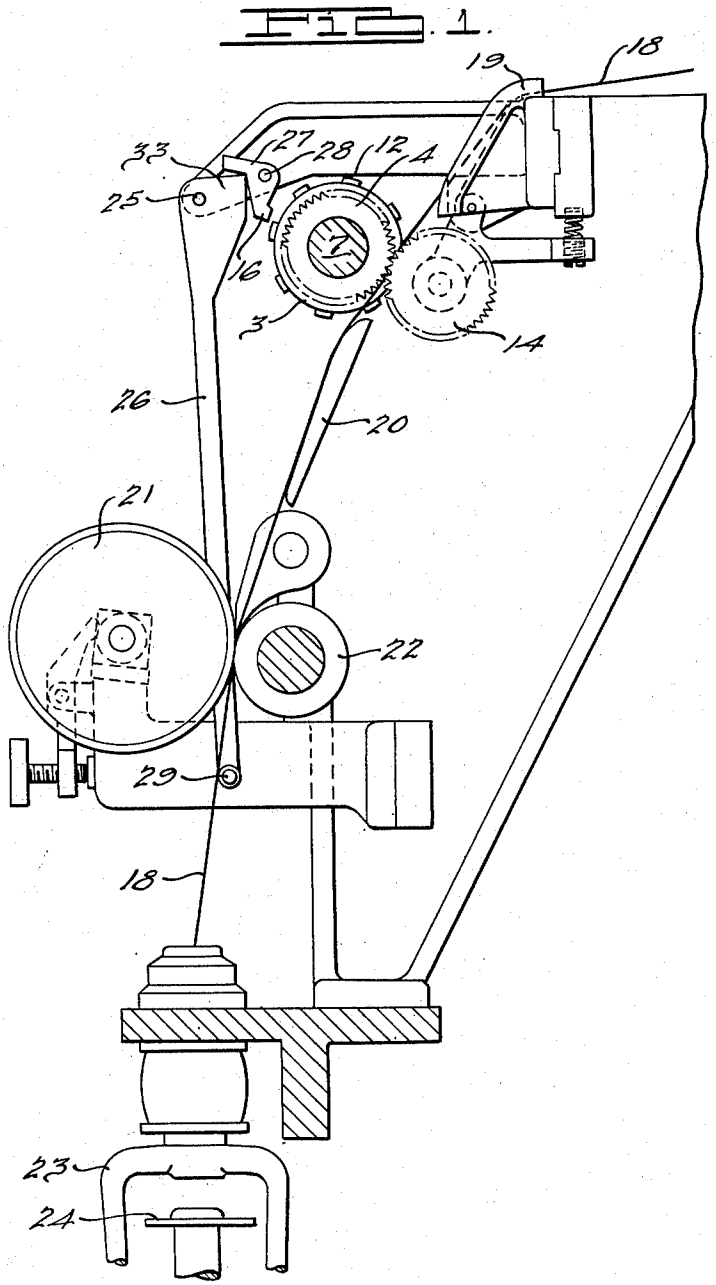
Dec. 30, 1952 H. E. BADE 2,623,348

STOPPING ARRANGEMENT AND COUPLING FOR THE THREAD FEED OF SPINNING MACHINES

Filed April 22, 1950 2 SHEETS—SHEET 1

FIG. 1.



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Filed April 22, 1950 2 SHEETS—SHEET 2

FIG. 2.

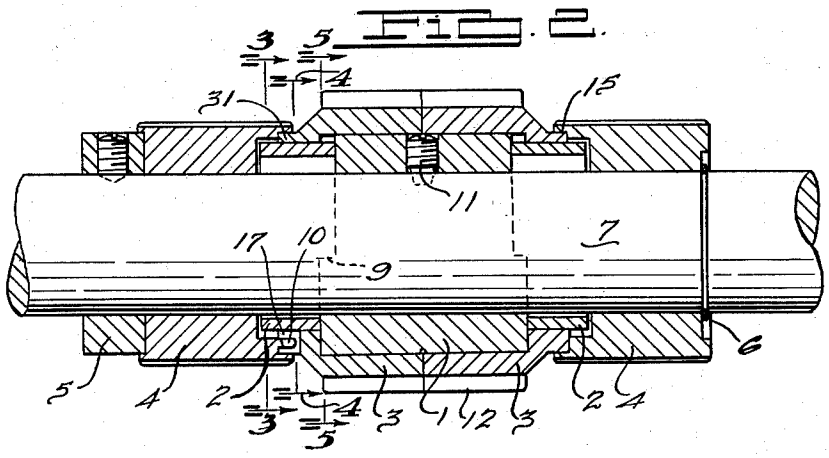


FIG. 3.

