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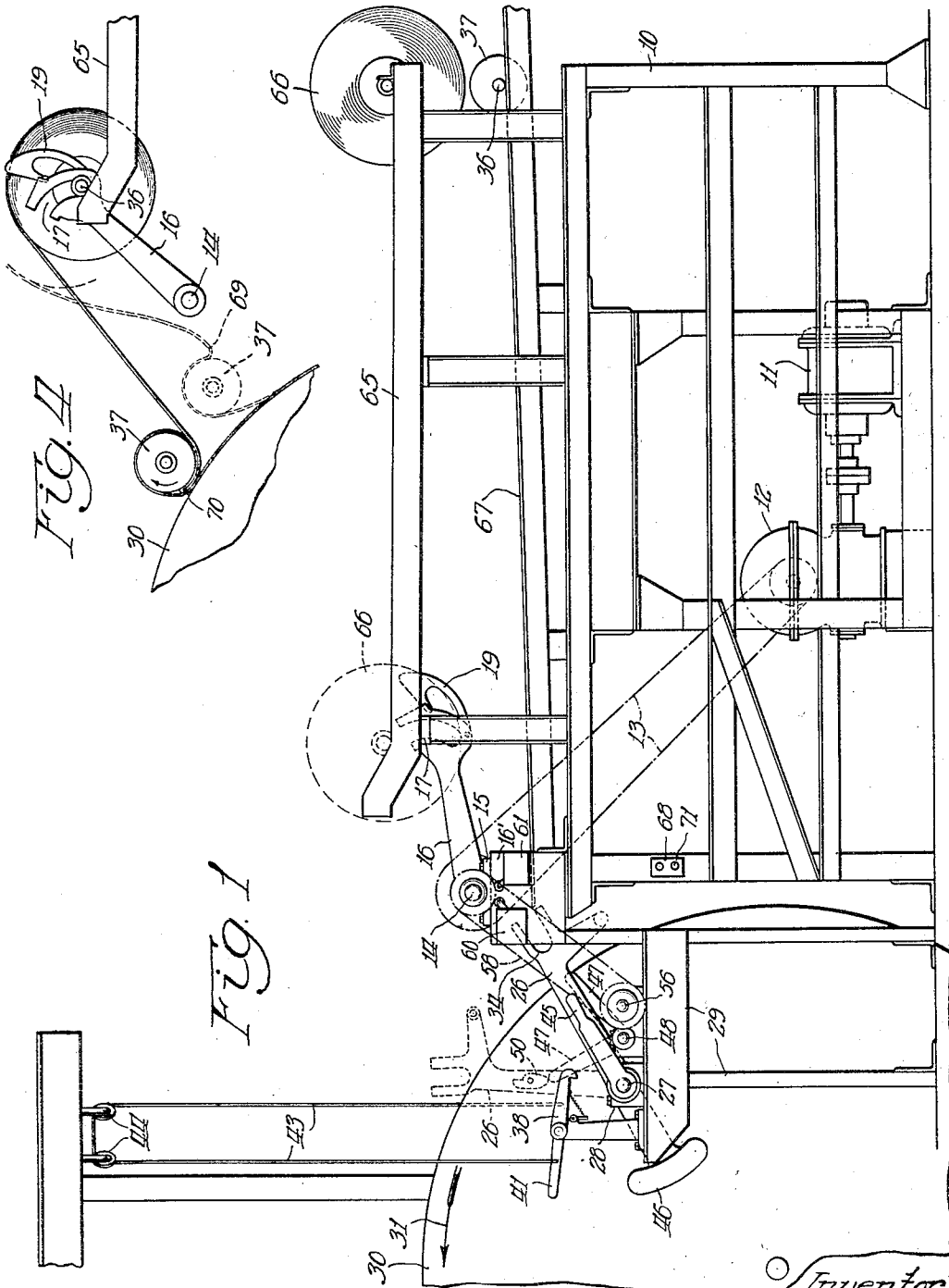
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Filed Nov. 16, 1931

