

May 8, 1945.

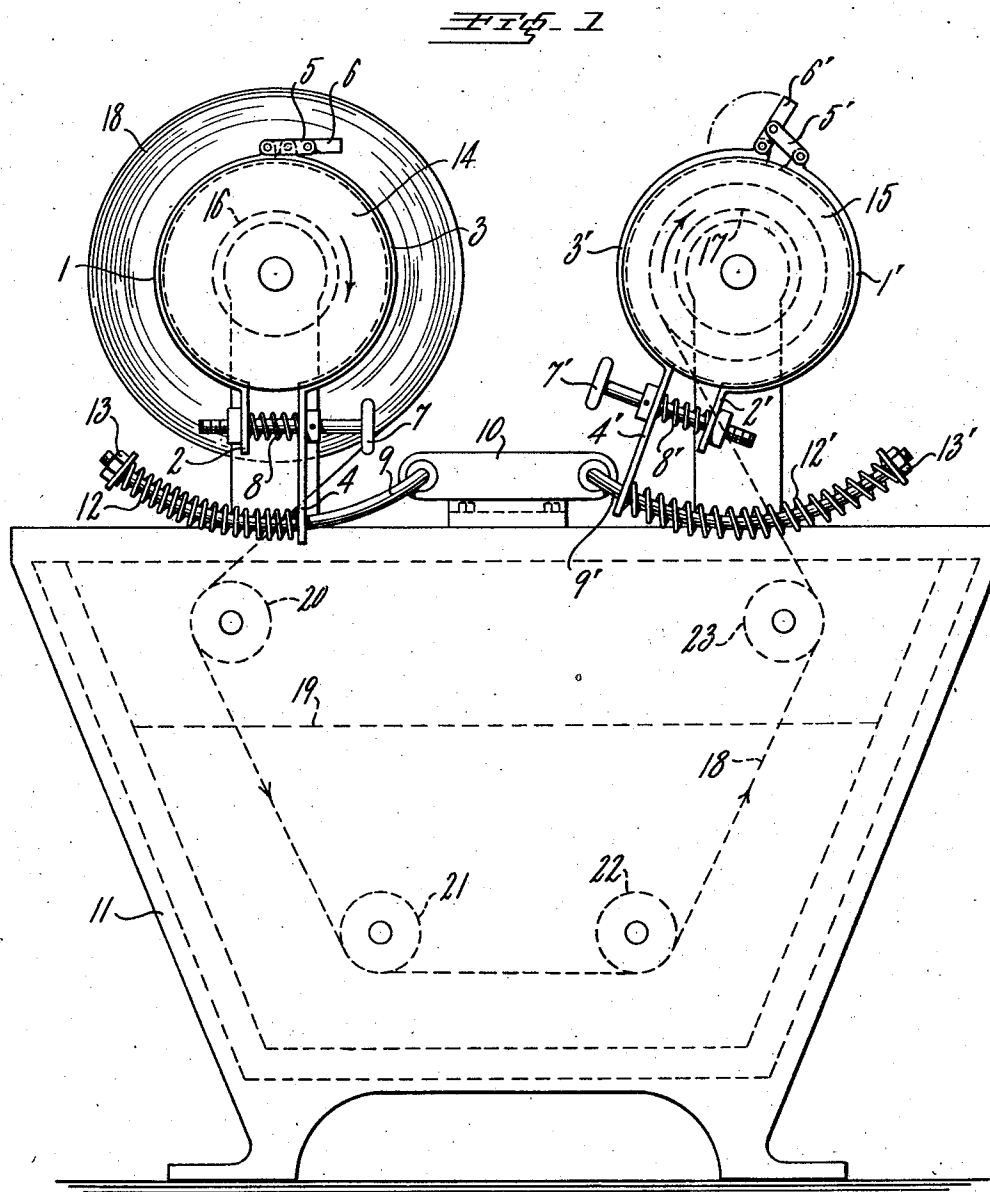
D. L. BALLOU

2,375,459

TENSION DEVICE

Filed Dec. 29, 1943

2 Sheets-Sheet 1



INVENTOR.
DONA L. BALLOU
BY *Charles Holland*
ATTORNEY

May 8, 1945.

