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BASTING DEVICE FOR SEWING MACHINE

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Fig. 1.

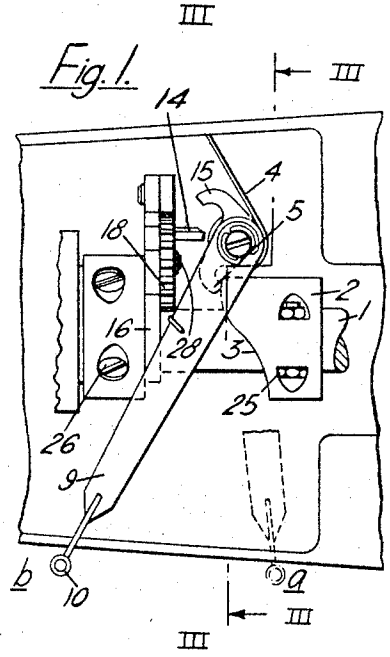


Fig. 2.

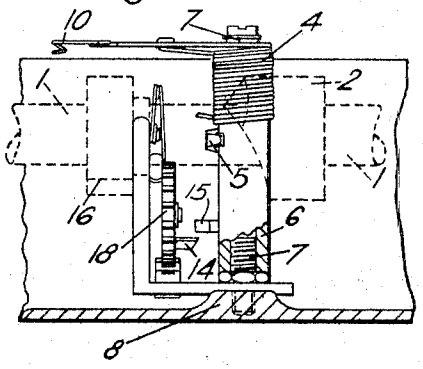
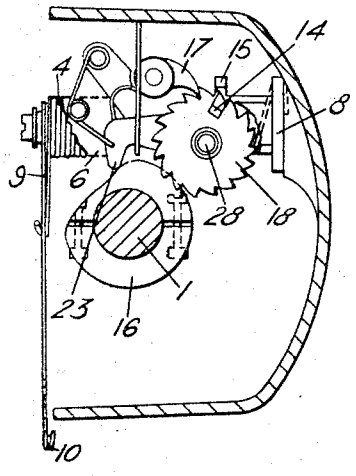


Fig. 3.



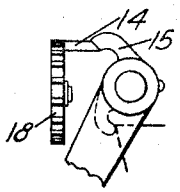


Fig. 4a

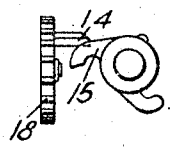


Fig. 4b

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Fig. 5.

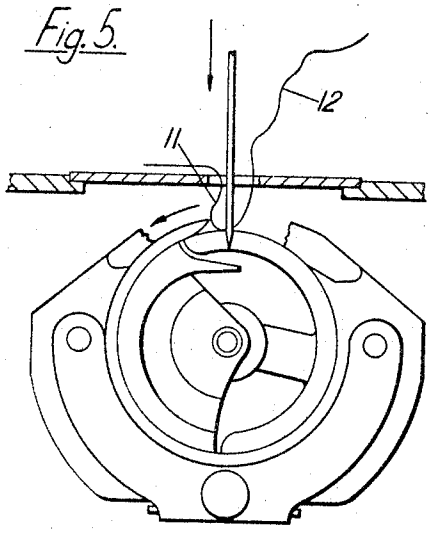
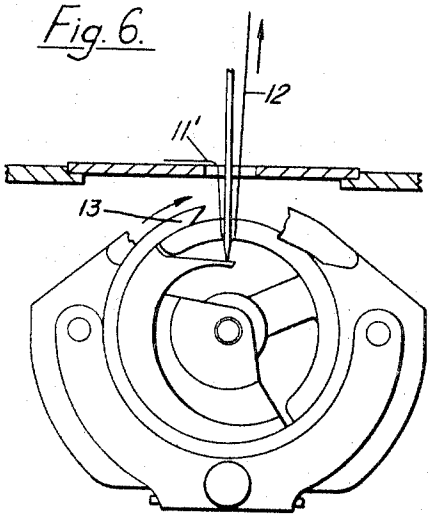


Fig. 6.



