

Aug. 27, 1940.

F. LUTZ

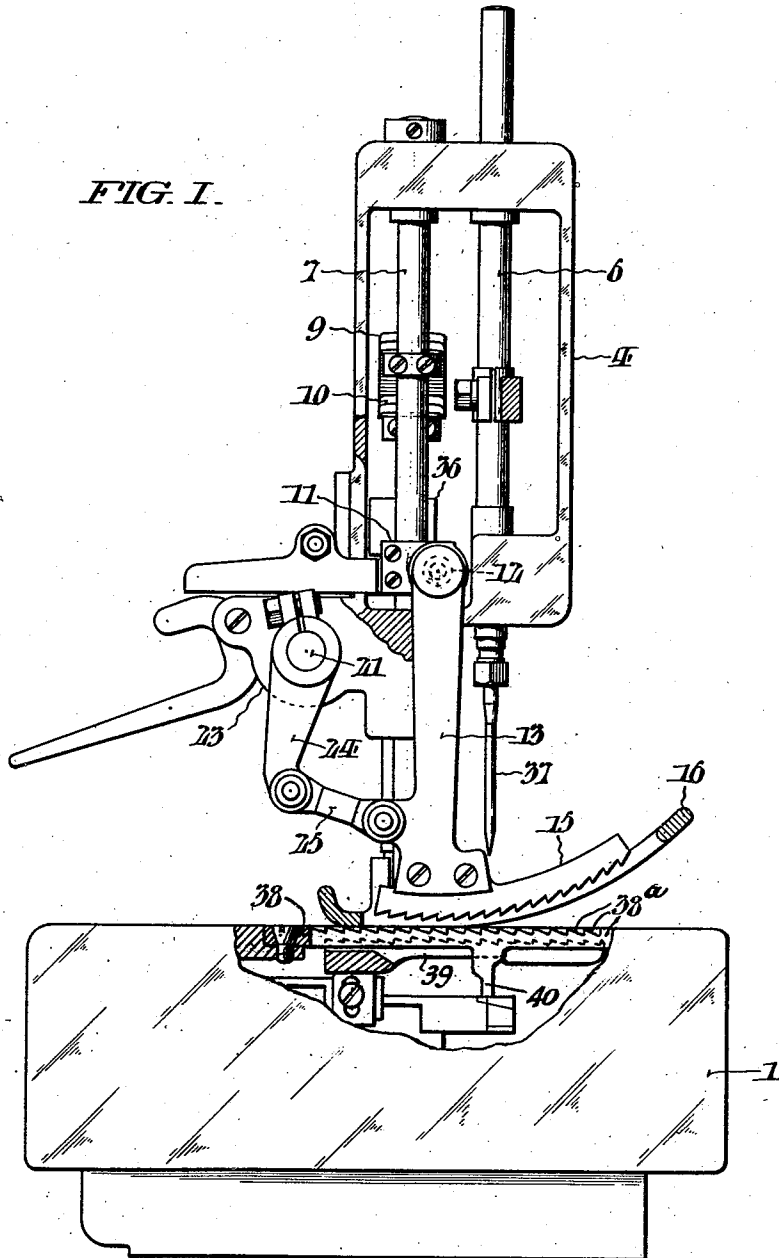
2,213,029

FEEDING MECHANISM FOR SEWING MACHINES

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2 Sheets-Sheet 1

FIG. 1.



