

[54] **AUTOMATIC STITCH-CUTTING
MECHANISM FOR BAG-CLOSING
SEWING MACHINES**

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[58] Field of Search 112/11, 252, 130

[56] **References Cited**

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3,478,709	11/1969	Fischbein et al.	112/11 X

FOREIGN PATENTS OR APPLICATIONS

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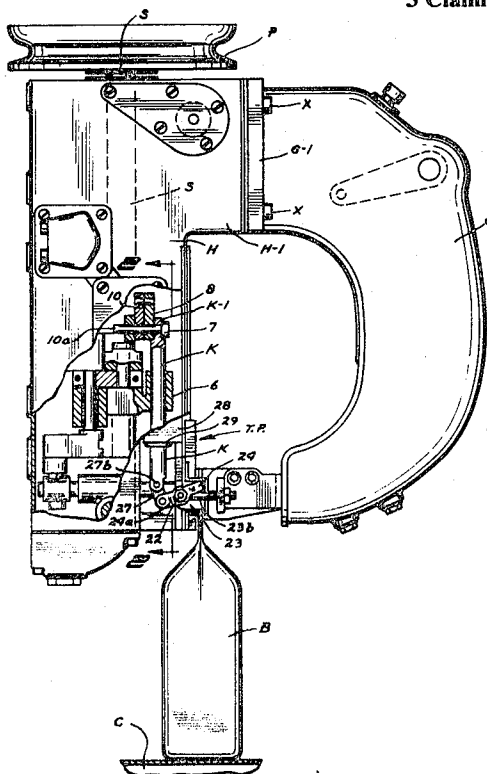
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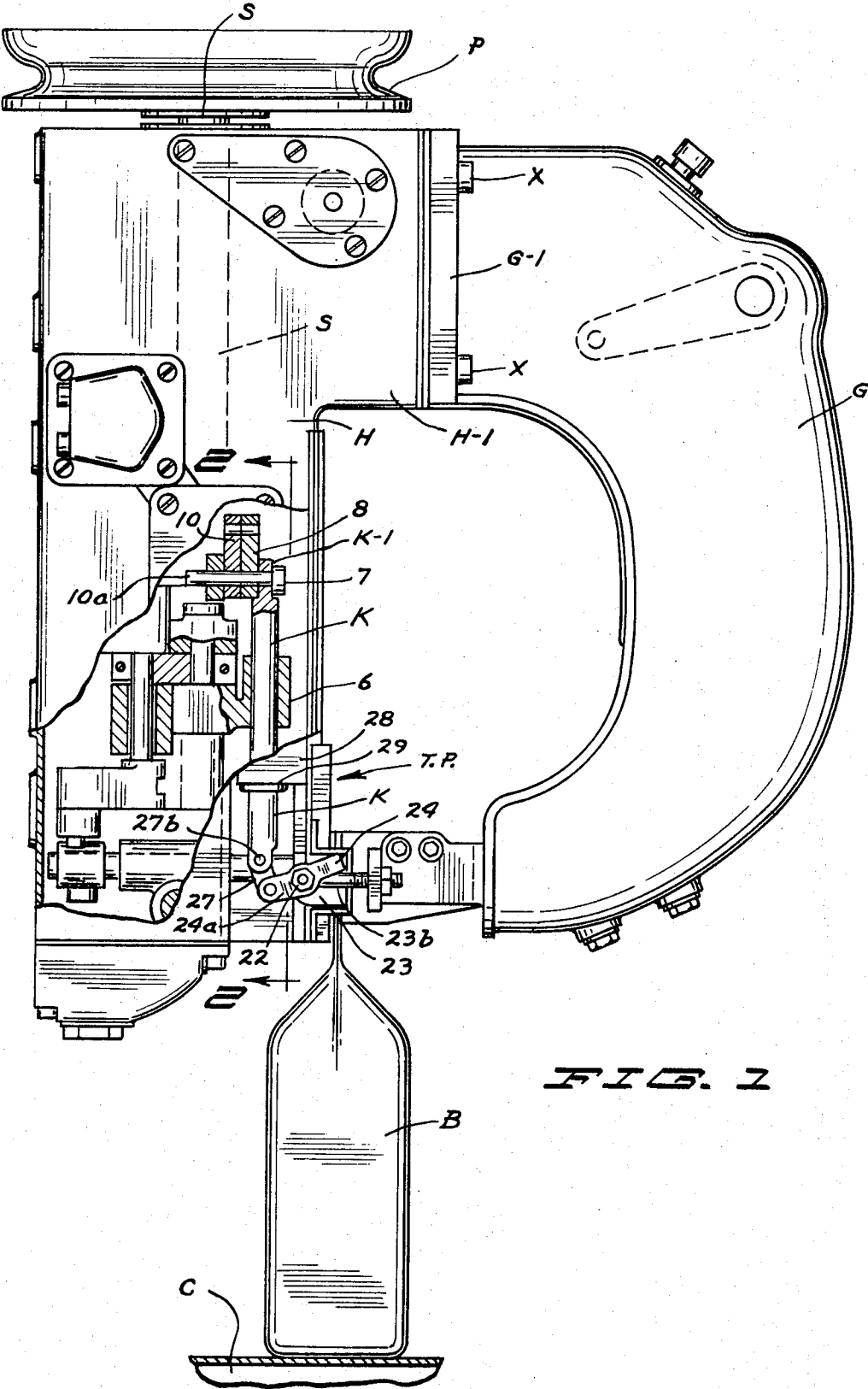
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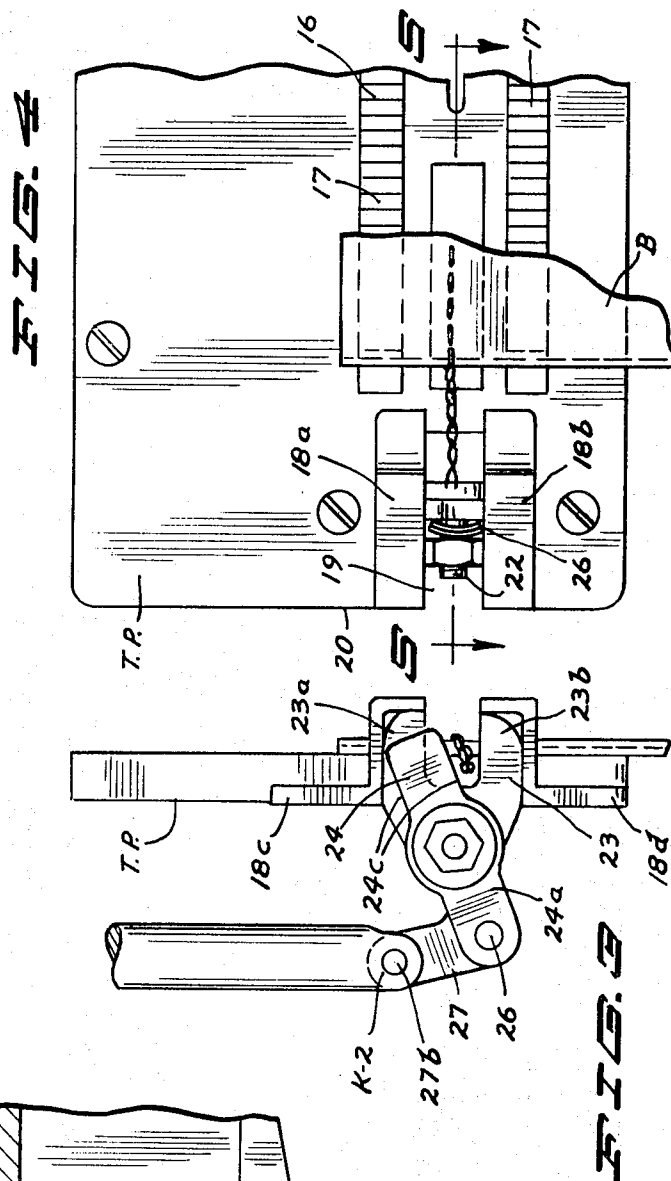
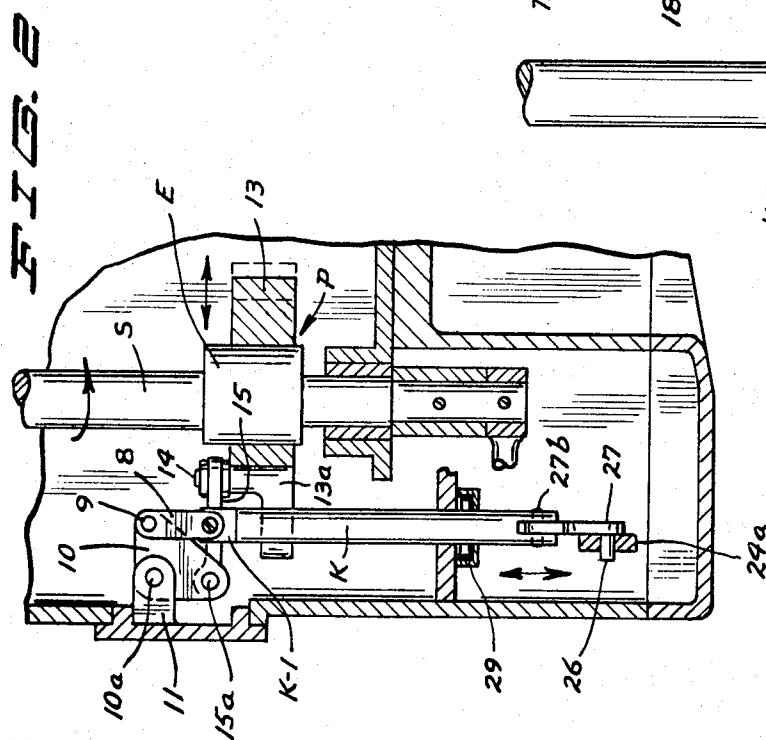
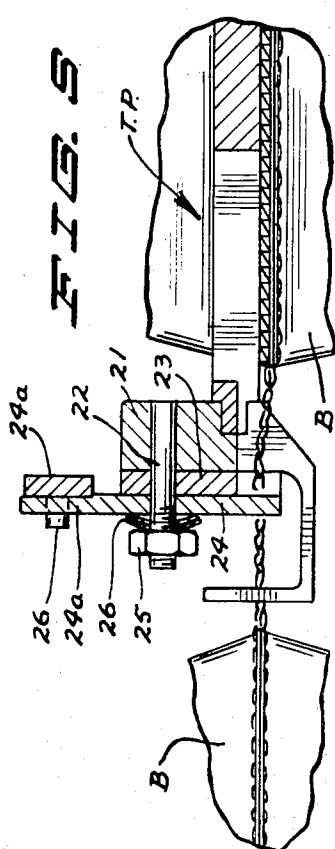
ABSTRACT

