Aug. 16, 1949. R. H. CARTER ET AL 2,478,928

LATCH-OUT DEVICE FOR TWISTING SPINDLES

Filed Dec. 31, 1947 2 Sheets-Sheet 1

Fig. 1.

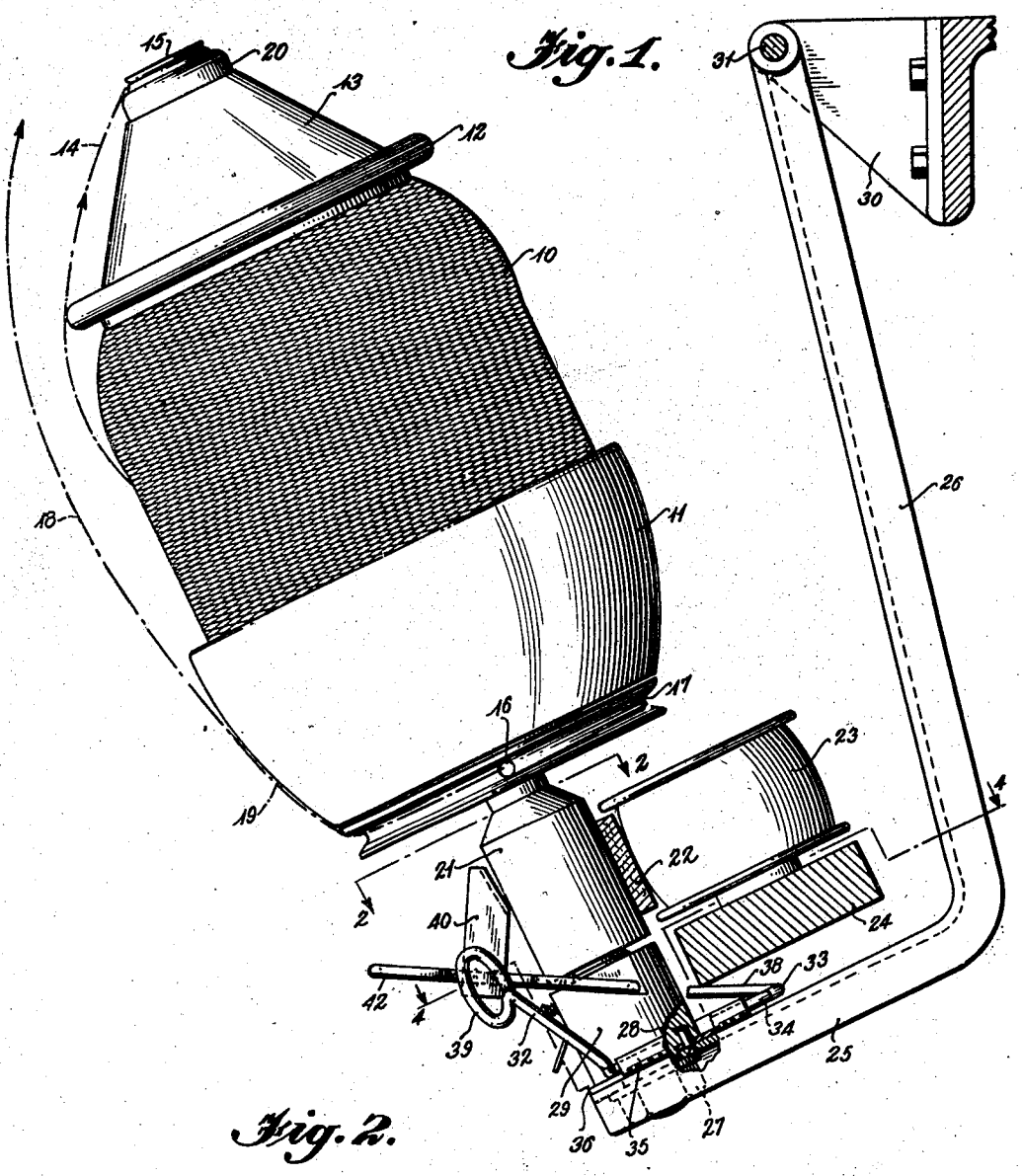
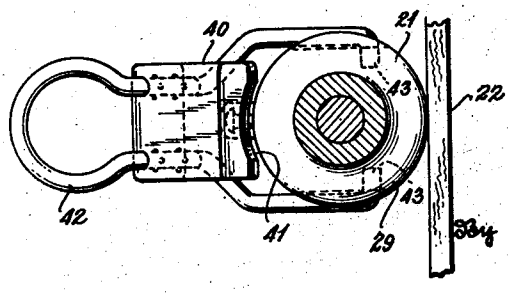


Fig. 2.



