Oct. 25, 1938. F. EBERT 2,134,329

DIFFERENTIAL MATERIAL FEEDER FOR SEWING MACHINES OF THE SUPPORTING ARM TYPE

Filed Aug. 18, 1936 4 Sheets-Sheet 1

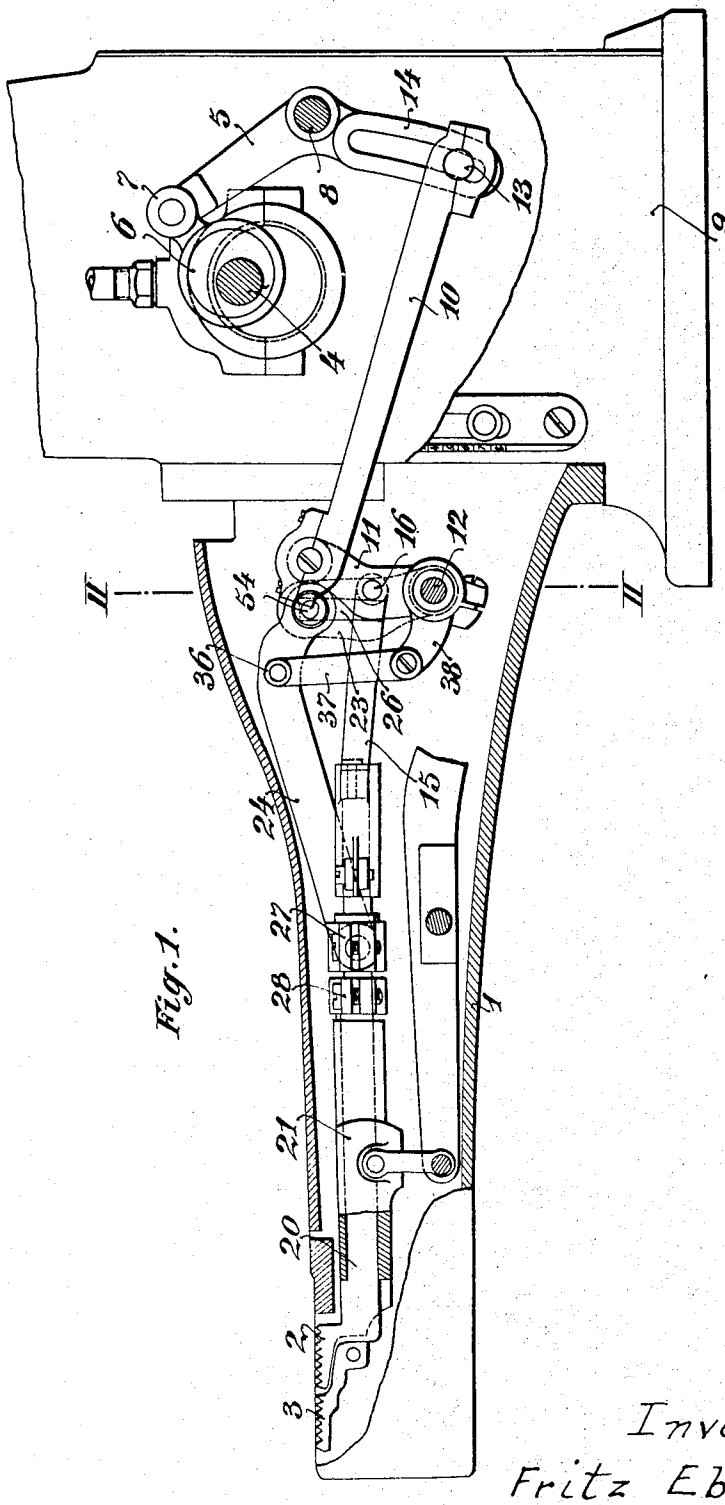


Fig. 1.

