Jan. 26, 1932. H. R. WILLIAMS 1,842,889

PAPER MACHINERY

Filed Sept. 1, 1928 4 Sheets-Sheet 1

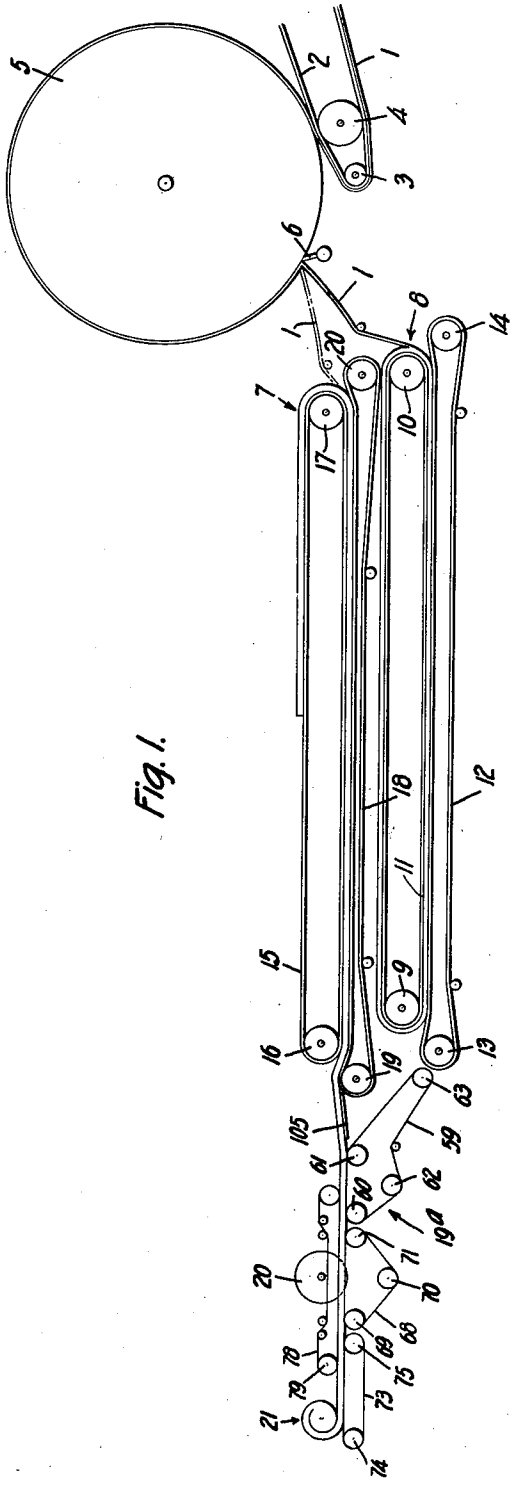


Fig. 1.

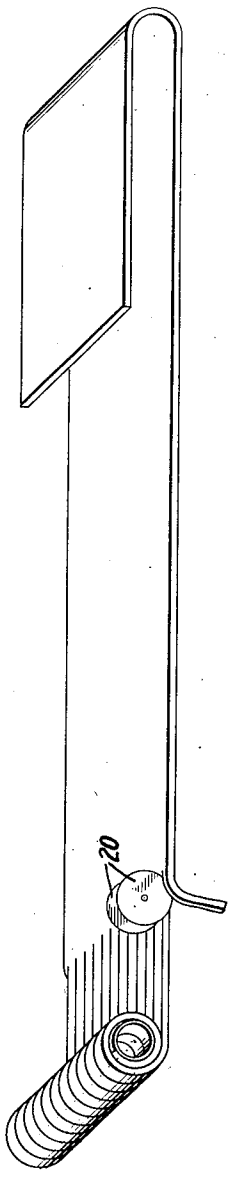


Fig. 2.

