

June 18, 1957

L. BIHALY
SEWING MACHINES

2,796,034

Filed Sept. 10, 1954

2 Sheets-Sheet 1

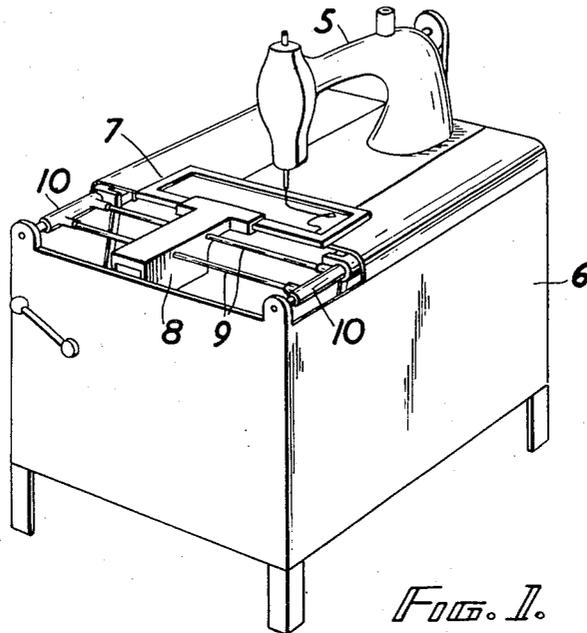


FIG. 1.

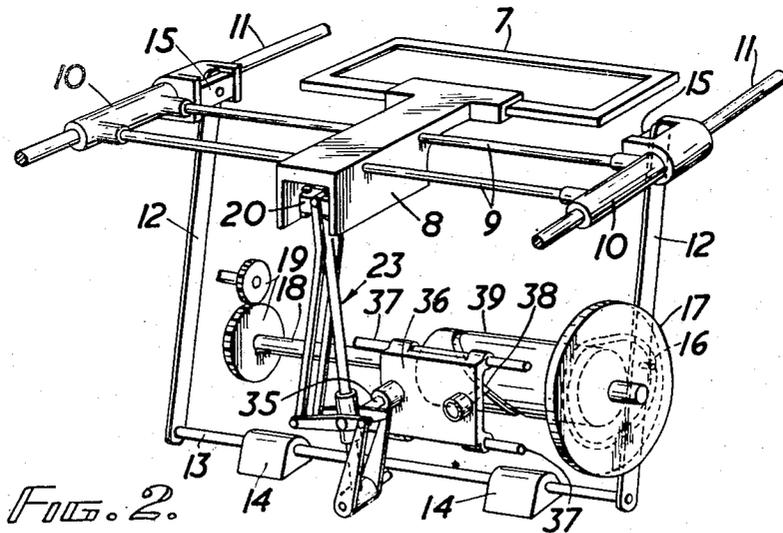


FIG. 2.

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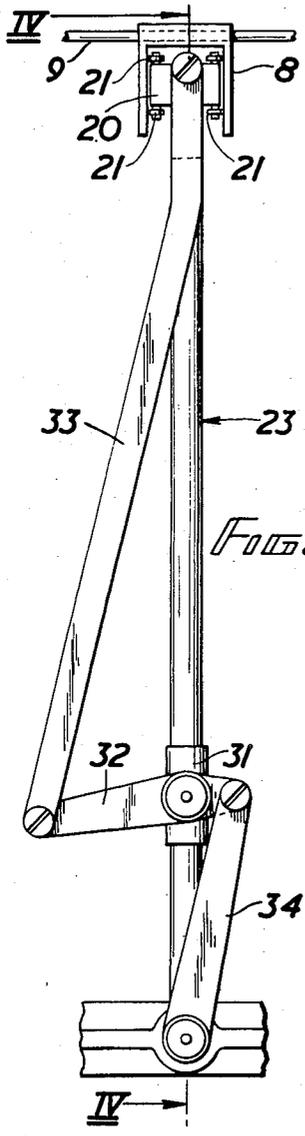


FIG. 3.

