Feb. 12, 1957 H. SPAHR 2,781,009

APPARATUS FOR ATTACHING FLEXIBLE TIE ELEMENTS TO THE EDGE OF THIN SHEETS OR WEB STRUCTURES

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Fig. 1

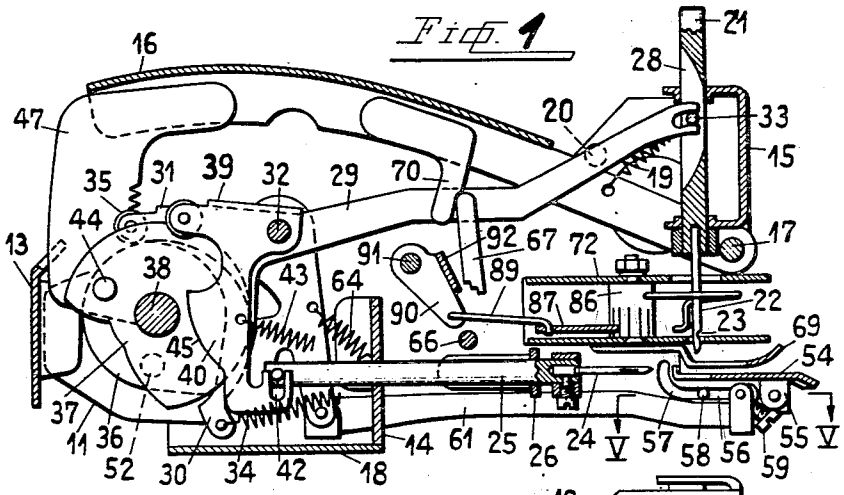


Fig. 2

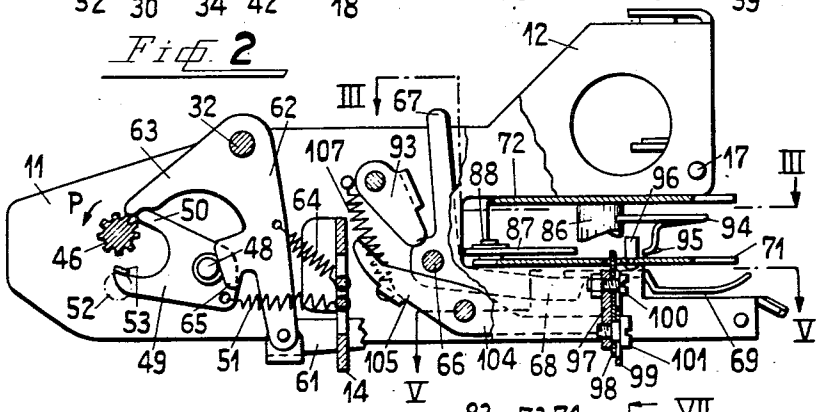
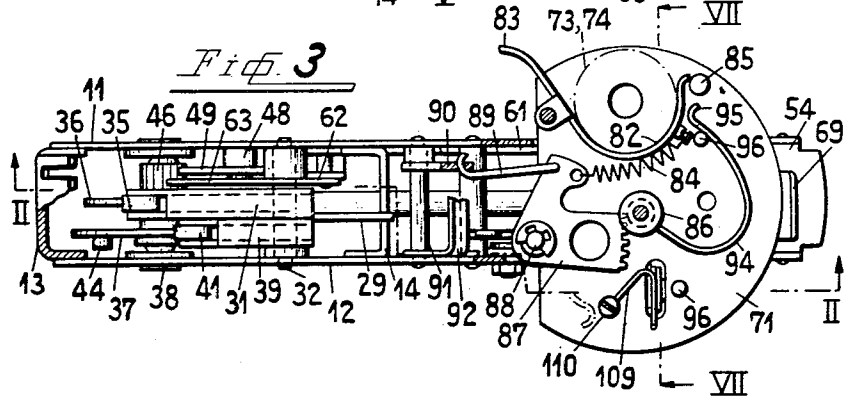


