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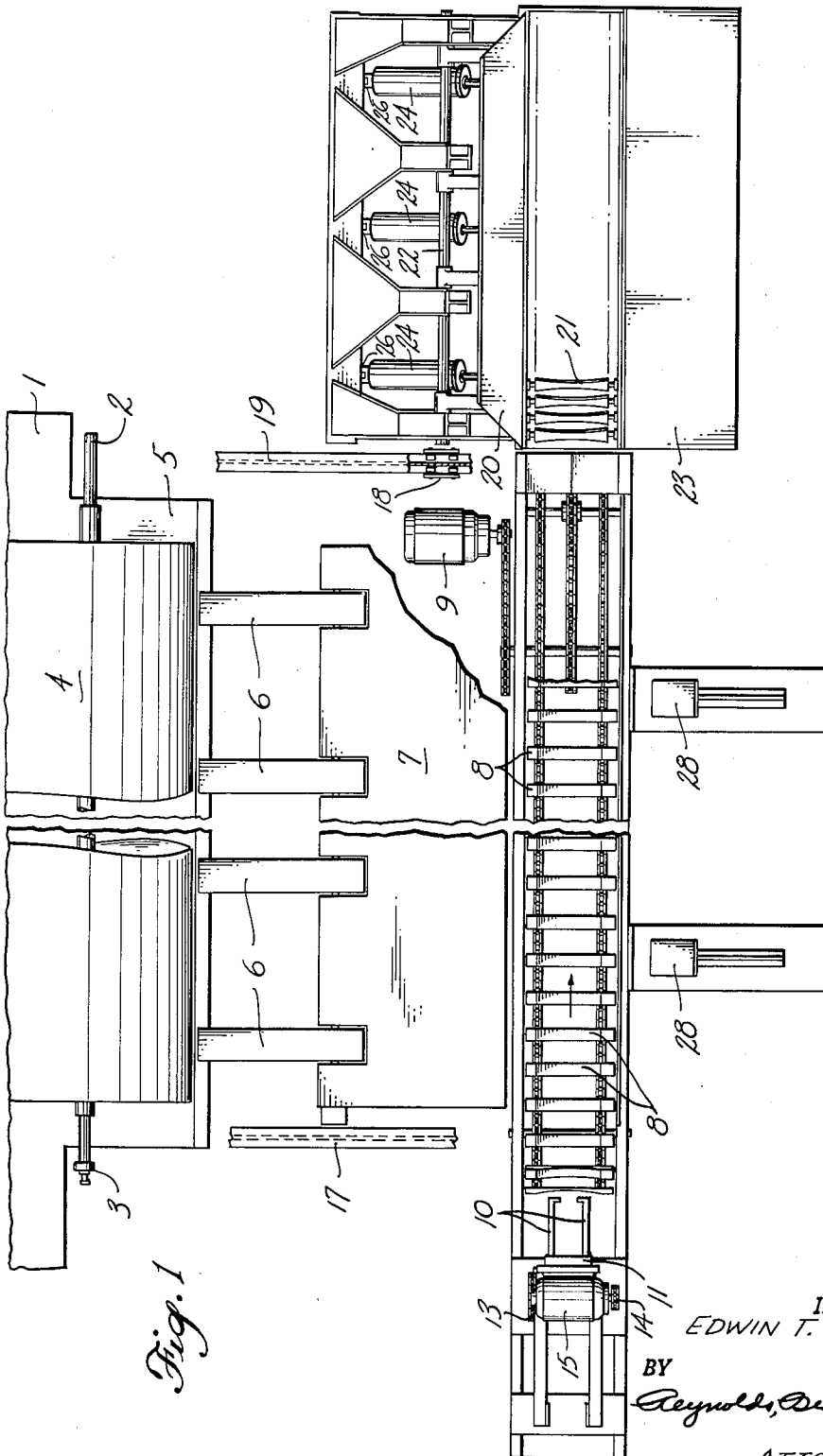
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METHOD AND MECHANISM FOR ROLL HANDLING

