July 4, 1933. R. K. HOHMANN 1,916,860

SEWING MACHINE

Filed Dec. 24, 1927 2 Sheets-Sheet 1

Fig. 1

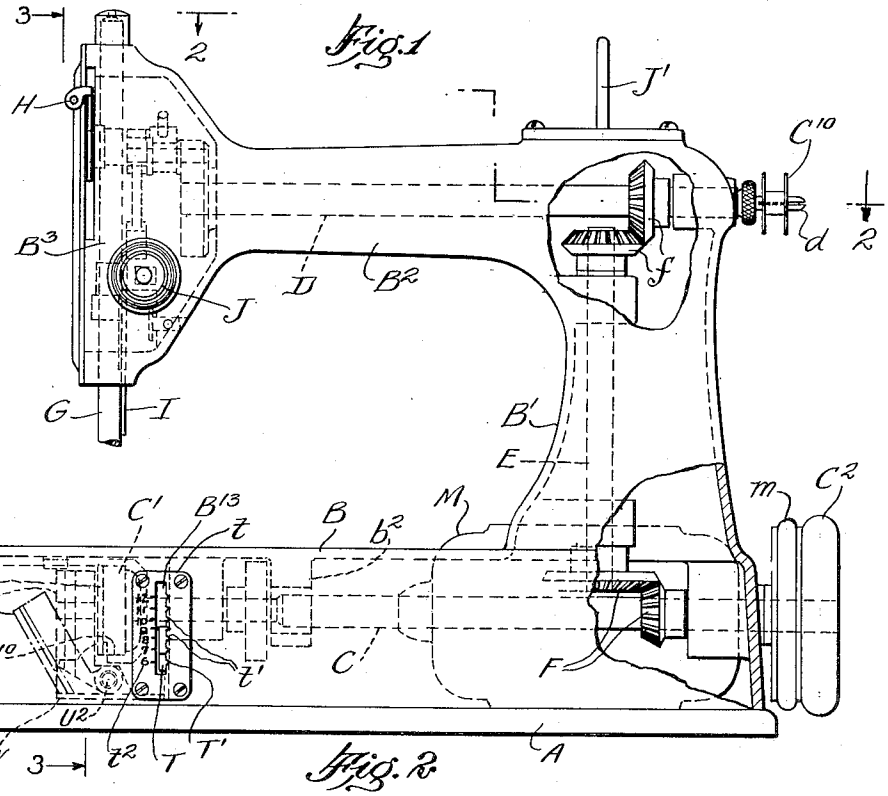
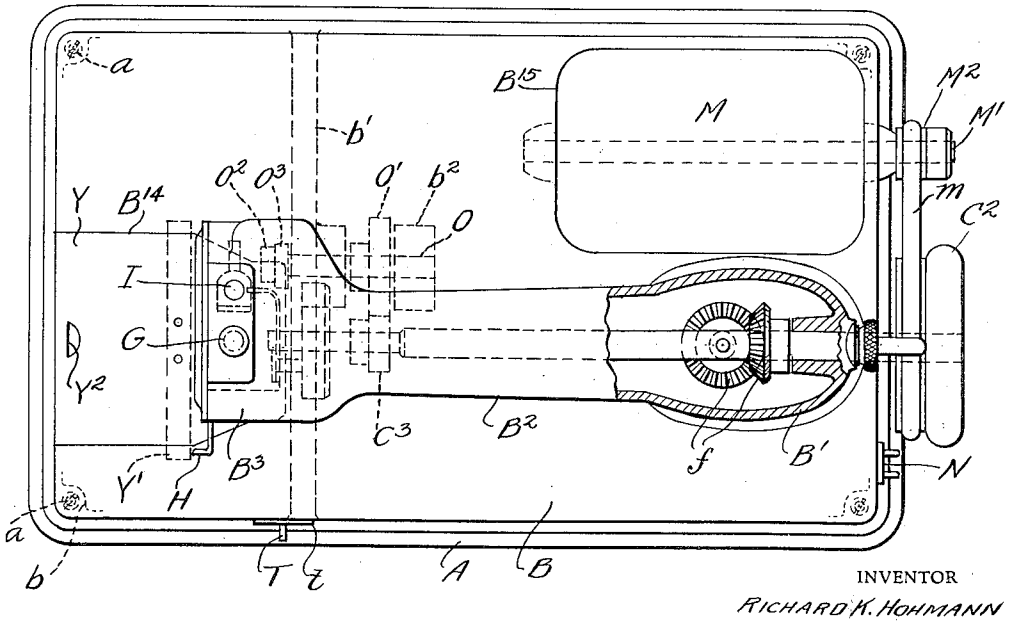


Fig. 2



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Fig. 6.