3 Sheets-Sheet 1



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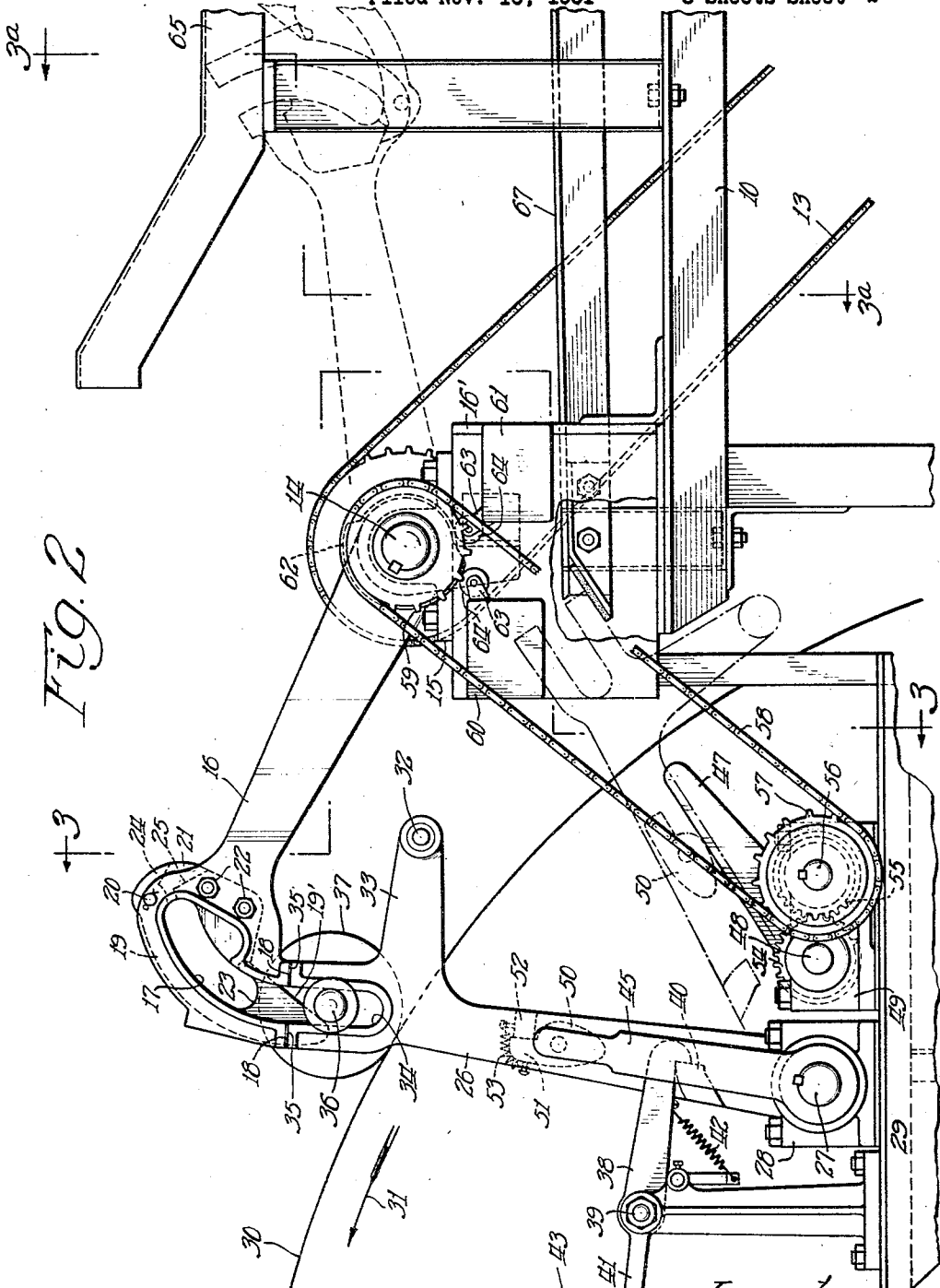


