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BOOSTER ARM FOR DROP HEAD SEWING MACHINE

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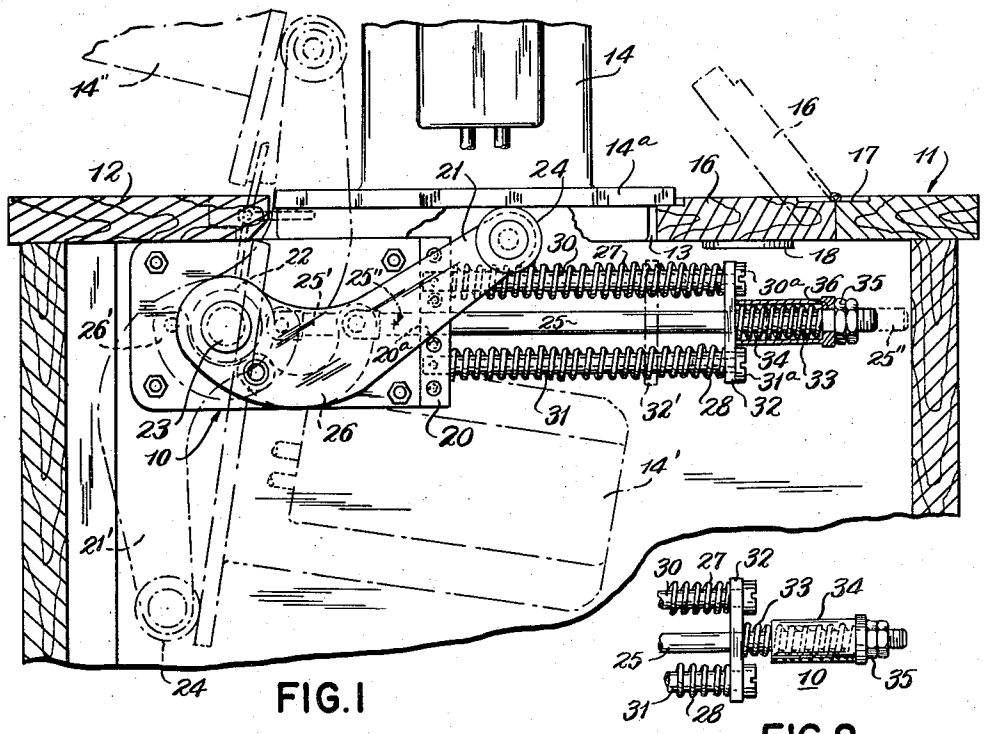

FIG. 1

FIG. 2

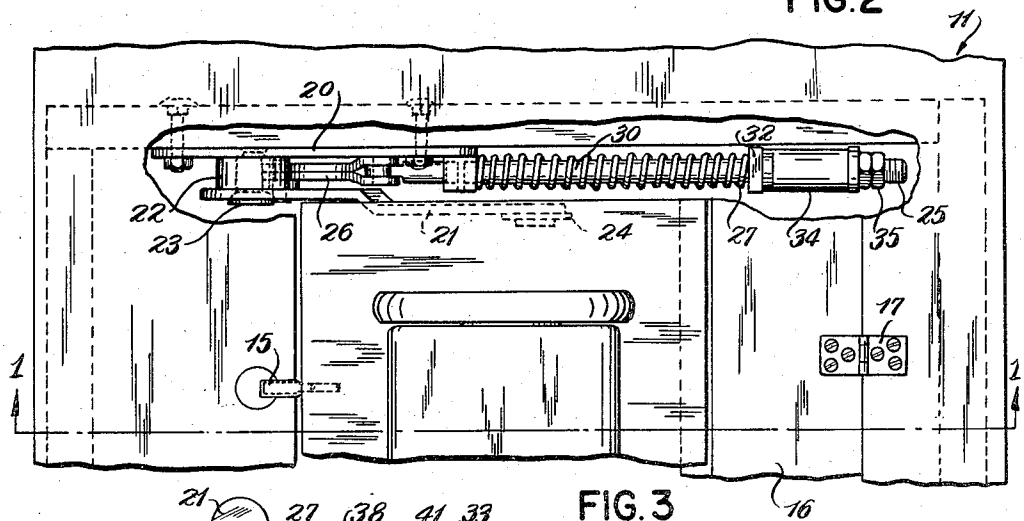

FIG. 3

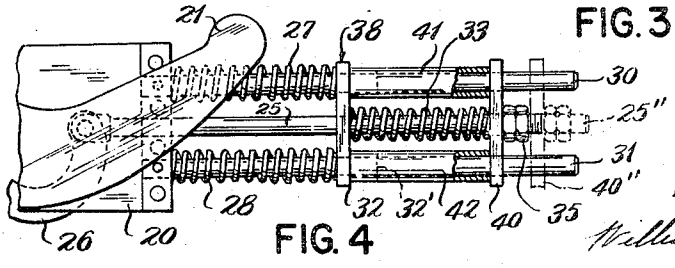

FIG. 4

INVENTOR.

