

Feb. 20, 1945.

W. M. WENTZ

2,369,696

CONTINUOUS PIECE GOODS PROCESSING MACHINE

Filed June 17, 1942

3 Sheets-Sheet 1

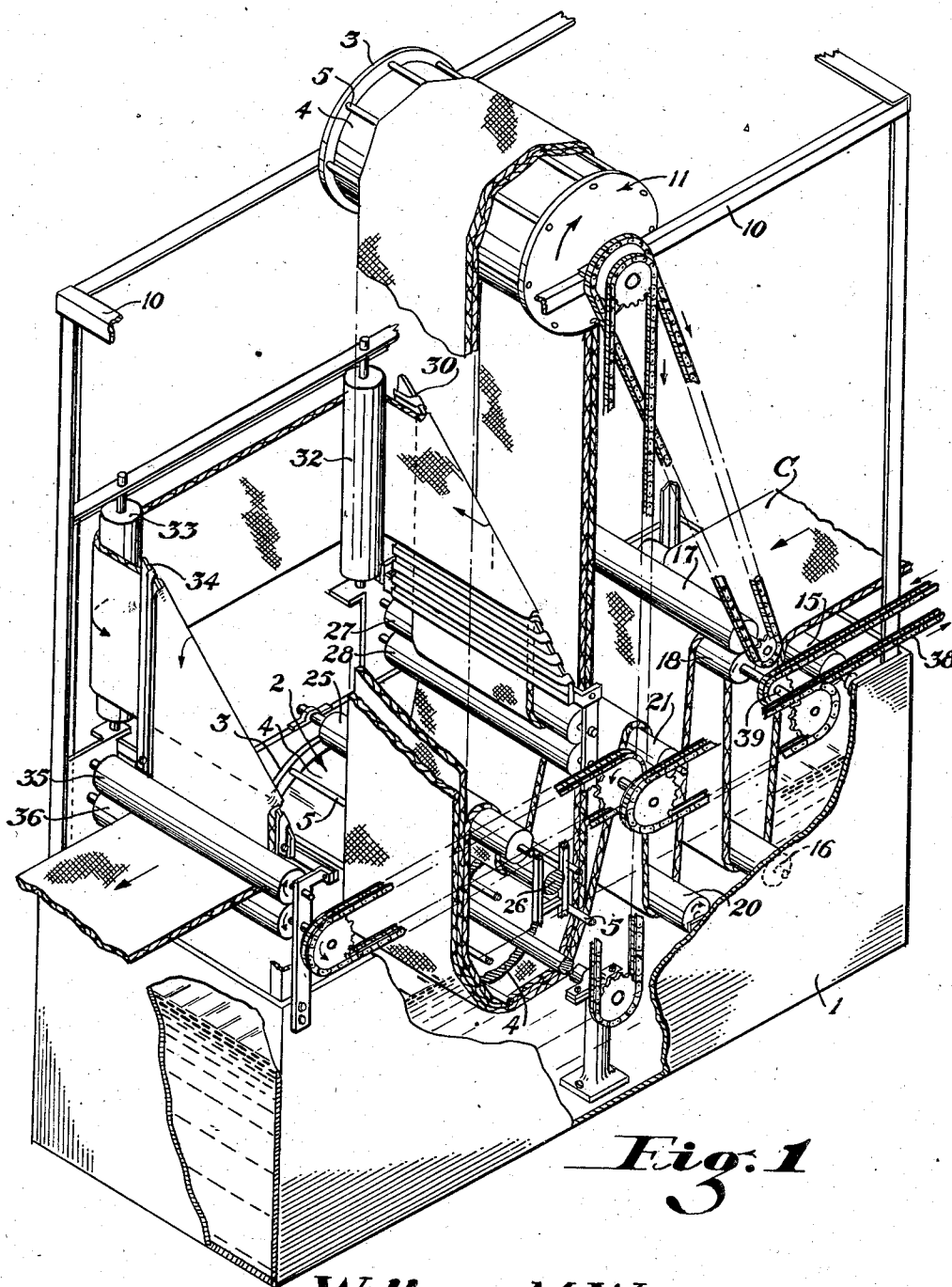


Fig. 1

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3 Sheets-Sheet 2

