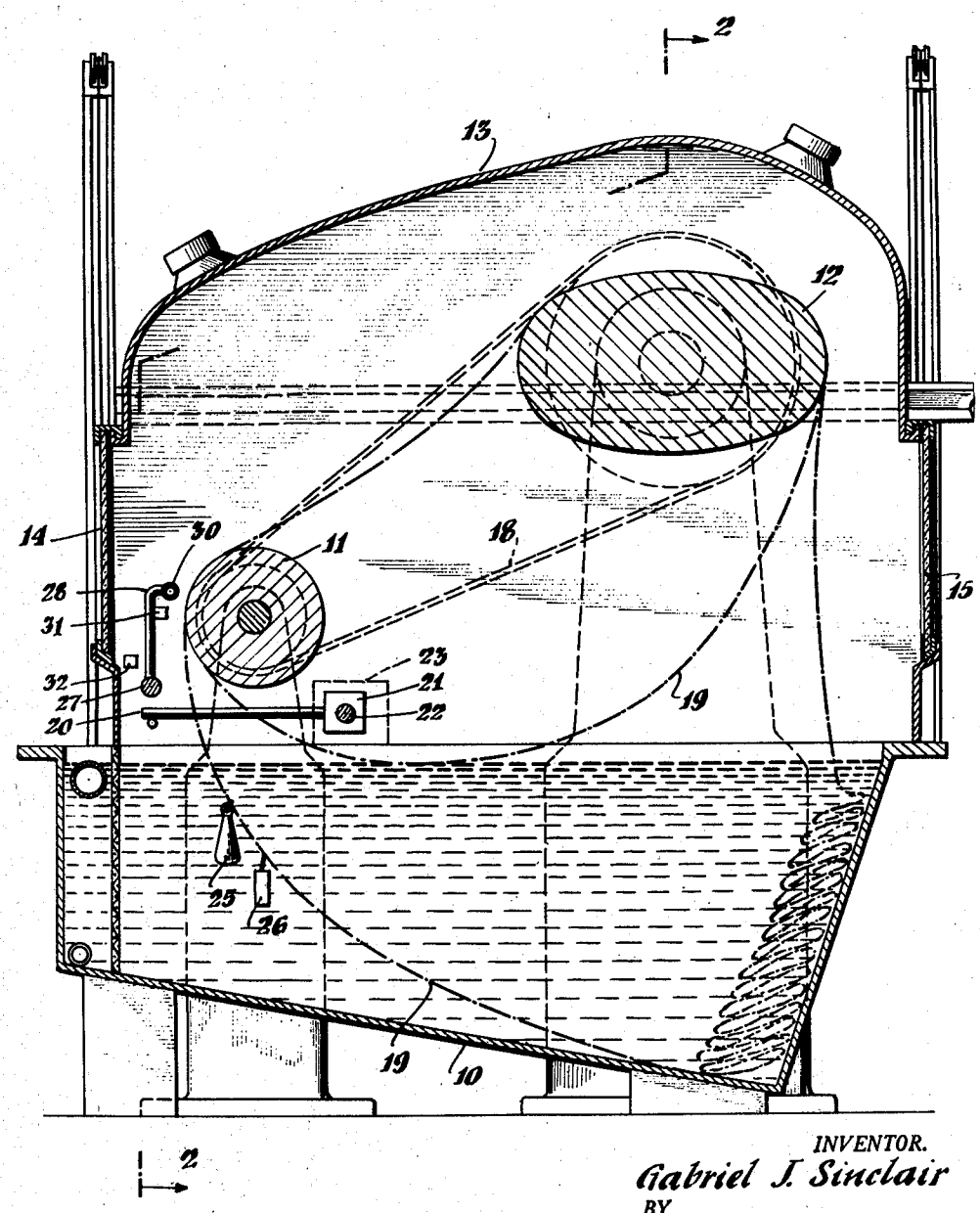
April 18, 1950 G. J. SINCLAIR 2,504,883

PREDETERMINED POSITION STOPPING DEVICE FOR TEXTILE TREATING APPARATUS

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Fig. 1



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Fig. 2

