June 19, 1945. W. K. R. BEYER 2,378,534

SEWING MACHINE

Filed Dec. 12, 1941

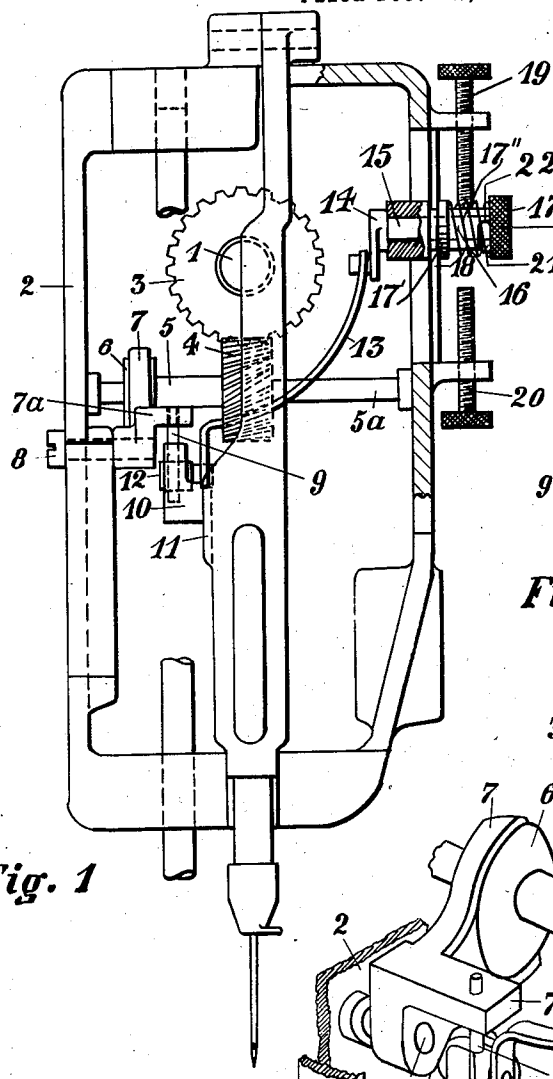


Fig. 1

Fig. 3

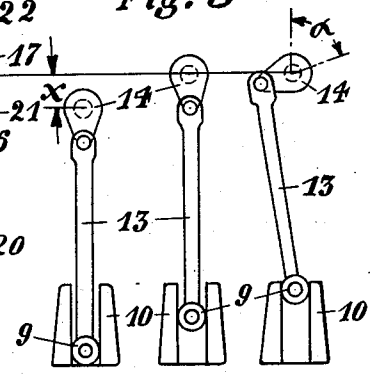


Fig. 2

Fig. 4

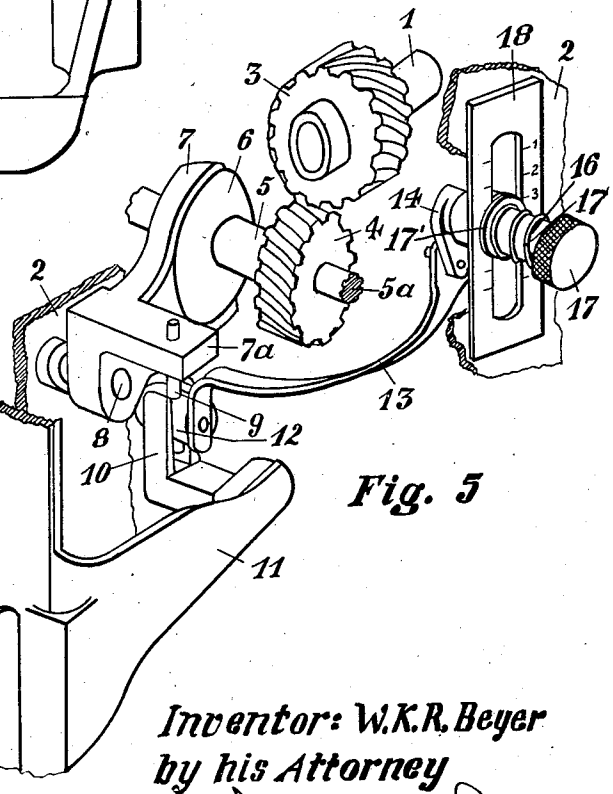


Fig. 5

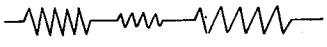


Fig. 6

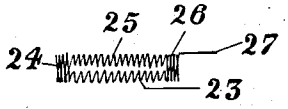


Fig. 7

Inventor: W.K.R. Beyer
by his Attorney

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SEWING MACHINE

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3 Claims. (Cl. 112—158)

The present invention refers to household sewing machines and more especially to zig-zag-sewing machines.

