Feb. 24, 1948. W. A. BEHRENS 2,436,545

HOOK AND KNIFE UNIT FOR CHENILLE MACHINES

Filed March 20, 1946 3 Sheets-Sheet 1

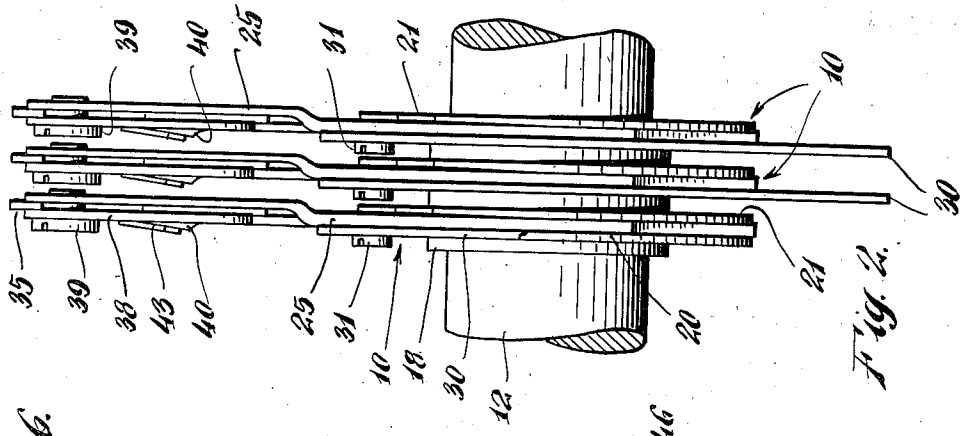


Fig. 2.

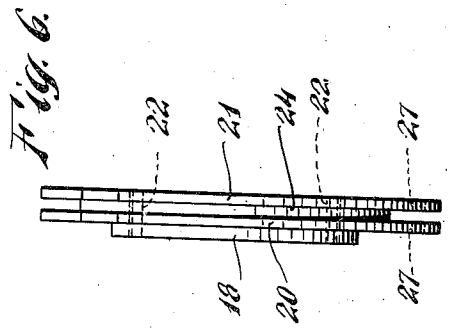


Fig. 6.

Fig. 1.

INVENTOR.
Walter A. Behrens
BY
ATTORNEY.

Feb. 24, 1948. W. A. BEHRENS 2,436,545

HOOK AND KNIFE UNIT FOR CHENILLE MACHINES

Filed March 20, 1946 3 Sheets-Sheet 2

Fig. 3.

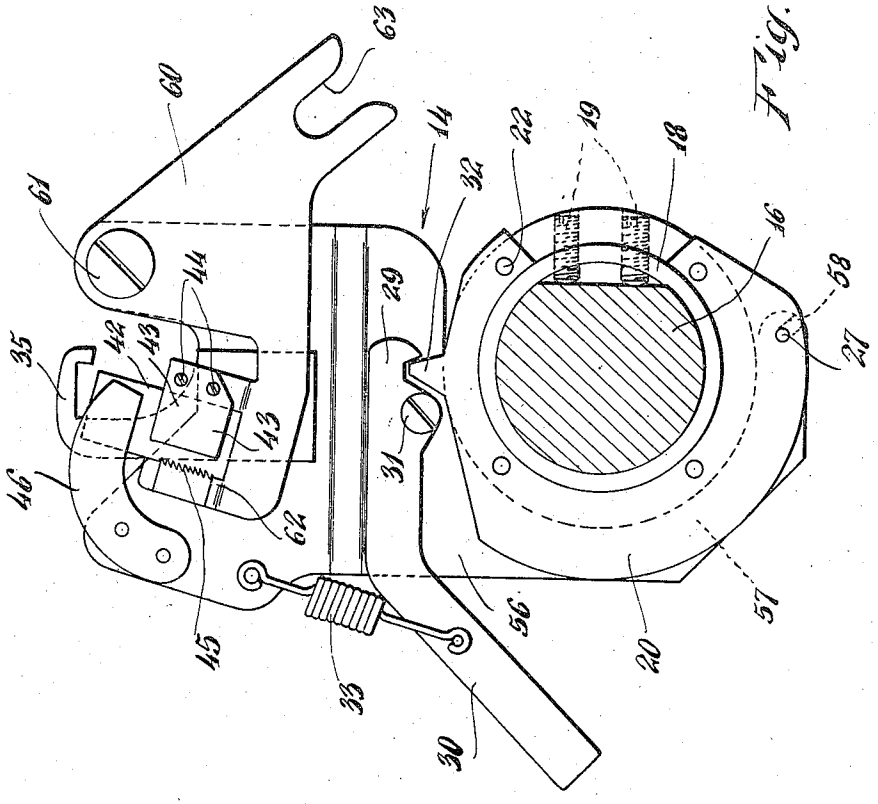
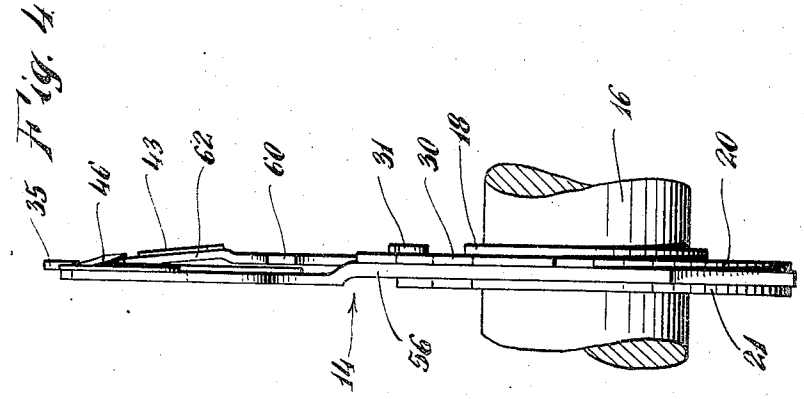


