Nov. 21, 1961 R. REEBER ET AL 3,009,432

SEWING MACHINE WITH STEPPER FEED

Filed July 18, 1960 2 Sheets-Sheet 1

FIG. 1

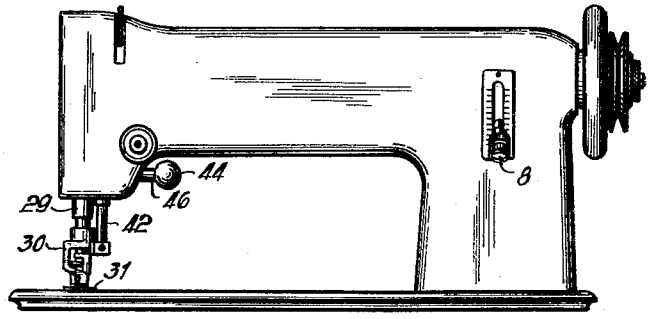


FIG. 3

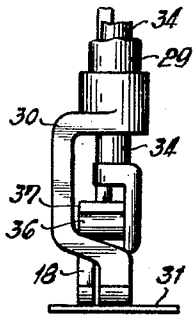
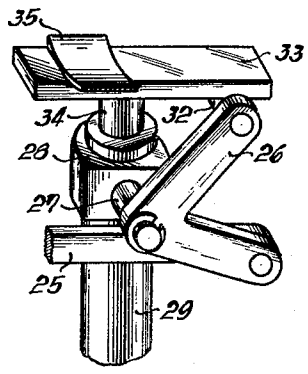


FIG. 4



INVENTORS
Rudolf REEBER
Helmut GROSS

BY Robert H. Jacob

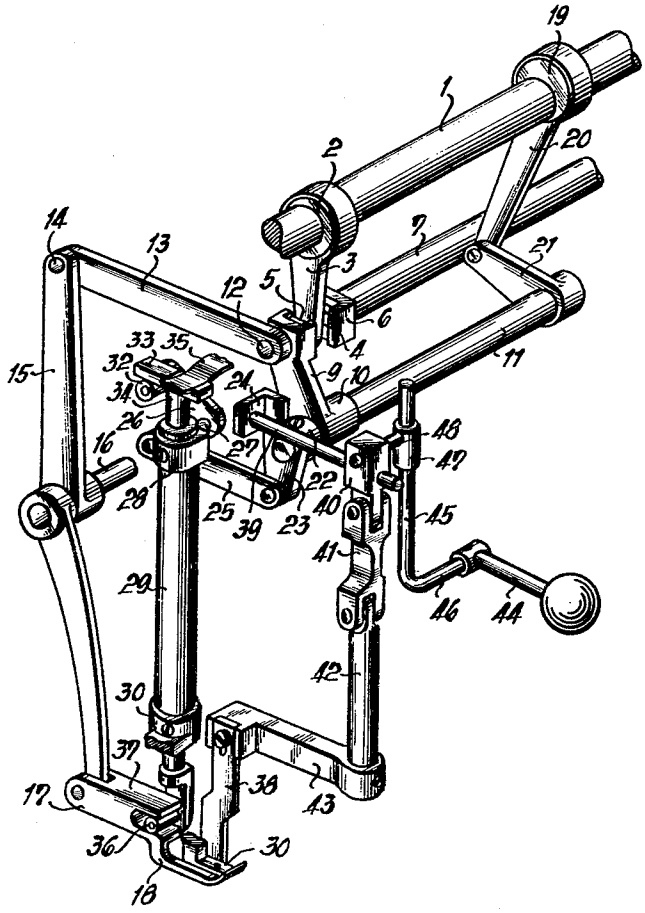
AGT.

Nov. 21, 1961 R. REEBER ET AL 3,009,432

SEWING MACHINE WITH STEPPER FEED

Filed July 18, 1960 2 Sheets-Sheet 2

FIG. 2



INVENTORS
Rudolf REEBER
Helmut GROSS

BY Robert H. Jacob

AGT.

United States Patent Office 3,009,432 Patented Nov. 21, 1961

3,009,432

SEWING MACHINE WITH STEPPER FEED

Rudolf Reeber and Helmut Gross, Kaiserslautern, Pfalz, Germany, assignors to G. M. Pfaff A.-G., Kaiserslautern, Pfalz, Germany

Filed July 18, 1960, Ser. No. 43,366
Claims priority, application Germany July 30, 1959
5 Claims. (Cl. 112—212)

The present invention relates to a sewing machine having a top feeding arrangement which operates by means of axially movable lifting bars for the top feed stepper foot and for the presser foot.