The width of the stitches in zig-zag-sewing machines is effected by the moving of a slide to and fro in a stationary slide track or by the reverse action that is: the slide is stationary and the track for the slide is moved. From the nonstationary part of the mechanism described a connecting rod leads to a peg for the purpose of adjustment, which peg usually sticks out from the front of the head of the sewing machine and which is movably adjusted there to conform to a scale of the several widths of the stitches.

In order not to have to hunt after each individual change of the widths of the stitches for an adjustment which is used repeatedly, setscrews have been used for the purpose of limiting the extent of the motion of the stop-peg. Such a limitation however fixes two widths of the stitch only. For instance: one setscrew serving as stop for the movement of the slide can be adjusted so that the slide comes to stop at $\frac{2}{16}$ inch, while the second setscrew serving as stop can be adjusted so that the slide comes to stop at the point of $\frac{7}{16}$ inch on the scale. These two widths of stitches fixed by the setscrews can be found during the operation of the machine without glancing at the scale. If however other widths of the stitches are desired than the ones which are established by the setscrews and which lie between and within the widths of the stitches as established by the setscrews, then it is necessary to find the new place on the scale for the position of the stop-peg. If however widths of the stitches are desired which are beyond the limits of the widths of the stitches as established by the setscrews, that is: widths which lie either above or below the set limits of the setscrews, then it is necessary to screw the setscrews back so that the desired adjustment on the scale can be made. For many performances of the machine it is necessary to be able to have adjusted more than only two widths of stitches in constant change with one another and this fact developed the necessity to be able to install additional adjustments without changing the previously fixed position of the setscrews.

A well known solution of this task proposes to move the stop-peg beyond the reach of the setscrews. By a change of the stop-peg relative to the setscrews the stop-peg must be temporarily removed from the realm of mutual activity of the setscrews or from within the limits of the setscrews, or on the other hand the set-screws must be brought out of the active and effective position into an inactive and ineffective position so that also thereby the realm of the mutual influence is destroyed by the change of position relative to each other, i. e., of stop-peg and setscrews.

In order to carry out this solution in actual practice the stop-peg is provided in this well-known device with an adjustable slide which, when in active use, is stopped by the setscrews, and which however can be moved from the realm of activity of the setscrews in order to make possible a complete freedom of motion for the stop-peg along the entire scale.

This device however cannot be serviced easily in every position of adjustment. When for instance the stop-peg has been removed from the realm of influence of the setscrews and shall then again be brought back to its position as before the removal, then it is necessary to move the stop-peg first again in a position which enables it to reestablish the mutual influence between the adjustable slide of the stop-peg and setscrews. This position must be hunted up or at least it must be felt for by repeated trying. A complete mechanical act, a "blind" finding is not possible.

To explain more fully the action of this well-known device according to the above described example: In order to bring the slide back again within the realm of the setscrews it is necessary to bring the stop-peg first into a position which makes it possible that the slide can be pushed again between the setscrews. If the stop-peg is not as yet in that particular position, then the slide will strike against the setscrews and can therefore not slide between the setscrews.

This present invention presents a further solution of the wellknown problem to effect more than two adjustments of the stop-peg on the scale without having to touch the adjusted setscrews; an act whereby the scope of mutual influence between stop-peg and setscrews is not changed by the change of the relative position. This is effected through the fact that an additional adjustment of the width of the zig-zag-stitches is obtained besides the one which was obtained by the change of position of the stop-peg between the limits established by the setscrews. This additional adjustment is obtained by means of an interior structure of an adjustment device added to the set of connecting rods between the stop-peg and the slide.

For the purpose of the easiest and most simple servicing of this device it is of advantage that the additional adjustment device, which is effected through an interior structure, can be ad-

justed likewise by means of the stop-peg which is movable within the limits of the setscrews.

A practical arrangement of this invention is marked by the fact that the set of connecting rods, found between the stop-peg and the slide, consist of a rod connected with the movable part of the slide and of a crank connected with the stop-peg, which rod and crank are movably connected with each other and which when held in rigidly extended position influence the movable part of the slide by moving the stop-peg between the adjusted limits, established by the setscrews, and which however by turning the stop-peg will be brought into a rigidly extended position and thereby cause an additional motion of the movable part of the slide.

The stretched, rigidly extended position of the connecting rod and crank can be secured by an endstop mounted on the stop-peg which endstop limits the turning of the stop-peg.