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Fig. 7a

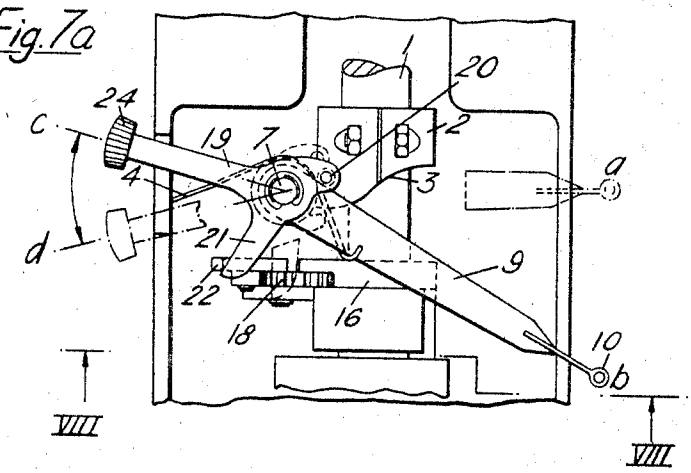


Fig. 7b.

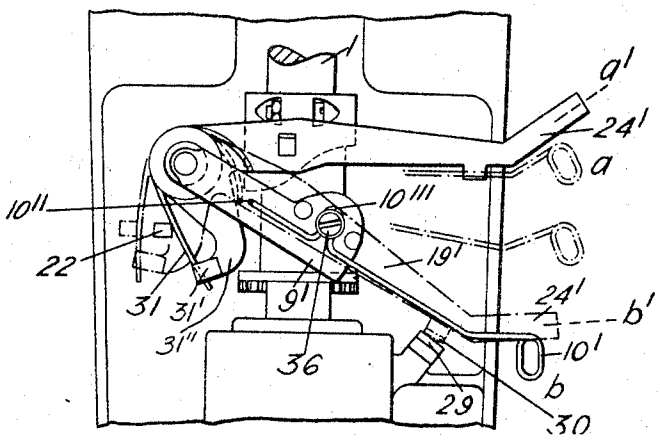
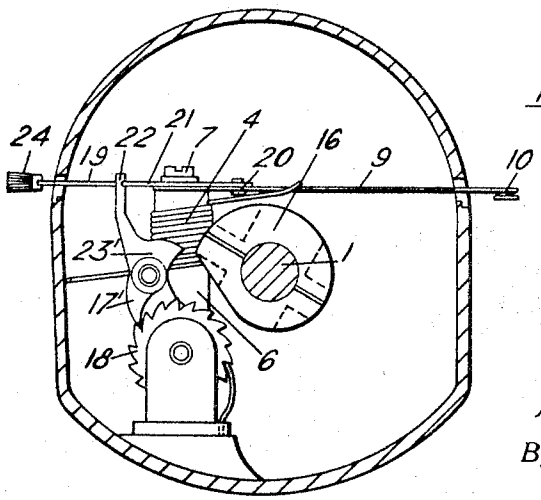


Fig. 8.



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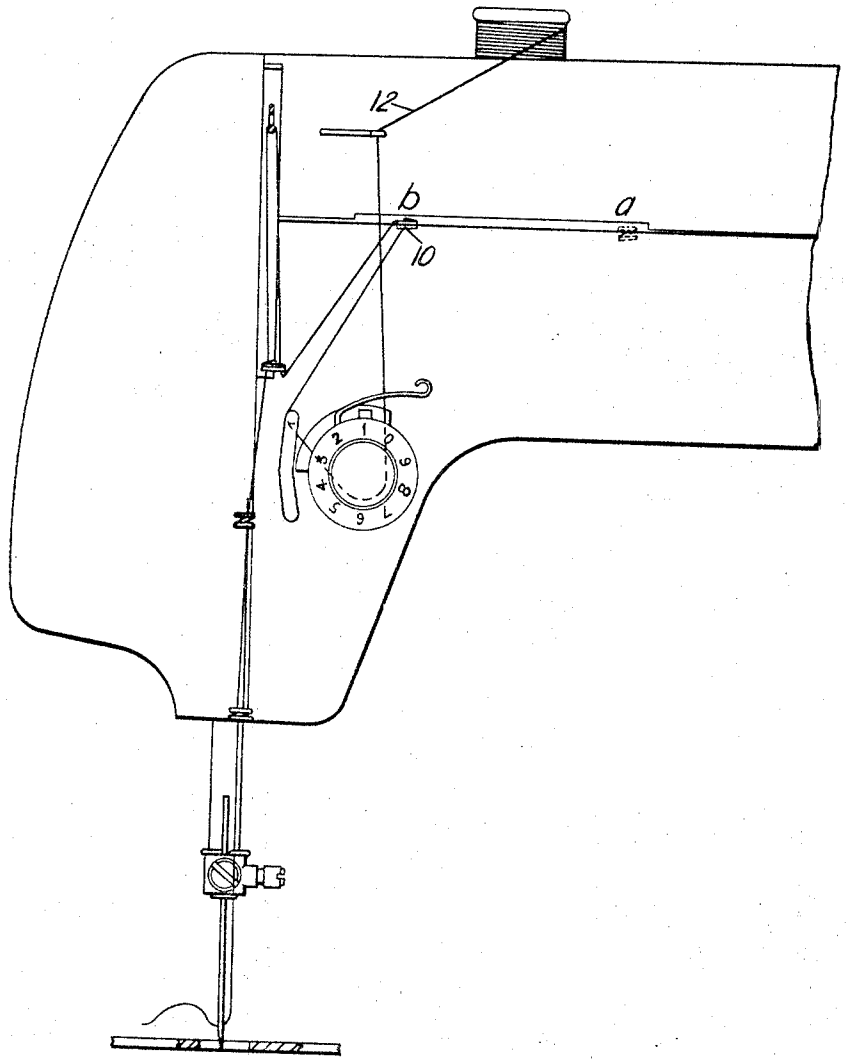
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Fig. 9a



