Sept. 14, 1943. M. CHINNICI ET AL 2,329,458

TUFTING MACHINE

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FIG. 1.

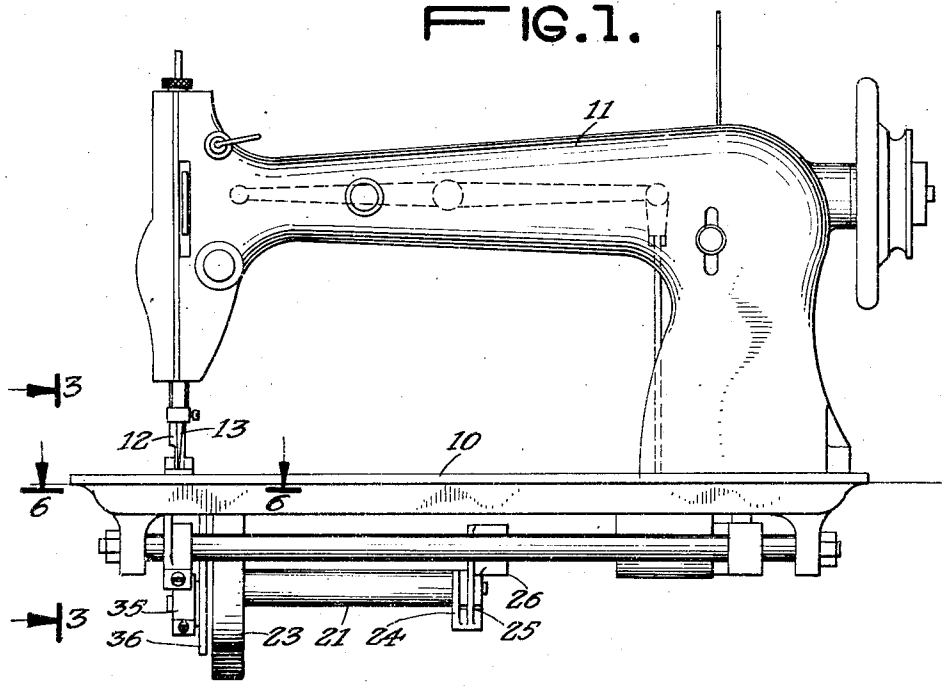

FIG. 2.

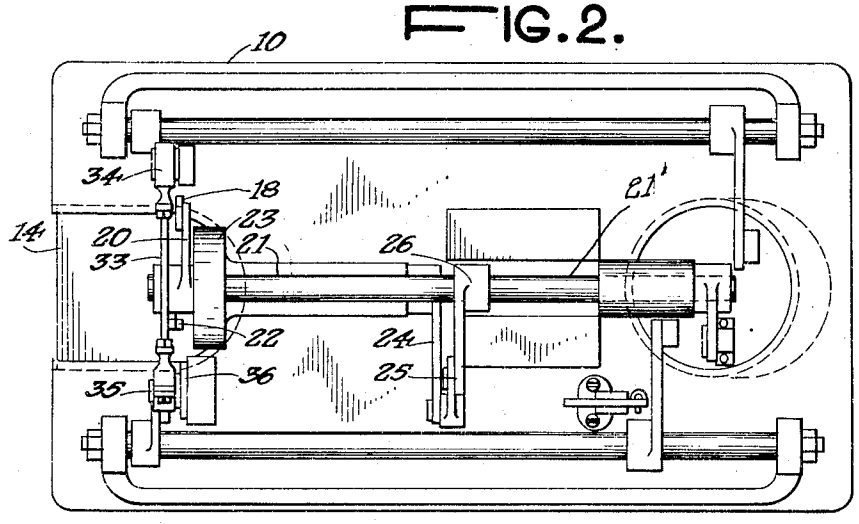

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FIG. 3.