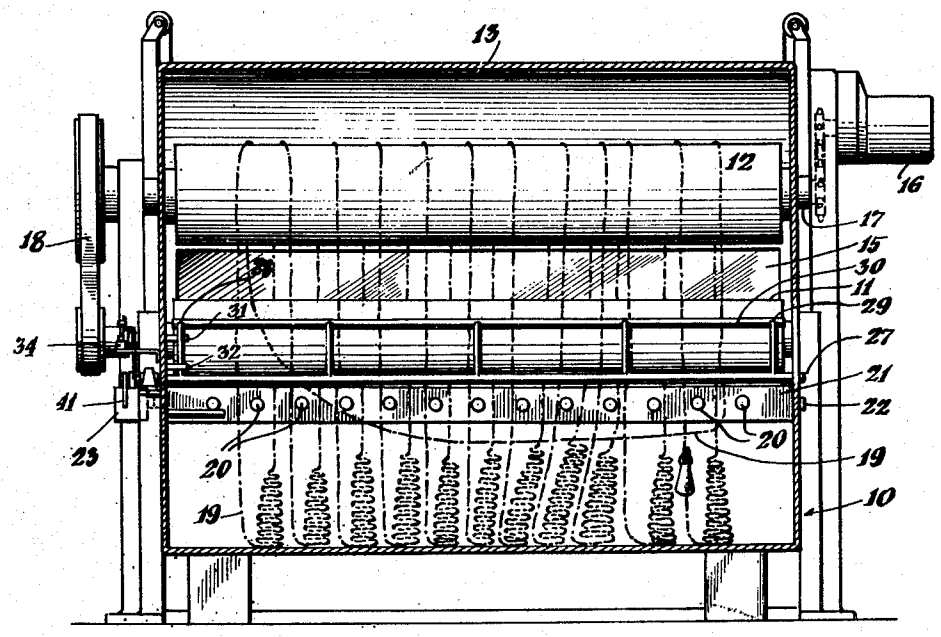
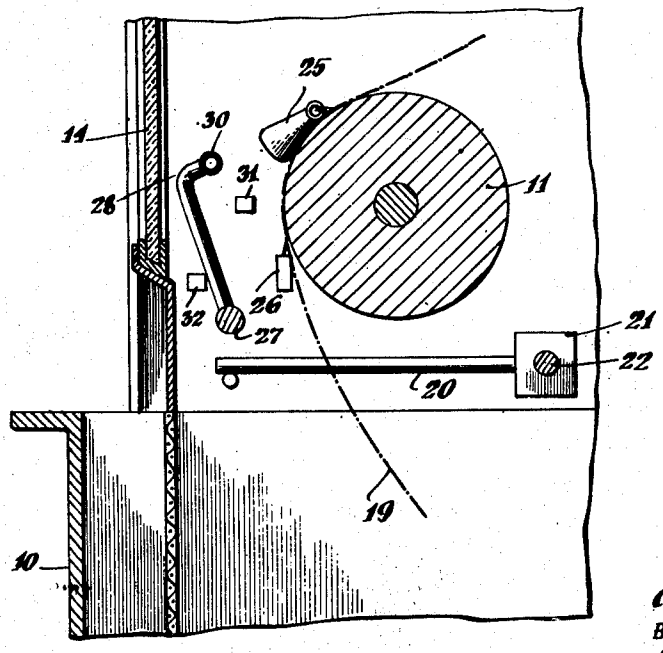


Fig. 3



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PREDETERMINED POSITION STOPPING DEVICE FOR TEXTILE TREATING APPARATUS

