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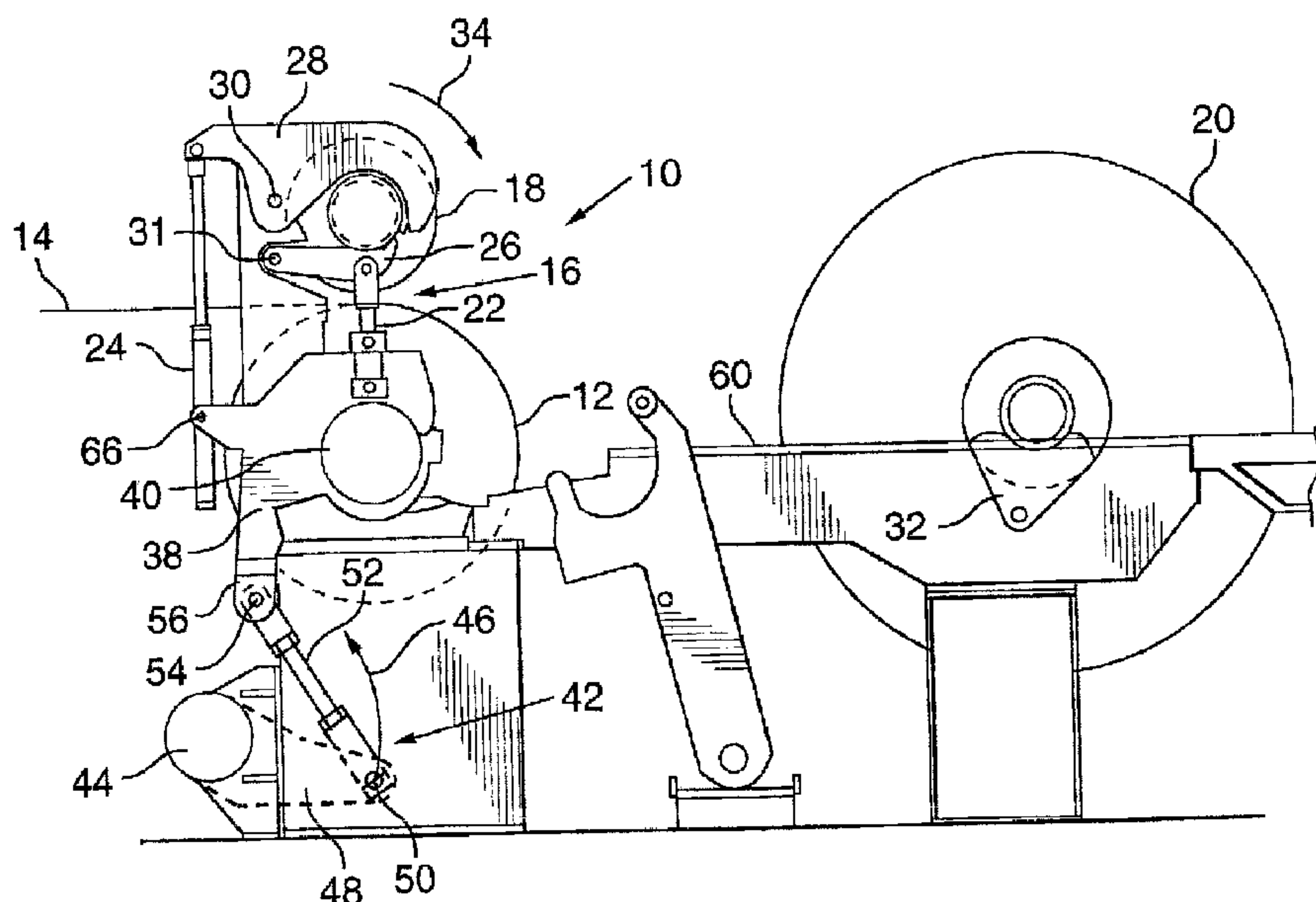
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(54) Titre : MECANISME DE TRANSFERT POUR LE BOBINAGE D'UN MATERIAU EN BANDE

(54) Title: TRANSFER MECHANISM FOR WEB WINDING DEVICE



(57) Abrégé/Abstract:

