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Fischbein et al.

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[54] **BAG GUIDING ASSEMBLY FOR BAG CLOSING MACHINE**

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[52] **U.S. Cl.** **112/11,** 112/252

[51] **Int. Cl.** **D05b 13/00**

[58] **Field of Search** 112/11, 252; 53/139

[56] **References Cited**

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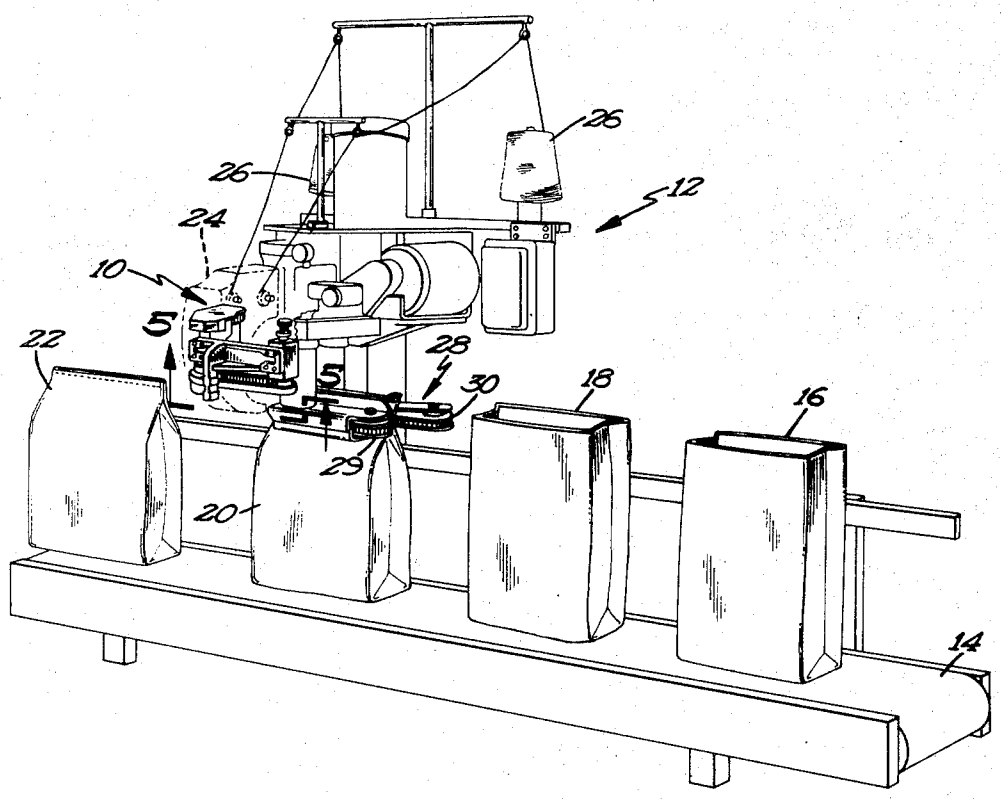
[57] **ABSTRACT**

A bag guiding assembly for cooperating with the thread chain cutter of a bag closing machine to aid in the severing of the thread chain interconnecting bag tops which have been stitched closed by the sewing head of the machine. The assembly includes a pair of cooperating rollers rotatably mounted to a frame and located on the downstream side of the thread chain cutter, the rollers and cutter being arranged along a straight line path so that a bag travels along the path past the sewing head and thence to and through the cooperating rollers so as to urge the bag top along the straight line path, the rollers exerting a pulling force on each bag passing therebetween to keep taut the thread chain interconnecting the bag tops and directing the thread chain through the thread chain cutter to insure severance thereof. A power transmission system equipped with a slip clutch drives the rollers and permits stoppage of roller rotation if a bag engaged by the rollers is prevented from moving any further along the path.