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Fig. 4

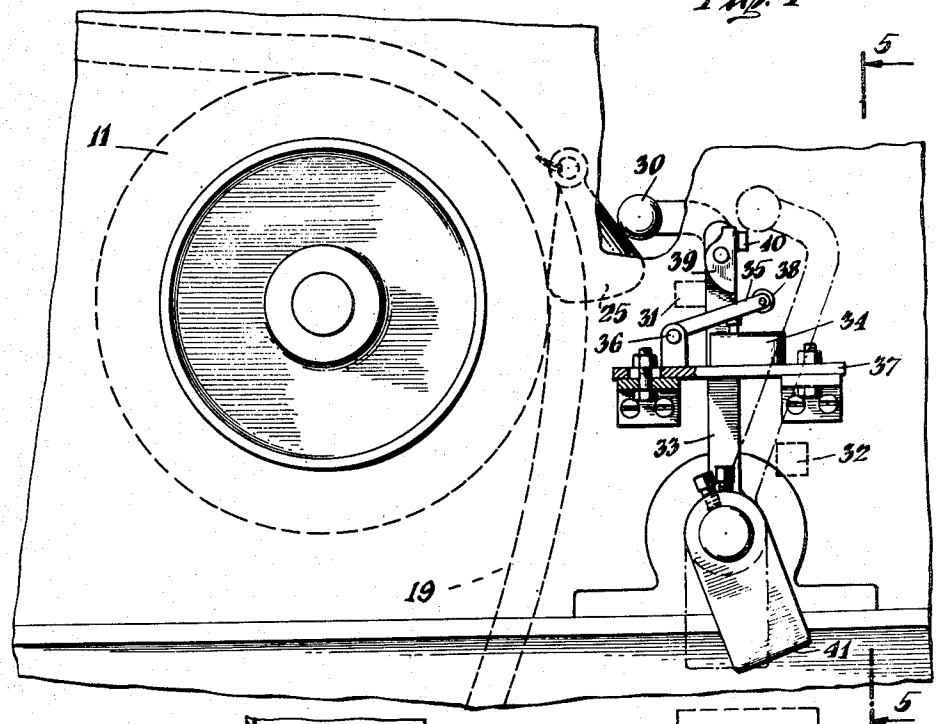


Fig. 5

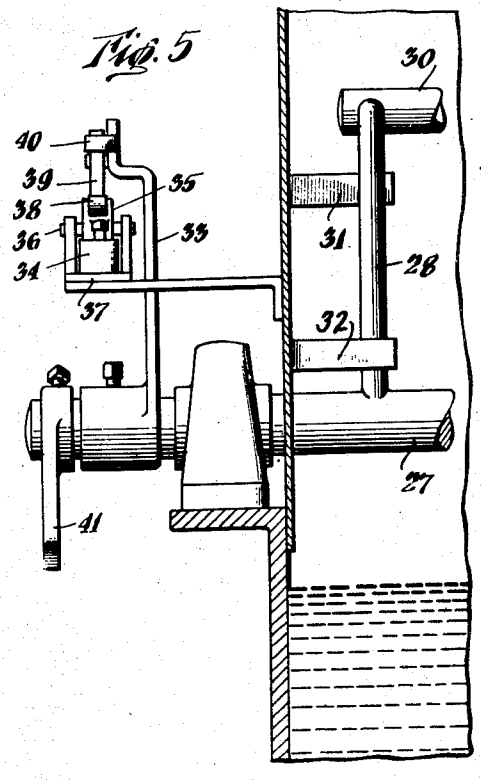
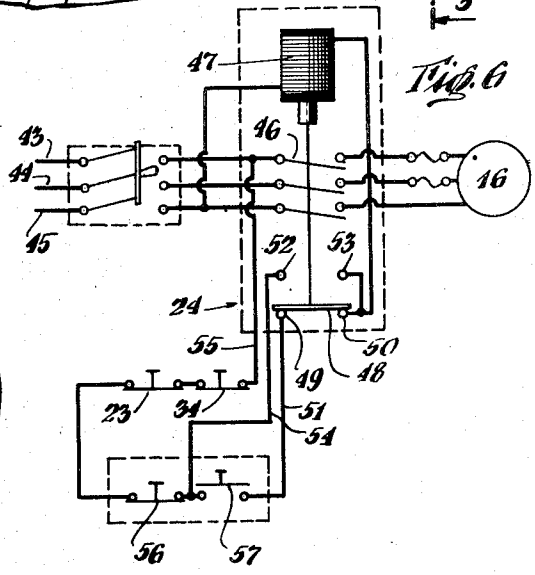


Fig. 6



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PREDETERMINED POSITION STOPPING DEVICE FOR TEXTILE TREATING APPARATUS

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Application January 13, 1950, Serial No. 138,339

9 Claims. (Cl. 192—127)

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This invention relates to apparatus for treating textile material, and more particularly to mechanism for stopping the travel of an endless string of material within a known locality in the apparatus so as to make a predetermined portion of said string accessible for inspection.