A mechanism for automatically and successively cutting the thread chain in a bag-closing sewing machine after the upper edges of each bag are stitched together which essentially employs: (a) a novel and special throat plate cooperating with the presser foot of the sewing machine for receiving and guiding the upper edges of filled bags as they are moved through the machine by carrier means, and for accommodating and assuring the cooperation of the needle mechanism and looper mechanism to stitch horizontally the upper edges in said guiding action; (b) at the bag delivery end of the throat plate an outwardly protruding bag-edge guiding ramp is provided, extending horizontally and spaced outwardly from the main body of the throat plate and joined with the body in an inclined, outwardly projected juncture and thereafter extending for a short distance in substantially planar form to an abrupt outer end; (c) a thread chain receiving slot extending longitudinally therein through said ramp and open at the bag delivery end of said ramp whereby stitching produced by the machine immediately following the trailing end of each stitched bag is automatically engaged in said slot and moved outwardly a slight distance with the trailing bag; (d) a thread chain cutting mechanism mounted inwardly of the ramp or at least its outer portion and comprising a movable sharp edge blade operating in a general plane perpendicularly of said slot and in position inwardly of said ramp; (e) and driving connections between the shiftable cutter blade and a powered element of the sewing machine to cause operation of the blade for each cycle of operation of the general components of the sewing machine.

3 Claims, 5 Drawing Figures







AUTOMATIC STITCH-CUTTING MECHANISM FOR BAG-CLOSING SEWING MACHINES

This application is a continuation-in-part of our pending application Ser. No. 55,195, filed July 15, 1970 now abandoned, and entitled AUTOMATIC STITCH-CUTTING MECHANISM FOR BAG-CLOSING SEWING MACHINES.