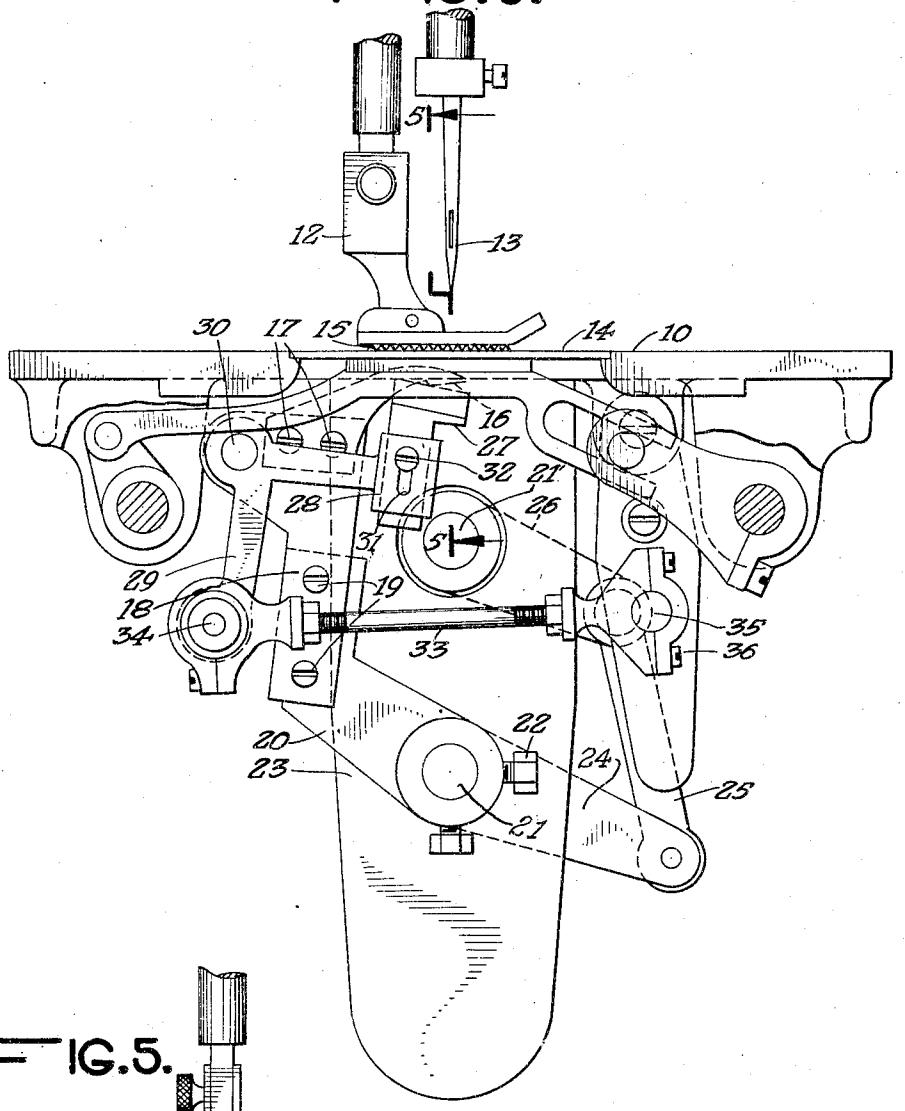
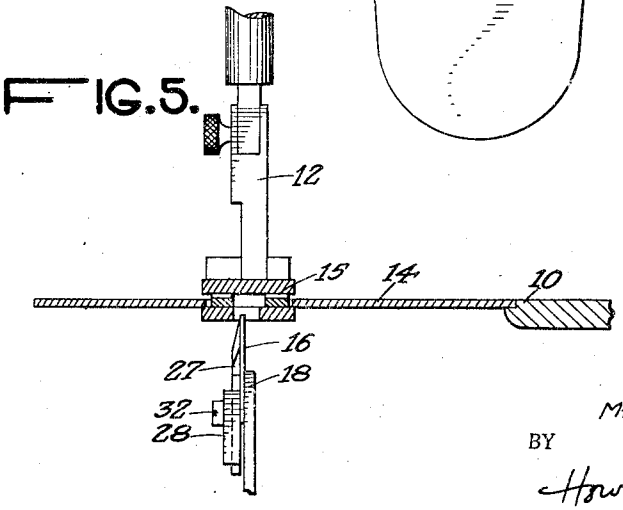


FIG. 5.



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TUFTING MACHINE

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FIG. 4.