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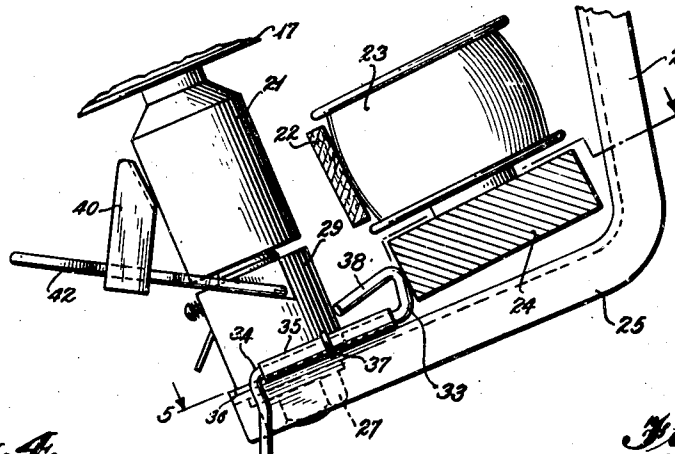


Fig. 3.

Fig. 4.

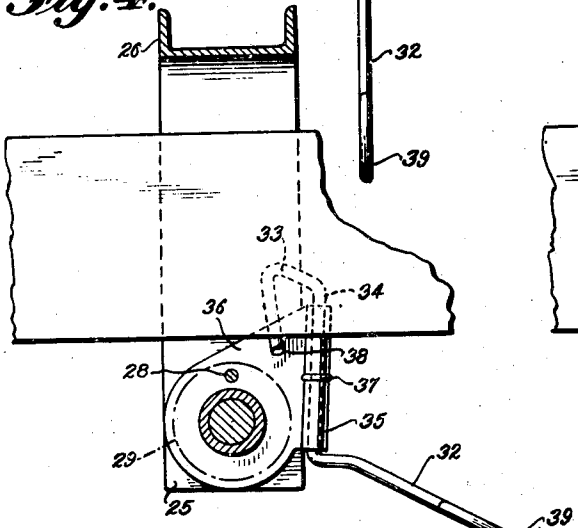
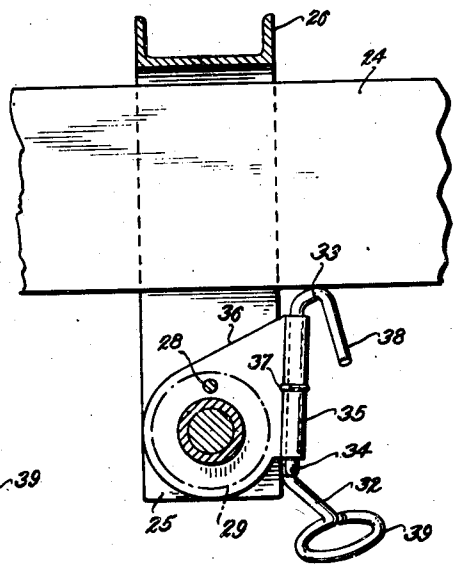


Fig. 5.



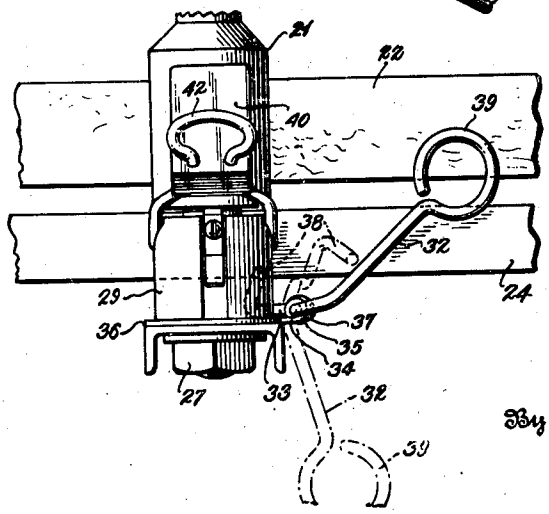


Fig. 6.