In sewing machines having top feeding means of the type known heretofore, the lifting bars for the feeding foot and for the presser foot are arranged one behind the other with respect to the direction of feed. The lifting bar for the top feeding foot in this connection is journalled in a rocking member which makes it possible to impart feeding movements to the top feeding foot which is connected thereto.

A rocking device of this type involves bulky components and therefore increases the mass which has to be moved. In top feeding arrangements of this type, both lifting bars execute thrust movements in rapidly changing alternate sequence which further increase the momentum. Particularly by raising the speed of operation the mass forces can increase to such an extent that the feet which alternately engage the material being sewn no longer touch the material at the correct time and with the required pressure. This results in irregularities in the feed which may affect the equality of stitch length.

In accordance with the invention a top feed mechanism is provided which can be accommodated in a small space and by means of which the moving masses are reduced so that highest operating speeds are possible. This problem is solved in that the lift bars for the top feed foot and for the presser foot are arranged one within the other and a sliding fork of the top feed foot slidingly engages a sliding block fastened to the lower end of the lift bar for the top feed foot. In this manner the structural form of the top feed mechanism is considerably simplified in spite of crowded structural conditions.

In accordance with an object of the invention, the mass forces are reduced to a particularly great extent, if in a top feed arrangement having a spring alternately biasing the two lift bars and a angular lever which performs a rocking movement and which is pivotally mounted on one of the lift bars, the spring acts upon the lift bar for the top feed foot and one end of the angular lever temporarily engages this lift bar for operation.

In this manner the presser foot is not raised during the feeding of the material but is only relieved of the pressure of the spring. The material being sewn which is under it can be advanced without being impeded by the top feed foot. The movements of the presser foot, as well as those of the lift bar, are as a result of this measure reduced to the minimum amounts which are the result of the difference between normal and compressed material thickness so that the mass forces become negligible.

An intermediate member which is rigidly connected with the lift bar for the top feed foot serves as a support for the spring and as abutment for the end of the angular lever.

The top feed arrangement in accordance with the invention provides the additional advantage of establishing the requisites for using a cutting arrangement in that the transfer of the lifting movement for the top feed foot and the cutter takes place by way of common elements

for a sufficient length of time until the disengageable operating means for the cutter is removed. This simple arrangement results from a clamping member which is rigidly connected with the shaft and which has two arms, one of which is connected by way of a link to the angular lever and the other carries a slide bar on which a slide member which actuates the cutter thrust bar is slidably mounted for movement by means of a shifting lever. The top feed arrangement in accordance with the invention can in this manner be operated without reducing the speed and in spite of the additionally provided cutting arrangement.

Further objects and details of the invention, as well as the advantages provided thereby will become apparent from the following specification with reference to the embodiment illustrated in the accompanying drawings in which:

FIG. 1 is a front view of a sewing machine provided with the mechanism in accordance with the invention;

FIG. 2 is a perspective view of the top feed mechanism assembly and of the cutting arrangement of the machine;

FIG. 3 is an enlarged view of the top feed and of the material presser foot shown in FIG. 1; and

FIG. 4 is a perspective view of the arrangement of the angular lever.

The arm shaft **1** which is driven in the conventional manner carries a cam **2** (FIG. 2) which moves a cam bar **3**. The other end of the cam bar **3** is provided on both sides with slide blocks **4**, **5**. The slide block **4** is guided in a slotted member **6**. The direction of the path of the adjustable slotted member **6** is determined by a setting shaft **7** which is journalled in the housing of the sewing machine having a lever **8** (FIG. 1) extending from the housing.

Owing to the directional guiding of the slide block **4** (FIG. 2) in the slotted member **6**, the slide block **5** turns a lever **9** which is loosely journalled by means of an apertured member **10** on a rocking shaft **11** disposed in the housing of the machine. The rotational movement of the lever **9** is transferred to a bar **13** by way of a stud **12** secured to the end thereof and from this bar by way of a joint **14** to a double armed lever **15**. This double armed lever **15** is pivotally mounted on a shaft **16** which is secured to the housing of the sewing machine. The second arm of the double armed lever **15** is rotatably journalled in a fork **17** of a top feed foot **18**. The length of the forward and rearward feeding path is variable. It depends upon the position of the adjustable slotted member **6**.