Fig. 4.



INVENTOR.
Walter A Behrens
BY Dan J Moseng
ATTORNEY.

Feb. 24, 1948. W. A. BEHRENS 2,436,545

HOOK AND KNIFE UNIT FOR CHENILLE MACHINES

Filed March 20, 1946 3 Sheets-Sheet 3

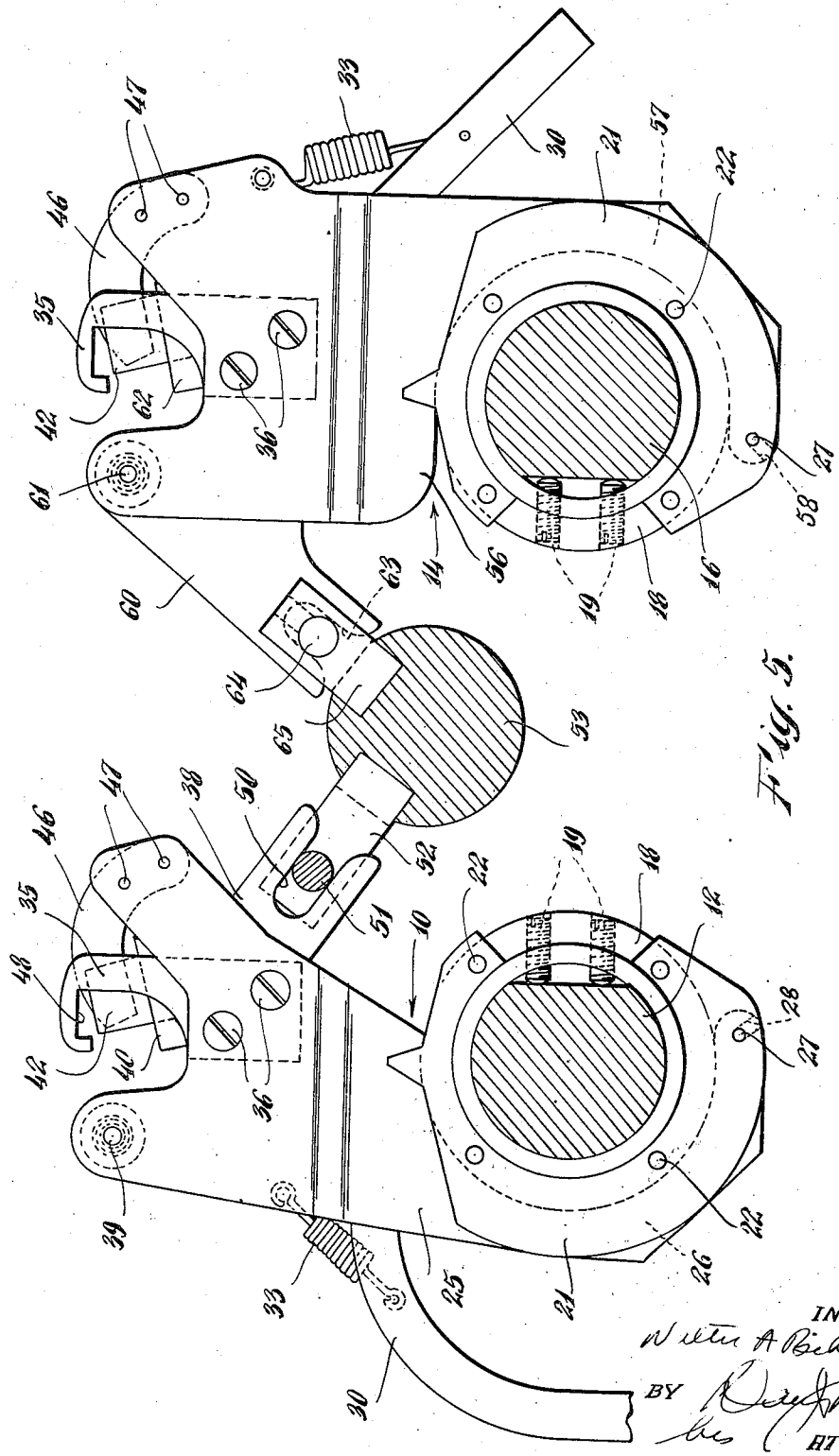


Fig. 5.

INVENTOR.
Walter A. Behrens
BY Dorsey & Mount
his ATTORNEY.

Patented Feb. 24, 1948

2,436,545

UNITED STATES PATENT OFFICE

2,436,545

HOOK AND KNIFE UNIT FOR CHENILLE MACHINES

Walter A. Behrens, New York, N. Y.

Application March 20, 1946, Serial No. 655,837

11 Claims. (Cl. 112—79)

1

This invention relates to chenille or tufting machines, such as are employed in the production of bedspreads, chenille cloth for various garments, bathrobes, bath mats and the like, and is more specifically directed to the construction of the hook and knife or "looper" mechanism used in such machines for progressively engaging and severing the loops of threads or yarn formed by the needles, to produce the nap-defining piles or tufts.

In my co-pending application S. N. 650,179, filed February 26, 1946, of which the present application is a continuation in part, I have disclosed a chenille machine of novel and improved construction having a number of needles, arranged in a single row or in a plurality of rows, and a novel type of looper mechanism which comprises units each carrying a loop-engaging hook and a loop-severing knife that are mounted on a common member, but are independently actuated by means of distinct mechanisms. The present invention is directed to a further novel construction of hook and knife units having the aforementioned general characteristics that are particularly adapted for use in a machine of the type disclosed in my aforesaid co-pending patent application, though capable of use generally in various apparatus for making chenille products.

An object of the invention is to provide a construction for hook and knife units of the character described whereby the hook and the knife may be readily displaced to an inoperative position in which they are easily accessible, for instance, for sharpening purposes, and restored to their original position in the machine without the necessity of disassembling and reassembling the unit.

Another object is to provide a unit, as aforesaid, so constructed as to insure that the hook and the knife will be automatically returned to the position they occupied prior to their displacement to the inoperative position, thereby insuring proper constant timing of the operation of the hook and knife relative to the loop-forming needles of the machine and eliminating the necessity for frequent adjustment of the hook and knife existing with the machines of the prior art.

A further object is to provide a hook and knife unit having means for insuring a constant relationship between the hook and knife, irrespective of their position in the machine.

Still another object is to provide hook and knife units of greatly reduced thickness adapted to be arranged in rows of units cooperating with rows of closely spaced needles of a chenille machine, to permit of the simultaneous formation of a large number of closely arranged rows of chenille stitching and tufts.

2

These and other objects of the invention will become apparent in the following description of the invention illustrated in the drawings, wherein:

Fig. 1 is a side elevational view of a hook and knife unit according to the invention.

Fig. 2 is a front elevational view of a plurality of units according to Fig. 1, illustrating the relationship of the units when mounted in a row.