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UNITED STATES PATENT OFFICE

2,478,928

LATCH-OUT DEVICE FOR TWISTING SPINDLES

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11 Claims. (Cl. 57—89)

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This invention relates to improvements in twisting spindles and more particularly to devices for effecting the operative engagement of said spindles with the means used for driving said spindles and for effecting the automatic or manual disengagement of said spindles from the driving means.

In double twist spindles, especially those of the "free balloon" type, the spindle is carried by a pivotally swinging arm so that it is kept tilted at an angle of from 20 to 30° from the vertical. The spindle, which rotates at high speed, carries members which support a supply package of the yarn or thread that is to be withdrawn therefrom and twisted. These supporting members, together with the yarn package, are mounted upon the spindle in such fashion that while they can turn or be turned freely thereon, they do not rotate along with the spindle, rotation of these members being prevented by means of an eccentrically pivoted counterweight disposed inside the package supporting member. It is customary to mount a number of such spindles for operation by a single drive belt, such belt being arranged to bear against drive pulleys or whorls on the individual spindles. Although the supply package and its support is normally held against rotation by the counteweight, aided by the inclined position of the unit induced by the pivotal and angular mounting thereof, it can turn or rotate about its axis and such turning or rotation may occur during the twisting operation and be caused by any factors that interfere with the smooth withdrawal of yarn from the supply package. Thus, bearing faults, dirt, snagging of the yarn, etc. may cause the supply package and its support to rotate about its axis. The counterweight will strive to restore the system to repose, but if the rotation persists, and the counterweight also begins to rotate, the pivotal arm will begin to oscillate, carrying the rotating or gyrating spindle, supply package and support with it and cause the system to "hunt" with a pendulum like motion with respect to the drive belt, i. e. the pulley or whorl on the spindle will alternately come into and out of contact with the drive belt. It is then desirable to lock the spindle automatically or manually out of contact with the drive belt in order to permit inspection and correction of the trouble. In disconnecting the spindle manually it is also desirable to bring the same to rest as rapidly as possible as by braking the same by some easily manipulated device so as to avoid injury to the operator.

It is an object of the present invention to

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provide means for automatically or manually disconnecting pivotally suspended spindles, of the aforesaid or similar type, from engagement with the driving means and for applying a braking action thereto when the disconnection is effected manually.

To this end a pivoted latch-out member is provided which normally permits the spindle pulley or whorl to bear against the drive belt, but which member, when the oscillation of the support arm exceeds a predetermined permissible amount, during which movement the spindle pulley moves out of contact with the drive belt, automatically assumes a position adapted to hold the spindle out of engagement with said belt, the gyrations of the yarn package support being allowed to cease of their own accord.

It is another object of the invention so to arrange the aforesaid automatic latch-out arrangement that it can also be manually actuated, the means used for effecting such manual operation being additionally associated with braking means adapted to be facultatively actuated by the operator at his discretion.

A still further object is to provide a latch-out arrangement for pivotally mounted spindles of this general type wherein the latch-out device also serves as a visual indication that one or more spindles of a bank of similar spindles have been latched-out and require attention.

An embodiment of the invention is illustrated in the accompanying drawing as applied to a pivotally disposed, tilted, free balloon type of twisting spindle. In the drawing:

Fig. 1 is a transverse section through a spindle rail showing the spindle engaged with the drive belt and the latch-out and braking devices in non-operating position.

Fig. 2 is a section on line 2—2 of Fig. 1, illustrating the manually operated braking device.

Fig. 3 is a sectional elevation of a portion of the lower end of the spindle, showing the belt drive means, latch-out device and brake, the spindle being in the latched-out position.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1, showing the latch-out device in position to permit the spindle to engage with the drive belt.

Fig. 5 is a similar view taken on line 5—5 of Fig. 3, showing the latch-out device in position to prevent the spindle from engaging with the drive belt.

Fig. 6 is a front elevation of the spindle rail, drive belt, with the latch-out device indicated in

both positions and also showing the braking mean.