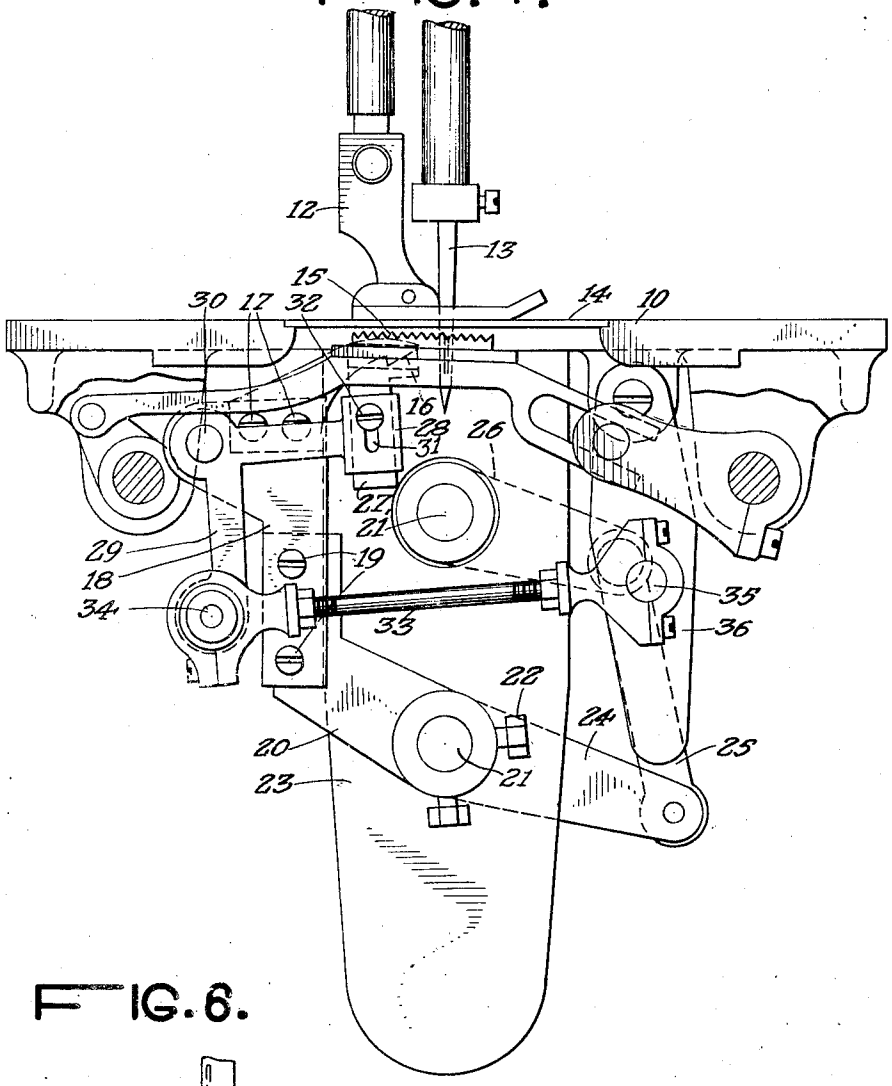
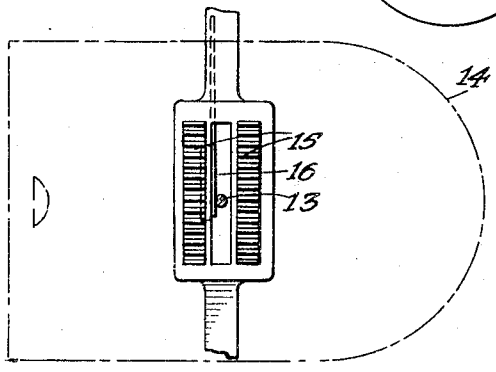


FIG. 6.



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Patented Sept. 14, 1943 2,329,458

UNITED STATES PATENT OFFICE

2,329,458

TUFTING MACHINE

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Application October 4, 1938, Serial No. 233,186

2 Claims. (Cl. 112—79)

This invention relates to tufting machines, and particularly to tufting machines which automatically form and cut loops to comprise the tufts.

