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R. BECKER

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THREAD-CONTROLLING MECHANISM FOR SEWING MACHINES

Filed Dec. 22, 1941

2 Sheets-Sheet 1

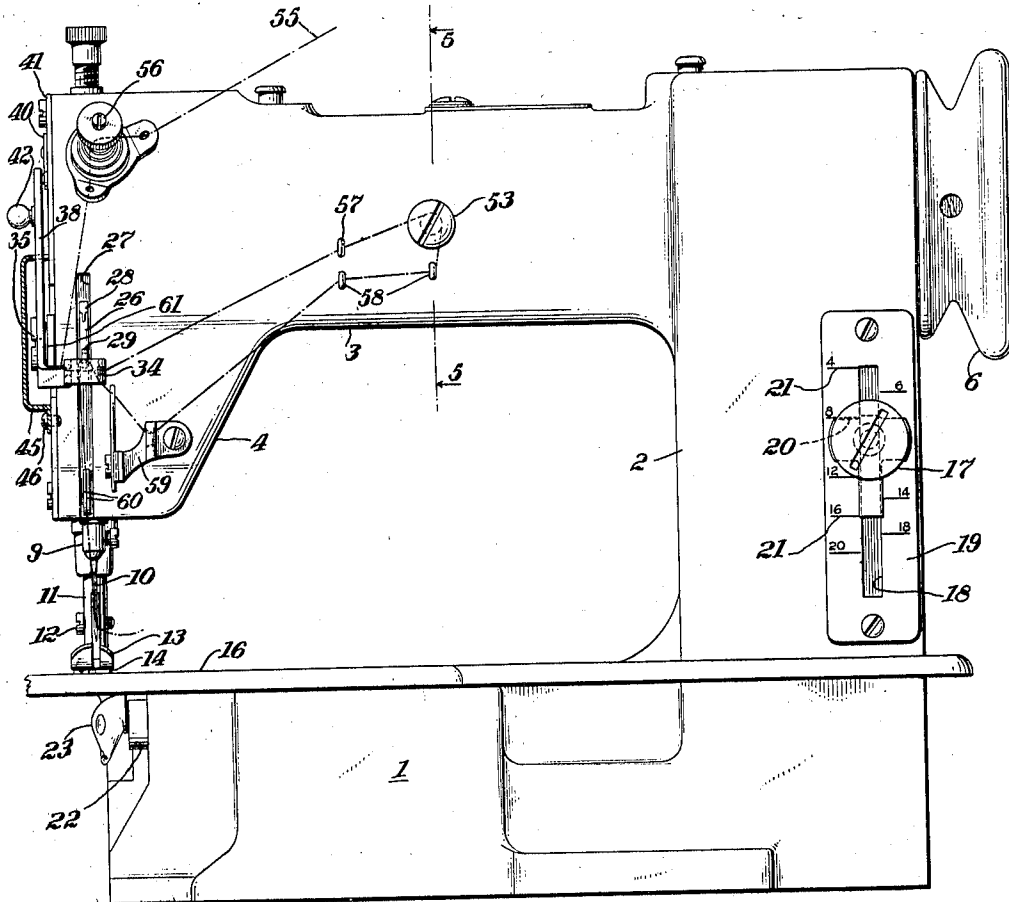


Fig. 1.

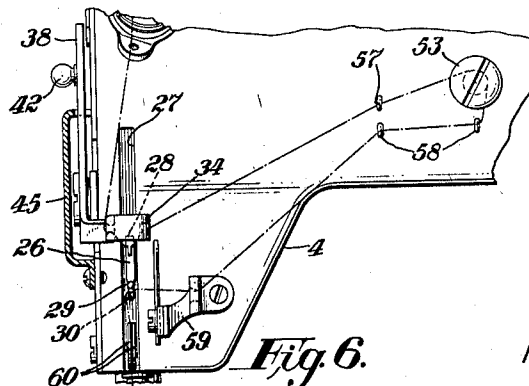


Fig. 6.

