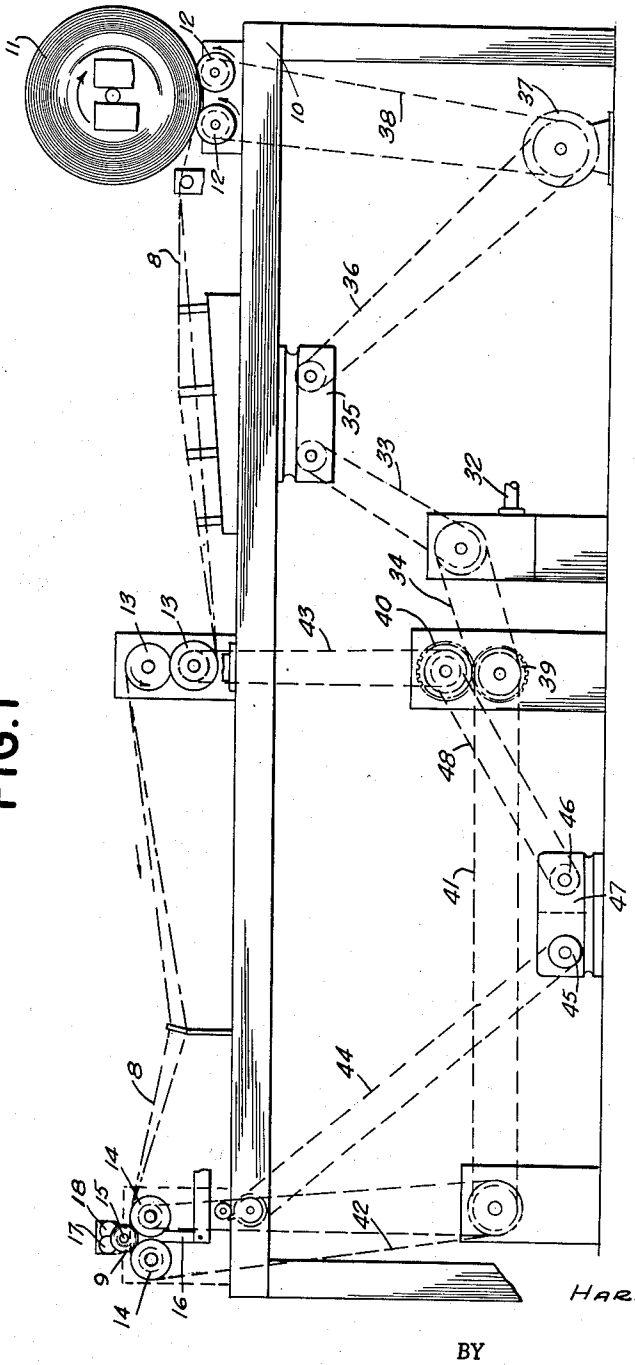
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ROLL WINDING MACHINE

