# United States Patent [19]

**Kato**

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[45] **July 17, 1973**


[54] **PORTABLE ELECTRIC SEWING MACHINE**


[76] Inventor: **Tamotsu Kato,** 856 Ooto, Yono-shi, Saitama-ken, Yono, Japan



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[21] Appl. No.: **234,920**

[30] **Foreign Application Priority Data**

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Oct. 29, 1971 Japan ..... 46/100602

[52] **U.S. Cl.** ..... **112/169**
[51] **Int. Cl.** ..... **D05b 1/00**
[58] **Field of Search** ..... 112/169, 80, 215, 112/216, 221; 223/102, 104



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*Primary Examiner*—James R. Boler
*Attorney*—Eliot S. Gerber



[57] **ABSTRACT**

A portable electric sewing machine is provided which comprises an elongated casing containing therein an electric motor and its driving power source. The rotary power of the motor is converted through a sewing needle operating mechanism to up-down reciprocal movement of a sewing needle and is transmitted through a cam assembly to a toothed member and a swing member to move them in snychronization with the needle operating mechanism.


**3 Claims, 8 Drawing Figures**

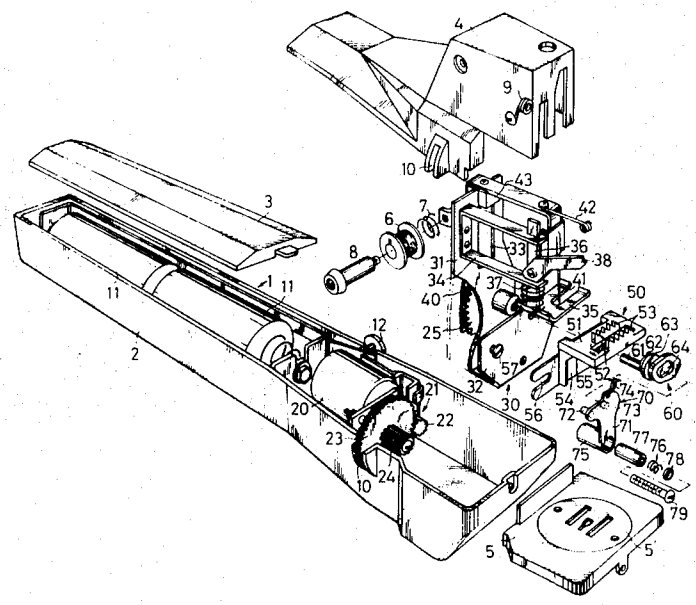


FIG. 1

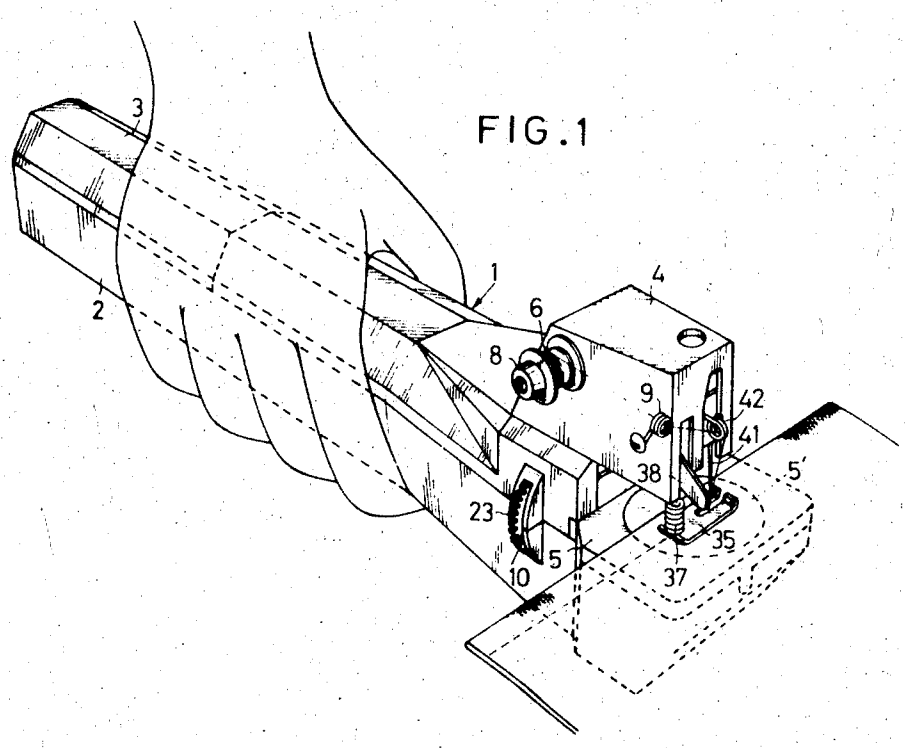



FIG. 3(a)