6 Claims, 6 Drawing Figures



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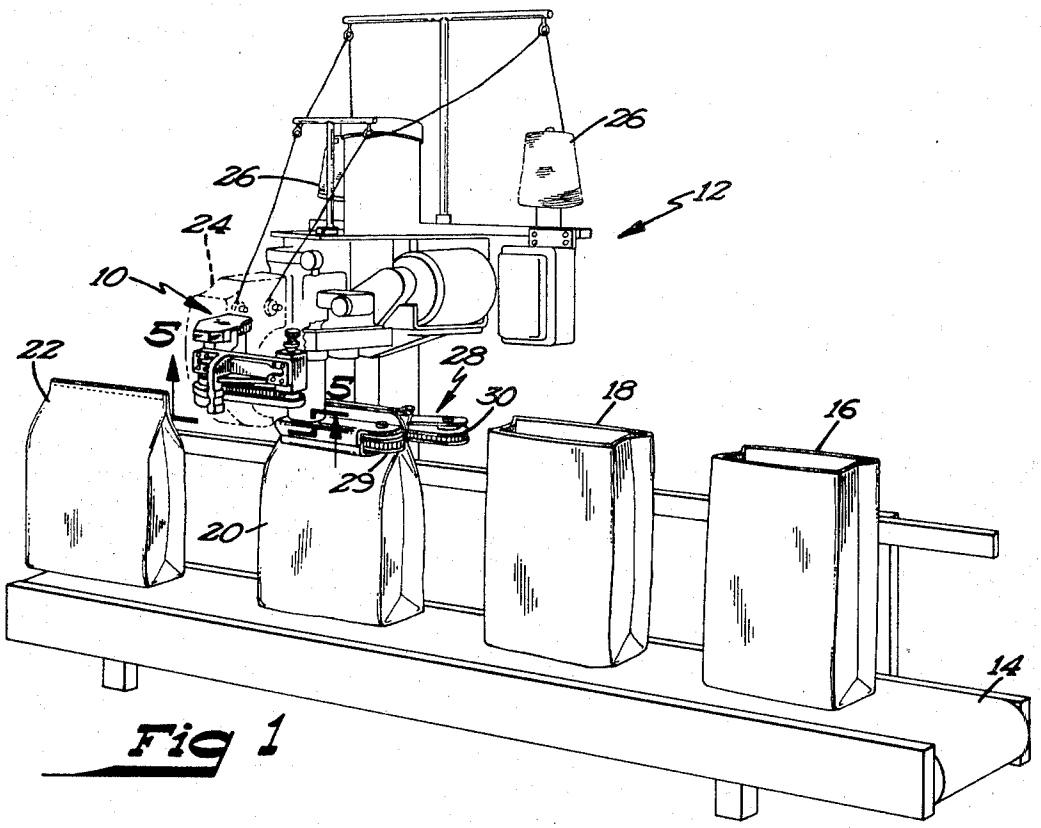