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FIG. 1




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FIG. 2

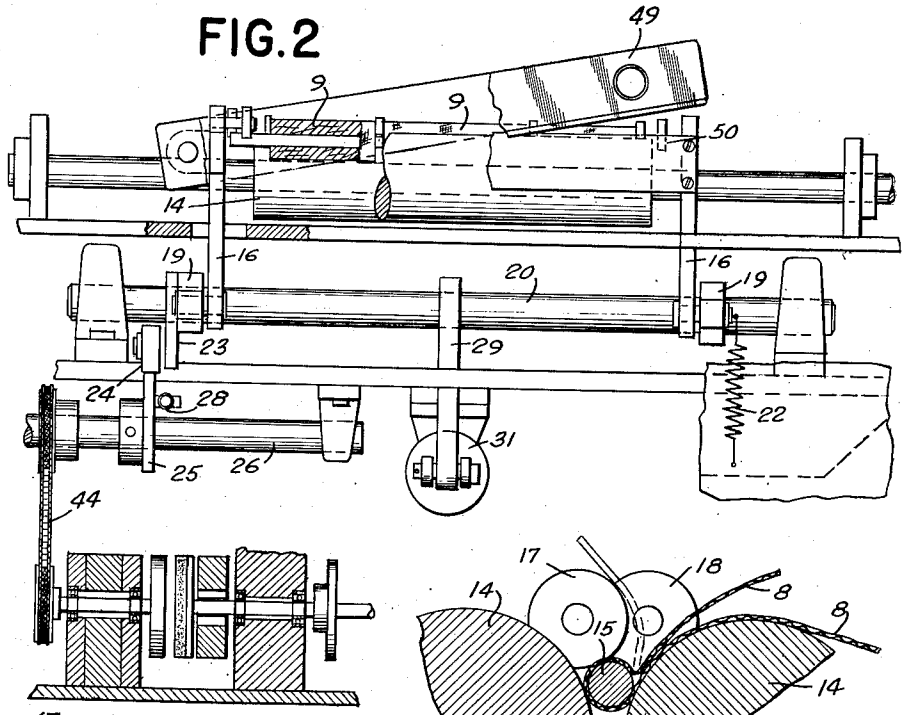






FIG. 4

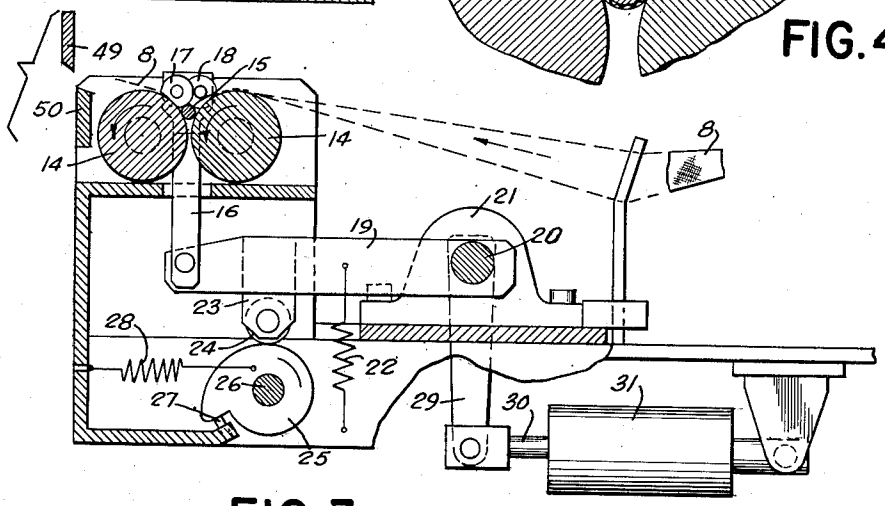



FIG. 3

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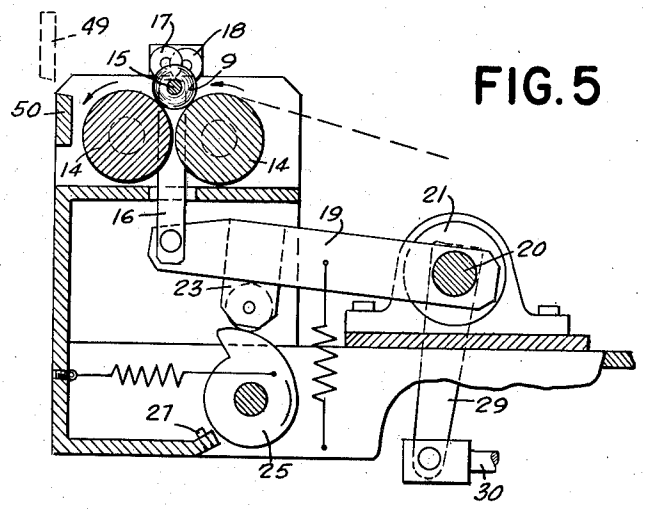



FIG. 5

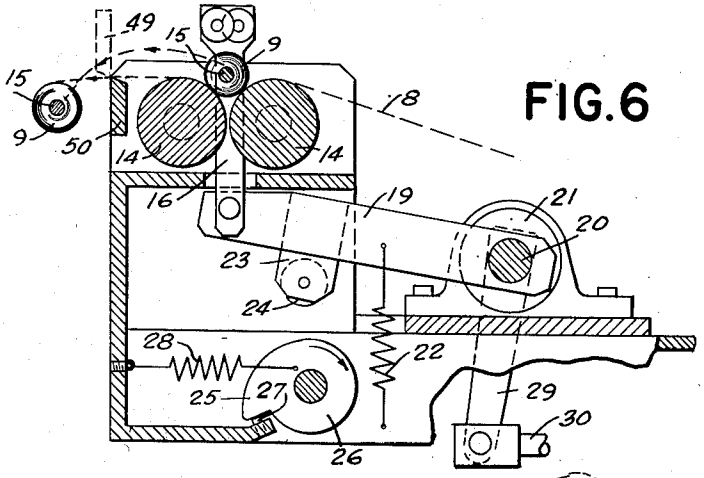



FIG. 6

FIG. 7

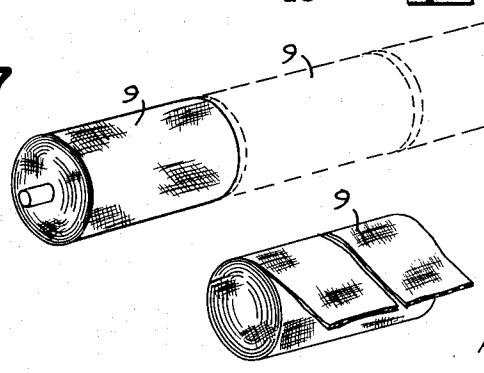



FIG. 8

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3,055,606

# ROLL WINDING MACHINE

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1 Claim. (Cl. 242—60)

The present invention relates to machinery for winding, with a minimum of tension, firm rolls of extensible bandaging material.

