July 18, 1961 F. WITSCHI 2,992,458

ABSORBENT COTTON BALLS AND METHOD AND APPARATUS FOR MAKING THE SAME

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Fig. 1.

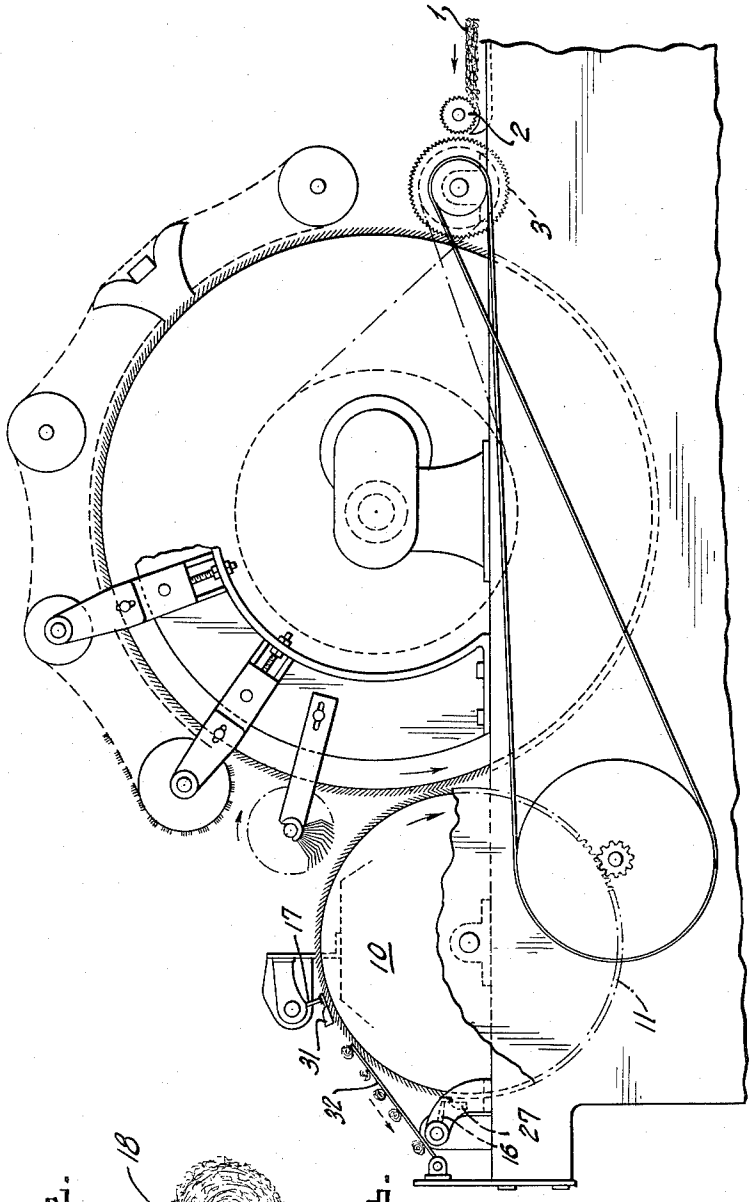

Fig. 2.

Fig. 3.

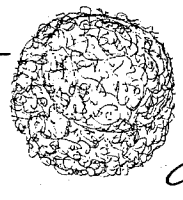

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FIG. 4.

