Nov. 7, 1950 W. R. THOMSON 2,528,713

PAPER REELING METHOD AND APPARATUS

Filed Dec. 21, 1946 2 Sheets-Sheet 1

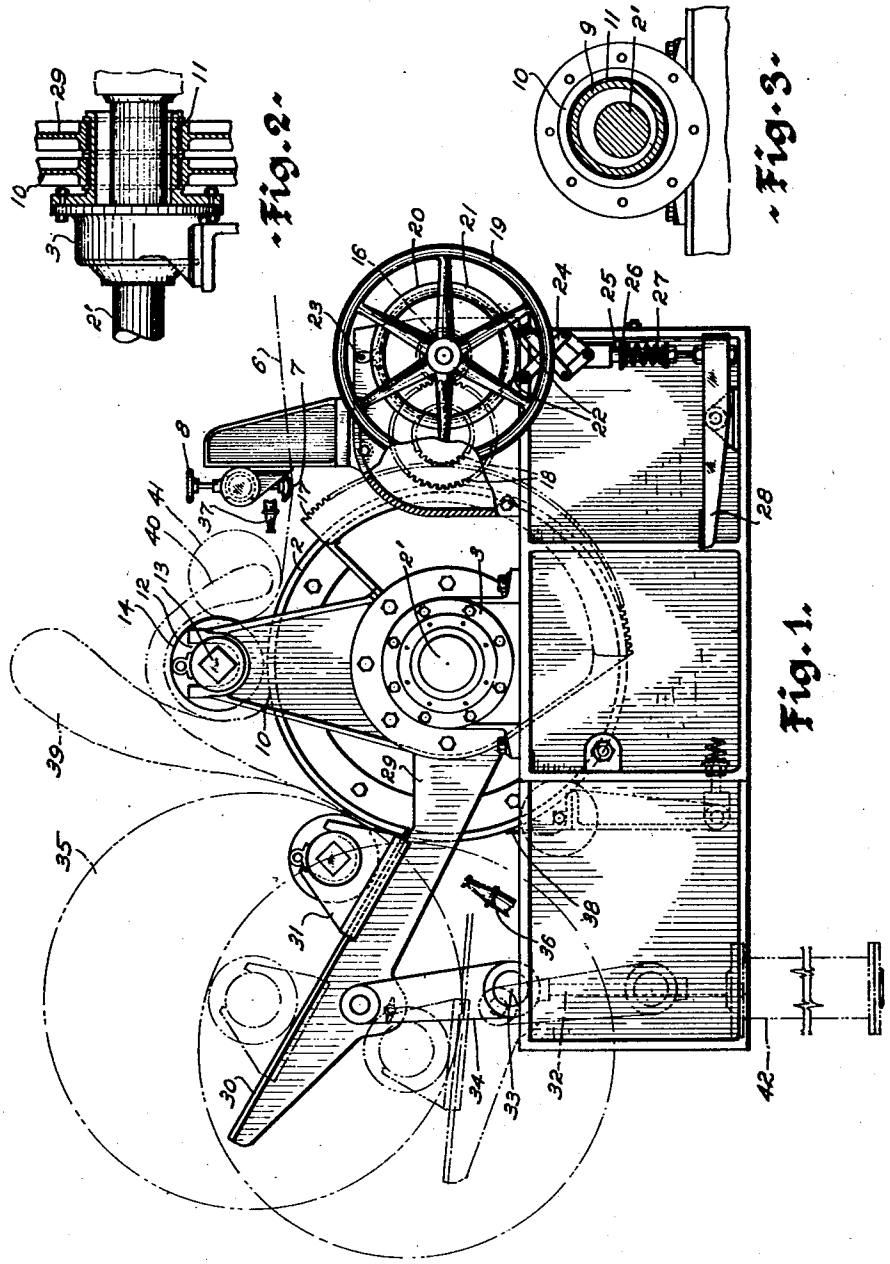


Fig. 1.

Fig. 2.

Fig. 3.