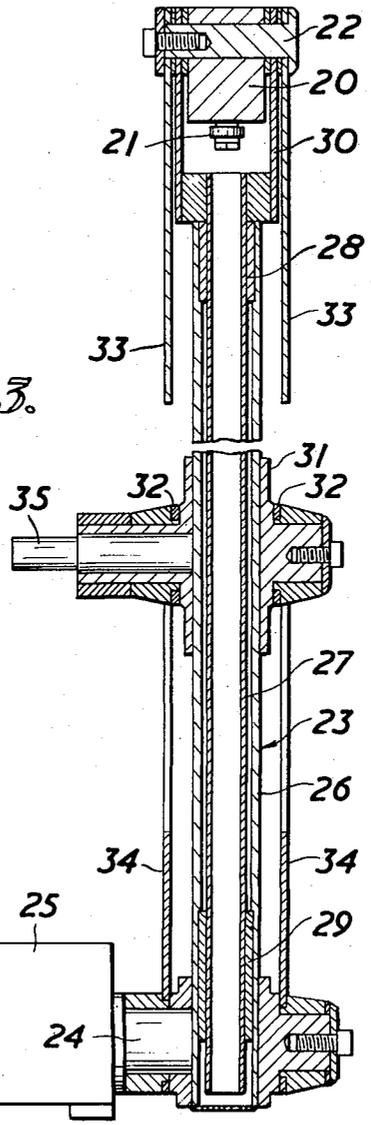


FIG. 4.

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2,796,034

SEWING MACHINES

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Application September 10, 1954, Serial No. 455,100

Claims priority, application Great Britain
September 11, 1953

7 Claims. (Cl. 112—204)

U. S. Patent No. 2,684,651 of July 27, 1955, to Lajos Bihaly describes apparatus for guiding a workpiece under the needle of a sewing machine along a predetermined stitching line. In this apparatus a work holder, or carriage for supporting a removable frame in which the work is held, is mounted upon guides which allow the carriage to move in two mutually perpendicular directions in a horizontal plane. Movements of the carriage in these two directions are respectively effected by a pair of cams mounted on a common horizontal shaft, disposed below the plane of movement of the carriage. The follower of each cam is connected to an intermediate point on a lever, or operating arm, which is pivotally mounted at its lower end and has its upper end connected (directly or indirectly) to the carriage.

In the form of apparatus described and illustrated in the above mentioned specification, one operating arm is of telescopic construction and has its upper end pivotally and slidably engaged with a rod which is secured to the carriage and extends parallel to the direction of the movements produced by the other operating arm. Owing to practical difficulties of manufacture, mechanism so constructed does not always work smoothly, but is subject to sticking or jamming.

The present invention provides an improved construction which is not subject to the above defect. In accordance with the invention the upper end of an extensible operating arm carries a head which engages the carriage for movement with it in one direction but is movable relative to it vertically and in the other direction of movement of the carriage; and the arm also carries a linkage whereby swinging movement of the operating arm causes extension and contraction of the arm, so that the head is constrained to move along a horizontal path.

The linkage for producing the required movement of the head relative to the operating arm may comprise an actuating member slidable longitudinally of the operating arm and constrained to move along a horizontal path when the arm swings, a two armed lever pivotally connected to the actuating member, a link extending between and pivotally connected to one arm of the lever and the head and a second link extending between and pivotally connected to the other arm of the lever and the pivotal axis of the extensible operating arm, the axes of all said pivotal connections being parallel to one another and the lengths of the two arms of the lever bearing to one another the same ratio as do the lengths of the two links.

The actuating member of the linkage may, and preferably does, serve also for imparting to the operating arm the swinging movement necessary to cause movement of the carriage.

A particular form of apparatus in accordance with the invention is shown by way of preferred example in the accompanying drawings. In these drawings:

Figure 1 is a perspective view of an automatic sewing

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machine provided with work guiding means in accordance with the invention;

Figure 2 is a perspective view of parts of this machine, showing the work supporting carriage and the means for guiding and moving it;

Figure 3 is an elevation on a larger scale of the operating arm and associated parts; and

Figure 4 is a section on a still larger scale taken on the line 4—4 of Figure 3.