Witness:

John H. Cave

Inventor
Rudolph Becker

By

John F. Heine

Attorney

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R. BECKER

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2 Sheets-Sheet 2

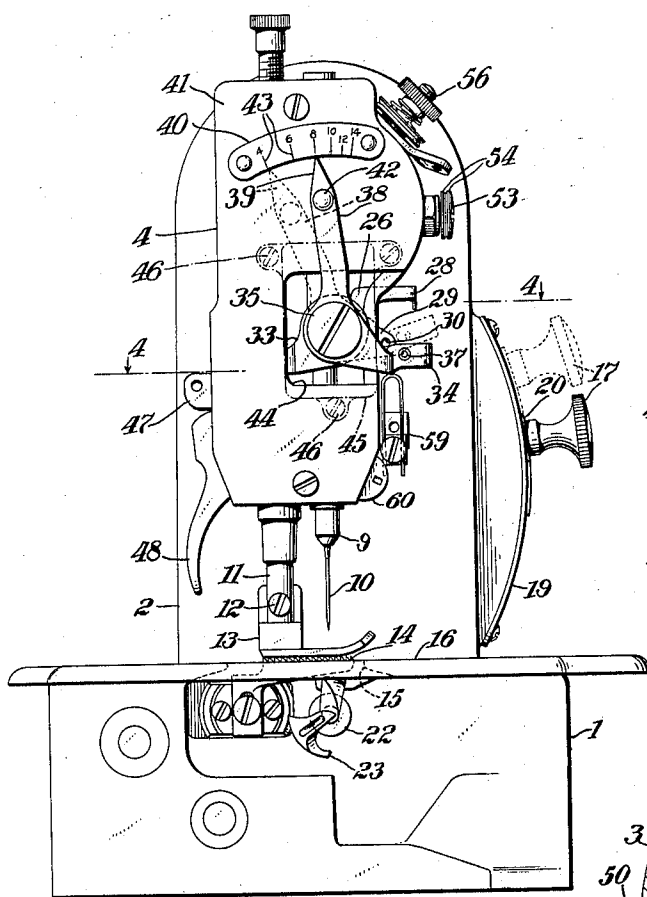


Fig. 2.

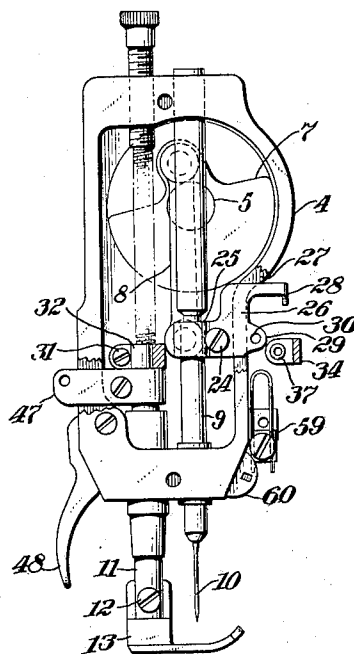


Fig. 3.

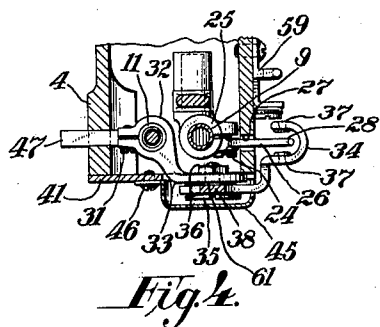


Fig. 4.

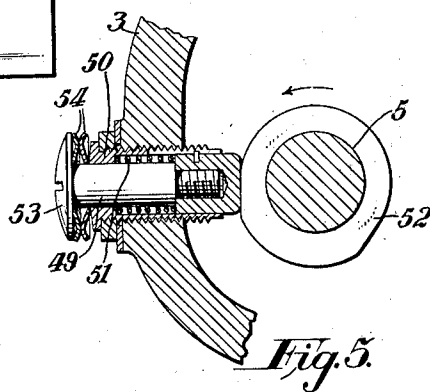


Fig. 5.

Witness:

John W. Cave

Inventor

Rudolph Becker

By

John F. Heine

Attorney

UNITED STATES PATENT OFFICE

2,325,995

THREAD-CONTROLLING MECHANISM FOR SEWING MACHINES

Rudolph Becker, North Plainfield, N. J., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

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11 Claims. (Cl. 112-245)

This invention relates to sewing machines and more particularly to improved needle-thread controlling mechanisms therefor.