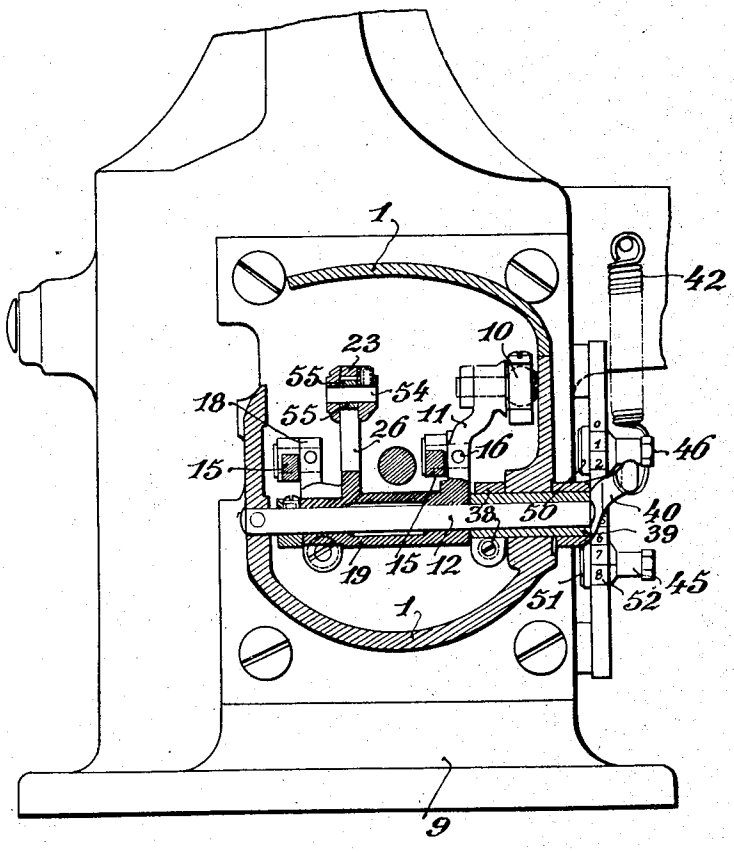
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Fig. 2.



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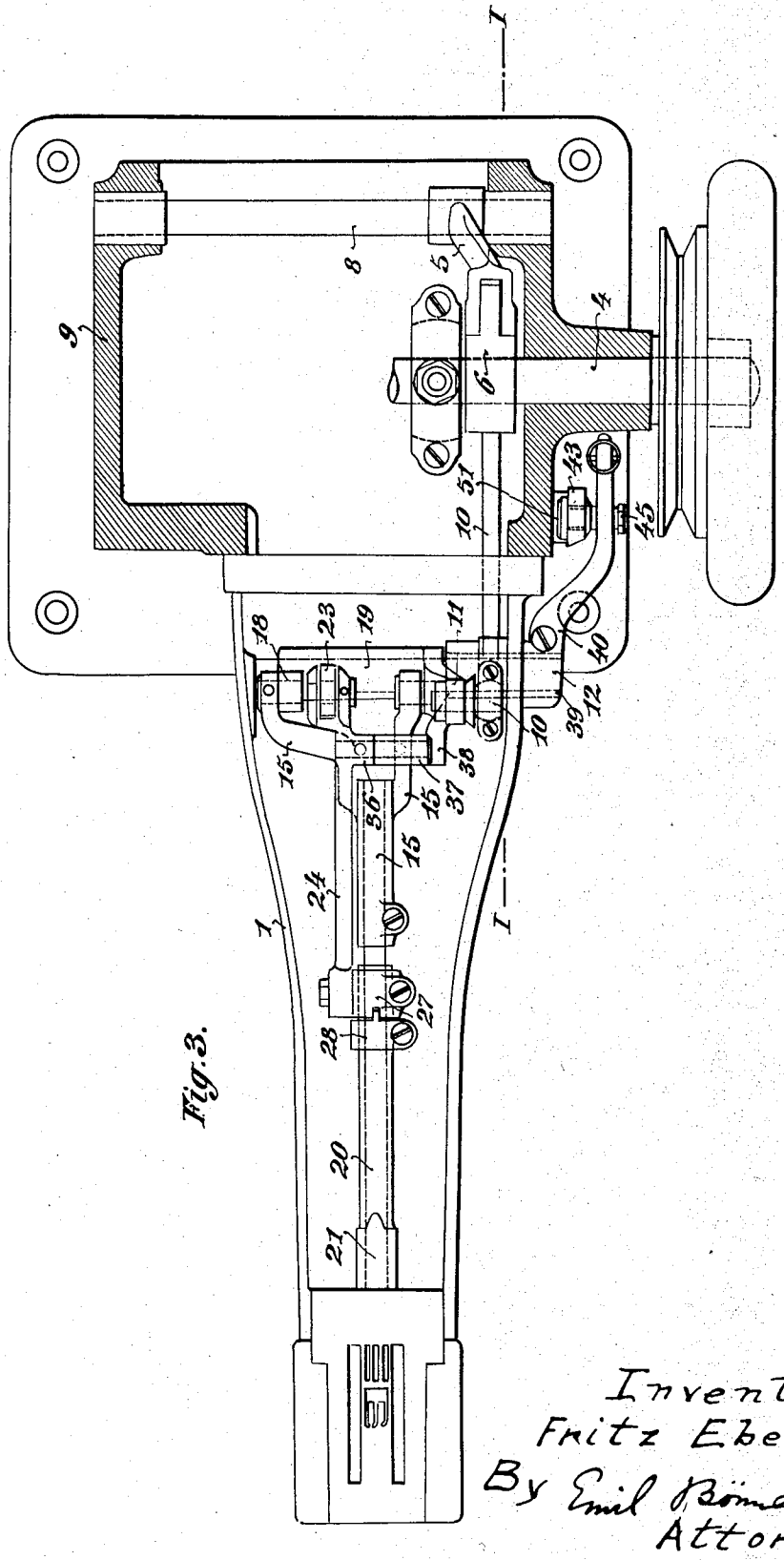