There is disclosed a web winding device for winding a substantially continuous web onto a rotating reel bar. The winding device includes a driving drum having an axis about which the drum is rotated. The driving drum maintains a nip driving engagement with the reel bar to rotate the reel bar and transfer the web passing over a surface of the driving drum onto the reel bar. The winding device further includes a transfer mechanism for moving the reel bar from a primary winding position where the web is initially wound onto the reel bar to a secondary winding position while maintaining the reel bar in nip driving engagement with the driving drum. The transfer mechanism includes rotating transfer arms mounted to rotate about an axis aligned to the axis of the driving drum. The rotating transfer arms support movable supporting jaws adapted to secure the reel bar and support the reel bar as it moves from the primary winding position to the secondary winding position. The transfer mechanism further includes actuator apparatus comprising movable linkage and rotator apparatus. The movable linkage interconnects the rotator apparatus to the rotating transfer arms. The rotator apparatus rotates a predetermined angular amount at a predetermined rotational velocity to cause the linkage to move and control the rotation of the rotating transfer arm about the axis of the driving drum. By providing linkage and a rotating machine of limited rotation, the present invention eliminates the use of a gear wheel rack and pinion and the associated problems that occur as the teeth in the gears wear out.

TRANSFER MECHANISM FOR WEB WINDING DEVICE

ABSTRACT OF THE DISCLOSURE

There is disclosed a web winding device for winding a substantially continuous web onto a rotating reel bar. The winding device includes a driving drum having an axis about which the drum is rotated. The driving drum maintains a nip driving engagement with the reel bar to rotate the reel bar and transfer the web passing over a surface of the driving drum onto the reel bar. The winding device further includes a transfer mechanism for moving the reel bar from a primary winding position where the web is initially wound onto the reel bar to a secondary winding position while maintaining the reel bar in nip driving engagement with the driving drum. The transfer mechanism includes rotating transfer arms mounted to rotate about an axis aligned to the axis of the driving drum. The rotating transfer arms support movable supporting jaws adapted to secure the reel bar and support the reel bar as it moves from the primary winding position to the secondary winding position. The transfer mechanism further includes actuator apparatus comprising movable linkage and rotator apparatus. The movable linkage interconnects the rotator apparatus to the rotating transfer arms. The rotator apparatus rotates a predetermined angular amount at a predetermined rotational velocity to cause the linkage to move and control the rotation of the rotating transfer arm about the axis of the driving drum. By providing linkage and a rotating machine of limited rotation, the present invention eliminates the use of a gear wheel rack and pinion and the associated problems that occur as the teeth in the gears wear out.

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TRANSFER MECHANISM FOR WEB WINDING DEVICE

FIELD OF THE INVENTION

The present invention relates to an apparatus for controlling the movement of a reel bar in a web winding device of a paper making machine as the reel bar moves from its primary winding position to its secondary winding position.

BACKGROUND OF THE INVENTION

Paper-making typically involves forming, pressing, drying and reeling of a paper web passing through the paper machine. Current day paper-making machines operate at high speed and reel bars provided in the winding section of the machine must maintain an uninterrupted winding of the web onto the reel bar.

The reel bar contacts in nip engagement a driving drum and is driven by this engagement so that the paper web passing in contact with the driving drum is wound onto the reel bar. The reel bar usually is supported on rails during the reeling operation. Tension is provided to the web by running the driving drum faster than the speed of the previous section of the paper-making machine. The tension and nip pressure can be varied to produce rolls of paper with a desired tightness.

To maintain uninterrupted winding, a new reel bar is usually supported above the winding section of the machine as the paper is wound onto a reel

bar supported on the rails. As the paper on the reel bar being wound reaches a full or wound condition, rotation of the new reel bar is started to bring the new reel bar up to a speed that will allow it to receive the paper web. The new reel bar is then lowered into nip driving engagement with the driving drum and the paper is cut so that the paper now winds onto the new reel bar. This initial winding position for the new reel bar is referred to as the primary winding position. The other wound reel bar supported on the rails is referred to as the secondary winding position. The wound reel bar is then moved down the rails away from the winder, rotation is halted, and the wound reel is removed from the rails.

