

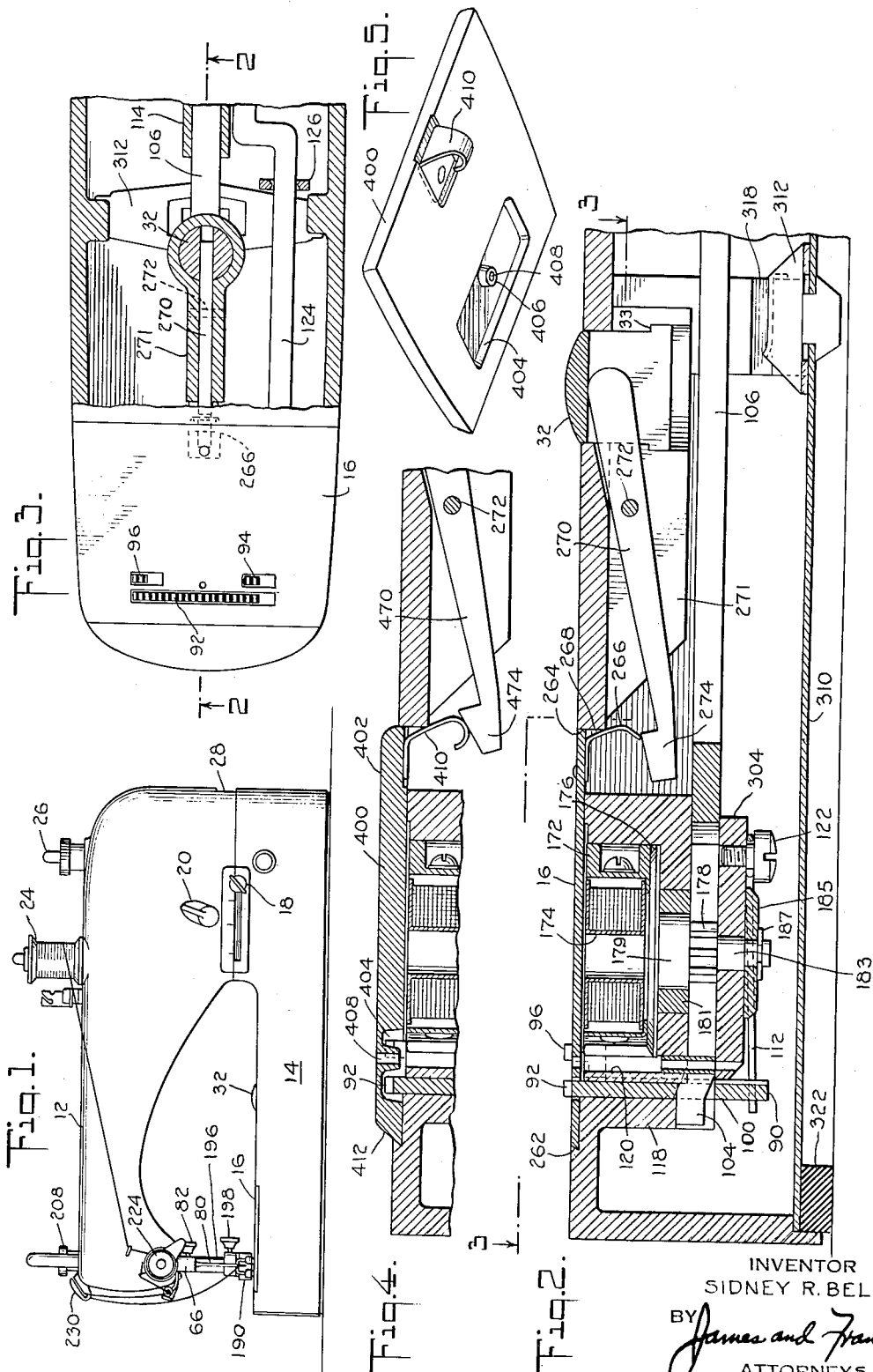
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SEWING MACHINE

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SEWING MACHINE

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7 Claims. (Cl. 112—260)

This invention relates to sewing machines, and more particularly to a miniature, light-weight, electrically driven sewing machine.