Fig. 2

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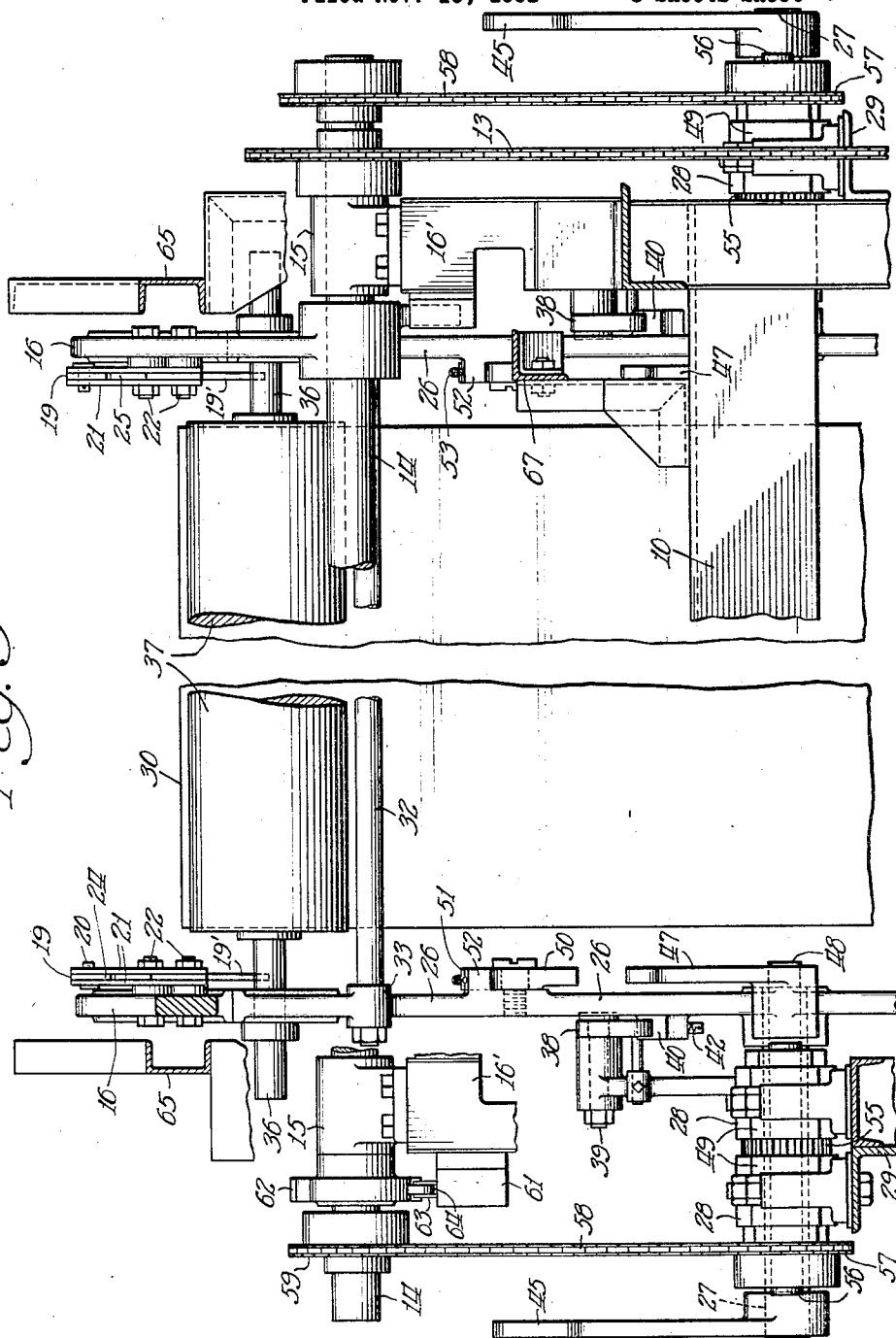
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FIG. 3



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UNITED STATES PATENT OFFICE

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11 Claims. (Cl. 242—65)

This invention relates to improvements in a paper winder, and more particularly to paper-winding mechanism designed for receiving and winding paper into a roll upon delivery of the paper from a paper-making machine.