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Fig. 9b.

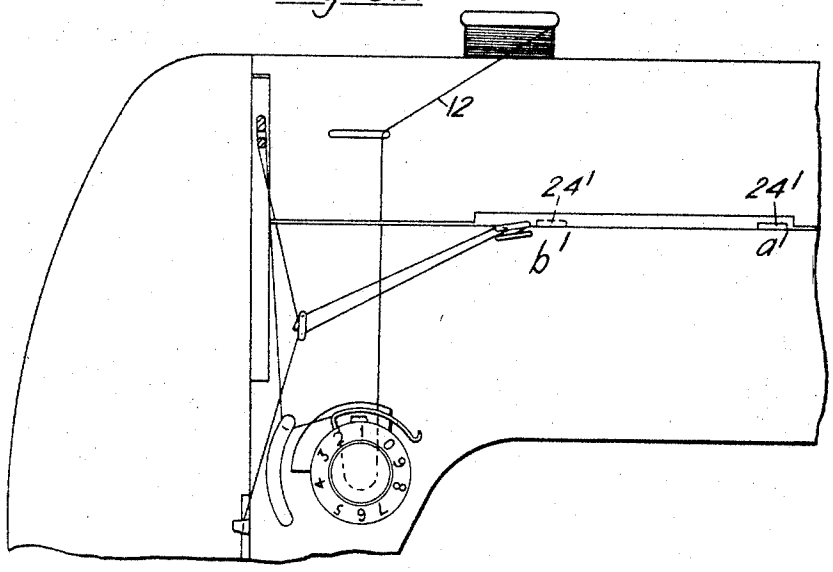


Fig. 10a.

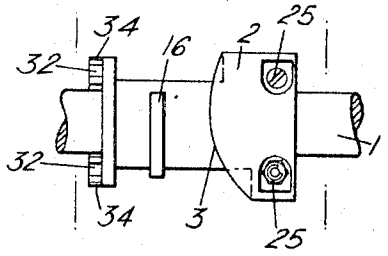


Fig. 10b.

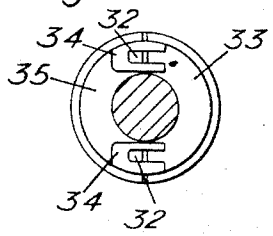
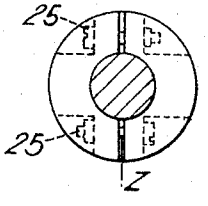


Fig. 10c.



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3,428,009

BASTING DEVICE FOR SEWING MACHINE

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Claims priority, application Italy, Nov. 27, 1964, 53,878/64
U.S. Cl. 112—255
Int. Cl. D05b 47/00
7 Claims

ABSTRACT OF THE DISCLOSURE

A sewing machine of the type having an upper horizontal hollow arm and a main shaft rotating inside the arm to control the up-and-down motion of a needle has a basting attachment comprising a cam fixed on and rotatable with the main shaft, and a pivotally mounted unit in the hollow arm comprising an oscillating lever and a cam follower and an abutment. The cam follower is spring-urged against the contour of the cam to oscillate the unit, and the lever carries a thread guide which extends through a slot in the wall of the hollow arm and terminates outside the arm. A pawl wheel is turned one notch with each rotation of the main shaft and carries a finger which from time to time contacts the abutment to hold the cam follower off the cam and prevent oscillation of the thread guide. The thread guide tensions the thread each time it oscillates thereby to close what would otherwise be the stitch loop and prevent locking of the stitch. Thus, only an occasional stitch is locked (when the finger contacts the abutment) and the rest of the sewing operation is basting.