INVENTOR
Harrison R. Williams.
BY Moser & Nolte
ATTORNEYS

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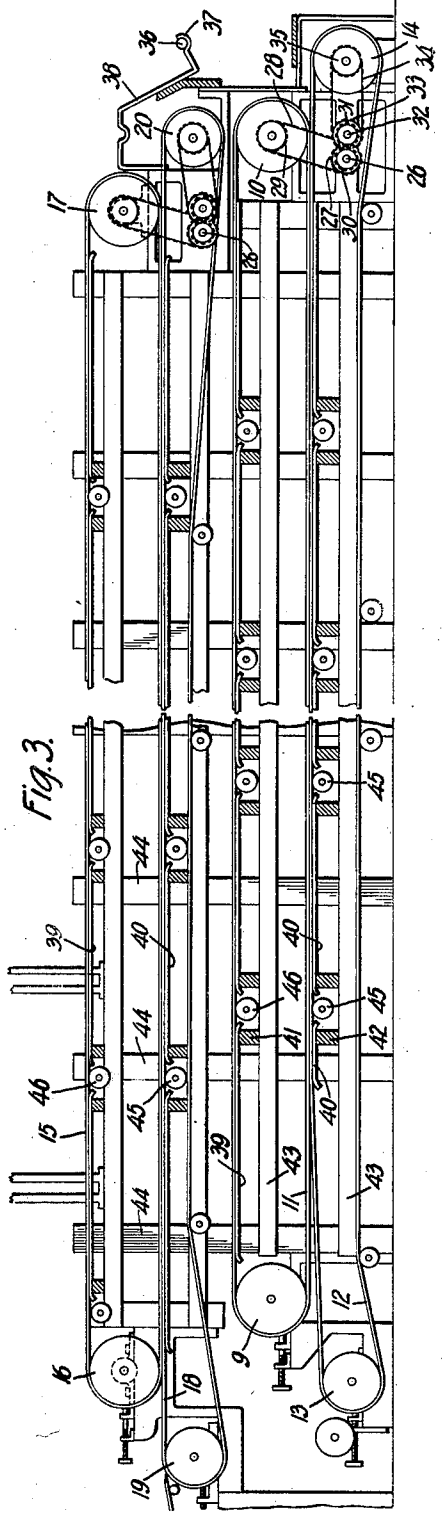


Fig. 3.

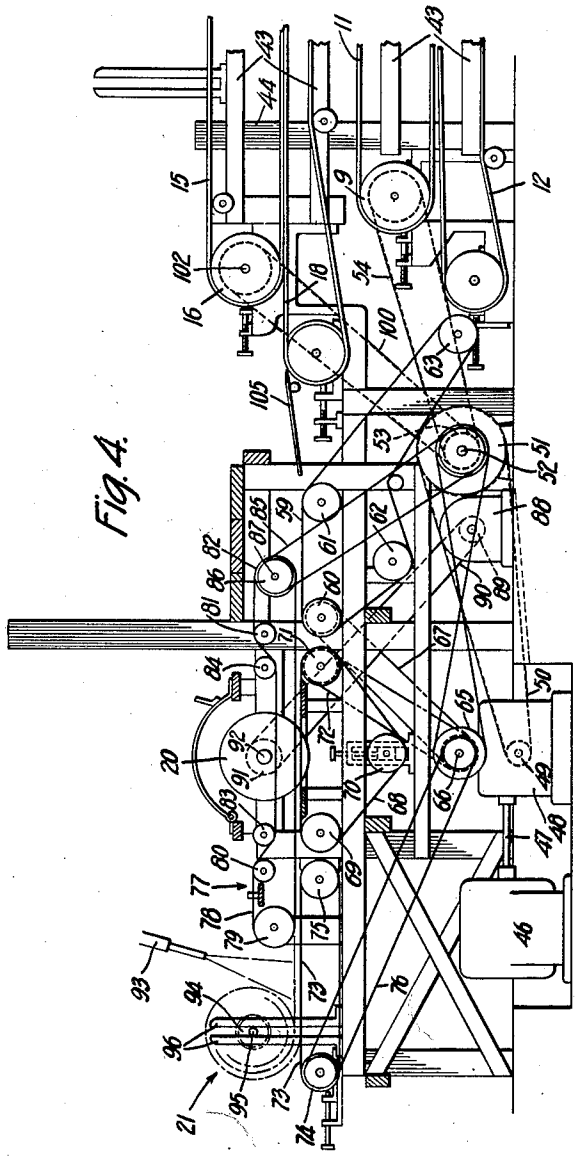


Fig. 4.