The drawing will illustrate the object of the invention by means of a practical example. In the drawing

Fig. 1 is an end view partly in transverse section of the head of a sewing machine with the device according to the invention with crank and connecting rod lying in stretched, rigidly extended position,

Figs. 2, 3 and 4 show diagrammatically three separate positions of the adjusting means,

Fig. 5 is a perspective view of the essential part in the head of a sewing machine showing among others the interior structure according to the invention,

Fig. 6 illustrates an ornamental stitching and Fig. 7 the stitching for a completed button hole.

In the arm of the sewing machine is the mainshaft 1 which reaches in a well-known way into the head 2 of the sewing machine and on which is mounted the means necessary for the transfer of the rotary motion to the mechanism built in the head. The motion necessary for swinging the needlebar to and fro is transmitted in the practical example by two spiral gears 3 and 4 the latter being upon the cylinder 5 which revolves around the shaft 5a which is situated in the interior of the machine head. Upon the cylinder 5 is a cam 6 which is surrounded by a fork 7. This fork 7 is swingably mounted upon a bolt 8 which is situated in the wall of the machine. From a lateral projection 7a of the fork 7 a bolt 9 extends within a fork 10 which is mounted on an arm 11 of the well-known movable needlebar guide. Upon the bolt 9 is a cylindrical slide 12 which extends between the ends of the fork 10. This slide 12 is movably connected with a rod 13 which in turn is movably connected with a crank 14. This crank 14 is fastened rigidly to a bolt 15 which extends through the shouldered stop-peg 16 and which carries at its front end a knob 17. A loose collar 17' is urged by coilspring 17'' toward the shouldered end. The stop-peg 16 is movable and frictionally held in place on a scale 18 fastened to the front wall of the machine and this up and down motion is limited by two setscrews 19 and 20. A small projection 21 at the knob 17 of the bolt 15 which drops into a notch 22 of the stop-peg 16 enables the turning of the bolt 15 to stop, when the connecting rod 13 and the crank 14 are situated in rigidly extended position. The operation of the device is the following: As mentioned above the motion of the main shaft 1 situated in the sewing machine head is transmitted by means of the two spiral gears 3 and 4 to the cylinder 5 situated in the head. The cam 6 which is mounted firmly upon the cylinder 5 conveys by its rotary motion to the first fork 7 a swinging motion around its pivot 8. The bolt 9 situated in the lateral projection 7a of the fork 7 receives likewise a swinging motion which the bolt 9 executes between the ends of the second fork 10 fastened to the needlebar guide 11. By means of the slide 12 which is mounted movably upon the bolt 9 situated upon the lateral projection 7a of the fork 7 the swinging motion of the bolt 9 is transmitted to the second fork 10 mounted on the arm 11 of the needlebar guide from whence this motion is transmitted in its turn to the movable needlebar housed in the head of the machine.

This transfer of rocking motion of the bolt 9 situated in the first fork 7 to the needlebar is effected only when the axis of the slide 12 stands laterally of the axis of the bolt 8 of this first turnable fork 7. In this coaxial position the cylindrical slide 12 undergoes a turning motion, but only around its own axis, hence it does not effect the second fork 10 on the arm 11 of the needlebar guide. If however the slide 12 is pushed out of this coaxial position further toward the free end of the bolt 9 which is situated between the prongs of the second fork 10, then the slide transmits the swinging motion of the bolt 9 in greater measure upon the second fork 10 and thereby upon the arm 11 of the needlebar guide as the slide is pushed away from the axis of the first fork.

This shifting is accomplished by the stop-peg 16 situated on the front of the machine head. The connection to the stop-peg 16 is effected by means of the connecting rod 13 movably mounted on the slide 12 and by means of the crank 14 situated on the bolt 15 which is inside the stop-peg 16. When these connecting links 13 and 14 are in a rigidly extended position and when these connecting links are secured in this rigid position, then it establishes as it were a firm connection between slide 12 and bolt 15 inside the stop-peg 16. The stop-peg 16 is moved on the scale 18 indicating the widths of stitches to the desired width and this shifting is transferred immediately upon the slide when the connecting rod 13 and crank 14 are in rigidly extended position. The limitation of the shifting of the stop-peg 16 on the scale 18 is done by means of the setscrews 19 and 20 situated at the front wall of the head of the machine. Referring to the example of operation mentioned in the introduction, the lower setscrew 20 can be adjusted so that the stop-peg touches against the setscrew at $\frac{3}{16}$ inch of width of stitch and the upper setscrew 19 can be adjusted so that the stop-peg touches the setscrew at $\frac{1}{16}$ inch of width of stitch. In such an adjustment the width of stitches can be changed "blindly" that is by touch only between $\frac{3}{16}$ and $\frac{1}{16}$ inch, a fact which has been known for a long time.

