United States Patent [19]

Grambo, Jr. et al.

[11] **3,904,097**

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[54] **DEVICE FOR BREAKING AWAY INDIVIDUAL ROLLS FROM A ROLL OF WEB OR SHEET MATERIAL AFTER THE ROLL HAS BEEN SLIT**

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[52] **U.S. Cl.** **225/103**; 214/DIG. 4

[51] **Int. Cl.²** **B26F 3/00**

[58] **Field of Search** ..... 225/4, 103, 104, 105, 96; 214/1 PB, DIG. 4

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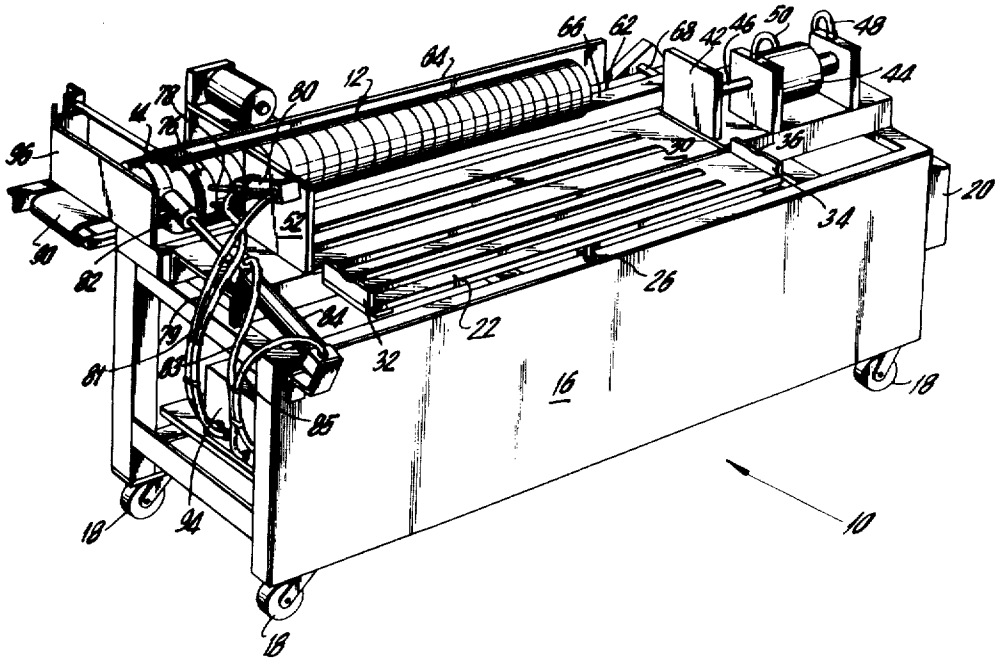
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Assistant Examiner—Leon Gilden
Attorney, Agent, or Firm—McGlew and Tuttle

[57] **ABSTRACT**

A machine for separating individual rolls from a combined roll of web material after it has been operated upon by a two drum slitter rewinding machine to form individual slits but unseparated rolls comprises a machine having a plurality of individual and distinct segments or parts. The first segment includes a tilting leaf type table on which the set of split rolls are placed while the winder shaft is removed. The table is operated to tilt it to move the combined split rolls without the winder shaft to deposit the roll into a second segment portion of the machine. The second segment includes means for applying pressure at the respective ends of the combined slit rolls in order to compress the combined rolls against the stop plate so that any misalignment or telescoping of the wound web material is eliminated. The straightened set of rolls is then rolled onto a third segment which conveys the entire set endwise towards a clamp and hammering mechanism. The fourth segment comprises a hammering mechanism that engages the combined roll while individual rolls are hammered until they are separated from the set. The remaining set of rolls is advanced then to a new position in which the remaining set of rolls is engaged while the outermost roll is hammered and separated from the remainder. The process is repeated until all the rolls in the set have been separated and are conveyed away from the machine. The machine is designed so that each additional set of rolls can be started through the first two segments while previous rolls are being separated by the third and fourth segments so that it is a continuous type machine.