Fig. 3 is a side elevational view of a unit also according to the invention, with slight structural modifications, adapted to be mounted in a different position in the machine.

Fig. 4 is a front elevational view of the unit of Fig. 3.

Fig. 5 is a side elevational view showing the other side of the units of Figs. 1 to 3 and illustrating the same mounted for joint operation in a machine having a double row of needles and cooperating hook and knife units.

Fig. 6 is a front elevational view of an element of a unit, shown isolated.

Referring now in detail to the drawings, and particularly to Figs. 1, 2 and 5, numeral 10 designates as a whole a hook and knife unit according to the invention, which may be one of a series of identical units adapted to be mounted on an oscillatable unit-actuating shaft 12 as shown in Fig. 5 to form a row of units cooperating with a row of needles in a multi-needle chenille machine of the type described in my aforesaid co-pending application. The shaft 12 may in turn be actuated, for any desired amount of oscillation and timing in relation to the actuation of the needles, by means of an adjustable driving mechanism of the character disclosed in said co-pending application to which reference is expressly made herein.

In the case of a multi-needle machine having a plurality of rows of needles and cooperating hook and knife units, for instance a double row of needles and units, the units 10 are intended to form the front row to which the work material will be first fed, and will slightly differ in construction from the units 14, providing the back row and mounted on a further oscillatable shaft 16 as shown in Fig. 5, for reasons that will become hereafter apparent, but such minor structural variations are well within the spirit of the present invention and the scope of the appended claims.

Each unit 10 comprises a collar 18 which is fixed to the shaft 12 as by means of set screws 19, and has juxtaposed to the opposite faces thereof a pair of flat substantially annular members or

plates 20, 21 secured thereto by means of pins or rivets 22 and having portions projecting beyond the periphery of the collar to define with this latter a peripheral channel or groove 24 (Fig. 6) extending at least along an arc of 180°. It is understood that the channel 24 could be formed in a one-piece collar of larger size, but the aforementioned structure is preferred as it permits to eliminate relative expensive machining operations.

A flat member 25, of a thickness corresponding to the width of the channel 24, has a lower or end arcuate portion 26, pivoted at 27 between the plates 20, 21, adapted to be received within said channel in surface engagement with the periphery of the collar 18 and the opposed inner faces of the plates, to locate the member in a normal position in which the upper or free portion of the member, that carries the hook and knife structure hereafter described, vertically extends from the collar-plates assembly toward the throat or needle plate of the machine (not shown), when the unit is mounted on the oscillatable actuating shaft 12 suitably positioned in the machine. The member 25 is releasably locked in said normal position thereof by a catch 29 which is formed at one end of a lever 30 pivoted at 31 to the free portion of the member, and engages a projection 32 at the periphery of the plate 20, so that the assembly collar 18, plates 20, 21 and the member 25 normally function as a rigid unit. A spring 33 urges the catch 29 to locking position, and the lever 30 is given an oportune shape and length to render the free end thereof easily accessible from the rear of the machine when the units are mounted in a machine having more than one row of units.

A loop-engaging hook 35 of appropriate shape and dimensions, is removably secured in predetermined position to one face of the free portion of the member 25 at the upper end thereof, as by means of screws 36. A further flat member or plate 38, juxtaposed to the base of the hook 35, has one end pivoted to the member 25, as at 39, and is provided with an angularly offset central portion 40, sloping in the direction of the hook and extending at an angle to the longitudinal axis of this latter. A knife blade 42, of flexible thin steel, is fastened to said portion 40 of the member 38 in any desired longitudinal position relative to the hook by a small flat spring 43 removably secured to the portion 40, as at 44. One of the longitudinal edges of the blade is provided with teeth 45 adapted to engage complemental teeth provided on the portion 40, so as positively to prevent axial displacement on the knife blade under stress during operation of the device. A curved arm spring 46, suitably secured at 47 to the member 25, bears upon the free portion of the blade 42 to urge the tip of the blade into close association with the hook 35, whereby to insure proper scissors-like coaction of the blade with the cutting edge 48 of the hook, to sever the loops accumulating on the hook when the blade is actuated by the rocking of the member 38 effected as hereafter described.