Fig 1

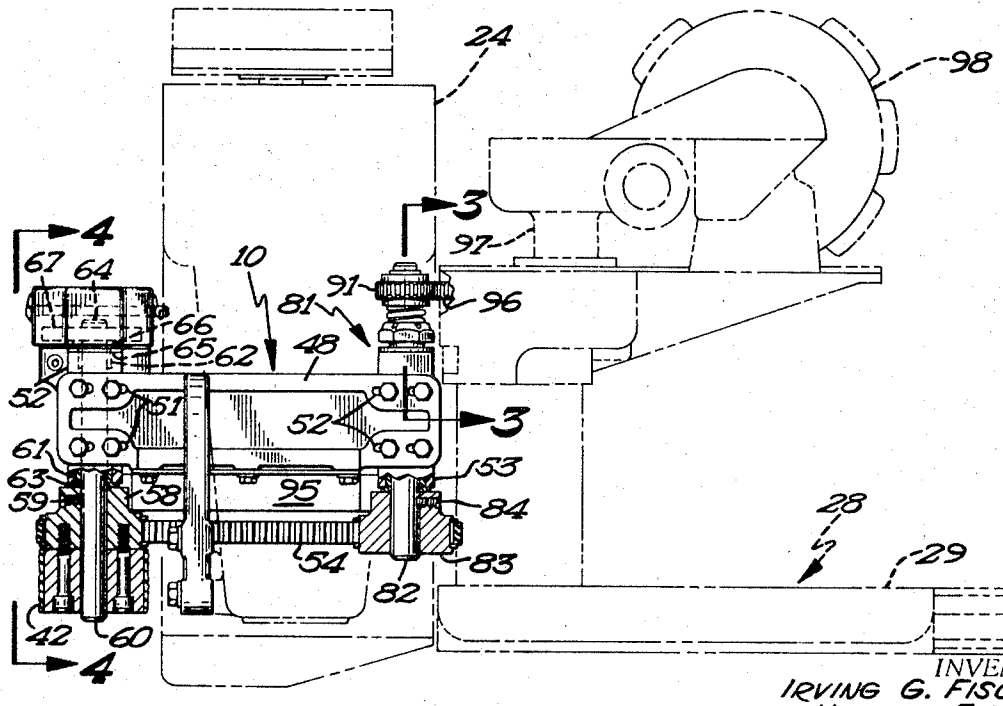

Fig 2

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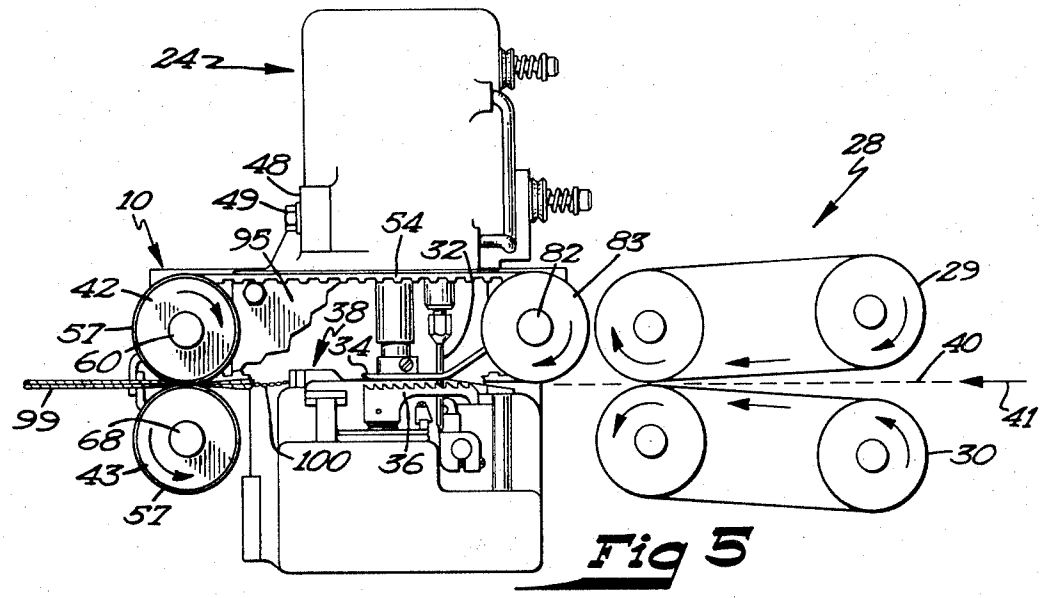