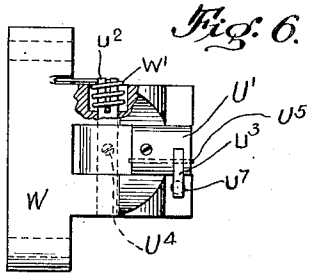


Fig. 3.

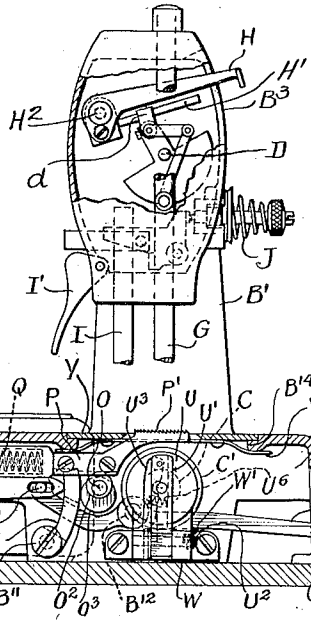


Fig. 7.

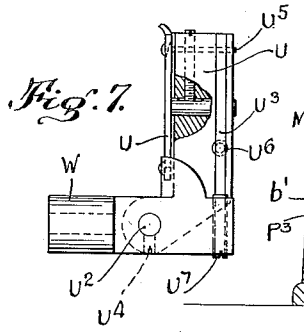


Fig. 4

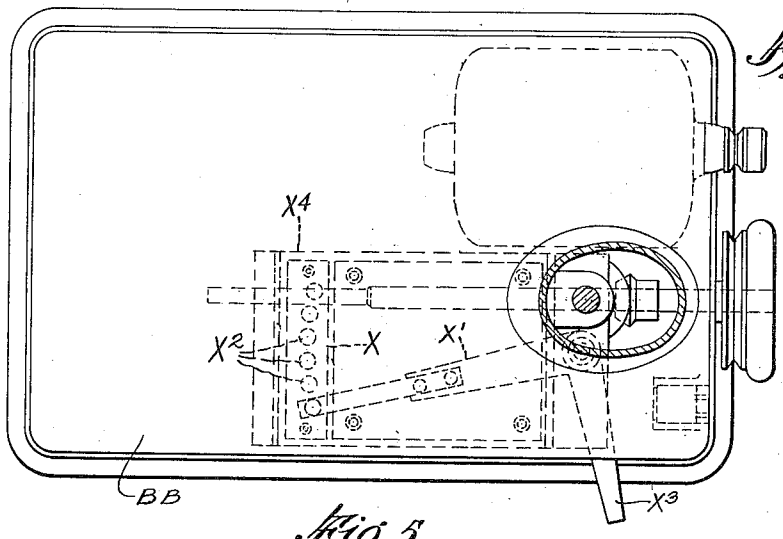
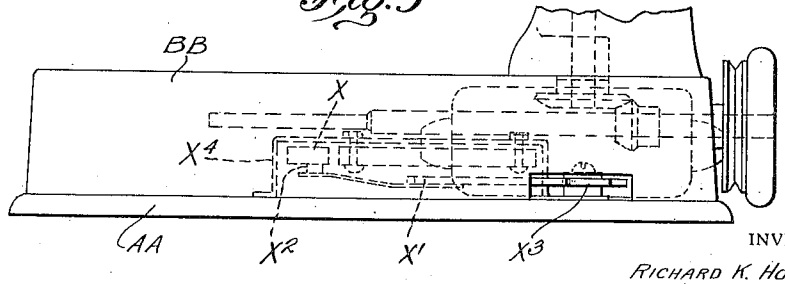


Fig. 5



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Patented July 4, 1933

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UNITED STATES PATENT OFFICE

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SEWING MACHINE

Application filed December 24, 1927. Serial No. 242,368.

The general object of the present invention is to provide an improved portable motor driven sewing machine primarily adapted for domestic use, and characterized by its compactness, small weight, and good operating characteristics. More specifically, the object of the invention is to provide a portable sewing machine which in respect to its operating capacity, reliability, and durability is substantially as good as, or better than the best motor driven domestic sewing machines in general use, and which because of its construction and arrangement, may be made more compact, substantially lighter in weight, and inherently less expensive to manufacture than any sewing machine heretofore made having as good or approximately as good operating characteristics and of like capacity.

My improved sewing machine comprises a frame casting having standard, arm and head portions which may be of any usual or suitable form, and a bed portion which differs from the bed portion of an ordinary sewing machine in that it is of inverted pan or box form. The space thus provided in the bed not only receives the rotating hook and hook shaft or like underwork sewing mechanism and a suitable work feeding mechanism, but also receives the driving motor or at least the major portion of the latter, and in addition may receive a rheostat or other controller for the motor when this is desirable.