In the apparatus of the present invention, an endless string of textile material is draped over rotatable members, and means are provided for driving at least one of said rotatable members to advance the string of material through a treating bath. The apparatus may accommodate a plurality of single strings, each string being constituted of one or more courses or convolutions, or only a single string containing several hundred yards of material. The several courses or convolutions of the material, whether in one or a plurality of endless strings, are draped over the rotatable members in such a manner that portions of the several courses are simultaneously travelling through a treating bath while other portions are suspended from the rotating members.

In treating textile materials the duration of treatment is an important factor in obtaining the results desired. When the treating process involves dyeing, for example, the apparatus must be occasionally stopped to permit inspection for determining the progress of the dyeing. It is a principal purpose of the present invention to enable an operator to stop the apparatus at a moment when an attached sample of the material has been brought within a locality in which it may be readily found. The stopping means by which this is accomplished includes a mechanical device (herein referred to as a bob) which is attached to the string of material at a point thereon which will effect the stopping of the advance of the string when the sample has reached a locality which is accessible to the operator. The sample may have been attached to the string at the point of attachment of the bob, or at a known distance therefrom, so that the sample will be opposite one or another of the openings to the apparatus when the movement of the string ceases.

The driving means for the rotatable members are disconnected when the bob acts upon and displaces mechanical means which controls the driving means. The mechanical means is adapted to be moved from an "inactive" position to an "active" position at the will of the operator whenever it is desired to effect stoppage. Stoppage occurs when the string carries the bob into engagement with said mechanical means and

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the bob displaces the mechanical means from its active position. In the present embodiment of the invention, the movement of the mechanical means by the bob effects the temporary opening of a switch and the cessation of the drive for the rotatable members. The proportions of the bob are such as to pass the mechanical means when they are in the inactive position without causing cessation of the advance of the string and to pass freely between the sticks of the usual rake beam without tipping the beam. Circuits control the operation of the driving means whereby the apparatus may be operated at any time except when the bob is functioning to cause stoppage.

The present invention will be hereinafter more fully described in the accompanying specification and claims. A preferred embodiment of the invention, and the best mode presently contemplated for applying the principle of the invention is illustrated in the accompanying drawings.

Fig. 1 is a cross-sectional view of a textile dyeing apparatus employing the invention and showing the mechanical means in the active position for effecting stoppage of the advance of the string;

Fig. 2 is a section on line 2—2 of Fig. 1;

Fig. 3 illustrates the mechanical means of the present invention in the inactive position;

Fig. 4 is an enlarged view of the switch controlling means of the mechanical means;

Fig. 5 is a front view on line 5—5 of Fig. 4; and

Fig. 6 is a diagram of the controlling circuits for the motor by which the rotatable members are driven.

The principle of the invention may be clearly demonstrated in connection with a conventional dyeing apparatus or dye beck, and such an apparatus has therefore been selected for illustration, but it is to be understood that the invention is adaptable for employment with other treating apparatuses or machines. With reference to Figs. 1 and 2, the apparatus includes a tank 10 and a pair of rotatable members or reels 11 and 12 which are mounted on parallel axes. One of the reels (12) has an elliptical surface, but the reel 11 has a generally cylindrical surface which may be corrugated or formed of separated slats to suppress slippage of the material carried thereover.

The apparatus has a casing 13, and movable front and rear windows 14 and 15, respectively, through which access may be had to the contents of the apparatus. The reel 12 is driven from a motor 16 which is connected by gears and a roller

chain to the shaft 17 of the reel 12, and a belt connection 18 may be employed to drive the reel 11 unless the same is allowed to be driven by the string of material 19. While two reels are sufficient for supporting and advancing the string through the treating fluid in the tank, other reels or rotatable members may be provided for advancing or guiding the string.

Pieces of the fabric or other material to be treated are sewed end-to-end to provide a string of suitable length. When the material is of a fragile nature, relatively short strings are employed. Each such string is draped over the reels and its ends are sewed together to form individual loops or courses. In this manner a number of short strings may be inspected at one time while being treated in a common bath. If the material is sufficiently coarse a long string is formed by passing and re-passing the string over the reels a number of times depending upon the length of the string and thereby forming a plurality of courses or convolutions of a continuous string. The ends of the string are then sewed together to form an endless string. The several convolutions or courses (whether of one continuous string or of several individual strings) are distributed lengthwise of the reels and are separated from each other by the sticks 20 of the rake beam 21, as more clearly shown in Fig. 2. Each course of a continuous string contains approximately the same amount of material.