With certain bandage materials, particularly of the type formed by the mercerization of cotton fabrics, it is desirable to roll the material with a minimum of tension in order to preserve its elasticity and self-clinging characteristics while at the same time form a relatively compact roll to prevent deformation during sterilization and to produce a roll easier to package and handle when the bandage is being applied. The present invention is drawn to roll-winding machinery particularly adapted, although not limited, to winding materials of this type.

A relatively tight wind can be obtained without tensioning the fabric by applying pressure on the roll as it is being formed. Too great a pressure will tend to overly compact the fabric, while a varying pressure on the roll during the winding operation will give rolls of varying compactness and diameter for any given length of fabric. It is therefore an object of this invention to provide a relatively constant pressure on the roll during winding while preventing too great compression of the roll. It is a further object to control the diameter of each convolution of the roll with respect to length of fabric being wound so that rolls containing substantially equal amounts of fabric will have about the same diameters.

Some of the objects of this invention have been stated. Other objects and advantages will become apparent from the following description taken in connection with accompanying drawings, wherein are set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is a partial sectional side view of a bandage winding machine having my improvements embodied therein;

FIG. 2 is a sectional end view of the winding rolls and winding pressure control mechanism;

FIG. 3 is an enlarged sectional detail view of the winding pressure control mechanism;

FIG. 4 is an enlarged cross sectional view of the winding spindle as the bandage starts to wind on the same;

FIG. 5 is a sectional view of the roll pressure control mechanism near the end of the formation of a bandage roll;

FIG. 6 is a view similar to FIG. 5 after the bandage roll has been formed and during its removal;

FIG. 7 shows the removed spindle with the bandage rolls thereon; and

FIG. 8 shows an individual bandage roll after it has been removed from the spindle.

Referring to the drawings, numeral **10** designates a frame or support for the winding mechanism. A stock roll **11** of fabric, adapted to be wound into smaller individual bandage rolls **9**, rests on surface unwind rolls **12**. The fabric is fed through guides to pull rolls **13** and from there to frictional winding rolls **14**. On winding rolls **14** rests a knurled spindle **15** onto which the bandage fabric **8** is rolled in forming the final bandage rolls **9**. This particular portion of the apparatus forms no part of the present invention.

The spindle **15** is urged down toward wind-up rolls **14** by hold-down arms **16**, one of which is at each end of the spindle **15**, the hold-down arms being provided with a pair of rollers **17** and **18** which are adapted to ride on



the ends of spindle **15**, acting as bearing surfaces so that the spindle **15** is free to rotate.

Pivotly secured to the lower ends of the hold-down arms **16** are links **19** keyed to a shaft **20** which is free to rotate in bearing **21**. The shaft **20** is pulled downwardly through the action of a hold-down spring **22**.

Near the end of link arm **19**, but spaced in from where it is connected to hold-down arm **16**, is a leg **23** to which is secured a roller **24**, which is adapted to rest on the surface of a cam **25**. The cam **25** is keyed to a shaft **26** and rests in its lowered position on adjustable stop screw **27**. A return spring **28** continuously urges the cam to its lowered position against screw **27**.

Also keyed to shaft **20**, together with the links **19**, is a cross link **29** secured at its other end to a reciprocating piston rod **30**. The piston rod **30** in the modification shown is actuated by compressed air through air cylinder **31** to move cross link **29**, rotating shaft **20** clockwise and thus raising hold-down arms **16** to release spindle **15** so the same can be removed when the bandage rolls have been wound thereon.

Unwinding rolls **12**, feed rolls **13**, and friction winding rolls **14** are all driven through a drive mechanism which forms no part of the present invention but which is hereinafter briefly described so that operation of the winding apparatus can be more readily followed. Drive shaft **32** is driven by an electric motor, not shown. Through drive shaft **32**, and suitable gearing mechanism, belts **33** and **34** are rotated. Belt **33**, acting through conventional variable speed tension control mechanism **35**, drives belt **36** which in turn, through suitable mechanism **37**, drives belt **38** which rotates unwind rolls **12**.