Referring in detail to the figures of the drawing, a form of spindle to which the invention is applicable is shown diagrammatically as a whole and as a structure having a conical top, the entire structure being shown tilted from the vertical, in Fig. 1. 10 designates a package of untwisted yarn or thread which is mounted in a bowl-shaped support member 11 and additionally supported by the flange 12 of a so-called cap member 13, the internal structure of the cap and the interior details of the bowl not being shown. The yarn or thread that is to be twisted is drawn from the supply package 10, in the direction of the arrow 14, passes beneath a disc-like movable tensioning member 15 cooperating with the top end 20 of the cap 13 and down through the center of the interior of the spindle whence it issues from a port 16 in the storage wheel 17 customarily used with spindle of this type and thereupon upward as indicated at 18. Starting at a point illustratively designated as 19 on the bowl 11 the thread, in its upward travel forms a so-called "free balloon" prior to entering a gathering eye (not shown) on its way to the take-up package. The size of the balloon and the location of its starting point on the outside of bowl 11 are dependent on a number of factors such as the denier of the thread and the tension applied thereto. However, only the general structure of the yarn support is of relevance in the further consideration of the latch-out device and brake of the present invention, hereinafter described.

The rotating portion of the spindle includes the storage wheel 17 from a port of which the yarn issues, as at 16, and the flangeless belt pulley or whorl 21 which derives its rotation by contacting with a drive belt 22 held in place by idler pulleys 23 carried by a support rail 24. In practice, a number of spindles are arranged to be driven by one belt and the support rail extends in spaced relation past all of the spindles for reasons hereinafter explained.

The flangeless belt pulley or whorl 21 that drives the spindle is mounted on arm 25 of a two-armed lever through agency of a bearing support 29, the latter being secured to the arm 25 by nut 27, a locating pin 28 being provided for correctly locating the support 29 to insure proper positioning of the brake device and latch-out device hereinafter described.

The other, longer arm 26 of the two-armed lever is disposed at an angle, preferably slightly more than a right angle with respect to the arm 25 and is carried by a suitable bracket 30 on the twisting machine through agency of a pivot 31.

In spindles of this type, the counterweight eccentrically carried within some portion of the yarn supply spool support, ordinarily tends to keep the yarn package from partaking of the high speed rotation of the spindle while still allowing it to turn occasionally completely or partially about its axis when factors come into play that tend to produce such relative turning. Bearing troubles, dirt, fly-waste, etc. may also produce the same effect. If the turning of the unit is momentary, the eccentric weight will quickly bring the package to rest, but if the turning is intermittent and repeated or prolonged, the supply package will begin to gyrate or turn to and fro and eventually begin to rotate. Since the supply package support assembly is by design substantially it of balance with respect to its axis, any rapid rotation will cause the two-armed lever 25, 26, and of course the spindle which it carries, to oscillate about its pivot point 31 after the fashion of a pendulum. As the drive belt 22 is normally in contact with the pulley or whorl 21 which operates the spindle, the oscillating motion will cause the whorl 21 to come into and out of contact with the drive belt 22. It is therefore desirable to provide means for latching the whorl 21 and hence the spindle out of contact with said belt if the oscillatory movement of the two-armed lever persists, so as to permit correction of any faults as rapidly as possible. For example, unless the spindle is thus latched out, the unit comprising the bowl 11 and cap 13 which carries the supply package may become operatively connected with the high speed spindle per se as by waste thread becoming jammed between the bowl and the storage wheel 17 or through bearing failure or for other reasons. This would cause the yarn support unit to revolve at the same speed as the whorl 21 and overcome the restraining and position-restoring efforts of the eccentrically pivoted counterweight within the yarn support structure. This may cause damage to the spindle, and, under certain conditions the possible centrifugal propulsion of portions of the yarn support, cap or tensioning members may cause damage to adjacent spindles or injury to workers. For this reason, in accordance with the invention, a latch-out arrangement is provided which will now be described.