The main object of the invention is to provide paper-winding mechanism which is operative to automatically start the winding of a web of paper on a new or substitute reel when another reel previously supplied to the mechanism has been filled and is removed from the machine. The present invention also has for one of its main objects the winding of a very light, flimsy sheet, such as crepe paper, in an efficient manner and without any material waste of paper.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings (three sheets), in which a paper winder embodying a preferred form of the invention is illustrated.

In the drawings:

Figure 1 is a side elevation;

Figure 2 is a side elevation of a certain portion of the mechanism shown in Figure 1, but on an enlarged scale, and showing certain parts in a different position;

Figure 3 is a transverse section through the machine, the left-hand end portion of Figure 3 being a section on the line 3—3 of Figure 2, and the right-hand end portion of Figure 3 being a section on the line 3^a—3^a of Figure 2, and

Figure 4 is a detail illustrating a certain feature of operation of the mechanism.

Referring now to the drawings, it will be seen that there is a main frame structure 10 of angle iron or other suitable construction, under which is located a power unit, for example, an electric motor 11 and a speed reduction drive 12. The motor 11 is directly connected with the speed reducer 12, and the speed reducer 12 is connected by means of a chain 13 to a main shaft 14 of the paper-winding mechanism, it being understood, of course, that suitable sprockets are connected with the speed reducer and shaft 14 for receiving the chain 13.

The shaft 14 is mounted for rotation in suitable bearing members 15 mounted on a suitable bed member 16' which is supported by the main framework 10. The shaft 14 has secured to it, near its opposite ends, a pair of arms 16, 16, these arms being keyed to the shaft for rotation or swinging movement therewith.

At their outer ends, each of the arms 16 is

provided with a hook-like formation which provides a downwardly-opening slot 17 having abutment faces 18, 18 at the opposite sides of the open end of the slot. A dog or latch member 19 pivoted at 20 in a bracket 21 secured to the arm 16, as indicated at 22, is provided for a purpose which will presently appear. The latch member 19 includes at its free end an inclined or cam face 19' and a concave retaining seat 23. For limiting swinging movement of the dog 19, it is provided with a lug portion 24 projecting from its hub part, the lug portion 24 being adapted to engage a stop face 25 formed on the bracket 21.

Another pair of arms 26, 26 is associated with the arms 16, 16, the arms 26 being secured respectively to complementary shafts 27, 27 at opposite sides of the mechanism. Each of the shafts 27, 27 is mounted for rotation in suitable bearings, such as indicated at 28, which are supported by auxiliary frames 29, 29, one of which is located at each side of a rotating reel or drum 30 to which the paper to be wound is fed from the paper-making machine by means of a suitable conveyor. The reel 30 is rotated in the direction of the arrow 31. The arms 26, 26 are also connected together by means of a tie bar 32 which is secured at its ends to the laterally extending lugs or ears 33 formed integral with the arms 26. The upper end of each of the arms 26 is provided with an upwardly facing slot 34 and with abutment faces 35 at opposite sides of the open end of the slot 34. As shown in Figure 2, the arms 16 and 26 are adapted to co-operate with each other to provide an upwardly extending and rearwardly curved slot which forms a path of travel for projecting end portions of the shaft 36 of a paper roll core 37.

The arms 26 are held in the position illustrated in Figure 2 by means of a dog 38 which is pivoted, as indicated at 39, in a suitable standard carried by the auxiliary frame 29. The free end of the dog 38 is adapted to engage back of a lug 40 formed on the arm 26 with which it is associated, and one of the dogs 38 is provided with a handle 41 for facilitating releasing of the dog from the lug 40. A coil spring 42 serves to normally hold the dog 38 in downwardly adjusted position in engagement with said lug. The dogs 38 at opposite sides of the machine are connected for simultaneous operation by means of a cable 43 which extends from the handle portion 41 upwardly around sheaves 44 and downwardly to the opposite dog 38. It will be seen that when the handle 41 is pulled downwardly to release the

dog connected directly to the handle, the other dog will also be moved upwardly through the cable connection just described.