The objects of the invention are to provide an improved tufting machine for obtaining more rapid formation of even-length tufts; to reduce moving parts to a minimum; to utilize movement of the loop hook to also operate the loop cutter; to provide for adjustment of cutter; to provide improved linkage and operating connections; to secure simplicity of construction and operation; and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings in which like numerals of reference indicate similar parts throughout the several views:

Figure 1 is a front view of a tufting machine embodying the present invention;

Figure 2 is an underneath view of the same;

Figure 3 is an end view looking toward the end of the machine having the foot and operating mechanisms;

Figure 4 is a similar end view showing the needle depressed and the cut completed;

Figure 5 is a sectional view on line 5—5 of Fig. 3 for showing the cutter more particularly; and

Figure 6 is a plan of the feed dog, showing the relationship thereto of the cutter.

In the specific embodiment of the invention illustrated in said drawings, the reference numeral 10 designates the bed plate of the machine having the usual overlying goose-neck 11 from which depends presser foot 12 and in which operates a vertically reciprocable needle 13 as is common practice with sewing machines and the like. A removable throat plate 14 is shown in the area of the bed plate surrounding the place where the needle passes through, this throat plate having an opening therein of appropriate size and shape for the serrated feed dog 15 to move as usual therein under influence of usual supporting and operating mechanisms. Suffice it to say that the several parts so far described are common in the sewing machine art, and obtain a synchronized vertical reciprocation of the needle and horizontal reciprocation of the feed dog together with a simultaneous limited vertical movement of the dog for feeding the work under the presser foot.

The present machine does not have a bobbin as usually found in sewing machines, but instead, provides a prong or hook 16 movable toward the needle from the side thereof at a position of the needle when below the throat plate and dog. Said hook 16 is movable in a plane closely adjacent to the needle so as to enter between the needle and the bite of thread depending from the work to the needle eye, whereby the retraction of the needle will leave the thread looped under the said hook. The said prong or hook 16 likewise constitutes one member of a scissor cutter by which the loop is ultimately cut, the successively cut loops thus providing a plurality of closely associated ends projecting from the work and constituting the tufts which it is the purpose of the machine to make.

As here shown, hook 16 is of goose-neck shape with the outer end directed substantially horizontally to a point and with a straight underside rearward from the point a distance less than the stroke of the hook. At the rear end of this straight portion of the underside of the hook, the hook is notched upward so that as the loop is received and passes rearwardly on the straight part of the hook, it ultimately comes to the notched end and is thereby retained from sliding back off the hook. It is particularly at this notched portion of the hook that the same constitutes a scissor member. The inner end of the hook widens and curves downward to form a base portion which is attached, as by screws 17 to an arm 18 in turn secured by screws 19 to the left end of a lever 20 the fulcrum of which is the auxiliary shaft 21 to which the right end of the lever is attached by set screw 22. Said auxiliary shaft 21 is shown mounted in a suitable bearing post 23 depending as a fixed part from the base plate 10.

Another arm 24 fixed on this auxiliary shaft on the other side of the bearing post from the first-mentioned lever, is connected by a link 25 to a lever arm 26 projecting from the main shaft 21'. By this mechanical connection and arrangement of parts, the hook-supporting lever is rocked about the axis of the auxiliary shaft in synchronism with the needle operation. It is to be observed that the pointed end of the hook is substantially over the auxiliary shaft, as a result of which the oscillatory motion imparted to the functioning end of the hook is substantially horizontal.

The complementary cutting or scissor member is here shown as an inverted L-shaped member 27 of which the horizontally disposed portion provides the cutting edge at its top, and the vertically disposed shank provides an adjustable mounting in connection with a supporting head 28 on a horizontally disposed lever arm of a bell-crank 29 of which the other arm depends from the pivotal mounting 30 at the juncture of the

arms. As here shown, the adjustable mounting is by virtue of a slot 31 in the supporting head 28 and an attaching screw 32 the shank of which passes through said slot into the shank of the complementary cutting member. By this construction, the complementary cutter is not only adjustable, but is readily and quickly replaceable or removable for sharpening or other purposes.