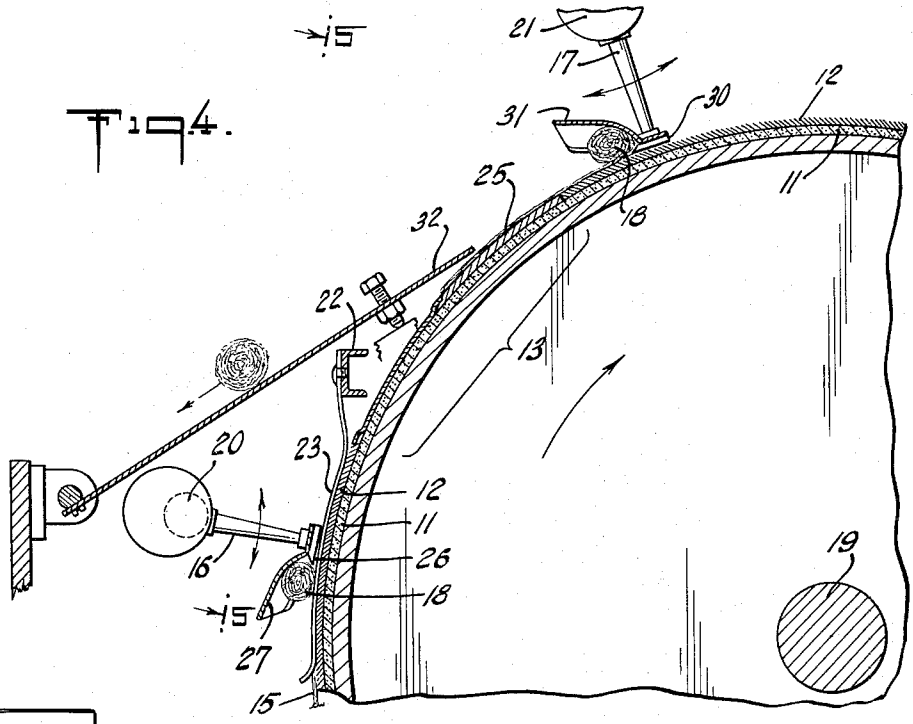
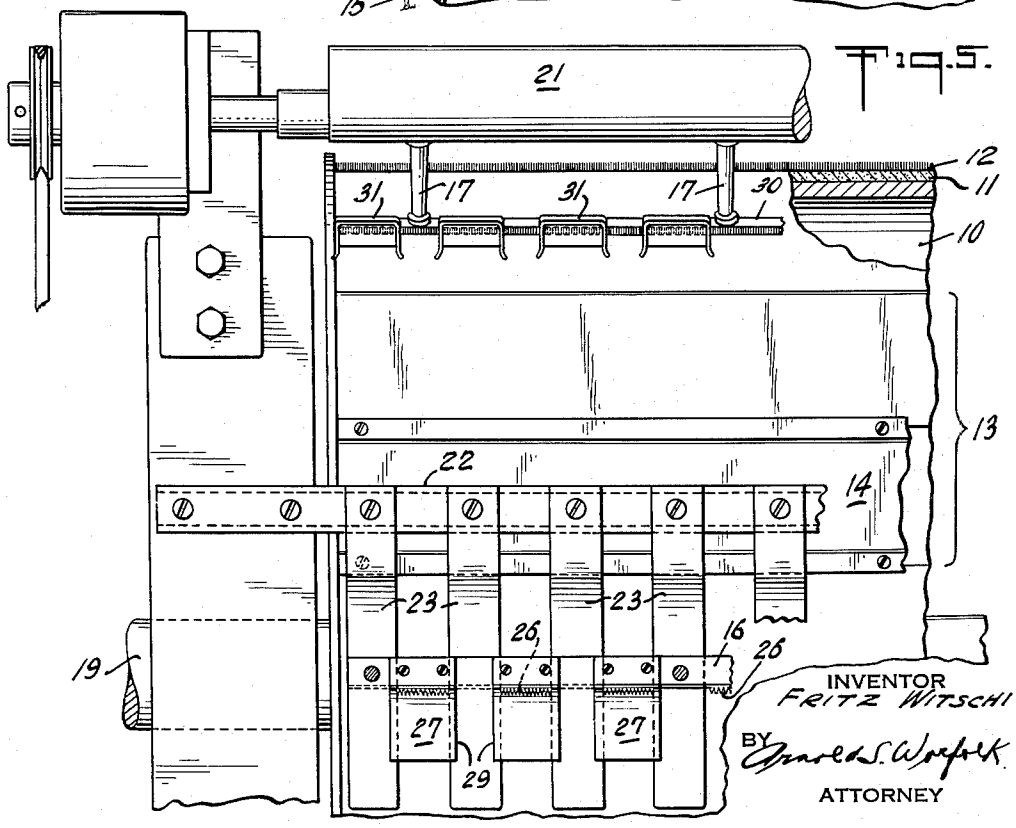


FIG. 5.



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ABSORBENT COTTON BALLS AND METHOD AND APPARATUS FOR MAKING THE SAME

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FIG. 6.