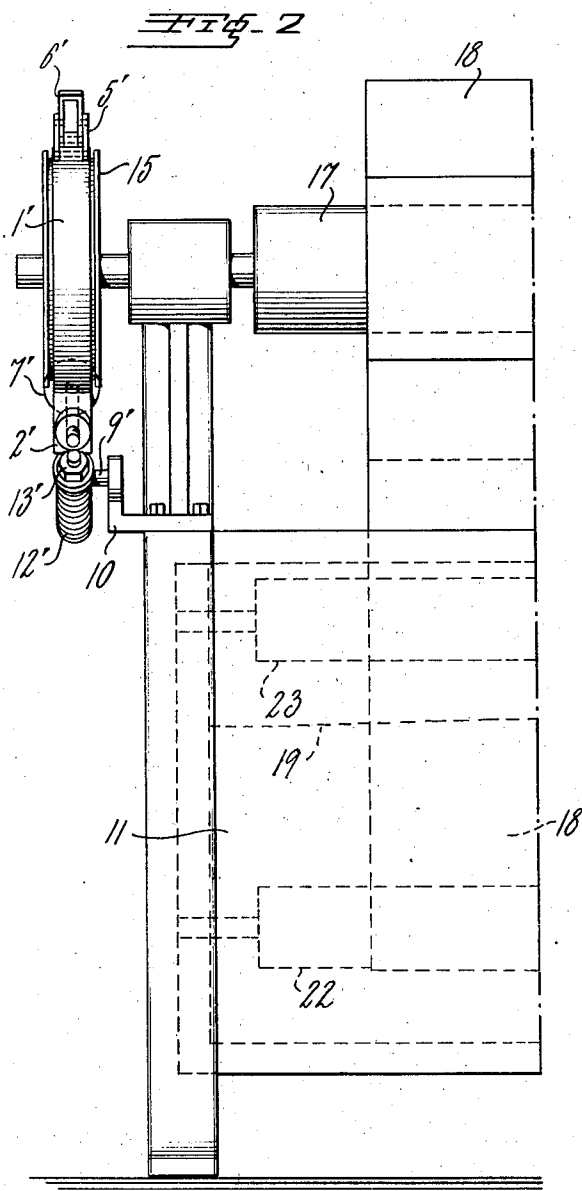
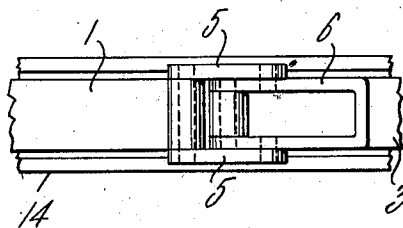
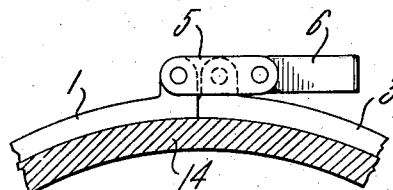
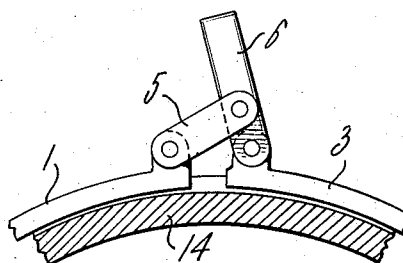
D. L. BALLOU

2,375,459

TENSION DEVICE

Filed Dec. 29, 1943

2 Sheets-Sheet 2



INVENTOR.
DONA L. BALLOU
BY *Charles Holland*
ATTORNEY

UNITED STATES PATENT OFFICE

2,375,459

TENSION DEVICE

Dona L. Bailou, Jewett City, Conn., assignor to
The Aspinook Corporation, Jewett City, Conn.,
a corporation of Delaware

Application December 29, 1943, Serial No. 516,100

7 Claims. (Cl. 242-75)

The present invention relates to tension devices. More particularly it relates to a device for controlling tension exerted on a web of fabric while on the beams of a textile processing jig during the dyeing or other processing of the web.