The primary object of my invention is to generally improve sewing machines, especially small, light-weight sewing machines intended to be readily portable.

Another feature and object of the invention is to improve the needle plate, and more especially the means for releasing the same.

Still another object of the invention is to provide an accessory needle plate which may be substituted for the regular needle plate to make the feed dog inoperative when desired.

Many features of the present sewing machine are not claimed herein but are claimed in my copending application Serial No. 85,191, filed April 2, 1949, or in divisional or continuation-in-part applications thereof. Division of said parent application Serial No. 85,191 was required, and the present application is a continuation-in-part of one of the divided portions of said parent application.

To accomplish the foregoing general objects, and other more specific objects which will hereinafter appear, my invention resides in the sewing machine elements and their relation one to another as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

Fig. 1 is a side elevation of a sewing machine embodying features of my invention;

Fig. 2 is a vertical section drawn to enlarged scale and taken through the forward part of the bed of the machine. The section is taken substantially in the plane of the line 2—2 of Fig. 3;

Fig. 3 is a partially sectioned plan view of the bed of the machine drawn to intermediate scale, the section being taken approximately in the plane of the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary section similar to the upper part of Fig. 2 but showing an accessory needle plate; and

Fig. 5 is a perspective view of the accessory needle plate.

Referring to the drawing, the sewing machine is shown in Fig. 1, it comprising an arm 12 overhanging a bed 14. The bed houses work feed and shuttle mechanism covered by a removable plate 16. The stitch length may be controlled by an adjustment indicated at 18. The direction of work feed may be reversed by a control indicated at 20. A bobbin from the shuttle may be rewound with thread from a spool 24 by means of a shaft end projecting at 26. The machine is electrically driven, connection being made at 28 by means of a suitable plug, not shown, the connection preferably including a suitable speed control rheostat, not shown, arranged to be operated by either the knee or the foot, as shown in my Patent No. 2,561,556 granted July 24, 1951.

The sewing machine head is preferably arranged to be carried in a small carrying case, not shown in the present drawings, but illustrated and described in my copending application, Serial No. 40,917, filed July 27, 1948, now

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Patent No. 2,677,341, dated May 4, 1954. The sewing machine is readily portable and very thin in dimension. To increase the work table area and to steady the machine, as described in said copending application, it is received in a mating opening in the case, which opening closely surrounds and comes flush with the top of the bed 14. To facilitate release of the then-surrounded needle plate 16, a pushbutton 32 is provided.

For the most part the sewing machine details are not described herein, being described in my aforesaid copending application Serial No. 85,191. The description there includes the main drive; the work feed mechanism; the stitch length control mechanism centering about the adjustment 18; the reverse feed mechanism centering about the control knob 20; the shuttle, the shuttle carrier and drive mechanism, and the relation between the shuttle and the needle 80 secured to reciprocable needle bar 66 by means of a thumbscrew 82; the thread tension mechanism centering about the parts 224 and 230; the bobbin wind mechanism utilizing the upper end of the motor shaft shown at 26; and the lamp and other miscellaneous details of the sewing machine.

The work feed mechanism comprises a vertical feed plate having a serrated upper edge 92. This plate is slidably held by appropriate guide walls in the bed of the machine. These serve to hold the plate in erect position while affording horizontal and vertical movement. The plate is provided with a vertical slot and a horizontal slot. The former permits vertical movement of the plate while receiving a feed means for producing horizontal movement of the plate. The horizontal slot 100 permits horizontal movement of the plate, while receiving a means 104 for producing vertical movement of the plate. By suitable timing the plate is given a four-way feed movement.