INVENTOR
Harrison R. Williams.
BY Moses & Nolte
ATTORNEYS

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Filed Sept. 1, 1928 4 Sheets-Sheet 3

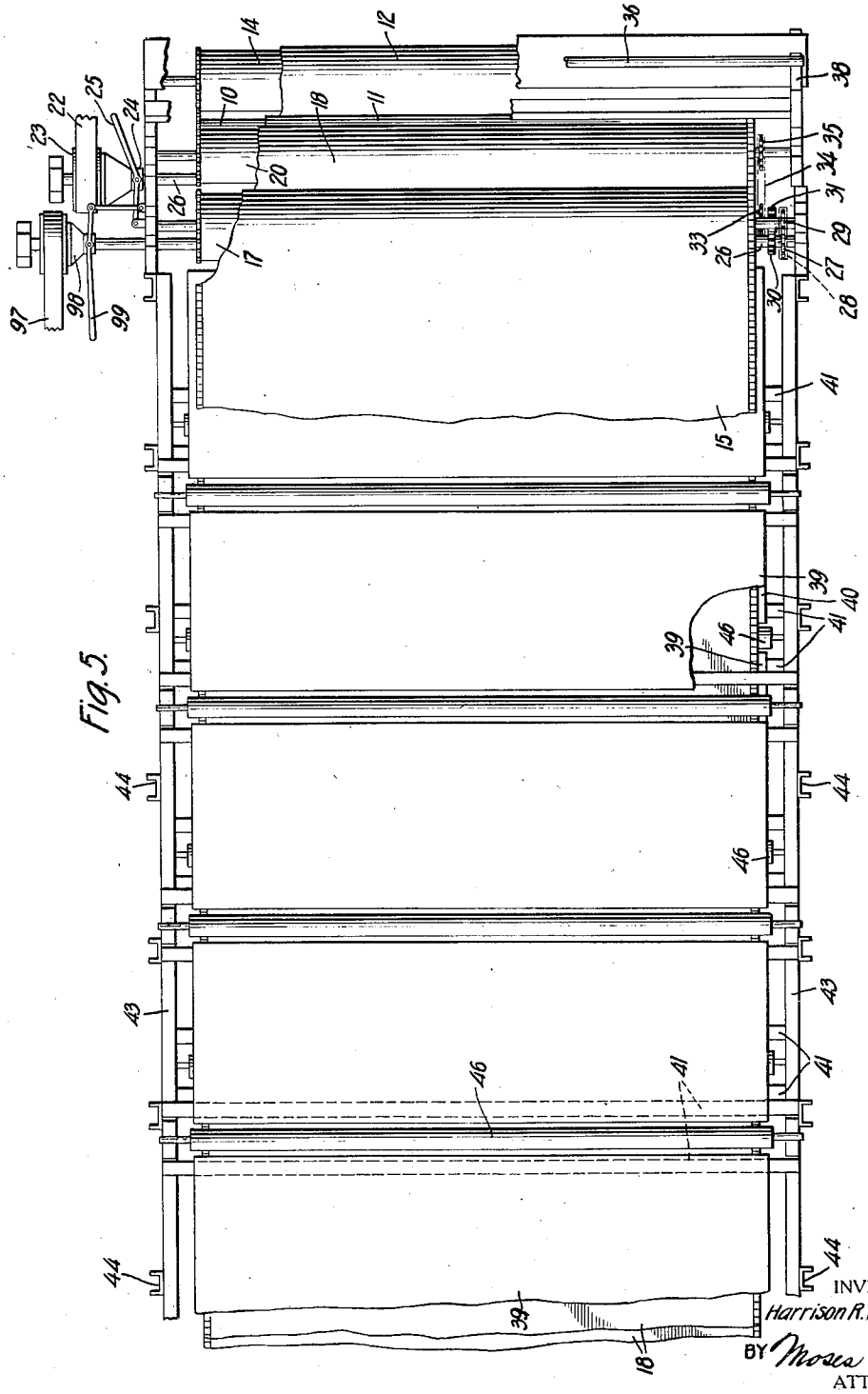


Fig. 5.