SUMMARY OF INVENTION

This invention relates to powered sewing machines which are particularly adapted for closing filled bags and sacks. The instant invention relates particularly to a novel automatic thread chain cutting mechanism which can be applied to a variety of bag-closing, sewing machines which employ conventional feed dog and presser foot mechanism for advancing the work.

Some of the machines of the prior art are stationary and some are portable. The stationary machines have bag carriers associated therewith which move the filled bags or sacks generally below the machine with the upper edges thereof, however, being guided and passing through the "throat" of the machine. In bag-closing machines of stationary as well as portable type, mechanism is required for driving and synchronizing the essential cooperating components which comprise the looper mechanism, the needle-operating mechanism, the material-feeding mechanism, and usually the thread-cutting mechanism.

Our invention provides a highly efficient and novel thread chain cutting mechanism which may be readily driven and synchronized with the driving means of a number of conventional bag-closing machines and which, regardless of the width of the filled bags, will automatically and immediately cut the thread chain at the completion of the closing operation on each bag without requiring any manual operation on the part of the operator.

BRIEF REFERENCE TO PRIOR ART

In practically all prior art bag-closing sewing machines the thread chain cutting knives are located beneath the throat plate of the machine. With such structure some periodically operated manual means is required to insure the cutting of the chain stitch at the end of each bag-closing operation. A variety of manually operated thread pushers have been employed in the prior art to move the thread chain at the end of the closing operation back into the throat of the machine where cutting knives are operated.

In the prior art known to applicants and their attorneys only one patent shows any mechanism for automatically, with the general operation of the sewing machine, cutting the thread chain at the completion of the closing operation on each filled bag. This Denker patent U.S. Pat. No. 3,460,494, issued Aug. 12, 1969) discloses a bag-closing sewing machine which, instead of using the feed dog and presser foot mechanism for moving and advancing the sewing work on the bag edges, requires an expensive and complicated belt drive yieldingly mounted for moving the upper edges of the bag forwardly in synchronism with the needle and looper mechanism. A special roller must be related to the belt drive for pushing or pulling the chain of thread as well as the stitched-together edges of the bag. In addition to the claimed subject matter the patent dis-

closes an automatic thread-cutting mechanism which has as required parts thereof, a special roller, a sensing device, and a leaf spring related with the special roller to automatically push the thread into a slot. Our invention relates to machines of the type employing a conventional feed dog and presser foot for moving and advancing the work (stitching and top bag edges). Our stitch-cutting mechanism requires only a stationary double track ramp having mounted therein a cutter blade mechanism which is driven in synchronization with the driving of the looper and needle mechanism of the machine. The combination of essential elements comprising our invention is very different from the cutting mechanism of said patent, employs relatively few parts and may be readily applied as an attachment to a bag-closing sewing machine employing the widely used feed dog and presser foot mechanism for advancing the work.

With our invention, elimination of any type of additional mechanical device for moving or pushing the thread chain is provided with positive assurance that the thread chain, immediately after completing the closing of each bag, is subjected automatically to a cutting structure located in a novel and highly effective position relative to the throat plate.

Our important new functions and results are accomplished by providing an outwardly raised portion which we choose to call a "ramp" in the throat plate of the machine, over which the trailing edge of the stitched portion of the bag or sack must travel in close cooperation with a thread chain-receiving longitudinal recess centrally of said ramp and in combination with a preferably double-action cutting mechanism disposed inwardly of said ramp for immediately operating on the thread confined by said recess. Our new combination is easily synchronized with the main driving shaft of the sewing machine and linkage to substantially instantly and automatically cut the thread after completion of the bag closing, greatly speeding up the capacity of the machine to a point where at least 45 bags per minute may be closed and the terminal threads cut.

It will of course be understood that the speed of the endless or other carrier for the filled bag must be properly synchronized to gain the full new advantages of our invention.

While our invention is adapted for bag-closing sewing machines of various structure in the embodiment illustrated, we have shown it combined with a sewing machine of the general construction set forth in our U.S. Pat. No. 3,478,709, issued Nov. 18, 1969.