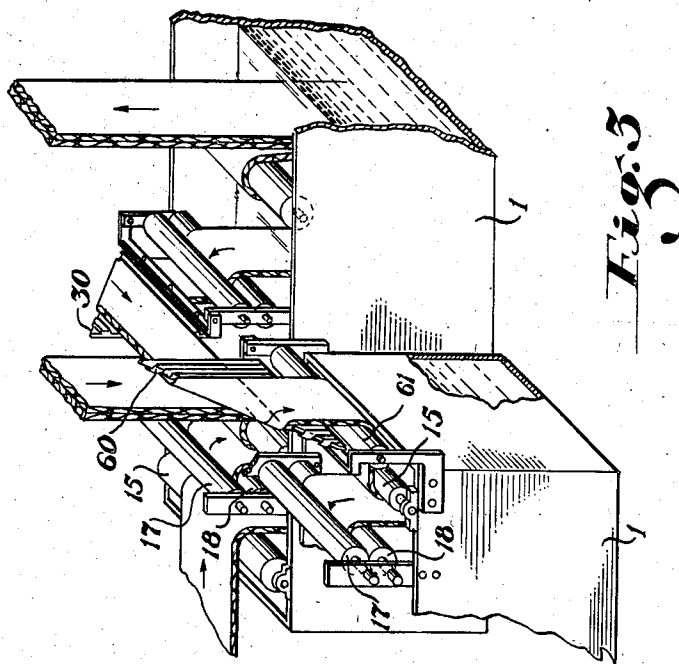


Fig. 3

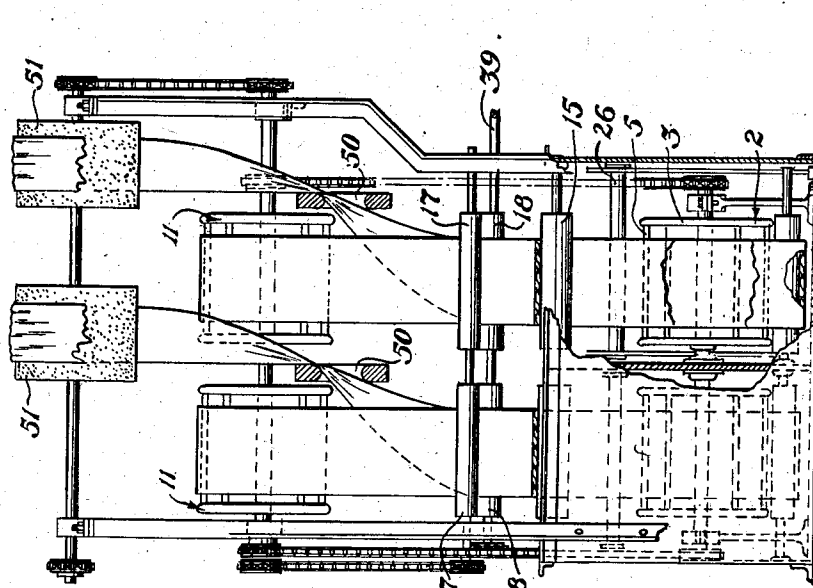


Fig. 2

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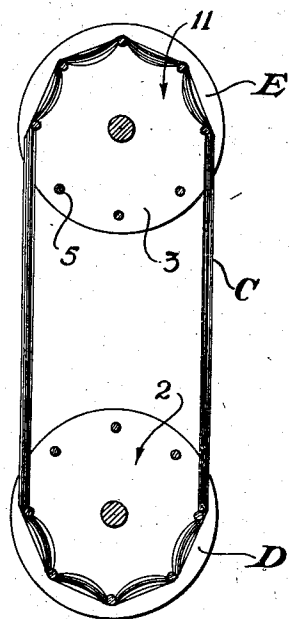