INVENTOR
Harrison R. Williams.
BY Moses & Holte.
ATTORNEYS

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Filed Sept. 1, 1928 4 Sheets-Sheet 4

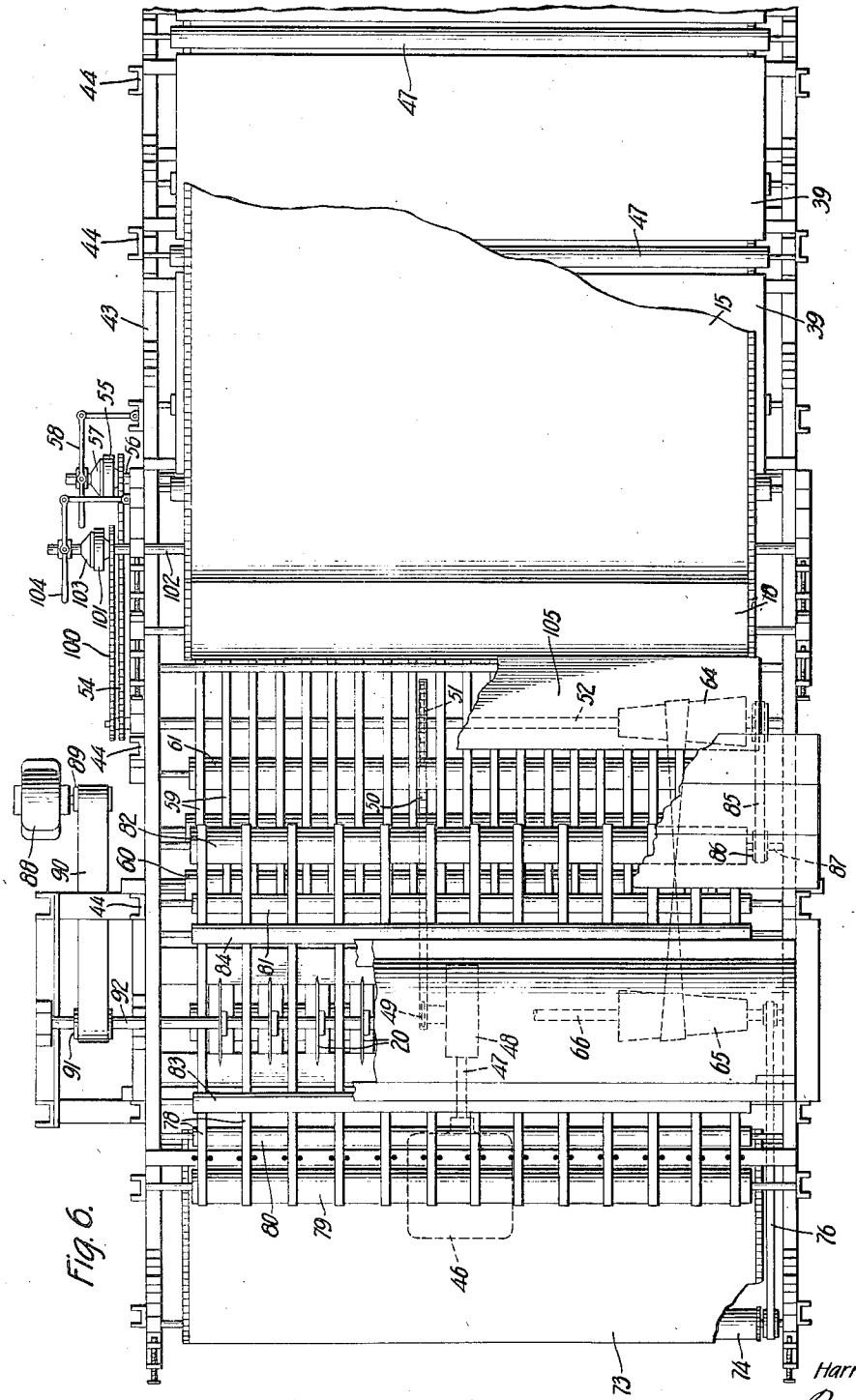


Fig. 6.

