July 18, 1967 E. J. KEZELI 3,331,543

DEVICES FOR FEEDING LENGTHS OF BREAKABLE MATERIAL

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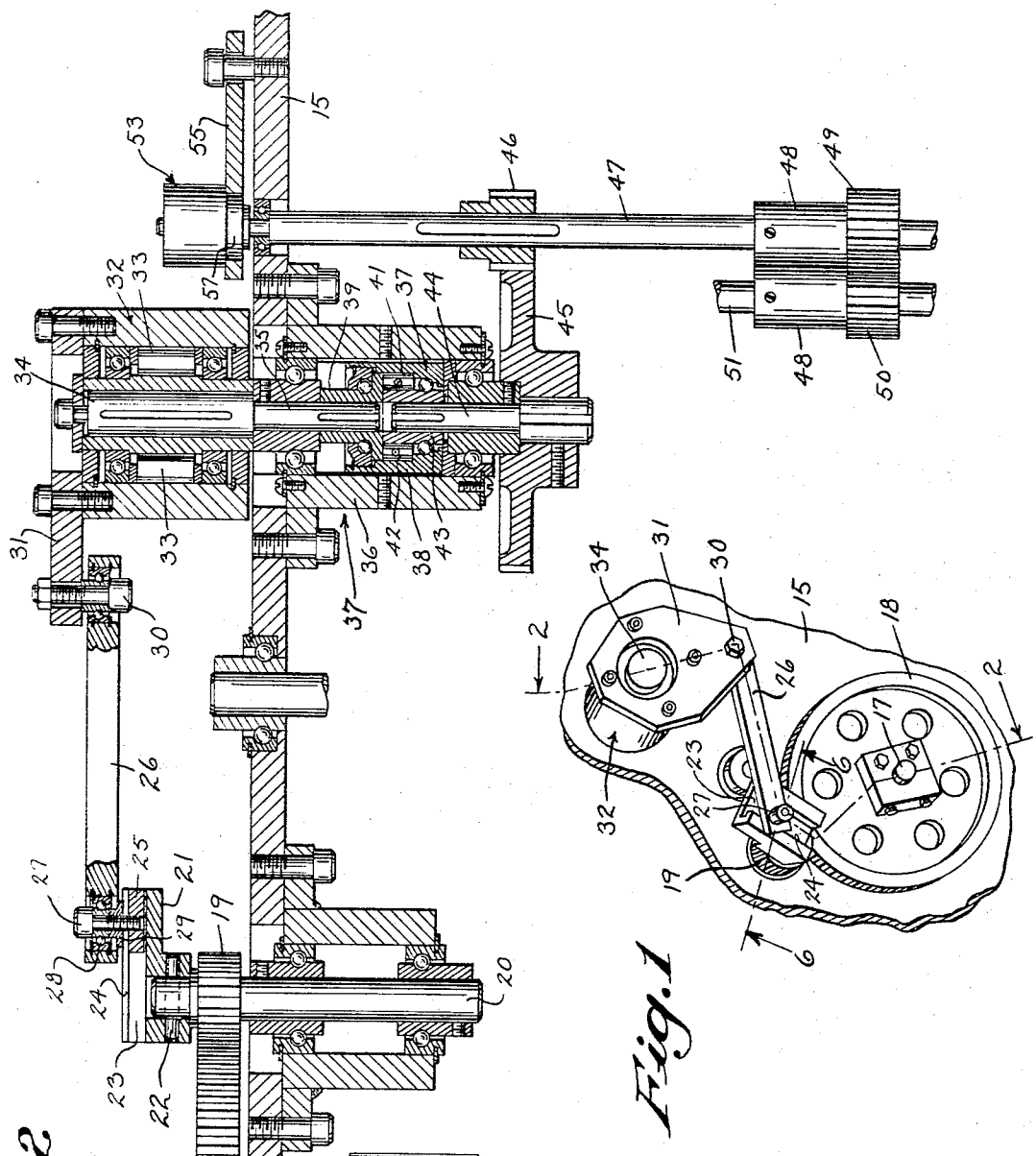