Fig. 3



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Fig. 4

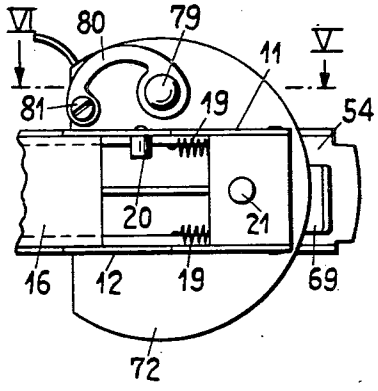


Fig. 5

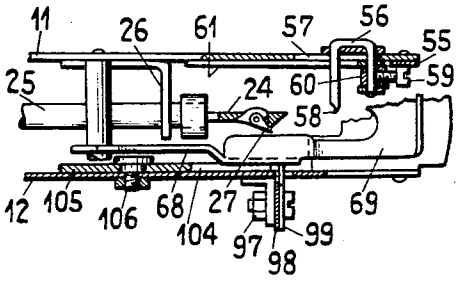


Fig. 7

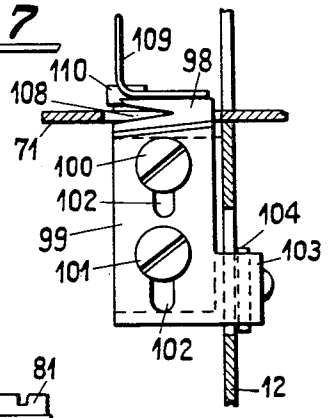
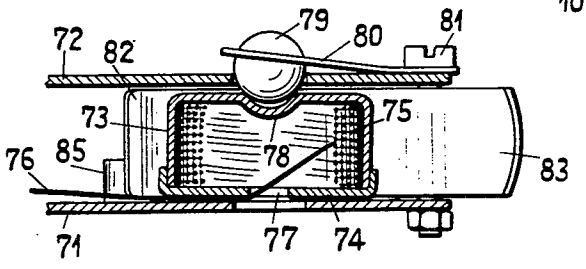


Fig. 6



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APPARATUS FOR ATTACHING FLEXIBLE TIE ELEMENTS TO THE EDGE OF THIN SHEETS OR WEB STRUCTURES

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Application November 27, 1953, Serial No. 394,791

Claims priority, application Switzerland November 28, 1952

11 Claims. (Cl. 112—169)

The present application relates to an apparatus for feeding a filament to the edge of web material, such as the selvage of piece goods, and for thereafter transforming said filament to a stringing tag.

In U. S. Patent No. 2,685,265 there is described and shown an apparatus for attaching flexible tie or tag elements to the edge of thin sheet or web structures, comprising a rest or support for the structure to be treated, and two working needles movable in intercrossing tracks, one needle serving to penetrate the structure while taking along the tie element which has been set ready in a direction at right angles to the needle track, for the purpose of producing an open loop having an ear or bight situated on the underside of the structure. The apparatus further comprises an erector means destined to tilt the ear formed over the corresponding edge of the structure, to erect said ear and thus put it in the track of the second needle, the latter serving to fetch one of the two loop legs by having a reciprocation imparted thereto, and to draw said leg through the ear for the purpose of closing the loop.

My present invention relates to a further form of said apparatus, which consists in mounting the mechanism in a housing which is directly formed as a handle adapted to be gripped by the operator's hand and comprising a movable portion forming a part of the control means. Said movable portion is actuatable by closing the operator's hand which is grasping the housing, against the action of a spring force, in order to operate the apparatus.

One form of my present invention is shown in the accompanying drawings, in which:

Fig. 1 shows a longitudinal section through the apparatus,

Fig. 2 depicts another longitudinal section along the line II—II of Fig. 3 through the apparatus of which certain parts have been omitted for the sake of clarity,

Fig. 3 is a top plan view of Fig. 2, partly in section on the line III—III of Fig. 2,

Fig. 4 is a top plan view of a portion of Fig. 1,

Fig. 5 shows a portion of the apparatus in section on line V—V of Figs. 1 and 2,

Fig. 6 is a section on the line VI—VI of Fig. 4 on an enlarged scale, and

Fig. 7 illustrates a part section on the line VII—VII of Fig. 3 on an enlarged scale.