If it is desired to work with a width of stitches narrower than the one adjusted by the setscrew 19 then this is done by turning the knob of the stop-peg 16. This knob 17, which forms one unit with the bolt 15 situated in the interior of the stop-peg 16 and with the crank 14 fastened to this bolt 15, during its turning motion swings the crank 14 and draws along thereby the rod 13 movably connected therewith, which rod 13 in turn is connected with the slide 12. According to the amount of the turning of the knob 17 the slide 12 situated upon the bolt 9 moves upward (see Fig. 4). Thus the distance of the to

and fro swinging motion of the needle is lessened. It is therefore possible to leave the stop-peg in its position, that is: touching the lower setscrew **20** and it is necessary only to turn the knob **17** in order to diminish the distance of the to and fro swinging motion of the needle. By correspondingly turning back the knob **17** up to the rigidly extended position of the connecting links, a motion limited by touching the notch **22** and the small projection **21** of the revolving knob **17**, the original position shown in Fig. 1 is instantly reestablished. The turning of the knob **17** can be done in any position at all of the stop-peg **16**.

In Fig. 1 the stop-peg **16** is in touch with the upper setscrew **19**. This corresponds with Fig. 3. In Fig. 4 however is shown a position of the slide **12** which is reached by turning the knob **17**. Here the slide **12** is in its coaxial position with the axis of the first fork **7**. When the knob **17** is turned so far that the slide **12** comes to stand in this coaxial position with the axis of the first swinging fork **7**, then the width of to and fro motion of the needlebar is "zero." Such an adjustment can be made completely "blind," that is: by touch only, without removing thereby the stop-peg **16** out of the realm of influence limited by the setscrews.

A change between a maximum size, a medium size and the adjustment "zero" of the width of the stitches is often used in sewing, be it for the purpose of doing special "zig-zag" ornamental sewing which changes continuously between a zig-zag seam of two different widths of stitches and plain stitches as is demonstrated in Fig. 6, or be it for the working of button holes, as is shown in Fig. 7. In the zig-zag stitch for ornamental sewing as is shown in Fig. 6 the adjustment of the width of the zigzag-stitch has for instance the following always recurring sizes:

$$\tfrac{3}{16}\text{—}0\text{—}\tfrac{1}{16}\text{—}0\text{—}\tfrac{3}{16}\text{—}0\text{—}\tfrac{1}{16}\text{—}0\text{—}\tfrac{3}{16}\text{—}0$$