Filed Jan. 12, 1953

2 Sheets-Sheet 1



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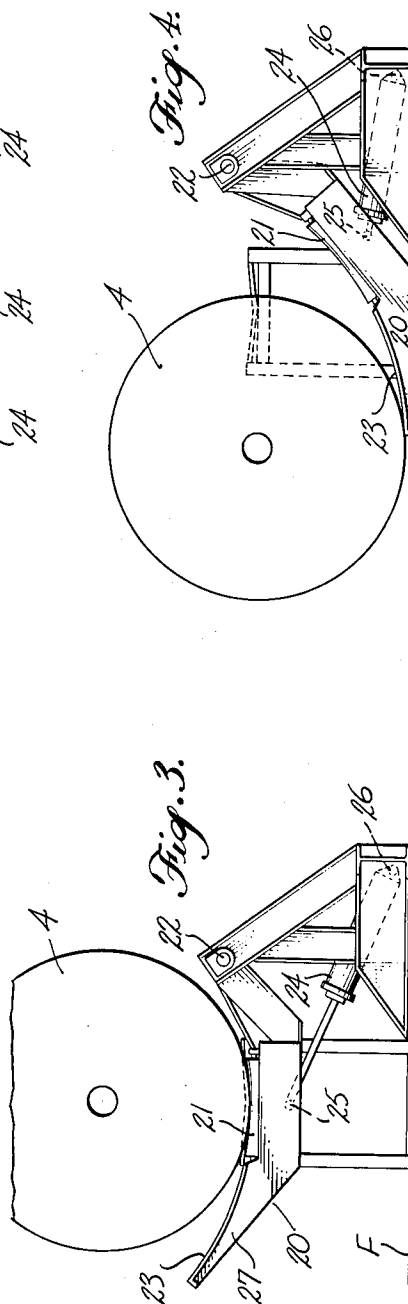
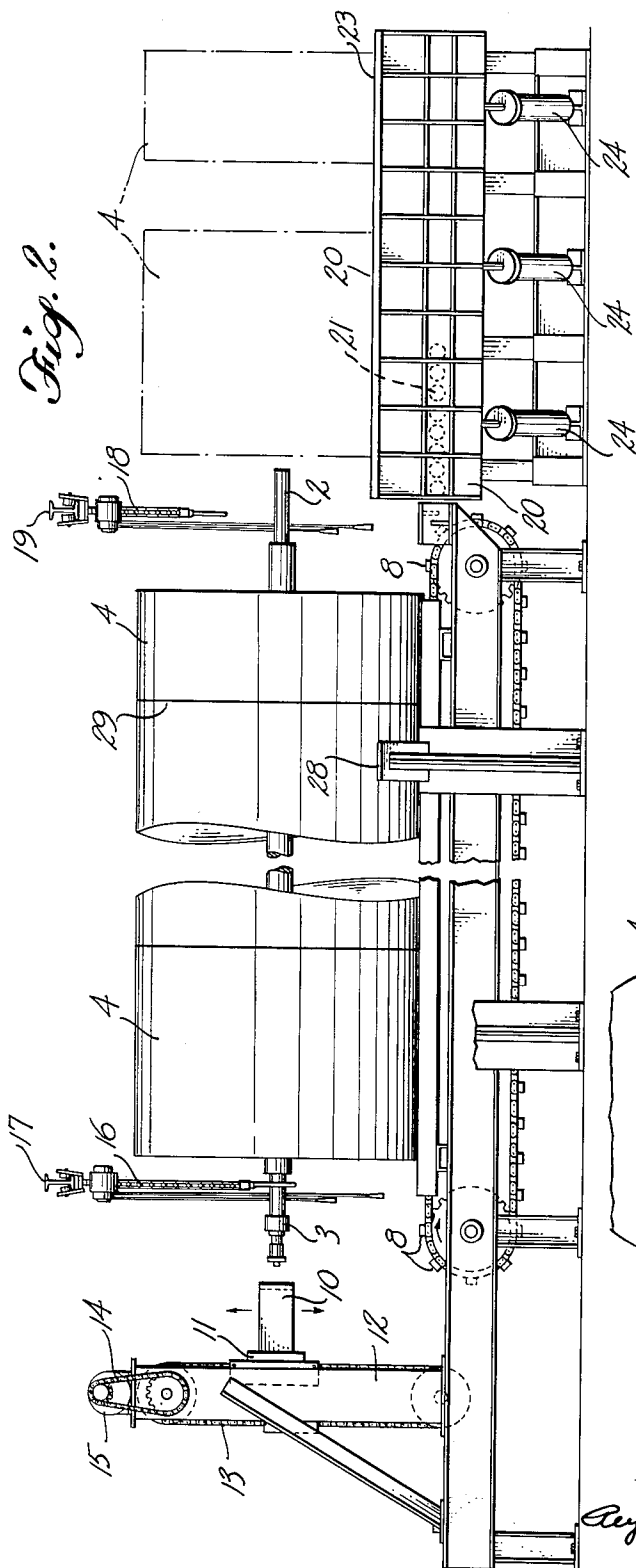
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METHOD AND MECHANISM FOR ROLL HANDLING