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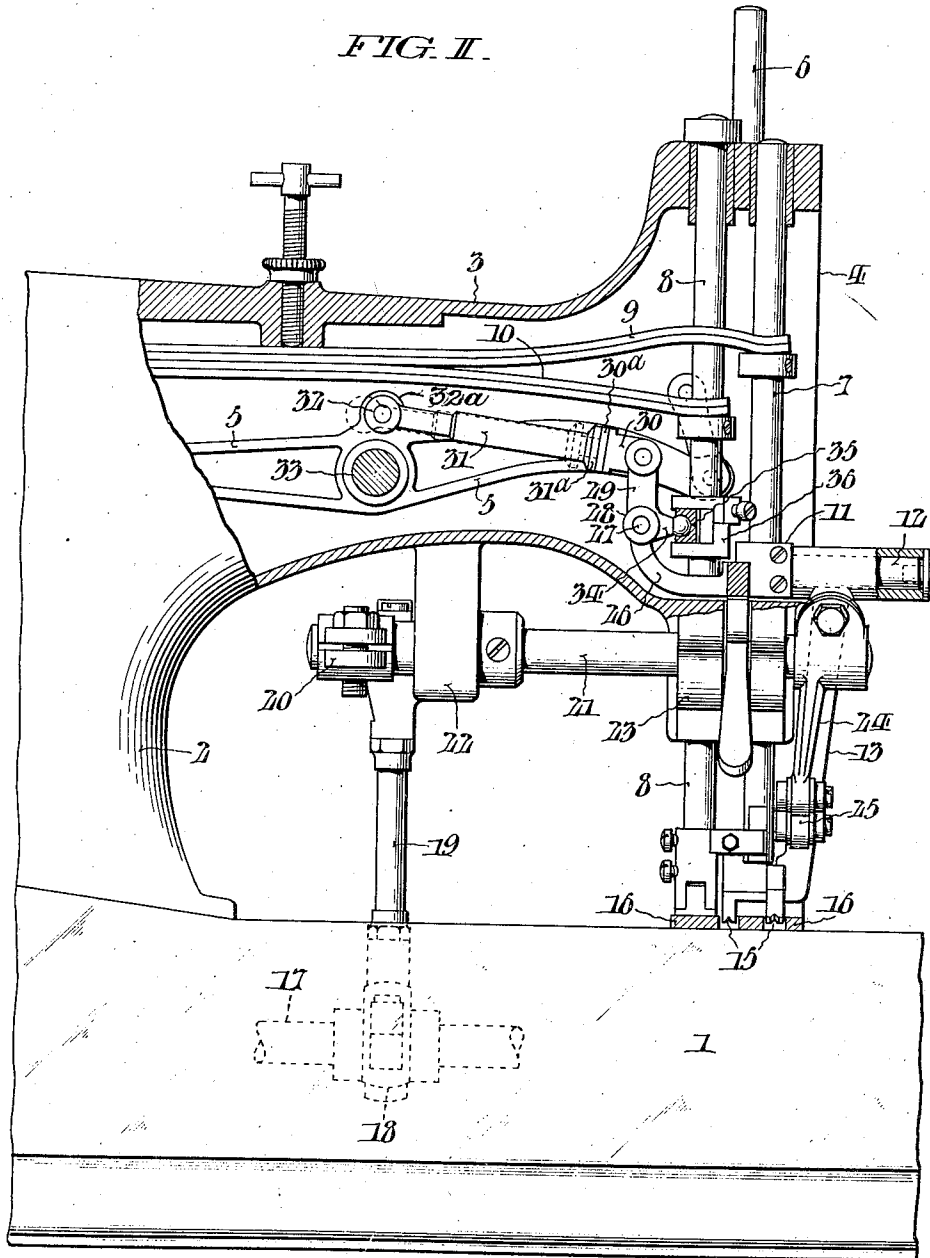
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2 Sheets-Sheet 2

FIG. II.



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UNITED STATES PATENT OFFICE

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FEEDING MECHANISM FOR SEWING MACHINES

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9 Claims. (Cl. 112—207)

This invention relates to feeding mechanism for sewing machines, particularly sewing machines adapted for seaming relatively heavy thick and stiff materials like duck fabric, leather, etc. Due to the hardness of such materials, difficulty is experienced in sewing them by reason of the inability of feeding mechanisms of ordinary construction to properly and uniformly advance them past the sewing needle or needles without crowding on the one hand and without slippage, as between the fabric layers when cross seams or other thickness irregularities are present in the materials.

The main object of my invention is to overcome the above drawbacks, which desiderata I attain in practice as hereinafter more fully disclosed through provision of a simple and reliable feed mechanism characterized by an oscillating toothed feed dog of comparatively large radius which is capable of use alone above the work support of the machine, or in conjunction with the ordinary forms of lower feed elements.