Fig. 1

Fig. 2

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Fig. 3

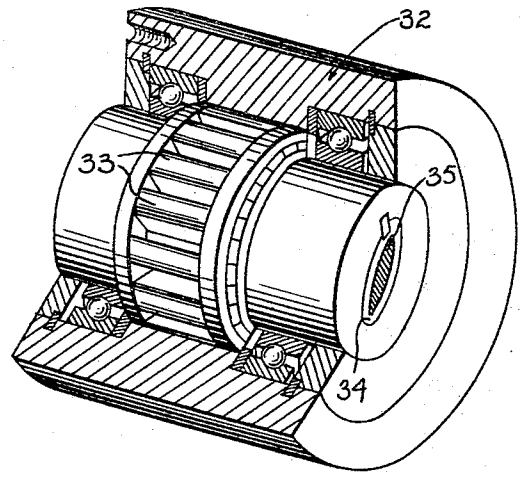


Fig. 4

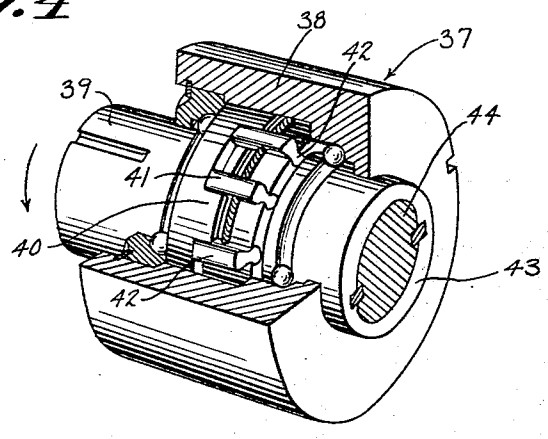
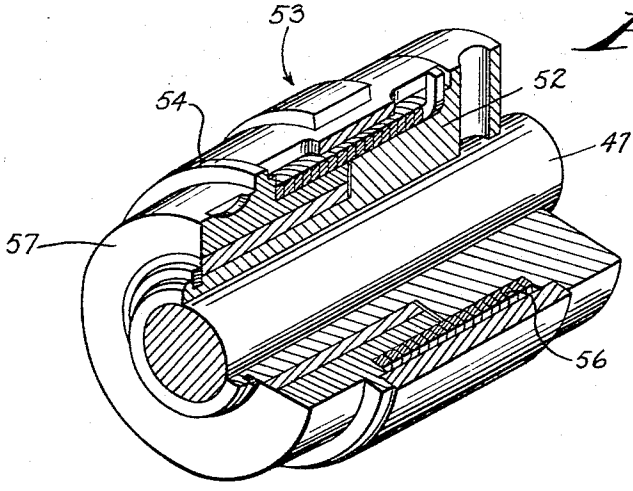


Fig. 5



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Fig. 6

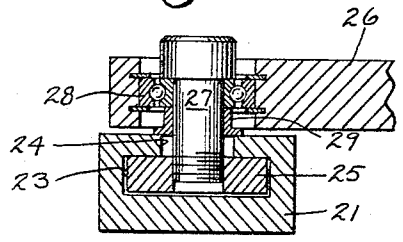
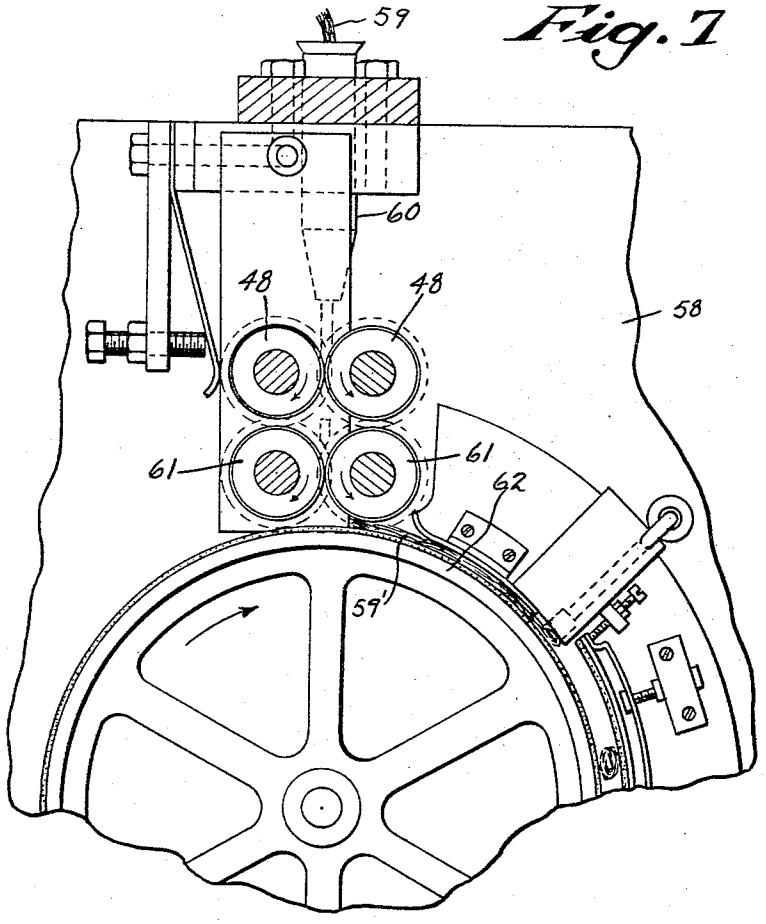