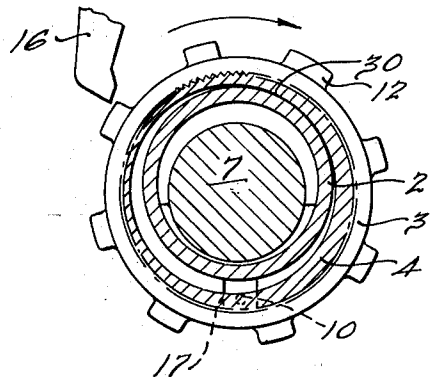


FIG. 4.

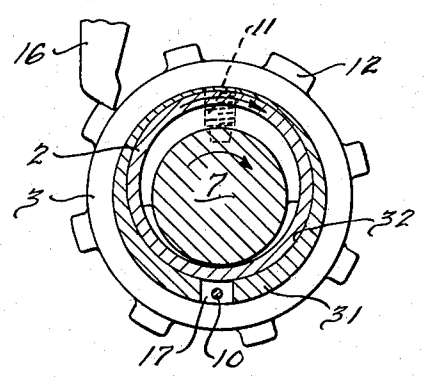
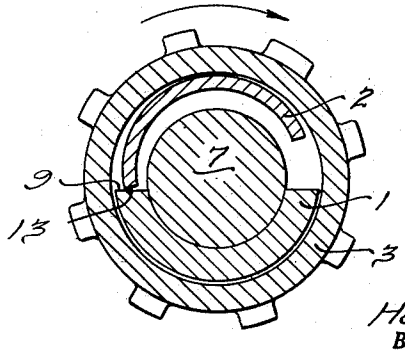


FIG. 5.



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Patented Dec. 30, 1952

2,623,348

UNITED STATES PATENT OFFICE

2,623,348

STOPPING ARRANGEMENT AND COUPLING FOR THE THREAD FEED OF SPINNING MACHINES

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Application April 22, 1950, Serial No. 157,558
In Germany October 17, 1949

12 Claims. (Cl. 57—83)

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The invention relates to an arrangement for automatically stopping the thread feed in a spinning machine on thread breakage under the control of a thread feeler which in the following will also be referred to as a thread guard.

The invention is particularly suitable for jute spinning machines. For the purpose of stretching the threads before the spinning operation, spinning machines are provided with a pair of feed rollers and a pair of delivery rollers. Since the pair of delivery rollers is driven at a considerably higher speed than the pair of feed rollers, the thread which passes through both pairs of rollers is stretched in the desired manner. While usually one of the rollers of the pair of feed rollers is directly driven, the other roller is movably arranged and, for example, is urged against this driven roller by means of a counterweight. In some of the known stopping arrangements, on thread breakage the movably arranged feed roller is pushed out of engagement with the directly driven feed roller, for example, by a drop weight released by a thread feeler-actuated safety catch.

It is also possible to provide a construction in which the drive shaft is continuously driven, and a disengageable coupling is provided between the drive shaft and the feed roller, this coupling taking the form, for example, of a friction clutch or an axially movable clutch. These types of construction, when applied to a spinning machine or similar device, present important disadvantages. For example, a friction clutch would present the disadvantage of having to absorb a large amount of torque, especially if the thread breakages are frequent. In the case of an axially moving part, this presents the disadvantage that such movement is not easily derived from the thread feeler.

It is an object of the present invention to overcome the disadvantages of previous constructions of stopping devices for thread feeders and to provide a mechanism having an overtaking coupling in which a coupling member is moved out of engagement on thread breakage through the influence of the thread feeler, and in which the feed roller is preferably held fast simultaneously with this action.