The latch-out arrangement consists of a two-armed lever so shaped and pivoted as to permit the end to drop into latching position by gravity, although of course it may also be spring-urged into such position. A preferred embodiment is shown in detail in Figs. 3, 4, 5, and 6. The lever is formed of suitable rod stock adapted for rapid quantity fabrication and preferably of a non-rusting metal such as stainless steel. The gravitational operation of the device is rendered possible by making one arm 32 longer and heavier than the other, 33. An intermediate portion 34 connects the two arms 32 and 33 and is pivotally journaled in a bearing sleeve preferably formed, likewise for quantity production reasons, integral out of one end of a plate 36; a snap ring 37 engaging in a cut-out in the journal member 35 and cooperating with a groove in the intermediate portion 34 of the latch-out lever serving to prevent excessive longitudinal play and insuring smoother pivotal action. A hole in the plate 36 cooperates with the locating pin 28, previously mentioned, to insure correct positioning of the lever when assembling the spindle. The shorter end 33 of the two-armed lever is bent over at 38 and the longer arm 32 preferably terminates in an eye 39 or other suitably shaped and readily fabricated handle-like configuration adapted to permit facile manual manipulation of the lever.

The arrangement operates as follows:

As shown in Fig. 1, the entire spindle is tilted so that whorl 21 contacts with the drive belt 22, in which position the rotating portions of the spindle, i. e. the whorl 21 and the storage wheel 17 rotates at very high speed, the bowl 11, yarn package 10, cap portions 13 and 20 and the tensioning member 15 however being kept at rest relatively to the rotating parts due to the counter-weight provided interiorly of the unit. The shorter end 33, 38 of the latch-out lever is shown in inoperative position in Fig. 1 and also in Fig. 6.

As previously pointed out and due to the inciting causes mentioned, the bowl and yarn package unit may begin to gyrate and thus cause the pivoted two-armed lever **25, 26** to oscillate in pendulous fashion. When the arc of oscillation of lever **25, 26** exceeds a predetermined magnitude, the portion **33, 38** of the latch-out lever clears the lower edge of the support rail **24** against which it rests while the spindle is functioning normally, and assumes the position shown in Fig. 3 in which it holds the spindle out of operative contact with the drive belt **22**. During this pivotal movement of the latch-out lever the longer arm **32** thereof along with the eye **39** drops down and serves as a signal that the spindle is being held in latch-out position and requires attention to correct some condition that prevents the proper functioning thereof. The signal also serves to point out which one or more of a large bank of spindles needs or need attention.

When a given spindle has been latched-out it may continue rotating for an appreciable length of time so that it may be desirable to brake the whorl so as to bring it to rest, as for example when the massing of thread between the storage wheel and the bowl or bearing failure has operatively connected the rapidly rotating portions with the portions that are supposed to remain relatively at rest, e. g. the bowl, yarn package and cap unit, so that the latter also continue to rotate. Even if no operative disturbance occurs, it is necessary to and desirable to provide a braking means for bringing the spindle to rest while the yarn supply package is being replaced. A braking device is therefore provided which comprises a brake shoe **40** of suitable material, preferably a fabric block impregnated with synthetic resin. This shoe has an arcuately recessed surface **41** to conform the shape of and provide adequate braking contact with the whorl **21** against which it is applied. The shoe is carried by a bail-like member comprising a substantially U-shaped rod of rustless metal, the prongs of which fit frictionally in holes bored in the shoe. One end of the bail **42** is preferably shaped as a ring or other suitable termination adapted to be readily seized by an operator. The two tips of the other end are bent inwardly as at **43** and engage pivotally in recesses in the bearing support **29** (Fig. 2).

The brake device performs two functions, each independently of the other and also both simultaneously, with one dependent on the other, according to circumstances or the desire of the operator. Thus, assuming that the spindle has been automatically disengaged from the drive belt by the latching device but still continues rotating, and, due to improper union of the parts, carries the bowl and yarn package unit along, the operator may apply the brake and stop the rotation by merely pushing upwardly on the end **42** of the bail. On the other hand, even under normal operating conditions, as when changing yarn supply packages, the brake device acts in cooperation with the latch-out device in that an upward thrust directed by the operator against the end **42** of the bail serves to tilt the two-armed lever **25, 26** about its pivot **31**, thus simultaneously causing the latch-out lever to drop into belt-disengaging position and the brake to be applied. The brake device therefore is adapted to perform two functions, one by itself alone and the other in cooperation with the latch-out device.

Modifications of this invention will be recognized readily by those skilled in the art and it is intended to cover all modifications coming within the scope of the appended claims.