When the apparatus is readied, the reels are rotated clockwise, Fig. 1, and the several courses of the material rise over the front portion of the reel 11 and descend over the rear portion of the reel 12 and into the treating bath. The rake beam is provided for the usual purpose of causing stoppage of the reels in the event that the string becomes tangled or a bunch of material is formed. When such an event occurs, the tangle pivots the rake beam on its shaft 22. Whenever the rake beam is lifted, it opens a switch 23 in a controlling circuit 24 (Fig. 6) by which the drive for the reels is discontinued, as will be more fully explained hereinafter.

The stopping mechanism of the present invention includes a bob 25 which is adapted to be attached to a continuous string, or to any one of several individual strings. Any rigid or pliable material may be used as a bob, it being necessary only that the bob be sufficiently firm and appropriately formed to effect actuation of the mechanical means hereinafter described for stopping the travel of the string. The bob may be made of rubber, metal, or other suitable material, and is preferably shaped in the form of an object of revolution such as a ball, or, for example, pear-shaped. The bob is lashed to the string, preferably at a seam, and an elastic cord may be used for this purpose, if desired.

A sample 26 of material is attached to the string at a point thereon which will be readily accessible to either the front window 14 or the rear window 15 when the advance of the string is stopped by the mechanism of the present invention. The stopping action of the bob is rendered effective by mechanical means which are adapted to be moved into an active position in which the same will be engaged by the bob as the bob advances with the travelling string. In the present embodiment of the invention the mechanical means are located in the vicinity of the front side of the reel 11 and while they may be mounted to slide in a direction transversely to the plane of travel of the several courses of a string a pivotal

arrangement has been found suitable for accomplishing such movement.

The mechanical means comprise a pivoted shaft 27 carrying a plurality of arms 28 and 29 to which a light tubular bar 30 is attached. The bar 30 and the bearings for the shaft 27 are substantially parallel to the shaft of the reel 11 and parallel to the plane of travel of the courses of the string of material opposite the bar.

The bar 30 may be moved toward and away from the courses of the material passing over the reel 11, and when it is located proximate the courses as shown in Figs. 1, 4 and 5, it can be engaged by the bob when the bob is carried opposite thereto. The bar is swung into this position (Fig. 1) by the operator when he desires that the bob be effective for stopping the advance of the string. This position is termed the active position of the bar and is determined by a stop 31 which extends from the side wall of the casing and is engageable by the arm 28. The spacing of the bar 30 from the surface of the reel 11, and consequently from the string of material passing thereover, is such that the bob will engage the bar and pivot the same in a direction away from the reel 11 or clockwise, Fig. 4. Any position in which the bar 30 is not subject to engagement by the travelling bob is termed the inactive position of the bar 30, and a stop 32 is provided which is so located with respect to the bearings of the shaft 27 as to support the bar 30 in its inactive position (Figs. 3 and 4).

During the operation of the apparatus the bar 30 is disposed in its inactive position, Fig. 3, and the bob 25 can pass by the bar 30 many times as the string continues to travel. When it is desired to inspect the sample 26 it is necessary only that the bar 30 be placed in its active position, Fig. 4. An arm 33 is attached to the shaft 27 and when this arm is rocked clockwise, Fig. 4, as the result of the engagement of the bar 30 by the bob 25, a switch 34 is momentarily opened. The switch 34 is a push-button switch having a spring which normally holds the switch closed. The circuits by which the switch affects the operation of the motor 16 will be explained hereinafter.

The switch-operating mechanism includes an arm 35 which is mounted on a pivot 36 supported by a plate 37. The switch 34 is also supported by the plate 37 and the plate is adjustably mounted to enable its positioning for timing the operation of the switch. The arm 35 carries a roller 38 which is adapted to be engaged by a pawl 39 on the arm 33. The pawl 39 is pivotally mounted on the arm 33 and the arm carries a stop 40 by which the rotation of the pawl is prevented when the pawl engages the roller 38 as the arm 33 is rocked clockwise, Fig. 4.