Fig 5

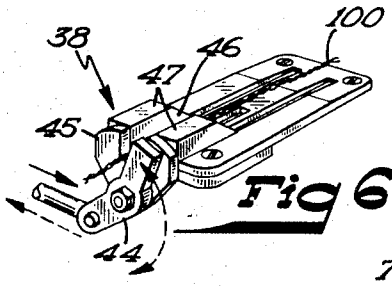

Fig 6

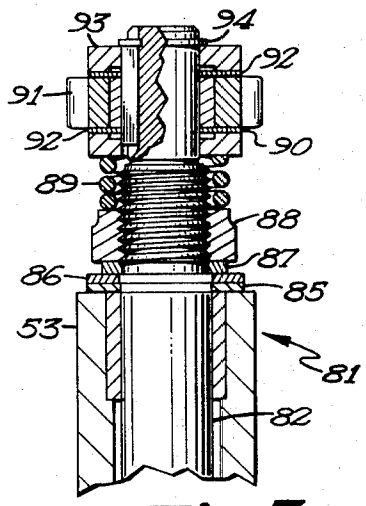

Fig 3

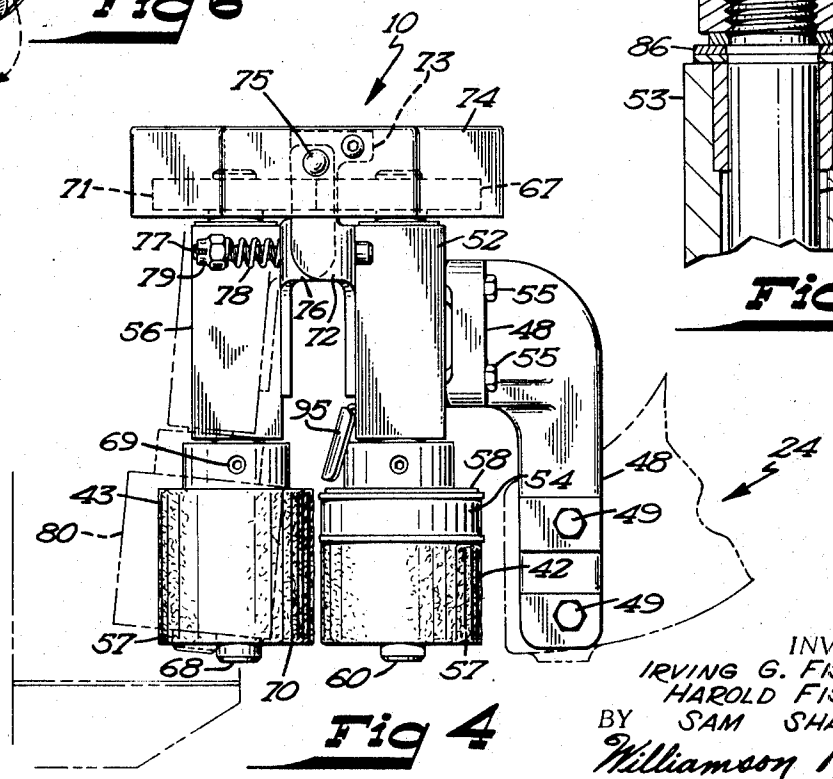

Fig 4

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BAG GUIDING ASSEMBLY FOR BAG CLOSING MACHINE

The purpose of the foregoing abstract is to enable the Patent Office and the public generally, and especially the scientist, engineers, or practitioners in the art who are not familiar with patent or legal terms of phraseology, to determine quickly from a cursory inspection the nature and essence of the technical disclosure of the application. The abstract is neither intended to define the invention of the application, which is measured by claims, nor is it intended to be limiting as to the scope of the invention in any way.

BACKGROUND OF THE INVENTION

The present invention relates to the field of bag closing machines and insures that the interconnecting thread chain between bags stitched closed by the machine's sewing needle will consistently pass through the thread chain cutter and be severed to separate successively closed bags.

Many industries require reliable, high speed bagging of their products as they pass along power conveyors to a final shipping point, and often thousands of bags per hour may pass through such a bag closing machine. To insure a continuous flow of bags from the production line to the shipping point, it is essential that the bag closing machine function smoothly and efficiently with a minimum of downtime and maintenance. When such a machine fails, the plant output is immediately affected, the product flow rapidly slowing down and soon coming to a halt. Such stoppage is felt at all points along the production line.

Bag closing machines have a sewing head positioned along the path traveled by the bags, the head having a sewing needle and a thread chain cutter therein. Upstream of the sewing head a feed mechanism encounters approaching bags as the conveyor moves them toward the sewing head, the feed mechanism properly folding each bag top prior to its passing the sewing needle where it is stitched closed. Immediately downstream of the sewing needle is a thread chain cutter to sever the otherwise continuous thread chain produced by the sewing needle and interconnecting the bag tops as they leave the needle. When the bags reach the shipping point it is important that this interconnecting thread chain has been consistently severed so each bag is a separate unit.

A common problem associated with commercially available bag closing machines is that bags flowing past the sewing needle on an often jolting and swaying conveyor can easily shift sufficiently that the thread chain does not pass through the thread chain cutter and consequently the thread chain does not get severed. To solve this problem the prior art provided a pulling apparatus downstream of the sewing head to grab and pull each bag top flowing through the head and then to bend the bag sharply and firmly against and around the sewing head adjacent the thread chain cutter so that the thread chain must pass through the cutter.