Fig. 4

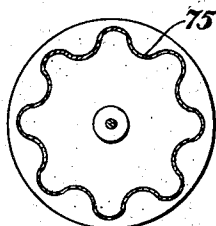


Fig. 7

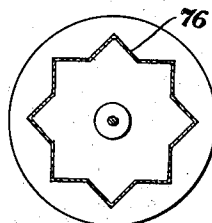


Fig. 8

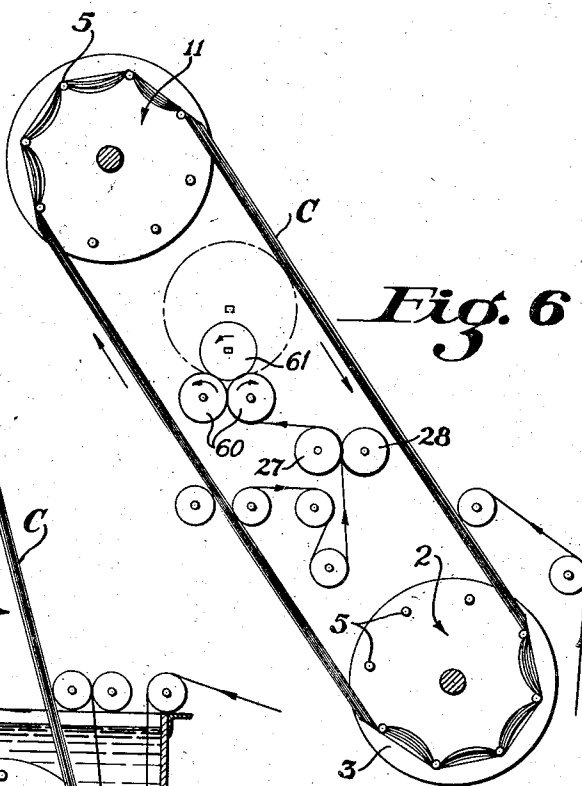


Fig. 6

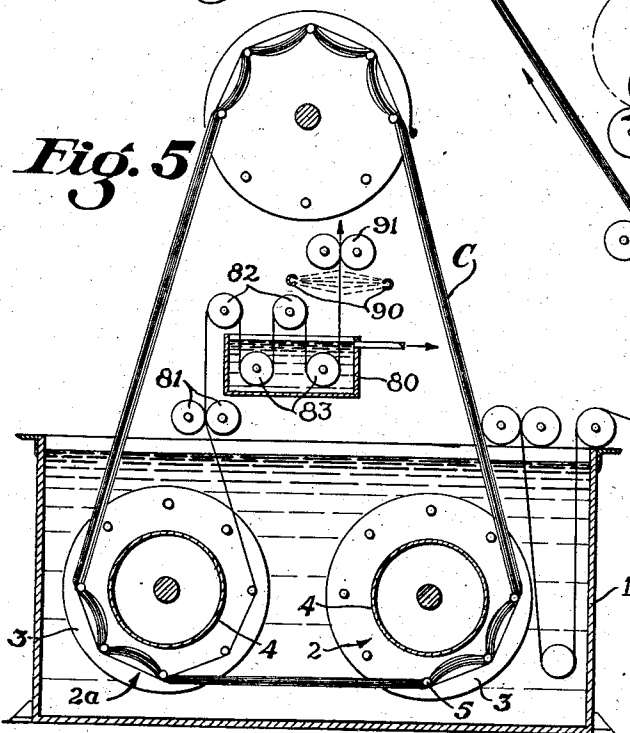


Fig. 5

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2,369,696

CONTINUOUS PIECE GOODS PROCESSING
MACHINE

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Application June 17, 1942, Serial No. 447,373

3 Claims. (Cl. 68—158)

This invention relates to a machine for processing piece goods wherein the goods may be subjected to treatment in a liquid treating bath in a continuous manner for an extended period of time.