SIDNEY J. HAMLETT

BY Hudson, Boughton, Williams, David & Hoffmann

ATTORNEYS

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BOOSTER ARM FOR DROP HEAD SEWING MACHINE

Sidney J. Hamlett, Parma, Ohio, assignor to White Sewing Machine Corporation, Cleveland, Ohio, a corporation of Delaware

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3 Claims. (Cl. 312—30)

This invention relates to improvements in a booster device for assisting the operator in lifting the sewing machine head of a drop head sewing machine from its storage position within the machine cabinet to a working position, that is, with its machine bed plate flush with the top of the cabinet.

It is, therefore, a general object of this invention to provide a booster mechanism for a drop head sewing machine of a simple, compact, and inexpensive construction which may be assembled as a unit and readily attached to the machine cabinet.

It is another object of the invention to provide an improved booster mechanism of the aforementioned character having a booster arm continually bearing against the bottom side of the machine head as the head is swung from its storage position into working position and return in response to force exerting means.

It is a further object of the invention to provide an improved booster mechanism for a drop head sewing machine having a booster arm continually forced into contact with the bottom side of the sewing machine head through force exerting means functioning during different portions of the booster arm movements.

It is an additional object of the invention to provide an improved booster mechanism for a drop head sewing machine wherein the booster arm is rotated, bearing against the machine head; in response to a plurality of springs exerting a force sequentially on a movable member.

Further and additional objects and advantages will become apparent hereinafter during the detailed description of the embodiments of the invention which is to follow, and which embodiments are illustrated in the accompanying drawings forming part of this specification and wherein:

Fig. 1 is a transverse fragmentary sectional view through a sewing machine cabinet equipped with a booster device embodying the invention and is taken along the line 1—1 of Fig. 3, the sewing machine head and booster device being shown in full lines in sewing position and in broken lines in maximum raised and lowered positions;

Fig. 2 is a fragmentary elevational view of a portion of the booster mechanism showing the mechanism when the sewing machine head is in the fully raised position corresponding to the maximum raised position shown in Fig. 1;

Fig. 3 is a partial top plan view of the sewing machine cabinet with a portion of the cabinet broken away to show the booster mechanism; and

Fig. 4 is a view partially in elevation and partially in section of a modified booster mechanism embodying the invention and detached from a sewing machine cabinet and head.

The booster mechanism **10** of the present invention is applied to a sewing machine cabinet **11** having a table top **12** provided with an opening **13** to allow the machine head **14** to be readily swung therethrough. The machine head

14 is provided with a pair of hinges **15** (only one shown), the pair of hinges being fixed to the cabinet **11** to allow the machine head **14** to be swung through the opening **13**.

The machine head **14** is shown by full lines in Fig. 1 in its normal working position and is further shown in broken outline, identified by the reference character **14'**; in its storage or maximum lowered position within the machine cabinet **11** and by the reference character **14''** in its fully or maximum raised position. On the opposite side of the opening **13** from the machine head hinges **15** there is provided a flap **16** which is also hinged to the table top **12** by a pair of hinges, only the hinge **17** being shown. The flap **16** in normal position engages a plate **18** secured to the sewing machine cabinet **11** and extending underneath the flap **16** to receive same and prevent it from dropping into the interior of the machine cabinet, to thereby retain the flap in a position flush with the table top **12**. The flap **16** is rabbeted at its free end to receive the bed plate **14a** of the sewing machine head **14** at a normal working position flush with the table top **12**.

When it is desired to use the sewing machine which is within the machine cabinet **11**, which is normally provided with a cover (not shown) that normally overlies the opening **13** is swung out of the way of the opening **13** to allow access to the machine head **14**. The operator then swings the flap **16** to a position above the table top **12**, as shown in dotted outline, and pulls the machine head **14** from its storage position **14'** to a position above the level of the table top **12**, sufficient to allow the flap **16** to be lowered into normal position. The flap **16** is then dropped into engagement with the plate **18** and the machine head **14** is swung back down to rest thereon. It is during this elevation of the machine head **14** from its storage position **14'** that it is particularly desired to provide a force exerting means to aid the operator in lifting the machine head.

The booster mechanism **10** is secured to an angle plate **20** fixed to one side wall within the sewing machine cabinet **11** and below the pivot point or hinge **15** for the machine head **14**. The angle plate **20** supports a booster arm **21** which is spaced from the plate **20** through the provision of a spacer member **22**. The spacer member **22** receives a pivot pin **23** passing through the booster arm **21** for securing same to the outer side of the plate **20** to allow the booster arm to rotate or swing about the pin **23**. The booster arm **21** in this instance is curved so as to be capable of extending upwardly through the opening **13** while continually bearing against the bottom side of the machine head **14** in its movement therethrough. The free end of the booster arm **21** may be provided with a roller **24** secured thereto for engaging the bottom side of the machine head **14**.