It is another object to provide a coupling of the above character in which the essential parts are arranged around the driving shaft and which is controlled exclusively by movement in the radial plane of the shaft axis, no axial displacement being necessary for the disengaging action, and no frictional absorption of energy being required during disengagement of the coupling.

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It is a further object to provide a coupling as above described, in which a coupling member is arranged eccentrically on the driving shaft, said member rotatably engaging a drive wheel or feed roller which is freely mounted on the shaft, the rotatable member being driven by the driving shaft either about its own rotary axis for the purpose of disengaging the driving wheel, or revolved about the driving shaft axis for the purpose of rotating the driving wheel.

It is also an object to provide a coupling of the above character, in which the operation of connecting and disconnecting the coupling is carried out by the drive shaft itself and does not load the thread feeler which only exercises a control function and may thus be of light and sensitive construction.

Other objects, features, and advantages of the present invention will become apparent from the subsequent description taken in conjunction with the accompanying drawings.

The accompanying drawings show one embodiment of the invention in simplified form and in the drawings:

Fig. 1 shows a section through a spinning position of a fine jute spinning machine constructed according to the invention,

Fig. 2 shows a longitudinal section through two couplings constructed according to the invention of which one coupling is the same as the other in all important parts but is oppositely arranged.

Fig. 3 shows a cross-section through line 3—3 of Fig. 2 with the coupling connected,

Fig. 4 shows a cross-section through line 4—4 of Fig. 2 with the coupling disconnected, and

Fig. 5 shows a cross-section through line 5—5 of Fig. 2 and which shows in particular how the eccentric ring is engaged.

Like parts in all drawings are indicated by the same references.

A description will first be given by reference to Figs. 2–5 of the preferred coupling used in the embodiment of the invention.

In the embodiment two couplings are provided which are the same in all important parts but are arranged oppositely. It is thus sufficient to limit the description of the invention to a single one of these two couplings.

The improved coupling comprises in general a continuously driven shaft upon which is rotatably mounted one of a pair of complementary thread feed rollers. One end of this feed roller is provided with a circular recess, the axis of this recess being eccentric to the drive shaft axis. Extending into this recess is an eccentric ring, the eccentric ring surrounding the drive shaft and

being rotatably mounted at one end of a detent ring. The detent ring is in turn rotatably mounted concentrically with the shaft, and in particular may be supported by a sleeve fixed to the shaft. The eccentric ring is supported by the detent ring for rotation about an axis eccentric to the drive shaft, the eccentricity being preferably the same as that of the recess in the end of the feed roller. The fixed sleeve on the driving shaft has a radial shoulder which is engageable with a corresponding shoulder at the end of the eccentric ring opposite the end which extends into the feed roller recess. When the drive shaft is rotated, the sleeve shoulder will engage its corresponding eccentric ring shoulder to move the eccentric ring. If the detent ring is allowed to move freely, friction between the detent ring and on the one hand eccentric ring and on the other hand the fixed sleeve, will cause the detent ring to rotate with the drive shaft. The seat for the eccentric ring will thus move with the eccentric ring, the result being that the eccentric ring will revolve about the shaft axis. This will cause engagement of the portion of the eccentric ring projecting into the feed roller recess with the inner wall of this recess, therefore positively driving the feed roller.

Upon thread breakage, the detent ring is locked by outside means against rotation, thereby holding the seat of the eccentric ring in a predetermined radial position. Continued rotation of the eccentric ring by the drive shaft will therefore cause the eccentric ring to rotate about its own eccentric axis rather than revolve about the shaft axis. This will disengage the eccentric ring from the feed roller, since a small clearance or play preferably exists between the eccentric ring and the feed roller recess. The driving of the feed roller is thus instantaneously halted. To prevent the feed roller from overtaking the eccentric ring from the other direction and attempting to revolve this ring about the shaft axis, means are provided for simultaneously braking the movement of the feed roller, and this means may comprise a connection between the detent ring and the feed roller which stops the feed roller when the detent ring is stopped.