It is claimed:

1. In a twisting spindle comprising in combination a twisting unit adapted for high speed rotation and a yarn package support unit carried thereby and adapted for rotary movement relative thereto, constantly operating drive means disposed adjacent said spindle, a member carried by said twisting unit for engagement with said drive means, a pendulously pivoted arm for carrying said spindle and normally causing said member on said twisting unit to engage said drive means, and latching-out means, carried by said pivoted arm and normally frictionally held in a position to permit operative engagement of said member with said drive means but pivotally urged to a position adapted to prevent operative engagement of said member with said drive means when the pendulously pivoted arm moves in oscillatory fashion beyond a predetermined limit.

2. In a twisting spindle comprising in combination a twisting unit adapted for high speed rotation and a yarn package support unit carried thereby and adapted for rotary movement relative thereto, constantly operating drive means disposed adjacent said spindle, a member carried by said twisting unit for engagement with said drive means, a pendulously pivoted arm for carrying said spindle and normally causing said member on said twisting unit to engage said drive means, and latching-out means carried by said pivoted arm and normally frictionally held in a position to permit operative engagement of said member with said drive means but gravitationally urged to a position adapted to prevent operative engagement of said member with said drive means when the pendulously pivoted arm moves in oscillatory fashion beyond a predetermined limit.

3. In a twisting spindle comprising in combination a twisting unit adapted for high speed rotation and a yarn package support unit carried thereby and adapted for rotary movement relative thereto, a pulley-like whorl on said twisting unit, a support rail adjacent said support and carrying a constantly operating belt, a pendulously pivoted arm for carrying said spindle and normally causing said whorl on said twisting unit to engage said belt and a latching-out member carried by said arm and normally resting against said support rail in a position to permit operative engagement of said whorl with said belt but pivotally urged to another position against said support rail to prevent engagement of said whorl with said belt when the pendulously pivoted support arm moves in oscillatory fashion beyond a predetermined limit.

4. In a twisting spindle comprising in combination a twisting unit adapted for high speed rotation and a yarn package support unit carried thereby and adapted for rotary movement relative thereto, a pulley-like whorl on said twisting unit, a support rail adjacent said support and carrying a constantly operating belt, a pendulously pivoted arm for carrying said spindle and normally causing said whorl on said twisting unit to engage said belt and a latching-out member carried by said arm and normally resting against said support rail in a position to permit operative engagement of said whorl with said belt but gravitationally urged to another position against said support rail to prevent engagement of said whorl with said belt when the pendulously pivoted support arm moves in oscillatory fashion beyond a predetermined limit.

5. In a twisting spindle comprising in combination a twisting unit adapted for high speed rotation and a yarn package support unit carried thereby and adapted for rotary movement relative thereto, constantly operating drive means disposed adjacent said spindle, a driven member carried by said twisting unit for engagement with said drive means, a pendulously pivoted arm for carrying said spindle and normally causing said member on said twisting unit to engage said drive means, latching-out means carried by said pivoted arm and normally frictionally held in a position to permit operative engagement of said member with said drive means but pivotally urged to a position adapted to prevent operative engagement of said member with said drive means when the pendulously pivoted arm moves in oscillatory fashion beyond a predetermined limit and braking means cooperating with the driven member on said twisting unit for braking said member, said braking means being adapted to be operated independently of said latching-out means.

6. In a twisting spindle comprising in combination a twisting unit adapted for high speed rotation and a yarn package support unit carried thereby and adapted for rotary movement relative thereto, constantly operating drive means disposed adjacent said spindle, a driven member carried by said twisting unit for engagement with said drive means, a pendulously pivoted arm for carrying said spindle and normally causing said member on said twisting unit to engage said drive means, latching-out means carried by said pivoted arm and normally frictionally held in a position to permit operative engagement of said member with said drive means but gravitationally urged to a position adapted to prevent operative engagement of said member with said drive means when the pendulously pivoted arm moves in oscillatory fashion beyond a predetermined limit and braking means cooperating with the driven member on said twisting unit for braking said member, said braking means being normally held gravitationally out of engagement with said driven member and being adapted to be operated independently of said latching-out means.