Fig. 3.

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Filed Aug. 18, 1936 4 Sheets-Sheet 4

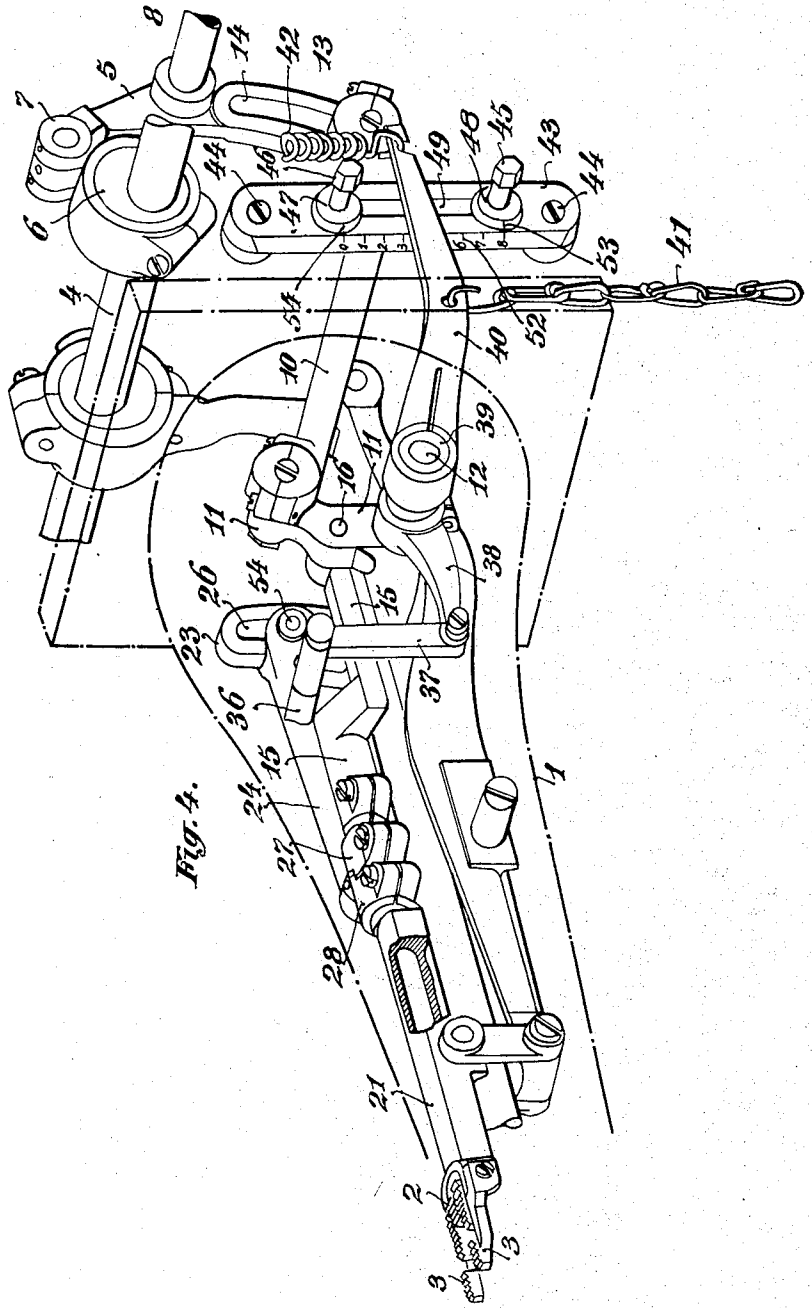


Fig. 4.

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UNITED STATES PATENT OFFICE

2,134,329

DIFFERENTIAL MATERIAL FEEDER FOR SEWING MACHINES OF THE SUPPORTING ARM TYPE

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Application August 18, 1936, Serial No. 96,681
In Germany September 20, 1935

5 Claims. (Cl. 112—209)

This invention relates to a differential material feeder for sewing machines of the supporting arm type in which the operative force acts on the feeder in the direction of the axis of the supporting arm. The drive in respect of the main material feeder is located in the upright of the sewing machine frame and is transmitted to an intermediate drive which is arranged at a stable point of the supporting arm near the upright of the frame of the sewing machine. This intermediate drive both actuates the element that moves the main feeder longitudinally as well as supplies the power for moving the differential feeder. The movement of these two feeders may be regulated, and there are provided separate means for varying the length of stitch and for the differential operation, in such fashion that on the one hand the oscillations of the comon element driving the two feeders and on the other hand the movements of the differential feeder may be varied separately.

The invention relates to means for regulating the differential feeder, such means being characterized by the fact that the extent of the differential effect may be adjusted when the machine is running, so that a greater or smaller amount of material may be fed to the needle dependent on the particular material concerned and the desired form.