As the arm 33 is displaced as a result of the engagement of the bar 30 by the bob 25, the pawl 39 engages the roller 38 and depresses the arm 35 as the pawl is carried over the roller. The arm 35 engages and depresses the push-button of the switch 34 and opens the switch 34. After the pawl 39 has passed over the roller, the switch 34 closes, with the result that the operation of the apparatus may be resumed while the bar 30 is in its inactive position. When the bar 30 is moved to its active position towards the reel 11, the pawl 39 freely rotates as it passes over the roller 38 without causing actuation of the arm 35 or the opening of the switch 34.

The shaft 27 is rocked counterclockwise (Fig. 4) to place the bar 30 in its active position, and this may be accomplished by a weight in the form

of an arm 41 which is secured to the shaft 27 outside of the casing at the left end of the apparatus. This arm is adjustably connected to the shaft and may be located in any angular position on the shaft to effect a counterpoising action of such magnitude as to require but the slightest pressure from the bob 25 to displace the bar 30 from its active position. Only a light touch of the bob 25 against the bar 30 suffices to tip the center of gravity of the pivoted system over the axis of the shaft 27. The ensuing clockwise movement of the pivoted system results in depressing the arm 35 and the opening of the switch 34. A microswitch may be used which requires only a few ounces of pressure to operate the push-button, but any other suitable type of commercially available switch will do.

While the apparatus may be wired to be driven by either a direct current or an alternating current motor, I have chosen to illustrate controlling circuits for controlling an alternating current motor, but the same circuits may be employed to control the operation of a mechanical clutch for connecting and disconnecting a power shaft to the reels of the apparatus in any well-known manner.

As shown in Fig. 6, a three-phase alternating current motor 16 is powered by lines 43, 44 and 45, which are connectable with the motor by a three-blade knife switch 46. The knife switch 46 is closed by the energization of the solenoid 47 of a relay. The relay controls the actuation of a two-way contactor 48 which in one position is engageable with contacts 49 and 50 of the line 51 of a starting circuit and in another position is engageable with contacts 52 and 53 of a holding line 54 when the relay is energized. The starting and holding lines are alternately connectable with a line 55 which is tapped to the line 43. The line 55 includes the rake beam switch 23, the switch 34 and the manually operable stop switch 56 and all of these switches are normally held closed by the action of their springs.

When the reels are at rest the solenoid 47 is deenergized and the two-way contactor 48 bridges the contacts 49 and 50. In this condition the motor switch 46 is open under the pull of gravity. For starting the apparatus and the rotation of the reels, the starting switch 57 is closed and the relay is energized, with the result that the contactor 48 is lifted into contact with the contacts 52 and 53, whereby the energization of the relay is maintained. The holding circuit 54, 55, can be broken by manually opening the switch 56, or by the opening of either of the switches 23 and 34. When the switch 34 is opened by the movement of the bar 30 from its active position, as hereinabove explained, the holding circuit 54, 55, is opened with the result that the relay is de-energized and the motor switch 46 is opened. Although the switch 34 immediately closes by itself, as the bar 30 rotates towards its inactive position, the operation of the machine cannot be resumed until the starting switch 57 is closed by the operator.

The point of attachment of a sample 26 to the string is selected after due allowance has been made for the time required for the cessation of the operation of the reels after the bob has come into contact with the bar 30. Such a point may be located adjacent the bob 25, or within a known distance from the bob, depending on the selected locality in the apparatus in which it

is desired to have the sample available when the apparatus has stopped. In Fig. 1, a sample 26 is illustrated as being attached to the string at a predetermined point below the bob. Upon stoppage of the string the sample will be accessible through the front window 14.

When the material being dyed is made from threads containing only one type of fiber, it is customary to cut main samples from the material, and all such samples are taken from within a given area, but when the material contains two or more different types of fibers, swatches of fibers made from pure fibers of the respective fibers of the material being dyed are attached to the string and samples are cut therefrom as the dyeing progresses. 26 accordingly indicates the location of one or more attached swatches, as well as the point in the string from which main samples are to be taken.

The location in the string from which samples are taken must be found every time the dyer checks on the shade, or progress of the dyeing. A sample or samples are taken each time a test is to be made. By examining these samples the dyer is assisted in obtaining an evenly dyed lot. Heretofore, much time was wasted by an operator in observing the operation of the apparatus and in trying to locate the whereabouts of the point or location in the string of material from which test samples had to be taken. The prolonged opening of a window to observe the travel of the string resulted in excessive loss of temperature, which is undesirable in dyeing operations. With the mechanism of the present invention, the loss of time and the loss of temperature are minimized because the operator can set the stopping mechanism, await the stopping of the travel of the string before opening a window, and then resume operation after having quickly removed samples for testing.

