United States Patent

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[54] **FEED ROLL MECHANISM**
3 Claims, 3 Drawing Figs.

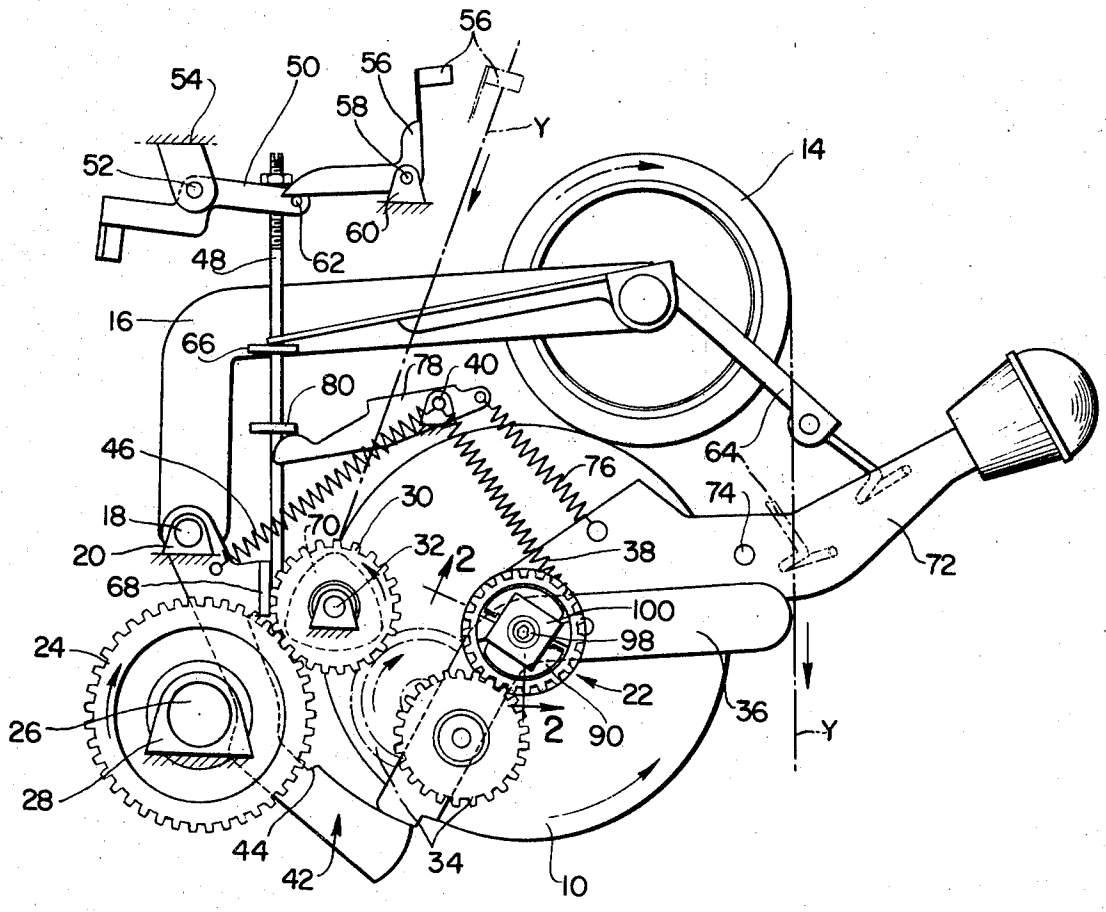
[52] **U.S. Cl.** **226/188,** 192/55
[51] **Int. Cl.** **B65h 17/20**
[50] **Field of Search** 226/11, 25, 121, 169, 188, 190; 74/63, 64; 192/415, 55; 188/102

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ABSTRACT: A positive drive strand-handling mechanism for advancing one or more strands of yarn about a feed roll. The mechanism has provision for stopping the feed roll by disengaging a train of gears in the event of strand breakage, and for absorbing shock when the gears are engaged to again advance the strand. The shock-absorbing means is a gear on a common shaft with the feed roll, the gear having slots substantially encircling the shaft with means including resilient elements in the slots for absorbing shock and drivingly connecting the gear and the shaft.