The foregoing objects and advantages of our invention will more clearly appear from the following detailed description made in conjunction with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

FIG. 1 is a side elevation showing a bag-closing sewing machine of the general structure of our U.S. Pat. No. 3,478,709 with our new invention applied thereto and with some portions of the housing and interior parts of the sewing machine broken away, more specifically illustrating the linkage and driving parts connected with the main driving shaft of the machine for vertically reciprocating a shaft and link assembly interconnected with a double moving knife;

FIG. 2 is a vertical section, taken on the line 2—2 of FIG. 1, showing the essential driving connections, lever and shaft link for swingably reciprocating the movable cutter blade;

FIG. 3 is a detail elevational view showing a linkage connection from the shaft link to the swingable, double reciprocating knife;

FIG. 4 is a detail elevational view with the needle-reciprocating portion and presser bar removed from the machine, showing the exterior of the throat plate and ramp, and illustrating the leading edge of a stitched bag and the involvement of the thread chain and cutting immediately after bag stitching is completed; and

FIG. 5 is a horizontal section taken substantially along the line 5—5 of FIG. 4.

Referring now in detail to the embodiment of the invention disclosed, it has been applied to the general construction of bag-closing sewing machine for applicant's U.S. Pat. No. 3,478,709. This structure employs a large, generally vertical housing, indicated as an entirety by the letter H, which has mounted therein on suitable and several bearings (not shown) a main vertical driving shaft S, provided as shown with a power take-off pulley P affixed to the upper end thereof. As said patent shows, said shaft has successively applied thereto at lower and various levels, a number of eccentrically driven pitman mechanisms which are successively (from the top of shaft S downwardly) interconnected with the driving mechanisms for: (a) the needle of the sewing machine; (b) the looper mechanism; (c) the work-advancing or feed dog mechanism. The elongate and arcuate needle bar of the patent, as well as the elongate presser-foot-arm are not shown in detail in the instant case, but are housed in a large, depending guard housing G having a squared and flanged upper end G-1 which is rigidly affixed to an overhanging rectangular upper portion H-1 of the general housing H, by suitable means such as heavy bolts X. Preferably applicants' stitch-cutting mechanism includes a longitudinally reciprocating element, vertically disposed in the embodiment of the invention illustrated, and there constituting an elongate link shaft K which is synchronized with the movements of the needle-driven mechanism, the looper mechanism, and the work-progressing dog mechanism.

It will be understood that the invention is not limited to a link shaft or element which must reciprocate vertically, but that swinging reciprocations may be employed in lieu thereof. A vertical, reciprocating link shaft K of the form disclosed is slidably mounted in a stationary vertical bearing 6 (see FIG. 1) which is rigidly mounted at its far side, not shown in the drawings, upon a vertical wall at one side of housing H. Shaft K, at its upper end K-1, is flattened and is pivotally attached by a readily removable pivot bolt 7 to a horizontally pivoted link 8 connected at its upper end by a horizontal pin 9 (see FIG. 2) with a triangular bellcrank lever 10 having its medial portion pivoted on a pivot pin 10a, which is mounted between the sides of a U-bracket 11 rigidly secured to a portion of the general housing H.

For actuating the bellcrank lever (swingable reciprocation), a pitman device, generally indicated as P, is mounted somewhat above the lower end of shaft S, and

as shown in cross section in FIG. 2 comprises an eccentric cylinder E affixed to the shaft, having surrounding the same a thick pitman block 13 which has an extension portion 13a at the left thereof, as shown in FIG. 2, having an upstanding vertical pin 14 which is gyrated by action of the pitman and travels in a substantially horizontal path, generally perpendicular to the axis of shaft S. A link 15, pivotally connects the upstanding gyrated pin 14 with the depending end of bellcrank lever 10, link 15 being flattened at its left hand portion in FIG. 2, said flattened portion being pivoted to the lower corner of the bellcrank lever 10 by a pin 15a. The extension 13a of the thick pitman 13 is disposed some distance rearwardly with more than adequate clearance from the vertical link shaft K as shown in FIG. 2.

We will now describe the novel structure of our throat plate and cutting knives, which in combination provide the new, automatic and valuable functions primarily of our invention.

The heavy, conventional, rigid throat plate of the sewing machine, indicated as an entirety by the letters TP, has in general a slightly curved contour and a somewhat inclined bag-edge-receiving portion (at the right as viewed in FIG. 4) and indicated as 16. It is provided with a horizontal slot 17 in conventional manner, and the doubled upper edge of a filled bag B, smoothly is moved by action of the bag-carrier, from right to left of the throat plate, as shown in FIG. 4, by the carrier and by the feed dog mechanism of the sewing machine.