Fig. 7



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DEVICES FOR FEEDING LENGTHS OF BREAKABLE MATERIAL

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5 Claims. (Cl. 226—146)

This invention relates to improvements in devices for feeding lengths of breakable material.

In the manufacture of cotton balls or other items from cotton slivers it is necessary to remove sliver material from a supply roll, break off predetermined lengths thereof, and then feed the lengths sequentially to the device using the cotton, such as a cotton ball machine of the type illustrated and described in FIGS. 12 and 13 of Pratt Patent No. 3,065,505. In this type of machine the sliver material is withdrawn from the supply roll by a pair of intermittently driven feed rolls which in turn deliver the sliver to continuously driven feed rolls. Each time rotation of the intermittently driven feed rolls stops, the sliver length is broken off because of the continuous pull of the continuously rotating feed rolls, the latter being in a position to deliver the broken off sliver lengths to the device which is to use the same.

Heretofore there has been no way of insuring that a selected predetrmined length of the sliver was accurate, as there was always the problem of the intermittently driven feed wheels coasting after they were intended to be stopped. Such coasting increases the length of the sliver. In addition, there has sometimes been a problem of having the intermittent feed rolls reverse their direction of rotation at the time forward rotation is stopped, with the result that too short a length of sliver is fed.

It is a general object of the present invention to provide efficient mechanism for driving the intermittent feed rolls whereby the above problems of overrunning or of reverse rotation of the intermittent feed rolls is prevented, whereby the intended sliver lengths are not altered by overrunning or reverse rotation.

A further object of the invention is to provide simple and effective mechanism for readily selecting and maintaining a drive-shaft rocking movement of predetermined arcuate length, depending upon the length of sliver desired.

With the above and other objects in view, the invention consists of the improved device for feeding lengths of breakable material, and all of its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, illustrating one complete embodiment of a preferred form of the invention, in which the same reference numerals designate the same parts in all of the views:

FIG. 1 is a fragmentary perspective view showing the side of a casing and a portion of the improved drive of a cotton feeding device;

FIG. 2 is an irregular straightened-out sectional view taken approximately on the line 2—2 of FIG. 1 and looking generally in an upward direction;

FIG. 3 is a fragmentary perspective view of an overrunning clutch which is interposed between the intermittent drive and the first driven shaft, parts being broken away and shown in section;

FIG. 4 is a perspective view of a reverse locking clutch mechanism which is interposed between the clutch of FIG. 3 and the drive shaft for the intermittent feed rolls, parts being broken away and shown in section;

FIG. 5 is a perspective view of a second clutch acting on the drive shaft for the intermittent feed rolls, which second clutch is a back-stopping type to eliminate any tendency toward reverse rotation of the intermittently feed rolls;

FIG. 6 is a fragmentary sectional view taken on line 6—6 of FIG. 1; and

FIG. 7 is a side elevational view of a portion of a cotton ball machine embodying the present feed mechanism, parts being broken away and shown in section.