9 Claims, 5 Drawing Figures



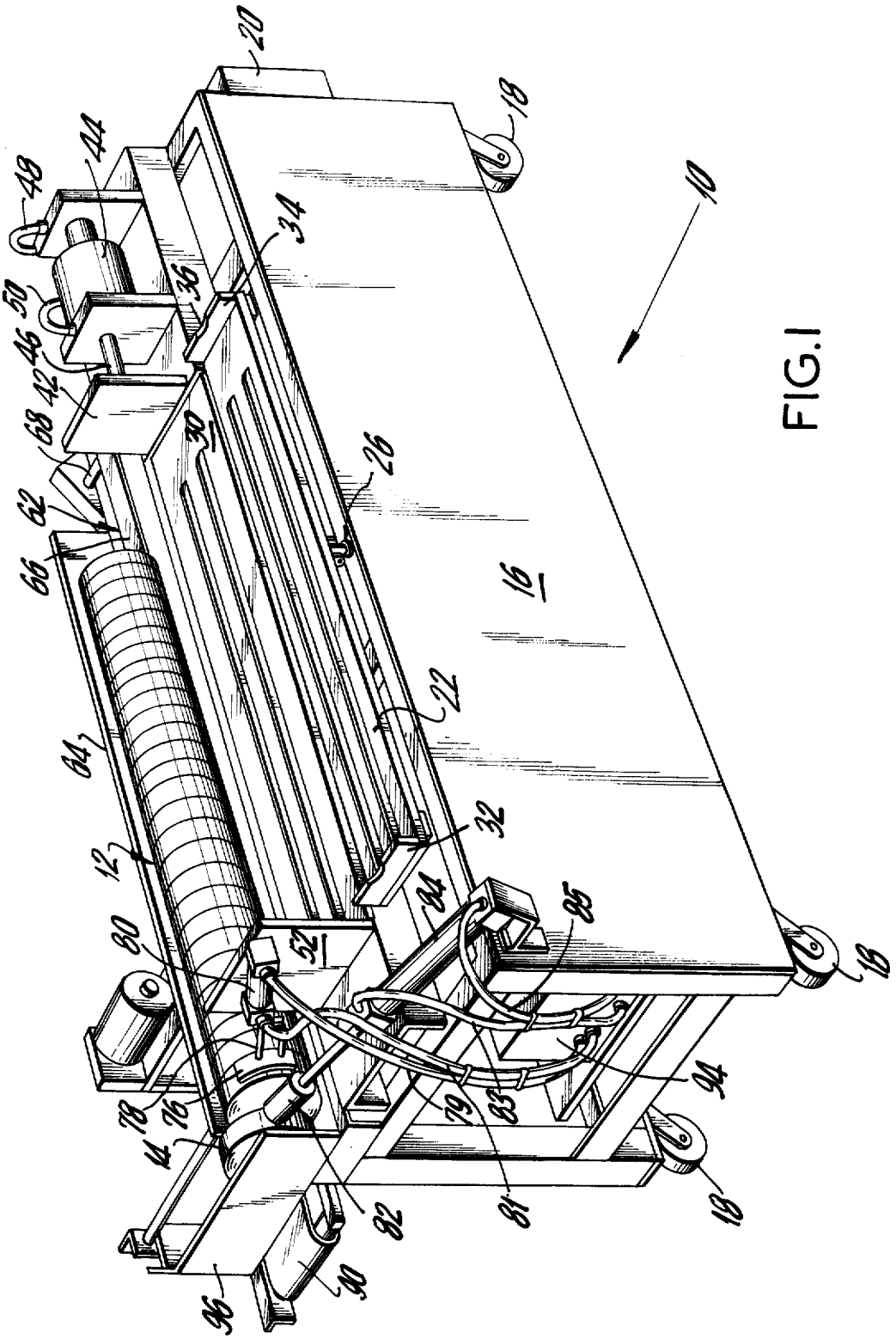

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FIG.1

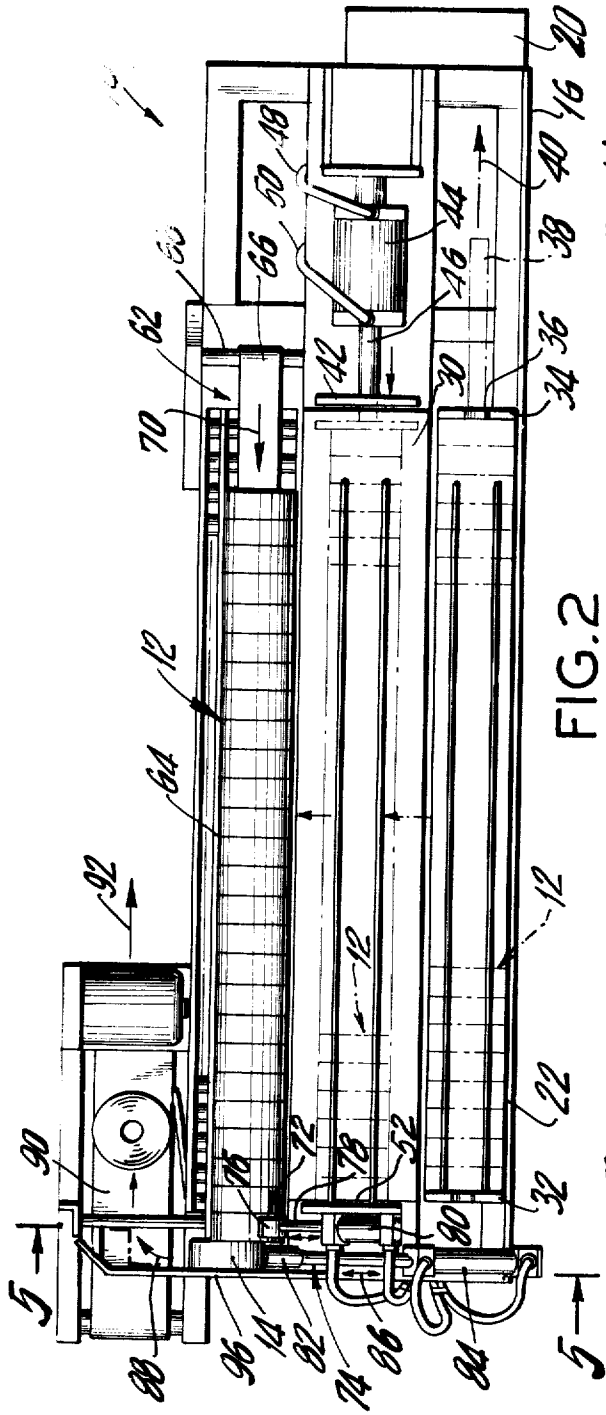


FIG. 2

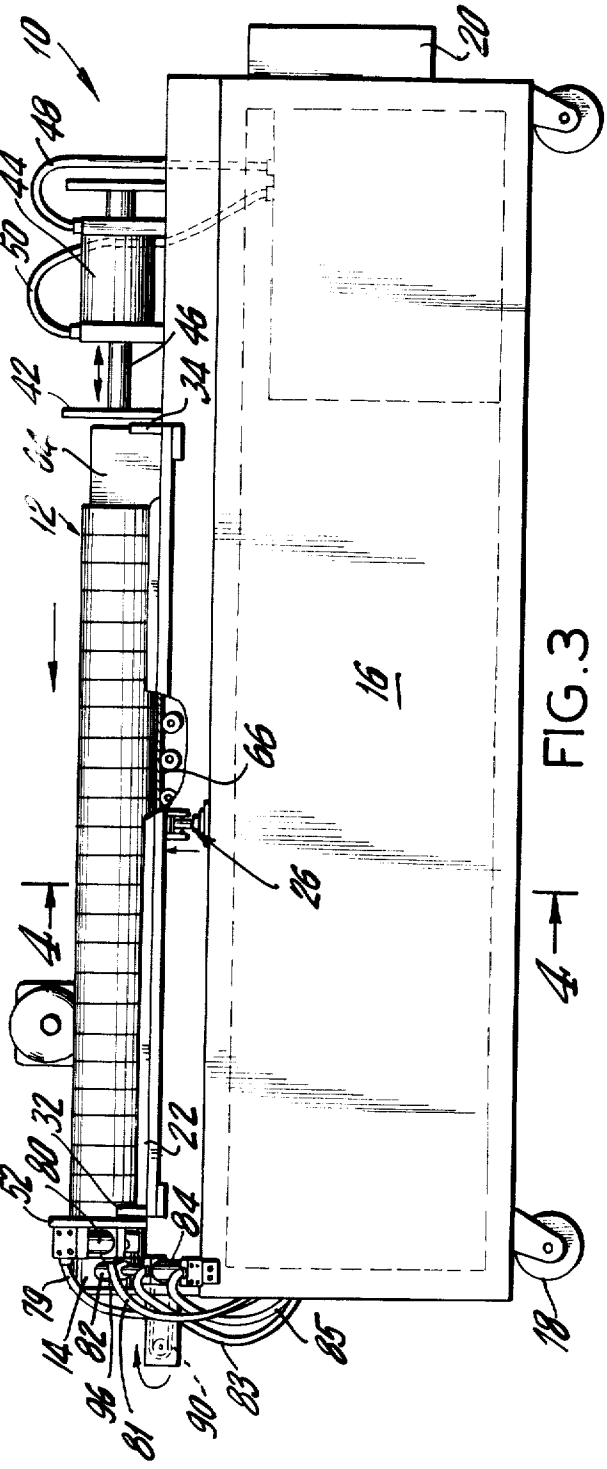


FIG. 3

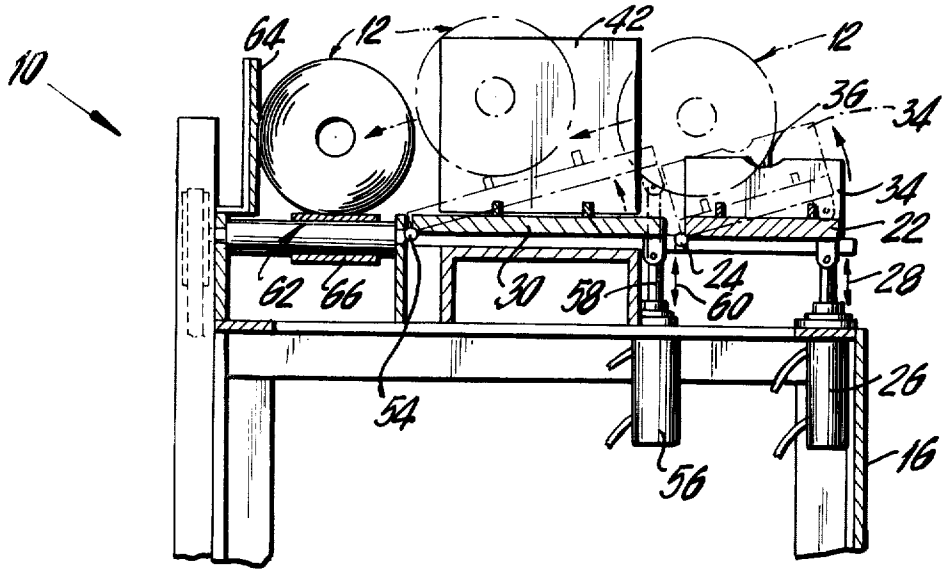

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FIG. 4

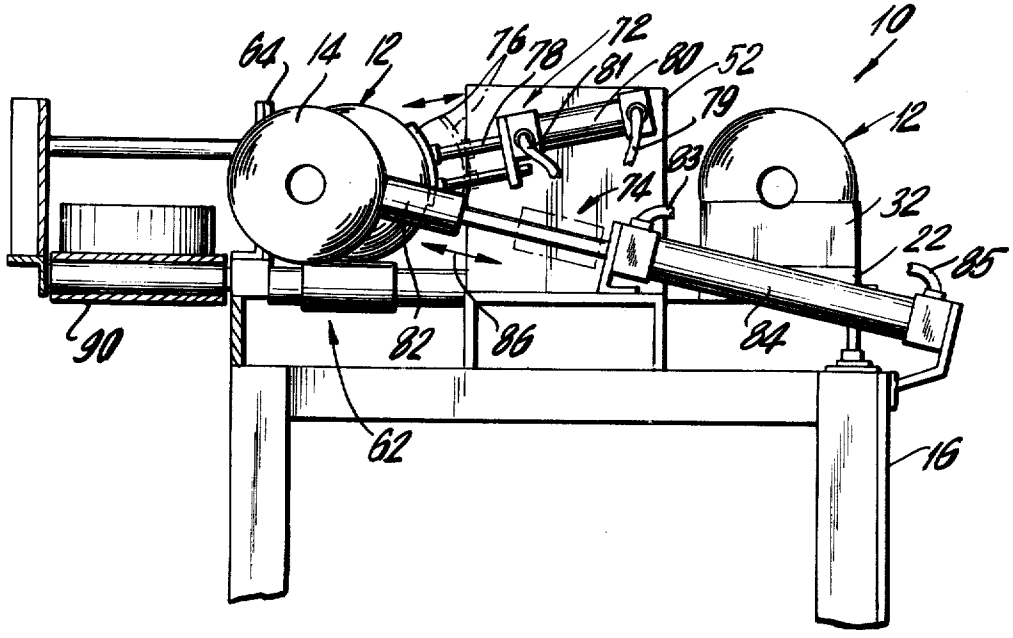

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62
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FIG. 5

DEVICE FOR BREAKING AWAY INDIVIDUAL ROLLS FROM A ROLL OF WEB OR SHEET MATERIAL AFTER THE ROLL HAS BEEN SLIT

DESCRIPTION OF THE PRIOR ART