The housing of the apparatus shown comprises two parallel sidewalls 11 and 12 spaced by webs 13 to 15. A portion 16 of the housing is movably formed with respect to the remaining housing and for such purpose is pivoted on a pin 17 to the sidewalls 11 and 12. On the side opposite the movable housing portion 16, which in the operative position of the apparatus is the lower side, the housing further comprises a cover plate 18. The housing described is directly formed as a handle adapted to be gripped by the operator's hand in that, for example, the thumb of the right hand grasps over the movable portion 16 while the cover 18 rests in the remaining four fingers of said hand. By closing the hand gripping the housing, the movable portion 16 may be swung downwardly against the action of two tension springs 19 which aim to move said portion upwardly. A stop 20 (Figs. 1 and 4) secured to sidewall 11 limits the upward movement of said portion 16.

In the front portion of the housing, i. e. that portion which in Figs. 1 to 5 is situated on the right, a pin 21 is guided in a longitudinally slidable relation. Said pin carries at its lower end a needle 22 which serves as first working element on the apparatus and provided with a catch recess 23 which is accessible from the front. A second needle 24 which functions as second working element, is secured to the front end of a pin 25 which is disposed at right angles to pin 21 and is longitudinally movable in recesses of web 14 and a guide angle 26. The needle 24 is provided with a rearwardly directed hook which co-operates with a pivoted pawl 27 (Fig. 5). Pin 21 is vertically movable and provided with a longitudinal groove 28 in which is engaged, as shown in Fig. 1, one arm 29 of a lever which further includes two arms 30 and 31. Said lever 29, 30, 31 is mounted on an axle 32 which is secured between the sidewalls 11 and 12. That end of arm 29 which is engaged in the groove 28, is forked and coupled to pin 21 by means of a stud 33. The free end of arm 30 is engaged by a tension spring 34 of which the other end is anchored to web 14 and tends to swing the lever 29, 30, 31 so that pin 21 together with needle 22 is moved upwardly. To arm 31 is pivoted a cam roller 35 which coacts with a cam plate 36. The latter, together with a second cam plate 37, is rotatably mounted on a shaft 38, said two cam plates being interconnected for rotation.

A lever having two arms 39, 40 is pivoted also on axle 32. Arm 39 carries a rotatable cam roller 41 which peripherally contacts cam plate 37. The other arm 40 comprises a forked portion 42 in which is engaged a cross-pin of pin 25 whereby the latter is coupled to lever 39, 40. Arm 40 is engaged by one end of a tension spring 43 of which the other end is anchored to web 14. Cam plate 37 carries a laterally projecting follower 44 which, when plate 37 rotates, coacts with a cam face provided on arm 40.

Further on shaft 38 is rotatably mounted a pinion 46 which is coupled to the two cam plates 36, 37 by means of a ratchet pawl (not shown) so that, when pinion 46 rotates in direction of arrow P in Fig. 2, the said cam plates also are rotated, but the latter stand still when the pinion is driven in the opposite direction. Pinion 46 meshes with a rim-gear segment 47 which is fixed to the movable housing portion 16 and is curved concentrically to pin 17 so as to permit driving of the pinion 46 by swinging the housing portion 16 downwardly. A pawl 49 is pivoted on a pin 48 to the sidewall 11, as shown in Fig. 2. Pawl 49 comprises a lug 50 which coacts with pinion 46, and is engaged by a tension spring 51 anchored to web 14. Said spring urges lug 50 into engagement with pinion 46 in order to prevent the latter from rotating in a direction opposite to arrow P. To cam plate 36 is fixed a lateral follower 52 adapted to co-operate with a lug 53 of pawl 49 in order to disengage the latter from pinion 46.

The forward, i. e. right-hand portion, of the apparatus comprises a rest or support 54 below the track of needle 22, which is secured to the sidewalls 11, 12 by means of ears 55 and is provided with a recess for the passage of needle 22. Below said rest 54 is disposed an erector means 56 in form of a U-shaped bracket of which the two legs pass through a slot 57 in sidewall 11, which slot serves as guide. One leg of bracket 56 on its free end carries a small hook 58 whilst the other leg is clamped in an adjusting ring 60 and pivoted to one end of a slide member 61. The other end of the latter is pivoted to one arm 62 of a bell crank 62, 63 pivoted on axle 32.

A tension spring 64 at one end engages the arm 62 and, at the other end, the web 14 and tends to so rotate the bell crank 62, 63 that slide 61 and erector 37 are moved to the right in Figs. 1 to 5. Two follower pins fixed laterally to cam plate 36, which are not shown in the drawings, coact with arm 63 and a nose 65 of arm 62 respectively in order to swing the bell crank in one or the other direction.