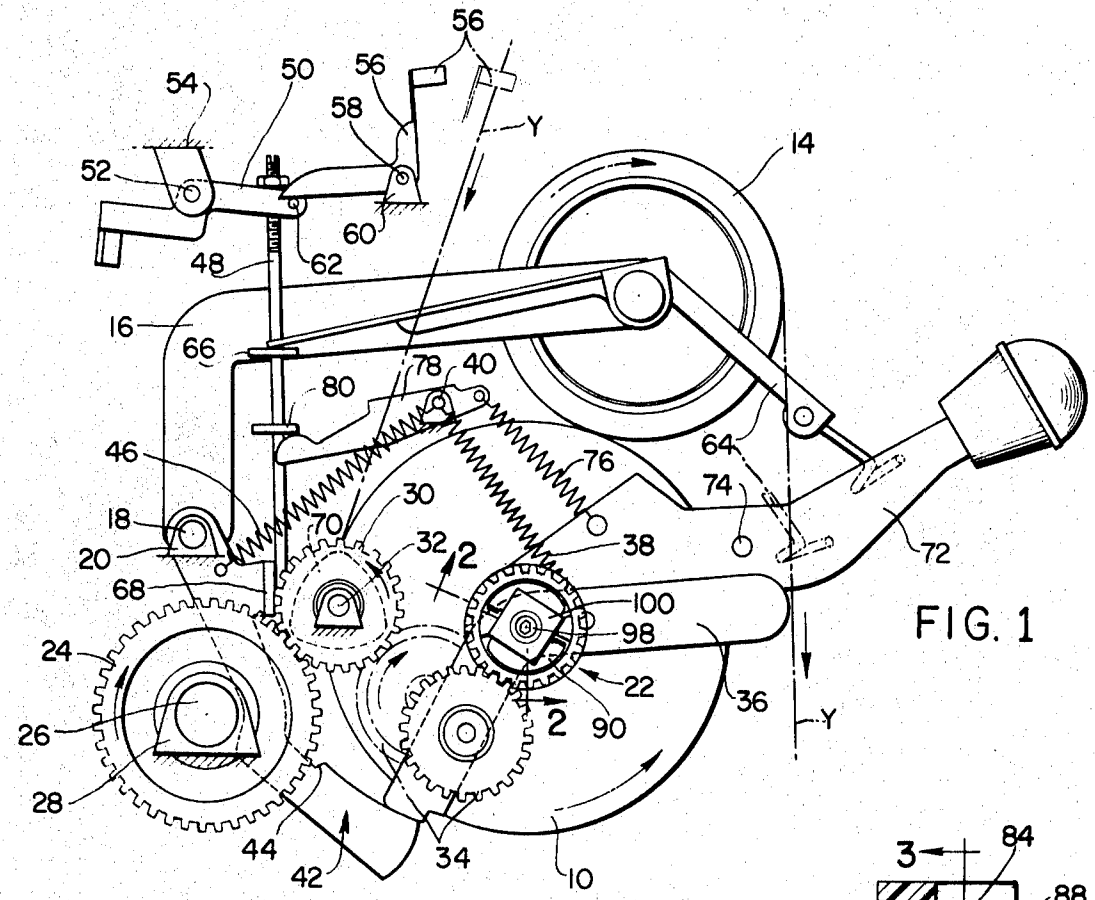


FIG. 1

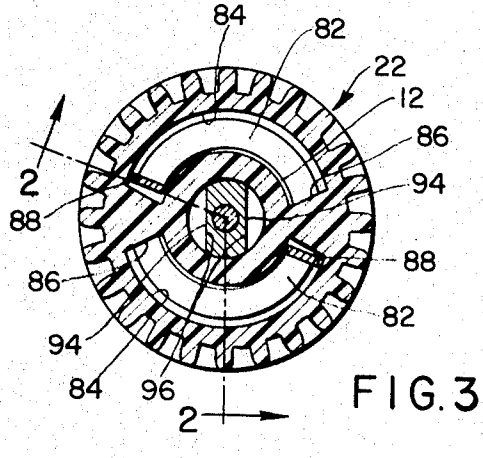


FIG. 3

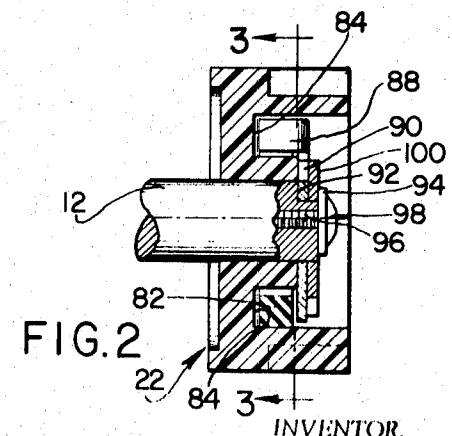


FIG. 2

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FEED ROLL MECHANISM

This invention relates to a strand-handling mechanism and, more particularly, to a disconnect and shock-absorbing apparatus in a positive drive mechanism for advancing one or more strands of yarn, and to subcombinations thereof.

As used herein the term "yarn" means any strand material, whether textile or otherwise.