The present invention relates to a device in rectilinear or zig-zag sewing machines for automatically obtaining basting, that is to say, sewing constituted of a knotted stitch followed by a series of knotless stitches. More particularly, the device according to the present invention is based on the principle of preventing stitch knotting by subjecting the sewing thread to a supplementary tension before the needle cooperates with the hook or shuttle. The sewing thread is thus prevented from making a loosened loop in which the hook or shuttle tip might engage in a well known manner for making the stitch. This supplementary tension is naturally applied cyclically only for a preset stitch series, whilst for at least one stitch subsequent to said series it is not applied, so that said (knotted) stitch is normally carried out.

Devices carrying out basting according to the aforementioned concepts have already been developed, nevertheless, they generally provide a complex structure, and are not always of dependable performance; furthermore said devices have so far been developed as accessories, attachable to the outside of the sewing machine frame (for example at the presser foot) for execution of basting, and consequently they are often subject to failures owing both to incorrect mounting by unskilled users, and to impacts.

The device according to the present invention obviates all the above-outlined inconveniences, because it is of simple construction and practical use. Such device is easily applicable to rectilinear or zig-zag sewing machines, both during and after assembling of the machine. The device according to the present invention is substantially characterized in that inside the upper hollow arm of the sewing machine and integral with the main rotary shaft for the sewing motion control is provided a cam controlling the cyclic oscillation of a lever pivoted on a stationary pin inside said hollow arm of the sewing machine, with said lever being integral with a thread guide jutting out of the sewing machine arm through a slot provided

in the wall of said arm, and is adapted to exert an intermittent traction upon a sewing thread in synchronism with the needle cyclic motion and under the control of the aforesaid cam.

The elements of the device according to the present invention may consist for the most part of suitable plastic material and are obtained through injection molding processes, without further machining, and hence they are very economical.

The invention will now be better described with reference to the accompanying drawings showing a preferred non-limiting embodiment of the device according to the present invention as applied in a sewing machine, wherein:

FIG. 1 shows in partial plan view the device according to the present invention inside the sewing machine arm;

FIG. 2 is a partial elevation view of the same device of FIG. 1;

FIG. 3 is a partial section view taken along the line III—III of FIG. 1;

FIGS. 4*a* and 4*b* show a detail of the stopping tooth of the thread guide, in stop and free oscillation positions, respectively;

FIGS. 5 and 6 are front views, partially in section, of the shuttle and needle in eyelet forming position before and respectively after the thread is stretched;

FIGS. 7*a* and 7*b* are partial plan views of two different embodiments of the mechanism for excluding the basting device;

FIG. 8 is a partial cross section on the line VIII—VIII of FIG. 7*a*;

FIGS. 9*a* and 9*b* are external views of the sewing machine with its stationary and movable thread guide in different embodiments; and

FIGS. 10*a*, 10*b* and 10*c* show in detail a side view and two cross sections, respectively, of the cams for the actuation of the thread guide and of the stopping tooth.

On the driving shaft **1** (FIGS. 1 to 3) is keyed the cam **2** against the front peripheral surface **3** of which rests, by action of the spring **4**, the tooth **5** integral with the bushing **6**; the latter is idly pivoted on the pin **7** fastened at one end to the frame **8** of the sewing machine.

The driving shaft **1** rotates with the cam **2**, which performs therefore a full revolution upon each complete rotation of the shaft **1**, that is for each stitch.

On the bushing **6** is rigidly fastened the arm **9** to which is fastened the thread guide **10**.