In adaptation to the construction set out in the foregoing, which enables the machine to be operated at a very high speed, there is provided in accordance with the invention an externally operated lever, which serves to vary the differential effect, on the shaft already carrying the operating means for the differential feeder, the movements thereof being transmitted to a link engaging in direct fashion with the support for the differential feeder. Preferably the lever is connected with a sleeve, which is fitted over the shaft and by means of which the rotary movement of the lever is conveyed to a lever system located within the supporting arm. The sleeve also serves as a collar for the oscillatory frame and may be readily adjusted or readjusted from the outside. At the other end the shaft is held in the supporting arm by means of a worm screw. The actuation of the setting lever results in an upward movement of the link with the material feeder support, there thus being adjusted a greater differential effect. The link encloses the operating lever of the differential feeder in fork-like manner and is guided in a segment of the operating lever by means of a guide member, which is carried by a cylindrical pin connecting the ends of the fork.

The setting lever may be actuated by a pedal or an angle lever and is capable of swinging between two stops which are preferably guided in a segment of a scale bar provided on the frame of the sewing machine. A spring engaging with the setting lever draws the latter against the upper stop, so that when the pedal or angle lever ceases to be actuated the original extent of the feeding movement is adjusted automatically. The greatest differential effect is fixed by the adjustable lower stop. The stops consist of threaded bolts and are preferably furnished with markings for exact adjustment of the differential effect, these markings co-operating with the scale provided on the bar. The markings are in the form of graduations on washers on the threaded bolts, which are guided by means of two surfaces so as to be secured against rotation in the segment of the scale bar.