The lifting movement of the upper feed foot **18** is likewise controlled by the arm shaft **1** from which the movement is transmitted to the rocking shaft **11** by way of a cam **19**, a cam bar **20** and a crank **21**. The rocking shaft **11** is provided at its forward end with a clamp member **22** which has two arms **23** and **24**. Arm **23** transmits the rotational movement of the rocking shaft **11** to an angular lever **26** by way of a link **25**. As particularly shown in FIG. 4, the angular lever **26** is rotatably journalled on a stud **27**. The stud **27** is a part of a clamp member **28** which is secured upon a tubular lift bar **29**. A presser foot **30** (FIG. 3) is connected to this lift bar **29** at the lower end thereof and presses down upon a stitch plate **31**. The angular lever **26** (FIG. 4) supports a roller **32** at its upper end (FIG. 4). If the angular lever **26** is moved in the direction of the upper dead center of its path by means of member **25**, the roller **32** engages below an intermediate member **33** which is secured to a lift bar **34** and thus raises the lift bar **34** which is under the pressure of a spring **35**. The spring **35** is secured to the housing. The lift bar **34** slides in the tubular lift bar **29** and carries a slide member **36** (FIG. 2) at its lower end which is engaged by a

sliding fork 37 of the upper feed foot 18 and turns the same about its pivot in forked member 17 raising it from the stitch plate 31.

If the roller 32 of the angular lever 26 is in its lowermost position, it disengages the intermediate member 33. In this manner the angular lever 26 and thus also the lift bar 29 with the presser foot 30 is relieved of the pressure of the spring 35. The material can slide under the pressure foot 30 because this foot rests on the stitch plate 31 only under the weight of the angular lever 26, lift bar 29 and its own weight. Thus, the presser foot 30 is not raised during the time that the pressure of spring 35 is completely transmitted to the top feed foot 18.

A cutter 38 arranged proximate the presser foot 30 is likewise driven by the clamp member 22 of the rocking shaft 11. The arm 24 of the clamp member 22 supports a slide bar 39 which effects rocking movements about the rocking shaft 11. These rocking movements are transferred by a slide member 40 through a guide member 41 to a cutter thrust bar 42 which is journalled in the housing of the machine. The cutter thrust bar 42 has a blade support 43 at its lower end to which the cutter 38 is secured.

If the cutter is to be disconnected and brought into idling position, the shifting lever 44 is moved upwardly. A shifting bar 45 which has an angularly bent arm 46 by means of which it is rotatably mounted in the housing of the machine and which is connected with the shifting lever 44 presses the slide member 40 on the slide bar 39 in the direction of arm 24 of the clamp member 22 by way of a slide sleeve 47 which has a stud 48. If at the end of the disconnecting operation the engagement position between the guide member 41 and the slide member 40 is disposed exactly in the axis of rotation of rocking shaft 11, then the movement of the guide member 41 is substantially zero because the length of the effective lever arm of the slide bar 49 for driving the cutter 38 becomes substantially zero. In synchronism with the disconnecting movement the sliding member 40 draws the cutter thrust bar 42 upwardly by way of link 41 and thus raises the cutter 38 over the stitch plate 31 so far that a space is formed between cutter 38 and stitch plate 31 and thus the cutter is rendered inoperative.

Having now described our invention with reference to the embodiment illustrated, we do not wish to be limited thereto, but what we desired to protect by Letters Patent is set forth in the appended claims.

We claim:

1. Sewing machine with top feeding mechanism comprising, in combination with a machine housing, a drive shaft, a pair of axially movable lift bars operatively linked to said drive shaft and including a top feed bar and a presser foot bar mounted for axial movement in said housing, a top feed lever pivotally mounted in said housing, a top feed foot pivotally supported on said lever and a presser foot mounted on the lower end of said presser foot bar, said bars being arranged telescopically one within the other, a slide fork disposed on said top feed foot, a sliding block disposed on the lower end of said top feed bar and extending laterally therefrom into sliding engagement with said slide fork and means connecting said lever for rocking movement to said drive shaft.

2. Sewing machine with top feeding mechanism comprising, in combination with a machine housing, a drive shaft, a pair of axially movable lift bars operatively linked to said drive shaft and including a top feed bar and a presser foot bar mounted for axial movement in said housing, a top feed lever pivotally mounted in said housing, a top feed foot pivotally supported on said lever and a presser foot mounted on the lower end of said presser foot bar, said bars being arranged telescopically one within the other, a slide fork disposed on said top feed foot, a sliding block disposed on the lower end of said top feed bar and extending laterally therefrom into

sliding engagement with said slide fork, means connecting said lever for rocking movement to said drive shaft, an angular lever rockably mounted at the upper end of said presser foot bar and a spring supported in said housing in biasing relation to the upper end of said top feed bar, one arm of said angular lever being adapted to temporarily engage a member of said top feed bar.