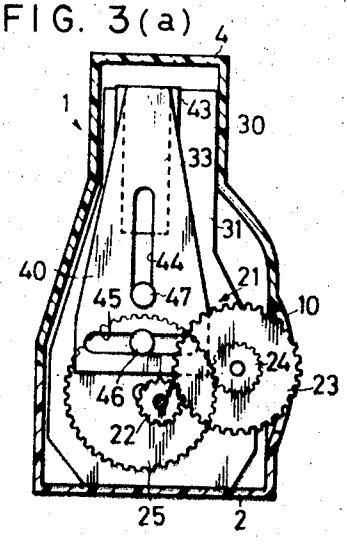



FIG. 3(b)

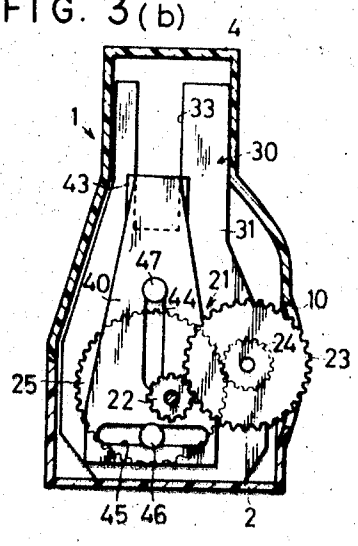


FIG. 2

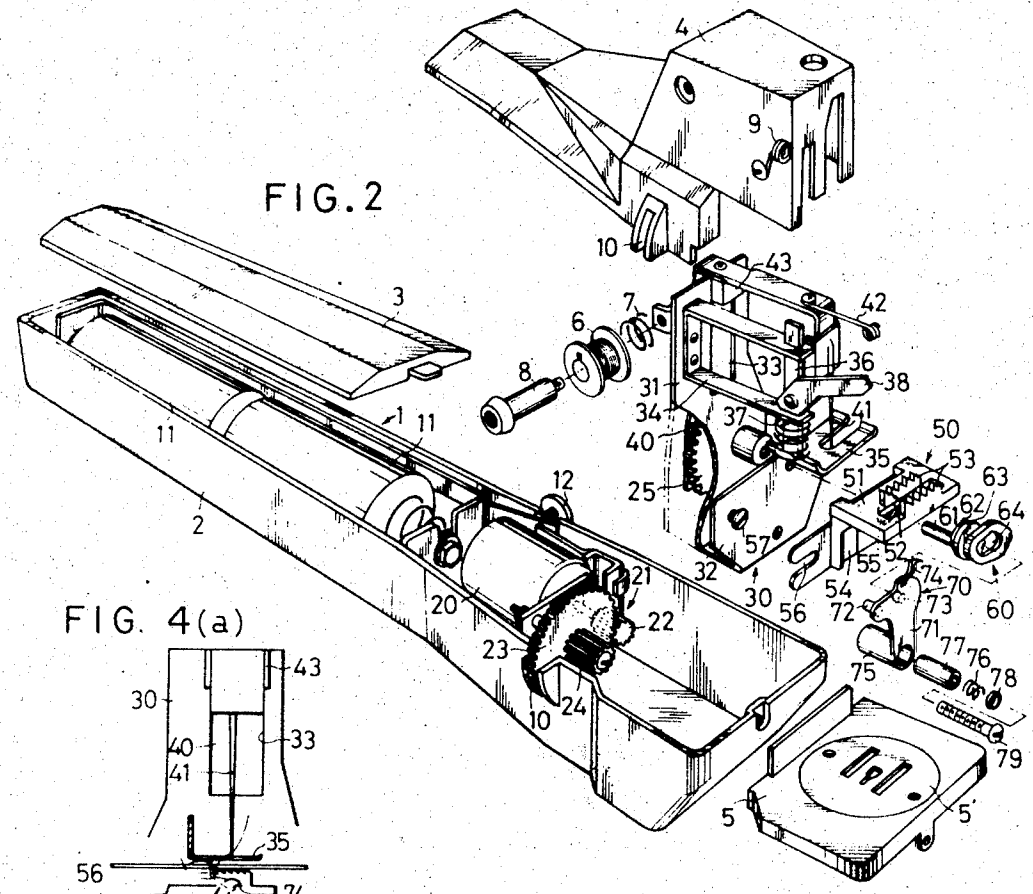



FIG. 4(a)




FIG. 4(b)

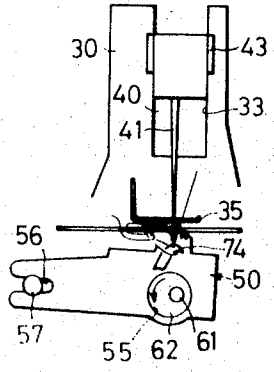



FIG. 4(c)

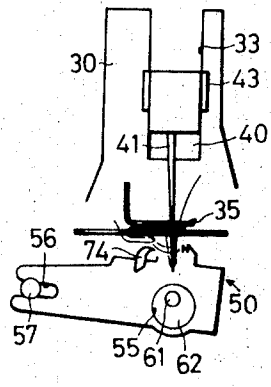
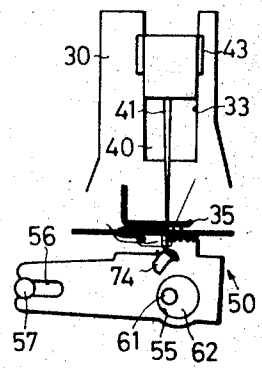



FIG. 4(d)



# PORTABLE ELECTRIC SEWING MACHINE

This invention relates to a portable electric sewing machine which can be held and operated with one hand for practising desired sewing in whatever direction one wants.

It would be of great convenience and phenomenally widen the scope of use of the sewing machine if there be available a portable sewing machine which can be held and used with one hand for performing sewing operation in any direction and at any place even overhead the user. Such sewing machine, however, is required to be light in weight and easy to handle, and it is also an essential requirement that the slight movement of the needle for passing a thread through the needle hole or for cutting the thread passed through the needle hole should be performed with the user's hand that is holding the machine.

In view of the above, it is an object of the present invention to provide a portable electric sewing machine which is small and light enough to be held and operated with one hand and which is low in manufacturing cost with minimized number of parts.

It is another object of the present invention to provide a portable electric sewing machine of the type described, in which delicate adjustment of the needle position can be effected with a finger of the hand that is holding the machine.