While the invention is applicable to a feeding device for feeding lengths of any breakable material to a device using the same, it is particularly applicable to devices for feeding cotton slivers to any type of device adapted to use the same. By way of illustration the drawings show the applicability of the device to a cotton ball forming machine.

Referring more particularly to said drawings, supported on a suitable frame member having a side **15**, is an electric motor **16** which drives a shaft **17**, suitably journaled in the frame side member to project externally therefrom as shown in FIGS. 1 and 2. Rigidly mounted on the shaft **17** to be driven thereby is a gear **18** which in turn drives a pinion **19** on a shaft **20**. The shaft **20** projects through the pinion **19** and has one end of a crank **21** pinned thereto by a pin **22**.

Referring more particularly to FIGS. 2 and 6, the crank **21** has an internal longitudinal slot **23** which is in communication with a narrower surface slot **24**. A block **25** is adjustable in the slot **23**. One end of a pitman **26** is pivoted on a bolt **27** which has its inner end threaded into the adjustment block **25**. The stem of the bolt **27** passes through a bearing **28** and through a flanged collar **29**. When the block **25** is in a selected position of adjustment the bolt may be tightened. Such tightening draws up on the block **25**. At the same time the head of the bolt acts in a downward direction on the upper end of the bearing **28**, and the latter in turn acts on the flanged collar **29** so that the flanges of the collar and the outer face of the block **25** serve to clamp the margins of the crank slot **24** therebetween to lock the block **25** in a selected position of adjustment. This affects the length of throw of the pitman **26** and hence the length of the arc of rotation of the intermittent feed rolls.

Referring again to FIGS. 1 and 2, the opposite end of the pitman **26** is pivotally connected as at **30** to the outer end of a clutch arm **31** suitably secured to a clutch sleeve **32**, the latter being mounted as shown in FIGS. 1 and 2. The sleeve **32** is part of an overrunning clutch mechanism such as a "Formsprag" overrunning clutch manufactured by Formsprag Co. With this type of mechanism when the clutch arm **31** causes the sleeve **32** to oscillate in a driving direction it acts through the sprags **33** to impart rotation in a driving direction to the shaft **34**. Referring again to FIGS. 1 and 2, it is apparent that through the crank and pitman drive **21–26** the clutch sleeve **32** is caused to rock back and forth through an arc of predetermined length depending upon the adjustment of the position of the block **25** in the crank slot **21** of FIGS. 2 and 6. Thus, when the rocking motion of the clutch sleeve is in one direction, the shaft **34** will be driven. However, when there is a return rock the sleeve **32** will overrun or "free wheel" without imparting any rotation to the shaft **34**. Equivalent ratchet and pawl mechanism may be used.

Referring again to FIG. 2, the shaft **34** has an extension **35** of reduced diameter which is suitably journaled for rotation in the frame side member **15**. Suitably supported on the inner side of the frame **15** is a housing **36** for a reverse locking clutch designated generally by the numeral **37**. This type of clutch may be one of several well known types, but is preferably a "Formsprag" reverse locking clutch. In the novel use of this type of clutch it is not used for reverse locking but to prevent overrunning of the driven shaft due to inertia.

Referring more particularly to FIG. 4, such reverse locking clutch includes a sleeve **38**. Rotatable within the sleeve is an inner sleeve **39** within which the shaft exten-

sion 35 is keyed. The sleeve 39 carries spaced control elements 40, each of which projects between a pair of opposing sprags 41 and 42. When the sleeve 39 is rotated in a driving direction the control elements 40 disengage the sprags 41 on one side from locking engagement with the outer sleeve 38 and drive the output sleeve 43 through the inner portions of these released sprags as is well known in this type of clutch. However, any overrunning or coasting movement of the output shaft 44 causes instantaneous wedging of the sprags against the stationary casing 38. Thus possibility of coasting of the driven load is eliminated.