In the dyeing, finishing and other processing of textile fabrics in the piece by the continuous methods in which the goods must be subjected to the treating bath for an extended period of time it has been the practice to pass the piece goods over and under numerous rollers so that it passes horizontally or vertically back and forth through the solution until treatment is completed. Ordinarily these machines are run at a speed whereby the cloth passes over the rolls at from 10 to 120 yards per minute. Where only a short contact with the solution is necessary no particular problem is involved in the use of this type of apparatus, but where the fiber is to be treated for an extended period of time and the same speed of production must be maintained, an extraordinarily large treating bath or a number of such treating baths must be employed to permit the goods to remain in the solution for the required time. In many cases the passing of piece goods over and under numerous rolls presents difficulties because of the tension under which the goods must be put to move it along.

To avoid the tension on the goods that is attendant in the conventional apparatus, methods have been devised to drive a larger number of the rolls over which the goods pass, or to employ nip or squeeze rolls spaced at more frequent intervals to pull the cloth along and to squeeze out excess liquor where desired. However, due to shrinking and stretching of goods when wetted, these methods are not entirely satisfactory, except where complicated electrical controls and compensators are employed and such controls add greatly to the cost of the equipment. Furthermore, in treating pile fabrics, the use of numerous squeeze rolls is to be avoided because of the tendency of such rolls to impart a permanent matting to the pile.

In the conventional continuous piece goods dyeing machines, where the fabric is to be maintained in contact with the solutions for extended periods of time, large volumes of the treating liquor are required to accommodate the amount of goods that must be under treatment at any one time because of the bulky manner required for manipulating the goods in the baths. The amounts of chemicals and dyes employed in the fiber treating solutions is of course proportional to the amount of solution used and at the end

of each run these solutions are discarded with attendant loss of dissolved chemicals, for the solutions are often unstable and even when stable the storage of large volumes of such liquids is impracticable.

It is therefore an object of this invention to provide a fabric treating apparatus for treating cloth in the continuous piece and in a continuous manner for an extended period of time, which is compact, simple in operation and in which the fabric is not subjected to undue tension while being treated.

A further object of the invention is to provide a continuous piece goods dyeing and treating machine which requires a minimum volume of treating liquor per unit of goods under treatment whereby in processes in which an equilibrium must be established between the treating solution and the material, before uniformity of treatment is finally attained, the time required to establish this equilibrium is reduced to a minimum.

A further object of the invention is to provide a continuous piece goods dyeing and treating machine in which the time of treatment of the goods passing there-through can be increased without altering the speed of the machine or the volume of the treating bath.

In the attached drawings which form a part of this application,

Fig. 1 is an isometric view, partially in section, of a preferred form of fiber treating apparatus illustrating the invention.

Fig. 2 is an end elevational view, partly in section showing the machine of Fig. 1 as a multiple unit with modified take-off mechanism.

Fig. 3 is a fragmentary isometric section showing a modified arrangement of the machines in tandem carrying the cloth directly from one machine to the next.

Fig. 4 is a detailed view illustrating the manner in which the slack in the inner wraps of the cloth is carried by the cloth carrying reels.

Fig. 5 is a diagrammatic view of a modified form of the apparatus illustrating the addition of a further treating bath through which the cloth may be run.

Fig. 6 is a diagrammatical detail view illustrating a method of taking off the fabric in the roll on the inside of the machine, and

Figs. 7 and 8 are sectional views illustrating modified forms of the cloth carrying reels.

In the accompanying drawings in which like reference numerals refer to corresponding parts in the several views, numeral 1 designates a tank or vat adapted to hold the liquid with which the

cloth is to be treated. In this tank is mounted for rotation a cloth carrying reel 2 made up with side plates 3 attached to a cylindrical center portion 4 with connecting rods 5 spaced away from the cylindrical center 4, the reel being of a length to accommodate the maximum width of cloth for which the machine is constructed.