The electric sewing machine according to the present invention has a casing forming an elongated grip or handle portion designed to allow easy grasping by a user's hand. An electric motor and a power source therefor are housed within said handle portion. There is also provided a gear train adapted to transmit the rotation of the motor, while reducing its velocity, to the moving mechanism of the sewing needle. One of the gears in said train has its external toothed periphery exposed partially to the outside from said casing. The user can turn this exposed toothed peripheral portion of said gear with a finger of his hand that is holding the casing, so as to make delicate adjustment of the movement of the needle hole.

A toothed member for feeding a cloth and a swing element having a hook for chain stitching, both of which must be moved in accurate synchronization with the needle moving mechanism, are actuated by rotation of a single cam assembly.

The other objects and features of the present invention will become more apparent upon a review of the following detailed description of a preferred embodiment of the invention when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of a portable electric sewing machine according to the present invention as it is in use;

FIG. 2 is an exploded view, in perspective, of the electric sewing machine shown in FIG. 1;

FIGS. 3(*a*) and 3(*b*) are sectional views showing the operative positions of the internal mechanism when the crank is at its uppermost position and at its lowermost position, respectively; and

FIGS. 4(*a*), 4(*b*), 4(*c*) and 4(*d*) are illustrations showing a process of chain stitching as performed with the electric sewing machine of the present invention.