INVENTOR
Harrison R. Williams.
BY Moses & Nolte
ATTORNEYS

Patented Jan. 26, 1932 1,842,889

UNITED STATES PATENT OFFICE

HARRISON R. WILLIAMS, OF GLENS FALLS, NEW YORK

PAPER MACHINERY

Application filed September 1, 1928. Serial No. 303,399.

This invention relates to the manufacture of soft, absorbent pads and bandages from a thin tissue web and has for its principal object to provide mechanism which will be suitable for building up the thin tissue into multiple-ply webs, and which will be capable of high speed operation, will require relatively little manual labor, and will produce composite webs which are of softer and more absorbent character than similar webs manufactured by mechanism of the prior art.

A particular feature of the invention relates to the provision of duplicate winders arranged in parallel and adapted to act alternately to take the tissue web from a single source of supply and to deliver the resultant multiple-ply webs alternately to a single slitting and reeling mechanism. Duplication of the slitting and reeling mechanism is thus avoided.

A further feature of the invention relates to the provision of winders of novel form, that is to winders in the form of endless belts running upon suitable driving drums or rollers. Such winders have the important advantage that there is no necessary limitation upon the length of multiple-ply web which may be formed at a single operation, and also the further advantage that the tissue plies are caused to shift and creep back and forth with reference to one another during the winding operation so that interlocking of adjacent plies compacting of the several plies, and objectionable tensioning of the plies are avoided. Such winders, being of little height, are adapted for disposition one above the other for delivering to common slitting and reeling mechanisms as mentioned in the last preceding paragraph.

Other objects and advantages will hereinafter appear.

In the drawings forming part of this specification:

Figure 1 is a diagrammatic, side elevation, illustrating in a general way the entire operation with which the present invention has to do and illustrating means utilized in carrying out such operation;

Figure 2 is a perspective view illustrating particularly the treatment to which a multiple ply web is subjected by the slitting and reeling mechanism;

Figure 3 is a sectional side elevation of the winder mechanism, showing duplicate winders disposed one above the other, the winders being shown broken away intermediate the ends thereof for compactness of illustration;

Figure 4 is a sectional side elevation disclosing principally details of the take-off, slitting and reeling mechanism;

Figure 5 is a fragmentary plan view showing particularly a considerable portion of the winding mechanism illustrated in Figure 2; and

Figure 6 is a fragmentary plan view showing the delivery end of the winder mechanism and also showing the take-off, slitting, and reeling mechanism.

Referring first to the general disclosure of Figure 1 a ply 1 is formed upon the lower face of an endless belt 2 and is conducted by the belt around an end roller 3 and over a feed roller 4 onto a drying drum 5. The ply 1 passes around the drying drum and is stripped therefrom by a doctor blade 6. From the drying drum 5 the tissue web passes either to an upper winding mechanism 7 or a lower winding mechanism 8. As illustrated in Figure 1 the web is being fed onto the winding mechanism 8.

The winding mechanism 8 consists principally of end rollers 9 and 10 and an endless belt 11 running upon said rollers, and an endless supporting conveyor comprising a belt 12 which runs upon end rollers 13 and 14. The end rollers 13 and 14 are not mounted in directly opposed relation to the rollers 9 and 10 but are positioned beyond the ends of the winding conveyor, the supporting conveyor being longer than the winding conveyor so that no objectionable increase of pressure occurs as the web increases in thickness.

The upper winding mechanism is similar to the lower one and comprises as its principal parts an endless belt 15 that runs upon end rollers 16 and 17 and a supporting conveyor comprising an endless belt 18 that runs upon end rollers 19 and 20.

The two winding mechanisms are adapted to be independently driven, being provided with suitable independent clutches which will be referred to more fully hereinafter. As illustrated in Figure 1 the lower winding mechanism 8 is being driven to take the tissue ply from the drying drum 5 and wind it layer upon layer on the belt 11. When a multiple-ply web has been built to the thickness desired the web 1 is torn off near the drum 5 and the end of the web is then inserted between the belts 15 and 18 of the winding mechanism 7. Winding mechanism 7 is then set into operation to build up a multiple-ply web, the winding device 8 is stopped, the web is then fed by suitable feeding means, indicated generally at 19*a*, to a series of longitudinal slitters 20. In the phase of the cycle of operations illustrated in Figure 1 such a built up web is being fed to the slitters from the upper winding mechanism 7. After the web passes the slitters 20 it continues to a reeling mechanism 21, which will be described in detail presently, and is wound on reels preparatory to being removed from the machine and put in another machine for performing the next subsequent operation in the manufacture of the pads.