Referring first to Figure 1, the apparatus illustrated comprises a sewing machine 5 of conventional construction supported upon a framework 6, which accommodates the means for driving the sewing machine and the apparatus (described below) for moving under the needle of the sewing machine a frame 7 holding the work to be stitched.

As best seen from Figure 2, the frame 7 is supported in a carriage 8, which is mounted for movement in two mutually perpendicular directions in a horizontal plane. The carriage is supported for sliding movement (in a direction which will hereinafter be referred to as longitudinal) upon a pair of parallel rods 9. The ends of the rods 9 are rigidly secured to a pair of sleeves 10, supported for sliding movement (in a direction which will hereinafter be referred to as transverse) upon a pair of rods 11, fixed in the framework 6.

Transverse movement of the work supporting carriage 8, together with rods 9 and sleeves 10, is effected by a pair of levers 12, secured upon the ends of a shaft 13, which is journaled in bearings 14, provided in the fixed framework of the machine. The upper end of each lever 12 is pivotally connected about a longitudinal axis to a block 15, which engages between a pair of vertical cheeks formed on the corresponding sleeve 10, whereby the upper ends of levers 12 are firmly connected to sleeves 10 for movement in a transverse direction, but vertical movement between these parts is permitted.

Lever 12 are rocked about their pivotal axis on bearings 14 by the engagement of a pin 16 on one lever in the groove of a disc cam 17. This cam is secured on a shaft 18, supported in the framework 6 and driven through gearing 19 from the driving means to the sewing machine 5.

Movement of the carriage 8 in the longitudinal direction is effected by the movement of a block or head 20 which engages in a vertical walled channel provided on the underside of the carriage 8 and extending in its other (transverse) direction of movement. As best seen in Figure 3, vertically disposed rollers 21, rotatably mounted in the head 20, project from two opposite faces of the head and engage the walls of the channel in the carriage. The carriage is thus constrained to partake of the longitudinal movements of the head, but can move freely in a transverse direction relative to the head and can also move vertically relative thereto. The other two side faces of the head carry transversely projecting trunnions, formed by the end of a pivot pin 22, which are pivotally received in the forked upper of an operating arm, designated generally by the reference numeral 23. This arm is pivotally supported at its lower end, for movement in a longitudinal vertical plane, by a transverse horizontal shaft 24, secured to arm 23 and journaled in a part 25 of the fixed framework 6.

The operating arm 23 is of telescopically extensible construction. It comprises an outer tubular member 26, secured at its lower end to shaft 24, and an inner tubular member 27, slidable within member 26 and guided therein by sleeves 28, 29 secured in member 26 near the upper and lower ends thereof. The upper end of the inner member 27 is secured to a fork member 30, pivotally connected by pin 22 to the head 20.

An actuating member in the form of a sleeve 31 is longitudinally slidable upon the outer tubular member 26 of arm 23. Pivotaly mounted upon this actuating member is a two armed lever formed by a pair of spaced parallel bars 32 disposed on opposite sides of arm 23. The outer end of one arm of this lever is pivotaly connected to the lower end of a link formed by a pair of spaced parallel bars 33, whose upper ends are pivotaly engaged with the pivot pin 22 of the longitudinally moving head 20. The upper ends of link bars 33 are cranked so as to lie alongside the upper end of arm 23, thus avoiding fouling of the walls of the channel in carriage 8. The outer end of the other arm of lever 32 is pivotaly connected to the upper end of a link formed by spaced parallel bars 34, whose lower ends are pivotaly engaged about the pivotal support of the operating arm. The lengths of the two arms of the lever bear to one another the same ratio (namely, 3 to 1 in the apparatus illustrated) as do the links 33, 34 to which they are respectively connected.