A driving ring 1 is secured to a driving shaft 7 for instance by means of a pin 11, the ring being provided with an outer bearing surface on which two oppositely directed similar detent rings 3 are rotatably mounted. These detent rings are provided around their peripheries with a series of cams or teeth 12 which are preferably equally spaced. Each of these detent rings 3 is provided with an extension piece 31 extending beyond the driving ring 1 in which extension pieces as shown particularly in Figs. 2 and 4, an eccentric bearing 32 is provided. These bearings serve for the rotatable positioning of an eccentric ring 2 of the same eccentricity. This eccentric ring, as shown particularly in Figs. 2 and 5, has discontinuous surfaces 13 adjacent the driving ring 1. Correspondingly the driving ring 1 has approximately radially extending engaging surfaces 9 so that the eccentric ring 2 and the driving ring 1 engage one another due to the extensions. The eccentric ring is driven at a constant speed by the rotating shaft 7 while the surface 13 engages with the surface 9 of the driving ring 1. Hence a free space 30 is provided between the inner circumferences of the eccentric ring 2 and the shaft 7.

The other end of the eccentric ring 2 projects into an eccentric bearing in a driving wheel 4 which in the embodiment is constructed as one of the feed rollers. The eccentricity of the bearing in the feed roller 4 is, in the embodiment, equal to the eccentricity of the eccentric ring 2 or its eccentric bearing in the detent ring 3. The bearing in the feed roller 4 is however made larger by a few millimeters, for example 2 mm., than the outer diameter of the eccentric ring 2. In this example of 2 mm. it is assumed that the eccentricity amounts to approximately 3 mm. The amount of play should be smaller than the eccentricity, since otherwise no coupling and no rotation could take place between the eccentric ring and the driving wheel. The feed roller 4 is provided in known manner with a toothed periphery which engages with the coresponding toothed periphery of the other free feed roller (see Fig. 1).

The feed roller 4 is freely rotatable on the driving shaft 7 and longitudinal movement thereof is prevented for example by a collar 5. In place of the collar a securing ring 6 may be used as shown for one of the two couplings. In order to prevent ingress of dust and dirt into the interior of the coupling as far as possible, the detent ring 3 engages by means of its extensions 15, which has a concentrically shaped outer surface, in a corresponding concentric bearing in the feed roller 4. The inner surface of the extension 15 is formed eccentrically for guiding and supporting the eccentric ring 2.

In operation in order to engage the coupling the detent ring 3 is not held fast. It is carried by the moving driving shaft 7 through friction with the constantly rotating driving ring 1 and with the eccentric ring 2 which is likewise driven positively by the shaft 7 through the engaging surfaces 9, 13. Since the eccentric ring is guided and supported by the eccentric bearing in the detent ring 3 and this detent ring rotates constantly with the shaft 7, the eccentric ring is thus also revolved as a kind of crank about the rotary axis of the driving shaft. Relative movement between the outer surface of the eccentric ring and the eccentric guiding surface of the detent ring 3 cannot therefore take place. Since the eccentric bearing of the feed roller 4 engages with the outer periphery of the eccentric ring 2, then at the beginning of the engagement the eccentric ring slightly overruns the lagging feed roller in a direction opposite to that of rotation of the driving shaft. Hence due to the small wedge-shaped crescent-space 30 between the eccentric surface of the feed roller 4 and the outer periphery of the eccentric ring 2, a wedging or locking action occurs which causes a rigid coupling between the feed roller and the eccentric ring. Since the latter constantly moves around the rotary axis of the driving shaft, the feed roller 4 is positively driven by this shaft.

It should be noted that the coupling is accomplished because the clearance between the internal surface of the feed roller eccentric bearing and the eccentric ring is less than the amount of eccentricity, so that positive engagement must take place when the eccentric ring is revolved about the shaft axis. It should also be observed that the detent ring 3 does not directly transmit the coupling force, but that its movement only serves to allow the eccentric ring to be revolved about the shaft axis, the rotational force being transmitted from the shaft through the eccentric ring directly to the feed roller 4.