3. Sewing machine with top feeding mechanism comprising, in combination with a machine housing, a drive shaft, a pair of axially movable lift bars operatively linked to said drive shaft and including a top feed bar and a presser foot bar mounted for axial movement in said housing, a top feed lever pivotally mounted in said housing, a top feed foot pivotally supported on said lever and a presser foot mounted on the lower end of said presser foot bar, said bars being arranged telescopically one within the other, a slide fork disposed on said top feed foot, a sliding block disposed on the lower end of said top feed bar and extending laterally therefrom into sliding engagement with said slide fork, means connecting said lever for rocking movement to said drive shaft, an angular lever rockably mounted at the upper end of said presser foot bar and a spring supported in said housing in biasing relation to the upper end of said top feed bar, one arm of said angular lever being adapted to temporarily engage a member of said top feed bar, said member of said top feed bar being an intermediate member rigidly secured to said top feed bar having engagement with said spring and defining an abutment for one arm of said angular lever.

4. Sewing machine with top feeding mechanism comprising, in combination with a machine housing, a drive shaft, a pair of axially movable lift bars operatively linked to said drive shaft and including a top feed bar and a presser foot bar mounted for axial movement in said housing, a top feed lever pivotally mounted in said housing, a top feed foot pivotally supported on said lever and a presser foot mounted on the lower end of said presser foot bar, said bars being arranged telescopically one within the other, a slide fork disposed on said top feed foot, a sliding block disposed on the lower end of said top feed bar and extending laterally therefrom into sliding engagement with said slide fork, means connecting said lever for rocking movement to said drive shaft, an angular lever rockably mounted at the upper end of said presser foot bar and a spring supported in said housing in biasing relation to the upper end of said top feed bar, one arm of said angular lever being adapted to temporarily engage a member of said top feed bar, said member of said top feed bar being an intermediate member rigidly secured to said top feed bar having engagement with said spring and defining an abutment for one arm of said angular lever, said mechanism including a cutting device and a rocking shaft operatively connected to said cutting device and said cutting device having a disengageable cutter bar, and a clamp member having a pair of arms mounted on said rocking shaft, one of said arms being in engagement with said angular lever by way of a link and the other carrying a sliding rod slidingly supporting a cutter thrust bar and slide member, and a shifting lever mounted in said housing having engagement with said slide member.

5. Sewing machine with top feeding mechanism comprising, in combination with a machine housing, a drive shaft, a pair of axially movable lift bars operatively linked to said drive shaft and including a top feed bar and a presser foot bar mounted for axial movement in said housing, a top feed lever pivotally mounted in said housing, a top feed foot pivotally supported on said lever and a presser foot mounted on the lower end of said presser foot bar, said bars being arranged telescopically one within the other, a slide fork disposed on said top feed foot, a sliding block disposed on the lower end of said top feed bar and extending laterally therefrom into sliding engagement with said slide fork, means connecting said lever for rocking movement to said drive shaft, an angular lever

rockably mounted at the upper end of said presser foot bar and a spring supported in said housing in biasing relation to the upper end of said top feed bar, one arm of said angular lever being adapted to temporarily engage a member of said top feed bar, said member of said top feed bar being an intermediate member rigidly secured to said top feed bar having engagement with said spring and defining an abutment for one arm of said angular lever, said mechanism including a cutting device and a rocking shaft operatively connected to said cutting device and said cutting device having a disengageable cutter bar, and a clamp member having a pair of arms mounted on said rocking shaft, one of said arms being in engagement with said angular lever by way of a link and the other carrying a sliding rod slidingly supporting a cutter

thrust bar and slide member, and a shifting lever mounted in said housing having engagement with said slide member, and a link extending between said cutter thrust bar and said slide member at a joint movable with said slide member by means of said shifting lever from a point substantially in axial alignment with the cutter thrust bar to a point in axial alignment with said rocking shaft, said link being simultaneously operative to withdraw the cutter bar to idling position.

References Cited in the file of this patent

UNITED STATES PATENTS

253,731	Luessen	Feb. 14, 1882
1,550,418	Bates	Aug. 18, 1925