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12 Claims. (Cl. 164—84.5)

The mechanism of this invention is utilized for handling rolls, especially large rolls of paper removed from a paper making machine, and transfers these rolls from such a machine to the floor, ready for shipment or storage.

In winding into rolls paper from a paper making machine the paper is wound upon a spindle, and during such operation a wide sheet of paper may be cut as it is rolled into several sections so that several narrow rolls will be wound upon the spindle. Upon completion of the winding operation it is necessary to strip the roll or rolls of paper from the spindle or mandrel, and if the paper sheet has been cut into narrower strips during winding, it may be necessary to break the individual rolls apart. Since the spindle or mandrel on which the paper roll or rolls are wound is usually a considerable distance above the floor, it will ordinarily then be necessary to lower the stripped paper roll or rolls onto the floor.

Since paper from a paper making machine is usually rolled into large rolls, they are quite heavy and the spindle on which the paper is wound also is heavy. It is an object, therefore, to provide mechanism for handling the paper rolls mechanically so that it is not necessary to lift or maneuver them by hand either during the procedure of stripping the paper rolls from the spindle or in lowering them to the floor.

A particular object is in stripping the paper rolls from the spindle to separate relatively narrow rolls readily from each other, which may be somewhat interconnected because of the cut between the rolls being somewhat incomplete. This operation can be accomplished quickly and easily without mutilation of the paper and without any possibility of losing control over the movement of a paper roll, however narrow it may be. Thus there is no danger of even a narrow roll toppling onto its side from a position resting on its periphery.

A further object is to lower one or more paper rolls to floor level under complete control so that during this operation there is no possibility of a roll toppling over, yet such lowering can be accomplished quickly although gently, and the paper roll or rolls will be freed automatically from the roll handling mechanism with little or no manual assistance.

The foregoing objects can be accomplished by releasing a roll winding spindle with the roll or rolls wound about it from a paper making machine, and shifting such spindle and roll assembly into a roll stripping station. In such station the spindle is anchored against lengthwise movement, and the roll or rolls are shifted lengthwise of the spindle to strip them from it. The rolls thus moved are shifted onto a tiltable conveyor cradle, and as each roll section is moved onto such cradle from the stripping station, the cradle is tilted upward to disjoin that roll completely from the adjacent unstripped roll. An additional roll may then be stripped from the spindle and severed in the same way until the desired number of rolls has been stripped from the spindle. Thereupon the cradle may be tilted or swung downward into a position inclined transversely of the roll stripping direction and

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transversely of the spindle, so that the rolls on the cradle will roll transversely across and off it and onto the floor.

Additional advantages and objects of the invention will be discussed in connection with the following specific description of the mechanism shown in the drawings:

Figure 1 is a plan view of the roll handling mechanism with parts broken away, and Figure 2 is an elevation view of such mechanism, showing the side of the paper rolls.