Referring first to FIG. 1 of the drawings, there is shown a general view of an electric sewing machine according to the present invention as it is grasped with the right hand of a user and which is in use to perform an ordinary sewing operation. The casing 1 of the machine is made of synthetic resin and comprises a bottom member 2 constituting a part of the elongated grip or handle portion, with a head portion integrally attached thereto, a rear cover member 3 detachably secured to said bottom member 2, an upper box-like structure 4 secured to said bottom member 2, and a front cover member 5 having a sliding plate 5'.



At a side of the upper box-like structure 4 is provided a flanged bobbin 6 on which a sewing thread is wound up and of which one flange is pressed elastically by a spring 7 while the other flange abuts against a knob 8 so that the damping of the bobbin rotation can be freely controlled. When the bottom member 2 and the upper box-like structure 4 are assembled together, there is formed a vertical elongated slit 10 in a side wall.

As apparent from FIG. 2, a motor 20 and two dry cells 11, 11 are housed within the elongated handle portion constituted by the bottom member 2 and they are connected by an electric circuit which is closed when a push button 12 exposed outside of the casing 1 is pushed and opened when the push on said push button is released. There is also provided a gear train 21 consisting of a pinion 22 mounted on the output shaft of said motor 20, a gear 23 meshed with said pinion 22, a pinion 24 integral with said gear 23, and a gear 25 meshed with said pinion 24, said gear train being driven by said motor 20. Said gear 23 and pinion 24 may be pivotally mounted on a suitable plate secured to said motor 20 in such a manner that the gear 23 is partially projected outside of the casing 1 from the slit 10 (see FIG. 1).

The gear 25 is rotatably mounted on a frame member 30 secured to the bottom member 2. This frame member 30 is U-shaped and comprises a long vertical wall portion 31 and a short vertical wall portion 32, and a deep vertical recession 33 is formed in the upper part of said long vertical wall portion 31. Said frame member 30 is also provided with a U-shaped bar element 34 for supporting a presser foot 35, a vertical arm 36 formed integral with said presser foot 35, said vertical arm being vertically movably supported by said bar element 34, a compression spring 37 coiled around a part of said vertical arm 36 below said bar element 34, and an operative lever 38 pivotally secured to said vertical arm 36 for raising up the presser foot 35 against the force of said compression spring 37.

A crank 40, which is generally trapezoid shape as shown in FIG. 3, is adapted to allow vertical movement of a needle 41 with rotation of the gear 25. Said crank is provided at its upper part with a thread guide 42 and an H-shaped guide member 43 and is also provided at its central and lower parts with an elongated vertical slot 44 and an elongated horizontal slot 45, respectively. Said crank 40 is coupled to the gear 25 by means of a machine screw 46 fitted in said horizontal slot 45 and is also secured to the long vertical wall portion 31 of the frame member 30 by means of a machine screw 47 fitted in said vertical slot 44. The H-shaped guide member 43 is slidably fitted in the deep vertical recession 33. On the short wall portion 32 of said frame member 30 are mounted a toothed member 50, a cam assembly 60 and a swing member 70, which will be further described below.

The toothed member 50, which was shaped from a self-lubricant synthetic resin such as for example nylon, consists of a horizontal portion 51 in which feeding

teeth 53, 53 are formed at the opposed edges of an opening 52 and a vertical wall portion 54 in which a circular hole 55 and an elongated horizontal recession 56 are formed. This toothed member 50 is arranged such that a machine screw 57 threadedly fixed in the short vertical wall portion 32 of frame member 30 is fitted into the horizontal recession 56 in said toothed member 50 so that its vertical wall portion 54 is lightly held by the back side of the head of said machine screw 57, whereby said toothed member 50 is attached to said short vertical wall portion 32 of the frame member 30 so that the former is slidable on the latter.

The cam assembly 60 consists of a cam shaft 61, a first cam 62, a partition plate 63 and a second cam 64 and is arranged such that said cam shaft 61 extends through the short vertical wall portion 32 of the frame member 30 and is coupled to the shaft of said gear 25 (such coupling being not shown in the drawings). The first cam 62 is snugly fitted in the hole 55 in the toothed member 50 and the partition plate 63 is lightly pressed against the surface of the vertical wall 54 of said member 50, allowing the latter to stay slidable on the vertical wall 32 of the frame member 30.