In certain classes of work, such as necktie stitching, exceptionally loose stitches are required to give the resultant seam the proper amount of elasticity. Heretofore it has been the usual practice to perform such loose stitching operations with a sewing machine which is adjusted so as to provide very little tension in the needle-thread, thereby giving rise to the loosely set stitches. However, when this expedient is used it becomes difficult to uniformly set the stitches as the needle-thread controlling mechanism has an indeterminate length of thread to handle with the formation of each stitch as there is no positive control over the thread when the thread-tension is slight. Furthermore, as the stitch length is varied, as by adjusting the feeding mechanism, the thread requirements of the stitching mechanism also vary. Variations in thickness of the work to be stitched also alter the thread requirements because more thread is needed to complete a stitch as the work becomes thicker. The above cited thread handling difficulties are all present in regular stitching operations using normal needle-thread tensions, but such difficulties all become highly magnified whenever loose stitches, especially of the single-thread chain-stitch variety, are to be produced with uniformity in a fabric. It is therefore, an object of the present invention to overcome the above cited stitching difficulties by provision of an improved needle-thread controlling mechanism.

Another object of this invention is to provide an improved needle-thread controlling mechanism including a thread pull-off device which is adjustable whereby various predetermined amounts of needle-thread may be made available for stitching purposes.

Another object of the present invention is to provide a needle-thread pull-off device which is automatically adjusted to compensate for variations in thicknesses of work passing through the machine, and which is manually adjustable so that it may be set to pull off various predetermined amounts of needle-thread corresponding to stitch length adjustments.

A further object of the present invention is to provide an improved compact and inexpensive needle-thread controlling outfit comprising thread pull-off and thread take-up devices, which outfit may be readily applied to a standard type of sewing machine.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings, Fig. 1 is a front elevation of a sewing machine embodying the present invention.

Fig. 2 is a left end view of the machine shown in Fig. 1.

Fig. 3 is a left end view of the hollow head portion of the machine frame with the face-plate removed.

Fig. 4 is a horizontal section taken substantially along line 4-4 of Fig. 2.

Fig. 5 is a fragmentary vertical section taken substantially along the line 5-5 of Fig. 1.

Fig. 6 is a fragmentary view of the hollow head portion of the machine frame shown in Fig. 1 but with the pull-off arm in its lower position.

Referring more specifically to the drawings, the invention is disclosed as embodied in a sewing machine having a frame comprising a base 1, standard 2, and an overhanging arm 3 which terminates in a hollow head 4. A main, or needle-bar-actuating shaft 5 is journaled lengthwise of the arm 3 and mounted at its rear end is a combined belt and hand-wheel 6. The forward end of the shaft 5 actuates, by means of the crank 7 and the link 8, a reciprocatory needle-bar 9 which is suitably journaled in the head 4 and carries an eye-pointed needle 10 at its lower end. Also mounted in the head 4 is a spring-pressed presser-bar 11 to the lower end of which is secured, as by a clamp-screw 12, a presser-foot 13.

Cooperating with the presser-foot 13 to effect step-by-step movements of the work between successive reciprocations of the needle 10, is a feed-dog 14 which operates through a slot 15 in the cloth-plate 16. This feed-dog 14 is adapted to be given backward-and-forward and rising-and-falling movements such as are common in conventional four-motion feeding mechanisms. These movements are effected by suitable mechanism located within the base 1 of the machine.

The amplitude of feed-dog movement, which directly governs the stitch length, is adjusted by manipulation of the usual feed-adjusting lever 17 projecting through a slot 18 formed in the forward wall of the standard 2. Indicating means in the form of an indicia plate 19 is provided on

the standard 2 for cooperation with an indicating plate 20 carried by the lever 17. Provided on the plate 19 are limits or numbered lines 21 which indicate the stitch lengths to which the lever 17 may be moved to thereby govern the amplitude of the feed-dog movements. A more detailed disclosure of the present feeding mechanism may be had by reference to my U. S. Patent No. 2,222,017, dated Nov. 19, 1940.

Mounted in the base 1 of the machine is a rotary shaft 22 carrying upon its outer end a conventional rotary wing-type chain-stitch loop-taker 23 which cooperates with the needle 10 in the formation of single-thread chain-stitches. Suitable mechanism within the machine frame effects rotation of the loop-taker 23 in timed relation with the reciprocations of the needle 10. For a more complete disclosure of the present stitch-forming mechanism reference may be had to my U. S. Patent No. 2,222,016, dated Nov. 19, 1940.