The arms 26, 26 are adapted to be adjusted from the operative position illustrated in Figure 2 to the down position illustrated in Figure 1 either automatically or manually but in this instance, through the agency of a hand lever 45 which is keyed to one end of the shaft 27. The arms 26, 26 are each provided with counterweight portions 46 for facilitating manual adjustment thereof from one position to another.

For adjusting the arms 26 from their down position illustrated in full lines in Figure 1 to their up position illustrated in broken lines in Figure 1 and in full lines in Figure 2, push levers such as indicated at 47 are associated with the respective arms 26 and secured to a shaft 48 which is mounted for rotation in suitable bearings, such as indicated at 49. Each push lever 47 is adapted to engage a stop 50 which is pivoted to the inside of the arm 26. Each stop 50 includes a tail portion 51 which is adapted to engage a lug 52 formed integral with the arm 26 for limiting pivotal movement of the stop 50 in one direction. A spring 53 serves to normally maintain the stop 50 in its limit of pivotal movement, i. e., with the tail 51 in engagement with the lug 52.

The push levers 47 are adapted to be swung counter-clockwise, as viewed in Figures 1 and 2, when the shaft 14 and arms 16 are swung in a clockwise direction. For effecting such swinging movement of the push levers 47, the shaft 48 is provided with a gear 54 which meshes with a gear 55 keyed to a shaft 56 which is mounted in the bearing members 49. A sprocket 57 is also secured to each shaft 56 and a chain 58 extends around the sprocket 57 and around a sprocket 59 secured to the shaft 14. It will be seen that when the shaft 14 turns in a clockwise direction the sprocket and chain arrangement 59, 58 and 57 will serve to rotate the shaft 56 in a clockwise direction, and that the gear connection 55, 54 between the shafts 56 and 48 will serve to rock the shaft 48 and push lever 47 in a counter-clockwise direction.

A pair of limit switches 60 and 61, respectively, are mounted on the supporting member 16' so as to be actuated by a cam 62 which is carried by the shaft 14. As clearly shown in Figure 2, each switch 60 and 61 includes an arm 63 which carries a cam roller 64 for engaging and following the cam 62.

The framework 10 supports a pair of upper tracks 65 which are arranged in transversely spaced relation for receiving a full reel of paper, the projecting end portions of the core being adapted to roll on the oppositely disposed tracks 65. The tracks 65 are preferably disposed at a downwardly inclined angle so as to cause full paper reels to roll from the receiving (left-hand) end of the tracks 65, as viewed in Figures 1 and 2, to the discharge end thereof. A full roll of paper is indicated at 66 at the opposite end of the tracks 65.

Another pair of tracks, such as indicated at 67, are mounted in transversely spaced relation beneath the upper tracks 65, and these lower tracks 67 are preferably inclined in the opposite direction so that an empty core placed on the tracks at the right-hand end of the machine, as indicated in Figure 1, will roll by gravity to the opposite ends of the tracks in position to be delivered

to the arms 26, when in the full line position shown in Figure 1.

Operation

At the start of the winding operation, the parts are in the positions shown in full lines in Figure 2. A core 37 is held in operative relation to the reel or drum 30 by having its end portions 36 positioned in the slots 34 of the respective arms 26. The diameter of the roll of paper wound on the core 37 gradually increases as the paper web is wound thereon and causes the projecting core ends 36 to rise in the slots 34 until they engage the cam edges 19' of the hooks 19. Continued rising of the core ends 36 obviously displaces the hooks and permits the core ends to enter the slots 17 in the arms 16. As soon as the core ends 36 pass the cam edges 19' of the hooks 19, the latter drop back into the position illustrated in Figure 2 and serve to lock the core with its winding of paper in the slots 17.

When the core 36 has been freed from the arms 26, the dogs 38 are elevated to release the arms, and the latter are manually swung downwardly through the agency of the hand lever 45 to the broken line position illustrated in Figure 2. When in this latter position, the slots 34 are disposed at the end of the lower tracks 67 so that the core disposed thereon may roll from the tracks into the slots 34 so as to be in readiness for adjustment to operative position relative to the reel 30 to continue the paper-winding operation upon the completion of the roll at that time guided by the slots 17 in the arms 16.