Whenever test samples are desired to be taken, the operator moves the bar 30 to its active position (Fig. 1) by manipulating the arm 41 which is located outside of the casing of the apparatus. Regardless of the position of the bob 25 within the apparatus, it will be brought into engagement with the bar 30 (Fig. 4) in a relatively short time. The bar pivots the shaft 27, with the result that the arm 33 swings and depresses the arm 35 to open the switch 34 and cause the controlling circuits to interrupt the travel of the string as previously explained. When the rotation of the reels has ceased as the result of this action, the desired point or location in the string will have arrived in a locality in which the indicated point (sample 26) is readily accessible to the operator.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the specific description herein be deemed illustrative and not restrictive and that the patent shall cover all patentable novelty herein set forth; reference being had to the following claims rather than to the particular showing herein to indicate the scope of this invention.

The subject matter of this application is related to the subject matter of applicant's co-pending application Serial No. 727,061, filed February 7, 1947.

What is claimed is:

1. In apparatus for treating an endless string of material in which the string is draped over rotatable members and means are provided for

driving at least one of said rotatable members to advance the string through a treating bath, the combination comprising means for stopping the advance of said string of material with a predetermined point on said string within a known locality in said apparatus, said stopping means including a bob attached to said string at a predetermined point thereon, and mechanical means for controlling the operation of said driving means, said mechanical means having a portion thereof movable towards and away from one of said rotatable members, said portion being movable between an inactive position removed from the path of travel of said bob on said string and an active position adjacent said rotatable member and in which the same may be engaged by said bob and moved from said active position as the bob advances with the travelling string, and means operated by and in response to the movement of said mechanical means from said active position upon engagement of said portion thereof by said bob for causing cessation of the operation of said driving means.

2. In apparatus for treating an endless string of material in which the string is draped over rotatable members and means are provided for driving at least one of said rotatable members to advance the string through a treating bath, the combination comprising means for stopping the advance of said string of material with a predetermined point on said string within a known locality in said apparatus, said stopping means including a bob attached to said string at a predetermined location thereon, and pivotal means mounted adjacent to one of said rotatable members and having a portion thereof extending substantially parallel to said rotatable member and movable between an inactive position removed from the path of travel of said bob on said string and an active position in which the same may be engaged by said bob and moved from said active position as the bob advances with the travelling string, and means operated by and in response to the movement of said pivotal means upon engagement of said portion thereof by said bob for causing cessation of the operation of said driving means.

3. In an apparatus for treating an endless string of material in which the string is draped over rotatable members and means are provided for driving at least one of said rotatable members to advance the string through a treating bath, the combination comprising a motor for operating said driving means, means for stopping the advance of said string of material with a predetermined point of said string within a known locality in said apparatus, said stopping means including a bob attached to said string at a predetermined point thereon, and mechanical means mounted adjacent to one of said rotatable members and movable between an inactive position removed from said rotatable member and an active position adjacent several courses of said string and at which said mechanical means may be engaged by said bob and moved from said active position to said inactive position as the bob advances with the travelling string, circuit means for controlling the operation of said motor, said circuit means including a switch operable by said mechanical means when the same is moved from said active to said inactive position by said bob to cause cessation of the operation of said motor.

4. In apparatus for treating an endless string of material in which the string is draped over

rotatable members and means are provided for driving at least one of said rotatable members to advance the string through a treating bath, the combination comprising a rake beam having sticks spaced from one another along the rake beam for separating successive courses of said string, means for stopping the advance of said string with a predetermined point on said string within a known locality in said apparatus, said stopping means including a bob attached to said string at a predetermined location thereon and having such proportions as to pass between adjacent sticks of said rake beam, and mechanical means for controlling the operation of said driving means, said mechanical means being pivotally mounted adjacent one of said rotatable members and having a portion thereof extending substantially parallel to said rotatable member and movable between an inactive position removed from the path of travel of said bob on said string and an active position in which the same may be engaged by said bob and moved from said active position as the bob advances with the travelling string, said bob being capable of freely passing by said portion of said mechanical means when the latter is disposed in said inactive position but incapable of passing said portion of said mechanical means without pivoting the same when the latter is in said active position, and means operated by and in response to the movement of said mechanical means from said active position upon engagement of said portion thereof by said bob for causing cessation of the operation of said driving means.