This positive grabbing of bags resulted in strain on the thread, and severe bending further increased such thread strain, the result being that the thread would break. Such breakage was especially likely if for any reason the bag was prevented from leaving the sewing head. For example, if the sewing head faltered or lagged in its stitching, the pulling apparatus generated enough force on the thread to break it or, even worse,

to damage the sewing head as it was stitching the bag. Any reduction in the stitching speed could cause the puller to generate enough tension on the bag to even break the sewing needle, thereby causing a complete stoppage of the bag closing machine and a shut down of the production line.

SUMMARY OF THE INVENTION

The invention comprises a bag guiding assembly for use with the thread chain cutter of a bag closing machine to insure the severing of the otherwise continuous thread chain interconnecting the bag tops. The invention has a pair of cooperating rollers rotatably mounted to a frame on the sewing machine, the rollers being located along a straight line path substantially passing through both the sewing needle and the thread chain cutter. After a closed and stitched bag flows past the needle and cutter, the leading edge of the bag is engaged by the cooperating rollers which are located downstream of both needle and cutter and urged along the straight line path such that the thread chain trailing behind the bag and leading to the successively stitched bag is pulled taut and directed through the thread chain cutter to insure positive severance. A power transmission system drives the pair of cooperating rollers, rotating the rollers in opposite directions to engage a bag top therebetween and urge it along the straight line path away from the sewing head. The angular velocity of roller rotation is compatible with the linear velocity of the bags as the power conveyor moves them past the sewing head. The power transmission system includes a slip clutch which interconnects a source of rotational energy and the cooperating rollers so that a bag engaged by the rollers but prevented from moving in response to the pulling of the rollers will not transmit damaging forces to the sewing head, breaking the sewing needle, the thread, or causing other damage. The use of a straight line path passing substantially through the needle and cutter results in minimal wear and strain to both bags and sewing head thereby resulting in less downtime and maintenance.

The invention is particularly well adapted to the novel thread chain cutter disclosed in now pending patent application Ser. No. 55,195, filed July 15, 1970, now abandoned, and entitled Automatic Stitch Cutting Mechanism. It should be understood, however, that the present invention can be used with other thread chain cutters known to the bag closing machine art.

The invention greatly improves dependability of bag closing machines and increases their efficiency in high production applications where minimum downtime and maintenance are essential. The invention can be used for closing any variety of bag whether constructed of textile material or paper. The invention's frame can be incorporated as a part of the frame of presently available bag closing machines or can be attached thereto as an accessory.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front perspective drawing of an automatic bag closing machine utilizing the bag guiding assembly invention.

FIG. 2 is a front elevational view of the machine of FIG. 1 showing the invention mounted on the sewing head and with peripheral components of the machine shown in outline.

FIG. 3 is an enlarged cross sectional view of a portion of FIG. 2 showing the structure of the slip clutch.

FIG. 4 is a side elevational view of the invention of FIG. 2 taken along arrows 4—4 of FIG. 2.

FIG. 5 is a bottom sectional view of the bag closing machine of FIG. 1 taken along arrows 5—5 showing the invention's use therewith.

FIG. 6 is a perspective view of the thread chain cutter of FIG. 5.

DESCRIPTION AND OPERATION OF THE INVENTION

Referring now to FIG. 1, the invention 10 is shown mounted on a bag closing machine 12 which is positioned adjacent a power conveyor 14 along which a stream of bags 16, 18, 20 and 22 move to and past a sewing head 24 where the bag tops are stitched closed. Spools 26 supply thread to the sewing head 24 where it is stitched into a thread chain which closes the tops of successively arriving bags. A power feed 28, (FIGS. 1 and 5) including a pair of cooperating chain drives 29 and 30 receives each bag top between the chains to align and fold the bag and direct it to the sewing head 24 where a sewing needle 32 completes the closure. A presser foot 34 cooperates with feed dog 36 to urge the bags toward thread chain cutter 38 and the bag guiding assembly which will hereafter be described.

The bags travel along a substantially straight line path 40 in a downstream direction 41 (FIG. 5) extending to and through the power feed 28, needle 32, presser foot 34, feed dog 36, thread chain cutter 38 and cooperating rollers 42 and 43 all the recited elements being located along the straight line path 40. Although a variety of cutters can be used with the invention, the preferred thread chain cutter 38 is shown in copending U.S. patent application Ser. No. 55,195 already referred to, which is provided with a reciprocating knife arranged to cut any thread chain passing between knife 44 and cooperating anvil 45 (FIG. 6) as the thread chain 100 passes through central slot 46 of ramp assembly 47.