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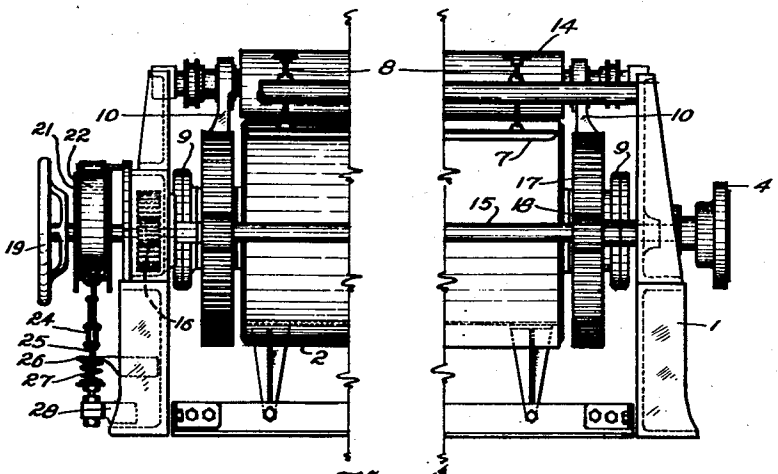


Fig. 4

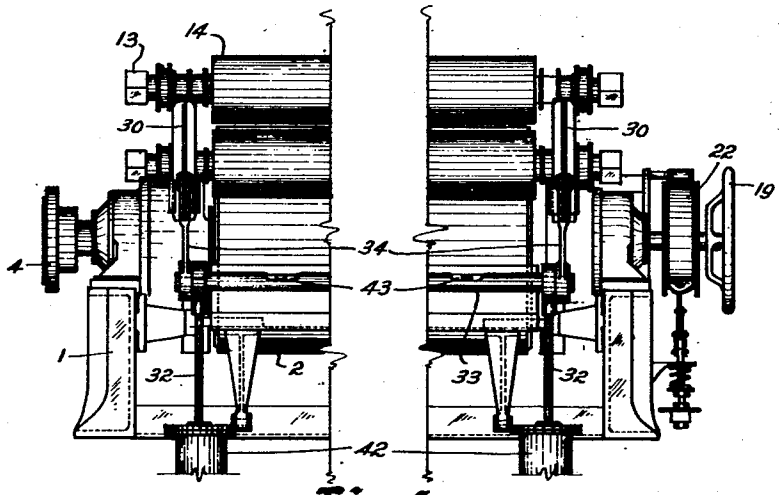


Fig. 5

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PAPER REELING METHOD AND APPARATUS

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10 Claims. (Cl. 242—65)

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This invention relates to paper winding methods and devices such as may be employed in association with paper making machines.

Many types of paper winding or reeling machines have heretofore been proposed and employed in the art, but such machines usually require more or less expert attention on the part of the operator and are subject to the production of a substantial amount of paper "broke" due to breakages of the paper web during the reeling operation or while transferring the web from one reel bar to another.

It is an object of this invention to provide a simplified and improved method and apparatus for carrying out the operation of winding paper on reel bars in a more expeditious and convenient manner and with substantial elimination of "broke."

The invention contemplates the provision, in combination with the usual reel drum and bearings therefor, of reel bar carrying and transferring mechanism and means for supporting a reel bar in paper reeling relation to the drum, the said mechanism being adapted in one position to receive and support a reel bar out of contact with the drum, and being movable in one direction to place the supported reel bar into contact with a paper web on the drum and further movable in the same direction towards the reel bar supporting means, while operable during such further movement to maintain contact between the reel bar and a paper web on the drum.

To this end, the invention includes, in combination with the usual reel drum and bearings therefor, reel bar transferring mechanism eccentrically mounted on the reel drum bearings and having reel bar supporting pockets, and means for revolving the transferring mechanism about the axis of the drum throughout a predetermined distance, the distance between the axis of the pockets and the surface of the drum being at one point substantially equal to the radius of a reel bar supported in the pockets and gradually decreasing from such point to one end of said predetermined distance and gradually increasing from such point to the other end of said predetermined distance.

