April 9, 1963 D. W. MATCHETT ET AL 3,084,647

THREAD DISPOSAL SYSTEM FOR SEWING MACHINES

Filed June 28, 1960 4 Sheets-Sheet 1

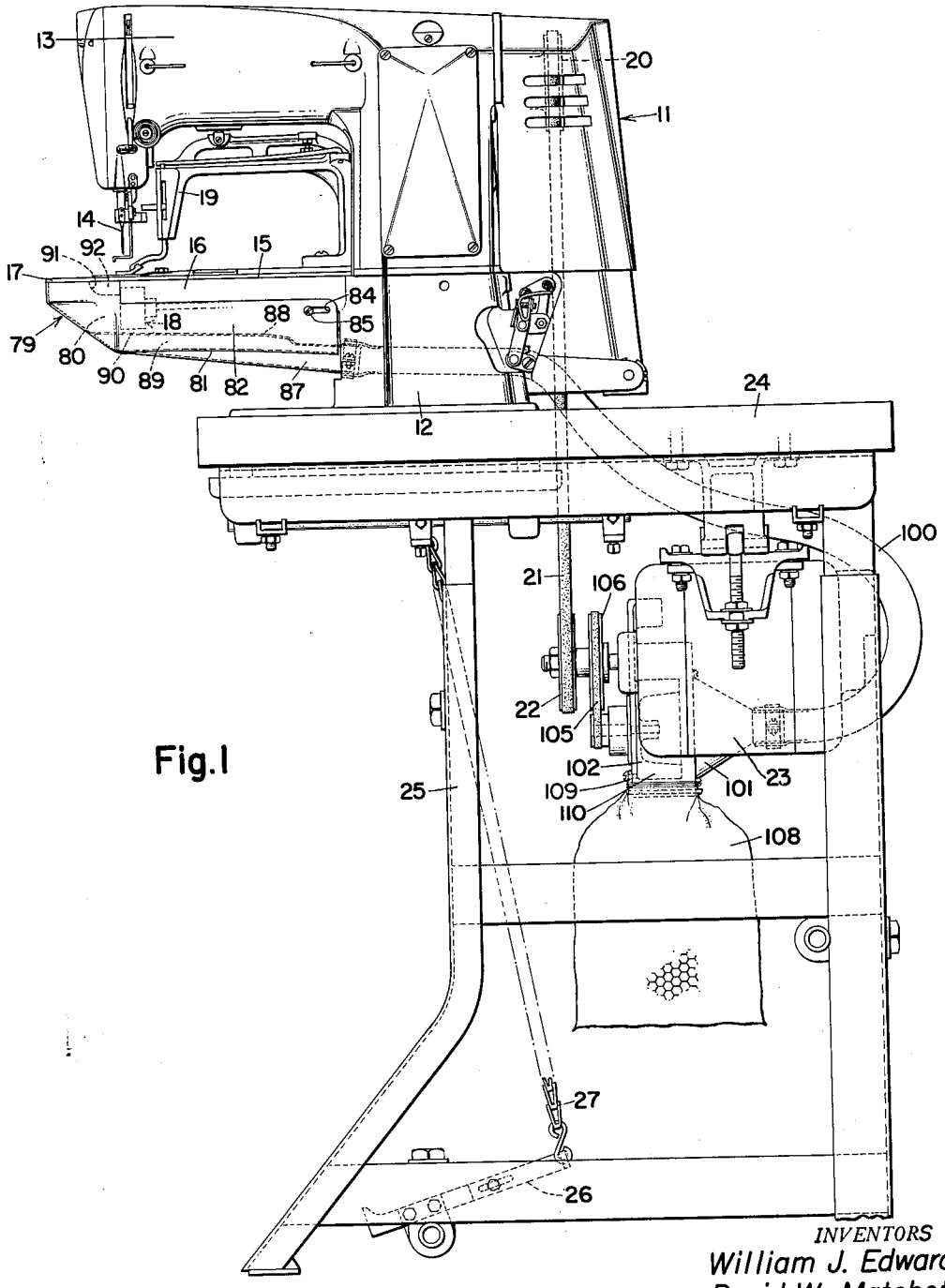



Fig.1

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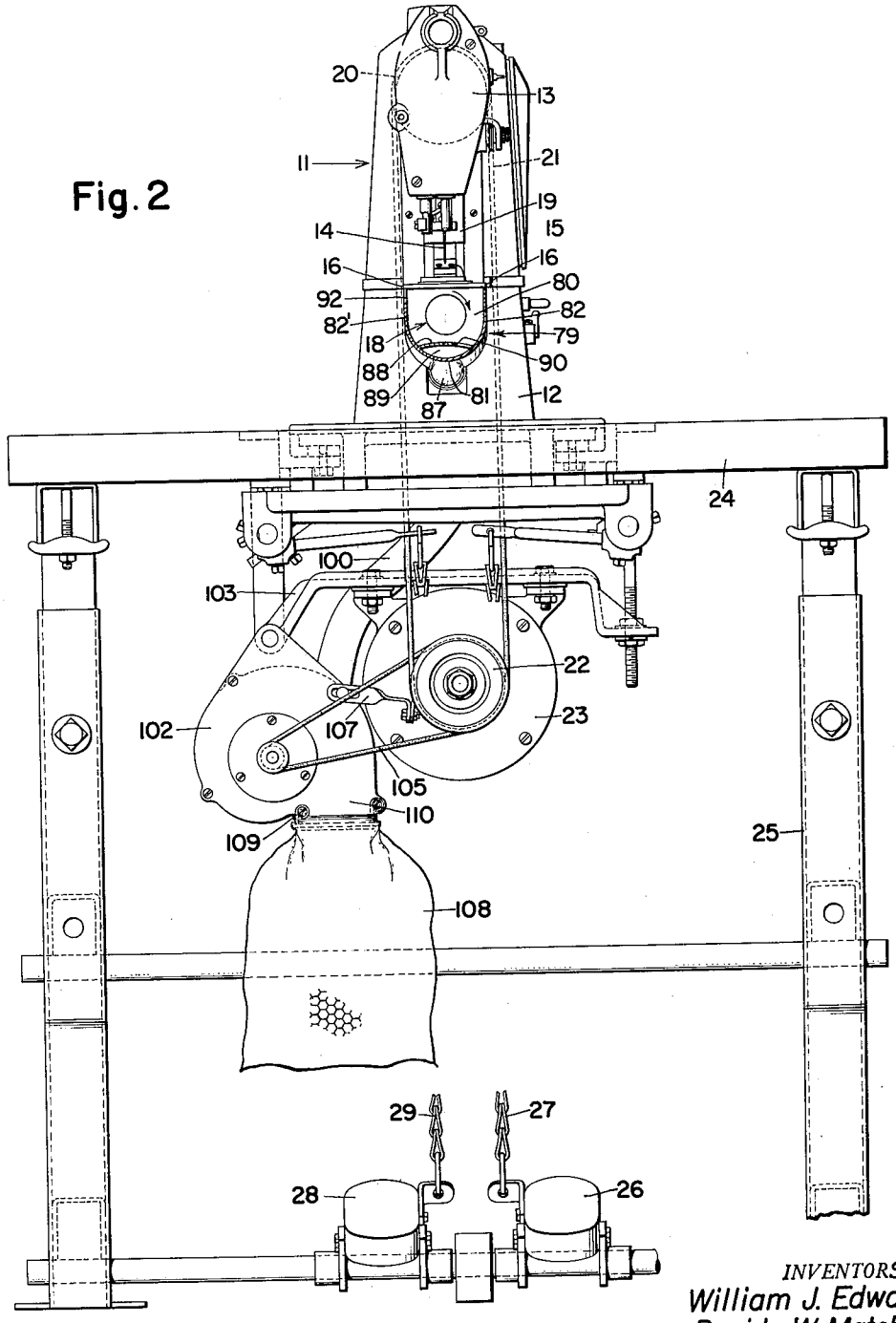
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THREAD DISPOSAL SYSTEM FOR SEWING MACHINES

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Fig. 2




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THREAD DISPOSAL SYSTEM FOR SEWING MACHINES

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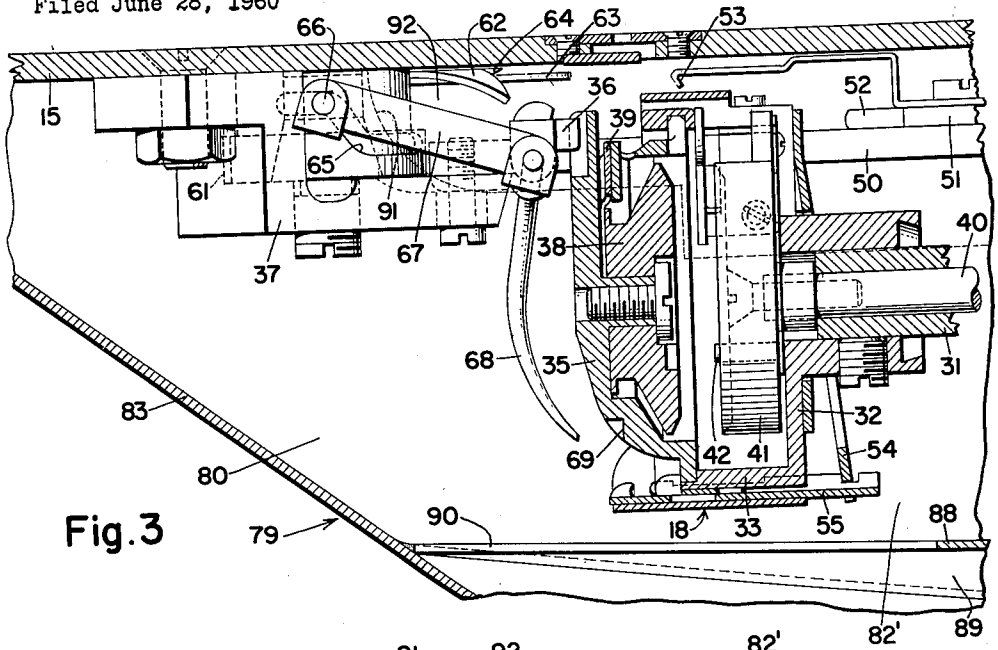



Fig.3

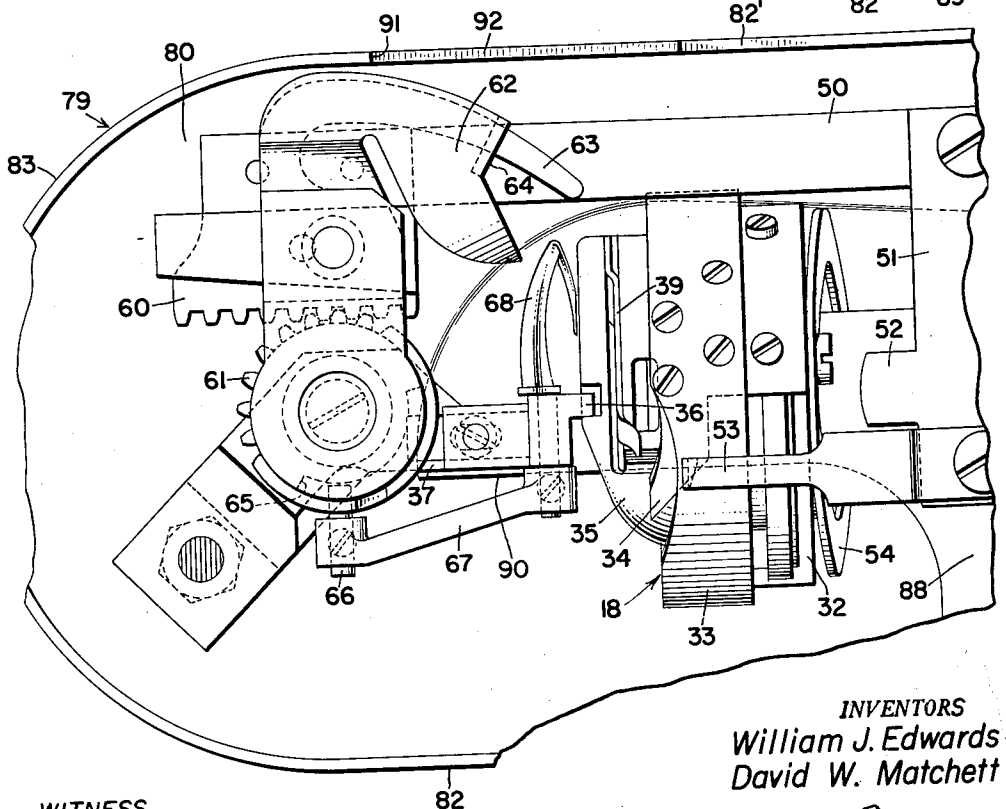



Fig.4

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THREAD DISPOSAL SYSTEM FOR SEWING MACHINES

Filed June 28, 1960 4 Sheets-Sheet 4

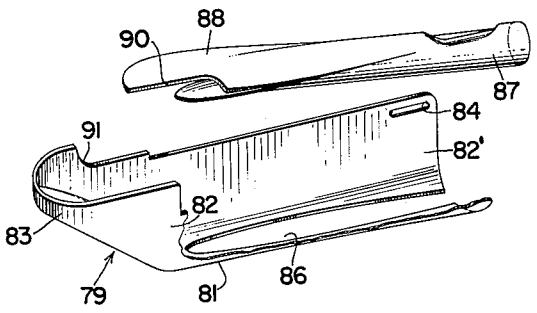



Fig.6

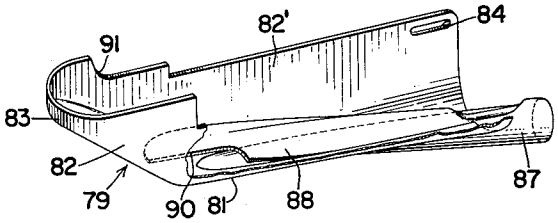



Fig.7

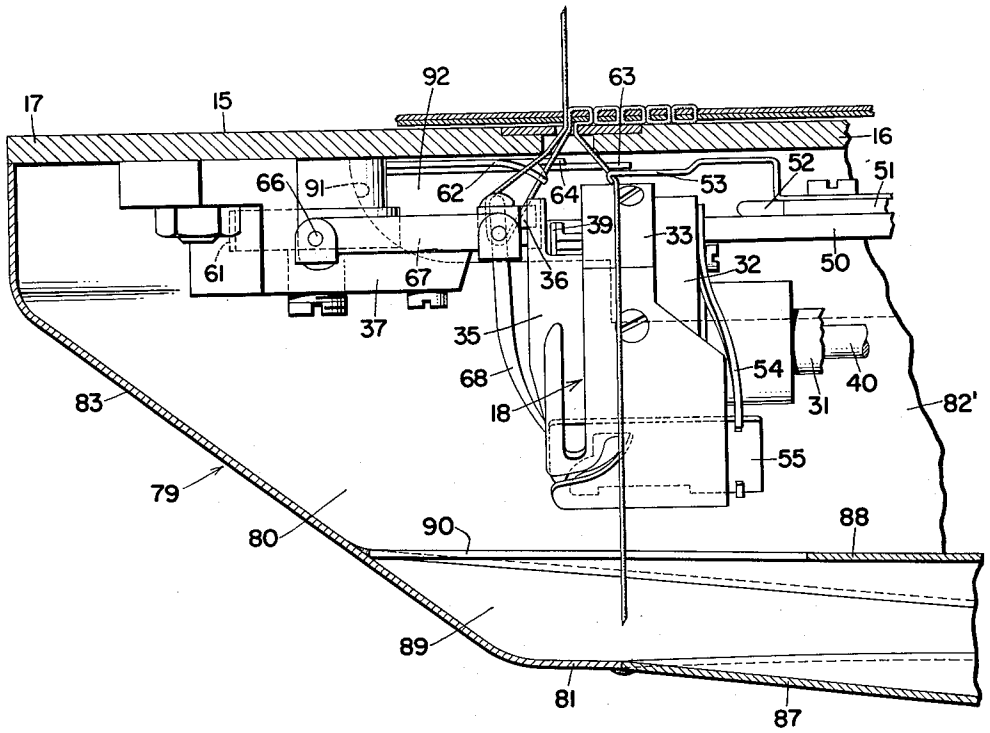



Fig.5

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United States Patent Office

3,084,647

Patented Apr. 9, 1963



3,084,647

# THREAD DISPOSAL SYSTEM FOR SEWING MACHINES

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Filed June 28, 1960, Ser. No. 39,341
2 Claims. (Cl. 112—252)

This invention relates to lock stitch sewing machines in which the bobbin while in place in the loop taker may be automatically periodically cleared and replenished with a fresh supply of thread, and more particularly to a means for disposing of the thread which is cleared from the bobbin in the loop taker.

It is an object of this invention to provide a novel and effective vacuum system for removing severed sewing threads from a sewing machine loop taker.

Another object of this invention is to provide a means for inducing a flow of air circularly about a loop taker in the direction of rotation thereof to remove threads cleared from the bobbin during rotation of the loop taker.

It is also an object of this invention to provide means for embodying a vacuum system for removing severed sewing threads from a sewing machine loop taker which does not detract from the appearance nor the space available at the work supporting bed of the sewing machine for manipulation of work fabrics thereon.

A preferred embodiment of this invention is illustrated in the accompanying drawings in which:

FIG. 1 represents a side elevational view of a sewing machine complete with a supporting table and sewing machine driving mechanism and having a thread end removal system of this invention applied thereto,

FIG. 2 represents a front elevational view of the sewing unit of FIG. 1,

FIG. 3 is an enlarged vertical cross sectional view of the sewing machine bed illustrating the loop taker in cross section,

FIG. 4 is a top plan view of the loop taker and thread severing mechanism of FIG. 3 with the work supporting plate of the sewing machine bed removed,

FIG. 5 is a vertical cross sectional view of the sewing machine bed similar to FIG. 3 but with the loop taker illustrated in elevation and showing the sewing threads and particualrly the bobbin thread cleared from the bobbin immediately prior to severance of the sewing threads,

FIG. 6 is a composite perspective view of the under closure for the sewing machine work supporting bed and of the air exhaust tube shaped for assembly therein, and

FIG. 7 is a perspective view of the under closure for the sewing machine work supporting bed with the air exhaust tube secured in place therein.

Referring to FIGS. 1 and 2, 11 indicates generally a sewing machine having a casing including a base 12, a bracket arm 13 rising from the base and supporting an endwise reciprocating needle 14. Projecting from the base beneath the bracket arm is a work supporting bed 15 having side portions 16 and an end portion 17. A rotary loop taker, indicated generally at 18 (FIGS. 1 and 2), is journaled for rotation about a substantially horizontal axis beneath the end portion 17 of the work supporting bed for cooperation with the endwise reciprocating needle 14 in the formation of stitches. A shiftable work clamp 19 carried by the sewing machine casing and adapted to be shifted by cam means (not shown) in the sewing machine serves to shift work fabrics relatively to the stitching point as determined by the endwise reciprocating needle and loop taker to form stitches in a predetermined pattern. The needle 14 and the loop taker 18 are operatively connected for movement in timed relation in the formation of lock stitches by conventional mechanism (not shown) within the sewing machine and may be driven by way of a conventional stop motion mechanism of which the driven pulley is indicated in FIGS. 1 and 2 at 20. A belt 21 operatively connects the stop motion pulley 20 with a pulley 22 fast on a shaft of an electric motor 23 which is supported beneath a table top 24 on which the sewing machine 11 is supported. The leg structure 25 sustaining the table top 24 also supports a treadle 26 connected by way of a chain 27 to a starting means for the stop motion mechanism of the sewing machine. Conventional cam means internally of the sewing machine may be used to initiate the stop motion mechanism upon completion of a cycle of sewing machine operation. A second treadle 28 supported on the leg structure 25 of the table is connected by means of a chain 29 to effect opening and closing of the sewing machine work clamp 19 as well as certain finishing operations, such as severing of the sewing threads, as will be described hereinbelow.



The loop taker illustrated in the accompanying drawings is preferably of the type disclosed in the co-pending United States patent application Serial No. 15,955, filed Mar. 18, 1960, S. J. Ketterer and W. J. Edwards in which thread from a needle thread supply may periodically be deposited and wound on a bobbin within the loop taker for subsequent use as bobbin thread in the formation of lock stitches. The above referenced patent application may be referred to for the details of construction of the loop taker, however, for an understanding of this invention a hollow loop taker shaft 31 is employed to which is secured a cup-shaped loop taker body 32 formed with a peripheral flange 33 which carries a needle loop engaging hook beak 34. Journaled within the loop taker flange 33 is a bobbin case 35 which is constrained from rotation with the loop taker body by means of a rotation restraining finger 36 carried by a knife supporting bracket 37 secured beneath the work supporting bed 15. Journaled freely in the bobbin case is a thread carrying bobbin 38 adapted to accommodate a supply of thread which leads from the bobbin, between the bobbin case and a bobbin thread tensioning spring 39 thereon, and thence to the work for concatenation in the formation of lock stitches with needle thread loops which are carried about the bobbin and bobbin case by the hook beak 34.

For winding a fresh supply of thread on the bobbin from the needle thread supply, a rod 40 slidable within the hollow loop taker shaft 31 carries a bobbin winding member 41 within the hook body 32. When the rod 40 is shifted to the left, as viewed in FIG. 3, the bobbin winding member 41 serves to clamp a needle thread loop on the hook beak 34, and to direct the clamped needle thread loop to the bobbin and to the bobbin tensioning spring 39. A bobbin rotating pin 42 carried by the bobbin winding member at the same time engages and rotates the bobbin 38 to wind thread from the needle thread supply thereon. When the rod 40 is retracted into the position illustrated in FIG. 3 after winding has been completed, the loop taker cooperates in a conventional manner with the endwise reciprocatory needle to form lock stitches. It will be understood that shifting of the rod 40 to effect winding of needle thread on the bobbin may be accomplished by cam means or the like (not shown) such as are disclosed in the above referenced United States patent application No. 15,955.

FIGS. 3, 4 and 5 also illustrate a mechanism associated with the loop taker for drawing from the bobbin any unused thread remaining thereon at the completion of a cycle of sewing machine operation, and thread cutting mechanism for severing at the completion of a sewing operation both the needle thread and the thread with-

drawn from the bobbin. Reference is made to the United States patent application Serial No. 12,828, filed March 4, 1960, S. J. Ketterer, W. J. Edwards and M. F. Ivanko, now Patent No. 3,038,429, granted June 12, 1962, to which reference may be had for a detailed disclosure of this bobbin thread withdrawing and bobbin and needle thread severing mechanisms. For an understanding of this invention it will be sufficent to appreciate that a slide bar **50** is carried lengthwise of the work supporting bed adjacent the loop taker and is shifted lengthwise at the completion of each sewing operation partly by cam means internally of the sewing machine and additionally by operation of the work clamp opening mechanism. For withdrawing unused bobbin thread from the bobbin at the completion of each sewing operation, the slide bar **50** carries a member **51** formed with a cam finger **52** disposed behind the loop taker body and with an arched thread gripping finger **53** secured thereon to overlie the loop taker flange **33**. Secured to the rear of the loop taker body is a circular spring **54** engaging an auxiliary hook member **55** slidable transversely of the loop taker flange **33**. The circular spring **54** normally biases the auxiliary hook into a retracted ineffective position, however, shifting motion of the slide bar **50** toward the left as viewed in FIG. 4 carries the cam finger **52** into the path of motion of the circular spring **54** serving to shift the auxiliary hook member **55** into a position beyond the flange **33** of the loop taker for engagement with the bobbin thread. The arched gripping finger **53**, being shifted with the cam finger **52**, moves to a position across the bobbin thread engaged by the auxiliary hook member **55** and, upon retraction of the slide bar **50**, the arched gripping finger **53** will draw the bobbin thread across the periphery of the loop taker flange **33**, as illustrated in FIG. 5, while the auxiliary hook cooperating with the loop taker flange will draw the unused thread from the bobbin. Since the loop taker rotates continuously in one direction, i.e., in the direction of the hook beak as illustrated in FIG. 4 and in the direction of the arrow appearing in FIG. 5, the thread from the bobbin which is withdrawn at the completion of each sewing cycle prior to being severed will extend across the loop taker body flange **33** and will depend on that side of the loop taker which turns downwardly away from the work supporting bed **15**.

For severing the sewing threads at the completion of each sewing cycle, the slide bar **50** carries a rack member **60** which meshes with a gear segment **61** journaled in the knife supporting bracket **37**. A thread severing knife blade **62** and associated with it a thread camming finger **63** serving to urge the sewing threads toward a sharpened cutting edge **64** on the knife blade are secured for turning movement with the gear segment **61**. A cam groove **65** formed in the gear segment **61** is tracked by a follower pin **66** carried on a rock arm **67** associated with a needle thread pick up finger **68** journaled in the knife bracket **37** and shiftable in response to the cam groove **65** to enter a notch **69** in the bobbin case to engage the last needle thread loop being carried by the hook beak for severance by the knife. Movement of the slide bar **50** to the left as viewed in FIG. 4 to effect withdrawal of unused thread from the bobbin, and initial movement of the slide rod **50** to the right as viewed in FIG. 4 to cause movement of the thread pick up finger **68** into the notch **69** in the bobbin case is preferably accomplished by cam means internally of the sewing machine. The sewing machine preferably is stopped at the completion of each sewing cycle with the loop taker and thread severing parts disposed as illustrated in FIG. 5 with the bobbin thread removed from the bobbin and the needle thread loop retained on the thread pick up finger but with the thread severing knife in a ready position poised to sever the threads upon continued turning movement. As mentioned above, a connection is preferably provided with the clamp opening mechanism for effecting continued movement of the slide bar **50** to the right as viewed in FIG. 4 to effect turning movement of the thread severing knife blade into the cutting position.



The work supporting bed of the sewing machine is provided with a bottom cover or under closure, indicated generally at **79**, which is best illustrated as applied to the sewing machine in FIGS. 1 and 2 and illustrated in perspective views in FIGS. 6 and 7. The under closure provides beneath the work supporting bed a chamber **80** enclosing the loop taker. The under closure **79** is preferably provided as an integral member formed of sheet material and including a bottom **81**, upwardly extending side walls **82** and **82'** and an end wall **83**, the end and side walls together defining a U-shaped top edge arranged to abut the side and free end portions respectively of the work supporting bed when the under closure is applied to the sewing machine. Each side wall **82** is formed with an elongate slot **84** embracing a fastening screw **85** threaded into the work supporting bed to secure the under closure in place. The slots **84** provide for movement of the under closure toward the free end of the work supporting bed to provide clearance for depressing the under closure to give access to the loop taker. Referring to FIGS. 6 and 7, the bottom **81** of the under closure is formed with a tapered opening **86** to accommodate a tube **87** extending through the bottom **81** of the under closure at an acute angle upwardly toward the end wall **83** of the under closure. The tube **87** is secured to the bottom of the under closure preferably by a weld continuously along the line of intersection of the tube with the under closure. Within the under closure the tube **87** is cut along a portion of the line of intersection of the tube with the bottom of the under closure and the severed portion of the tube within the under closure is gradually flattened to provide a partition **88** which is joined, as by a continuous weld, to the side walls **82** and the end wall **83** of the under closure to define a compartment **89** within the under closure, which compartment is opened to the tube **87**. The partition **88** is formed with an aperture **90** which, as illustrated in FIGS. 2 and 4, is disposed below the level of the loop taker and at that side of the loop taker which turns downwardly away from the work supporting bed of the sewing machine on which side of the loop taker the withdrawn thread from the bobbin will depend prior to severance of the thread, as illustrated in FIG. 5. A portion of the side wall **82'** of the under closure is cut away, as at **91**, to provide, when the under closure is in place beneath the work supporting bed, an aperture **92** opening into the loop taker enclosing chamber **80** provided by the under closure **79** at the opposite side of the loop taker from the partition aperture **90** and above the level of the loop taker.

When air is evacuated from the tube **87**, the aperture **92** provides an air intake port into the chamber defined by the under closure and the aperture **90** provides an air outlet port from the chamber creating a circulation of air through the chamber substantially in the direction of rotation of the loop taker. This arrangement provides for particularly effective means to clear the severed bobbin thread ends from the loop taker into the tube **87**.

A tapered flexible hose **100** is connected to the tube **87** and extends through the base **12** of the sewing machine casing, and downwardly through the table top **24** to a conical intake **101** of a blower unit **102** which is supported on a supporting bracket **103** for the electric motor **23** beneath the table top. The blower unit may be of conventional centrifugal action type and is preferably driven continuously by means of a belt **105** from a pulley **106** on the electric motor shaft with a strut **107** connecting the electric motor to the blower unit to regulate the tension in the belt **105**. A mesh bag **108** secured by spring clips **109** to the exhaust port **110** of the blower unit provides for a readily removable receptacle for the evacuated thread ends.

The evacuation system of this invention provides for the effective removal of thread ends from the loop taker

and minimizes the possibility of clogging of the thread ends at any point in the system. Moreover, this thread evacuating system is arranged compactly in a sewing machine and does not detract from the appearance nor the space available at the work supporting bed of the sewing machine for manipulation of work fabrics thereon.

Having thus set forth the nature of this invention what is claimed herein is:

1. In a sewing machine having a casing including a work supporting bed, a rotary loop taker journaled on an axis disposed beneath said bed, a thread carrying bobbin journaled in said loop taker, means associated with said loop taker for drawing out to one side of said loop taker the thread wound on said bobbin, means for severing said drawn out bobbin thread closely adjacent to said work supporting bed, cover means attachable beneath said bed providing a chamber enclosing said loop taker, means defining an air outlet port in said cover means opening into said chamber completely beneath said loop taker and completely on that side of the axis of said loop taker to which said bobbin thread is drawn out, means defining in air inlet port into said chamber completely above and completely at the opposite side of the axis of said loop taker from said outlet port, and means for evacuating air from said chamber through said outlet port.

2. In a sewing machine having a casing including a base, a work supporting bed projecting horizontally from said base and having side portions and a free end portion, a rotary loop taker journaled beneath the free end portion of said bed on a substantially horizontal axis, means for rotating said loop taker in one direction, an upwardly open under closure for said work supporting bed including an integral member of sheet material formed with a bottom, upwardly extending side walls, and an end wall defining a U-shaped top edge arranged to abut said side and free end portions respectively of said work supporting bed to provide a chamber enclosing said loop taker, a tube extending through the bottom of said under closure at an acute angle upwardly toward the end wall of said under closure, means securing said tube to said under closure continuously along the line of intersection of said tube with said under closure, said tube within said under closure being cut along a portion of the line of intersection of said tube with the bottom of said under closure, the severed portion of said tube within said under closure being gradually flattened to provide a partition, means joining said partition continuously to said side walls and end wall of said under closure to defiine a compartment within said under closure open to said tube, said partition being formed with an aperture disposed below the level and at that side of said loop taker which turns downwardly away from said work supporting bed, said under closure side wall being formed with an aperture opening into said chamber above the level of said loop taker and at the opposite side of said loop taker from said partition aperture, and means for evacuating air from said tube to provide a circulation of air through said chamber in the direction of rotation of said loop taker.



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