Mounted above the reel 2 on a frame 10 is a second reel 11 of similar construction to that of reel 2. The reels 2 and 11 are mounted in alignment so that the cloth, in a continuous piece, may be wrapped around the reels in the open width or in a folded strip in such a manner that the inner wrap is removed from the reels at the same rate of speed as the cloth is fed onto the reels as the outer wrap. The reel 2 is mounted at any desired depth within the tank 1 so the solution may completely cover the reel or any portion thereof, whereby the cloth as it passes about the reels 2 and 11 is treated for the desired length of time, the time of treatment being dependent upon the number of wraps of cloth about the reels and the speed at which the machine is operated.

As illustrated in Figure 1 the cloth C is led into the machine in the open width or in a folded strip over the roller 15 and down into the treating liquor under the roll 16, to give the goods a preliminary wetting then passed between the nip or squeeze rolls 17 and 18 which may also constitute the impelling force for moving the strip of cloth into the machine. The cloth is then passed under a roll 20 to give it a further wetting, then over the roll 21 and about the reel 2 as the outer wrap. It is then led over the reel 11 and back around the reels 2 and 11 in a multiple of wraps, the number being dependent upon the time required to complete the treatment of the goods in the treating bath. The goods is then led out over roll 25 and under the float roll 26 through the nip or squeeze rolls 27 and 28, then out from the side of the machine over the 45° guide 30. As illustrated in Fig. 1, the goods may then be carried around the rolls 32 and 33 over a second 45° guide 34 and through the take-off rolls 35, 36. The cloth may then be batched or led into another machine arranged in a line with the machine illustrated.

The feed rolls 17—18, 27—28 and take-off rolls 35—36 are all driven from any source of power such as through chain 38 on shaft 39 by conventional driving means or by sprockets and chains as illustrated in the drawings. The reels 2 and 11 may also be driven or they may rotate freely with the cloth as it passes thereabout, the cloth being moved through the machine entirely by the nip or squeeze rolls.

As illustrated in Fig. 2 the machines may be arranged in tandem, and the cloth may be carried from the machines in rope form through the pot-eyes 50 and over the take-off reels 51. The goods taken from the reels 51 may be further treated in a rope form or passed through scutchers or other conventional opening devices after which it may again be treated in the open width or subjected to the usual finishing operations in any desired type of apparatus.

Fig. 3 illustrates the arrangement of two or more machines whereby the cloth is taken directly from one machine and passed into the second bath for treatment without undue exposure to air. By bringing the cloth from the 45° guide 30, directly to a second 45° guide 60 in the second machine, then under the roll 61 from where it passes

through the second machine in the same manner illustrated in Fig. 1.

Variable speed transmissions of conventional types may be employed in driving the squeeze rolls 17—18, 27—28 and 35—36 if desired, to permit adjustment for any variation in the feeding of the cloth in the machine, such as may be caused by shrinkage or stretching of the goods when wetted by the treating solutions. The reel 2 which operates in the vat 1 is preferably a closed cylinder about which the rods 5, secured in the flanges 3 are spaced sufficiently far from the cylinder portion 4 to permit adequate access of the treating liquor to the inside as well as the outside layer of the cloth that passes about this reel. By using a closed cylinder type of reel as illustrated, the volume of treating solution in the bath may be kept at a minimum. It is to be understood that in the accompanying drawings the feed rolls, float rolls, reels, etc., are arranged further apart than will be necessary in order that the invention may be properly illustrated in the drawings. The more compact the arrangement of rolls and reels within the vat 1, the smaller will be the amount of treating solution required to effectively treat any given amount of cloth that is constantly passing through the machine. Where tandem machines are arranged in line, as illustrated in Fig. 2, the squeeze rolls used for feeding the cloth in and taking the cloth from the machines may be mounted on the same shafts so the machines may be run in unison.