It is a feature of the present invention to mount the bell crank supporting the complementary cutter directly upon to be movable with the arm 18 to which the other cutting member, that is, hook 16, is attached. Thus the two scissor members move together about the common axis of the auxiliary shaft 21. In addition to this common movement of the two members, the complementary member also has a swinging movement upon its pivotal mounting 30 for effecting the cut of the thread loop. By this construction, the members constituting the scissor jaws may be maintained in tight shearing contact with respect to each other and have a minimum movement with respect to each other in the operation of the machine. Thus, while the hook may be given a relatively long stroke for hooking into the loop, the complementary member travels forwardly and rearwardly with the hook and no wear results from that movement. Cutting movement between those members is obtained by an adjustable link 33 one end of which rides on a stud 34 at the lower end of the depending bell crank lever 29, and the other end of which is mounted on a fixed stud 35 projecting laterally from a fixed bracket 36 in turn depending from the base of the machine. Thus link 33 has no longitudinal movement, but can swing up and down to accommodate the necessary vertical motion of the lower end of the depending arm of the bell crank. By virtue of this arrangement, the same motivating energy which swings the hook functions to also rock the bell-crank and its scissor member. Attention is directed to the fact bell-crank lever 29 is pivoted to arm 18, and that these two members each carry removable cutter or scissor members, these several parts or members being removable from the machine as a unit, thus constituting a unitary structure removable as such, but with the scissor members maintained in shearing adjustment.

The length of loop or tuft can be changed as desired by substitution of a different hook member 16 or other suitable positioning of the hook on arm 18 so the under side of the said hook where the loops are formed is closer to or further from the throat plate of the machine. Change of this hook member is entirely independent of the pivotal connection 30 of arm 18 with bell-crank 29, not requiring any separation of the pivotal connection. Adjustment of blade 27 in head 28 of bell crank 29 also has no disturbing effect upon the said pivotal connection 30, and the relationship of the scissor edges is adjustable by manipulation of screw 32 with the unitary structure either on or off the machine. Screws 17 holding the hook 16 on arm 18 can be manipulated and the hook changed whether the unitary structure is on or off the machine.

In operation, it will be observed that as the needle descends so its eye comes to about the level of the hook, said hook moves inward close to the needle so the outer lip of the hook enters the loop of thread presented by the needle. Such entry serves to push previously formed loops still on the hook inward thereof to a position thereon where the lower blade will function to cut the innermost loop thereafter. As the needle moves upward, the hook is then in the last-formed loop as well as several previously formed and not yet cut. The thread is therefore prevented from pulling out of the goods when the needle retracts; but instead, the thread slides in the needle eye, leaving the new loop with the other uncut loops, on the hook below the work or goods. The hook moves back (in the same direction as the work is advanced) as the needle again comes down through the work and then forward again to repeat the above-described operations. Rearward movement of the hook, that is, away from the needle, is also accompanied by a resultant swinging of the bell crank which operates the lower cutting blade of the scissor members to cut the innermost loop on the upper member or hook, but the adjustment is such that said lower blade does not close upon the entire upper member or hook, and accordingly leaves several loops thereon uncut. The uncut loops are successively cut as new loops are formed and push the previously formed ones to the inner part of the hook where the cutting is effected.

We claim:

1. A tufting machine comprising a unitary removable tufting unit, said unit providing a swinging arm and a bell-crank lever pivoted at its elbow to said swinging arm adjacent an upper corner thereof, a hook member removably secured to an upper end portion of said swinging arm and at a part thereof to one side of said pivotal mounting of the said bell crank arm, a cross-lever having its pivot substantially below the said hook member and at an outer end rigidly supporting said swinging arm with said swinging arm and cross-lever transverse one to the other whereby both the hook and bell crank lever are moved laterally as the cross lever swings up and down, said hook member having a projecting part thereof constituting a scissor member, and a complementary scissor member carried by said bell crank lever in cutting association with the first said scissor member, and means for supporting said complementary scissor member on said bell crank lever for adjusting the jaw opening between said scissor members.

2. A tufting machine comprising a unitary removable tufting unit, said unit providing a swinging arm and a bell crank lever pivoted at its elbow to said swinging arm adjacent an upper corner thereof, a hook member removably secured to an upper end portion of said swinging arm and extending from an opposite upper corner thereof to the side of the same away from said pivotal mounting of the said bell crank arm, a cross-lever having its pivot substantially below the said hook member and at an outer end rigidly supporting said swinging arm with said swinging arm and cross-lever transverse one to the other whereby both the hook and bell crank lever are moved laterally as the cross lever swings up and down, said hook member having an outer end part thereof constituting a scissor member, and a complementary scissor member carried by said bell crank lever in cutting association with the first said scissor member, and means for supporting said complementary scissor member on said bell crank lever for adjusting the jaw opening between said scissor members.

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