The frame casting may rest upon and be detachably secured to a base member which advantageously is a plate of wood or light metal to which are secured the motor and electric circuit connector therefor, and the motor controller when the latter is located within the chambered frame casting bed portion. With such an arrangement the motor and its electrical connections, as well as the under-work portion of the sewing machine mechanism, may be entirely exposed for inspection, repairs, etc. by merely separating the frame casting and base member. The machine in its preferred form is a two thread rotary lock-stitch machine in which the hook shaft makes two or more revolutions to one of the needle shaft operatively characterized by the fact that the driving motor is operatively connected to the hook shaft of the machine, and drives said shaft through a speed reducing gearing advantageously consisting of a pulley on the hook shaft, a pulley on the motor shaft, and a connecting belt. The needle bar shaft is driven by the hook shaft through a speed reducing gearing which may comprise a belt and pulleys, but preferably comprises a transverse shaft and toothed gears connecting the transverse shaft to the hook shaft and to the needle shaft. With the described sewing machine drive the motor directly drives the most rapidly rotating shaft of the sewing machine proper. This permits a higher motor speed than would be practically possible if the motor shaft were geared to any other operating shaft of the sewing machine by gearing no less bulky or heavy than that employed. Generally speaking, the smaller the motor used, the higher is the motor speed, and the described arrangement permits of effective use of a light-weight high speed motor of standard construction with a single speed reducing connection, the largest unit of which is of moderate diameter.

With the described arrangement the hook shaft rotation is such that the top of the hook member moves away from the operator, and I advantageously combine with the hook shaft a short work-feed shaft driven from the hook shaft through two spur gears carried one by each shaft, and I associate with said work feed shaft, work feed mechanism characterized by its simplicity and effectiveness, and in particular by the simple means provided for adjusting the length of the work feeding strokes.

Various novel features of construction and arrangement which characterize the present invention and contribute to a desirable compactness and very substantial reduction in weight without any corresponding reduction in operative capacity or in the desired excellence of operating performance are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, how-

ever, its advantages and specific objects attained with its use, reference should be had to the accompanying drawings descriptive matter in which I have illustrated and described forms in which my invention may be embodied.

Of the drawings:

Fig. 1 is a front elevation;

Fig. 2 is a plan view partly in section on the line 2—2 of Fig. 1;

Fig. 3 is an end elevation partly in section on the line 3—3 of Fig. 1;

Fig. 4 is a plan taken similarly to Fig. 2, illustrating a modified construction; and

Fig. 5 is a partial front elevation of the modification shown in Fig. 4; and Fig. 6 is a plan view, and Fig. 7 an elevation, of the bobbin case retaining means, portions shown in each figure being broken away and shown in section.

In the form of my invention shown in Figs. 1, 2 and 3, the frame work of the sewing machine comprises a base member A which may well be made of wood and upon which the driving motor M is mounted, and upon which is detachably secured the frame casting of the machine. The latter comprises a bed B, a standard B′ rising from one end of the bed portion, and an arm B^2 supported by the standard B′ and terminating at its free end in the head B^3. Except for the bed B, the frame casting may be generally similar in form to the frame castings of ordinary domestic sewing machines, but is advantageously made somewhat smaller, and is preferably made of aluminum to reduce the weight of the machine. The bed B is in the form of a shallow inverted pan or box open at its underside, with the edge of its rim portion seated on the base member A and detachably secured to the latter as by means of screws *a* entering threaded sockets formed in the filleted corners *b* of the bed B. The top surface of the bed B serves as the cloth surface or work support of the machine, and the standard B′ rises as usual from one end of the bed and intermediate the front and rear edges of the latter.

The sewing machine mechanism comprises a hook shaft C carrying a rotating hook C′ at one end and journalled adjacent the latter in a transverse web portion *b′* of the bed casting. The opposite end of the hook shaft projects through the rim portion of the bed B and is journalled in said rim portion which is locally thickened or provided with an internal boss for the purpose. At its outer end the shaft C carries a wheel C^2 which serves as a hand operating wheel, and is also provided with a grooved pulley surface for the belt *m* through which the hook shaft C is driven by the pulley M^2 carried by the shaft M′ of the motor M, said shaft M′ projecting through an opening formed for the purpose in the rim portion of the bed B.