As the goods is passed about the reels 2 and 11 in a plurality of wraps it will be apparent that due to the gradual increase in the effective diameter of the reels, particularly where heavy goods are being treated, there tends to be an increase in the amount of goods taken onto the outer wrap, as compared with the amount of goods delivered from the inside wrap about the reels. This difference in amount of goods is compensated for by the construction of the reels 2 and 11. As illustrated in Figs. 1 and 2 the rods which are spaced about the central portion of the reel and which carry the goods to be treated permits the goods to be carried about the reels in a loose form as more particularly illustrated in Figs. 4, 5 and 6. The modified forms of reels may of course be employed to accomplish the same results as more particularly illustrated in Figures 7 and 8. When an ordinary cylinder is employed, in place of the reels of the types illustrated, it has been found that after a number of yards of goods have been passed through the machine, the goods begin to collect and drop down below the reel 2, especially where heavy goods is being treated or where a large number of wraps are made about the two reels. By the use of the rods 3 or the corrugated surfaces 75 and 76 (as illustrated in Figs. 7 and 8), this difficulty has been overcome, for the same amount of goods that is fed onto the reels as the outer wrap is carried evenly thereabout and taken off from the inside at the same rate. It has been found that several thousand yards of goods may be passed through the type of machine illustrated without any noticeable loosening of the goods about the reels.

As illustrated in Fig. 5, more than one reel may be employed in the dyebath 11, in the construction of the machine it is found desirable to add additional treating apparatus through which the cloth is to be run before it is unduly exposed to the air. In this view the cloth is taken off from one of the lower reels and subjected to a further treatment in a bath 80 by passing it through squeeze rolls

81 and over the guide rolls 82 and 83. Where this treatment is a water wash, the water may be sprayed from pipes 90 onto the goods as it passes upward to the squeeze rolls 91.

As illustrated in Fig. 6 the goods may be taken off through the squeeze rolls 27—28 and batched on a conventional drum winder 60—61. As further illustrated in Fig. 6 the top reel 11 need not be positioned vertically above the lower reel 2, the arrangement of these two reels being in any desired manner that may be required to get them into the space available for the construction of the machine. Furthermore, where the reels carry the cloth on an incline, as in Fig. 6, the looser inner wraps are carried from reel 2 to reel 11 on the outer wraps, when the movement of the cloth is clockwise as illustrated.

With the apparatus of this invention, as illustrated in the attached drawings, piece goods may be treated in a treating bath in a continuous manner for extended periods of time, the length of time being dependent upon the number of wraps about the reels 2 and 11 and the speed at which the machine is operated. The greater the number of wraps about the reels 2 and 11 the longer will be the time of treatment of the fiber in the treating solution for any given speed of operation of the machine. With light fabrics a large number of wraps may be made about the reels without undue drag or tension, particularly where both upper and lower reels are driven, making the machine particularly suitable for the treating of thin, easily distorted fabrics. With heavier fabrics the number of wraps about the two reels will necessarily be less. With 8 ounce duck it has been found that 24 wraps about the reels, which was the number required for the particular operation, to give the necessary time of treatment at the speed of operation of the machine, operated very successfully. Where a longer treatment is desired without an increase in the speed of the machine a greater number of wraps may of course be employed, while for a shorter period of treatment the number of wraps may be reduced.

With this apparatus the cloth may be treated in the continuous piece in a single relatively small fiber treating bath thereby keeping at a minimum the amount of solution required for any particular amount of cloth to be treated. This is of particular importance in treating relatively short runs of from one thousand to several thousand yards of cloth. This small volume is also of particular importance in dyeing processes such as in the development of vat dyes, where it is essential that equilibrium between the padded goods and the development bath be attained in the shortest possible time, as more particularly described in my U. S. Patent 2,318,133 which issued May 4, 1943. In the development of vat dyes, where the goods must be maintained in contact with the developing solution for an extended period of time, the machine as above described offers the particular advantage that a comparatively small volume of treating solution is required and the cloth which first enters the bath is continuously treated in that same bath for the full period of time required to establish the equilibrium.

Although in the apparatus illustrated in the drawings the goods wrapped about the reels 2 and 11 is immersed in the treating bath for only a part of the time during its rotation, it has been found that, even with vat dyestuffs where oxidation of the color in the solution and premature

oxidation on the fiber is to be avoided, apparently due to the numerous wraps about the single reels and the large amount of liquor continuously carried therein, even less oxidation of the solution takes place per unit of goods treated than ordinarily takes place in the conventional dyeing machine. This is indicated both from a visual inspection of the dyed material and dye-bath and from a chemical analysis of the quantity of sodium hydrosulfite consumed in the dyeing and developing operations.