When the paper roll which is guided by the arm 16 reaches the desired size, an electric switch indicated at 68 is operated to energize the motor 11, whereby the shaft 14 is caused to rotate in a clockwise direction, as viewed in Figures 1, 2 and 4. Such rotation of the shaft 14 obviously causes the arms 16 to swing in a clockwise direction, carrying with them the completed roll of paper. During the clockwise swinging movement of the arms 16, the arms 26 which had previously been manually adjusted to the broken line position illustrated in Figure 2, are moved in a counter-clockwise direction to carry an empty core into operative relation with the roll 30. Such swinging movement of the arms 26 is effected through the agency of the push levers 47 which are caused to swing in a counter-clockwise direction through the driving connections already described. The levers 47 engage the pivoted stops 50 so as to effect said swinging movement of the arms 26, and the extent of movement is such that the arms 26 are swung to the position substantially as illustrated in broken lines in Figure 1, wherein the free end of the levers 47 may pass under the stops 50, whereupon the arms 26 drop back slightly to the position in which they are held by the dogs 38, as shown in Figure 2.

During the upward swinging movement of the arms 26, the arms 16 are, of course, moving in a clockwise direction. By reference to Figure 4, it will be seen that the empty core 37, being brought up by the arms 26, will engage the web of paper extending between the reel 30 and the full reel of paper carried by the arms 16. A condition substantially as indicated in broken lines in Figure 4 will result during the movement of the empty core 37 to operative position. This condition includes a loop 69 in the paper web back of the empty core 37. The slack in the paper web, to form the loop, occurs by reason of the fact that the web continues to be delivered by the drum 30

at the normal, constant speed, while the full roll, as soon as it leaves the drum 30, begins to slacken its rotating speed and hence fails to take up the paper web as fast as it is delivered. Upon further movement of the core 37, and substantially to its operative position, as indicated in full lines in Figure 4, the loop portion 69 of the paper web will come into contact with the paper web on the reel or drum 30 and will be carried between the empty core 37 and the drum 30, the loop being pinched substantially as indicated at 70.

As clearly shown in Figure 4, the clockwise movement of the arms 16 serves to deposit the complete roll of paper on the receiving end of the tracks 65, the movement of the arms being continued to substantially the position indicated in Figure 1, wherein the core ends are free from the arms 16 so that the paper roll may roll down the tracks 65. It will now be apparent that inasmuch as the empty core 37 is held in operative position by the arms 26 and the full roll tends to move away from the empty core, the web of paper extending therebetween will gradually be drawn taut and broken, whereupon the core 37 continues to receive the paper web from the drum 30. It will be observed that the arrangement of the hooks 19 is such that when the arms 16 reach a position approximately as indicated in Figure 4, the hooks swing clear of the slot 17 to permit the full roll of paper to be freed from the arms 16.

When the arms 16 reach the limit of clockwise movement, substantially as indicated in full lines in Figure 1, the cam 62 actuates one of the limit switches 60 or 61, depending upon the arrangement of the electric motor circuit, to stop the motor 11. Then the motor 11 is caused to rotate in a reverse direction by means of the reversing switch indicated at 71, so as to effect rotation of the shaft 14 in counter-clockwise direction. The arms 16 will thus be swung in a counter-clockwise direction until their co-operative position relative to the arms 26 (as shown in full lines in Figure 2) is reached. During such counter-clockwise rotation of the arms 16, the push levers 47 are turning idly in a clockwise direction. When the arms 16 and push levers 47 reach their respective operative positions as shown in full lines in Figure 2, the cam 62 operates the other of the limit switches 60 or 61 to again stop rotation of the motor 11. When the new roll core is filled, the operation is again repeated by starting the motor by means of the switch 68.

Instead of mere limit switches 60 and 61, one of the switches may be made to automatically reverse the direction of rotation of the motor 11, so that the operation of the winder will be entirely automatic.