It is usual to form short widths of rolled web material such as paper, cloth, metal foils, plastic, etc. in a large width roll which is subsequently slit into narrow widths. Usually the large roll comprises a so-called "mill roll" which is 24 inches to 100 inches in width and is from 2000 to 10,000 yards in length or longer. When narrower shorter rolls such as 2 inch slits out of a 60 inch are slit and rewound from this mill roll on a two drum rewinder they have a tendency to interweave, cone in one direction or wander back and forth several times while the shorter length is being cut and wound. This interweaving or misalignment creates a severe problem when the smaller rolls must be separated for packaging or future use. Presently most processors must physically bang the rolls or pry them apart by hand.

SUMMARY OF THE INVENTION

In accordance with the present invention there is provided a machine which acts upon a combined slit roll having a plurality of individual rolls which remain joined together to the set and acts upon the roll to first effect a compression of the ends to cause an alignment of the individual roll widths and to automatically advance the roll into association with means for clamping the roll while each individual roll in succession is broken away from the remainder.

In the preferred form of the invention the machine includes several distinct and separate parts or segments which are capable of independent and automatic operation to effect the necessary action on the individual roll elements. With the inventive arrangement the first segment comprises a tilting leaf type table on which a combined roll which includes a whole set of split rolls which are interconnected and which has been removed from a slitter rewinding machine is placed while the winder shaft is removed. After the shaft has been removed the combined roll is moved to a second table portion by the tilting of the first table portion to cause it to roll into place and at the second table portion pressure is exerted on one end of the rolls while the other end is constrained by a stop plate. This action on the rolls causes any misalignment or telescoping of the wound paper to be almost completely eliminated.