Figure 3 is an elevation view of the roll handling mechanism taken perpendicular to the view of Figure 2, so that the end of the paper roll is seen, and Figure 4 is a similar view with the roll supporting cradle in tilted roll discharging position.

The present roll handling mechanism may be utilized with paper making machines of different types and even with machines other than paper making machines in which sheet material is accumulated in rolls which may be wound upon a shaft or spindle. The details of such a paper making or other machine have not been disclosed for that reason.

The paper making or other sheet supplying machine 1 will be such as to supply sheet material for winding on the spindle or mandrel 2 which has a head 3 or other gripping portion at one end. The paper rolls 4 may be of any desired width, but since the spindle 2 is quite long and the web of paper or other sheet material approaches the length of the spindle, it is customary to split the length of the roll into at least two parts during the winding operation, and frequently into considerably more than two parts. Usually, however, the paper roll sections are somewhat connected by portions of the sheet material which have not been severed completely.

When rolls of sufficient size have been wound upon the mandrel 2, such mandrel is freed from the paper making or similar machine, and the rolls 4 will be lowered onto the table 5. The mandrel will be carried by the paper rolls. Thus carrying the mandrel, the rolls may be rolled across bridging beams 6 from the table 5 onto a platform 7. One end of each of these beams may be pivotally mounted on the edge of platform 7 adjacent to table 5, so that one or more of such beams can be swung upward to afford a passageway between the table 5 and platform 7 through which workmen may walk to inspect the periphery of roll 4 or attend to the roll or sheet making machine.

To facilitate movement of the rolls 4 onto and across the platform 7, such platform may be inclined downward slightly away from table 5, and the bridging beams 6 may also be inclined downward slightly away from such table. Alongside the edge of platform 7 remote from table 5 is the stripping conveyor 8 of the slat and chain type, the slats of which, as shown at its left end in Figure 1, are somewhat concave to cradle the rolls 4 more effectively. This conveyor is driven by a reversible motor 9 through suitable chain drive mechanism shown in Figure 1.

Aligned with the stripping conveyor is a mandrel anchoring device including the gripping fingers 10 carried by the carriage 11 held by and movable vertically along ways 12. Such carriage movement is effected by the endless chain 13, driven through the chain drive 14, connected to the sprocket shaft of chain 13, which in turn is driven by motor 15. While held against axial movement by the gripping fingers 10, the adjacent end of spindle 2 to such fingers may be supported by a chain hoist 16 movable along an overhead rail 17. When necessary, the opposite end of the spindle may be supported by a second hoist 18, movable along an overhead rail 19.

Also aligned with the stripping conveyor 8 is an off-bearing conveyor cradle 20 carrying a row of rolls 21 extending in continuation of the off-bearing conveyor

8. These rolls are preferably tapered toward their centers in order to cradle paper rolls more effectively. The cradle is swingably mounted on a shaft 22 extending parallel to the stripping conveyor 8 but offset from it. At the side of the conveyor rolls 21 opposite the cradle supporting shaft 22 the cradle has a concave roll way 23 inclined relative to the plane formed by the axes of rolls 21 and extending upward away from such conveyor rolls when their axes are horizontal.

The position of the cradle 20 with the axes of rollers 21 horizontal may be maintained by fluid-operated piston and cylinder devices 24, of which there may be several distributed along the cradle as shown in Figure 2. The cradle will be proportioned and the pivot shaft 22 located such that when the axes of rolls 21 are horizontal the upper surfaces of the conveyor formed by rolls 21 and of the roll stripping slat conveyor 8 will be in alignment. If the piston and cylinder devices 24 are of the hydraulic type, the cradle may be maintained in such position simply by closing the liquid supply and discharge pipes to such devices so that the liquid will be confined within the cylinders.