The two screw stops also permit of the adjustment of a certain fixed differential effect without actuation of the pedal or the angle lever. For this purpose the two screws should be so adjusted that in the desired position of the setting lever they bear against the two sides thereof. The machine may accordingly then be employed in the manner of the ordinary differential feeder machine.

The advantage of the adjustment means for the differential feeder in accordance with the invention resides in particular as compared with the known arrangements in the simple arrangement of the parts and in utilization of existing elements, so that it is possible also with this arrangement to use the machine for a higher output by increasing the circumferential velocity.

A possible form of embodiment of the invention is illustrated in the accompanying drawings, in which—

Fig. 1 is an elevational view of the frame and the supporting arm of the sewing machine, partly in section,

Fig. 2 is a vertical section along the line II—II in Fig. 1 in the plane of the shaft of the intermediate operating means.

Fig. 3 is a plan view of Fig. 1, partly in section.

Fig. 4 is a perspective view of the device according to the invention.

The differential feeder is driven by the main shaft 4 mounted in the frame 9 of the machine, which drives through the medium of an eccentric 6 a double lever 5 mounted on the shaft 8, the other arm of which lever is engaged by a con-

necting rod 10, which actuates a rocking lever 11 mounted to be rotatable on a transverse spindle or axle 12 which is furnished in the supporting arm 1 in the vicinity of the upright 9. The rocking lever 11 possesses an additional arm 18 with which it forms a U-shaped structure, to the arms of which there is pivoted a fork-like frame 15, which at the other end is detachably connected with a rod 20 carrying the main feeder 2. To adjust the length of stitch the pin 13 of the connecting rod 10 is guided in a slot 14 in the lever 5. There is also derived from the U-shaped lever 11 the drive in respect of the differential feeder 3, a third arm 23 provided on the lever 11 transmitting the oscillatory movements by way of a connecting rod 24 to a support 21, at the end of which the differential feeding means are located.

To adjust the differential effect on the part of the feeding means 3 when the machine is in operation the connecting rod 24 in the arm 23 is made to be adjustable by means capable of being actuated externally of the machine.

For this purpose the transverse spindle 12 mounted in the supporting arm 1 is extended outwardly at the one end and carries a sleeve 39, to which the setting lever 40 acting on the connecting rod 24 is firmly secured. The connecting rod 24 is adapted to oscillate around a stud of a clamping sleeve 27 secured against rotation by a setting collar 28. On the inner side of the supporting arm 1 there is also firmly secured on the sleeve 39 a lever 38, which participates in the rotary movement transmitted to the sleeve 39 by the setting lever 40. The sleeve 39 serves at the same time as a collar for the rocking lever 11 for the purpose of adjusting the lever-system 11, 18, and 23 in the longitudinal direction of the spindle 12 in order to avoid a clamping effect of these levers and the parts connected thereto. The collar 39 can be adjusted in an axial direction in order that the rocking lever 11 shall serve as a stop member whereby the support 21 will not be jammed. The spindle 12 is held on one side of the supporting arm by a screw. To the lever 38 there is pivoted a link 37, which in turn engages with an eye 36 in the connecting rod 24, whereby the point of engagement of the connecting rod 24 with the slotted guide 26 of the arm 23 is varied by rocking the setting lever 40 and in this way a greater or smaller differential effect is caused on the part of the feeder 3.

In order to render possible a proper adjustment of the connecting rod at high speed of operation of the machine provision is made for a ready and frictionless guiding of the end of the connecting rod in the arm 23. The connecting rod 24 encloses the arm 23 in forklike manner and is held by a pin or abutment 55 which is capable of sliding in the guide 26. This abutment is mounted on a cylindrical pin 54 which connects the two ends of the fork.