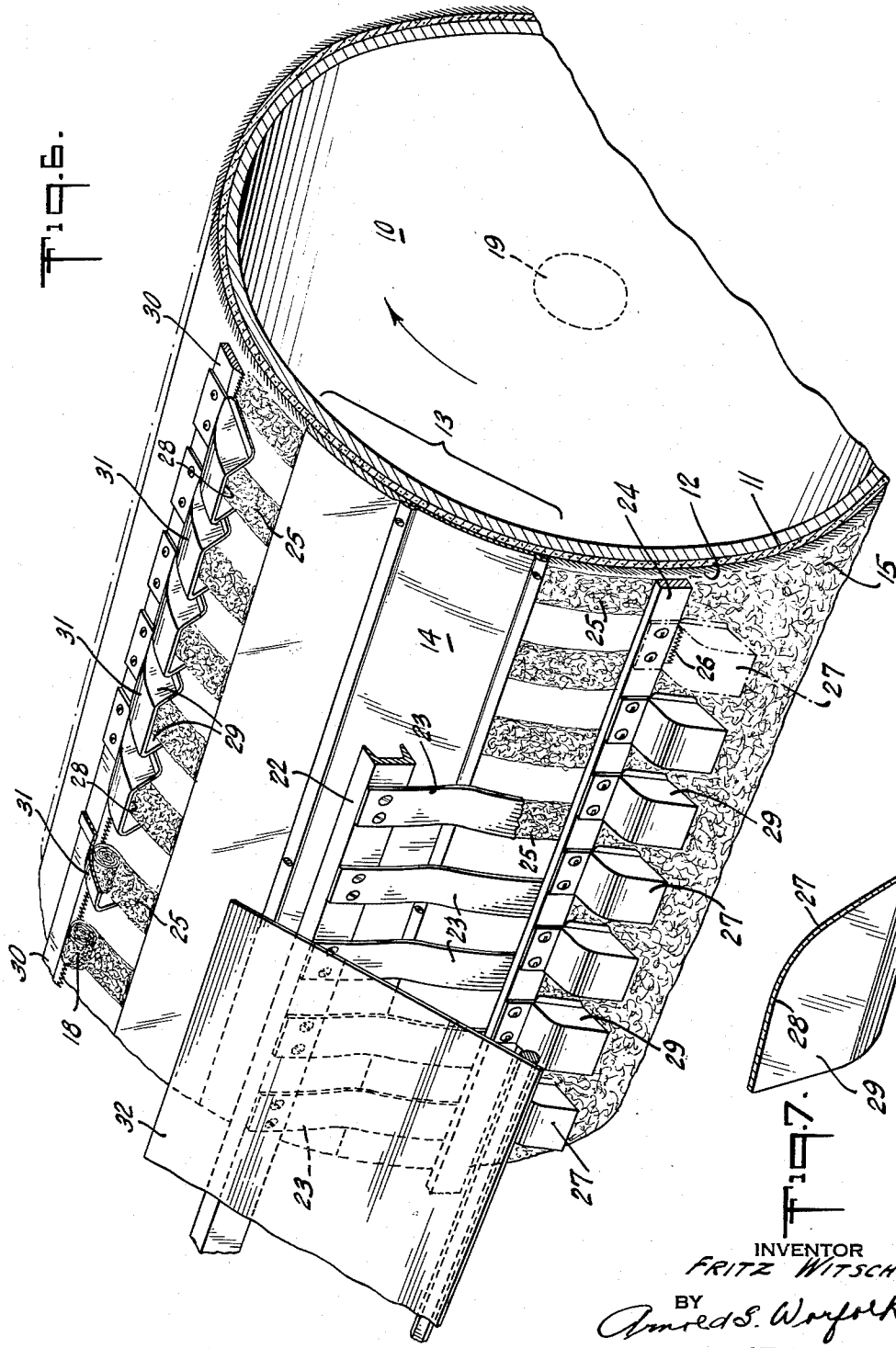
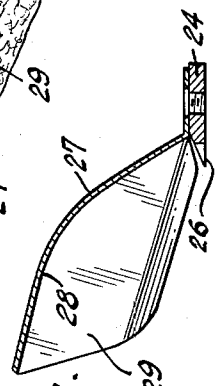


FIG. 7.



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ABSORBENT COTTON BALLS AND METHOD AND APPARATUS FOR MAKING THE SAME

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10 Claims. (Cl. 19—106)

In one method, heretofore used, of manufacturing absorbent cotton balls capable of serving as so-called tampons, a batting of cotton wool of moderate thickness and given length was rolled up and the roll thus produced cut transversely into a number of cotton balls. This manner of manufacture not only is cumbersome and comparatively slow, but also has the disadvantage that the turns of the cotton balls easily come open.