On an axle 66 fixed to the sidewalls 11, 12 is pivoted a second bell crank which has two arms 67 and 68. Arm 68 carries a presser 69 disposed above the rest 54 (Figs. 2 and 5) which is apertured for the passage of the two needles 22 and 24. Arm 67 may be so rotated, by depressing the housing portion 16 and through an actuating cam 70 secured thereto, that the presser 69 is moved towards the rest 54. A spring, not shown, causes the bell crank 67, 68 to swing in the other direction.

Two plates 71 and 72 standing at right angles to needle 22 are secured, at some distance from each other to the sidewalls 11 and 12 above the presser 69 and the rest 54. Both these plates are provided with apertures for the passage of needle 22 and pin 21. Between the two plates 71, 72 is inserted a box (Figs. 3 and 6) consisting of two detachably interconnected parts 73 and 74 which surround a spool 75 of a filamentary structure. Said spool is, for example, a self-supporting cross-wound bobbin and may be unwound from the inside. The unwound filament runs through a central hole 77 of the box-cover 74 and between the box and the lower plate 71 thereof. The box part 73 has a bight 78 into which protrudes a ball 79 which projects through a hole in the upper plate 72 and, under the action of a spring 80, presses and holds the box 73, 74 against the lower plate thereof. The spring 80 is secured to plate 72 by means of a screw 81. One arm 82 of a lever 82, 83 engages half the circumference of the spool box. Said lever is pivoted on the pin of screw 81 so that, by actuating the arm 83 which serves as handle, the spool box may be pushed forwardly between the plates 71, 72 by means of the curved arm 82. A spring 84 draws the lever 82, 83 into its ineffective position, in which the arm 82 abuts against a stop 85 secured to plate 71.

A spindle 86 is rotatably mounted between the two plates 71 and 72 in parallel relation with needle 22 and in its lower half portion is formed as a pinion. The latter meshes with a gear segment 87 which is pivoted on a pin 88 to the plate 71. One end of spring 84 engages segment 87 and urges the latter in one direction. Segment 87 further is operatively connected to a lever arm 90 through a link 89, which arm is pivoted on an axle 91 fixed to the sidewalls 11 and 12. Lever 90 through a web 92 is connected to a second lever 93 extending parallel to lever 90 and being also pivoted on axle 91. When depressing the housing portion 16, the actuating cam 70, thereof starts coaction with web 92, whereupon the levers 90 and 92 are moved and segment 87 is actuated. To spindle 86 is fixed an arm 94 which at its free end is formed as hook 95. In the position of rest of the various parts, said hook is situated close to the spool box 73, 74, but when the housing portion 16 has been fully depressed, said hook is in the position shown by dash-and-dot lines in Fig. 3. Further, guide pins 96 for the filament are provided on the lower plate 71.

Below plate 71, a stationary knife 98 of a pair of scissors is secured to sidewall 12 by means of a piece of angle iron 97, which scissors further include a movable knife blade 99. The two knives 98, 99 are disposed on the angle 97 by means of two screws 100 and 101, and the movable knife 99 comprises two vertical slots through which pass the said screws. A lug 103 of knife 99 projects through a slot in sidewall 12 into the housing of the apparatus and is pivoted on one arm 104 of a two-arm lever 104, 105 which is pivoted on a screw 106 to sidewall 12. The other arm 105 of said lever is engaged by a spring 107 which is anchored to sidewall 12 and

tends to swing the lever so that the movable knife 99 moves downwardly. Arm 105 further projects into the track of lever 93 so as to be actuable by the latter. The stationary knife 98 comprises a lateral notch 108 (Fig. 7) of which the upper edge is formed as knife blade. The back of stationary knife 98 together with a spring 109 forms a clamp in which the thread is clampable, as will be described further below. Spring 109 is secured to plate 71 by means of a screw 110.