In connection with feeding mechanism having the above attributes, it is a further aim of my invention to provide for moving the oscillating feed dog out of contact with the material being sewed during its idle retractive strokes, through provision of means coordinated with the presser bar of the sewing machine and operated from the needle actuating means, without attendant lifting of the presser foot from the material and without attendant change in the operative relation between the dog and said presser foot as the latter rises and falls with passage of the fabric thickness variations beneath it.

Another object of my invention is to insure engagement of high and low portions of the fabric at the same time by both the feed dog and the presser foot for the purposes of positive feeding, which object is also attained as hereinafter set forth in fuller detail, by rounding the presser foot to correspond and coincide with the curvature of the feed dog.

Another object of my invention is to prevent, through provision of teeth on the throat plate of the machine to cooperate with the presser foot, retrogression of the fabric being sewed during the retractive strokes of the feed dog.

Other objects and advantages will appear from the following detailed description of the attached drawings, wherein Fig. I shows, in end elevation, a sewing machine conveniently embodying the feeding mechanism of my invention, portions of the machine being broken out and sectioned to

expose important parts which would otherwise be concealed.

Fig. II is a fragmentary view showing the sewing machine partly in side elevation and partly in longitudinal section.

The illustrated sewing machine has a hollow base 1 which serves as a work support, with a standard 2 at one end thereof sustaining an overhanging horizontal arm 3. Within the hollow of the arm 3 is a needle actuating arm 5; and confined to axial reciprocation in the head 4 of said arm is a vertical needle bar 6, a guide bar 7, and a presser bar 8, said guide and presser bars being yieldingly urged downward by regulatable leaf springs 9 and 10 respectively. Secured to the guide bar 7 within the hollow of the head 4 is a block 11 which supports an outwardly-extending fulcrum stud 12 for an arm 13 which carries the feed dog 15. As shown, the feed dog 15 is secured to the arm 13 by screws, and is curved substantially concentrically with the fulcrum stud 12. To the lower end of the presser bar 8 is secured a presser foot 16 which is also curved concentrically with the fulcrum 12 for the feed dog arm 13 in coincidence with the latter, and which, moreover, has laterally-spaced clearance openings for the toothed portions of the feed dog 15, see Fig. II. The main shaft of the machine is indicated at 17, the same being suitably journaled within the hollow of the base 1. The feed dog arm 13 is oscillated on its fulcrum 12 from an eccentric 18 on the main shaft 17 through intermediate connections including a vertical eccentric strap link 19 whereof the upper end is connected, with capacity for adjustment, to an arm 20 on a horizontal rock shaft 21. As shown this rock shaft 21 is journaled in bearings 22, 23 respectively afforded by the overhanging arm 3 and the head 4, see Fig. II. To the forward end of the rock shaft 21, immediately beyond the head 4 is secured a pendant arm 24 which is connected to the arm 13 of the feed dog 15 by a link 25.

During the operation of the machine, the arm 13 and the feed dog 15 are elevated while the needle of the machine passes through the material being sewed. Such movement of the feed dog results as a consequence of the following provisions: Extending rearwardly and upwardly from the block 11 on the guide bar 7 is an arm 26 which supports a pivot 27 for a bell crank 28 whereof the upward arm 29 is coupled to the needle bar lever 5 by means of a member in the form of a multi-partite link having capacity for permitting lost motion. As shown, this link com-

prises two telescoping components 30 and 31 whereof the first is pivotally connected to the arm 29 of the bell crank 28, while the component 31 is pivotally connected at 32 to a lug 32a on the needle actuating arm 5 at a distance above the fulcrum 33 of said needle actuating arm. Also, as shown, the horizontal arm 34 of the bell crank 28 has a spherical or ball end which engages a socket member 35 in a block 36 adjustably secured to the presser bar 8. see Fig. II.