The method in accordance with the instant invention avoids such disadvantages and makes possible the continuous manufacture of cotton balls directly from the card. The improvement contemplates that the cotton web, while on a doffer roll which is provided with card clothing, is cut into strips along its entire width. Such strips are arranged in pairs directly alongside each other, one strip in each pair being removed from the doffer roll by one stripping comb while the other strip is removed from the doffer roll by a second stripping comb, each strip then being rolled into a cotton ball.

The apparatus for carrying out of the improved method is characterized by the fact that for the formation of the strips, there are provided, for each pair of strips, one stripping comb and one tongue resiliently pressing against the doffer roll. The tongue maintains within the sphere of action of the first doffer comb that strip of the pair of strips which is moved further on by the doffer roll to the second stripping comb. The apparatus is further characterized in that each comb end, acting on the cotton web, is enclosed on the side away from the doffer roll by a corresponding shell which presents a guide surface to effect a rolling up or convoluting of the web strip as it is stripped by the comb end from the doffer roll. The improved cotton ball itself is fluffy, and substantially homogeneous and absorbent throughout.

The method, apparatus, and improved cotton ball in accordance with the invention will be described in greater detail below on basis of an illustrative embodiment of the apparatus shown in the attached drawing.

FIGURE 1 is a side elevation, partially in section of a cotton card equipped with the present improvements;

FIG. 2 is a perspective view of cotton partially rolled up to form a cotton ball;

FIG. 3 illustrates a completed cotton ball formed in accordance with the invention;

FIG. 4 is a partial axial section through the doffer roll and comb;

FIG. 5 is a transverse section on line 5—5 of FIG. 4;

FIG. 6 is a perspective view of a portion of a doffer roll equipped with the present improvements and looking at the machine from the discharge end thereof; and

FIG. 7 is a longitudinal sectional view through one of the shells which cooperate to effect the rolling-up of the cotton ball.

Cotton, or other suitable fiber material, from a lap **1** is fed into a card by a feed roll **2** to a lickerin roll **3** from which fibers are picked up (FIG. 1) by a card cylinder **4** for transfer to a doffer roll **10**. Since such equipment may be of standard construction, and conventionally equipped and driven, the details thereof will be familiar to those versed in the art and accordingly need not be described.

The doffer roll **10** is covered on its periphery with customary card clothing **11** consisting for instance of felt from which uniformly distributed card wires **12** extend radially outwardly (FIGS. 1, 4, 5, and 6). On an axial zone **13** of the card clothing over a center angle of, for instance, forty degrees (40°), the card wires are removed and over about two-fifths of the center angle of this zone the felt of the card clothing is covered by a sheet metal strip **14** which is polished on its outside and is firmly screwed to the doffer roll drum (FIGS. 4 and 5).

A fluffy cotton web **15** formed on the doffer roll by cotton picked up from the card cylinder, is transported on the doffer roll **10**, as it rotates in a clockwise direction as viewed in the drawings, to a position where a first stripping comb **16** is located. At this location, the web is divided uniformly over its entire width into strips of which in all cases, one of the strips, arranged directly alongside of each other in pairs, is stripped off the doffer roll by the first stripping comb **16** and the other of the strips by a second stripping comb **17** and rolled into cotton balls **18**. The combs **16** and **17** can be swung up and down on doffer pins **20** and **21** parallel respectively to the axis of the roll **19**, and are arranged at an angular distance around such axis about 60° apart. Conventional comb oscillating equipment at the side of the machine will serve the purpose of moving the combs up and down. From a cross-member **22**, fixed at its ends in the machine frame and located in a position parallel to the axis **19** of the doffer roll, there extends downwardly, between a comb plate **24** of the lower comb **16** and the doffer roll, a plurality of tongues **23** which press resiliently against the doffer roll **10**. There is one tongue for each pair of strips and its width is such as to cover that strip **25** of the pair of strips in question which is transported further by the doffer roll toward the upper comb **17**. Each tongue is located in a vicinity of the comb plate **24** of the lower comb **16** which is devoid of teeth. The comb plate **24**, however, is provided with teeth **26** on sections thereof corresponding to spaces between adjacent tongues **23** (FIGS. 5, 6, and 7). In said spaces, the cotton web **15** is stripped from the doffer roll by the swinging motion of the comb **16** and thus divided into the strips.