The invention also includes the provision of reel bar bearings for supporting a reel bar during the paper reeling operation, and inclined supports to slidably receive the reel bar bearings, such supports being adjustable as to inclination to vary the nip pressure between the paper roll and the reel drum.

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Other objects, details and advantages of the invention will become apparent from the ensuing description with reference to the accompanying drawing, in which

Figure 1 is an end elevation of the paper winding device in accordance with the invention,

Figure 2 is a detail side elevation in section of the eccentric supporting structure,

Figure 3 is a detail sectional end elevation of the eccentric supporting structure,

Figure 4 is an elevation of one side of the paper winding device, and

Figure 5 is an elevation of the other side of the winding device.

In the drawing, 1 is a main supporting frame in which is mounted a reel drum 2 having journals 2' mounted in suitable bearings 3. The reel drum is driven in any suitable manner through the drive coupling 4. The paper web 6 is fed onto the drum as indicated and the usual spreader bar 7, which bears on the web to avoid wrinkling of the paper, with adjusting means 8 therefor, may be provided.

A stationary eccentric sleeve 9 is secured to each bearing 3 in spaced relation to the respective journal 2' and rotatably mounted thereon is an arm 10, a bushing 11 being preferably provided as a bearing surface between the arm and sleeve. The free end of each arm 10 is provided with a pocket 12 to receive the end 13 of a reel bar 14. In the upright position of the arms 10, as shown in full lines in Figure 1, the reel bar 14 supported therein is adapted to be substantially in contact with the drum 2 or spaced therefrom only a distance approximately equal to the thickness of the paper sheet. The eccentricity of the sleeves 9 is such that rotative movement of the arms in one direction from the upright position, as to the left in Figure 1, gradually decreases the distance between the axis of the pockets and the surface of the drum whereby the reel bar therein remains in contact with the drum and moves outwardly to a slight extent, and rotative movement of the arms in the opposite direction from the upright position, as to the right in Figure 1, gradually increases the distance between the axis of the pockets and the surface of the drum whereby the reel bar therein moves out of contact with the drum. The rotative movement in the first direction is preferably through an arc of from 40° to 70°, while the rotative movement in the second direction may be of considerably less degree as through an arc of from 20° to 35°.

Means for swinging the arms 10 throughout the

desired rotative movement comprises a shaft 15 suitably journalled in the frame, gears 16 thereon, a gear segment 17 fixed to each arm, and intermediate gears 18. A handwheel 19 is provided for driving the shaft 15. A brake 20 for holding the arms in any position to which they are moved is also provided. While various types of brakes will be found to be satisfactory for the purpose, that illustrated is particularly effective and comprises a brake drum 21, and a pair of shoes 22 engageable with the drum and having their upper ends pivotally connected together at 23 and their lower ends pivotally connected to a "lazy tongs" arrangement of levers 24. A rod 25 for actuating the tongs is slidably mounted in a bracket 26. A spring 27 normally urges the rod in a downward direction to apply the brake, and a pedal 28 is pivotally connected to the rod 25 and is adapted to move the same upwardly to release the brake.

Means for supporting the reel bar during the paper winding operation comprises a pair of arms 29 positioned adjacent either end of the frame and rotatably mounted on the eccentric sleeve 9. Each arm is provided with an inclined extension constituting a rail 30 which slidably carries a reel bar supporting bearing 31. It will be observed that the arms and rails are free to swing about their pivotal mounting on the sleeve 9 and means for supporting them in adjustable position with relation thereto comprises a pair of vertically disposed rods 32 having their upper ends pivotally engaging a shaft 33, and a pair of links 34, each having its lower end pivotally mounted on the shaft and its upper end pivotally mounted on a rail. Power means, such as hydraulic motors 42, are provided to impart vertical movement as desired to the rod 32. Level indicating means, such as spirit levels 43, may be provided on the shaft 33 in order that any variation in the desired synchronous movement of the rods 32 may be noted and corrected.

A plurality of air nozzles 36, supplied with air under pressure from any suitable source, are located below the nip between the paper roll 35 and reel drum and are adapted to direct air jets substantially tangentially of the roll and drum. A second series of air nozzles 37 are located to the right of the nip between the drum and the reel bar as supported by the arms 10 in the upright position thereof and are adapted to direct air jets tangentially of the drum and reel bar.