Referring now to FIGS. 2 and 5, the bag guiding assembly 10 has a frame 48 mounted to the sewing head 24 by bolts 49 or other known means. The frame has elongated bolt apertures 50 and 51 at opposite ends thereof to mount stationary roller housing 52 and transmission housing 53 thereto and may be formed of any sturdy, rigid material such as steel or other appropriate material. The elongated bolt apertures permit the housing to be adjusted to tighten belt 54 which will be described hereafter.

A pair of cooperating rollers 42 and 43 (FIGS. 4, 5) are rotatably mounted to the frame 48, roller 42 having a stationary housing 52 which is bolted to the frame by bolts 55 and roller 43 having an identical housing 56 which is hinged to stationary housing 52 to achieve a floating effect to be further described hereafter.

Rollers 42 and 43 (FIG. 4) are coated with a friction producing material 57 for gripping a bag top. A pulley wheel 58 which is fixed relative to roller 42 by cap screws therebetween or other known means, forms a part of the power transmission system to be described hereafter. The wheel 58 has a plurality of spaced ridges thereon to better engage a similarly ribbed belt 54. Set screw 59 rigidly attaches the roller 42 and wheel 58 to shaft 60. Bushings 61 and 62 between stationary housing 52 and shaft 60 aid the smooth rotation of shaft 60. A bearing washer 63 is seated on shaft 60 between wheel 58 and housing 52. The remaining end 64 of the shaft 60 having bearing and thrust washers 65 and 66, respectively, separating stationary housing 52 and spur gear 67 which is keyed to the shaft. The gear 67 is retained on the shaft by a snap ring seated in an annular slot about the shaft.

Referring now to FIG. 4, the second cooperating roller 43 is retained on shaft 68 by set screw 69, the shaft 68 being substantially parallel to shaft 60 when in the normal rest position 70 shown in FIG. 4. The internal structure of housing 56 and the means of attachment of spur gear 71 to shaft 68 are identical to those described for housing 52 and will not be further described. It should be understood that the described and claimed pair of cooperating roller rotatably mounted include rollers 42 and 43, housings 52 and 56, and intermeshed spur gears 67 and 71, although other housing and gear apparatuses can be substituted and are within the purview of the invention.

Stationary housing 52 has a fixed hinge portion 72 attached thereto and extending outwardly to form a bracket 73 to which gear guard 74 is firmly attached. A pin 75 lying substantially perpendicular to the plane of the drawing in FIG. 4 and parallel to the straight line path, already described, provides a pivot to which a movable hinge portion 76 is swingably mounted, the housing 56 being attached to movable hinge portion 76 to thereby make roller 43 pivotally mounted relative to housing 52 and roller 42. A cap screw 77 extends from the fixed hinge portion 72 through an aperture on movable hinge portion 76. A coil spring 78 is placed under compression on the screw shaft and a lock nut 79 retains the spring thereon. The spring compression of spring 78 urges the movable hinge portion 76 toward stationary roller 42 but permits it to swing away from roller 42 when pushed by a bag or irregular object.

It should be understood that spur gears 67 and 71 intermesh with one another to transmit rotation therebetween and such linkage is present even when in normal operation the floating roller 43 swings outward to a position 80 spaced from stationary roller 42. This gearing arrangement assures that each bag passing between the rollers is guided and urged along from both sides of the bag by the respective rollers to assure a positive but evenly divided guiding force which results in a smooth flow of bags from the sewing head and past the cutter with a minimum of malfunction, further assuring that the thread chain 100 between bags is kept taut and is directed through the cutter 38.