When the coupling is to be disengaged, the detent ring is held fast by means of a catch 16 forming part of a lever 27 and controlled by

a thread feeler in a manner to be described subsequently, thus preventing further locking with the driving ring 1. The detent ring in this manner maintains the eccentricity of the eccentric ring in a particular radial position. Since however the eccentric ring is still driven by the shaft 7 through the engaging surfaces 9, 13, it still continues to rotate about its eccentric axis the position of which with relation to the rotary axis of the shaft is fixed in a particular manner through the eccentric bearing of the detent ring. This is possible provided that relative movement can take place between the engagement surfaces 9, 13 and that there is sufficient play between the eccentric ring 2 and on one hand the shaft and on the other hand the concentric bearing of the detent ring 3.

Through this movement of the eccentric ring 2 around its eccentric axis, it follows that the locking action between it and the feeder roller ceases since both parts are immediately separated from one another whereby the feed roller moves slightly in the direction of rotation. This movement is aided by friction between it and the driving shaft to which it is actually mounted. The driving connection between the eccentric ring and the feed roller is thus interrupted and the coupling is disconnected.

There is now the risk in some circumstances that the feed roller when the coupling is disconnected is moved further in the direction of rotation since it is, for example, acted upon due to friction by the shaft 7. After some time there would occur due to this movement a further wedging action between the eccentric ring still rotating about its eccentric axis and the feed roller. The feed roller would then tend to carry round the eccentric ring about the axis of the driving shaft. This would lead to a break since the eccentric position of the eccentric ring is in fact fixedly maintained by the detent ring in the manner described. In order to prevent this danger, means are provided in order to limit further rotation of the feed roller from the coupling position. In the embodiment a pin 10 fixed to the feed roller serves for this purpose as shown in Figures 2, 3 and 4, the pin engaging with suitable play in a notch 17 provided in the detent ring 3. It will be understood that other structural arrangements could be used for braking or stopping the feed roller upon stopping of the detent ring, and that the particular structure herein described is merely illustrative of a preferred arrangement.

According to Fig. 1 in which the stopping arrangement is shown in the spinning position, the thread 18 runs over a thread guide 19, thence between the two feed rollers 4, 14 and is then guided over any type of stretching device 20 between the delivery rollers 21, 22 which in known manner are driven at a considerably greater speed than the feed rollers. The thread 18 is then drawn through a flyer 23 and wound on to a spool 24.

A coupling such as described in relation to Figs. 2 to 5 is arranged on the driving shaft 7 of which only the feed roller 4 and the detent ring 3 with its cams 12 are shown. On the frame of the spinning machine is rotatably mounted somewhat above the driving shaft 7 by means of a bolt 25, a feeler lever 26 acting as a thread feeler of which the longer depending lever arm carries a roller 29 for instance of porcelain, rotatably mounted thereon, the roller lying against

the tensioned thread during spinning at a point between the delivery rollers 21, 22 and the flyer 23. The apex of the short weight-loaded arm 33 of the feeler lever 26 engages with an arm of a pawl 27 likewise constructed as a bell-crank lever and rotatably mounted by a pin 28 on the frame of the spinning machine.

Due to the tension in the thread, the feeler lever is prevented from rotating in a clockwise direction under the influence of gravity. In this position it holds the free arm of the pawl 27 out of the path of the cams 12 of the detent ring 3. By a suitable choice of the lever ratio or the feeler lever 26 and the pawl 27, disengagement of the coupling following a slight movement of the feeler lever 27 in the clockwise direction due, for instance, to inequalities in the thread can be avoided. It will be understood that other structural arrangements of the thread feeler are possible, and in particular the feeler lever could be allowed to operate directly on the detent ring, thus decreasing the cost of manufacture.

On thread breakage however the feeler lever 26 is no longer supported by the thread tension so that it can swing in a clockwise direction about its centre of gravity. The pawl 27 is thus released and likewise swings so far under the influence of gravity in an anticlockwise direction that one of the cams 12 on the detent ring 3 strikes against the free arm whereby further rotation of the detent ring is prevented. The coupling is thereby disengaged and the feed roller 4 braked as already described in connection with Figs. 2 to 5 so that thread feed is interrupted. It will be understood that other types of actuating means for the coupling could be employed, and in particular the coupling could be engaged and disengaged by electromagnetic means controlled by a switch such as a tilting mercury switch operated by the thread feeler.