The actuating member or sleeve 31 carries also a transversely projecting pin 35 which engages rotatably (see Figure 2) in a boss formed on a slide mounted for longitudinal horizontal movement upon stationary guide rods 37 forming part of framework 6. Slide 36 also carries a pin 38 which engages in the helical groove of a cylinder cam fast upon the shaft 18. Rotation of shaft 18 thus causes both transverse movement of the carriage 8, through the action of cam 17 and levers 12, and longitudinal movement of the carriage, through cam 39, slide 36, actuating member 31 and arm 23. During such movement, guide rods 37 constrain the actuating member to move along a horizontal path and thereby slide lengthwise of operating arm 23. Such sliding movement of the actuating member moves the linkage constituted by lever 32 and links 33, 34 to extent or contract the telescopic operating arm 23 and maintain the head 20 in the same horizontal plane.

The levers 12 and sliding blocks 15 for effecting transverse movement of the carriage 8 may be replaced by one or more telescopic operating arms with length controlling linkages, similar to the operating arm 23 used in the apparatus illustrated for effecting longitudinal movement of the carriage. In this particular apparatus, however, which is primarily intended for stitching shirt collars, the transverse movement of the carriage is small compared to the longitudinal movement and the use of the mechanism shown has proved satisfactory.

What I claim is:

1. In apparatus for guiding a workpiece under the needle of a sewing machine along a predetermined stitching line, the combination comprising, a frame, a work supporting carriage movably connected to said frame, mechanism restricting movement of said carriage with respect to said frame to motion in a plane, a longitudinally extensible operating arm having one end pivotaly supported with respect to said frame about an axis parallel to and spaced from the plane of movement of said carriage, a guide channel on said carriage extending in the direction of the pivotal axis of said one end of said operating arm, said channel comprising a pair of spaced parallel guide walls, a head on the other end of said operating arm, opposite side portions of said head being in engagement with respect to the spaced parallel walls of said

guide channel, means carried by said frame and engaging said operating arm for swinging said operating arm about said pivotal axis, whereby said carriage will be moved in a direction perpendicular to the direction of said pivotal axis, and mechanism interconnecting said frame and said head and controlled by the swinging of said operating arm about its pivotal axis to effect extension of said extensible operating arm, said extension effecting mechanism being operative to constrain movement of said head along a line parallel with the plane of movement of said carriage, and means carried by said frame for causing movement of said carriage in a direction parallel to the direction of said pivotal axis.

2. Apparatus in accordance with claim 1 wherein said extension effecting mechanism comprises an actuating member slidably disposed along said operating arm, means constraining movement of said actuating member to a path parallel with the plane of movement of said carriage, a two-armed lever pivotaly connected to said actuating member, a link extending between and pivotaly connected to one arm of said lever and said head, and a second link extending between and pivotaly connected to the other arm of said lever and the pivotal axis of said extensible operating arm, the axes of all said pivotal connections being parallel to one another and the lengths of the two arms of said lever bearing to one another the same ratio as do the lengths of said two links.

3. Apparatus in accordance with claim 2 in which said lever and each of said links is formed by two parallel spaced members disposed on opposite sides of said extensible operating arm.

4. Apparatus in accordance with claim 2 in which said head is pivotaly connected to said other end of said operating arm about an axis parallel to the pivotal axis of said operating arm.

5. Apparatus in accordance with claim 4 wherein said head comprises rollers journalled about axes perpendicular to the extending direction of said guide channel, said rollers being in rolling engagement with said walls of said guide channel.

6. Apparatus in accordance with claim 2 wherein said one end of said operating arm comprises an outer tubular member and wherein said other end of said operating arm comprises an inner member telescopically slidable within said outer member, said actuating member comprising a sleeve surrounding arm slidable on said outer member.

7. Apparatus in accordance with claim 2 wherein said actuating member constraining means comprises a slide supported in said frame for movement in a plane parallel to the plane of movement of said operating arm, said actuating member being pivotaly connected to said slide, said slide carrying a cam follower, and rotary cam means cooperative with said cam follower for reciprocating said actuating member and swinging said operating arm.

References Cited in the file of this patent

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