The throat plate of the machine is indicated at 38, the same being longitudinally slotted for protrusion of the toothed portions of the usual lower feed dog 39, which, through suitable mechanism not illustrated, derives its movements from the main shaft 17 of the machine within the base 1. In order to be able to withstand the rather heavy pressure imposed upon it from above by the feed dog 15 and the presser foot 16, the throat plate 38 is given additional support in accordance with my invention at an intermediate point by an integrally formed strut 40 which bears on a fixed part within the hollow of the base 1 of the machine. Also, in accordance with my invention, the throat plate 38 is provided with teeth 38a, which, in cooperation with the presser foot 16 will effectively hold the material being sewed against retrogression during the idle retractive strokes of the upper and lower feed dogs, 15 and 39.

The operation of the feeding mechanism is as follows:

Upon initiation of clockwise movement of the needle actuating arm 5 in Fig. II about its fulcrum 33 and attendant downward movement of the needle 37, the guide bar 7 is lifted in opposition to the spring 9 and the feed dog 15 bodily raised with it. Upon clearing the material being sewed, the feed dog 15 is swung anti-clockwise through an idle retractive stroke as a consequence of movement imparted to the rock shaft 21 from the eccentric 18 on the main shaft 17 in the base 1 of the sewing machine. Such raising of the feed dog 15 is accomplished as a result of coaction between the head 31a on the link component 31 and the shoulder 30a of the link component 30, with attendant impartation of clockwise movement of the bell crank 28 about its connection 34 with the block 35 on the presser bar 8. This action takes place without in any way affecting the presser bar, so that the presser foot 16 is maintained in firm contact with the material by action of the spring 10. With initiation of the subsequent return movement of the arm 5 and elevation of the needle 37, the feed dog 15 is permitted to descend into engagement with the fabric as a result of anti-clockwise movement of the bell crank 28, with attendant leftward movement of the link 30, 31 in Fig. II. Upon re-engagement of the dog 15 with the material being sewed, it is moved through an active or feed stroke by the eccentric 18, and in cooperation with the usual feed dog 39, advances the material on the work support 1 relative to the needle 37. In this connection it is to be particularly noted that the head 31a of the link component 31 moves away from the shoulder 30a of the link component 30, as shown in dotted lines in Fig. II, immediately after the feed dog 15 has contacted with the fabric, so that during continued raising of the needle 37 as the arm 5 completes its anti-clockwise movement about its fulcrum 33, no movement is imparted to the presser bar 8. Accordingly here, as before, the presser foot 16 is maintained in firm contact with the material

under the pressure of the spring 10. It will thus be seen that the action of the feed dog 15 is entirely independent of the presser foot 16. However, when the presser bar 8 rises and falls as thickness variations such as folds or cross seams in the material pass beneath the presser foot 16, the feed dog 15 is obliged to rise and fall with the presser foot by reason of connection of the guide bar 7 with the presser bar 8 through the bell crank 28 and the arm 26 of the block 11. It therefore follows that a constant operative relation is maintained between the feed dog 15 and the presser foot 16 with the result that the action of the dog is positive under all conditions. Due to the fact that the curvature of the feed dog 15 and the presser foot 16 is relatively large, the angle intervening these elements and the top of the throat plate 38 is correspondingly small. This is of advantage in that it insures engagement of both low and high portions of the fabric at the same time by both the feed dog 15 and the presser foot 16 with avoidance of slippage between superposed fabric layers, or crowding of the material in advance of cross seams.

It is, of course, understood that the usual lower feed dog 39 is operated in synchronism with the movements of the upper feed dog 15.

Having thus described my invention, I claim:

1. Feeding mechanism for sewing machines with a needle-actuating arm and a presser bar carrying a presser foot, comprising an oscillating feed dog; a spring-pressed guide bar supporting the fulcrum axis of the feed dog; means for actuating the feed dog including a rock shaft with an arm thereon, and a link coupling said arm with the feed dog; and means for moving the feed dog out of contact with the material being sewed during its idle retractive strokes without so moving the presser foot, including a bell crank fulcrumed on the guide bar and having one of its arms pivotally connected to the presser bar, and a member having capacity for lost motion, connecting the other arm of the bell crank with the needle actuating arm.