Cooperating with the booster arm **21** there is provided a movable member or rod **25**, adapted for axial or longitudinal movement to cause the booster arm **21** to swing about the pivot pin **23**. The rod **25** is in this instance supported intermediate its ends for horizontal linear movement. The protruding portion of the angle plate **20** is provided with an aperture **20a** to slidably receive the rod **25**. Interconnecting the booster arm **21** and the rod **25** there is provided a force transmitting member or curved link **26**. The curved link **26** has one end pivotally secured to one end of the rod **25**, while the opposite end of the link is pivotally secured to the booster arm **21** adjacent the pivot pin **23** but at a location offset downwardly and to one side thereof.

The curved link **26** is constructed and disposed adjacent to the pivot pin **23** so as to transmit the axial or linear movements of the rod **25** to the booster arm **21** as a swinging movement of the latter. To this end, the curved link **26** is arranged so that in causing the booster arm **21** to travel through an arc of approximately 180 degrees, the

connection point between the booster arm and the link will travel around the pivot pin 23 in a curved path between two points on substantially opposite sides of the pin. During this interval the opposite end of the link 26, or the end connected to the rod 25, travels in a straight line towards or away from the pivot pin 23 in response to the movement of the rod 25; depending on whether the booster arm 21 is urged downwardly or upwardly respectively.

To better appreciate the movements of the link 26 in response to the movement of the machine head 14 the various positions are shown in Fig. 1 in dotted outline and identified by priming the reference characters of the parts therefor. The position of the booster arm 21 when the machine head 14 is in its storage position 14' is identified by the reference character 21'. The position of the curved link 26 at this instance is similarly identified by the reference character 26', while the reference character 25' identifies the corresponding position of the rod. When the machine head is in a position 14", substantially 180 degrees from its storage position 14', the link has traveled upwardly so that the pin connecting the link 26 to the rod 25 will have its center at a point as approximately identified by the reference character 25", the opposite end of the rod 25 is similarly identified by the reference character 25" for this position. The portion of the booster mechanism 10 shown in Fig. 2 is illustrated in this position.

The rod 25 is provided with force exerting means in the form of a pair of cooperating compressive springs 27 and 28 spaced parallel to the axis of the rod and on opposite sides thereof. The springs 27 and 28 are coiled on rods 30 and 31 respectively, provided therefor. Supporting rods 30 and 31 are secured at one end to the protruding portion of the angle plate 20, with the ends of the springs 27 and 28 abutting the angle plate. The opposite ends of the springs 27 and 28 abut a slidable member 32 mounted on the rod 25. The slidable member 32 is slidably mounted on the rod 25 and is also slidably received on the rods 30 and 31 so so as to engage their springs 27 and 28. The rods 30 and 31 each have their ends provided with a stop abutment, in this instance the securing members 30^a and 31^a, respectively, to prevent the travel of the movable member 32 beyond the ends thereof. Accordingly, the sliding movement of the member 32 is effective to compress and release the springs 27 and 28 within the compressive limits of the springs. When the member 32 slides into abutting engagement with the members 30^a and 31^a, the rod 25 slides through the member 32.

The slidable member 32 is mounted on the rod 25 adjacent to but spaced from the free end of the rod. The rod 25 is provided with another spring 33 mounted on the free end of the rod and in engagement with the opposite side of the slidable member 32 from the springs 27 and 28. Enclosing a portion of the spring 33 there is provided a tubular sleeve 34 which is arranged to slide over the spring to limit its action in one direction, when the machine 14 is being positioned in its storage position 14'. The spring 33 and the sleeve 34 are held against displacement from the rod 25 by the securing members or nuts 35 provided at the extreme end of the rod 25. The sleeve 34 is so defined as to have an inwardly extending shoulder portion 36 slidably engaging the rod 25 to thereby engage or abut the opposite end of the spring 33. It is readily apparent that the movements of the sleeve 34 toward the pivot pin 23 are effective to cause the spring 33 to compress against the slidable member 32 within limits defined by the length of the sleeve. To this end, the preferred length of the sleeve 34 is constructed so that the sleeve will engage the slidable member 32 when the machine head 14 is in its work position.