The free angularly extending end of the member 38 is provided with a slot 50 which, when the member 25 is in locked or operative position, slidably receives a pin 51 carried by an element or block 52 suitably secured to an oscillatable knife-actuating shaft 53, as illustrated in Fig. 5. The means for oscillating said shaft by any desired amount and with any suitable timing, may be of the type disclosed in my co-pending application

hereinbefore referred to and need not be described.

In the operation of the machine incorporating the units 10 described, the oscillation of the unit-carrying shaft 12 obtained at predetermined intervals, causes corresponding oscillation of the collar and plate assembly 18, 20, 21 and therefore of the whole unit 10 including the hook 35, so that the hook is repeatedly moved in an arcuate path between two extreme positions to enter and hold the loops successively formed by an associated needle of the machine. The oscillation of the unit, however, does not cause actuation of the knife blade 42 and severing of the loops, because in the oscillation of the unit, the pin 51 is allowed to slide in the slot 50 without causing a rocking of the member 38 and therefore of the blade 42 fastened thereto, so that the position of the blade relative to the oscillating unit remains unchanged and the blade is inactive. The rocking of the member 38 and consequent actuation of the knife 42 can take place only upon oscillation of the shaft 53, from which the actuation of the knife is therefore independently controlled.

It will be apparent from the foregoing that the construction of the unit 10 provides a hook and knife assembly readily displaceable from its normal operative position, in which the unit cooperates with a needle, to a position wherein the hook 35 and the knife 42 are easily accessible for removal whenever required, as for instance, when they need sharpening. For this purpose, it is sufficient to disengage the catch 29 of the lever 30 from the projection 32, whereupon the member 25 may be swung outwardly about its pivot 27 relative to the collar-plates assembly to the position shown in dash and dot lines in Fig. 1. In order to provide for complete removal of the member 25 and associated elements from the machine, the portion 26 of said member is preferably provided with a slot 28 permitting disengagement of the member from the pivot 27 when the member has been sufficiently swung outwardly. The connection of the unit with the knife actuating shaft 53 is such as to permit the aforesaid displacement of the member 25 and associated elements, as the slot 50 of the rockable member 38 is so arranged as to slide relative to the pin 51 and to become disengaged therefrom during the swinging movement of the device.

As a result of the construction described, the displacement or even total removal of the hook and knife of each unit, and therefore the sharpening, adjustment or replacement thereof, can be accomplished without in any way affecting the timing of the operation of the unit (and therefore of the hook) and of the knife, because the position of the timing controlling elements (shaft 12, 53) remains unchanged, and the hook and knife are automatically returned to the same position they originally had relative to the shafts when the member 25 is re-inserted and swung back to its normal locked position. Likewise, the relationship of the hook and knife remains unchanged since both elements move as a unit with the member 25.

The hook and knife units 14 are of substantially the same structure as the units 10 and function in identical manner to the latter, the only structural differences residing in the somewhat different shape and arrangement of the swingable member and of the rockable knife-carrying member. Such minor structural differences are required to permit proper actuation of the knives and free displacement of the hook

and knife assembly to the inoperative, readily accessible position, when the units are disposed to form the rear row of units in a machine in which the units 10 form the front row, as in Fig. 5, but a single knife actuating shaft is provided for the units of both rows for simplicity of construction of the machine.

In the units 14 the swingable flat member indicated at 56 has a lower portion 57, identical to the lower portion 26 of the corresponding member 25 of the units 10, likewise provided with a slot 58 and pivoted, for the purposes previously set forth, to a collar-plates assembly 18—20—21 such as described with reference to the units 10, which is mounted on the unit-actuating shaft 16. The upper portion of the member 56, which is somewhat wider than the corresponding portion of the member 25, is similarly provided with a pivoted spring-biased lever and catch 30 and 29, for releasably locking the member 56 in operative position. The unit however embodies a rockable flat member 60 which, as shown in Fig. 3, is centrally pivoted at 61 to the upper end of the member 56 and carries at one of its ends the knife blade 42, removably and adjustably secured to an angularly offset member portion 62 in the same manner as the knife blade on the corresponding inclined portion 40 of the member 38 of the unit 10. The other end of the member 60, which extends in opposite direction to the slotted end of the member 38 of the unit 10, is provided with a suitably disposed slot 63 adapted to slidably receive a pin 64 carried by a block 65 secured to the shaft 53 centrally located between the units 10 and 14, from which shaft therefore the knives of both rows of units are actuated.