The above described structure is particularly adapted to the winding of very thin, flimsy paper webs, although not limited thereto. However, thin, flimsy paper webs are readily broken, as in the described operation of the device, without the use of auxiliary means for cutting or weakening the web. For heavier paper webs which might be difficult to break in the manner described, an automatic or mechanical breaker may be provided or suitable cutting or wetting devices may be provided to weaken the web for facilitating the breaking thereof. But little waste results from the operation of the above described structure, and the paper web is rolled smoothly and evenly.

I am aware that changes may be made in the mechanism above described without departing from the spirit of the invention, the scope of

which should be determined by reference to the following claims, the same being construed as broadly as possible consistent with the state of the art.

I claim as my invention:

1. In a paper winder of the class described, the combination of a rotary drum for delivering a paper web, means for supporting a roll core in a position adjacent said drum for receiving the paper web from the drum, means for supporting an empty roll core in a position adjacent said paper-receiving position, and means for moving said empty roll core from its initial position to said receiving position and for simultaneously moving the first-mentioned roll core away from said receiving position in such a manner as to cause a length of said paper web to extend across the path of movement of said empty core.

2. In a paper winder of the class described, the combination of a rotary drum for delivering a paper web, means for supporting a roll core in a position adjacent said drum for receiving the paper web from the drum, means for supporting an empty roll core in a position adjacent said paper-receiving position, and means for moving said empty roll core from its initial position to said receiving position and for simultaneously moving the first-mentioned roll core away from said receiving position in such a manner as to cause a length of said paper web to extend across the path of movement of said empty core and so as to cause said web to loop around said empty core and to engage the web on the drum, said looped portion being thereby carried between said empty roll and the drum, whereby the web is attached to said empty core.

3. In a paper winder of the class described, the combination of means for delivering a web of paper, a pivotally mounted arm having means at its free end for maintaining an incomplete paper roll in receiving position relative to said delivery means, another pivoted arm having means at its free end for carrying an empty roll core into receiving position relative to said delivery means, means for simultaneously swinging said arms in opposite directions so as to remove the paper roll from receiving position and to deliver an empty roll core to said receiving position; means for temporarily retaining said empty-core-carrying arm into position for maintaining an incomplected paper roll in receiving position relative to the discharge means, said arms each having slots for co-acting with the roll core in receiving position, and said slots being aligned with each other when both of said arms are disposed in position to maintain the roll core in receiving position relative to the delivery means.

4. In a paper winder of the class described, the combination of a rotary drum for delivering the paper web, an arm pivotally mounted at one end and provided at its free end with a slot for guiding and maintaining a paper roll core in receiving position relative to the delivery drum, another arm pivotally mounted at one end at a point located intermediate the axis of the drum and the pivot axis of said first-mentioned arm, and provided at its free end with a slot for receiving a portion of an empty core, whereby said arm is adapted to carry such empty core from an initial, inoperative position to said web-receiving position relative to the drum, means connecting said arms for simultaneous pivotal movement in one direction and including means whereby said first-mentioned arm may be moved in a reverse direction independently of the sec-

ond-mentioned arm, power means for effecting movement of the first-mentioned arm in both directions, and means for automatically limiting the extent of movement imparted to said first-mentioned arm.

5. In a paper winder of the class described, the combination of a rotary drum for delivering the paper web, an arm pivotally mounted at one end and provided at its free end with a slot for guiding and maintaining a paper roll core in receiving position relative to the delivery drum, another arm pivotally mounted at one end at a point located intermediate the axis of the drum and the pivot axis of said first-mentioned arm, and provided at its free end with a slot for receiving a portion of an empty core, whereby said arm is adapted to carry such empty core from an initial, inoperative position to said web-receiving position relative to the drum, means connecting said arms for simultaneous pivotal movement in one direction and including means whereby said first-mentioned arm may be moved in a reverse direction independently of the second-mentioned arm, power means for effecting movement of the first-mentioned arm in both directions, means for automatically limiting the extent of movement imparted to said first-mentioned arm, and means for facilitating manual movement of the second-mentioned arm, independently of the movement of said first-mentioned arm in one direction.

