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[54] **UPPER TRANSPORT DEVICE FOR SEWING MACHINES**

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June 19, 1971 Germany ..... G 71 23 663.0

[52] **U.S. Cl.** **112/212**

[51] **Int. Cl.** **D05b 27/04**

[58] **Field of Search** 112/70, 203, 207, 112/212

[56] **References Cited**

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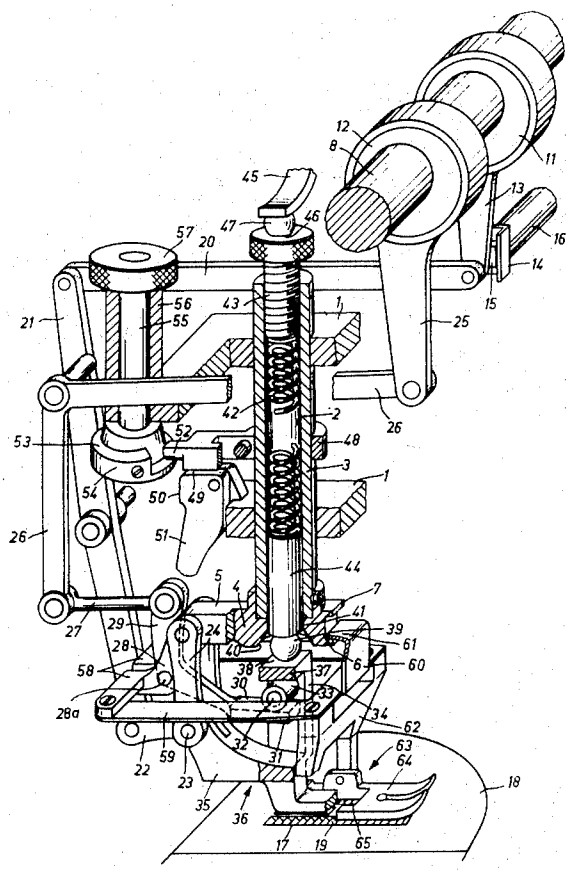
[57] **ABSTRACT**

The means for feeding the material to be sewed by a sewing machine (especially a high speed sewing machine) comprises an upper transport foot and a material pressure foot. According to this invention, separate spring means, independent of one another, are provided to apply pressure to the upper transport foot, and the material pressure foot, so that the mass of the moving parts can be reduced and the undesirable inertia effects can be overcome when stopping the machine.