In the textile finishing and dyeing industry, a jig is a piece of equipment used for soaping, dyeing or washing the fabrics. It comprises ordinarily a tank for holding the dye or processing liquor, cylinders or beams above the tanks on which the fabric is rolled, and rollers within the tank over which the fabric is threaded to guide the fabric from one beam to the other. The fabric is first wound on one beam and passes down into the processing liquor and over the rollers located therein, and is rewound on the other beam. The motion is then reversed and the fabric passes back and again is wound on the first roller. The operation is repeated, the fabric traveling back and forth until the processing is completed. The operative power may be applied by a clutch engaging with a line shaft or by a motor directly connected with the jig or by other means adapted to impart reciprocal motion to the beams.

It is necessary to control the tension of the web when it is run in the manner described from one beam to the other and to shift the tension when the fabric passes in the reverse direction. This is required in order to prevent slackening of the cloth in the processing tank and the consequent irregular winding, twisting or lapping of the fabric on the beam receiving it from the processing tank. In present practice this tension is effected generally by providing an extension of the beams to hold pulleys over which a belt is slung. Weights are attached to the belt so as to bear on the pulley of the beam that is at any given time unwinding the fabric in such a manner as to retard the speed of unwinding, while the rewinding beam is allowed to run free, thus keeping the cloth at all times in a taut condition in its passage through the tank. When, however, the direction of movement is reversed, the weights must be shifted to bear on the pulley of the other beam which then becomes the feeding beam.

Devices of this sort have no means of controlling the tension and the operator frequently is unaware of how much weight is being applied on the feeding beam. It very often happens that the weights are accidentally supported against parts of the apparatus so that the beam is not receiving the effect thereof. Furthermore, as the

operator must shift the weight from one beam to the other manually, there is very great likelihood of accidental injury and even death to the operator. The tension may in fact vary from nothing to 100 lbs. or more without the operator knowing it.

It is an object of the present invention to provide a tension device that requires a minimum of attention from the operator and which at all times will indicate whether full tension is being applied or not.

It is a further object to provide a device that will be easy to operate and which will give the operator a tension which is at all times controlled and the degree of which is determinable by simple observation.

The device of the present invention consists of a special type of brake band adapted to be frictionally fitted to a channel of a pulley especially provided on an extension of the beam, there being one such brake band carried on each beam. The brake band encircles the pulley groove and is split at a point intermediate its extremities and the split is bridged by a toggle joint locking device. At its extremities are two arms disposed in parallel relation to each other, one arm being considerably longer than the other. A hand screw joins the two arms so that they can be drawn together when the screw is turned and the brake band will thus be tightened on the pulley channel so as to exert a predetermined degree of friction when locked by the toggle. The long arm of the brake band is provided with an opening through which passes an arcuate bar suitably anchored or fastened on the jig at one end and provided with a helical spring bearing upon the arm at one end and upon a stop at the free end. Accordingly, when the beam rotates so as to feed the fabric into the jig, a tightening of the hand screw and locking of the toggle joint causes the long arm of the brake band to ride along the arcuate bar and compress the helical spring on said bar. The degree of compression of the helical spring will indicate to the eye the amount of tension exerted on the beam, and this may be registered, if desired, on a suitable scale (not shown) placed alongside the arcuate bar. The tension is applied at any given time only to that one of the beams which is feeding the fabric to the jig. The other brake beam, rewinding the web as it comes from the jig, is set by the hand screw so as to exert the same tension as the brake on the feeding beam but is thrown out of operation by opening the toggle joint, thus per-

mitting the rewind beam to run without retardation by the frictional grip of the brake band.

The invention will be more fully understood by reference to the drawings in which Fig. 1 schematically represents a side elevation of the jig in operation showing the split brake band of the invention on the pulley of the feeding beam in closed position, and on the pulley of the rewind beam in open position; Fig. 2 schematically shows a front elevation of the jig partially broken away, one split brake band being shown in open position on the pulley of a feeding beam; Fig. 3 shows a plan view of the toggle joint locking device in closed position; Fig. 4 shows a side view in section of the toggle joint locking device in closed position as in Fig. 3; and Fig. 5 shows a similar side view of the toggle joint locking device in open position bridging the split of the brake band.