Numeral 70 designates a swing member comprising an arm 71 provided with two lobes 72 and 73, a hook 74 provided at the top of said arm 71, and a cylindrical portion 75 extending from one side of the bottom end of said arm 71. Said lobes 72 and 73 are designed to abut against the outer periphery and the inner periphery, respectively, of the second cam 64 such that the latter is held between said two lobes. A threaded stem 79 mounted with a spring 76, a sleeve 77 and a washer 78 is passed through said cylindrical portion 75, with the end of said stem being threadedly secured to the frame member 30 so that said swing member 70 can swing about said stem 79.

Now, the operation and use of the present sewing machine are described. First, the thread wound on the bobbin 6 is drawn out therefrom and passed through the thread guides 9, 42 and then through the needle hole. The suitable positioning of the needle hole for facilitating the passage of the thread therethrough can be attained by turning with a finger the gear 23 which is partially extended out from the slit 10. Then the operating lever 38 is pressed down to hold an article to be sewn by the presser foot 35 and then the push button 12 is pushed to start rotation of the motor 20. The driving force is transmitted through the gear train 21 to the crank 40 and the cam assembly 60. As apparent from FIGS. 3(*a*) and 3(*b*), the crank 40 reciprocates along with rotation of the gear 25, causing the needle 41 to make repetitive up and down movements. At the same time, the first and second cams 62 and 64 are actuated to move the toothed member 50 and the swing member 70, respectively. The interrelation of the needle 41, toothed member 50 and swing member 70 will be apparent from FIGS. 4(*a*), 4(*b*), 4(*c*) and 4(*d*).

The hook 74, which has caught the thread and formed a loop thereof, moves to the right while the end of the needle 41, through which the thread has been passed, moves upwards away from the article to be sewn, during which period said article is advanced forwardly by the toothed member 50 (see FIG. 4(*a*)).

When the needle 41 is thrust through the cloth, the hook 74 begins to move to the left while the toothed member 50 separates from the article to be sewn (FIG. 4(*b*)). Then the needle end pierces through the thread loop formed by the hook 74 and said hook 74 moves to the left to leave the loop, while the toothed member 50 moves to the right below the article to be sewn. (FIG. 4(*c*)). Then the hook (74) again moves to the right and catches the thread which has just been passed through the end of the needle 41 which had pierced through the loop, and forms a new loop, while at the same time the needle 41 retracts upwardly (FIG. 4(*d*)), thus restoring the initial condition shown in FIG. 4(*a*). The above operation is repeated to accomplish the chain stitching with a single thread.

The thread is guided by the thread guide 42 which is moved up and down along with the needle 41, and a suitable tension is constantly given to said thread by the elastic action of the spring 7 which is elastically pressed by the bobbin 6.

What is claimed is:

1. A portable electric sewing machine comprising in combination:
   - a casing having an elongated handle portion housing an electric motor and its driving power source, and a head portion contiguous to said handle portion and provided with a sliding plate, said casing containing a vertical fixed wall below said sliding plate;
   - a sewing needle operating mechanism driven by said electric motor to let the sewing needle reciprocate in the direction perpendicular to said sliding plate;
   - a cam assembly consisting of a first and a second cam which are formed integral with each other and arranged rotatable in response to said sewing needle operating mechanism;
   - a toothed member having a face formed with an elongated recession designed to receive therein a protuberance on sai vertical fixed wall and a hole designed to said therein said first cam, and a face in which teeth are formed, said both faces meeting at right angles to each other;
   - a swing member provided with a hook, said member being pivotally mounted on said vertical fixed wall to be swung by said second cam; and
   - a presser foot mechanism for elastically pressing an article to be sewn on said sliding plate.

2. A portable electric sewing machine according to claim 1, in which said sewing needle operating mechanism comprises a gear train including a gear of which the toothed periphery is partially exposed to the outside from a vertical slit formed in the casing.

3. A portable electric sewing machine according to claim 1, in which said toothed member is formed of self-lubricant synthetic resin.

* * * * *

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# UNITED STATES PATENT OFFICE
# CERTIFICATE OF CORRECTION

Patent No. 3,745,950 Dated July 17, 1973

Inventor(s) Tamotsu Kato

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 42, "sai" changed to --said--;

Column 4, line 43, "said" (first occurrence) changed to --receive--

Signed and sealed this 20th day of November 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents