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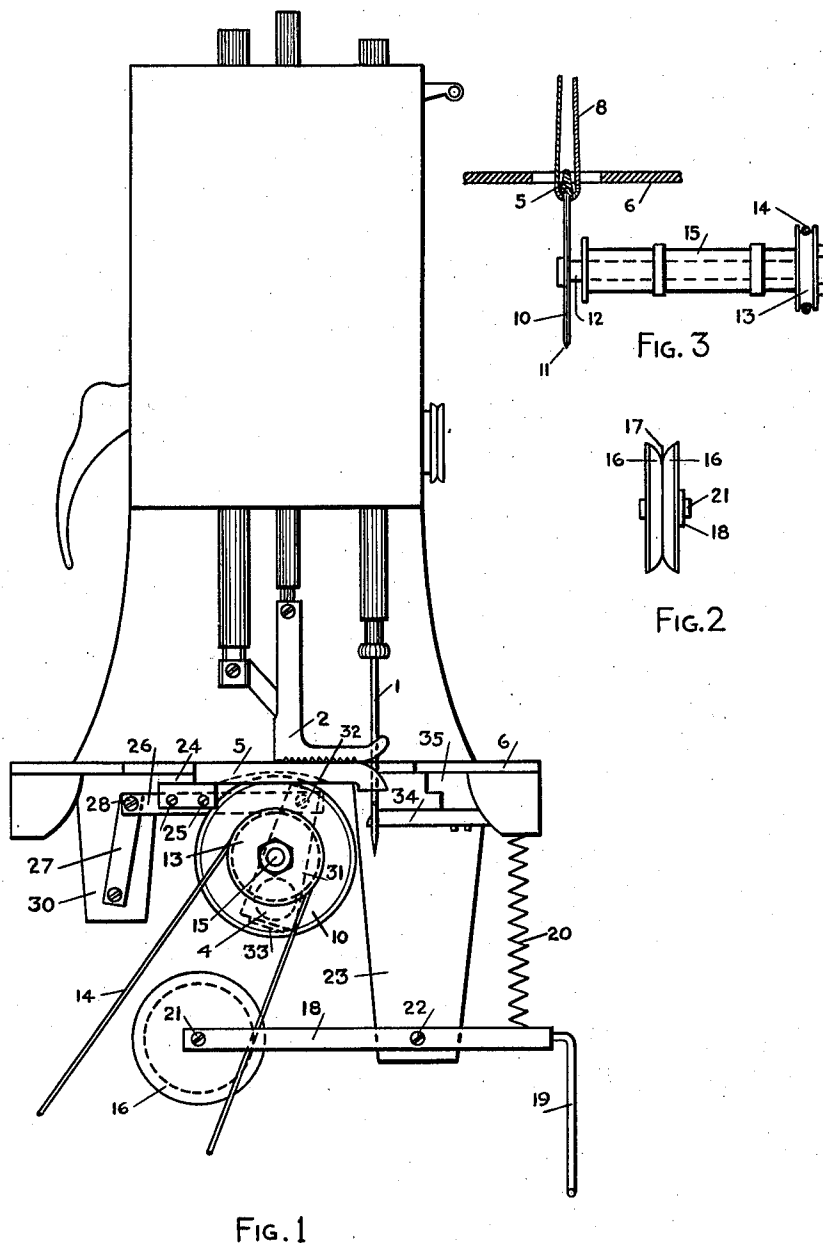
M. A. TARADASH

2,103,798

TUFTING MECHANISM FOR TUFTING A FABRIC BASE

Filed March 2, 1936

2 Sheets-Sheet 1



INVENTOR
MENDEL A. TARADASH
PER. *Goldstick*
ATTORNEY

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M. A. TARADASH

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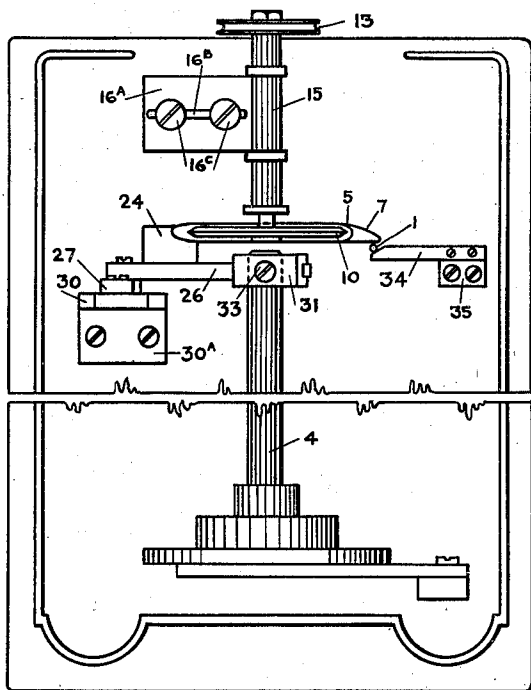


FIG 4

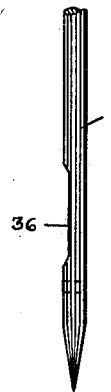


FIG. 5

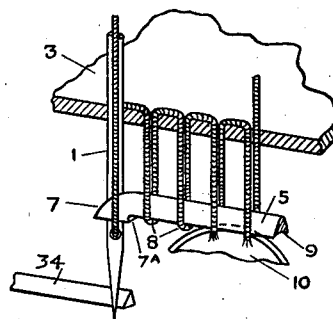


FIG. 6

INVENTOR
MENDEL A. TARADASH

PER. *D. Goldstein*

ATTORNEY

UNITED STATES PATENT OFFICE

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TUFTING MECHANISM FOR TUFTING A
FABRIC BASE

Mendel A. Taradash, Toronto, Ontario, Canada

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5 Claims. (Cl. 112—79)

The invention relates particularly to a mechanism adapted for incorporation into a standard sewing machine, and has for particular mention simplicity of construction, durability and cheap-

ness to manufacture.
An object of the invention is to provide means associated with the needle for engaging the thread on a reciprocating looper-bar of novel construction after the same has been carried through the fabric to form a series of loops and bringing such loops into the path of a thread severing member.

Machines of this type heretofore in use possessed numerous undesirable features, the chief among these may be tabulated as follows:—firstly; a looper bar of complex construction; secondly, failure to present the loop to be severed in a way that the same will be cut directly across the thread; thirdly, failure to sever the loops at a point equidistant from the fabric, caused by the cutting member becoming dulled and having its thin edge angularly displaced; fourthly, frequent dulling of the cutting member necessitating shut downs some two or three times an hour; fifthly, uneven stitching caused by the progressive dulling of the cutting member thereby causing the loops to pile up on the looper bar and producing progressive variations in the tension on successive loops and in addition slowing up operation; and sixthly, a tendency of the looper-bar to miss some of the strands when loosely spun yarn is employed thus "jamming" the machine and necessitating a shut down.

This invention particularly seeks to cure these deficiencies and incidentally other improvements are introduced hereinafter described.

Referring to the drawings:

Figure 1 is a front end elevation of the machine.

Figure 2 is a side elevation of the honing mechanism.

Figure 3 is a side elevation of the thread severing device in relation to the looper-bar.

Figure 4 is a bottom plan view of the machine.

Figure 5 is a view of the needle in elevation.

Figure 6 is a fragmentary view in perspective.

The present embodiment of the invention shown in the drawings utilizes a standard Singer sewing machine of the type used for stitching awnings and the like, it may be equipped with a so-called "walking foot and needle," but it will be readily understood that the mechanism in question may be adapted for association with almost any other standard or special sewing machines, with or without the walking foot and needle.

This machine comprises the usual supporting and actuating mechanism for the reciprocating needle 1 and for the presser foot 2 which feeds the fabric 3 through the machine. The usual shuttle and connecting parts of the standard sewing machine is removed and its reciprocating shaft 4 is devoted as actuating means for the improved looper-bar 5.

The reciprocating looper-bar 5, comprising a thread engaging tip 7, a horizontally jogged downwardly extending foot 24 and a depression 9 in its underside to provide an inverted well for the thread severing member 10, it is centrally secured through its foot by means of screws 25 to a reciprocating arm 26 disposed in a relatively horizontal plane, this arm is pivotally secured at one end 28 to the end of a relatively vertical arm 27 whose opposing end is pivotally mounted on a stationary shaft disposed on a bracket 30 depending from the underside of the machine platform 6, the opposite end of the horizontal arm is similarly secured through pivot 32 to one end of a link member 31 and the opposing end of this link member is secured by screw 33 to the forward end of the reciprocating shaft 4. The "throw" of the looper-bar may be regulated by adjusting the various parts disposed at the extreme rear of the shaft comprising the transmission mechanism. The looper-bar is constructed of either round or oval tool steel and the depression 9 in its underside may, in its simplest form, be V-shaped, and is adapted to receive a portion of the periphery of the cutting member 10 and form an inverted well for same. The needle 1 shown in an enlarged view in Figure 5 which co-operates with the looper-bar has an indentation 36 in the shank directly above the eye. As the needle travels downwardly carrying the thread through the fabric 3 and before the downward movement has terminated, the looper-bar moves forwardly toward the needle and when the tip 7 of the bar is relatively opposite to the indentation 36 the tapered portion of the needle above the point is brought against a stationary bevelled surface 34 affixed to the underside of the machine deviating the path of the needle sufficient to insure that the tip 7 will enter the space created by the said indentation and therefor will enter the loop between the needle shank and the thread. By this arrangement the possibility of missing some strands of the thread is avoided. While the needle is completing the downward stroke and commencing its upward movement the looper-bar tip has moved forwardly in an upwardly curved path so that the thread

is in a position beyond the looper-bar tip, that is, at the point where the underside of the bar is abruptly cut away to produce a hook-like structure 7A and it should be noted that beyond the point 7A the underside of the bar is substantially straight; thereafter the looper-bar tip completes its curved path and commences to retrace same but in a direction away from the needle but still within the confines of the needle indentation and as the needle moves upwardly it becomes dissociated from the bevelled surface 34 and springs back to a normal position permitting it to clear the bar as it completes its rearwardly curved movement. It will be understood from the method in which the looper-bar is mounted and activated that the path described by its tip constitutes a curve approximating a circle. This feature is of great importance, heretofore a variety of methods were employed to move the completed loop into the path of the cutter the most common being a reciprocating finger intended to make positive contact with the loop and move or push same rearwardly, this process, in addition to requiring a complex and expensive piece of machinery also had the fault of "jamming", that is, on occasions missing some strands of the yarn, a further method devised by Farrell, U. S. Patent No. 1,924,715 employs a hooked looper-bar which physically pulls the loop into the path of the cutter, by this method each loop is cut as it is formed, thus an undesirable tension is exerted both against the free end of the previously severed loop and against the loose thread being fed from the needle with the result that tufts of uneven length are manufactured. A method described by Keeney, U. S. Patent No. 1,855,916 is essentially equivalent to Farrell. By this invention the movement of the loop toward the cutter is the result of the tilting effect imparted to the looper-bar as it moves forwardly thereby inducing the relatively taut loops to move freely and naturally with the fabric and thus also a multiplicity of uncut loops may be built up on the bar to afford ideal working conditions. An examination of the method of construction shown in Figure 7 illustrates the tilting effect above referred to. It will be noted that the spacing of the lower extremities of the two link members, that is, the inter-shaftal distance is dissimilar from the spacing of their upper extremities, that is, the inter-pivotal distance, and in the preferred construction shown in Figure 7, taken at the termination of the needleward stroke of the looper-bar, the link 31 is substantially at right angles to the arm 26 while the link 27 forms a greater angle. Obviously, the same result may be achieved by positioning link member 27 to form an acute angle with the arm. Thus, as the looper-bar moves in an anti-needleward direction the link 31 is rotating bringing the pivotal point 32 to a lower plane while at the same time link member 27 rotates to bring its upper pivotal point 28 to an elevated plane, this has the effect of tilting the looper-bar tip-downwardly while the rear portion of the looper-bar maintains a relatively unvaried plane.

An important feature embodied in the improved shape of the looper-bar is to present each loop to the severing member with the thread stretched at right angles to the plane of the cut, as in Figure 2, and since outwardly it is entirely the cut edges of the loops which are presented to view, the appearance of the finished rug is greatly enhanced by the method adopted.

Previously looper-bars (where they were not

combined with the cutter into a single tool) were made of thin tool steel, thus requiring a great deal of labor and skill to fashion the required well for the cutter in its thin under-edge and furthermore by reason of this shape it did not present the thread horizontally to be cut.

The cutter 10 comprising a disc having a sharp periphery 11, is removably mounted on one end of a rotatable shaft 12 and a belt engaging pulley 13 is disposed on the opposing end, the shaft is held in a tubular bearing 15, the entire assembly is adjustably affixed to the underside of platform 6 and relative to the looper-bar by means of a plate 16A integral with the said tubular bearing and having a slot 16B co-operating with screws 16C disposed relative to such slot thereby permitting lateral adjustment of the cutting assembly either toward or away from the looper bar tip and thus predetermining the aggregate number of uncut loops which may simultaneously co-exist on the said looper-bar. This in itself is a matter of utmost importance as will be later indicated. It is preferable where high rotating speeds are desired, to provide independent driving means for the cutter from the main shaft as shown in Figure 1 wherein pulley 13 is operated by means of belt 14 from the main shaft not shown; it is, however, readily possible to adapt the cutter to be activated by the reciprocating shaft 4.

A honing device shown in detail in Figures 1 and 2 is provided comprising two rotatably mounted spherical sections 16 in honing relation and set to make suitable contact against the respective sides of the periphery 11 of the cutting member, these hones may be of highly polished steel, glass, leather or other suitable material, having regard to the rotative speed of the cutter and the nature of the thread to be cut, furthermore they may be arranged to rest in continuous honing relation to the cutter or the honing may be intermittently applied. In the embodiment shown in the drawings the hones 16 are rotatably mounted on a shaft 21 disposed at the extreme end of an arm 18 which is swingably mounted at an intermediate point therein on pivot 22 to a stationary bracket 23 depending from the machine platform and a handle 19 for manual manipulation is disposed at the opposing end of the arm, the hones are held out of honing contact by means of a helical spring 20 one end of which is secured to the underside of the machine platform and the other end to a point in the said arm in the vicinity of the handle.

The honing of the cutter as herein outlined, although not itself new, is nevertheless novel in its present application, and therefore I claim it as part of this invention and it will be seen that this honing process coupled with the high rotative speed at which the cutter is driven averts numerous practical disadvantages of machines previously used for this purpose and in addition to those specifically set out in the above tabulation as thirdly, fourthly and fifthly it also eliminates, for all practical purposes the pull against the thread which would tend to shorten or distort the free end of a previously severed loop, and by means of this invention it becomes possible to cut the loops virtually as they are formed, although having regard to the nature of the thread and fabric employed it may be desirable in order to avoid the pull exerted by the upward movement of the needle against a previously severed loop to have say one uncut loop positioned on the looper-bar at the instant when the newest

loop is being formed and the loop adjacent to the uncut loop on the remote side is being severed, as will be indicated.

In the standard machine, the reciprocating shaft operates sympathetically to the needle accordingly here the looper-bar is brought into action successively as each loop is deposited thereon, and after the needle has finished its downward stroke and made a complete return the fabric is moved rearwardly through the action of the presser foot 2, a calibrated between stitch distance carrying as previously outlined the newly formed loops successively in the direction of the thread severing member. For the best results it is desirable that as few uncut loops as possible reside simultaneously on the looper-bar, the reason for this is obvious when it is pointed out that to make designs having curves and angles it becomes impossible to guide the fabric along these design outlines if a multiplicity of loops remain uncut on the bar, these having the tendency to restrain any movement of the fabric, excepting in a straight line.

Obviously this invention is not restricted to the particular embodiment herein shown nor is it essential that all the features herein described be used conjointly, they may be employed in various combinations, and sub-combinations described in the claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a sewing machine, a tufting mechanism comprising the following co-acting parts: a thread engaging looper-bar having a sharply pointed tip portion, a relatively substantial body portion and a longitudinal slot in its underside; an arm whereon a connecting foot of such bar is centrally secured; link members pivotally secured at each end of the said arm the free end of one such link member being mounted on a rock shaft and the free end of the other being pivotally mounted on a stationary bracket depending from the machine frame, and the said parts so arranged that upon actuation the looper-bar-tip reciprocates along a curved path substantially transverse to a reciprocating needle.

2. In combination with a sewing machine a tufting mechanism comprising a thread engaging looper-bar consisting of a tip portion, a body portion and terminating in a connecting foot, an arm having the said connecting foot centrally secured thereon, link members pivotally secured to the ends of the said arm, the free end of one such link member being pivotally mounted on a stationary bracket depending from the machine frame and the free end of the other link member being secured to a rock shaft, the spacing of the two pivotal points in the upper extremities of said link members being dissimilar to the spacing of their lower extremities.

3. In a machine as defined by claim 1 rotatable thread severing means comprising a shaft member, a thread severing disc, a portion of the sharp periphery whereof intrudes into the said longitudinal slot in the looper bar, disposed on one end of such shaft and a belt driven pulley at the opposing end, a tubular bearing having a laterally extending plate integral therewith provided with a slot adapted to co-operate with relatively placed screws for adjustably securing such bearing to the underside of the machine platform; and timed actuating means for the said parts in relation to one another.

4. In combination with a sewing machine, a tufting mechanism comprising in combination a thread engaging looper-bar, an arm whereon a connecting foot thereof is centrally secured, link members pivotally secured at each end of the said arm the free end of one such link member being mounted on a rock shaft, and the free end of the other being pivotally mounted on a stationary bracket depending from the machine frame; and the said parts so arranged that the respective angles formed by each link with the arm are dissimilar.

5. In a machine as defined by claim 4 means for severing loops deposited on the said bar; means for controlling the number of uncut loops on the bar at any one time consisting of a bracket whereon the thread severing assembly is secured, a slot therein for adjustable positioning thereof co-operatively with retaining screws either closer to or more remote from the loop origin.

MENDEL A. TARADASH.