The comb plate **24**, in those sections thereof which present the teeth **26**, is equipped, on its outer side which faces away from the doffer roll, with individual shells **27** fastened to the comb plate **24**, and which cover the toothed sections **26**. Each shell **27** presents a concave wall **28** defining a pocket which faces the doffer roll. The pocket is closed at one end by a portion of said wall which extends approximately at a right angle to the said outer side of the toothed end **26** of the comb plate. Each shell **27** is bent at an angle on both sides so as to form walls **29** directed at a right angle to the doffer roll and which define the side walls of the pocket. The opposite end of the concave wall **28** or what is the same thing, the outer end of the pocket, is located beyond the toothed comb plate by an amount equal to the stroke of the comb as it oscillates back and forth. Thus, the web strip as it is stripped from the doffer roll by the comb plate **24** is continuously deflected in the shell **27** and, because of its flimsiness, is rolled up upon itself into a cotton ball by the swinging motion of the comb, in conjunction with the rotation of the doffer roll. The cotton ball thus formed is relatively homogeneous due to the fluffy nature of the web and due also to the fact that there is no tension on the cotton during the windup operation.

The upper comb **17** is, in similar manner, also provided with a comb plate **30** which, over its entire length, has toothed sections appropriately located for stripping the strips **25**, and shells defining pockets in which the cotton is wound up.

Upon rotation, the doffer roll **10** cannot take over,

at the wire-free zone **13** of the card clothing **11**, any card web from the preceding main card roll, so that the web in this zone is interrupted over the entire width of the doffer roll. When this zone moves below the combs **16** and **17**, the cotton ball **18** in each shell **27** and **31** respectively, rotates in engagement with the felt clothing of the card with the result that the end of the strip combines with and loses its identity in the rest of the cotton ball. Later, when the polished sheet metal strip **14** arrives adjacent the cotton balls, its lack of adherence for the ball causes the latter to fall out of the shells into a collector or on to a conveyor belt (not shown) which leads them to the packing room. The cross member **22** and the lower comb **16** are covered by an oblique shield **32** fixed on the machine frame and over which the cotton balls roll in dropping from the upper comb. Thereupon the wire-covered card clothing again brings cotton web to the combs where the formation of the cotton balls is repeated.

It will be observed that the absorbent fiber ball made on the improved machine and in accordance with the improved method is quite homogeneous throughout and indeed is devoid of any central hole such as that which customarily results when a ball is wound upon a spindle and the spindle removed. Furthermore, since the sliver is under absolutely no tension during convolution of the layer of carded fibers, a fluffier ball results having greater utility than as a ball of equivalent fiber weight but of greater density.

I claim:

1. Apparatus suitable for forming rolls of cotton directly from a fiber web, and which includes, in combination, a doffer roll rotatable in one direction, a plurality of oscillatable doffer combs associated with the doffer roll in spaced relation around the cylindrical surface thereof, a first one of said combs having sections presenting teeth and sections devoid of teeth alternately spaced along its length, and a second one of said combs having sections presenting teeth located, in the direction axially of the roll, correspondingly with the sections devoid of teeth on the first comb, a leaf device associated with said first comb and with the doffer roll at positions intermediate its toothed sections, for retaining the web on the roll at such sections while the webs intermediate such sections is removed from the roll by the oscillation of said first doffer comb.

2. Apparatus according to claim 1 wherein means are provided at each said toothed section of a doffer comb for convoluting the fiber web removed from the doffer roll by such section.

3. Apparatus according to claim 1 wherein the convoluting means at each said toothed section of a doffer comb is mounted on the doffer comb to move therewith.

4. The method of producing fibrous balls such as balls of cotton or like fibers from a carded web of such fibers which comprises: doffing from traveling card clothing a plurality of immediately adjacent strips of a carded web of fibrous material of predetermined length and, in different zones spaced along the travel of the web, rolling a different one of said adjacent strips into balls as it is doffed from the card clothing, and automatically discharging each rolled ball from its respective zone when the full length of its strip has been rolled up.

5. The method of producing fibrous balls such as balls of cotton or like fibers from a carded web of such fibers which comprises: doffing from traveling card clothing a plurality of pairs of immediately adjacent strips of a carded web of fibrous material of predetermined length and, in different zones spaced along the travel of the web, rolling a corresponding strip from each pair of strips into balls as the strip is doffed from the card clothing and automatically discharging each rolled ball from its respective zone when the full length of its strip has been rolled up.