As shown in FIG. 2, the shaft 44 drives a gear 45, and the latter drives a pinion 46 keyed to the shaft 47, which latter drives one of the intermittent cotton feed rolls 48, there being a driving connection by way of the gears 49 and 50 with the other intermittent feed roll 48. The latter is mounted on a shaft 51 suitably supported for rotation in the frame. The outer end of the drive shaft 47 for the intermittent feed rolls is journaled through the frame side member 15 and has an end portion of reduced diameter which is connected within the adaptor 52 of a backstopping clutch 53 (see FIG. 5), preferably a Curtiss-Wright backstopping clutch. Such backstopping clutch has an outer sleeve 54 and a hub 57 which is suitably held against rotation by an arm 55, the latter being connected to the frame side member 15 as shown in FIG. 2. A feature of this type of clutch is that there is a spring 56 around the shaft adaptor 52 and the mounting hub 57. The inside diameter of the spring 56 is smaller than the diameter of the drum of the shaft adaptor 52 and mounting hub 57 on which it is mounted and normally produces a diametral squeeze which causes the spring to grip the adaptor drum 52 and the mounted hub 57. When the shaft 47 for the intermittent feed rolls is rotating in a driving direction the spring 56 loosens, permitting such drive. The instant there is any tendency for the direction of rotation of the shaft 47 to be reversed this tends to cause the spring to grip both of the drums 52 and 57 to instantly stop such reverse rotation.

Referring now to FIG. 7, the numeral 58 designates a frame member of a suitable cotton sliver receiving machine such as a cotton ball machine of the type illustrated and described in FIGS. 12 and 13 of Pratt Patent No. 3,065,505. In this type of machine a sliver of cotton is adapted to be withdrawn from a suitable supply roll, not shown. The sliver is guided through a guiding tube 60 to the intermittent feed rolls 48, which rolls are driven by the mechanism heretofore described. Coacting with the intermittently driven rolls 48 is a pair of continuously driven rolls 61 which are positioned to deliver broken off slivers 59' of predetermined length to the device which is adapted to use the same, such as to the wheel 62 of the cotton ball forming machine heretofore referred to.

Operation

In operation, with the sliver receiving wheel 62 of FIG. 7 suitably driven and with the rolls 61 continuously driven, the intermittent feed rolls 48 will be intermittently driven by the mechanism of FIGS. 1 and 2. In this mechanism the continuously rotating gear 18 causes a continuous driving of the pinion 19 and operation of the crank 22. Through the pitman 26 the clutch arm 31 will be oscillated back and forth to produce a rocking motion of the shaft 34. In one direction of movement this will drive the shaft 47 for the intermittent feed rolls 48. During reverse oscillation of the clutch arm 31 there will be no movement imparted to the shaft 47 for the intermittent feed rolls 48. With the improved motion transmitting mechanism of the present invention the clutch sleeve 32 is designed to overrun in the reverse direction of the clutch arm without imparting any of such reverse rotation to the driven shaft 34. Inasmuch as there is a tendency for conventional cotton feed wheels to coast after the application of torque in a driving direction has stopped, the present invention prevents such coasting, as the use of the clutch 37 in the particular location locks the shaft 44 against said coasting. In addition, the backstopping clutch 53 prevents any tendency of reverse rotation of the shaft 47 which might be caused by any imperfect action of the clutch 32, such as delayed release of the sprags or other locking elements therein.

As a result of the above, the intermittent cotton feed rolls 48 will be rotated through an arc of predetermined length to withdraw predetermined lengths of sliver 59 from the supply and deliver such lengths to the continuously driven feed roll 61. Each time the intermittently driven rolls 48 stop, the continuous drive of the rolls 61 will break off the cotton and deliver a broken off sliver 59' of predetermined length to the receiving wheel 62.

With the present invention all coasting of the intermittent feed wheels 48 is prevented, as well as any tendency toward reverse rotation which might be otherwise caused by the oscillatory drive at 31. Thus slivers of exactly the desired length are delivered. By preventing overrunning of the rolls 48 any increase in predetermined length of the slivers is prevented, and by preventing reverse rotation any decrease in said length is effectively prevented.

The exact length of the sliver may be accurately set by the mechanism shown in FIG. 6. Thus by setting the block 25 farther away from the axis of the shaft 20, the length of the stroke and hence the length of the arc of rotation of the intermittent feed rolls will be increased. Reverse movement of the block will decrease the length of such arc. It is also apparent that the mechanism of FIG. 6 provides a simple means for securely maintaining the desired adjustment.