As will be clear from the foregoing description, the hook and knife units of the present invention, in both the embodiments illustrated, while permitting displacement of the hook and knife to a position for removal without disassembling the units or affecting the timing of the hook and knife in the machine, are differentiated from the units disclosed in my aforementioned copending application in their general structure and particularly in the construction and arrangement of the knife-carrying and actuating means whereby the knife travels along an arcuate path instead of being given a rectilinear reciprocatory movement. Furthermore, with the construction described the units can be made essentially from flat stampings, and therefore with a reduced cost of manufacture, and the thickness of the units may be greatly reduced as compared with similar units heretofore known, so as to permit a very narrow needle gage in the machine and the simultaneous formation of a large member of closely arranged lines of chenille stitching, with obvious advantages in the production of the chenille goods. This characteristic of the units is clearly illustrated in Fig. 2.

It is to be understood that changes may be made in the structures described and illustrated in the drawings without departing from the spirit of the invention or exceeding the scope of the claims.

I claim:

1. A hook and knife unit for chenille machine comprising a member fixedly mounted on a unit-oscillating shaft, a member movable relative to said fixed member, means for releasably locking said movable member to said fixed member in a predetermined normal position relative thereto, a hook carried by the movable member, a plate mounted on the movable member for oscillation thereon, a knife carried by said plate for movement thereby in an arcuate path toward and away from said hook, and means in the plate for disengageably connecting the plate to means for oscillating the same independently of the unit-oscillating shaft.

2. A hook and knife unit for chenille machine comprising a member fixedly mounted on a unit-oscillating shaft, a member movable relative to said fixed member, means for releasably locking said movable member to said fixed member in a predetermined normal position relative thereto, a hook removably carried by the movable member, a plate mounted on the movable member for oscillation thereon, said fixed member, said movable member and said plate defining a substantially flat thin assembly, a knife removably carried by said plate for movement thereby toward and away from said hook, and means in the plate for connecting the plate to means for oscillating the same independent of the unit-oscillating shaft.

3. A hook and knife unit for chenille machine comprising a member fixedly mounted on a unit-oscillating shaft, a member movable relative to said fixed member, means for releasably locking said movable member to said fixed member in a predetermined normal position relative thereto, a hook carried by the movable member, a plate mounted on the movable member for oscillation thereon, said fixed member, said movable member and said plate defining a substantially flat thin assembly, a knife carried by said plate for movement thereby toward and away from said hook, and means in the plate for connecting the plate to means for oscillating the same independently of the unit-oscillating shaft, said plate-connecting means being disengageable from said oscillating means when the movable member is displaced from the normal position thereof aforesaid.

4. A hook and knife unit for chenille machine comprising a member fixed on a unit-oscillating shaft, a member connected to said fixed member and swingable relative thereto, means for releasably locking said swingable member to said fixed member in a predetermined normal position, a hook removably carried by the swingable member in fixed position thereon, a plate oscillatably carried by the swingable member, a knife removably and adjustably carried by said plate for movement thereby in an arcuate path toward and away from said hook, and a slot in the plate receiving a plate-actuating means and slidable relative to said means to cause the plate to remain stationary relative to the unit in the oscillation of this latter when said plate-actuating means are inoperative.

5. A hook and knife unit for chenille machine comprising a member fixed on a unit-oscillating shaft, a member connected to said fixed member and swingable relative thereto, means for releasably locking said swingable member to said fixed member in a predetermined normal position, a hook removably carried by the swingable member in fixed position thereon, a plate oscillatably carried by the swingable member, a knife removably and adjustably carried by said plate for movement thereby in an arcuate path toward and away from said hook, and a slot at one end of the plate for receiving oscillatable plate-actuating means independent of the unit-actuating shaft, said slot being disengageable from said means when the unit is displaced from said normal position thereof and being movable relative

to said means to cause the plate to remain stationary relative to the unit and the knife to remain inactive in the oscillation of the unit when said plate-actuating means are inoperative.