The setting lever 40 is capable of performing a rocking movement in a vertical plane and may be actuated either by means of a pedal (not shown) or by means of an angle lever (also not shown). A spring 42 engaging with the lever 40 returns the latter into the initial position. The movement of the setting lever is limited by two stops which are made to be adjustable. In order to be able to fix exactly the extent of the differential effect these stops are shiftable on a scale bar 43, which is secured to the sewing machine frame 9 by means of screws 44. The stops consist of threaded bolts 45, 46 screwed into nuts 50, 51, which are guided in the slot 49 of the bar 43 and in conjunction with washers 47, 48 are capable of being locked in position. The washers bear graduations 53, 54, which serve for fixing the position of the stops in relation to the scale 52 provided on the bar 43. To prevent rotation of the washers these and also the nuts 50, 51 are furnished with cut faces, by means of which the parts in question are guided in the slot 49.

With this arrangement any desired extent of the differential effect may be determined and fixed beforehand. The differential effect may be introduced in the desired extent during the operation of the machine by actuation of the pedal or the angle lever, whereby the setting lever 40 moves against the lower stop. After release of the setting lever this returns automatically against the upper stop, so that there is again adjusted the original extent of movement. The two screw stops, however, may also be provided in close proximity on either side of the setting lever, so that any desired differential effect may be set so as to be incapable of variation.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. A differential feeding mechanism for sewing machines comprising a supporting arm, main and auxiliary material feeders, means mounted on an axle for operating the said auxiliary feeder, a support for the said feeder, an externally operated lever for varying the differential effect of the said auxiliary feeder, the said lever being mounted on the said axle, a lever system located within the said supporting arm, a sleeve on said axle for transmitting the rotary movement of the said externally operated lever to the said lever system, and a link co-operating with the said sleeve and engaging with the said support by means of a connecting rod, the said sleeve also acting as a collar for the said lever system so that the latter may be exactly adjusted in relation to the said support.

2. A differential feeding mechanism for sewing machines comprising main and auxiliary material feeders, means mounted on an axle for operating the said auxiliary feeder, a support for the said auxiliary feeder, an externally operated lever for varying the differential effect of the said feeder, the said lever being mounted on the axle of the said operating means, a slotted guide on the operating means for the differential material feeder, a link cooperating with the said support and enclosing the said guide in fork-like manner, a cylindrical pin connecting the ends of the fork, and a guide member on the said pin for guiding the said link in the slot of the guide.

3. A differential feeding mechanism for sewing machines comprising main and auxiliary material feeders, means for operating the said auxiliary feeder, a support for the said feeder, an externally operated lever for varying the differential effect of the said feeder, a scale bar, stops on the said bar limiting the extent of movement of the said lever, a spring for drawing the said lever against one of the stops, and a link for transmitting the movements of the said lever and engaging with the said support by means of a connecting rod.

4. A differential feeding mechanism for sewing machines comprising main and auxiliary material feeders, means mounted on an axle for operating the said auxiliary feeder, a support for the said feeder, an externally operated lever for vary-

ing the differential effect of the said feeder, the said lever being mounted on the axle of the said operating means, a scale bar, threaded bolts constituting stops for limiting the extent of movement of the said lever, the said stops having markings co-operating with the said scale bar, a spring for drawing the said lever against one of the stops, and a link for transmitting the movements of the said lever and engaging with the said support by means of a connecting rod.

5. A differential feeding mechanism for sewing machines comprising main and auxiliary material feeders, means mounted on an axle for operating the said auxiliary feeder, a support for the said feeder, an externally operated lever for varying the differential effect of the said feeder, the said lever being mounted on the axle of the said operating means, a scale bar having a slot therein, threaded bolts constituting stops for limiting the extent of movement of the said lever, the said stops having flattened faces to secure them against rotation in the said slot, washers on the said stops having graduations adapted to co-operate with the said scale bar, a spring for drawing the said lever against one of the said stops, and a link for transmitting the movements of the said lever and engaging with the said support by means of a connecting rod.

FRITZ EBERT.