6. In a paper winder of the class described, the combination of a rotary drum for delivering a paper web, and a core-carrying arm for delivering a core into web-receiving position relative to the drum, said arm being mounted at one end for pivotal swinging movement, a roll-carrying arm pivotally mounted at one end for swinging movement and provided with means at its free end for guiding and carrying a paper roll, said roll-carrying arm being arranged to receive a partially formed paper roll from said core-carrying arm, means for adjusting said core-carrying arm to initial core-receiving position while maintaining said roll-guiding arm in position to guide and maintain the incomplete roll in receiving position relative to the delivery drum until such roll is completed, and power means for simultaneously effecting adjustment of said core-carrying and roll-carrying arms to remove a completed roll from receiving position and to deliver an empty core to said receiving position, said means being arranged to transfer the delivered paper web from the full roll to the empty core as an incident to the respective movements thereof.

7. In a paper winder of the class described, the combination of a rotary drum for delivering a paper web, and a core-carrying drum for delivering a core into web-receiving position relative to the drum, said arm being mounted at one end for pivotal swinging movement, a roll-carrying arm pivotally mounted at one end for swinging movement and provided with means at its free end for guiding and carrying a paper roll, said roll-carrying arm being arranged to receive a partially formed paper roll from said core-carrying arm, means for adjusting said core-carrying arm to initial core-receiving position while maintaining said roll-guiding arm in position to guide and maintain the incomplete roll in receiving position relative to the delivery drum until such roll is completed, power means for simultaneously effecting adjustment of said core-carrying and roll-carrying arms to remove a

deliver an empty core to said receiving position, said means being arranged to transfer the delivered paper web from the full roll to the empty core as an incident to the respective movements thereof, and means for automatically stopping the movement of said core-carrying and roll-carrying arms.

8. In a paper winder of the class described, the combination of a rotary drum for delivering a paper web, and a core-carrying arm for delivering a core into web-receiving position relative to the drum, said arm being mounted at one end for pivotal swinging movement, a roll-carrying arm pivotally mounted at one end for swinging movement and provided with means at its free end for guiding and carrying a paper roll, said roll-carrying arm being arranged to receive a partially formed paper roll from said core-carrying arm, means for adjusting said core-carrying arm to initial core-receiving position while maintaining said roll-guiding arm in position to guide and maintain the incomplete roll in receiving position relative to the delivery drum until such roll is completed, power means for simultaneously effecting adjustment of said core-carrying and roll-carrying arms to remove a completed roll from receiving position and to deliver an empty core to said receiving position, said means being arranged to transfer the delivered paper web from the full roll to the empty core as an incident to the respective movements thereof, means for automatically stopping the movement of said core-carrying and roll-carrying arms, and means for effecting reverse movement of said roll-carrying arm while maintaining said core-carrying arm in adjusted position.

9. In a paper winder of the class described, the combination of means for carrying a completed paper roll, means for carrying an empty roll core, and means for simultaneously moving said roll carrying means and said core carrying means respectively in opposite directions so as to cause the web of paper to engage and loop around the core, thereby to attach the web to the core.

10. In a paper winder of the class described, the combination of a drum for guiding a web of paper, means for carrying a completed paper roll, means for carrying an empty roll core, and means for simultaneously moving said roll carrying means and said core carrying means respectively in opposite directions so as to cause the web of paper extending between the drum and roll to engage and loop around the core, and to be pinched between the drum and core, thereby to attach the web to the core.

11. In a paper winder of the class described, the combination of a drum for delivering a paper web to be rolled, means for holding a roll being wound in engagement with the drum so as to be thereby rotated to effect winding of the web on said roll, said means also being operative to carry the roll when completed away from the drum, whereby the speed of rotation of the roll is caused to slow down, means for carrying an empty roll core into web receiving position relative to said drum, said roll carrying means and roll core carrying means being movable so as to cause the core to engage a slackened portion of the web resulting from the reduced speed of rotation of the full roll, and so as to cause such slackened web portion to loop around the core to thereby become attached to the core.

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