6. A hook and knife unit for chenille machine comprising a member adapted to be fixedly mounted on a unit-oscillating element, a member pivoted to said fixed member and having a portion conformed to engage a surface of the fixed member to define a predetermined normal position of said pivoted member, means for releasably locking said pivoted member in said normal position thereof, a hook removably secured at one end of the pivoted member, a plate rockably mounted on the pivoted member adjacent said hook, a knife removably mounted on said rockable plate for movement thereby in an arcuate path to and from a position for severing loops held by the hook, resilient means for urging said knife into close association with the hook at the loop-severing position, and means for connecting the plate to a plate-rocking means independent of the unit-oscillating element aforesaid.

7. A hook and knife unit for chenille machine comprising a member adapted to be fixedly mounted on a unit-oscillating element, a member pivoted to said fixed member and having a portion conformed to engage a surface of the fixed member to define a predetermined normal position of said pivoted member, means for releasably locking said pivoted member in said normal position thereof, a hook removably secured at one end of the pivoted member, a plate rockably mounted on the pivoted member adjacent said hook, a knife removably mounted on said rockable plate for movement thereby in an arcuate path to and from a position for severing loops held by the hook, resilient means for urging said knife into close association with the hook at the loop-severing position, and means for operatively connecting the plate to a plate-rocking means independent of the unit-oscillating element aforesaid, said plate-connecting means being disengageable from the plate-rocking means when the pivoted member is displaced from the aforementioned normal position thereof and being ineffective to cause rocking of the plate during oscillation of the unit when the plate-rocking means is inactive.

8. A hook and knife unit for chenille machine comprising a member fixedly mounted on a unit-oscillating shaft, a member removably connected to said fixed member, means for releasably locking said removable member to said fixed member in a predetermined normal position relative thereto, a hook removably carried by the removable member, a rockable plate mounted on the removable member, and a knife removably and adjustably carried by said plate for movement thereby toward and away from said hook, said rockable plate having a portion operatively connected to a means for rocking the plate independent from said unit-actuating shaft, and said portion being separable from said plate-rocking means when the removable member aforesaid is displaced from said normal predetermined position thereof relative to the fixed member.

9. In a multi-needle chenille machine, a number of hook and knife units arranged in pairs of opposing units mounted on oscillatable unit-actuating shafts, each of said units comprising a member fixed to one of said oscillatable shafts, a member movable relative to said fixed member,

means for releasably locking said movable member in a predetermined normal position relative to the fixed member, a hook carried by the movable member, a rockable element mounted on the movable member, and a knife mounted on said rockable element for movement thereby toward and away from said hook, a single oscillatable shaft for actuating the rockable elements of all the hook and knife units, and means for operatively connecting the rockable elements to said actuating shaft therefor.

10. In a multi-needle chenille machine, a number of hook and knife units arranged in a plurality of pairs of opposing units mounted on oscillatable unit-actuating shafts, each of said units comprising a member fixed to one of said oscillatable shafts, a member swingably connected to said fixed member, means for releasably locking said swingable member in a predetermined normal position relative to the fixed member, a hook carried by the swingable member, a rockable element mounted on the swingable member, and a knife mounted on said rockable element for movement thereby toward and away from said hook, the fixed member, the swingable member and the rockable element defining a substantially flat thin assembly whereby a plurality of units may be mounted on the unit-actuating shafts with their knives in closely spaced relation, a single oscillatable shaft for actuating the rockable elements of all the units extending between the opposing units of all pairs, and means for operatively connecting the rockable elements to said actuating shaft therefor.

11. In a multi-needle chenille machine, a number of hook and knife units arranged in a plurality of pairs of opposing units mounted on oscillatable unit-actuating shafts, each of said units comprising a member fixed to one of said oscillatable shafts, a member swingably and removably connected to said fixed member, means for releasably locking said swingable member in a predetermined normal position relative to the fixed member, a hook carried by the swingable member, a rockable plate mounted on the swingable member, and a knife mounted on said rockable plate for movement thereby toward and away from said hook, a further oscillatable shaft extending between the opposing units of all pairs, and pins associated with said further shaft for oscillation therewith, the rockable plates of the opposing units of the pairs having oppositely extending slotted portions receiving said pins to cause rocking of the plates in the oscillation of said further shaft, said slotted portion being disengageable from the pins in the displacement of the swingable member from said normal position thereof and being movable relative to the pins to cause the plates to remain stationary relative to the units and the knives inactive in the actuation of the units by the oscillatable unit-actuating shafts when said further oscillatable shaft is inoperative.

WALTER A. BEHRENS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,123,114	Looper	July 5, 1938