2 Claims, 2 Drawing Figures



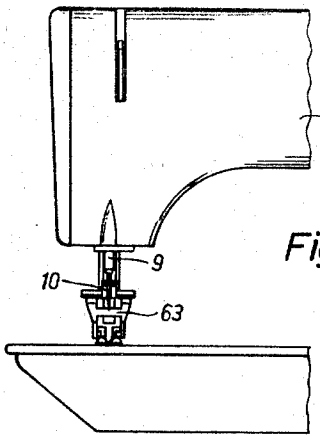

1
9
10
63

Fig.1

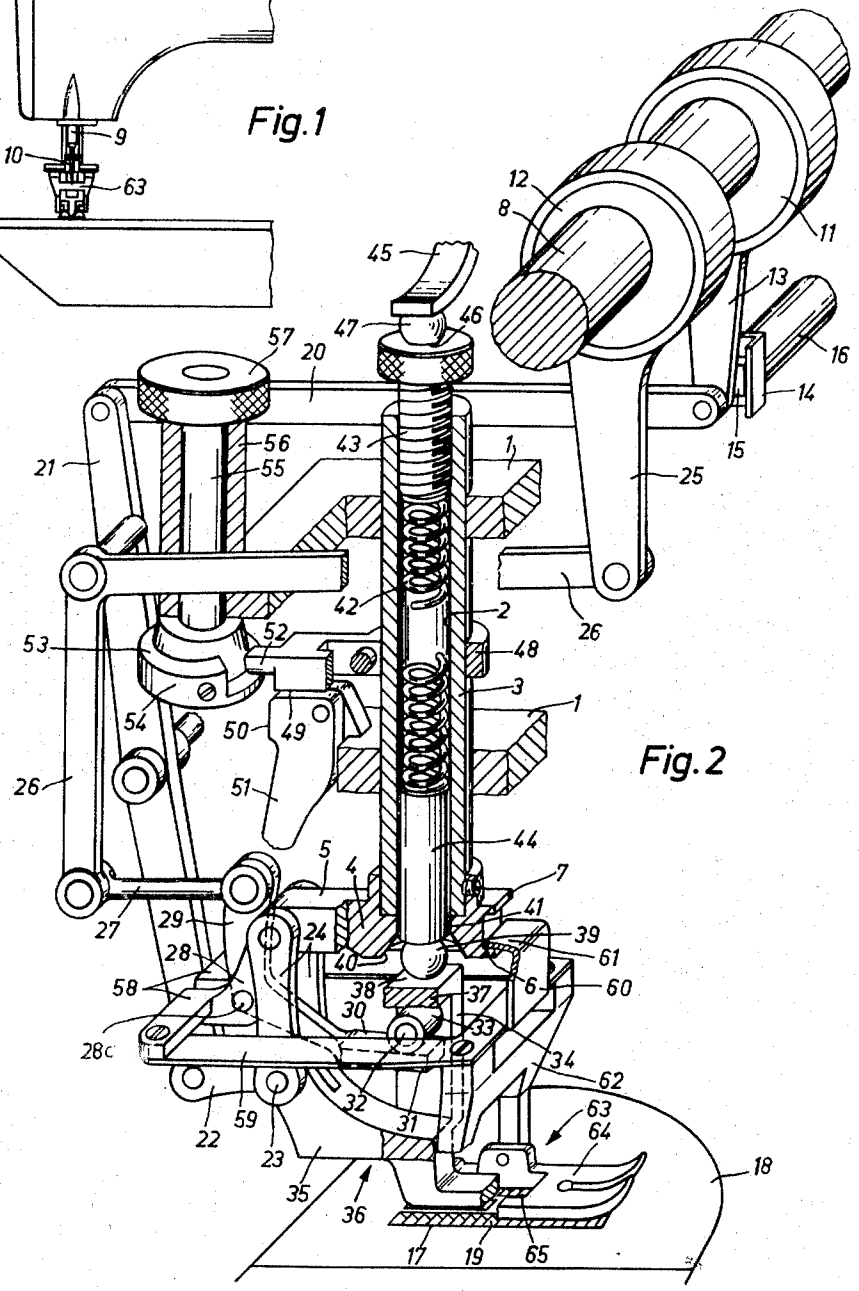

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Fig.2

UPPER TRANSPORT DEVICE FOR SEWING MACHINES

The invention concerns an upper-transport device for a sewing machine with a spring operated stopping of the material pusher foot and the upper transport foot carried on the material pusher rod.

By known arrangements of the art, undesired vibrations occur at high operating speeds which are produced through the reaction of the upper transport foot on the sewed goods or on the lower material pusher and through the inertia of the moving parts. Especially with high speed sewing machines, there is not guaranteed, under these conditions, an orderly performance from the upper transporting foot as well as the necessary contact between the material presser foot and the sewing goods. As a result, the material to be sewed is not equally transported.

For the reduction of the moving mass, upper transport arrangements are already known in which the combination between the material pressure foot and the upper transporting foot is developed, so that the pressure foot no longer lifts off the to-be-sewed material, but only releases it. Thereby, the moving mass is indeed somewhat reduced, however, the resultant inertia of the material pressure system, which the lifting and lowering motion of the lower material pusher brings forth, is not essentially reduced.

The invention seeks to essentially reduce the moving mass of an upper transport arrangement and to attain this object by supporting the material pressure rod from a parallel, adjustably attached stop provided on the sewing machine and by arranging for both the material pressure foot and the upper transporting foot opposite the material pressure rod to move vertically at any given time by an allotted amount independently of each other, and to remain under the influence of a suitable spring.

In the attached drawing which illustrates, by way of example, a constructional form of the invention;

FIG. 1 is a partial front view of a sewing machine with the upper transport device of the invention, and

FIG. 2 is an enlarged prospective view, partially in section, of the upper transport device.

The material presser rod **3**, having a bore **2**, is supported in housing **1** in the sewing machine, and to the lower end thereof the bracket **4** is fastened with screws. The bracket **4** is equipped with an arm **5** projecting behind the rod **3** (with respect to the front of the machine), and has at its forward end two parallel stops **6** and **7**, one above the other.

In the housing **1** of the sewing machine, there is, furthermore, supported in the known manner, the main driving shaft **8**, which through a driving element (not shown) drives the needle rod **9** (FIG. 1), containing the needle **10**. Besides, there is attached to the main shaft **8** (FIG. 2) a first eccentric **11** and a second eccentric **12**.