With the inventive arrangement the second receiving table may also be tilted to displace the combined roll set out of the second segment after it has been compressed and to move it into a third segment where the entire combined roll is moved endwise to a clamp and hammering mechanism. The fourth segment includes a hammering mechanism that continues to strike the individual rolls until they are separated from the set and a conveyor is provided in this segment to advance each set until the next roll is in a position to be clamped and struck by the hammering mechanism and then separated from the remaining roll portions.

In accordance with the method of the invention the process of removal of the winding core, compression of the roll to straighten it and subsequent hammering of each individual roll is repeated and each separated roll is then conveyed out of the machine.

A feature of the invention is that the machine is designed so that additional sets of rolls can be started through the first two segments while the previous rolls are being separated by the third and fourth segments and thus it is a continuous type machine.

Accordingly it is an object of the invention to provide an improved method of acting upon slit combined rolls which comprises compressing the rolls by endwise pressure, and thereafter engaging the roll set while each roll in succession is hammered away from the roll set.

A further object of the invention is to provide a device for removing individual slit rolls from an attached combined roll set which includes table means for holding the roll set while the core is removed and for subsequently transferring the roll set into association with another table where the combined roll is compressed by endwise pressure to straighten the individual rolls, and thereafter further includes means for engaging the remaining roll set while the last roll in the set is hammered away from the set.

A further object of the invention is to provide a roll separating device for use with combined rolls which have been previously slit on a slitter and which is simple in design, rugged in construction and economical to manufacture.

For an understanding of the principles of the invention, reference is made to the following description of typical embodiments thereof as illustrated in the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

In the Drawing:

FIG. 1 is a front top perspective view of a machine for separating individual rows of wound strip material from a composite slit row;

FIG. 2 is a top plan view of the machine shown in FIG. 1;

FIG. 3 is a front elevational view of the machine shown in FIG. 1;

FIG. 4 is a section taken along the line 4—4 of FIG. 3; and

FIG. 5 is a section taken along the line 5—5 of FIG. 2.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in particular the invention embodied therein comprises a machine generally designated 10 for separating individual lengths of rolled strip material such as paper, foil, etc. from a composite slit row generally designated 12 into individual short width rows 14. The composite row 12 is a so-called mill row usually of widths of from 24 inches to 100 inches or longer and the wound material is from 2,000 to 10,000 yards in length or longer. It is generally the practice to subject such rolls to the action of a slitter and rewinder in order to slit the composite roll as the material is rewound on a two drum rewinder. After this operation is done however it is difficult to separate the individual rolls from the composite roll. The machine generally designated 10 provides a means for simply and economically removing the individual rolls 14 from the composite roll 12.

In accordance with the invention the machine 10 includes a base 16 which is supported on wheels 18 for movement throughout the plant. A control box 20 for the machine is provided with means for connecting the machine to suitable electrical power supply lines and to

fluid pressure units to effect the operation of the individual parts of the machine.

The machine **10** includes a plurality of various operating stations or tables including an entrance table or tilt table **22** which is pivoted at its inboard end **24** as shown in FIG. **4** and may be raised and lowered by a fluid piston drive **26** as indicated by the double arrows **28** in order to tilt it upwardly and cause a roll **12** which has been initially placed thereon to be moved to the next tilting table **30** after the first operstion is performed thereon. With the roll **12** at the first table **22** as best seen in FIG. **2** the composite roll **12** is held between end plates **32** and **34** and at least one of them the end plate **34** has a guide notch **36** which permits the removal of the winder shaft **38** from one end as indicated by the arrow **40** as shown in FIG. **2.**