The mode of operation of the apparatus described and shown is as follows:

When a marking thread has to be tied to the edge of a thin sheet or web structure, for example to the selvage of a fabric, said selvage is introduced between the rest 54 and the presser 69. The operator then closes his hand which grips the housing of the apparatus, whereby the movable housing portion 16 is depressed and pinion 46 through gear segment 47 is rotated in the sense of arrow P in Fig. 2. Immediately after commencement of the swinging movement of housing portion 16, the actuating cam 70 thereof moves the arm 67 so that the presser 69 is applied to the fabric and holds the latter by pressing it against the rest 54. On rotation of pinion 46, the cam plates 36 and 37 are also rotated. Cam plate 36 thereby controls the levers 29, 30, 31 so that pin 21 with needle 22 is moved downwardly. The thread 76 running from spool 75 passes, in the position of rest of the apparatus, from spool box 73, 74 in front of the guide pins 96 and of needle 22 to clamp 98, 109 through which the end of the thread is retained. When needle 22 is moving downwardly, it takes through its recess 23 the freed thread downwardly approximately at the midpoint thereof, thereby forming an open loop. When needle 22 penetrates the fabric, the ear or bight portion of the loop comes to lie on the fabric underside. Through a lateral follower of cam plate 36, not shown, the arm 63 of the bell crank 62, 63 is swung downwardly so that the slide 61 in Figs. 1 and 2 moves to the left. The stirrup-like erector 56 thereby is moved in guide 57, hook 58 seizing one leg of the ear formed by the thread and taking same along. The looper needle 22 now moves upwardly again. In the curved portion of the guideway 57 that leg of erector 56 is moved upwardly which is provided with hook 58, the ear being tilted and erected around the fabric selvage and simultaneously opened. Follower 44 of cam plate 37 then runs up on the curved portion 45 of arm 40, whereby pin 25 with needle 24 is sprung forwardly. Needle 24 thereby moves into the erected ear of the threaded-loop and through its nose engages the two legs of the thread-loop from the rear. Cam plate 37 then through arm 39 moves pin 25 with needle 24 back into its initial position, the needle pulling the two legs of the thread-loop through the ear thereof. The movable pawl 27 of needle 24 prevents the needle-hook from being seized by the thread-loop ear.

Even during the return movement of needle 24, the actuating cam 70 of the movable housing portion 16 starts to act on web 92 to thereby move the two arms 90 and 93. Segmental gear 87 thereby is moved against the action of spring 84 so that spindle 86 is rotated through that portion thereof which is formed as pinion. Arm 94 thus is moved from the position shown in Fig. 3 by solid lines into the position shown by dash-and-dot lines, hook 95 seizing the thread issuing from the spool and pulling same out to a loop while drawing off a corresponding length of thread from said spool. One leg of this loop through the hook is guided into notch 108 of knife 98, and the other leg being guided underneath the clamping spring 109. Arm 93 in the meantime has contacted arm 105, lever 104, 105 thus being moved while the housing portion 16 is moving further downwardly. The movable knife 99 thereby is moved upwardly so that the thread running through notch 108, which thread is a portion of one leg of the loop formed by needle 22, is cut off.

The operator at this point may let the housing portion **16** swing upwardly under the action of the two springs **19**. The two cam plates **36** and **37** which previously have performed a full revolution, thereby remain at rest owing to said ratchet pawl clutch, whilst knife **99**, arm **94** and presser **69** return to their initial positions. The fabric now can be withdrawn from the apparatus, together with the closed thread-loop formed by the latter, such loop being situated at the selvage. The apparatus then is ready for producing a new loop, as the thread issuing from the spool is clamped between the spring **109** and the back of the stationary knife **98** and passes in front of the looper needle **22**.

A closed loop thus may be produced by simply pressing down the housing portion **16**. By means of the apparatus described and shown it thus is possible to tie a plurality of such loops in a second, whereas the same operation performed by hand requires close to thirty seconds.

Through the pressure of spring **80** on the spool box **73**, **74** the thread **76** leaving the spool is clamped to some extent between box portion **74** and plate **71** so as to brake the speed of the thread.

If the movable housing portion **16** in the course of its downward movement is let loose, it cannot swing upwardly again owing to the action of pawl **49** and lug **50** thereof. When the apparatus is in its position of rest, follower **52** of cam plate **37** pushes the pawl upwardly to its inoperative position, as shown in Fig. 2. As soon as, however, the housing portion **16** starts to move downwardly, follower **52** moves away from lug **53** and the pawl enters into action and is active until follower **52** again engages the lug **53** after a complete revolution of the two cam plates. This is the case when the housing portion **16** has been entirely depressed. Once an operation has been started in the apparatus, it logically must be completed, thereby avoiding derangements of the mechanism and the like.