Various types of strand-handling mechanisms, such as winding equipment, utilize feed rolls for advancing one or more strands of yarn. In the event that a strand breaks it is desirable to terminate operation of the feed roll until the equipment is again threaded in proper operating manner. Upon starting feeding operation of the feed roll, a positive drive is subject to considerable shock and substantially greater torque than is normally required to continuously feed the yarn. The required starting torque varies with the speed, type, denier and number of strands being feed. For example, with a fine denier strand of yarn such as 70 denier, 5 to 6 inch-ounces of starting torque may be required, and with a heavier denier strand of yarn, such as 1,000 denier, a starting torque of 11/2 inch-pounds may be required. This vastly exceeds the torque required for normal continuous advancing of the strand and such excess torque and shock may cause damage to positive drive equipment, particularly in stripping gear teeth in the feed roll drive train. Various shock-absorbing expedients have been found to be inadequate in this environment, either because of cost, bulkiness or durability and service problems. Additionally, it is desirable to provide both a simple and an effective mechanism for stopping operation of the feed roll upon a break in the strand and for easily engaging the feed roll drive when the strand is again threaded in its normal operating path.

The invention is, in brief, directed to a strand-handling mechanism in which a feed roll is driven through a gear train. Certain gears of the train may automatically be disengaged to stop operation of the feed roll in the event of strand breakage. Upon again engaging the gears to drive the feed roll, resultant shock through the gear train is absorbed by the unique shock-absorbing feature which prevents damage such as stripping of the gears. More particularly, a gear is provided with a compact shock absorbing and drive connection.

It is a primary object of this invention to provide new and improved strand-handling mechanism, and subcombinations thereof.

Another object is to provide a new and improved strand-handling mechanism having provision for stopping feeding of the strand in the event the strand breaks, and also having provision for absorbing shock when the strand is again advanced.

A more specific object is provision of a new and improved strand-handling mechanism including a feed roll for receiving the strand and a drive train including at least a driven gear drivingly connected with the feed roll and a driving gear normally drivingly coupled with the driven gear, with apparatus for automatically disengaging the driving gear and the feed roll, and provision for substantially retarding transmission of shock between the feed roll and the driving gear upon engagement of the drive train.

Still another object is provision of a new and improved shock absorbing apparatus. A related object is provision of such an apparatus in a gear.

These and other objects and advantages of the invention will be apparent from the following description and the accompanying drawing, in which:

FIG. 1 is a schematic elevational view of a strand-handling mechanism illustrating a preferred embodiment of the invention in a drivingly disengaged position;

FIG. 2 is an enlarged sectional view of a preferred embodiment of a shock-absorbing gear and is taken generally along the lines 2–2 in FIG. 1 (and in FIG. 3); and

FIG. 3 is an enlarged sectional view of the gear taken generally along the line 3–3 in FIG. 2.

Referring to FIG. 1 of the drawing, a strand-handling mechanism is shown in nondriving condition. When in normal driving condition it is operable for advancing (in the direction indicated by the arrows) one or more strands of yarn Y (phantom line) from a suitable source of supply (not shown) and about a feed roll **10** fixed on a shaft **12** (FIGS. 2 and 3) rotatably mounted in suitable fixed journals (not shown). The feed roll **10** cooperates with a pinch roll **14** journaled on an arm **16** pivoted by means of a pin **18** to a fixed support **20**.

A gear train, shown disengaged, is provided for driving the feed roll **10** and more particularly for driving a driven gear **22** journaled on the feed roll shaft **12** and resiliently anchored thereon as will be described later. The gear train includes a drive gear **24** rotatable with a drive shaft **26** mounted in fixed journals **28**, and a pair of intermediate gears drivingly coupled with the driven gear. More particularly, the intermediate gears include a knockoff gear **30** rotatably mounted on a fixed shaft **32** and a control gear **34** rotatably mounted on a free end of an intermediate lever **36** which is journaled intermediate its ends concentric with the feed roll shaft **12** and is resiliently urged toward a released position by a tension spring **38** connected with lever **36** and a fixed pivot pin **40** to be discussed later. This intermediate lever **36** and the control gear **34** are releasably maintained in a normal operating position (phantom lines) for driving the feed roll **10**, with the control gear **34** and the knockoff gear **30** drivingly engaged, by means of a latching lever **42** having one end pivoted about the pin **18** and at the other end having an offset **44** latchingly engaging the free end of the intermediate lever **36**. The latching lever **42** is urged into latching position by a tension spring **46** secured to the lever and to the fixed pivot pin **40**, as will be discussed later.