The means 104 is essentially a cam formed at the end of a bar 106 which is longitudinally reciprocated by mechanism at its opposite end, not shown. The cam-shaped end 104 of the bar 106 is preferably so wide as to support the plate 90 with its upper edge 92 in substantially horizontal position. The slot 100 is even longer in a horizontal direction than the width of the bar, in order not to interfere with horizontal movement of the plate. The plate is normally urged downward by means of a generally U-shaped spring wire 112.

Referring now to Fig. 3 it will be seen how the reciprocable bar 106 is guided for longitudinal movement by appropriate bearing surfaces 114, the end portions 104 also being guided between suitable ways. Fig. 2 also shows how the feed plate 90 is supported between stationary guide walls 118 and 120, and how the spring 112 is secured in position by means of a screw 122.

Reverting now to Fig. 3 the horizontal movement of the feed dog is produced by the forward end of a lever 124 fulcrumed at 126. The rear end of said lever is operated by mechanism not shown.

Referring to Fig. 2, the shuttle 172 is of the oscillating hook type. It receives a conventional bobbin of thread, indicated at 174. The shuttle rests on and is turned by a shuttle carrier 176, the latter being oscillated by a pinion 178. The shuttle carrier 176 is for the most part a flat disc which underlies the shuttle, but at one point on its periphery is provided with an upstanding wall received in a mating notch, thus causing the shuttle to rotate with the carrier. However, the shuttle lies loosely on top of the carrier so that a loop of thread from the needle can pass bodily around the shuttle.

The shuttle is oscillated over an angle somewhat more than half a revolution. To provide this oscillation the pinion 178 meshes with a gear rack, not shown. The gear rack in this case is formed on the longitudinally reciprocable cam bar 106 previously described. More

specifically, the end of the cam bar is bifurcated, and the furcations straddle the pinion. The inside edge of one of the furcations is toothed to form the rack. The ends of the furcations are bent upwardly to provide the cams 104 which actuate the feed plate vertically.

Referring to Fig. 1 of the drawing, a presser foot 190 cooperates with the serrated edge of the feed plate. The presser foot is pivoted on a bracket, secured to rod 196 by means of a thumbscrew 198. The rod 196 is urged downwardly by a compression spring, the tension of which may be adjusted by means of a threaded bushing 208.

To remove the bobbin from the shuttle it is necessary to remove the needle plate 16. This operation is facilitated by the provision of the button 32 previously referred to in connection with Fig. 1. Referring now to Fig. 2 of the drawing, it will be seen that the outer edge 262 of the needle plate is undercut, while the inner edge 264 is not. However, the inner edge is provided with a bent leaf spring 266 so shaped as to lock beneath the edge 268 of the opening in the top of the bed of the machine. The button 32 is vertically slotted and receives one end of a lever 270 pivoted at 272. The integrally cast bearing walls for the button 32, and for the lever 270, are clearly shown in section in Fig. 3. The button is retained by a shoulder 33 (Fig. 2). The opposite end 274 of the lever bears against the free end of spring 266. The parts are so shaped that upward pressure at 274 tends to cam the spring toward the left or releasing position, and at the same time pushes the spring upwardly, thereby raising the needle plate about the opposite or undercut edge 262. Thus by pressing button 32 downwardly the needle plate is raised, and it then remains raised because of spring 266 which expands above the bed. The plate is then readily picked up and removed.

This exposes the shuttle and the bobbin, the latter being readily raised upward out of the shuttle for re-winding. The bobbin is removed and placed on the upper end 26 (Fig. 1) of the motor shaft. This end is so dimensioned and shaped as to frictionally receive the bobbin.

The entire bottom area of the bed is closed by means of a plate 310, which may be stamped out of sheet metal. This plate is fitted within the peripheral edge of the bed. The plate is anchored in position by means of a rotatable spring lock 312. The upwardly bowed ends of the spring 312 are received in mating slots 318 shown in Fig. 2.