Referring now to Fig. 1, the tension device will be seen to include a split brake band comprising two band elements, the shorter band element 1 having a short arm or extension 2 and the long band element 3 having a long arm or extension 4. The arms or extensions 2 and 4 are disposed in parallel relation to each other. The two band elements are joined at an intermediate position by a toggle locking device consisting of the forked bar 5 pivoted to band element 1 at one end and the bar or bail shaped element 6 which is pivoted at one end to the band element 3. The bar 6 is also pivoted at either side between the arms of the forked bar 5 so as to permit movement of bar 6 on an arc about its pivot to band element 3 subject to restraint by forked bar 5. A hand screw 7 passes through the arms or extensions 2 and 4 of the band elements 1 and 3. The tension to be exerted on the beam is regulated and controlled by tightening or loosening the grip of the locked brake band by turning the screw 7 so as to draw the arms or extensions 2 and 4 closer together or to allow them to move further apart. A spring 8 around the shank of the screw 7 may be employed to bear against the tightening action of screw 7 and to force the arms 2 and 4 apart when screw 7 is loosened. An arcuate bar 9 is pivotally anchored to stanchion 10 mounted on the tank 11. The arcuate bar 9 passes through an opening in arm or extension 4 of band element 3 and carries a helical spring 12 and nut 13 acting as a stop or restraint upon helical spring 12 as it may be compressed by movement of arm 4 along arcuate bar 9.

As shown in Fig. 1, two tension devices are mounted on two pulleys 14 and 15. Pulley 14 is formed on an extension of beam or roller 16 which is shown functioning as the feeding beam. Similarly, pulley 15 is formed on an extension of beam or roller 17 which is shown as the rewind beam. The parts of the tension device on pulley 15 corresponding to indicating numerals 1, 2, 3, 4, 5, 6, 7, 8, 9, 12 and 13 of tension device on pulley 14 are numbered 1', 2', 3', 4', 5', 6', 7', 8', 9', 12' and 13'. It will be observed that toggle joint locking device on pulley 14 is closed by depressing bar 6 and that toggle joint locking device on pulley 15 is open, the bar 6' being shown in raised position. The two tension devices operate similarly but in reverse.

The operation of the jig and the tension devices is as follows:

The cloth to be dyed or otherwise processed is indicated at 18 wound upon beam 16. It is threaded through tank 11 in which is a charge which may be dye or other processing liquor 19. The cloth 18 passes around rollers 20, 21, 22 and 23 and then passes to beam 17 where it is to be rewound. Be-

fore starting the beams in motion, the operator tightens the hand screws 7 and 7' to effect the desired degree of tension, the tension being equal on both beams. He then presses down bar 6 of the toggle joint on feeding beam 16, thus locking the tension device into operative position. At the same time he throws up bar 6' of the toggle joint on rewind beam 17, thus unlocking that tension device so that it is out of operating position and will exert no force on the rewind beam 17.

The power is then applied and the beams revolve. Beam 17 revolves at full speed as it is in no manner retarded by the unlocked brake band. Beam 16, however, is retarded by the locked brake band and revolves at a slower speed. Consequently, the fast revolving beam 17 takes up all the slack of the cloth and keeps the web taut in the tank.

The action of the tension device is observable to the eye of the operator. As the beam 16 revolves, the arm or extension 4 moves along the arcuate rod 9 and compresses helical spring 12, thus giving an indication of the amount of tension being applied which is at all times observable to the eye. The tension device on beam 17, however, not being in operation is static. The arm or extension 4' does not move on arcuate rod 9' and exerts no pressure upon spring 12'.

When, however, the cloth has been substantially completely rewound, the toggle joint of the tension device on beam 16 is unlocked by throwing up bar 6 and the similar joint of the tension device on beam 17 is locked by pressing down bar 6'. The power is then applied and the process proceeds in reverse from beam 17 as the feeding beam to beam 16 as the rewind beam, the arm or extension 4' moving along arcuate rod 9' and indicating the amount of tension by the degree of compression of helical spring 12'. Arm or extension 4 is quiescent and exerts no pressure on helical spring 12 since the device on beam 16 is not now operating.

The brake band of the invention consists fundamentally of a split band which can be tightened about a pulley groove by the turning of a hand screw. As shown in the drawings, the two parts of the split band are joined by a toggle joint and while this is the preferred construction, a simple hinge may be substituted for the toggle joint locking device. However, in the latter case it is necessary to loosen the hand screw when the brake on one of the beams is to be thrown out of operation, and to tighten it again when it is desired to have it function. When the two portions of the split band are joined by the toggle joint locking device, it is only necessary to set the hand screw at the beginning of operations and both brakes may be tightened so as to exert an equal tension. Thereafter, it is unnecessary to adjust the screw and either band may be thrown out of operation by simply throwing up the toggle joint locking device. It can in an equally simple manner be put into operation by pressing down the bar 6 of the toggle joint so as to close the brake about the pulley groove.