According to the description herein, the movable housing portion **16** together with the cam plates **36**, **37** and the levers **29**, **30**, **31**, **39—40** and **62—63**, may be assigned to the control means which permit the logical sequence of motions of the two working elements **22** and **24** and of the erector **56**.

The apparatus described, in contradistinction to known devices, which serve for the same or related purpose, has the advantages of compact construction and fully automatic operation. The apparatus is very handy and even when used for longer periods of operation, does not cause any signs of fatigue in the hand of the operator.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In an apparatus for feeding a filament to the selvage of web material and transforming said filament to a stringing tag and having mechanism including a first reciprocable needle for moving said filament through said selvage and forming a loop thereon, further having erector means to tilt said loop about said selvage, and a second reciprocable needle operable for threading a portion of said filament through said loop to obtain said tag; a housing for said mechanism, said housing conforming approximately to the palm of an operator's hand and including a fixed portion, in which said mechanism is mounted and a movable portion pivotally secured to said fixed portion, spring means normally urging said movable portion away from said fixed portion, and means operatively connecting said movable portion with said mechanism, whereby upon grasping said machine and closing the hand against the action of said spring means said movable portion is displaced relative to said fixed portion to actuate in sequence said first needle, said erector means and said second needle.

2. In an apparatus according to claim 1, said erector means including slide means provided with a guide slot, and a stirrup having a pair of legs, one of said legs being pivoted to said slide means, the other of said legs extending through said guide slot and terminating in a hook, said hook serving to open said loop upon actuation of said erector means.

3. In an apparatus according to claim 1, including a plate on said fixed housing portion, a box including a cover on said plate, a supply spool for said filament within said box, said cover being provided with a hole for passage of said filament therethrough and thence between said box and said plate, and means urging said box against said plate.

4. In an apparatus according to claim 3, said box being provided with a recess, said urging means including a ball disposed in said recess.

5. In an apparatus according to claim 4, including a lever arm pivoted to said plate, said lever arm holding said box in position, whereby said box may be removed for replacement upon actuation of said lever arm.

6. In an apparatus according to claim 1, including a support for said selvage, said operatively connecting means including actuating cam means on said movable portion for holding said selvage on said support upon pivoting of said movable portion in one direction against the action of said spring means, rim-gear segment means on said movable portion, a shaft on said fixed portion of said housing and extending transversely of the latter, pinion means rotatably supported on said shaft and operatively engaging said rim-gear segment means for rotation upon pivoting of said movable portion in said one direction, and cam plate means rotatably supported on said shaft and operatively connected with said mechanism, said pinion means engaging said cam plate means for driving the latter.

7. In an apparatus according to claim 6, including ratchet pawl means actuated by said pinion means and engaging said cam plate means for rotating the latter upon pivoting of said movable portion in said one direction, said ratchet pawl means being ineffective upon pivoting of said movable portion in return direction, and means on said cam plate means for disengaging said pawl means and said pinion means upon predetermined pivoting of said movable portion in said one direction.

8. In an apparatus according to claim 7, said operatively connecting means further including an axle rotatably supported on said fixed housing portion and extending in parallel direction to said first needle, further pinion means on said axle, gear segment means pivotally mounted on said fixed housing portion and meshing with said further pinion means, second spring means urging said gear segment means in one direction, first lever means pivoted to said fixed housing portion and coupled with said gear segment means in opposition to said second spring means, said first lever means being operatively coupled with said actuating cam means on said movable housing portion.

9. In an apparatus according to claim 8, including spool means for holding a continuous filament for forming said tags, clamp means for holding an end of said filament extending from said spool means adjacent said first needle means, scissor means for cutting said filament upon stringing of a tag, and a follower arm on said axle and terminating in a hook for engagement with said filament, whereby following actuation of said second needle means, said hook of said follower arm advances a length of said filament to said clamp, said scissor means cutting said filament to complete stringing of one tag, said clamp means holding uncut filament in readiness for further tag stringing.

10. In an apparatus according to claim 9, said scissor means including a movable knife and a stationary knife,

said clamp means including a spring cooperating with said stationary knife.

11. In an apparatus according to claim 10, said operatively connecting means further including second lever means pivoted on said fixed housing portion and actuated by said first lever means, said second lever means engaging said movable knife, whereby actuation of said second lever means displaces said movable knife to cut said filament.

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