The ring follower of eccentric **11** is connected to the eccentric rod **13** on which is encamped the slide block **15** held in the rocker arm guide **14**. The direction of the guideway **14** is determined by the adjustable shaft **16** which is supported in the housing with a hand lever (not shown), projecting from the housing. With the hand lever, the size and direction of the feed movement of the material advancing means **19**, projecting through the slit **17** of the stitching plate **18** is determined in the known way.

As a result of the enforced guiding of the slider block **15** in the guide **14** and the movement of the slide block **15** resulting from the eccentric rod **13**, a horizontal or sideward movement is transmitted to the rod **13** which depends on the inclination of the guide **14**. A link **20** transmits the horizontal or side movement of rod **13** to a double lever **21** which is supported in the housing, and thence to a link **22** mounted on pivot **23** which is carried by a pair of links **24** on the arm **5** of bracket **4**.

The eccentric **12** drives the eccentric rod **25** which, through bell crank **26** (supported in housing **1**) and a link **27** operates a lever **29**, which in turn, is supported from a pivot **28a** on a forked-like extension **28** of the arm **5**.

The free arm **31** of lever **29** has a smooth upper surface **30**, which stretches under the pin **32** rotatably supporting roller **33**. The pin **32** is attached in the yoke-like shaft **34** (partly cut away) mounted on arm **35**, which is also supported from pivot **23** as part of the upper transporting foot **36**.

The horizontal wall portion **37** of the yoke-like shaft **34** has a smooth pressure surface **38** adjacent the lower end of bracket **4** on which the ball **39**, extending from the lower flared surface **40** of bore **41** in bracket **4**, the flaring of surface **40** being adapted to accommodate the ball **39**.

The bore **41**, in bracket **4**, is an extension of the boring **2** in the material pressure rod **3**. In said boring **2**, a spring **42** is provided which contacts adjacent the upper end of the rod **3**, an adjusting screw **43** threadedly connected to the rod **3** and which spring contacts at its other end, a bolt **44** which is guided in the borings **2** and **41** and presses against ball **39**.

The leaf spring **45**, which is attached to the housing in a known way, presses with its end against ball **47**, held in the cup shaped recess **46** of the adjusting screw **43**. By screwing adjusting screw **43** in or out the pressure of leaf spring **45** can be changed.

A lifter **48** is attached to the material pressure rod **3** and has a stop surface **49** cooperating with stop **50** of the pivotable hand lever **51** which is attached to the housing **1**, as shown.

The arm **52**, which is rigidly connected to or an integral part of the lifter member **48**, cooperates with the helically rising curved track **53** of the fitting **54**. Said fitting **54** is carried at the end of shaft **55** mounted in bearing eye **56** of housing **1**, and said shaft **55** carries a rotatable knob **57** at its outer end.

The extension **28** of arm **5** comprises two supporting arms **58** extending at right angles to the extension **28** and to the ends of which a yoke-formed spring **59** is attached. This spring carries at its front side an upwardly extending, curved clip or claw **60**, the free end **61** of which is inserted between stops **6** and **7**. On the front side of spring yoke **59** is attached the shaft **62** of the material presser foot **63** whose base **64** presses the goods to be sewed against the advancing means **19**. The base **64** is provided with a slot **65**, through which the upper transport foot **36** can bring the sewed goods and the material advancing means **19** into contact.

In operation, the spring **45** holds the arm **52** of the material presser rod **3** on the curved track of the fitting **54**. Through rotation of the knob **57**, the support bearing for the material presser rod **3** can be adjusted to the strength (thickness) of the goods to be sewed. With it,

the material presser rod 3 and its attached bracket 4, will be effectively lowered so far, that the base 64 of the material-presser-foot 63 rests on the goods to be sewed under the action of spring 59 when the advancing means 19 is lowered below the stitch plate 18 and so that the end of clip 60 is lifted straight off of stop 6. The material presser foot 63 will no longer be pressed on the goods to be sewed by the pressure of spring 50 when the pressure of leaf spring 45 presses heavily on the fitting 54 and is not transmitted to the material pressure foot 63.

The apparatus works as follows:

Rotation of the main shaft 8 propels the eccentrics 11 and 12 together with the sewing mechanism of the machine.