The stitching line and portions of the stitching and of the upper edges of the bag, are shown in FIG. 4. Protruding outwardly from the face of the throat plate TP and extending horizontally, is a ramp structure comprising a pair of parallel bag-guiding tracks 18a and 18b, spaced apart to define an elongate stitch-receiving recess 19. The left end of the throat plate TP is rectangularly recessed to the extreme left edge 20 and the tracks 18a and 18b of the ramp, as shown, are of right angular cross section (see FIGS. 5 and 3), having broad outwardly angular attachment feet 18c and 18d which are rigidly affixed to the inside surface of the recessed portion of the throat plate. The tracks 18a and 18b extend in parallel spaced relation and incline upwardly, as clearly shown in FIG. 4, from the right hand ends to their intermediate portions which form the upwardly projecting or raised ramp for guiding the trailing ends of the stitched upper edges of the filled bags.

On the back or inward surface of the throat plate TP a rather heavy attachment boss 21 is integrally formed or rigidly attached, the left hand end extending to the rectangularly recessed portion in the throat plate and carrying a horizontal pivot post 22 for mounting of the cutter knives. As shown, a stationary, double cutter knife 23 of general V-shape configuration is mounted on pivot post 22 (but not for oscillation) and is retained in stationary position by conformance on its exterior sides 23a and 23b of the V-shape, within the interior of the ramp tracks 18a and 18b.

A swingably reciprocating, double action knife 24 is pivotally mounted outside of the stationary double knife 23 and pivoted to post 22, and, as shown, a retaining nut 25 is screw-threaded upon the outer portion of the pivot post 22 and has interposed between it and the reciprocating knife 24 a friction washer 26. The reciprocating knife 24 has an actuating extension 24a

extending from the left end thereof, which is smoothly and cylindrically apertured to receive and journal a pin 24b which extends from a flat surface 27a of a short link 27. The upper end of link 27 carries a connection pivot pin 27b which fits within and is journaled by a suitable aperture K-2 formed in the lower and flattened end of the link shaft K.

From FIGS. 3 and 1 it will be seen that the operating elements of our cutter mechanism, including the reciprocating knife 24 which has sharp cutting edges at both of its longitudinal sides, and the stationary double knife 23 which has the two sharpened inner edges 23b, are disposed outwardly of the inner surface of the throat plate TP enlarged, rectangular recess formed in the left end of the throat plate. These working parts are guarded and protected by the guide rails 18a and 18b of the ramp but the longitudinal slot of the ramp 19 must necessarily receive the chain stitch at the trailing side of a bag after that bag has been fully stitched and then passes and is guided smoothly over the rails 18a and 18b of the ramp.

The length of the actuating extension 24a of the reciprocating knife and the length of link 27a connected therewith are properly dimensioned during reciprocation of the shaft link K to produce swinging reciprocation of the movable knife 24 through an angle approximating 30°.

As will be seen in FIG. 1, the vertically reciprocating link shaft K passes through an offset partition portion 28 of housing H which, as shown, is disposed close to the top edge of the throat plate TP. Link shaft K is sealed with respect to the offset partition 28 of the housing by a pair of sealing gaskets 29 affixed to the bottom of the said horizontal partition 28. This is essential in the form of the invention disclosed since it is here cooperated with a self-lubricating system for all the parts of the sewing machine, as clearly set forth, described and illustrated in applicants' U.S. Pat. No. 3,478,709.

OPERATION

With the driving of the main shaft S of the sewing machine at the predetermined r.p.m., all of the several driving and connection mechanisms for the needle, the looper, and the feed dog mechanisms are synchronized for one cycle of operation during each revolution of the main shaft S. This is also true of driving and linkage mechanism for vertically reciprocating the shaft link K. More particularly, in reciprocating link K (see FIG. 2) the eccentric E fixed to the lower portion of shaft S gyrates pitman 13 which at its left extension 13a is connected by upstanding pin 14 with the link 15. In the movement of the pitman, link 15 is moved mainly longitudinally and horizontally, and imparts that motion to the lower depending end of the triangulated bellcrank lever 10, thus swingably reciprocating the bellcrank in and for every revolution of the main driving shaft S. The pivot pin 15a at the upper end of the bellcrank through its interconnected link 15 vertically reciprocates the link shaft K which, through its connection at the lower end with short link 27, swingably reciprocates the movable cutter knife 24.