The operation of the booster mechanism 10 may now be readily appreciated from the foregoing construction. When the machine head 14 is in its storage or maximum lowered position 14'; the weight of the machine head is arranged to override the force exerted by the compression of the springs 27, 28 and 33 bearing against the bottom of the machine head. The position of the slidable member 32 when the machine head 14 is in its storage position is shown in dotted outline and identified by the reference character 32'. It is readily appreciated that at this instance the springs 27 and 28 are both fully compressed to this position, along with the predetermined limited compressed position of the spring 33, due to the engagement of the sleeve 34 with the member 32. The link 26 has now assumed the position 26' in response to the movement of the rod 25 traveling a proportional distance to the left to the position 25', as illustrated in Fig. 1.

As the machine head 14 is raised or swung from its storage position 14' the force exerted by the compressed springs 27 and 28 is gradually released against the machine head 14 through the arm 21 and the slidable member 32 is caused to move toward the right hand side of the cabinet 11 from the position 32; until it abuts the members 30^a and 31^a. On the machine head 14 being swung above the work level of the table top 12, the sleeve 34 will travel away from the slidable member 32 to thereby progressively release the spring 33. During this latter movement of the springs 27 and 28 have assumed their fully expanded position and remain there until the machine head is lowered below the normal work position. Upon the subsequent positioning of the flap 16, the machine head 14 is swung back towards its work position to rest on the flap 16 at which time the sleeve 34 returns into engagement with the slidable member 32. At this position, the compression of the spring 33 maintains the booster arm 21 bearing against the bottom side of the machine head 14.

Referring now to Fig. 4, the modified portion of a detached booster mechanism is shown. The booster mechanism 38, shown in Fig. 4, is substantially the same as the booster mechanism 10 illustrated in Figs. 1–3, except that the rods 30 and 31, in this instance, are elongated to extend through and beyond the slidable member 32. Also, a second slidable member 40 is provided to slide along the ends of the rods 25, 30 and 31. In this embodiment a pair of slidable sleeves 41 and 42 are provided to slide along the free ends of the rods 30 and 31, between the members 32 and 40. The sleeves 41 and 42 serve to determine the compression of the spring 33. The slidable member 40 abuts the sleeves 41 and 42 as well as engaging the spring 33. The slidable member 40 is secured to the rod 35 by means of securing members or nuts 35 fixed to the end thereof. The remaining portion of the booster mechanism 38 is substantially similar to the booster mechanism 10 and the booster arm 21 may be constructed without the roller 24, as illustrated.

It should be noted that in this modified construction, the movement of the machine head 14 above the normal work position causes the springs 27 and 28 to be continuously released. This movement results from the continuous travel of the slidable member 32 to the right, as illustrated in Fig. 4, and bearing against the spring 33. Upon the machine head 14, being placed in position 14", the member 32 will travel to the point identified by the dotted line 32", while the rod 25 is positioned at 25", and the member 40 at 40".

Although preferred forms of the invention have been described and illustrated herein, it will be understood that the invention may be embodied in other forms coming within the scope and meaning of the appended claims.

Having thus described my invention, I claim:

1. A booster device for a sewing machine cabinet having an opening and a sewing machine head pivoted to the cabinet permitting it to be swung from a lowered inop-

erative position within the cabinet upwardly through the opening to sewing position; said device comprising a support adapted to be secured to the cabinet within the latter and provided with a fixed horizontal pivot pin, a booster arm swingably mounted adjacent one of its ends on said fixed pivot pin while its opposite end is free and is adapted to engage the underside of the sewing machine head during the swinging movements of the latter, and a force applying mechanism operatively associated with said booster arm to apply forces thereto and to the sewing machine head to facilitate the raising and lowering of the latter and including a force rod slidable in said support in substantially the same horizontal plane as said fixed pivot pin and movable linearly in a direction extending transversely of said pin toward and from the latter, a link bodily movable relative to said support and pivotally connected at one end to the end of said rod that is adjacent said pivot pin and pivotally connected at its opposite end to said booster arm at a location offset downwardly and to one side with respect to the swinging axis of said arm on said pivot pin, and spring means operatively associated with said rod to exert forces thereon which vary sequentially during the swinging movement of the booster arm and the sewing machine head to apply through said link varying torque forces to said arm, said force rod at its end that is remote with respect to said link mounting an abutment element, while said spring means includes a pair of supporting rods parallel to said force rod on opposite sides thereof and having one of their ends fixed in said support while the other of their ends is provided with a stop head, a plate slidable on all of said rods, coil springs surrounding said supporting rods with one end abutting said support and the opposite end abutting said plate, a coil spring surrounding the force rod intermediate said plate and the abutment element thereon, and sleeve means limiting the compression of said last mentioned spring between said plate and said abutment element.

2. A booster device as defined in claim 1 and wherein said spring means surrounds said last mentioned spring with the latter having one end abutting said plate and its other end abutting an interior shoulder in said sleeve means.

3. A booster device as defined in claim 1 and wherein said sleeve means includes sleeves on said supporting rods intermediate said plate and a second plate slidable on all of said rods while said last mentioned spring has its opposite ends abutting said plates.

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