Secured to the needle-bar 9 by means of a clamp-screw 24 is a collar 25 from which extends a bracket 26. Extending from the bracket 26 and protruding through the slot 27 in the hollow head 4 is a thread-engaging pull-off arm 28 and a take-up member 29 containing the take-up thread eye 30. It is to be understood from the above description that collar 25, bracket 26, pull-off arm 28 and take-up member 29 all reciprocate as an integral unit with the needle-bar 9.

Secured to the presser-bar 11 by means of a clamp-screw 31 is a collar 32 from which extends the bracket-arm 33 pivotally supporting the thread-guide arm 34 by means of a pivot screw 35 and a nut 36. The free end or thread guide portion of the arm 34 is U-shaped and is provided with two thread eyelets 37 disposed one on each side of the vertical plane containing the pull-off arm 28.

Extending upwardly from the thread-guide arm 34 is an indicating and adjusting member or arm 38 having its free end pointed as at 39 to function as an indicator finger which is adapted to cooperate with the indicia-carrying plate 40 secured to the face-plate 41. Mounted upon the free end portion of the member 38 is a knob 42 which is adapted to function as a handle so that the operator may grasp the same and swing the member 38 about the pivot screw 35 to thereby adjust the thread eyelets 37 relative to the pull-off arm 28. The friction washer 61, disposed between the arm 34 and the bracket-arm 33 frictionally retains the adjusting member 38 and the arm 34 in their proper adjusted positions. The plate 40 is provided with limits or numbered lines 43 which correspond to those lines 21 found on the stitch length indicia plate 19.

As may be best seen in Fig. 4, the face-plate 41 is provided with an aperture 44 for the purpose of permitting the bracket-arm 33, the thread guide arm 34 and the pivot screw 35 to protrude forwardly of the face-plate. A cover-plate 45 is secured to the face-plate 41 by means of screws 46 and thereby provides a cover for the protruding thread-controlling mechanism.

As illustrated in Fig. 3 the presser-bar 11 has secured thereto directly below the collar 32, the usual laterally extending arm 47 which is engaged by the presser-bar lifter 48 in the usual manner, as for example when the operator raises the lifter 48 for the purpose of elevating the presser-foot 13. It is to be understood therefore, that since the collar 32 is secured directly to the

presser-bar 11, the bracket-arm, and consequently the thread guide 34 will be raised and lowered directly with the presser-foot 13 whether the foot be actuated by means of the manually controlled lifter 48 or by the action of work passing beneath said foot.

Projecting from the front of the machine arm 3 is a periodically acting thread nipper comprising a general shank portion 49 mounted for lengthwise movement in a stationary sleeve 50 which is threaded directly into the arm 3. A coil spring 51 causes one end of the shank 49 to engage an actuating cam 52 fixed on the shaft 5. Between a head portion 53 of the shank 49 and the sleeve 50 are mounted two thread-engaging disks 54 which are adapted to receive the needle thread between their respective inner faces. The coil spring 51 causes the disks 54 to normally forceably engage each other and rotation of the cam 52 will periodically shift the shank 49 outwardly and open the disks to thereby release the thread caught therebetween.

As best disclosed in Fig. 1, the needle-thread 55 is delivered from a supply source, not herein shown, directly to the usual double disk tension unit 56 from which it is threaded through the eyelets 37 of the thread guide 34, and then it is led backwardly through a stationary eyelet 57 to the thread-nipper 54. From the nipper unit the thread is led forwardly through a pair of stationary eyelets 58 directly to a stationary thread guide generally designated by the numeral 59. Finally the thread is led from the guide 59 to the take-up thread eye 30 and then downwardly between the guide disks 60 to the needle 10.