The piston and cylinder devices 24 are connected to the cradle 20 by a pivot 25 and to the cradle supporting frame by a pivot 26. If liquid is supplied to the cylinders of these devices, the distance between pivots 25 and 26 will be increased, and the cradle 20 will be swung upward somewhat about its shaft 22 to dispose the cradle roll conveyor elevated slightly above the roll stripping conveyor 8. Conversely, if fluid is discharged from the piston and cylinder devices, the cradle will swing downward about shaft 22 from the position of Figure 3 to that of Figure 4, during which movement the piston and cylinder device will contract and it will swing somewhat relative to the cradle 20 and the supporting framework for the piston and cylinder devices. In such downwardly swung position the underside 27 of the roll way 23 may rest on the floor F, as shown in Figure 4. Since the whole cradle will be inclined downwardly from the shaft 22 in that position, the paper roll or rolls 4 which may be on the cradle will roll gently off it onto the floor.

In using the roll handling mechanism the mandrel 2 will be disengaged from its supporting bearings, in accordance with customary procedure, and the roll or rolls 4 on such mandrel will rest on the table 5. With the bridge beams 6 in the lowered position shown in Figure 1, the rolls may be moved easily onto the bridge beams 6 by a workman grasping and applying force to one of the opposite ends of the mandrel. In this way the roll is moved across the bridge beams onto the platform 7, and if the beams 6 and platform 7 are inclined slightly downward, no appreciable additional effort will be required to move the roll or rolls onto the roll-stripping conveyor 8. If a roll is already on this conveyor chocks may be placed under the newly discharged roll or rolls when they reach the platform 7 so that they will be held on this platform until they can be moved onto the roll stripping conveyor 8. In order to prevent the momentum of the rolls 4 causing them to roll on beyond the roll stripping conveyor, stop abutments 28, as shown in Figures 1 and 2, may be provided, which may be engaged by the rolls to prevent them from rolling past the stripping conveyor.

When the rolls on a spindle 2 have been brought to rest on the roll stripping conveyor 8, the motor 15 will be energized to raise or lower the mandrel gripping fingers 10 out of alignment with the spindle 2. Motor 9 may then be energized to drive conveyor 8 in a direction to shift the rolls and the mandrel supported by them to the left as seen in Figure 2 until the mandrel head 3 has passed beyond the ends of gripping fingers 10 bent toward each other. Motor 15 is then energized again to shift the gripping fingers 10 vertically until their bent ends are engaged behind the head or enlargement 3 of the mandrel.

To strip the rolls 4 from the spindle 2 the motor 9 is now reversed to drive the stripping conveyor 8 toward the right, as indicated by the arrow in Figure 1. During such operation the piston and cylinder devices 24 will be extended to the position shown in Figures 2 and 3, in which they hold the rolls 21 of the cradle roll conveyor in alignment with the roll stripping conveyor 8. When the stripping conveyor has moved the first roll onto the cradle so that the first roll division line 29 is in registry with the gap between the roll stripping conveyor and the end of cradle 20 adjacent to it, motor 9 will be stopped and fluid will be supplied to the piston and cylinder devices 24 to swing the cradle 20 upward slightly. Such movement will sever any pieces of the sheet material interconnecting the roll section withdrawn from the mandrel and resting on cradle 20 from the next roll section into which the mandrel still extends and which is carried by stripping conveyor 8. Such upward swinging of the cradle, however, will not produce any tendency for the roll section moved upward by such tilting of the cradle to tip over, because the disjoining of the roll sections is effected by relative offsetting movement of the roll sections parallel to a plane perpendicular to the axes of such roll sections.

When the first roll section has thus been disjoined from the adjacent section, the cradle will be swung downward again to dispose the roll supporting surfaces of rollers 21 in alignment with the roll supporting surfaces of the slats on conveyor 8. The motor 9 will then be energized again to move the roll stripping conveyor 8 in the direction of the arrow shown in Figure 1 until the junction between the next roll section and the one following it has been brought into registry with the space between the cradle and the stripping conveyor. By extension of the piston and cylinder devices 24 the cradle 10 will then again be moved upward to disjoin the second roll section from the one following it, while roll stripping conveyor 8 remains stationary. After this roll section disjoining operation stripping conveyor 8 will be started again following downward movement of the cradle until its conveyor section is aligned with the stripping conveyor. As the stripping of the paper roll sections from the mandrel 2 continues, the roll sections on cradle 20 will be pushed to the right as seen in Figures 1 and 2 until substantially the entire length of the cradle has been filled.