In order to bring back the feeler lever 26 to the spinning position it is now moved to its raised position whereby the coupling is again engaged and the thread feed again established. At the same time it is only necessary to connect the end of the thread on the spool side with the end of the thread from the feed roller. The operation of a drop weight and thereafter the bringing in of a catch with the aid of the thread feeler as is necessary in the known stopping arrangements is entirely avoided. Dealing with thread breakage is accordingly greatly simplified by the invention.

There is in addition a further important advantage of the invention. The coupling is only engaged again when the thread feeler is brought back to its spinning position which is fixed by the tension in the thread. This characteristic is also similarly advantageous in connection with spool changing for which the machine must be stopped. In known stopping arrangements employing drop weights, the mechanism is disconnected while the machine is running at the slower speed since the thread tension is not sufficient to hold the thread feeler in the spinning position. In general the drop weights have been locked in readiness while the locking device was coupled with the lever controlling the connection and stopping.

The provision of such additional complications is not necessary with the present invention to enable spool changing to be effected. Before starting up the machine again it is only neces-

sary to ensure that the roller 29 on the feeler lever 26 lies on the correct side of the thread 18. Immediately the machine starts, the thread 18 is tensioned since the flyer 26 has a higher speed than the delivery rollers 21, 22. The consequent tensioning of the thread immediately brings the feeler lever 26 into its spinning position, shown in Fig. 1, whereby the coupling is engaged and a thread breakage is avoided. This thread tensioning with corresponding engagement of the thread feeler also takes place in the known arrangements. There however the engagement of the thread feeler does not again connect up the thread feed. Since hand starting, for instance on a single thread breakage, is not simultaneously possible for all the spinning positions of a spinning machine, there is in the known arrangements no other possibility than to take precautions that on starting all stopping arrangements are operative.

The improved coupling of this invention is also advantageous, especially in spinning machine stopping arrangements, in that it is operated by a small amount of power. The friction losses when the coupling is disconnected are relatively small and as a result a larger number of spinning positions on a spinning machine can be efficiently operated. Furthermore, since there are no axially moving parts, the construction is greatly simplified and the cost of manufacture reduced. The coupling has the further advantage of free running since it can be rotated with the driving shaft stationary. As a result of these advantages, the coupling finds application in machines other than spinning machines, such as machine tools, power vehicles and gear transmission boxes.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed, I declare that what I claim is:

1. In a coupling mechanism, a continuously rotating shaft, a driven member rotatably mounted on said shaft, a continuously driven coupling member eccentric to said shaft and rotatably engageable with said driven member, and means for causing said coupling member to be held in a fixed radial position relative to said shaft, whereby its coupling engagement with said driven member is halted.

2. A coupling for connecting a continuously rotating shaft with a driven member rotatably mounted on said shaft, said coupling comprising a coupling member for transmitting the rotation of said shaft to said driven member, a disconnecting member engaging said coupling member and adapted to disengage said coupling member from said driven member, and means for braking said driven member simultaneously with the disengagement of said coupling member.

3. A coupling for connecting a continuously rotating shaft with a thread feed roller rotatably mounted on said shaft, said coupling comprising a coupling member for transmitting the rotation of said shaft to said thread feed roller, a disconnecting member engaging said coupling member and adapted to disengage said coupling member upon thread breakage, and means for braking said feed roller simultaneously with the disengagement of said coupling member.

4. A mechanism for automatically stopping a thread feed, comprising a continuously rotating shaft, a thread feed roller rotatably mounted on said shaft, a coupling member eccentrically mounted on said shaft and rotatably engageable with said feed roller, and means operable by thread breakage for causing said coupling member to be held in a fixed radial position relative to said shaft, whereby the movement of said feed roller is halted.

5. In an arrangement for automatically stopping a thread feed, a continuously rotating shaft, a feed roller rotatably mounted on said shaft, an eccentric ring surrounding said shaft, a detent ring rotatably mounted on said shaft, said detent ring rotatably supporting said eccentric ring in a position eccentric to the shaft axis, means for positively moving said eccentric ring upon rotation of said shaft, said detent ring being normally rotatable with said shaft whereby said eccentric ring revolves about the shaft axis, and mutually engaging surfaces on said eccentric ring and said feed roller, whereby the revolving eccentric ring will cause positive rotation of said feed roller.