Having thus described the details of the present needle thread controlling mechanism, the operation thereof will be understood as follows: The machine being threaded as described and power being applied to the belt-wheel 6, the needle 10 descends to present the loop-taker 23 with a needle-thread loop in the usual manner. As the needle thus descends the cam 52, being suitably cut, permits the nipper to remain closed and thereby clamp the needle-thread 55. As may be best seen in Fig. 6, the pull-off member 28 in descending with the needle-bar 9 engages the needle thread 55 strung between the eyelets 37 of the thread guide 34 and thereby pulls off a length of thread through the tension 56 from the supply source. The closed nipper prevents any thread from being stolen from the needle. The length of needle thread pulled off from the supply at any one stroke of the pull-off member 28 depends upon the position of the thread-guide 34 relative to the pull-off member. Referring to Fig. 2 it is to be seen that as the thread guide 34 is elevated the pull-off arm will engage the thread strung between the eyelets 37 for a longer period of time and thus pull off a greater length of thread from the supply. Fig. 2 illustrates in solid lines, the thread-guide 34 and its control arm 38 adjusted so as to pull off a length of thread sufficient to produce one stitch when the stitch length is adjusted to eight stitches per inch. Fig. 1 shows the stitch length lever 17 correspondingly adjusted for eight stitches per inch. Fig. 2 illustrates, in dotted lines, the thread guide 34 and the stitch length lever 17 adjusted to produce four stitches per inch and thus requiring a greater length of available needle-thread.

As hereinabove described the thread guide 34 will be raised and lowered directly with the presser-foot 13. It is to be understood therefore, that

the pull off member 28 will act to pull off the exact length of thread required for each stitch regardless of the thickness of work as the thread guide 34 will be adjusted, relative to the pull-off member 28, directly with the variations in work thickness, through the medium of the presser-bar 11.

The needle 10 and the loop-taker 23 form the stitches in the usual manner and the take-up thread-eye 30 on its downward stroke with the needle-bar 9 gives its thread up to the loop-taker 23. As the needle-bar begins its upstroke the nipper disks 54 open and release the thread made available by the pull-off member 28. The take-up thread-eye 30 also ascends and thereby, in conjunction with the combined actions of the feeding mechanism and the loop-taker, draws up the stitch. At the same time that it helps to draw up the stitch, the thread-eye 30 also pulls from the supply side of the nipper the length of thread made available by the pull-off member. As the pull-off member and the take up thread eye 30 reach the top of their strokes, the nipper closes and thus completes the cycle of the needle-thread controlling mechanism.

From the above it is to be understood that to properly adjust the present needle-thread controlling mechanism the operator need only select the proper stitch length for the work at hand and then set the stitch length adjusting lever 17 and the thread guide adjusting member 38 to their respective corresponding limits.

Thus it is to be understood that a sewing machine having the present needle-thread controlling mechanism is particularly adapted for the production of loose stitches in a fabric such that all of the stitches are uniform in character, particularly as regards the amount of slack thread therein. Furthermore, this machine is adapted to provide such uniform stitches at all times by automatically adjusting the thread pull-off action as the work thickness varies and by having a manually adjustable arm by means of which the operator may adjust the pull-off action to compensate for any change made in the stitch length, thereby to provide a uniform amount of slack in all stitches.

With particular reference to the accompanying drawings it is to be understood that the present needle-thread controlling outfit, comprising the unitary pull-off member and take-up arm, and the unitary thread guide and adjusting mechanism, is of a simple and compact nature and inherently economical to manufacture. Furthermore, such an outfit may readily be applied to a standard sewing machine without involving any major changes in the normal machine structure. It may be observed that the entire outfit, including both of the above noted unitary structures, is supported by the presser- and needle-bars.

Having thus set forth the nature of the invention what I claim herein is:

1. In a sewing machine, a needle-bar, a thread pull-off member, a thread take-up member, said thread pull-off and said take-up members being actuated by said needle-bar, and a thread-nipper for engaging the needle-thread between said pull-off and said take-up members.

2. In a sewing machine, a needle-bar, a thread pull-off member for pulling off predetermined lengths of needle-thread, a thread take-up member, said pull-off and said take-up members being actuated by said needle-bar, manually controlled means for varying the amount of needle-thread pulled off by said pull-off member, and a periodi-

cally operating thread-nipper for engaging the needle-thread between said pull-off and said take-up members.

3. In a chain-stitch sewing machine, a frame, a needle-bar, a needle, a thread tension, a thread nipper engaging the needle-thread between said tension and said needle, a thread pull-off arm carried by said needle-bar for pulling off predetermined lengths of thread between said tension and said nipper, a thread-guide associated with said pull-off arm, manually controlled means for shifting said thread-guide for the purpose of varying the lengths of thread pulled off by said pull-off arm, means carried by said frame establishing limits for movements of said manually controlled means corresponding to predetermined amounts of thread pulled off by said pull-off arm, and a thread take-up member engaging the thread between said nipper and said needle.