For a more complete and detailed understanding of the invention reference should be had additionally to Figures 3, 4, 5, and 6.

The drying drum 5 is driven by mechanism (not shown) and the lower winding mechanism is driven from the same source of power through a belt 22, a pulley 23, and a clutch 24, the clutch being operable by a lever 25 for connecting and disconnecting the pulley with a shaft 26 upon which the pulley is mounted. As seen best in Figure 3 the shaft 26 has fast upon it a sprocket 27 which, through a suitable chain 28, drives a sprocket 29 and thereby imparts rotary movement to the roller 10 for feeding the belt 11. The shaft 26 is also provided with a pinion 30 which meshes with a pinion 31 mounted on a stub shaft 32. Stub shaft 32 also carries a sprocket 33 which, through a chain 34, drives a sprocket 35 for imparting rotary movement to roller 14 to feed the belt 12. The belts 11 and 12 are driven at equal speeds slightly lower than the peripheral speed of the drying drum 5. As a consequence of this difference of speed the tissue web is caused to assume a crêpe form with transverse folds or corrugations as it leaves the drying drum. The web in passing from the drying drum is led over a guide rod 36 which is supported in a notch 37 of a bracket 38. The rod is so situated that the web comes in contact with the belt 11 or with the plies of material wound thereon at a point substantially in advance of the bight formed by the belts 11 and 12, and runs in a circular path about the axis of the roller 10 to such bight. The belts 11 and 12 always run at a linear speed equal to the peripheral speed of the rollers 10 and 14, and the composite web which is being built upon the belt 11 travels at this same linear speed in all portions of its path except where it travels around the rollers 9 and 10. At these portions the outer surface of the web travels at a higher velocity, and since it is such a surface that effects the feeding of the web 1 into the winding mechanism there is always sufficient material fed in to assure against tensioning of the material as it passes around rollers 9 and 10, and to assure a little slack in the several plies of the composite web in all other portions of the web, so that tight winding tending to compact the material is avoided. As a consequence of the intermittent taking up of this slack and letting it out again as the web passes successively around the rollers and along the level stretches of the winder the several plies are caused to shift relatively to one another, first in one direction and then the other so that the material has no tendency to have the corrugations of adjacent plies become intermeshed in compact form with one another. In order to further assure that the composite web shall not be under tension the upper stretch of the supporting belt 12 and the upper stretch of the belt 11 are supported horizontally and do not permit the composite web to sag under its own weight or under the weight of the belt 11. The supports for the upper stretches of the belts 11 and 12 consist, respectively, of supporting plates 39 and 40 which form almost continuous supporting tables. The plates 39 and 40 are supported, respectively, upon cross beams 41 and 42 which are carried by longitudinal beams 43 mounted on uprights or standards 44.

In the gaps between the plates 40 provision is made of belt supporting rollers 45, which rollers are desirably arranged to protrude slightly above the plane of the upper surfaces of the plates 40 so as to provide rolling contact for the belt and thereby reduce frictional wear, and also to provide looseness between the tissue plies by causing a slight shifting between the plies as they pass over the rollers. Rollers 46 are provided in the gaps between plates 39 to assist in supporting belt 11 and to take a portion of the weight off the plates 39 and thereby reduce the frictional wear to which the belt is subjected in sliding over the plates 39.

Corresponding portions of the upper winder are similarly supported.

When the web has been built up to the desired thickness the winder 8 is stopped by disconnecting the clutch 24. The built up web is then severed transversely and the winder 8 is again set into motion, but at a reduced speed for delivering the built up web to the longitudinal slitter 20 and to the reeling mechanism.