Referring now to FIGS. 2 and 3 a power transmission assembly shown generally at 81 has a longitudinal shaft 82 rotatably mounted in housing 53 in a manner identical to that for shaft 60 and housing 52. A pulley wheel 83 is fixed to shaft 82 by set screw 84 to rotate with the shaft which extends through housing 53, bearing washer 85, thrust washer 86, respectively; snap ring 87 retains the shaft in the housing 53. A lock nut 88 is threaded onto the shaft 82 to rest against snap ring 87. A spring 89 rests on lock nut 88 and encircles shaft 82, the spring being placed under compression by a clutch plate 90 forced down on top thereof. A spur gear 91 having a friction washer 92 on each side thereof is next mounted on the shaft and a second clutch plate 93 rests against friction washer 92, a snap ring 94 retaining the spring loaded clutch plate 93 on the shaft. Both clutch plates are keyed to the shaft and rotate therewith, but spur gear 91 can rotate relative to the shaft and acts as

a slip clutch. The spring **89** exerts sufficient force on the clutch plate **90** so as to cause the spur gear **91** to be gripped by the friction washers and thus to rotate with the shaft under normal conditions. However if excessive resistance is encountered by spur gear **91**, slippage occurs between gear **91** and the adjacent friction washers to insure that bags passing between rollers **42** and **43** can not be pulled hard enough by the rollers to cause the thread to break or the sewing head to be damaged as will be further explained hereafter.

A belt **54** extends from wheel **58** to the wheel **83** transmitting rotational energy from the shaft **82** to the cooperating rollers. Belt **54**, which extends along and adjacent the straight line path **40** (FIG. **5**) aids in guiding bag tops into engagement with the cooperating rollers and assists in urging a bag top along the straight line path. A guard **95** extending along the belt **54** prevents bag tops from becoming entangled in the belt.

Spur gear **91** meshes with a cooperating spur gear **96** (FIG. **2**) which is part of a variable speed drive **97** leading from an electric motor **98.** The motor transmits rotational energy through the drive **97** and spur gear **96** to the spur gear **91.** Roller speed variation is achieved by adjusting the variable speed drive **97.**

It is thus seen that spur gear **91**, shaft **82**, housing **53**, wheel **83** and interconnecting belt **54**, collectively form a power transmission system with transmits rotational energy from spur gear **96** to the cooperating pair of rollers. The described slip clutch, although extremely desirable, is not essential to the effective operation of the power transmission system or to the bag guiding assembly. Without it, the puller functions acceptably in directing bags along the straight line path and assures severance of the thread chain. It should be understood that the shown transmission system is but one type of such system and that other transmission systems can be used with the invention and are within the purview thereof.

In operation, bags move along the conveyor **14** and enter the power feed **28** where they are engaged by the moving chain drives **29** and **30**, which move in directions indicated by the arrows (FIG. **5**), and directed along the straight line path **40** toward the sewing head **24.** The bags pass between the presser foot **34** and the feed dog **36** of the sewing head and are stitched closed by needle **32**, the feed dog moving in a conventional manner to urge the bag onward along the straight line path toward the thread chain cutter **38.** During this stitching operation, motor **98** supplies rotational energy to the variable speed drive **97** which transmits such rotation to the spur gear **91** through gear **96** which results in rotation of shaft **82.**

Shaft **82** rotates wheel **83** as indicated by arrow (FIG. **5**) which moves belt **54** so as to transmit rotation to wheel **58** on shaft **60.** Rotation of shaft **60** is transmitted to shaft **68** through the meshed spur gears **67** and **71.** Thus the rollers **42** and **43** rotate in opposite directions as indicated by arrows in FIG. **5** and cooperate to engage passing stitched bag **99** as the moving belt **54** guides the bag along the straight line path **40** which passes between rollers **42** and **43.** The speed of roller rotation is selected to be compatible with the speed of the conveyor **14.** It has been found helpful to have the conveyor's linear velocity slightly greater than the velocity of the rollers to insure that the rollers do not have to pull the full weight of the loaded bag. The rollers exert a pulling force on each bag therebetween to keep the interconnecting thread chain **100** taut and direct the chain through the cutter **38** so that the reciprocating knife **44** cuts the chain **100.** The friction producing material **57** on each roller provides excellent gripping contact between bag and roller to urge the bag in the downstream direction **41** away from the sewing head.

If for any reason the bag is prevented from leaving the sewing head, as for example, the stitching not yet being completed, then the increased drag on rollers **42** and **43** will cause them to stop rotating due to slippage between spur gear **91** and friction washers **92** (FIG. **3**). The degree of compression of spring **89** is selected to permit gear **91** to slip before sufficient force is generated to tear the bag, break the thread, or damage the sewing head. Thus excessive forces are not transmitted to the sewing head and the danger of needle breakage is eliminated.