2. Feeding mechanism for sewing machines with a work support, a needle-actuating arm and a presser bar carrying a presser foot, comprising an oscillating feed dog operative above the work support; means for actuating the feed dog; and means for lifting the feed dog clear of the material being sewed during its idle retractive strokes without so moving the presser foot, including a spring pressed guide bar confined to vertical movement and supporting the fulcrum axis of the feed dog, a bell crank fulcrumed on the guide bar and having one of its arms pivotally connected to the presser bar, and multipartite links with capacity for lost motion connecting the other arm of the bell crank with the needle actuating arm.

3. Feeding mechanism for sewing machines with a work support, a needle-actuating arm and a presser bar, comprising an oscillating feed dog operative above the work support and curved concentrically with its fulcrum axis; means for actuating the feed dog; a presser foot associated with the presser bar and having a curvature coincident with that of the feed dog; and means for lifting the feed dog out of contact with the material being sewed during its idle retractive strokes without so moving the presser foot, including a spring-pressed guide bar confined to vertical movement and supporting the fulcrum axis of the feed dog, a bell crank fulcrumed on the guide bar and having one of its arms pivot-

ally connected to the presser bar, and a member with capacity for lost motion connecting the other arm of the bell crank with the needle actuating arm.

4. Feeding mechanism for a sewing machine having a needle actuating arm and a presser foot, said mechanism including a pivotally suspended lever arm, a feed dog at the lower end of the lever arm, a mounting for the pivot of the lever arm, actuating means for oscillating the lever arm, and means connected to the needle actuating arm for raising the pivot mounting to lift the feed dog out of contact with the material being sewed during the idle retractive strokes of said dog.

5. Feeding mechanism for a sewing machine having a needle actuating arm and a presser foot, said mechanism including a pivotally suspended lever arm, a feed dog at the lower end of the lever arm, a mounting for the pivot of the lever arm, actuating means for oscillating the lever arm connected thereto at a point adjacent the feed dog, and means connected to the needle actuating arm for raising the pivot mounting to lift the feed dog out of contact with the material being sewed during the idle retractive strokes of said dog.

6. Feeding mechanism for sewing machines having a needle actuating arm, and a presser bar with a foot for engaging the work from above, said mechanism comprising a pivotally suspended lever arm, a feed dog at the lower end of the lever arm, a mounting carrying the pivot of the lever arm, means for oscillating the lever arm; and means connected to the presser bar and actuated from the needle actuating arm for raising the pivot mounting to lift the feed dog out of contact with the work being sewed during the idle retractive strokes of said dog without attendant lifting of the presser bar and foot.

7. Feeding mechanism for sewing machines having a needle actuating arm and a presser bar, said mechanism including a pivotally suspended

lever arm, a feed dog at the lower end of said lever arm curved concentrically with the lever arm pivot, a presser foot carried by the presser bar and having a curvature coincident with that of the feed dog, a separate mounting carrying the pivot for the lever arm, actuating means for oscillating the lever arm, and means connected to the presser bar and actuated by the needle actuating arm for raising the pivot mounting to lift the feed dog out of contact with the material being sewed during the idle retractive strokes of said dog without causing corresponding movement of the presser bar and foot.

8. Feeding mechanism for sewing machines having a needle actuating arm, and a presser bar with a foot for engaging the work from above, said mechanism including a pivotally suspended lever arm, a feed dog at the lower end of the arm, a mounting carrying the pivot for the arm, actuating means for oscillating the arm, means connected to the presser bar and actuated from the needle actuating arm whereby the feed dog is lifted with the presser foot as the latter responds to the passage of material thickness variations during the feed strokes of the dog, and whereby said dog is lifted clear of the material without attendant lifting of the presser foot.

9. Feeding mechanism for sewing machines having a needle actuating arm, and a presser bar with a presser foot, said mechanism including a pivotally suspended lever arm, a mounting carrying the pivot for the lever arm, a feed dog at the lower end of the lever arm, actuating means for oscillating the lever arm, and means including a member having capacity for lost motion, operated from the needle actuating arm and connected to the presser bar, for raising the pivot mounting to lift the feed dog out of contact with the material being sewed during its idle retractive strokes without affecting the presser bar and foot.

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