6. The method of producing fibrous balls such as balls of cotton or like fibers from a carded web of such fibers which comprises: forming a web of fibrous material on a traveling card member presenting on its surface a substantial area equipped with card clothing and a lesser area devoid of card clothing extending in an axial direction, doffing from said card member a plurality of immediately adjacent strips of a carded web of fibrous material and, in different zones spaced along the travel of the web, rolling up said adjacent strips as they are doffed into balls, and permitting the discharge of the balls from their respective zones as the terminal ends of the strips from which they are formed reach the rolling up zones by the arrival in such zone of the area of the card member devoid of card clothing.

7. Apparatus suitable for forming rolls of cotton directly from a fiber web and which includes, in combination, a doffer roll rotatable in one direction and having a segment which extends lengthwise of the roll with a relatively large dimension around its cylindrical surface provided with card clothing for conveying a fibrous web, and a segment which likewise extends lengthwise of the roll with a relatively smaller dimension around its cylindrical surface devoid of card clothing, and a plurality of oscillatable doffer combs associated with the doffer roll in spaced relation around the cylindrical surface thereof, a first one of said combs having sections presenting teeth and sections devoid of teeth alternately spaced along its length, and a second one of said combs having sections presenting teeth in corresponding locations with the sections devoid of teeth on the first comb, said doffer combs acting at said toothed sections and upon rotation of the doffer roll to strip from the doffer roll a web of fibers equivalent in length to the length around the relatively large cylindrical segment thereof provided with card clothing.

8. Apparatus suitable for forming rolls of cotton directly from a fiber web and which includes, in combination, a doffer roll rotatable in one direction and having a segment which extends lengthwise of the roll with a relatively large dimension around its cylindrical surface provided with card clothing for conveying a fiber web, and a segment which likewise extends lengthwise of the roll with a relatively smaller dimension around its cylindrical surface devoid of card clothing, and a plurality of doffer devices associated with the doffer roll in spaced relation around the cylindrical surface thereof, a first one of said doffer devices having along its length alternately spaced sections respectively operable and inoperable to remove strips of the fiber web from the doffer roll, and a second one of said doffer devices having operable sections located, in a direction axially of the roll, correspondingly with the inoperable sections on the first doffer device, said doffer devices acting at said operable sections and upon rotation of the doffer roll to strip from the doffer roll a web of fibers equivalent in length to the length around the relatively large cylindrical segment thereof provided with card clothing.

9. Apparatus suitable for forming rolls of cotton directly from a fiber web which includes, in combination, a doffer roll rotatable in one direction, a plurality of doffer devices associated with the doffer roll in spaced relation around the cylindrical surface thereof, a first one of said doffer devices having along its length alternately spaced sections respectively operable and inoperable to remove strips of the fiber web from the doffer roll, a second one of said doffer devices having operable sections located, in a direction axially of the roll, correspondingly with the inoperable sections on the first doffer device, and a leaf device associated with said first doffer device and with the doffer roll at positions corresponding to the inoperable sections therealong for retaining a strip of the web on the roll at such sections while a strip of the web at positions corresponding to the operable sections therealong are removed from the roll by the operation of the leading doffer device.

10. Apparatus suitable for forming rolls of cotton directly from a fiber web and which includes, in combination, a doffer roll rotatable in one direction and having a segment which extends lengthwise of the roll with a relatively large dimension around its cylindrical surface provided with card clothing for conveying a fiber web, and a segment which likewise extends lengthwise of the roll with a relatively smaller dimension around its cylindrical surface devoid of card clothing, a plurality of doffer devices associated with the doffer roll in spaced relation around the cylindrical surface thereof, a first one of said doffer devices having along its length alternately spaced sections respectively operable and inoperable to remove strips of the fiber web from the doffer roll, a second one of said doffer devices having operable sections located, in a direction axially of the roll, correspondingly with the inoperable sections on the first doffer device, and shell means associated with the doffer devices presenting a pocket at each of said operable sections having an opening facing in the direction opposite to the direction of rotation of the doffer roll, said doffer devices acting at said operable sections thereof and upon rotation of the doffer roll to strip from the

doffer roll a web of fibers equivalent in length to the length around the relatively large cylindrical segment thereof provided with card clothing, and said shell means acting as the strips of fiber web are removed from the doffer roll to receive the same in the pockets thereof and to convolute the web strip into a roll.

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