Various changes and modifications and other adaptations may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What I claim is:

1. In an apparatus for feeding lengths of breakable material, said apparatus having a frame and having a pair of cooperating rotatably supported feed rolls, a continuously rotatable drive shaft journaled in said frame, a second shaft having two parts, means between said drive shaft and a first part of said second shaft for intermittently imparting partial rotation to the same in one direction, clutch means between said two parts of the second shaft for causing a driving connection between said two parts when said first part of the second shaft is being partially rotated and for locking said other part against coasting from inertia as soon as rotation of the first part stops, said clutch means being a reverse locking type clutch having a sleeve portion fixed to the frame, and means between said other part of the second shaft and the feed rolls for transmitting said intermittent rotation to the latter.

2. In an apparatus for feeding lengths of breakable material, said apparatus having a frame and having a pair of cooperating rotatably supported feed rolls, a continuously rotatable drive shaft journaled in said frame, a second shaft having two parts, means between said drive shaft and a first part of said second shaft for intermittently imparting partial rotation to the same in one direction, clutch means between said two parts of the second shaft for causing a driving connection between said two parts when said first part of the second shaft is being partially rotated and for locking said other part against coasting from inertia as soon as rotation of the first part stops, means between said other part of the second shaft and the feed rolls for transmitting said intermittent rotation to the latter, and means for locking said feed rolls against any tendency toward reverse rotation said last means being a backstopping clutch having a portion anchored to the frame.

3. In an apparatus for feeding lengths of breakable material, said apparatus having a frame with a feed roll

shaft journaled therein and with a pair of cooperating feed rolls on said feed roll shaft, a continuously rotatable drive shaft journaled in said frame, a countershaft journaled in said frame and having two parts, means between said drive shaft and a first part of said countershaft for intermittently imparting partial rotation to the same in one direction only, clutch means between said two countershaft parts for causing a driving connection therebetween whenever the first counter shaft part is being partially rotated and for locking said second countershaft part against coasting from inertia as soon as rotation of said first countershaft part stops, said clutch means being a reverse locking clutch having a sleeve part connected to the frame, and means between said second countershaft part and the shaft for the feed rolls for transmitting said intermittent rotation to the latter.

4. In an apparatus for feeding lengths of breakable material, said apparatus having a frame with a feed roll shaft journaled therein and with a pair of cooperating feed rolls on said feed roll shaft, a continuously rotatable drive shaft journaled in said frame, a countershaft journaled in said frame and having two parts, means between said drive shaft and a first part of said countershaft for intermittently imparting partial rotation to the same in one direction only, clutch means between said two countershaft parts for causing a driving connection therebetween whenever the first countershaft part is being partially rotated and for locking said second countershaft part against coasting from inertia as soon as rotation of said first countershaft part stops, means between said second countershaft part and the shaft for the feed rolls for transmitting said intermittent rotation to the latter, and means on said shaft for the feed rolls for locking said shaft and feed rolls against any tendency toward reverse rotation said last means being a backstopping clutch having an adaptor portion into which the shaft is rigidly

connected, having a hub portion anchored to the frame, and having spring means for locking said adaptor portion to said hub portion in response to such tendency toward reverse rotation.

5. In an apparatus for feeding lengths of breakable material, said apparatus having a frame with a feed roll shaft journaled therein and with a pair of cooperating feed rolls on said feed roll shaft, a continuously rotatable drive shaft journaled in said frame, a countershaft journaled in said frame and having two parts, means between said drive shaft and a first part of said countershaft for intermittently imparting partial rotation to the same in one direction only, clutch means between said two countershaft parts for causing a driving connection therebetween whenever the first countershaft part is being partially rotated and for locking said second countershaft part against coasting from inertia as soon as rotation of said first countershaft part stops, means between said second countershaft part and the shaft for the feed rolls for transmitting said intermittent rotation to the latter, and a backstopping clutch within which a portion of said shaft for the said feed rolls is connected, said backstopping clutch having means including a connection with the frame for locking said feed rolls against any tendency toward reverse rotation.

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