The usual doctoring device 38 for keeping the reel drum surface clean is provided.

In operation, the reel bar transferring step will be described, assuming the machine to be in the operating order shown in Figure 1 with a substantially full roll of paper on one reel bar and a second reel bar supported in pockets 12 in vertical axial alignment with the reel drum and driven thereby. The paper roll is withdrawn slightly from the drum face by the hoisting or other suitable mechanism and the nozzles 36 are opened to direct air jets against the web and produce a paper loop as indicated at 39. The nozzles 36 are then closed, which permits the loop to fall into the position indicated at 40 which is to the right of the nip between the second reel bar and the drum. The nozzles 37 are then opened to direct air jets against the loop 40 which causes it to be engaged by the nip. As the loop becomes wound upon the second reel bar, the portion of the loop between the bar and the full roll breaks and the web continues to wind upon the second reel bar. The full roll is then removed by means of the hoisting mechanism and the sliding bearings 31 return to their lowermost position. Releasing the brake by actuation of the pedal 28, the operator revolves the handwheel 19 to swing the arms 10 with the second reel bar to the left a sufficient distance to deposit the reel bar in the bearings 31. During such movement, the reel bar remains in paper reeling relation to the drum but is free to mount out of the pockets 12. After engagement of the reel bar with the bearings 31, the arms 10 are left in position until the reel bar has accumulated sufficient paper to move out of the pockets 12, when the arms are swung to the right to a position slightly to the right of the upright position of the arms. While in such position, another reel bar is placed in the pockets 12, and it will be observed that the bar, as indicated at 41, is free from engagement with the drum or web. The arms may then be swung back to upright position wherein the reel bar is driven by the drum, preparatory to subsequent positioning on the bearings 31 in the manner described.

The nip pressure between the paper roll and the reel drum may be varied as desired by adjusting the inclination of the rails 30. This is highly desirable since, for satisfactory operation, the nip pressure should be adjusted for varying weights of paper. For instance, when reeling a lightweight paper, the nip pressure must be relatively low to avoid breakage of the web.

Furthermore, it will be observed that, for any fixed position of the roll supporting rails 30, the nip pressure will increase with increased size and weight of the roll 35. However, with the structure described, it is possible to maintain substantially constant any desired nip pressure by lowering the rails 30 either periodically or continuously, by actuation of the power means 42, at a rate synchronized with the rate of increase of the size of the roll 35 as the web is wound thereon.

It will be observed that the apparatus described is subject to simple and convenient operating steps requiring little skill on the part of the operator. Moreover, the transfer of the web from one reel to another is occomplished with no wastage of paper and, with the proper adjustment of nip pressures, breakages during reeling are substantially eliminated.

Furthermore, mechanism may be readily provided for automatically carrying out the simple operating steps required.

It will be understood that various changes in details and arrangement of parts may be made without departing from the spirit and scope of the invention as defined in the appended claims. For instance, the rails 29 may be of curved, instead of flat contour, as illustrated. Further, while the arms 10 are shown and described as being in upright position at the initial nip engagement between the reel bar and reel drum, it will be understood that this position may be other than upright with corresponding arrangement of the other parts of the machine.

What is claimed is:

1. In a paper reeling machine having a driven reel drum, journals for the drum, and supporting bearings for the journals, a fixed sleeve surrounding each journal in spaced eccentric relation thereto, an arm pivotally mounted on each sleeve and having a reel bar receiving pocket, and means for swinging the arms about the sleeves.

2. In a paper reeling machine having a frame and a driven reel drum mounted therein, arms pivotally mounted in the frame for supporting a reel bar in substantially contacting relation with

a paper web on the drum, the pivotal axis of said arms being laterally offset from the vertical axis of said drum, means for supporting a reel bar in paper winding relation to the drum comprising a pair of inclined rails, and a bearing slidably mounted on each rail, and means for swinging said arms to transfer a reel bar therefrom to said bearings.