Yarn break sensor means include an actuating or knockoff rod **48** freely suspended from a mounting bracket **50** pivoted by a pin **52** to a fixed support **54** and counterweighted to maintain the rod **48** elevated during normal operation. If the strand Y breaks upstream of the feed roll **10**, yarn guide **56** pivoted by a pin **58** to a fixed support **60** is released and drops against a pin **62** on the bracket **50** to permit the rod **48** to drop. If the strand Y breaks downstream of the feed roll **10**, another pivoted yarn guide **64** is released and, acting against an abutment **66** on the rod **48**, depresses the rod. Thus, the knockoff rod **48** drops and is received between an abutment **68** on the latching lever **42** and a knockoff cam **70** integral with the knockoff gear **30**. This cam **70** is generally triangularly shaped so that an apex engages the rod **48** and causes it to move the latching lever **42** clockwise and out of latching engagement with the intermediate lever **36**. Thereupon, the spring **38** attached to the intermediate lever **36** and to the pivot pin **40** causes the intermediate lever to pivot counterclockwise so that the control gear **34** is disengaged from the knockoff gear **30**, thus stopping rotation of the feed roll **10**.

Upon rethreading of the strand Y into its normal path, the knockoff rod **48** is returned to its normal elevated position and the control gear **34** is again engaged with the knockoff gear **30** by operation of a starting lever **72**. The lever **72** is journaled concentric with the feed roll shaft **12** and is depressed so that an abutment pin **74** on the lever depresses an end of the intermediate lever **36** opposite the control gear **34** and thereby meshes the control gear and the knockoff gear **30**, thus starting rotation of the feed roll **10**. Before these gears mesh, a tension spring **76** connected between the starting lever **72** and an end of a reset pawl **78** intermediately pivoted on the pin **40**, causes the opposite end of the pawl to lift an abutment **80** fixed to the knockoff rod **48** and elevate the rod to its normal elevated position. With the yarn again advancing through the guides **56** and **64**, the rod **48** remains in its normal position.

As mentioned previously, considerable shock may result in starting the feed roll **10**. For substantially eliminating the effect of such shock, the driven gear **22** is provided with shock absorbing means, as may best be seen in FIGS. 2 and 3. Herein this means is in the form of resilient members **82** which are generally semicircular segments of resilient material such as

cast polyurethane, for example ASTM (D—2,000) 2 BG 950, either E14, E34 or F19. These resilient members **82** are received in segmental slots **84** concentric with and substantially encircling the rotational axis of the driven gear **22**. During normal driving operation these resilient members **82** are seated between abutments formed by ends **86** (FIG. **3**) of the slots **84** and other abutments **88** on a plate **90** (FIGS. **1** and **2**) seated against a shoulder **92** on the feed roll shaft **12** and suitably nonrotatably attached to the shaft **12** as by a flats **94** on the shaft and a cooperating flats **96** of an aperture in the plate **90** which receives the shaft. A bolt **98** overlies the plate **90** and a washer **100** and is threaded into the end of the shaft **12** to hold the plate in place. A pair of inwardly directed tabs on the plate provide the abutments **88** and engage ends of the resilient members opposite the ends seated on the driven gear abutments **86**. When not driving, the resilient members **82** fit loosely within their respective slots **84**, and upon starting rotation of the feed roll **10**, shock is absorbed by these resilient members, thus effectively preventing transmission of shock through the gears and possible damage to the assembly such as stripping of the gears. The compact nature of this construction is particularly advantageous in the present environment.

While this invention has been described with reference to a particular embodiment in a particular environment, various changes may be apparent to one skilled in the art and the invention is therefore not to limited to such embodiment or environment except as set forth in the appended claims.

I claim:

1. A strand-handling mechanism comprising means including a feed roll operatively secured to a rotatably mounted shaft for advancing a strand, a first gear mounted on said shaft, a driven second gear normally releasably drivingly coupled with said first gear for operating the feed roll to advance the strand, means drivingly coupling said feed roll and said first gear for retarding transmission of shock to the strand upon initiating advancement of the strand and including, said first gear having a pair of slots generally concentric with said shaft, a pair of resilient members, one in each of said slots, cooperating means on said first gear and said shaft for compressing said resilient members responsive to shock and for drivingly connecting said shaft and said first gear and including pairs of abutments, one for each of said resilient members, each pair including an abutment on said first gear and another abutment on said shaft, the abutments of each pair embracing the respective member, operating means for disengaging and drivingly engaging said first and second gears and including, a first lever mounted for pivotal movement and carrying said second gear, a latching lever normally releasably latchingly engaged with said first lever for releasably retaining said first gear drivingly engaged with the second gear, and actuating means for moving said latching lever out of said latching engagement with said first lever for movement of the gears out of said driving engagement.

2. A mechanism as set forth in claim **1** in which said actuating means comprises a cam on one of said gears and a cooperating abutment on said latching lever, an actuating member, and means mounting said actuating member for movement into a disengaging position between said cam and said abutment for moving the latching lever out of said latching engagement with said first lever.

3. A mechanism as set forth in claim **2** in which said mounting means normally maintains said actuating member out of said disengaging position and releases said actuating member for movement into said disengaging position responsive to a break in the strand.