The mechanism for thus feeding the web is operated from a motor 46. This motor drives

a shaft 47, first entering a gear box 48 and through suitable gearing therein drives a sprocket 49. The sprocket 49 drives a chain 50 which in turn drives a sprocket 51 fast on a shaft 52. A sprocket 53 fast on shaft 52 acts thru a chain 54 to drive a clutch member 55, which runs loosely on a shaft 56 that carries the roller 9. A mating clutch member 57 fast on shaft 56 is shiftable into and out of driving engagement with clutch member 55 by operation of a lever 58.

The mechanism for conducting the web from the winder 8 comprises a conveyor consisting of a series of belts 59 running upon rollers 60, 61, 62, 63. The train for driving the conveyor belts 59 comprises a tapered pulley 64 fast on shaft 52 a crossed belt running on said pulley and on a tapered pulley 65 carried by a shaft 66 and a belt 67 forming a driving connection between the shaft 66 and roller 60.

From the conveyor formed by belts 59 the web passes to a further conveyor consisting of a multiplicity of belts 68 running upon rollers 69, 70 and 71. The roller 71 is driven from shaft 66 through a belt 72.

While carried by the conveyor formed by belts 68 the web is subjected to the action of the longitudinal slitter 20 as will be described presently.

From the belts 68 the slitted web passes onto a conveyor formed by a belt 73 and rollers 74 and 75. The roller 74 is driven from shaft 66 through a belt 76.

Provision is made of a hold-down conveyor 77 for assuring proper presentation of the web to the slitter 20. This conveyor overlies the active stretches of belt 68 and the adjacent ends of the active stretches of the belts 59 and 73. The conveyor 77 comprises belt 78 which runs upon rollers 79, 80, 81, 82, and which in their upper stretches runs beneath guide rollers 83 and 84.

Shaft 52 drives the conveyor through a belt 85 and a pulley 86, the pulley 86 being fast on a shaft 87 by which the roller 82 is carried.

The slitters 20 are driven at high speed by a motor 88 through a pulley 89 on the motor shaft of belt 90 and a pulley 91 fast on a shaft 92 that carries the slitters.

After the slitters 20 have operated upon the web, the web strips are conducted beneath spraying nozzles 93 and onto a series of reels 94. The reels are provided with an axle 95 which is guided for vertical movement between vertical guides or standards 96 at opposite sides of the machine. The reels are rotated from the belt 73 through the material being wound on the reels and hence is caused to move always at the same linear peripheral speed as said belts, without producing either tension or slack in the material. As soon as the web strips have been fully wound up, the reels are removed from the machine and replaced by fresh reels. The clutch lever 58 is then operated to render the winder 8 idle.

While the above described operations are in progress the winder 7 is not idle. Just before the severance of the web 1 between the drying drum 5 and the winder 8, the winder 7 is set into operation so that the winding of the web 1 can go on without interruption. The winder 7 is driven similarly to the winder 8 from a belt 97 through a clutch 98 which is controlled by a clutch lever 99. The operation with reference to winder 7 is the same as that described with reference to winder 8. When the web has been built up to the desired thickness, the winder 7 is stopped by operation of the clutch lever 99, the web is slitted transversely and the winder is then set into motion for feeding the web to the longitudinal slitters 20 and to the reeling mechanism. The driving means for the winder 7 in effecting this operation is similar to the driving means of the winder 8. Shaft 52 drives a chain 100 which in turn drives a clutch member 101 loose on shaft 102. A mating clutch member 103 fast on shaft 102 is controlled by a clutch shifting lever 104.

The built up web is delivered from winder 7 to the conveyor formed by belts 59 which conveyor has already been described. The gap between the belt 18 of winder 7 and the belts 59 is bridged by a plate or table 105 which supports the web and prevents tensioning thereof. The remainder of the treatment of this web is the same as that already described with reference to the web delivered by the winder 8.

While I have described what I believe to be the best embodiment of my invention, I do not wish to be limited to the embodiment shown, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. In a machine for forming soft absorbent pad webs, in combination, means for delivering a web, and a winder for building up a multiple ply web while maintaining the several plies loose and uncompressed comprising a winding conveyor including an endless belt running upon spaced rollers, and a supporting conveyor impositively supporting the multiple ply web opposite said end rollers but positively supporting it at other points.