The bottom of plate 310 is provided at its peripheral edge with a soft rubber strip 322 having a thickness greater than the rabbet into which the bottom is received. This rubber strip has a vibration absorbing and sound deadening effect. It also prevents marring of furniture should the machine be placed directly on a table top or the like, instead of in the carrying case. When so used, it further prevents movement or sliding of the machine.

Referring to Figs. 2 and 3, the bearing walls 114 for rack bar 106 are molded integrally with the bed. The same applies to the bearing walls 271 of the lever 270, and the guide for button 32. At the shuttle the bed is molded with a circular well which holds the shuttle in alignment with the shuttle carrier. The shuttle carrier is inserted in position from above, the pinion 178 (Fig. 2) being smaller in diameter than the journal 179. The bearing 181 of journal 179 is preferably an Oilite or other suitable bearing. The small diameter journal 183 beneath pinion 178 is received in a plate 304. Here too an Oilite bearing is preferably employed, though not shown. The stepped diameters 179, 178, 183 make for ease of removal, for service, cleaning, etc. The carrier is held in position by means of a large bearing washer 185 and a split spring washer 187.

A modified form of needle plate is shown in Figs. 4

and 5 of the drawing. This is an accessory needle plate which may be used in place of the regular needle plate to make the feed dog inoperative. For this purpose the accessory needle plate 400 is made of exaggerated thickness such as to bring its top surface 402 at a level higher than the maximum rise of the serrations or teeth 92 of the feed dog. The bottom of the feed plate is hollowed or cut away as is best shown at 404 in Fig. 5. It is cut away to such height as to clear the feed dog, leaving a thinned wall on which the fabric being sewn can rest and over which it may readily be slid while darning or performing any other operation in which automatic feed by the feed dog is not wanted.

Although not essential, I prefer to leave a small tubular boss of material indicated at 406 and surrounding the needle hole 408. The location and dimension of this boss is such that it does not interfere with the normal motion of the feed dog. The area cut away at 404 (Fig. 5) is adequate so that there is no interference with the horizontal movement as well as the vertical movement of the feed dog. The plate may be molded to final configuration out of a suitable molding plastic.

The plate 400 is preferably provided with a steel spring 410 corresponding in function to the spring 266 previously described. As before, the plate may be inserted in position by first placing the beveled edge 412 in the mating undercut in the machine bed, and then pressing the plate downward so that the spring first yields inward and then snaps outward to the position shown in Fig. 4. To release the spring the pushbutton 32 is depressed, thereby raising the working end 474 of the lever 470. The spring 410 differs somewhat in shape from the spring 266 previously described, but it functions in the same manner, that is, when the button is pressed there is a sideward component to release the spring as well as an upward component to lift the plate.

It is believed that the construction, operation, and method of use, as well as the advantages of my improved needle plate mechanism, will be apparent from the foregoing detailed description. It will also be apparent that while I have shown and described the invention in several forms, changes may be made in the structures disclosed without departing from the scope of the invention, as sought to be defined in the following claims.

I claim:

1. In a sewing machine, a machine bed having a top wall which is open in the region of the needle, a needle plate for closing the open part of the top wall, said bed having ledges to support the needle plate against downward movement, one edge of said needle plate and an edge of the bed opening being matingly undercut to hold the needle plate in position against upward movement, the opposite edge of the needle plate being provided with a bent leaf spring secured beneath the needle plate and shaped and dimensioned to snap past the adjacent edge of the opening to hold the needle plate in position, and manually operable means mounted on the machine bed and operable for upwardly ejecting the needle plate.