The eccentric 11 displaces the rod 13 with its slide block 15 in the guide 14. According to the position of the guide 14, which can be adjustably changed through shaft 16, the double lever 21 is more or less vigorously oscillated and a corresponding degree of feeding movement is transmitted to the upper transport foot 36 through link 22.

The horizontal movement of upper transport foot 36 is made possible through contact between roller 33 and the surface 30, as well as between surface 38 and ball 39, and between bolt 44 and the roller bearing. The stop surface 40 limits the movement of ball 39 and the relative position of the upper surface 38 of the wall portion 37.

The eccentric 12 oscillates the bell crank lever 26 through rod 25 and thus oscillates the lever 29 through link 27. Thereby, the arm 31 of lever 29 is lifted and lowered. Upon lifting arm 31, the upper surface 30 thereof pushes the upper transport foot 36 upward by means of the roller 33. The lifting is carried out agains the action of spring 42, the loading pressure of which is applied to ball 39. As soon as the upper transport foot 36 has lifted, the sewed goods accordingly is loaded only by the pressure of spring 59 acting on material pressure foot 63. The lower material advancing means 19 has then dropped below the upper surface of stitch plate 18.

By lowering of arm 31, the roller 33 is released from upper surface 30 whereupon the upper transport foot 36 touches down on the goods being sewed through the action of spring 42. Simultaneously, the teeth of the material advancing means 19 move through the open slit 17 of stitch plate 18 above the surface of the stitch plate to lift the material pressure foot 63. Since the distance between the two stops 6 and 7 is greater than the height of the lift of the material advancing means 19 above the surface of stitch plate 18, the spring 59 takes up all of the lifting movement of the material pressure foot 63. The material pressure rod 3 remains in its lower position.

At first, when the material pressure foot 63 is lifted, so as to pass a certain thickness of sewing material, whereupon the end 61 of clip 60 is supported against the upper stop 7, the clip 60 lifts the material presser rod 3 and the pressure of leaf spring 45 acts now additionally through the material pressure rod on the material pressure foot 63.

The upper transport system of the invention has, accordingly, a stroke limit for the lower material advancing means 19 operating independently from the springiness of the upper transport foot 36 and the material presser foot 63. By this means, in the normal sewing process, only the slight mass of the two feet is required to be accelerated and retarded. When, on the other hand, the change of material in the sewing process comes up — when additional pressure will be necessary — the system works as the known upper transport equipment.

For the lifting of the material pressure foot 63, the hand lever 51 is rotated. Thereby the stop 50 of the lift member 48 and the material pressure rod 3 is lifted. Simultaneously, the stop 6 moves upwardly and takes along the clip 60 so that the material presser foot 63 is lifted from the sewing goods. As a result of the pivoting, the upper transport foot 36 will, as well, be correspondingly lifted through the link pair 24 and also through the pivoting of lever 29 on carrier 4.

I claim:

1. An upper transport arrangement for a sewing machine having a main drive shaft, a casing, a material pressure foot and an upper transport foot and drive mechanisms to operate said pressure foot and said upper transport foot from the main drive shaft comprising,

a vertically moveable material pressure rod mounted in the casing of the machine,

a first spring disposed in said casing acting to urge said material pressure rod downwardly,

a stop means adjustably mounted in the casing of the machine for supporting the material pressure rod with respect to said first spring,

means connecting the material pressure rod with the material pressure foot constructed and arranged to make possible a vertical movement between the material pressure rod and the material pressure foot, said means including a second spring means associated with said pressure rod normally urging the material pressure foot against the goods to be sewed,

a pair of stop means mounted on the material pressure rod and cooperating lug means on the material pressure foot projecting into the space between said pair of stop means to limit the vertical movement of the material pressure foot with respect to the material pressure rod,

means connecting the material pressure rod and the upper transport foot constructed and arranged to make possible a vertical movement between the material pressure rod and the upper transport foot, said means including a third spring means associated with said pressure rod, independent of the second spring means and normally urging the upper transport foot against the goods to be sewed,

a lever linked with the material pressure rod for imparting a lifting and lowering movement to the upper transport foot against the action of the third spring means, roller means on the upper transport foot through which said lever operates,

and means linking said lever to the main drive shaft to impart an oscillating movement to the lever.

2. The transport means as claimed in claim 1, and including control means to adjust for the thickness of the material to be sewed comprising a rotatable shaft parallel to the material pressure rod carrying a curved spiral cam surface, and collar means attached to said material pressure and having an arm adapted to ride on said cam surface.

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