Having thus described my invention, what I claim is:

1. A tension device including, in combination with the beams of a textile processing jig, pulleys fixedly mounted upon one end of each beam, split brake bands mounted in the grooves of each of said pulleys each reversibly to the other, each brake band comprising a toggle joint locking device bridging the split in said brake band whereby said brake band may be locked into or out of operation, and arms of unequal length disposed at

the ends of said brake band in parallel relation to each other, a hand screw passing through both of said arms whereby the degree of contraction of said brake band upon said pulley may be adjusted, an arcuate rod pivotally anchored at one end upon said jig, passing through the longer of said brake band arms and carrying a helical spring bearing against said arm at one end and against a stop at the other end.

2. A tension device including in combination with pulleys fixedly mounted upon the ends of the beams of a textile processing jig, a pair of brake bands split at points intermediate between the ends, one mounted in the groove of each pulley, each in reverse relation to the other, the parts of said split band being connected by a toggle joint locking device and each part carrying arms of unequal length at the ends remote from said locking device, screw means associated with said arms whereby the degree of contraction of said brake bands upon said pulley groove can be adjusted, and arcuate rods pivotally anchored at one end on said jig, one such rod passing through the longer arm of each brake band, and a helical spring on each rod, said spring bearing on one end against said long arm and at the other end against a stop.

3. A tension device according to claim 2 in which the toggle joint locking device of the split brake band comprises a double bar pivotally anchored on one half of the split brake band and a longer single bar pivotally anchored to the other half of said brake band, said first bar being pivoted to either side of said second bar whereby on moving said second bar about its pivot the split in said brake band is opened or closed, thereby expanding or contracting said split brake band in the groove of its pulley.

4. A tension control device in a textile processing jig comprising in combination with pulleys fixedly mounted upon the ends of the beams of said jig a pair of split brake bands, one set upon each beam of said jig in reverse relation to the other; means for adjusting the degree of contraction of each of said brake bands on its beam including arm extensions of said brake band of unequal length and screw adjusting means associated with said arms; means for locking and unlocking said brake bands into or out of operation without disturbing said adjustment means, and helical springs bearing against the longer arm extensions of said brake bands in opposition to the direction of movement of said arms.

5. A brake for beams of textile processing jigs comprising a split brake band with arm extensions of unequal length at the ends, screw adjusting means associated with said arms and a locking means bridging said split consisting of two bars, one pivoted to either side of said split and both pivoted together whereby upon raising one of said rods the brake band is forced apart at said split and upon lowering said rod said brake band is contracted and an arcuate rod pivotally anchored on the frame of said jig and slidably engaged by the longer arm of said brake band, said rod carrying a helical spring bearing against said longer arm at one end and against a stop on said rod at the other end.

6. A tension device including, in combination with the beams of a textile processing jig, pulleys fixedly mounted upon one end of each beam, a split brake band mounted in the groove of each of said pulleys, each reversibly to the other, a hinge uniting the two parts of each brake band at the split, and two arms of unequal length disposed at the ends of each of said brake bands in parallel relation to each other, screw adjusting means connecting each pair of arms whereby the degree of contraction of each brake band upon its pulley may be controlled, and arcuate rods each pivotally anchored at one end on said jig and passing through the longer arm of each brake band and carrying a helical spring bearing against said arm at one end and against a stop at the other end.

7. A brake for the beams of a textile processing jig comprising a brake band in two sections, said sections being joined by a toggle joint at their meeting ends and having arm extensions of unequal length at the other ends thereof; screw means associated with said arms whereby the degree of contraction of said brake upon its beam may be controlled; an arcuate rod anchored on said jig at one end and slidably engaged by the longer arm of said brake band at the other end, said rod carrying a helical spring bearing against said longer arm at one end and against a stop on said rod at the other end; said toggle joint being adapted and arranged to tighten or loosen said ring band sections without disturbing the adjustment setting effected by said screw means.

DONA L. BALLOU.