Rotation of belt **34** causes rotation of meshed gears **39** and **40** to transmit the driving power through belts **41** and **42** to winding friction rolls **14** and through belt **43** to pull rolls **13**. In order to assure no slippage, the belts throughout are chains, a chain drive being preferred.

The shaft **26**, on which cam **25** is mounted, is rotated by belt **44**, which is actuated by gear **45** which is connected through a magnetic clutch and a conventional variable speed mechanism to gear wheel **46**. The magnetic clutch and adjustable gear ratio mechanism are contained in housing **47**. The gear **46** is driven through belt **48** on rotation of gear **40**. When the circuit is closed so that the motor drive shaft **32** is rotating, and the magnetic clutch in housing **47** is energized, gauze is fed to spindle **15** and wound thereon while at the same time cam **25** is slowly rotated, raising hold-down arm **16** to limit the pull applied to the ends of spindle **15**. The gear ratio between gears **45** and **46** is adjusted so that as the radius of the bandage roll **9** increases the hold-down arms **16** are progressively raised, limiting the downward movement of spindle **15** and accordingly the amount of pressure applied to the roll **9** as formed as well as the radial degree to which the roll can be compressed. By varying the gear ratio between gears **45** and **46**, the pressure on the bandage roll **9** as it is being formed can be varied so as to give, for any particular fabric, a tight roll throughout or a relatively loosely wound roll with the diameter of each convolution of the roll being controlled as the convolution is formed. The gear ratio between gears **45** and **46** is not varied during the winding operation but is pre-set to give the desired firmness of roll for the particular fabric being wound.

In operation, when the drive is energized so is the magnetic clutch which locks gear **45** into driven relation with gear **46**. As the fabric is wound on spindle **15** to form roll **9**, hold-down spring **22**, through cross links **19**, exerts a continuous pull on hold-down arms **16**. Arms **16** in turn, through rollers **17** and **18**, exert a downward pull on spindle **15**, compressing the rolls **9** between the spindle **15** and the friction wind rolls **14**. Spring **22**,

however, cannot pull the spindle any closer than a predetermined progressively increasing distance from the wind-up rolls **14** because of the opposition offered by cam **25**. As a result, the amount of pressure applied to the roll during formation is limited, while at the same time the radius of the roll is controlled through the application of this pressure on each convolution as the roll is being formed. In this manner, any variations in the fabric thickness are compensated for through a slight increase or decrease in applied pressure to give a roll of substantially uniform radius for any given length of material wound thereon. When the roll **9** has reached the desired size, the circuit is opened to stop the motor driving shaft **32** and to de-energize the magnetic clutch in housing **47**. On de-energization of the magnetic clutch, gear **45** is no longer connected with gear **46** and is free to rotate independently of gear **46** with the result that return spring **28** draws cam **25** back into its lowered position against stop screw **27** into the position shown in FIGS. 3 and 6. After the winding operation is stopped through de-energization of the motor driving shaft **32**, air is admitted into cylinder **31** through valve means, not shown, to extend piston rod **30**, causing counterclockwise rotation of shaft **20** and raising of hold-down arms **16** to their fully raised position, as shown in FIG. 6. With hold-down arms **16** fully raised, the operator can readily remove the spindle **15** with the bandage rolls **9** thereon. The rolls are then severed from the strip fabric **8** through actuation of movable knife **49** toward stationary knife **50**. The formed bandage rolls **9** are then slid off of spindle **15**, and the spindle is placed on the severed fabric end, which lies across the wind-up friction rolls **14**, as illustrated in FIG. 3. Air is then released from air cylinder **31** to permit the hold-down arms **16** to return to their lowered position, as also shown in FIG. 3, and the drive and magnetic clutch again energized to repeat the winding cycle.

The invention has been illustrated in connection with one embodiment thereof, although many modifications are within its spirit. It is to be limited, therefore, only by the scope of the appended claim.



Having thus described my invention, I claim:

In a machine for winding rolls of yielding material, mechanism for controlling the firmness and diameter of said rolls comprising a spindle onto which said material is wound into material rolls, a pair of friction rolls for winding said material through frictional contact with said material roll, spring actuated hold-down arms for holding down said spindle, rollers carried on said hold-down arms bearing on the spindle near the ends thereof to permit free rotation of said spindle while engaged by said arms, spring means for urging said arms downwardly, a rotatable cam stopping the downward movement of said hold-down arms, spring means for normally urging said cam to its fully depressed position, means for simultaneously driving said friction rolls and turning said cam to progressively limit the downward movement of said hold-down arms with continuing rotation and resulting increase of radius of said material roll, a clutch in said drive means for disengaging the drive to said cam after a material roll has been completed to permit the said cam to return to its initial starting position, and means for raising said hold-down arms to permit removal of said spindle with the material rolls thereon.

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