2. In a sewing machine, a machine bed having a top wall which is open in the region of the needle, a needle plate removably mounted on the bed of the machine for closing the open part of the top wall, said bed having ledges to support the needle plate against downward movement, one edge of said needle plate and an edge of the bed opening being matingly undercut to hold the needle plate in position against upward movement, the opposite edge of the needle plate being provided with a bent leaf spring shaped and dimensioned to snap past the adjacent edge of the opening to hold the needle plate in position, and means including a pushbutton projecting from the bed and a lever operated thereby and housed within the bed for bearing against the spring, said spring and said lever at their surfaces of contact being so relatively shaped that the pressure of the lever on the spring has a sideward com-

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ponent to release the spring and an upward component to lift the needle plate from the bed.

3. In a sewing machine, a bed, an accessory needle plate removably mounted on the bed of the machine, said bed having ledges to support the needle plate against downward movement, one edge of said needle plate having means to hold the same in position against upward movement, the opposite edge being provided with a bent leaf spring secured beneath the needle plate and shaped to hold the same in position against upward movement, and means including a pushbutton and a lever operated thereby for bearing against the spring in such direction as to release the spring and eject the latter edge of the needle plate upwardly, said accessory needle plate having an exaggerated thickness sufficient to bring its top surface higher than the rise of the feed dog during normal work feed operation, and said needle plate being cut away over the feed dog to provide clearance for motion of the feed dog without contact between the feed dog and the work.

4. In a sewing machine, a bed, a needle plate, said bed having ledges to support the needle plate against downward movement, one edge of said needle plate having means to hold the same in position against upward movement, the opposite edge being provided with a bent leaf spring secured beneath the needle plate and shaped so that a part comes yieldably beneath the bed to hold the needle plate yieldably in position against upward movement, and manually operable means for forcibly upwardly ejecting the needle plate against the resistance of the spring.

5. In a sewing machine, a bed, and a needle plate removably mounted on the bed of the machine, said bed having ledges to support the needle plate against downward movement, one edge of said needle plate having means to hold the same in position against upward movement, the opposite edge being provided with a bent leaf spring secured beneath the needle plate and shaped so that a part comes yieldably beneath the bed to hold the needle plate yieldably in position against upward movement, and means including a pushbutton and a lever operated thereby for bearing against the spring in such direction as to release the spring and eject it with the needle plate upwardly.

6. In a sewing machine, a machine bed having a top wall which is open in the region of the needle, a needle plate assembly including a needle plate and a detent spring, said needle plate being removably mounted on the bed of

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the machine for closing the open part of the top wall, said bed having ledges to support the needle plate against downward movement, one edge of said needle plate and an edge of the bed opening being matingly undercut to hold the needle plate in position against upward movement, the opposite edge of the needle plate being provided with the aforesaid detent spring, said spring being a bent leaf spring secured beneath the needle plate and shaped and dimensioned to snap past the adjacent edge of the opening to hold the needle plate in position, and means including a pushbutton projecting from the bed and a lever operated thereby and housed within the bed for bearing upwardly against the needle plate assembly in order to eject the same upwardly.

7. In a sewing machine, a machine bed having a top wall which is open in the region of the needle, an accessory needle plate assembly including an accessory needle plate and a detent spring, said plate being removably mounted on the bed of the machine for closing the open part of the top wall, said bed having ledges to support the plate against downward movement, one edge of said plate and an edge of the bed opening being matingly undercut to hold the plate in position against upward movement, the opposite edge of the plate being provided with the aforesaid detent spring, said spring being a bent leaf spring secured beneath the plate and shaped and dimensioned to snap past the adjacent edge of the opening to hold the plate in position, and means including a pushbutton projecting from the bed and a lever operated thereby and housed within the bed for bearing upwardly against the plate assembly in order to eject the same upwardly, said plate having an exaggerated thickness sufficient to bring its top surface higher than the rise of the feed dog during normal work feed operation, and the bottom of said plate being cut away over the feed dog to provide clearance for motion of the feed dog, the top of said plate preventing contact between the feed dog and the work, and said plate thereby acting as the equivalent of mechanism to make the feed dog inoperative.

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