5. In apparatus for treating an endless string of material in which the string is draped over rotatable members and means are provided for driving at least one of said rotatable members to advance the string through a treating bath, the combination comprising a rake beam having sticks spaced from one another along the rake beam for separating successive courses of the string of material, a motor for operating said driving means, means for stopping the advance of said string of material with a predetermined point on said string within a known locality in said apparatus, said stopping means including a bob attached to said string at a predetermined location thereon, and pivotal means mounted adjacent to one of said rotatable members and having a portion thereof extending substantially parallel to said rotatable member and movable between an inactive position removed from the path of travel of said bob on said string and an active position in which the same may be engaged by said bob and moved from said active position as the bob advances with the travelling string, circuit means for controlling the operation of said motor, said circuit means including a switch which is operable by said rake beam to cause cessation of the operation of said motor when said rake beam is displaced from normal position and a second switch in series with said first switch and which is operable by said mechanical means upon movement thereof from said active position to said inactive position by the engagement of said bob therewith for causing cessation of the operation of said motor.

6. In apparatus for treating an endless string of material in which the string is draped over rotatable members and advanced thereby through a treating bath, the combination comprising means for driving at least one of said rotatable members to advance the string, means for stopping the advance of said string of material with

a predetermined point on said string within a known locality in said apparatus, said stopping means comprising a bob attached to said string, a horizontally disposed bar located opposite a plurality of courses of the string, means pivotally supporting said bar for movement in a direction laterally of the plane of travel of said courses opposite from said bar, means for supporting said bar in an active position in which said bar may be engaged and pivoted by said bob as the bob is carried past the bar by said string, and means controlled by the pivoting of said bar from said active position for discontinuing the travel of the string when the string carries the bob into operating engagement with said bar.

7. In apparatus for treating an endless string of material in which the string is draped over rotatable members and advanced thereby through a treating bath, the combination comprising means for driving at least one of said rotatable members to advance said string, a bob attached to said string, a rotatably mounted shaft, a bar carried by said shaft and movable towards and away from one of said rotatable members, said bar being movable to an active position in which it may be engaged by said bob and to an inactive position in which said bob may be carried past said bar without engaging therewith, means for controlling the operation of said driving means, said controlling means including a relay circuit and a switch, and means carried by said shaft for opening said switch as said shaft is rotated by the movement of said bar from said active position after engagement of said bob with said bar.

8. In apparatus for treating an endless string of material in which the string is draped over rotatable members and advanced thereby through a treating bath, the combination comprising means for driving at least one of said rotatable members to advance said string, a bob attached to said string, a rotatably mounted shaft, a bar carried by said shaft and movable towards and away from one of said rotatable members, said bar being movable to an active position in which it may be engaged by said bob and to an inactive position in which said bob may be carried past said bar without engaging therewith, means for controlling the operation of said driving means, said controlling means including a circuit

adapted to operate a relay, a normally closed switch in said circuit, means carried by said shaft for momentarily opening said switch as said shaft is rotated by the movement of said bar from said active position, said switch-opening means being so constructed as to be incapable of affecting said switch when moved in the reverse direction, and a second circuit for energizing said relay for closing said first-named circuit.

9. In apparatus for treating an endless string of material in which the string is draped over rotatable members and advanced thereby through a treating bath, the combination comprising means for driving at least one of said rotatable members to advance said string, a bob attached to said string, a rotatably mounted shaft, a bar carried by said shaft and movable towards and away from one of said rotatable members, said bar being movable to an active position in which it may be engaged by said bob and to an inactive position in which said bob may be carried past said bar without engaging therewith, means for controlling the operation of said motor driving means, said controlling means including a circuit adapted to operate a relay, a normally closed switch in said circuit, and means carried by said shaft for opening said switch as said shaft is rotated and said bar is moved from said active position, and a weight attached to said shaft, said weight being of such magnitude as to influence the pivoted system of said shaft to rotate the shaft to said inactive position after movement thereof by said bob.

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