If a bag has been overfilled or improperly folded in closing, the bag top may be thicker than usual and may swing the roller **43** outward from roller **42** as shown in FIG. **4.** This presents no problem since roller **43** is pivotally mounted at pin **75** and is free to float to a position where spacing between rollers is compatible with the bag thickness. As the bag leaves the rollers, the restoring spring force generated by spring **78** on movable hinge **76** pushes the roller **43** to its former position of contact with adjacent stationary roller **42.**

Accordingly it is seen that the present invention provides an apparatus which effectively assures the severance of the thread chain interconnecting closed bags without danger of the cord missing the cutter and without risk that the bag will be torn or that the sewing head will be damaged by excessive force transmitted thereto.

While the preferred embodiments of the present invention have been described, it should be understood that various changes, adaptations and modifications may be made therein without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. A bag guiding assembly for use with the thread chain cutter of a bag closing machine to aid in the severing of the otherwise continuous thread chain interconnecting the tops of bags which are stitched closed by a needle on a sewing head as the bags are moved on a conveyor along a straight line path past the needle and toward the thread chain cutter to avoid thread breakage at the needle and damage to the needle comprising:

a frame on the bag closing machine adjacent the thread chain cutter;

a pair of cooperating rollers rotatably mounted to said frame and on the downstream side of the thread chain cutter, the straight line path passing between said pair of rollers, said pair of rollers arranged to engage an approaching stitched bag top therebetween and urge the bag top along the straight line path, the said pair of rollers exerting a pulling force on the bag to keep taut the interconnecting thread chain between bags and directing the thread chain through the thread chain cutter to insure severance thereof;

a power transmission system for connecting said pair of rollers to a source of rotational energy, the system driving said pair of cooperating rollers, said system arranged to rotate at least one of said rollers so that the cooperating rollers engage a bag top therebetween and urge it along the straight line

path and away from the sewing head, the velocity of roller rotation being compatible with the velocity of the conveyor moving the bags along the path; and

said power transmission system including a slip clutch so that a bag engaged by the said pair of rollers but prevented from passing through the rollers will not transmit damaging forces to the needle or cause the thread to break.

2. The combination according to claim **1** wherein said cooperating rollers are mounted on substantially parallel shafts and each shaft has a spur gear thereon, the spur gears meshing to transmit rotation from one shaft to the other shaft to provide positive drive to each roller.

3. The combination according to claim **1** wherein a first roller is swingably mounted relative to a second roller so that the swingably mounted roller is free to swing laterally when an irregular object passes between said pair of rollers.

4. The combination according to claim **1** and further including a friction producing material on each roller to grip a bag top passing therebetween.

5. The combination according to claim **1** wherein said power transmission system includes a combined power transmitting and bag guiding belt extending from one of said rollers and along the straight line path.

6. A bag guiding assembly for use with the thread chain cutter of a bag closing machine to aid in the severing of the otherwise continuous thread chain interconnecting the tops of bags which are stitched closed by a needle on a sewing head as the bags are moved by conveyor past the needle and toward the thread chain cutter to avoid thread breakage at the needle and damage to the needle comprising:

a frame on the bag closing machine adjacent the thread chain cutter;

a pair of cooperating rollers rotatably mounted to said frame and on the downstream side of the thread chain cutter, said pair of rollers arranged to engage an approaching stitched bag top therebetween and urge the bag top between the rollers, the said pair of rollers exerting a pulling force on the bag to keep taut the interconnecting thread chain between bags and directing the thread chain through the thread chain cutter to insure severance thereof;

a power transmission system for connecting said pair of rollers to a source of rotational energy, the system driving said pair of cooperating rollers, said system arranged to rotate at least one of said rollers so that the cooperating rollers engage a bag top therebetween and urge it away from the needle, the velocity of roller rotation being compatible with the velocity of the conveyor moving the bags; and

said power transmission system including a slip clutch so that a bag engaged by said pair of rollers but prevented from passing through the rollers will not transmit damaging forces to the needle or cause the thread to break.

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