Next, the new reel bar is moved or rotated about the primary winding drum from the primary winding position to the secondary winding position. During this rotation, the reel bar is maintained in nip driving engagement with the driving drum by a transfer arm mechanism. Once the reel bar reaches the secondary winding position, the reel bar is usually supported on rails and another arm maintains the reel bar in nip driving engagement with the driving drum. This permits the transfer arm to release the reel bar and move back to its initial position to receive a new reel bar.

The rotation of the transfer arm mechanism is typically controlled by a rack and pinion type gearing. The lower surface of the transfer arm when in its initial position is provided with a portion of a gear wheel having teeth along its curved surface. These gear teeth mesh with a pinion gear whose rotation is by a motor. It should be understood that there is a transfer arm mechanism is located at each side of the winding drum driven by a corresponding pinion to balance the loading effect of the reel bar as it is lowered from the primary winding position to the secondary winding position. A motor drives the pinions in synchronization by a shaft that extends from the motor and links up both pinions. While this gearing mechanism has worked relatively well in the past, after years of cycling the transfer arm, the gear teeth on the transfer arm mechanism become worn resulting in slight deviations in relative movement of between the ends of the reel bar as it is lowered into the secondary winding position. This has an adverse effect on the winding operation.

SUMMARY OF THE INVENTION

In accordance with an aspect of the present invention there is provided

a web winding device for winding a substantially continuous web onto a rotating reel bar. The winding device includes a driving drum having an axis about which the drum is rotated. The driving drum maintains a nip driving engagement with the reel bar to rotate the reel bar and transfer the web passing over a surface of the driving drum onto the reel bar. The winding device further includes a transfer mechanism for moving the reel bar from a primary winding position where the web is initially wound onto the reel bar to a secondary winding position while maintaining the reel bar in nip driving engagement with the driving drum. The transfer mechanism includes rotating transfer arms mounted to rotate about an axis aligned to the axis of the driving drum. The rotating transfer arms support and secure the reel bar to support the reel bar as it moves from the primary winding position to the secondary winding position. The transfer mechanism further includes actuator apparatus comprising movable linkage and rotator apparatus. The movable linkage interconnects the rotator apparatus to the rotating transfer arms. The rotator apparatus rotates a predetermined angular amount at a predetermined rotational velocity to cause the linkage to move and control the rotation of the rotating transfer arm about the axis of the driving drum.

By providing linkage and a rotating machine of limited rotation, the present invention eliminates the use of a gear wheel rack and pinion and the associated problems that occur as the teeth in the gears wear out.

Preferably, the actuator apparatus is located at both sides of the winding device and the rotator apparatus comprises two rotating machines at each side of the winding device that are interconnected by a shaft to synchronize movement of the rotating machines and corresponding linkage and rotating transfer arms.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the nature and objects of the present invention, reference may be made to the following diagrammatic drawings, in conjunction with the accompanying specification, in which:

FIGURE 1 is a side view of the winding device of the present invention showing the transfer arm mechanism in its primary winding position;

FIGURE 2 is a side view of the winding device of the present invention showing the transfer arm mechanism in its secondary winding position; and,

FIGURE 3 is a rear partial view of the web winding device of Figures 1 and 2.

DETAILED DESCRIPTION OF EMBODIMENTS

Referring to Figure 1 there is shown a web winding device or reeling device generally at 10. The winding device includes a driving drum 12 with a continuous web 14 passing thereover. Driving drum 12 forms a nip contacted point 16 shown between the reel bar 18 and the drum 12. The reel bar 18 is shown in a position just before it is lowered into nip engagement with the driving drum 12 to begin winding in the primary winding position.

To the right of Figure 1 is shown a wound roll 20. In practice, wound roll 20 would not be in the position shown in Figure 1 until after the reel 18 had come into nip engagement with drum 12. The lowering of reel 18 is accomplished by a piston cylinder mechanism 22 and piston cylinder mechanism 24. Mechanism 22 contracts bringing down a lower jaw 26 and piston cylinder mechanism 24 expands allowing an upper jaw 28 to drop and pivot about its pivot point 30. This brings the reel 18 into engagement with drum 12. At this time web 14 would be cut from the wound roll 20 and wound roll 20 would be moved into the final resting position shown to the right of Figure 1. A braking mechanism not shown in great detail at 32 would slow the rotation of the drum and wound roll 20 so that this roll could be removed by suitable means such as for example a crane.