3. In a paper reeling machine having a frame and a driven reel drum mounted therein, arms pivotally mounted in the frame and having reel bar receiving pockets, means for revolving the arms a predetermined distance through an arc the center of which lies on an axis laterally offset from the vertical axis of the drum, the distance between the axis of the pockets and the surface of the drum being at one point substantially equal to the radius of a reel bar supported in the pockets and gradually decreasing from such point to one end of said predetermined distance and gradually increasing from such point to the other end of said predetermined distance.

4. In a paper reeling machine having a frame and a driven reel drum mounted therein, arms pivotally mounted in the frame and having reel bar receiving pockets, means for revolving the arms a predetermined distance through an arc the center of which lies on an axis laterally offset from the vertical axis of the drum, the axis of said pockets being in one position in substantially vertical alignment with the axis of the drum, and means for supporting a reel bar in paper winding relation to the drum, said revolving means constituting means for transferring a reel bar from the pockets to the reel bar supporting means, the distance between the axis of the pockets and the surface of the drum being at said one position substantialy equal to the radius of a reel bar supported in the pockets and gradually decreasing when moved from such position in a direction towards said reel bar supporting means.

5. In a paper reeling machine having a driven reel drum, journals for the drum, and supporting bearings for the journals, a sleeve surrounding each journal in spaced eccentric relation thereto and fixed to one of said bearings, an arm pivotally mounted on each sleeve and having a reel bar receiving pocket, said arms being in horizontal alignment and the axis of said pockets being in one position in substantially vertical alignment with the axis of the drum, the distance between the axis of the pockets and the surface of the drum being in said one position substantially equal to the radius of a reel bar supported in the pockets, and gradually decreasing when moved from such position in one direction.

6. A paper reeling machine as defined in claim 5, including means for revolving said arms a predetermined distance about their pivots, and brake means for holding the arms in any position to which they are moved.

7. In a paper reeling machine having a driven reel drum, journals for the drum, and supporting bearings for the journals, a fixed sleeve surrounding each journal in spaced eccentric relation thereto, an arm pivotally mounted on each sleeve and having a reel bar receiving pocket, means for swinging the arms in unison about the sleeves, a second arm pivotally mounted on each sleeve and carrying a reel bar supporting rail, and means for swinging said second arms in unison about the sleeves.

8. In a paper reeling machine having a frame and a driven reel drum mounted therein, arms pivotally mounted in the frame for supporting a reel bar in substantially contacting relation with a paper web on the drum, the pivotal axis of said arms being laterally offset from the vertical axis of said drum, means for supporting a reel bar in paper winding relation to the drum comprising a pair of inclined rails pivotally mounted in the frame, the pivotal axis of said rails coinciding with the pivotal axis of said arms, and means for swinging said rails in unison about their pivots to vary the inclination thereof.

9. In a method of reeling paper on a reel bar utilizing a reel drum, the successive steps which comprise placing the reel bar in adjacent substantially parallel but non-contacting relation to the drum, swinging the reel bar in an arcuate direction to a position in substantially contacting relation to the drum, directing a web of paper between the reel bar and drum to initiate formation of a roll of paper on the reel bar, again swinging the reel bar in said arcuate direction immediately on initial formation of the roll of paper thereon to another position while continuously maintaining the roll of paper in contact with the drum, and supporting the reel bar in the latter position while continuing the formation of the roll of paper thereon.

10. In a method of reeling paper on a reel bar utilizing a reel drum, the successive steps which comprise placing the reel bar in adjacent substantially parallel but non-contacting relation to the drum and offset to one side of the axis of the drum, swinging the reel bar in an arcuate direction to a position in substantially contacting relation to the drum and with the axes of the reel bar and drum in substantially vertical alignment, directing a web of paper between the reel bar and drum while in the latter position of the reel bar to initiate formation of a roll of paper thereon, again swinging the reel bar in said arcuate direction immediately on initial formation of the roll of paper thereon to another position offset to the other side of the axis of the drum while continuously maintaining the roll of paper in contact with the drum, and supporting the reel bar in the latter position while continuing the formation of the roll of paper thereon.

WILLIAM ROBERT THOMSON.

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