The apparatus as above described may be employed in all processes having to do with the treating of textile fibers in the continuous piece either in the open width or in a folded form, such as in the dyeing, bleaching, scouring, impregnating, developing, finishing, etc.

The apparatus of this invention, as more particularly illustrated in the accompanying drawings, may also be employed in the aging, steaming, baking or other treatment of goods in the continuous piece even where a liquid treating bath is not required, by enclosing the mechanism in a steam tight chamber or box, whereby heat, steam or acid vapors may be introduced in the conventional manner.

Due to the continuous removal of the inner wrap of goods from the reels, this apparatus is particularly suitable for subjecting goods while it is passing about the reels to the action of infra red rays where such treatment is desired in baking or drying the chemicals with which the fabric is treated.

Where the time required for the treatment of the goods in the apparatus is not unduly long the output of the machine may be materially increased by leading a plurality of pieces of goods into the machine at the same time to form several wraps about the reels and taking them off together as a layer or separately, as the situation demands. This apparatus is suitable for the application of all types of dyes such as vats, direct, acid and the various types of azo dyestuffs including those in which the dye is formed on the fiber by treating the previously impregnated fabric with a coupling component in solution. All types of fabrics may be treated with this apparatus including those which are adversely affected by tension, since there is a minimum amount of tension applied to the goods during its passage through the machine.

I claim:

1. In a continuous piece goods dyeing and treating apparatus, a bath adapted to hold the solution with which the goods are to be dyed or treated, a reel mounted to rotate in the bath with the lower portion below the surface of the treating solution, a second reel spaced from and mounted in cooperative relationship with the first reel about which the piece goods in open width may be wound in a plurality of wraps about itself on the reels to permit prolonged treatment of the goods in the bath while it is continuously fed onto and taken off from said reels, said reels being of a diameter substantially greater than the aggregate thickness of said wraps, said reels being provided with alternatively arranged raised portions and depressions extending axially the effective length of the reels into which depressions the loose folds of goods on the inner wraps may be carried, said raised portions being spaced apart a distance sufficient to receive and carry in the intervening depressions the loose folds of the inner wraps, means for feeding the goods onto and for taking it from said reels.

2. In a continuous piece goods dyeing and treating apparatus, a bath adapted to hold the solution with which the goods are to be dyed or treated, a reel mounted to rotate in the bath with the lower portion below the surface of the treating solution, a second reel spaced from and mounted in cooperative relationship with the first reel about which the piece goods in open width may be wound in a plurality of wraps about itself on the reels to permit prolonged treatment of the goods in the bath while it is continuously fed onto and taken off from said reels, said reels being of a diameter substantially greater than the aggregate thickness of said wraps, means associated with said reels provided with alternatively arranged raised portions and depressions extending axially the effective length of the reels into which depressions the loose folds of goods on the inner wraps may be carried, said raised portions being spaced apart a distance sufficient to receive and carry in the intervening depressions the loose folds of the inner wraps, means for feeding the goods onto and for taking it from said reels.

3. In a continuous piece goods treating apparatus, a first reel and a second reel spaced therefrom and mounted in cooperative relationship with the first reel about which two reels the piece goods in open width may be wound in a plurality of wraps about itself to permit prolonged treatment of the goods in the treating apparatus while the said goods is fed continuously onto and taken from said reels, said reels being of a diameter substantially greater than the aggregate thickness of said wraps, means associated with said reels provided with alternatively arranged raised portions and depressions extending axially the effective length of the reels into which depressions the loose folds of goods on the inner wraps may be carried, said raised portions being spaced apart a distance sufficient to receive and carry in the intervening depressions the loose folds of the inner wraps, means for feeding the goods onto and for taking it from said reels.

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