Once the reel 18 is in nip engagement with driving drum 12, the reel 18 is rotated about the driving drum 12 in the direction shown by arrow 34. The reel 18 is rotated in the direction of arrow 34 shown in Figure 1 to a secondary winding position shown in Figure 2 at 36. To rotate the reel 18 relative to the driving drum 12 and maintain it in nip engagement such that the web 14 is continuously wound onto the reel 18, the present invention utilizes a transfer mechanism 38.

The transfer mechanism 38 includes jaws 26 and 28 which are adapted to clasp or secure the rear bar 18 and support the rear bar 18 as it moves from the primary winding position to the secondary winding position. The transfer mechanism 38 is mounted to pivot about an axis 40 which is aligned to the center axis 41 of the drum 12 (see Figure 3).

The rotation of the transfer mechanism 38 is controlled by actuator

apparatus comprising a movable linkage 42 and a rotator 44. The rotator 44 comprises a hydraulic actuator which has been referred to as a "rotac". This hydraulic actuator or rotac includes two vanes 47 that allow it to rotate in first direction 100°. Through hydraulic means, not shown, this motor 44 is rotated in the direction of arrow 46 (see Figure 1) approximately 100° to the position shown for the linkage 42 in Figure 2. The linkage 42 includes a first crank 48 which is rotatably secured to the hydraulic actuator 44 and has a remote end pivotly connected at 50 to an adjustable linking arm 52. The other end of the adjustable linkage arm 52 is pivotly connected at 54 to flange 56 of the transfer mechanism 38. The hydraulic actuator moves or rotates at a predetermined velocity and a predetermined angular amount. The angular amount again is defined by the number of vanes in the hydraulic actuator and the velocity in which it rotates is determined by the hydraulic pressure involved.

The actuator rotator 44 is connected with an actuator rotator on the other side of the paper winding machine by means of a shaft 58 (see Figure 3). Shaft 58 allows for the actuator apparatus 44 (motor or rotac) on each side of the paper winding machine to control and synchronize movement of the ends of the reel 18 as it is lowered into its secondary position as shown in Figure 2.

Referring to Figure 2, once the reel 18 reaches its secondary winding position, it is supported on rails 60. A secondary arm 62 provides a cam surface 64 in contact with the hub of the reel 18 to maintain the nip pressure at 16 between drum 12 and reel 18. The secondary arm 62 maintains pressure on the reel drum 18 by use of hydraulic actuating members which are not shown.

Once the reel 18 is in the secondary position shown in Figure 2, the piston cylinder mechanism 24, pivotly interconnected between the transfer mechanism 38 at 66, is contracted in the direction of arrow 68. This causes the jaw 28 to pivot about pivot point 30 and release the reel 18. After this happens, the rotator 44 moves in the direction of arrow 70 (see Figure 2) causing the linkage mechanism to revert to the position shown in Figure 1. The transfer mechanism 38 is now in a position ready to receive a new reel.

By providing the linkage mechanism 42 and the rotator 44, the present

invention has eliminated the use of a gear wheel whose teeth would mesh with a pinion. The advantage with the present invention is that over several years of repeated cycles, there would not be wear and tear on the linkage mechanism in a similar fashion to what one would expect between the meshing relationship between the teeth in a pinion and a gear wheel.

WHAT IS CLAIMED IS:

1. A web winding device for winding a substantially continuous web onto a rotating reel bar, the winding device including:

a) a driving drum having an axis about which the drum is rotated, the driving drum maintaining a nip driving engagement with the reel bar to rotate the reel bar and transfer the web passing over a surface of the driving drum onto the reel bar;

b) a transfer mechanism for moving the reel bar from a primary winding position where the web is initially wound onto the reel bar to a secondary winding position while maintaining the reel bar in nip driving engagement with the driving drum, the transfer mechanism including:

(i) rotating transfer arms mounted to rotate about an axis aligned to the axis of the driving drum, the rotating transfer arms secures the reel bar to support the reel bar as it moves from the primary winding position to the secondary winding position; and,

(ii) actuator apparatus comprising movable linkage and rotator apparatus, the movable linkage interconnecting the actuator apparatus to the rotating transfer arms, the rotator apparatus rotating a predetermined angular amount at a predetermined rotational velocity to cause the linkage to move and control the rotation of the rotating transfer arm about the axis of the driving drum.