6. The combination according to claim 5, further provided with means for preventing the rotation of said detent ring, said means being operated by thread breakage, whereby continued rotation of said shaft will cause rotation of said eccentric ring about its eccentric axis.

7. A stopping arrangement for thread feeders, comprising a rotating shaft, a thread feed roller rotatably mounted on said shaft, an eccentric ring surrounding said shaft, a detent ring rotatably mounted on said shaft, said detent ring having a supporting portion for said eccentric ring so as to hold the eccentric ring eccentrically to said shaft, a pair of mutually engaging radial shoulders on said shaft and said eccentric ring, whereby rotation of said shaft moves said eccentric ring, said detent ring being normally rotatable with said shaft so that said eccentric ring revolves about the shaft axis, an eccentric recess on said feed roller, a portion of said eccentric ring projecting into said recess, whereby the revolving movement of said eccentric ring positively drives said feed roller, and means controlled by thread breakage for stopping the rotation of said detent ring, whereby said eccentric ring will be held in a particular radial position relative to said shaft and will rotate about its own eccentric axis.

8. The combination according to claim 7, further provided with means for braking said feed roller simultaneously with the stopping of said detent ring.

9. A device for stopping a thread feeder, comprising a rotating drive shaft, a thread feed roller rotatably mounted on said drive shaft and adapted to cooperate with a complementary roller, a drive ring fixed to said drive shaft, an eccentric ring surrounding said drive shaft, said drive ring and said eccentric ring having mutually engaging radial shoulders whereby rotation of said shaft moves said eccentric ring, a detent ring rotatably mounted on said drive ring, said detent ring being normally rotatable with said drive ring, an eccentric bearing on said detent ring for supporting said eccentric ring eccentrically to said drive shaft, whereby during normal rotation of the parts said eccentric ring revolves about the shaft axis, a surface on said feed roller engageable by said revolving eccentric ring to positively drive the feed roller, and means operated by thread breakage for stopping the rotation of said detent ring, whereby said eccentric ring is held in a particular radial position relative to the shaft axis and is rotated about its own eccentric axis, thus stopping the movement of said feed roller.

10. An arrangement for stopping a thread feed, comprising a rotating shaft, a thread feed roller rotatably mounted on said shaft, and eccentric ring surrounding said shaft, means for supporting said eccentric ring eccentrically to said shaft, said supporting means being normally rotatable with said shaft whereby said eccentric ring revolves about the shaft axis, an eccentric surface on said feed roller engageable by said revolving eccentric ring to positively drive the feed roller, said surface and said eccentric ring having relative play less than the amount of eccentricity of said eccentric ring, and means controlled by thread breakage for stopping the rotation of said eccentric ring supporting means, whereby the positive drive of said feed roller is stopped.

11. An arrangement for stopping a thread feed, comprising a rotating shaft, a thread feed roller rotatably mounted on said shaft, and eccentric ring surrounding said shaft, means for supporting said eccentric ring eccentrically to said shaft, said supporting means being normally rotatable with said shaft whereby said eccentric ring revolves about the shaft axis, an eccentric surface on said feed roller engageable by said revolving eccentric ring to positively drive the feed roller, said surface and said eccentric ring having relative play less than the amount of eccentricity of said eccentric ring, means controlled by thread breakage for stopping the rotation of said eccentric ring supporting means, whereby the positive drive of said feed roller is stopped, and means for braking said feed roller simultaneously with the stopping of said eccentric ring supporting means, said braking means comprising a mutually engageable pin and notch on said feed roller and said detent ring.

12. A stopping arrangement for a thread feeder comprising a pair of complementary thread feed rollers, a continuously rotating shaft for driving one of said rollers, a coupling member driven by said shaft and engageable with said positively driven feed roller, means for disengaging said coupling member from said feed roller and for simultaneously braking the movement of said feed roller, and thread feeler means for actuating said disengaging and braking means, said thread feeler means comprising an arm having a thread feeler engageable with the thread on one side of said complementary rollers, said arm being pivoted at the other side of said complementary rollers, whereby the leverage of said arm is relatively long.

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