The action of the surface **3** of the cam **2**, which is suitably shaped, together with the action of the spring **4**, causes the tooth **5** to make an entire oscillation which is transmitted to the thread guide **10**; the latter makes therefore a reciprocating motion *a–b–a* (FIGS. 1 and 9*a*). To this end, spring **4** urges tooth **5** counterclockwise as seen in FIG. 1. The shape of the control surface **3** of the cam **2** is such that when the needle is about to complete the penetrating stroke and to make the eyelet **11** (FIG. 5) with the upper thread **12**, the thread guide **10**, through which the thread **12** (FIG. 9*a*) is caused to pass, moves quickly away from the left-hand position *b* towards the position *a* (FIGS. 1 and 9*a*), therefore tensioning the thread **12** (as indicated at **11'** in FIG. 6).

Under this circumstance, the tip **13** of the shuttle cannot penetrate the eyelet **11** (as instead occurs in usual sewing), and there is failure of the knotting of the upper thread with the lower thread, that is to say, the knotted stitch is not formed.

The thread guide **10**, by the combined action of the cam **2** and the spring **4**, continues its motion towards the right-hand position *a* (FIGS. 1 and 9*a*), recovering the upper thread that remains loose because of the failure to knot and thus avoiding any thread entanglement. The cam undergoing continuous rotation, the thread guide **10** will

be shifted back to the left-hand side (towards), supplying thread for a subsequent stitch. In this manner, the oscillation *a–b–a* of the thread guide **10** is repeated at each rotation or stitch of the machine.

In this way, there will be no knot forming. In order to cyclically obtain a knot after a certain number of knotless stitches, the tooth **14** will enter into operation; said tooth acts, by means of the hereinafter described mechanism, on the arm **9** after a preset number of knotless stitches, so as to maintain the tooth **5** and therefore the thread guide **10** out of the path of the cam **2**, that is to say, in left-hand position *b* (FIGS. 1 and 7*a*); the regular knotting of the upper and lower threads then takes place.

The mechanism which stops the thread guide **10** is controlled by a cam **16** keyed on the shaft **1**; this cam causes the pawl **17** to oscillate, because pawl **17** is mounted on an arm that bears against cam **16**, which pawl, at each rotation of the cam, advances one tooth of the toothed wheel **18**; with the latter is integral the tooth **14** which after the preset number of turns abuts against the tooth **15** of the bushing **6** (FIG. 4*a*), stopping said tooth **15** and thus impeding the upper tooth **5** from following the profile of the cam **3** under the action of the spring **4**.

At the subsequent rotation of the cam **16** the toothed wheel **18** advances another step, releasing the tooth **14** from the tooth **15**; the oscillations of the tooth **5** then resume for forming knotless stitches until the tooth **14** again abuts against the tooth **15** in the subsequent operating cycles of the sewing machine.

For excluding the basting device from the operation of the sewing machine a lever **19** (FIG. 7*a*) is provided, pivoted for oscillation on the pin **7**. The lever **19** carries an extension piece **20** which comes into contact with the arm **9** of the thread guide **10** and another extension piece **21** which comes into contact with the extension **22** of the arm **23** upon movement of lever **19** from the position *d* to the position *c*, said arm **23** carrying the pawl **17**. The lever **19** is operable from the outside of the machine arm through the handle **24**. When the handle **24** is in the *c* position, the extension piece **20** holds the arm **9** and thus the thread guide **10** in the position shown in FIG. 7*a*, in which the tooth **5** is disconnected from the profile **3** of the cam **2**, said cam rotating then freely.

In a closely analogous manner, the extension piece **21** of the lever **19** pushes away the end **22**, disconnecting the tappet arm **23** from the cam **16**; also this cam rotates then freely and the basting device may be considered then fully excluded from the operation of the sewing machine.

When it is desired to restore the basting operation, the handle **24** will be carried back to the position *d* (FIG. 7*a*); the extension pieces **20** and **21** will then move away respectively from the arm **9** and the end **22**, and the basting device resumes operation.

In the embodiment shown in FIG. 7*b*, wherein similar parts or parts having the same function have the same reference numbers, the handle **24'** of the disconnecting lever **19'** projects from the front portion of the machine arm, where its use is made easier.

The lever is retained in the disconnecting position by a projection **29**, preferably obtained by casting as one piece with the machine arm on which the tooth **30** of the lever **19'** can hook.

As in the case of the device of FIG. 7*b*, by the action of the lever **19'**, hooked in **29**, the thread guide **10'** and related control tooth **5** are kept disconnected from the profile **3** of the cam **2**; through the spring-loaded member **31**, integral with the lever **19'**, it is further possible to render inoperative the arm **22** of the feed pawl assembly.