After the winder shaft **38** is removed the composite slit row **12** is directed to the second tilting table **30** by actuating the fluid motor **26** to raise the first table **22** and to cause the roll **12** to move off of it and onto the second table **30.** On the second table **30** the composite roll **12** is subjected to a very important action in accordance with the method of the invention, that is it is subjected to a compression which is produced on the action of a presser plate **42** which is moved by a piston which is reciprocatable in a fluid pressure cylinder **44** and which carries a piston rod **46** which is secured to the plate **42.** By suitable control means at the control station **20** fluid pressure is directed selectively through a pressure hose **48** and into the cylinder **44** and the cylinder is evacuated through a hose **50.** This causes movement of the pressure plate **42** to compress the composite roll against a stationary plate **52.** By compressing the whole roll **12** by applying endwise pressure any misalignment or telescoping of the wound paper is completely eliminated and this insures that the rolls which are removed are removed while the wound material is severed cleanly and straightly.

After a compressive force is applied and then released the second table **30** is pivoted upwardly about a pivot **54** upon actuation of a fluid pressure cylinder **56** which has a piston rod **58** capable of raising and lowering the table as indicated by the double arrows **60.** The table **30** is raised to move the roll **12** after compression onto a third station or table **62.** At this station the roll **12** becomes pressed against a vertical plate or support wall **64.** The third station **62** comprises an endless belt conveyor **66** as best shown in FIG. **2** which is driven by a motor not shown connected to the control **20** in order to drive a drive shaft **68** to move the composite roll **12** to the left in the direction of the arrows **70** as shown in FIG. **2** in order to move each roll in succession into association with clamping means **72** and to position a roll **14** which is about to be severed from the composite roll **12** in a position in which it may be acted upon by a hammer mechanism generally designated **74.**

At the station **62** the composite roll **12** is gripped by engagement of the clamping means **72** with the composite roll **12** adjacent to the next to the last separate roll **14.** The clamping mechanism **72** includes a curved plate **76** which is carried on a piston rod **78** which is moved under the force of movement of fluid pressure in a fluid pressure cylinder **80** acting on a piston connected to the piston rod **78.** When the composite roll **12** is clamped the whole row is urged against the plate **64.** The hammer mechanism **74** includes a hammer **82** which is reciprocated backwardly and forwardly by a piston movable in a cylinder **84** in the directions of the double arrow **86** to cause the hammer **82** to strike with hard force against the endmost roll **14** and clearly sever it from the composite roll **12.** The stroke of the hammer **82** is great enough to move the loosened roll **14** in the direction of the arrow **88** as shown in FIG. **2** and at this location it arrives on a conveyor **90** which conveys it toward a packing table as indicated by the arrow **92** as shown in FIG. **2.** The fluid pressure cylinder **80** is connected through suitable connecting lines **79** and **81** to an intermediate control box **94.** Similarly the fluid pressure cylinder **84** is connected through pressure lines **83** and **85** to the intermediate control box **94** which is actuated for example by suitable timing control means in the control **20** or by direct individual actuation in a semi automatic fashion. After each roll **14** is separated from the set **12** the roll is advanced by the conveyor **66** to position a new roll **14** in the hammering station position against an end plate **96** along which it is guided after severance to the conveyor **90.** The process is repeated until all of the rolls **14** of the composite roll **12** have been separated and conveyed for example in the direction of arrow **92** to a packing table.

A feature of the construction is that the machine is capable of handling several rolls simultaneously. Additional rolls can be started through the first or entrance table **20** and thereafter fed to the intermediate table **30** as the last roll is being separated on the last table or station **62.** With the method of the invention it has been found extremely advantageous to apply endwise squeezing pressure to the rolls because it has been found that this aligns the materials on the rolls and insures that they will not separate unevenly nor will there be any tendency of the rolls to migrate. The hammer **82** is made to operate so that it continues to strike the roll to be separated until it breaks free. Because the composite roll **12** is clamped in the vicinity of the next in line individual roll of the composite roll **12** the arrangement insures that there will be no damage to the material. The fluid pressure cylinders **80** and **84** are advantageously operated and adjusted to exert only the power that is necessary to separate the rolls. The hammering mechanism is recycled automatically so that the operator has the choice of striking the end roll once or twice at a high force or it can be readjusted to strike many times at a lower force in order to insure the elimination of any damage to the material.