Cutter knife 24 is double action in nature, having both of its longitudinal edges sharpened to cooperate with shearing effect with either of the shearing edges

23a and 23b of the double bladed bed knife 23. It should be noted that if the trailing stitching following the trailing edge of a stitched bag is disposed in the receiving slot 19 of the ramp, it will be automatically and necessarily severed in the cycle of operation of the reciprocating, swingable double edged knife 24. Thus the movable knife 24 makes a full cycle for every revolution of the main driven shaft S of the sewing machine.

From the foregoing it will be seen that immediately after the upper edges of every bag has been stitched, and the trailing stitched edge of the bag passes over the ramp constituting the bag-guiding tracks 18a and 18b, the trailing thread chain, horizontally disposed, positively drops into the slot or thread chain-receiving recess 19 of the ramp, and is severed close to the trailing edge of the bag.

In exhaustive tests of our inventive structure, we have determined that with bags placed upon a horizontally moving carrier in close spaced relation and with the speed of the carrier synchronized properly with speed of the stitching operations of needle and looper, and work-moving dog, the capacity and speed of the overall bag-closing operation may be very substantially increased, and in fact bags averaging 10 inches in width may be stitchedly closed and the thread chains severed at a speed up to 50 bags per minute, all without requiring attention of an operator to manually push or actuate any thread-cutting mechanism.

The assembled unit of our invention is sturdy in nature and with modifications may be applied to the housing or throat plate of many types of sewing machines. It may be inherently formed and manufactured with the manufacture of a complete sewing machine or, if desired, may be applied as an attachment for bag-closing sewing machines now in use.

It is to be understood that the driving and synchronizing connections for actuating our cutter mechanism are not limited to the specific linkage and pitman drive disclosed in the drawings, but may vary widely in form, depending on the source of power or shaft of the main sewing machine as long as such connections reciprocate the movable cutting knife in synchronism with the cycles of operation of the needle, the looper, and the feed dog of the machine.

What is claimed is:

1. For use with a sewing machine of the type for stitching together and closing the lapped upper edges of filled bags and sacks where continuous stitching in a horizontal line is effected and where advance of the material stitched is accomplished solely by a feed dog and presser foot mechanism working in cooperation with a stationary bag-edge-guiding, throat plate, and wherein said machine includes a conveyor for causing filled bags to travel through a horizontal course at a speed synchronized with the advance of the bags during stitching,

mechanism for automatically cutting the thread chain produced by said sewing machine after sequential stitchings of said horizontally moved filled bags are respectively completed, having in combination:

the guiding surface of said throat plate having a receiving end and a delivery or trailing end, a mounting structure rigidly attached to the delivery or trailing end of said throat plate,

a stationary bag-edge guiding ramp constituting a part of said mounting structure and extending convergingly from the trailing end of said throat plate for a relatively short distance and diverging outwardly therefrom,

said ramp comprising two parallel, generally horizontally extending tracks defining therebetween a deep, straight slot horizontally aligned with the line of stitching of the machine, said tracks in operation of the machine guiding the stitched edges of bags along a path disposed outwardly of the line of stitching of the machine and ending abruptly at the track ends opposite from said convergence with said throat plate, whereby the trailing upper edges of stitched bags successively and automatically drop inwardly towards the housing of said machine, causing the line of stitching to positively be disposed in said deep recess,

thread cutting mechanism mounted inwardly of said ramp and having a movable sharp-edge blade operating in a plane generally perpendicu-

lar to said slot for cutting said thread chain whenever said thread chain is moving within said slot, and

driving connections between said blade and a powered element of said sewing machine for operating said blade for each cycle of operation of the components of said sewing machine.

2. The structure and combination set forth in claim 1 wherein said thread cutting mechanism comprises in combination with said movable blade, a stationary, sharp-edged bedknife disposed in shearing relation to the movable blade.

3. The structure and combination set forth in claim 2 wherein said driving connections for the shiftable blade of said thread chain cutting mechanism comprises a longitudinally reciprocating link having at its lower end a link connection with said movable blade for swingably reciprocating said blade and having at its upper end linkage connection with the main driven shaft of said sewing machine to produce said longitudinal reciprocation of said first mentioned link.

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