In the mechanism shown the length of cradle 20 is less than that of the stripping conveyor 8. The cradle may be made of any desired length, but unless it should be desired to accommodate on it the entire roll capacity of the mandrel 2 it is not necessary that this cradle be as long as the stripping conveyor. When the cradle has been loaded with roll sections as desired up to the number which would fill it, fluid may be discharged from the piston and cylinder devices 24 to rock the cradle from the roll receiving position shown in Figure 3 into the discharging position shown in Figure 4, in which the disjoined roll sections will roll from the cradle onto the floor. The fluid may be discharged gradually from the piston and cylinder devices, so that the roll sections will move slowly from the rolls 21 onto the roll way 23 and across it until the roll way reaches the floor, whereupon the roll sections will roll off the roll way with minimum momentum. Immediately after such discharge of the roll sections, fluid may be supplied again to the piston and cylinder devices to swing the cradle 20 back into the roll receiving position of Figure 3 for reception from the stripping conveyor 8 of additional roll sections stripped from the mandrel 2 and disjoined.

After a substantial portion of the roll sections have been stripped from mandrel 2, hoist 16 is rolled along track 17 and engaged with the end of the mandrel adjacent to the gripping fingers 10 to support this mandrel end in proper relationship to the gripping fingers and to keep the mandrel horizontal. When the last roll section is about to be stripped from the opposite end of

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the mandrel, hoist 18 is rolled along track 19 and engaged with such mandrel end so that the mandrel will be supported entirely by the two hoists 16 and 18 when the last roll section has been stripped from it. The hoists are then elevated to raise the mandrel above the level of the next paper roll, and after such roll has been discharged from the paper making machine, the empty mandrel may be lowered into position and mounted on the paper making machine ready to receive additional paper rolls. The roll sections of the newly wound roll will then be stripped from the mandrel extending through them in the manner described above.

I claim as my invention:

1. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of circular sections and operable to move such roll axially, offbearing means aligned with said first means and disposed level with the same, operable to receive a roll section from said first means, and means operable to move said offbearing means upward parallel to a plane perpendicular to the axis of such roll from such position level with said first means to disjoin a roll section on said offbearing means from an adjacent roll section on said first means and offset such roll sections with their axes parallel.

2. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of annular sections and operable to move such roll axially, offbearing means aligned with said first means and disposed level with the same, operable to receive a roll section from said first means, means operable to move said offbearing means upward parallel to a plane perpendicular to the axis of such roll from such position level with said first means to disjoin a roll section on said offbearing means from an adjacent roll section on said first means and offset such roll sections with their axes parallel, and means thereafter operable to lower said offbearing means with the disjoined roll section thereon for discharge thereof from said offbearing means.

3. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of annular sections and operable to move such roll axially, offbearing means aligned with said first means, pivot means supporting said offbearing means and operable to dispose said offbearing means level with said first means for receiving a roll section therefrom, and means operable to swing said offbearing means upward about said pivot means parallel to a plane perpendicular to the axis of such roll from such position level with said first means to disjoin a roll section on said offbearing means from an adjacent roll section on said first means and offset such roll sections with their axes parallel.

4. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of annular sections and operable to move such roll axially, offbearing means aligned with said first means, pivot means supporting said offbearing means and operable to dispose said offbearing means level with said first means for receiving a roll section therefrom, means operable to swing said offbearing means upward about said pivot means parallel to a plane perpendicular to the axis of such roll from such position level with said first means to disjoin a roll section on said offbearing means from an adjacent roll section on said first means and offset such roll sections with their axes parallel, and means thereafter operable to swing said offbearing means oppositely about said pivot means to discharge the disjoined roll section from said offbearing means.

5. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of annular sections and operable to move such roll axially, offbearing means aligned with said

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first means, pivot means supporting said offbearing means to swing about an axis parallel to the direction of roll movement effected by said first means, but offset from said first means in a direction laterally of the direction of movement of such roll effected by said first means, and operable to dispose said offbearing means level with said first means for receiving a roll section therefrom, and means operable to swing said offbearing means upward parallel to a plane perpendicular to the axis of such roll from such position level with said first means to disjoin a roll section on said offbearing means from an adjacent roll section on said first means and offset such roll sections with their axes parallel.

6. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of annular sections and operable to move such roll axially, offbearing means aligned with said first means, pivot means supporting said offbearing means to swing about an axis parallel to the direction of roll movement effected by said first means, but offset from said first means in a direction laterally of the direction of movement of such roll effected by said first means, and operable to dispose said offbearing means level with said first means for receiving a roll section therefrom, means operable to swing said offbearing means upward about said pivot means parallel to a plane perpendicular to the axis of such roll from such position level with said first means to disjoin a roll section on said offbearing means from an adjacent roll section on said first means, and offset such roll sections with their axes parallel, and means thereafter operable to swing said offbearing means oppositely about said pivot means to lower the disjoined roll section and discharge it from said offbearing means.

7. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of annular sections and operable to move such roll axially, offbearing means including an arcuate cradle disposed adjacent to said first means and operable to receive a roll section from said first means, pivot means supporting said cradle to swing about an axis extending axially of such cradle and offset a substantial distance from the central portion of such cradle, and means operable to swing such cradle about said pivot means to roll a roll section carried by said cradle off the same.

8. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of annular sections and operable to move such roll axially, offbearing means including an arcuate cradle of an arcuate extent considerably greater than the width of said first means disposed adjacent to said first means and operable to receive a roll section from said first means, pivot means supporting said cradle to swing about an axis disposed at least as high as said first means, extending axially of such cradle and offset a substantial distance from the central portion of such cradle, and means operable to swing such cradle downward about said pivot means and thereby lower a roll section carried by said cradle and roll it off said cradle in the direction away from said pivot means.

9. Roll handling mechanism comprising means operable to support a composite roll of sheet material including a plurality of annular sections and operable to move such roll axially, offbearing means aligned with said first means including an arcuate cradle of an arcuate extent considerably greater than the width of said first means, pivot means supporting said cradle to swing about an axis disposed at least as high as said first means, extending axially of said cradle and offset a substantial distance from the central portion of such cradle, said pivot means being operable to dispose said cradle level with said first means to receive a roll section from said first means, means operable to swing said cradle upward about said pivot means parallel to a plane perpendicular to the axis of such roll from such position level with said first means to disjoin a roll section on said cradle from an adjacent roll section

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on said first means and offset such roll sections with their axes parallel, and means operable thereafter to swing said cradle downward about said pivot means and thereby lower the disjoined roll section carried by said cradle and roll it off said cradle in the direction away from said pivot means.

10. The method of separating annular sections in a composite section roll of sheet material, which comprises supporting one roll section stationarily, independently supporting a second roll section partially connected to said first roll section in a position with such roll sections aligned axially, and raising said second roll section relative to said first roll section while maintaining the axes of said roll sections parallel and thereby disjoining the roll sections.

11. The method of handling rolls of sheet material incorporating a plurality of annular sections, which comprises supporting all the roll sections on a single support, moving the roll axially and thereby shifting one of such roll sections onto an independent support aligned and level with the first support, raising such independent support relative to the first support while maintaining the axes of said roll sections parallel and thereby disjoining the roll section shifted onto the independent support and the roll section adjacent thereto on the first support.

12. The method of handling rolls of sheet material in-

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corporating a plurality of annular sections, which comprises supporting all the roll sections on a single support, moving the roll axially and thereby shifting one of such roll sections onto an independent cradle support aligned and level with the first support, raising such independent cradle support relative to the first support while maintaining the axes of said roll sections parallel and thereby disjoining the roll section shifted onto the independent support and the roll section adjacent thereto on the first support, and thereafter tilting such independent cradle support and rolling the disjoined roll section therefrom.

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