By slightly pushing upward the lever **19'** one may easily release it from the tooth **29**, so as to bring the basting device back into function, thus permitting the regular oscillation of the thread guide **10'** between the positions *a'* and *b'*. In the embodiment of FIG. 7*b*, the thread guide **10'** is not made as one piece with its support lever **9'**, but it is pivoted thereupon at **10'''** and may be fastened through an anchoring screw **36**; this ensures, besides an easy replacement of the thread guide **10'**, in case of breakdown, also an adjustment of the mutual angular position.

In other words, the thread guide **10'** also moves with the oscillating lever **9'**, by virtue of the locking screw **36**. When the control arm **19'** with its handle **24'** is in position *a'*, the thread guide **10'** freely oscillates between position *a* and position *b*, and there is no interference between **10'** and **19'**; but when the basting device is to be rendered inoperative, the handle **24'** is shifted from position *a'* to position *b'*, and the hook **30** is anchored on the stationary hook **29**. In this way, lever **19'** is held locked in position *b'* and in turn retains lever **9'** and hence the thread guide **10'** locked in position *b*. Spring **31** engages a hook **31'** on a second arm **31''** of the lever **19'** and presses against tooth **22**, which is shifted into its phanton-line position and thus rendered inoperative.

The cams **2** and **16** may be constituted each of one piece and adapted to be keyed on the shaft **1** before this is mounted in its seats, and then timed and correctly positioned. In a modified embodiment the cams **2** and **16** may be made each of two pieces, associable along a diametral plane and fastened on the shaft **1** by the screws **25–26**; in this case, the cams are suitable for mounting also when the sewing machine has been fully assembled.

According to another embodiment, illustrated in FIGS. 10*a, b, c*, the cams **2** and **16** are obtained by molding in two parts, separated from each other along a diametral longitudinal plane of the shaft **1** and which may be associated with each other and locked on the shaft **1** through the screws **25** and complementary cogs **32, 34**.

All the members constituting the basting device, except screws, springs and thread guide, may be made out of plastic material (such as nailafil-nylon-delrin or other suitable material) or alloys through die casting, which permits low manufacturing costs.

The pin **7** of the thread guide **10** and the pin **28** of the pawl assembly **17–18** with the elements mounted thereon, are preferably fastened on a support applicable to the inside of the machine arm to constitute an assembly for easy mounting and removal.

What I claim is:

1. In a sewing machine having an upper horizontal hollow arm and a main shaft rotating inside said arm and adapted to control the up-and-down motion of a needle for the execution of rectilinear or zig-zag sewing; the improvement comprising a basting attachment comprising first cam means fixed to and rotatable with said main shaft, a pivot carrying an oscillating lever and a cam follower movable with the lever, said pivot, lever and cam follower being mounted inside said hollow arm, said first cam means acting on said cam follower for controlling cyclic oscillation of said lever, said hollow arm having a wall having a slot therethrough, a thread guide secured to the end of said lever and projecting through said slot outside said hollow arm, spring means for maintaining said cam follower in contact with said first cam means, and disconnecting means for intermittently disconnecting said cam follower from said cam means.

2. Apparatus as claimed in claim **1**, in which said disconnecting means comprises a pawl wheel which is caused to move forward by one tooth at each stitch, a finger carried by said pawl wheel, and an abutment oscillatable with said lever, said finger contacting said abutment to limit oscillation of said abutment thereby to disconnect said cam follower from said cam means in at least one of the positions of said pawl wheel.

3. Apparatus as claimed in claim **1**, and means for adjusting the relative angular positions of said oscillating lever and thread guide.

4. Basting device according to claim 2, said disconnecting means comprising second cam means keyed on said rotating main shaft and engageable with the teeth of said pawl wheel.

5. Basting device according to claim 4, comprising a pin integral with said hollow arm, said oscillating lever of the thread guide being pivoted on said pin, a lever arm also pivoted on said pin, said lever arm having means adapted to engage said oscillating lever and said feed pawl, said lever arm extending outside said hollow arm of the sewing machine to be operable by hand to disconnect the thread guide and the feed pawl from the respective control cams, thereby excluding the basting device.

6. Basting device according to claim 5, in which said means engaging said oscillating lever and said feed pawl comprise at least one spring-loaded member.

7. Basting device according to claim 6, comprising a stationary tooth on said hollow arm and a second tooth integral with said lever arm, said stationary tooth and said second tooth, co-operating to lock said lever arm in disconnecting position.

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