4. In a sewing machine, a frame terminating in a hollow head, a needle-bar journaled in said hollow head, a pull-off arm carried by said needle-bar for pulling off predetermined lengths of needle-thread, a thread-guide associated with said pull-off arm and being sustained by said hollow head, manually controlled means to shift said thread-guide relative to said pull-off arm to vary the length of thread pulled off by said pull-off arm, and means carried by said hollow head establishing limits of movements of said manually controlled means corresponding to predetermined amounts of thread pulled off by said pull-off arm.

5. In a sewing machine, a frame, a needle, needle-actuating means, a needle-thread engaging member, said needle-thread engaging member being actuated by said needle-actuating means, a normally stationary thread guide associated with said thread-engaging member, means responsive to the variation in work thickness to automatically adjust said thread guide relative to said thread-engaging member, manually controlled means for adjusting said thread guide relative to said thread-engaging member, and indicia carried by said frame in cooperative relationship with said manually controlled means.

6. In a sewing machine, a frame, a needle-bar, a presser-bar, a thread-engaging member, said thread-engaging member being actuated by said needle-bar, a thread-guide associated with said thread-engaging member and having a plurality of operative positions, said thread-guide being carried by said presser-bar, manually controlled means carried by said presser-bar for adjusting said thread-guide relative to said thread-engaging member, and indicia carried by said frame and disposed in cooperating relationship with said manually controlled means.

7. In a sewing machine, a frame terminating in a hollow head, a needle-bar and a presser-bar journaled in said hollow head, a thread pull-off member carried by said needle-bar for pulling off predetermined lengths of needle-thread, a thread guide associated with said pull-off member and carried by said presser-bar, manually controlled means including an arm member extending from said thread guide for adjusting said thread guide relative to said pull-off member, and indicia carried by said hollow head and associated with said manually controlled means.

8. In a sewing machine, a hollow head, a needle-bar journaled in said hollow head, a bracket-arm carried by said needle-bar, a pull-off member for pulling off predetermined lengths

of thread, a take-up member, said pull-off and take-up members being carried by said bracket-arm and extending through said hollow head, a thread guide sustained by said hollow head and complementary to said pull-off member, means including a manually controlled arm associated with said thread guide for adjusting the same relative to the pull-off member, and means carried by said hollow head for establishing limits of movements of said manually controlled arm.

9. In a sewing machine having a frame including a hollow head portion, stitching mechanism including needle-actuating mechanism, feeding mechanism, means to adjust the stitch length including a manually controlled lever and cooperating stitch length indicating means, a needle-thread pull-off member for pulling off predetermined lengths of needle thread, said pull-off member being actuated by said needle-actuating mechanism, a thread guide associated with said pull-off member, and a presser-bar; the improvement which consists in the provision of adjusting means carried by said presser-bar and associated with said thread guide for shifting the same relative to said pull-off member, and indicia carried by said frame and associated with said adjusting means for establishing limits of movement of said means corresponding to those of said stitch length indicating means.

10. A thread-controlling device adapted for attachment to a sewing machine, having a hollow head, and a needle- and a presser-bar mounted within said hollow head, said thread-controlling device comprising, a thread-engaging arm adapted to be secured to said needle-bar, a bracket-arm adapted to be secured to said presser-bar, a thread-guide complementary to said thread-engaging arm, and a manually controllable arm associated with said thread-guide, said thread-guide and said manually controllable arm being adjustably carried upon said bracket-arm.

11. A thread-controlling device adapted for attachment to a sewing machine having a hollow head and a needle- and a presser-bar mounted within said hollow head, said thread-controlling device comprising, a bracket adapted to be secured to said needle-bar, a pull-off arm and a take-up member extending from said bracket, a bracket-arm adapted to be secured to said presser-bar, a thread-guide complementary to said pull-off arm and adjustably carried by said bracket-arm, and an adjusting member carried by said bracket-arm for adjusting said thread-guide relative to said pull-off arm.

RUDOLPH BECKER.