2. In a machine for forming soft absorbent pad webs, in combination, means for delivering a web, a winder for building up a multiple ply web comprising an endless belt running upon spaced rollers and means for supporting the belt substantially continually between said rollers.

3. In a machine for forming soft absorbent pad webs, in combination, means for delivering a web, a winder for building up a multiple ply web comprising an endless belt

running upon spaced rollers and a supporting conveyor therefor.

4. In a machine for forming soft absorbent pad webs, in combination, means for delivering a web, a winder for building up a multiple ply web comprising an endless belt running upon spaced rollers and tables supporting the stretches of a winder belt between the rollers.

5. In a machine for forming soft absorbent pad webs, in combination, means for delivering a web, and a winder for building up a multiple ply web comprising an endless belt running upon spaced rollers, and tables supporting the stretches of the winder belt between the rollers, said tables each comprising a succession of supporting plates having narrow gaps therebetween, and supporting rollers in said gaps.

6. In a machine for forming soft absorbent pad webs, in combination, means for delivering a web, and a winder for building up a multiple ply web comprising an endless belt running upon spaced rollers, and tables supporting the stretches of the winder belt between the rollers, said tables each comprising a succession of supporting plates having narrow gaps threbetween, and supporting rollers in said gaps, said supporting rollers protruding slightly above the plane of the plates.

7. In a machine for forming soft absorbent pad webs, in combination, means for delivering a web, a winder for building up a multiple ply web while maintaining the several plies loose and uncompressed comprising an endless belt running upon spaced rollers, and means for causing the web to be delivered to said winder over a portion of the periphery of one of the rollers so that it will be fed in at a slightly higher linear speed than that of the belt, and a supporting conveyor guiding the lower stretch of such endless belt in a substantially rectilinear path but disposed to apply no direct compression force to the multiple ply web.

8. In a machine for forming soft absorbent pad webs, in combination, means for delivering a web, a winder for building up a multiple ply web while maintaining the several plies loose and uncompressed comprising a nendless belt running upon spaced rollers, means for causing the web to be fed onto the winders at a slightly greater speed than the linear speed of the winder, and means for positively supporting the lower stretch of said belt through the multiple ply web at points between said spaced rollers but not in directly opposed relation to them.

9. In a machine for forming soft absorbent webs, in combination, means for delivering a web, means for operating on the built up pad web, and a plurality of winders interposed between the web delivering means, and said operating means, said winders being disposed in parallel relation and adapted to wind a pad web alternatively and to deliver to the said operating means alternatively.

10. In a machine for forming soft absorbent webs, in combination, means delivering a web, means for operating on the built up pad web, and a plurality of winders interposed between the web delivering means and said operating means, said winders being disposed in parallel relation and adapted to wind a pad web alternatively and to deliver to said operating means alternatively, said winders each comprising an endless belt running on end rollers and being disposed one above the other.

11. In a machine for forming soft absorbent webs, in combination, means for delivering a web, means for operating on the built up pad web, and a plurality of winders interposed between the web delivering means and said operating means, said winders being disposed in parallel relation and adapted to wind a pad web alternatively and to deliver to said operating means alternatively, and conveying mechanism adapted to carry the web from either winder to said operating means.

12. In a machine for forming soft absorbent webs, in combination, means for delivering a web, means for operating on the built up pad web, and a plurality of winders interposed between the web delivering means and said operating means, said winders being disposed in parallel relation and adapted to wind a pad web alternatively and to deliver to said operating means alternatively, said winders each comprising an endless belt running on end rollers and being disposed one above the other, and conveying mechanism adapted to carry the web from either winder to said operating means comprising an inclined conveyer running upward from a point adjacent the lower winder and a support substantially bridging the gap between the upper winder and said conveyer.

In testimony whereof I have affixed my signature to this specification.

HARRISON R. WILLIAMS.

CERTIFICATE OF CORRECTION.

Patent No. 1,842,889. Granted January 26, 1932, to

HARRISON R. WILLIAMS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 125, claim 2, for the word "continually" read continuously; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of May, A. D. 1932.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.