2. The web winding device of claim 1 wherein the transfer mechanism includes movable releasable supporting jaws adapted to secure and support the reel bar as it is transferred from its primary winding position to its secondary winding position.

3. The web winding device of claim 1 wherein the actuator apparatus is located at both sides of the winding device and the rotator apparatus comprises two hydraulic rotating machines at each side of the winding device that are interconnected by a shaft to synchronize movement of the rotating machines and corresponding linkage and rotating transfer arms.

4. The web winding device of claim 1 further including a secondary arm for engaging the reel bar to maintain the reel bar in nip driving

engagement with the driving drum in the secondary winding position after the supporting jaws release the reel bar.

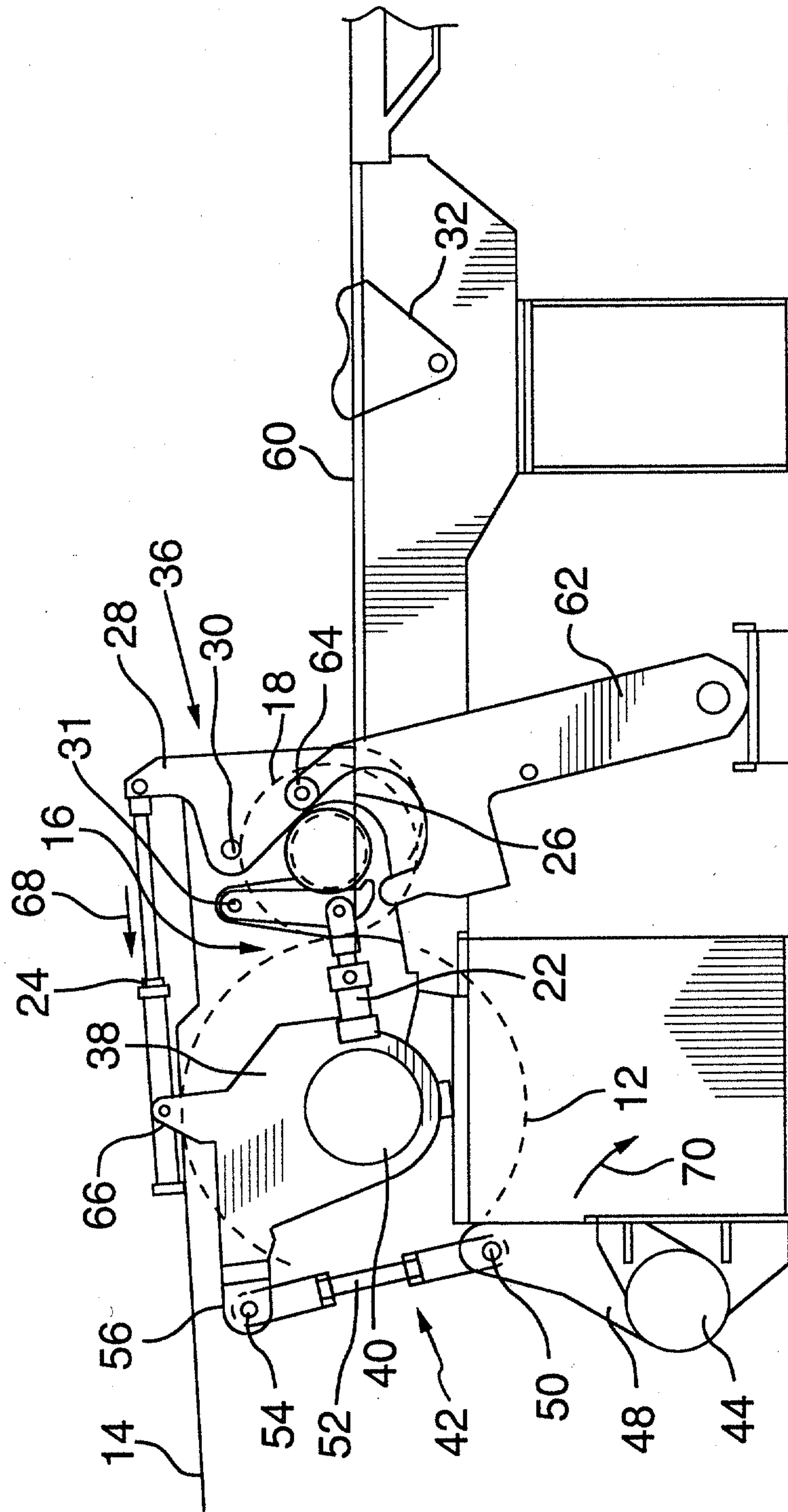


FIG. 2

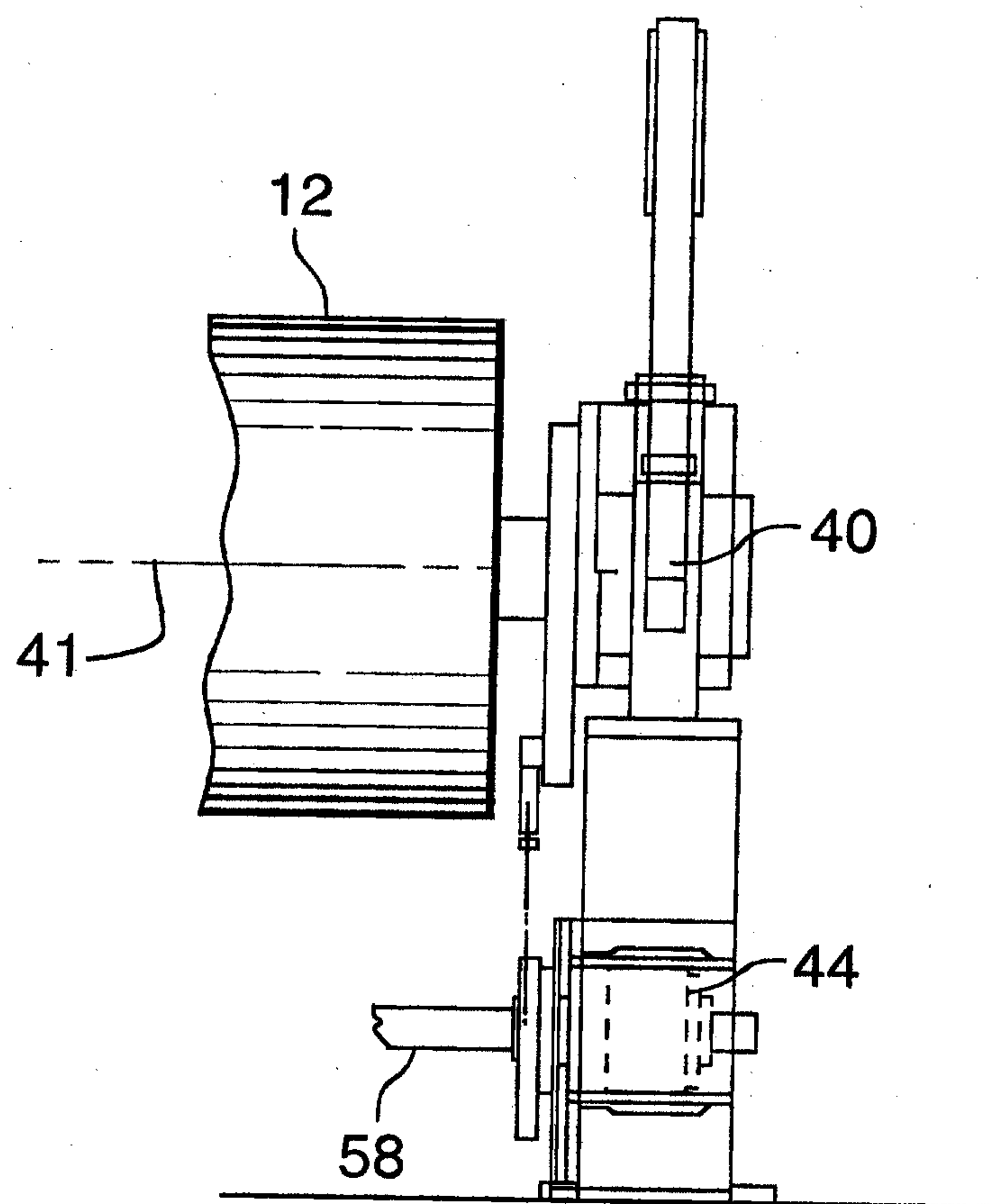


FIG. 3

