on the

fixed drum and move said web receiving shaft onto said fixed drum.

28. In a web winding machine, a fixed driven drum, a second drum pivoted to said first drum, a web receiving shaft supported and rotated by said drums, vertically adjustable pivoted supports connected to said shaft and movable therewith, arms pivoted beneath said second drum, means for raising said arms to swing said second drum about said first drum and move the web receiving means onto said first drum, means for locking the shaft supports against lowering movement, and means for moving the pivoted drum back to starting position.

29. In a web winding machine, a fixed driven drum, a second drum, supports for said second drum pivoted to said first drum, a web receiving shaft mounted upon and rotated by said drums, a pair of supports secured to said shaft and movable therewith, arms pivoted to said drum supports and adapted to be raised to swing said pivoted supports about the fixed drum to cause the web receiving shaft to move onto the fixed drum, means for fastening the shaft supports to maintain the shaft on said fixed drum, and means for moving the pivoted drum back to its starting position.

30 In testimony whereof I have hereunto subscribed my name.

EARL E. BERRY.

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