It is preferable that the clamping plate **76** be applied to the composite roll **12** at a location directly adjacent the roll being severed and that the clamping action is under sufficient force that there is a slight deformation of the roll which is clamped. It has been found that this clamping and slight deformation operation is necessary to the overall hammering operation because it insures that separation of the rolls is much easier. When the adjacent roll is held it is insured that the full energy of the hammer is exerted on the roll being struck and not absorbed or cushioned by a loosely held adjacent roll. It is very important that the clamping plates **76** be of cylindrical shape and complementary to the shape of the composite roll **12** so that the clamping insures that the composite roll is properly held while the hammering mechanism operates.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be un-

derstood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A device for separating individual short width rolls from a pre-slit composite roll of a plurality of interconnected short width rolls, comprising a support housing, first, second and third support plates each having a composite roll receiving area and all being substantially coextensive in length and arranged side by side on said housing, first tilting means for tilting said first support plate to incline it toward said second support plate to deliver the composite roll thereon to said second support plate, first clamping means adjacent said second support plate engageable with the ends of the composite roll thereon and being movable axially from at least one of the respective ends inwardly to engage and axially compress the composite roll, second tilting means for tilting said second plate to incline it toward said third plate to deliver the compressed composite roll thereon to said third plate, second clamping means adjacent said third plate being engageable laterally against said composite roll inwardly of the outermost individual roll to hold the composite roll in position, and hammer means located alongside the outermost individual roll adjacent said third plate and being movable to hammer the individual roll to sever it from the composite roll.

2. A device for separating individual short width rolls from a pre-slit composite roll of a plurality of interconnected short width rolls, comprising means for supporting said rolls, first operable pressure applying means engageable with the respective ends of said roll including a movable member movable to compact said composite roll and to subsequently release it, second operable clamping means overlying said supporting means including a movable clamp plate engageable with a side of said composite roll adjacent the end thereof inwardly from the endmost short width roll to hold it against movement, and third hammer means operable exterior of said clamping means for hammering the endmost short width roll to sever it from said composite roll.

3. A device according to claim 2, wherein said supporting means includes a tilt table aligned with said pressure applying means and a hammering station adjacent said tilt table, and means for raising one end of said tilt table to direct said roll after it is released by said pressure applying means into said hammering station.

4. A device according to claim 3 including an entrance table alongside said tilt table, said entrance table being pivoted on a side thereof adjacent said tilt table and means for raising said entrance table to shift the roll from a position thereon into said tilt table, said entrance table having guide means for the removal of a winding shaft from said composite roll.

5. A device according to claim 3, wherein said hammering station includes an endless belt conveyor supporting said composite roll and being movable toward said clamping means, said clamping means comprising a curved plate engageable with the short width roll adjacent to the end short width roll of said composite roll, said end short width roll being aligned with said hammer means.

6. A device according to claim 5, wherein said hammer means comprises a reciprocal hammer member and fluid pressure means connected to said reciprocal hammer member to move it backwardly and forwardly against said short width roll.

7. A device according to claim 6, including conveyor means alongside said hammering station in a position in alignment with the endmost roll to receive the endmost roll that has been removed from said composite roll and to advance it away from said hammering station.

8. A device according to claim 2, wherein said means for supporting said roll includes a first support table aligned with said pressure applying means and hammering station support table alongside said support table, means for shifting said composite roll from said support table after it is compressed to said hammering station support table, means on said hammering support table for shifting said composite roll endwise toward said hammering means, said hammering means comprising a hammer reciprocable toward and away from said hammering station support table.

9. A device according to claim 8, wherein said clamping means comprises a clamping plate engageable around a portion of the periphery of the short width roll which is next to the endmost short width roll and fluid pressure means connected to said plate for applying it against said composite roll.

* * * * *