etc. Therefore the setscrews are adjusted so that the lower setscrew **20** stops the stop-peg at $\frac{3}{16}$ of an inch and the upper setscrew **19** stops the stop-peg at $\frac{1}{16}$ inch. In order to make such a seam one begins the sewing with an adjustment of the stop-peg in the lowest position of contact, that is, in the position where the stop-peg touches the lower setscrew **20**. After finishing the $\frac{3}{16}$ inch wide zigzag-stitches the knob **17** is turned until one feels the touch of the small projection **21** against the notch **22**. Since the slide **12** stands now in a coaxial position with the axis of the first fork **7**, the needlebar makes no to or fro motion, in other words, it sews plain stitches. After finishing these plain stitches the knob **17** is turned in the opposite direction back to its limit, which can be felt, thus establishing the rigidly extended position of the connecting links and then the stop-peg is shifted against the upper setscrew **19** and comes there to rest. Now the needlebar swings to and fro a distance of $\frac{3}{16}$ inch. After finishing these $\frac{3}{16}$ inch wide zigzag-stitches the knob **17** is turned again so far that one feels the touching of the limit as described above, which again corresponds to the coaxial position of the slide **12** with the axis of the first fork **7**, that is, until it sews without to and fro motion of the needlebar a seam sewn in "zero" that is: plain stitches. If it is now desired to sew again a $\frac{3}{16}$ inch wide zig-zag stitch one turns back the knob **17** so far that one feels the limit of the rigidly extended position of the connecting links, and shifts at the same time the stop-peg again against the lower set screw **20**. That is the same position from which the start has been made in the example here cited. This is repeated during the further sewing. The sewing of a buttonhole according to Fig. 7 can be done in the following manner: one begins to sew the edge **23** of the one side of the buttonhole from a point I with an adjustment of $\frac{3}{16}$ inch width of stitches, that is, the stop-peg is in touch with the upper set-screw **19** and the connecting links between stop-peg and slide are in rigidly extended position. This edge is finished to point II, then one moves the stop-peg down to the lower setscrew **20** retaining the rigidly extended position of the connecting rods, and the one end **24** of the buttonhole is sewed with a width of $\frac{3}{16}$ inch stitching; after finishing this end **24** one moves the stop-peg against the upper setscrew **19** again by maintaining the rigidly extended position of the connecting links. The second edge **25** of the other side of the buttonhole is then sewed with a $\frac{1}{16}$ inch wide zig-zag stitch from III—IV. After finishing this edge the stop-peg is again moved until it touches the lower setscrew **20** again retaining the rigidly extended position of the connecting links, and now the other end **26** of the buttonhole is closed with stitches $\frac{3}{16}$ inch wide. After finishing this end **26** one turns the knob **17** so far that one feels its boundary limit, that is, until a coaxial position has been established between the slide **12** and the axis of the bolt **8** of the first fork **7**, and now, the thread is made "fast" by plain stitch **27**. When the next buttonhole is to be started one turns back the knob **17** again until the rigidly extended position of the connecting links has been established and the stop-peg is pushed against the upper setscrew **19**. In Figs. 2 to 4 diagrams of the adjustments which take place in the interior of the head during the execution of these two sewing examples are again represented. Fig. 2 corresponds to the adjustment of the stop-peg, when the stop-peg touches the lower set-screw **20**. The width of the stitches here, is for instance, $\frac{3}{16}$ inch. From this position the stop-peg is pushed upward for the distance x so that it touches the upper setscrew **19** retaining thereby always the rigidly extended position of the connecting links. This is shown in Fig. 3. Now the width of the stitch is to be $\frac{1}{16}$ inch. By turning the knob **17** the crank **14** connected with the bolt **15** and knob **17** is swung at an angle α. This corresponds to the to and fro motion of the needlebar "zero" therefore plain stitches are sewed. The above described examples of sewing can be executed completely "blind," that is by touch only, because each and every position used in them is limited by stops which can be felt. When besides these limits, which can be felt, other limits of widths of stitches are to be installed, they can be installed by means of a small indicator—not shown in the drawing, which is mounted upon the knob **17** and which works according to a scale not shown in this drawing on the stop-peg **16**. It is necessary to observe that the desired width of the stitches is the difference between the width of the stitch indicated on the main scale **18** and the width of the stitch indicated on the scale on the stop peg. A third adjustable stop besides the two already present in the shape of the setscrews can be mounted in the stop-peg **16**, against which stop the above mentioned indicator or some other projection of the knob **17** strikes and limits thereby the turning of the knob **17**. This arrangement is of special advantage when it is not desired to fall

back upon plain stitches corresponding to the "zero" position, but when the width of the stitch is to be greater than "zero."

It must be understood that in the drawing only those parts of the construction are designated by number which are essential to clarify my invention.

In this description I have explained only one practical construction of the device, but it must be understood that my invention may be embodied in other forms and on other sewing machines.

I claim:

1. In the head of a zigzag sewing machine, a vibratory needle guide provided with a guide way, a member oscillatable about a pivot normal to the guide way, a slide member disposed in said guide way and carried by said oscillatable member for adjustment along said guide way relative to said pivot for providing stitches of variable length transversely upon oscillation of said oscillatable member, and means for adjusting said slide member comprising a member bodily movable between opposed adjustable stops, and means supported by said last member for providing further adjustment of the slide member with said bodily adjustable member in fixed adjusted position.

2. In the head of a zigzag sewing machine, a vibratory needle guide provided with a guide way, a member oscillatable about a pivot normal to the guide way, a slide member disposed in said guideway and carried by said oscillatable member for adjustment along said guideway relative to said pivot for providing stitches of variable length transversely upon oscillation of said oscillatable member, and means for adjusting said slide member comprising a member bodily movable in the machine head between opposed adjustable stops, and means supported by said last member for varying the position of the slide member relatively to the pivot while the bodily adjustable member is in fixed adjusted position.

3. In the head of a zigzag sewing machine, a vibratory needle guide provided with a guideway, a member oscillatable about a pivot normal to the guideway, a slide member disposed in said guideway and carried by said oscillatable member for adjustment along said guideway relative to said pivot for providing stitches of variable length transversely upon oscillation of said oscillatable member, a collar movable bodily in the machine head between opposed adjustable stops, a crank shaft journaled in the collar and a connecting rod between the crank shaft and the slide member for providing further adjustment of the latter with the collar in adjusted position.

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