7. In a twisting spindle comprising in combination a twisting unit adapted for high speed rotation and a yarn package support unit carried thereby and adapted for rotary movement relative thereto, a pulley-like whorl on said twisting unit, a support rail adjacent said support and carrying a constantly operating belt, a pendulously pivoted arm for carrying said spindle and normally causing said whorl on said twisting unit to engage said belt, a latching-out member carried by said arm and normally resting against said support rail in a position to permit operative engagement of said whorl with said belt but pivotally and gravitationally urged to another position against said spindle to prevent engagement of said whorl with said belt when the pendulously pivoted support arm moves in oscillatory fashion beyond a predetermined limit and braking means cooperating with the driven member on said twisting unit for braking said member, said braking means being normally held gravitationally out of engagement with said driven member and being adapted to be operated independently of said latching-out means.

8. In a twisting spindle comprising in combination a twisting unit adapted for high speed rotation and a yarn package support unit carried thereby and adapted for rotary movement relative thereto, a pulley-like whorl on said twisting unit, a support rail adjacent said support and carrying a constantly operating belt, a pendulously pivoted arm for carrying said spindle and normally causing said whorl on said twisting unit to engage said belt, a latching-out member carried by said arm and normally resting against said support rail in a position to permit operative engagement of said whorl with said belt but pivotally and gravitationally urged to another position against said support rail to prevent engagement of said whorl with said belt when the pendulously pivoted support arm is moved in oscillatory fashion beyond a predetermined limit, and braking means pivotally carried by said spindle for braking said whorl said braking means being held gravitationally out of engagement with said whorl and adapted to be manually operated independently of said latching-out means but adapted for simultaneously manually oscillating said support arm to effect gravitational operation of said latching-out means and permit facultative manual application of said braking means.

9. In a latch-out arrangement for a pendulously supported twisting spindle comprising, in combination, a pivoted support for pendulously carrying said spindle, a drive pulley on said spindle a support rail carrying a constantly operating drive belt normally engaging with said pulley in a predetermined position of said pivoted support and a latch-out device for holding said spindle out of contact with said belt when said support oscillates beyond said predetermined amount, said latch-out device comprising a two-armed lever and a central portion connecting said arms said central portion being pivotally journaled on the support carrying said spindle, one of the arms of said lever when bearing against one portion of said support rail serving to permit operative engagement of said spindle with said drive means and when moved to another position against said support rail by the oscillation of said pivoted support beyond said predetermined amount serving to prevent return of said spindle into operative engagement with said drive means, the other arm of said two-armed lever serving as a gravitational actuating means for said first arm and as an indicator that said first arm has been moved to spindle latch-out position.

10. In a latch-out and braking arrangement for a pendulously supported twisting spindle of the type wherein the spindle comprises a high speed twisting unit and a yarn package unit carried thereby and normally stationary thereon but capable of rotation relatively thereto, in combination, a pivoted support for pendulously carrying said spindle, a drive pulley on said spindle, a support rail carrying a constantly operating drive belt normally engaging with said pulley in a predetermined position of said pivoted support and a latch-out device for holding said spindle out of contact with said belt when said support oscillates beyond said predetermined amount, said latch-out device comprising a two-armed lever and a central portion connecting said arms, said central portion being pivotally journaled on the support carrying said spindle, one of the arms of said lever when bearing against one portion of said support rail serving to permit operative engagement of said spindle with said drive means and when moved to another position against said support rail by the oscillation of said pivoted support beyond said predetermined amount serving to prevent return of said spindle into oper-

ative engagement with said drive means, the other arm of said two armed lever serving as a gravitational actuating means for said first arm and as an indicator that said first arm has been moved to spindle latch-out position, and a brake cooperating with said spindle for braking said spindle when in latched-out position, said brake comprising a block pivotally carried by said spindle but normally held gravitationally out of engagement with said spindle and adapted to be manually operated independently of said latching-out means but adapted for simultaneously manually oscillating said pivoted support to effect gravitational operation of said latching-out device and permit facultative manual application of said brake block to said spindle.

11. A latch-out and braking arrangement for a pendulously pivoted twisting spindle comprising a latching-out member gravitationally operated in response to pendulous oscillations of said spindle and a braking device carried by said spindle and normally held gravitationally out of engagement with said spindle and adapted to be manually operated independently of said latching device but adapted for manually oscillating said pivoted spindle to effect gravitational operation of said latching device and simultaneously permit facultative manual application of said braking device.

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No references cited.