The hook shaft C drives the needle bar shaft D mounted in the arm B^2, by speed reducing gearing which ordinarily is arranged to give the needle bar actuating shaft D one revolution for each two revolutions of the hook shaft C. This speed reducing gearing, as shown, comprises a vertically disposed shaft E mounted in the hollow standard B′, 1 to 2 bevel gears F connecting the shaft C to the lower end of the shaft E, and 1 to 1 bevel gears *f*, connecting the upper end of the shaft E to the shaft D. Advantageously, and as shown, the rear end of the shaft D is provided with an attachment including a split shaft *d* on which a thread bobbin C^{10} can be placed and frictionally held to turn with the shaft D so as to wind thread on the bobbin whenever it becomes necessary to thus fill a bobbin.

The rotation of the needle shaft D gives a reciprocatory movement to a needle bar G and take-up lever H through mechanisms which may be of any usual or suitable form, and in practice I contemplate that, except for the bobbin filling attachment to the shaft D, all portions of the sewing machine above the bed, including the parts already referred to, and in addition the presser foot bar I, its actuating lever I′, the tension device J, the thread spool post J′, may be of the character employed in modern high quality motor driven domestic sewing machines. I have found it advantageous to modify the known type of actuating mechanism for the take-up lever H by changing the usual location of the bar H′ connected to the take-up lever H and passing slidingly through the yoke *d* pivotally connected to and rotated by the shaft D and thereby serving to actuate the bar H′ and the lever H. In accordance with the preferred construction illustrated in Fig. 3 the bar H′ is located below the fulcrum pivot H^2 for the lever H and extends generally parallel to the latter. With this arrangement the means for giving the take-up lever H its movements may be very compact.

Mounted within the hollow bed B is a short feed shaft O which is parallel to the hook shaft, and is journalled in the web *b′* and in a second lug portion b^2 depending from the top of the bed. The shaft O is driven at half the speed of the shaft C by means of a spur gear O′ carried by the shaft O and a meshing spur gear C^3 carried by the shaft C. At the front side of the web *b′* the shaft O carries a cam O^2 which gives the feed dog P′ its rising and falling movements, and a cam O^3 which gives the feed dog its movements forward and back in the line of feed. The cam O^2 acts directly upon a member P to which the feed dog P′ is secured. The member P is formed with a slot or guideway P^2, receiving a headed post B^{10} secured to the web *b′*. The member P oscillates on the post B^{10} as the feed dog P′ is raised and lowered, and slides on the post B^{10} to accom-

modate the movements of the feed dog P′ in the direction of the line of feed.

As shown, the feed dog is constantly urged toward the front of the machine by a spring Q located in a spring chamber formed in the member F and acting between one end of that chamber and the pin B^{10}. The cam O^3 acts on the member P, and thereby on the feed dog P′, through an adjustable thrust bar R which has one end pivoted on a pin P^3 carried by a bracket-like portion of the member P. The front end of the thrust bar R engages the curved rear surface of a lever S which is pivotally mounted on a post B^{11} secured to the web b' and is interposed between the forward end of the thrust bar R and the cam O^3.

The length of the feed stroke of the dog P′ may be adjusted by raising or lowering the front end of the thrust bar R. This adjustment is effected by a lever T which is fulcrumed on a post or stud shaft B^{12} secured to the web b', and carrying at its rear end a pin T′ received on a slot formed in the thrust bar R adjacent its front end. The forward end of the lever T projects through a vertical slot B^{13} formed at the front of the machine in the rim portion of the bed B. As shown, the slot B^{13} is surrounded by a thin scutcheon t formed at one side with notches t', one or another of which receives a rib T′ formed for the purpose in the adjacent side of the lever T which is arranged so that its own resilience tends to hold the rib T′ in whichever of the notches t' it may be entered. Advantageously, as shown, the scutcheon t is also provided with scale marks t^2 indicating the position of the lever T and thereby the feed adjustment.

To hold a bobbin C^{10} in place within the revolving hook C′, I advantageously employ a bobbin retaining device, shown as comprising a disc-like part U normally held directly in front of the open mouth of the bobbin cavity in the hook C′ by a member U′ which is secured as by a set screw U^4 to a shaft U^2 pivoted in a bracket member W, the latter being screw-attached to the web b'. A spring W′ acting between bracket W and the shaft U^2 tends to throw the member U′ into the inclined position shown in Fig. 1 to permit the insertion and removal of the bobbin. Normally, however, the member U is held in the vertical bobbin retaining position by a latch bar U^8 pivoted at U^5 to the member U′ and normally held by a spring U^6 in the position in which it bears against a stop U^7. As shown, the stop U^7 is formed by a screw threaded into a vertical socket in the member W and thereby vertically adjustable so that the member U′ may be normally held in the exact position required.

To permit ready access to the bobbin retaining member and bobbin from the upper side of the bed, the latter is formed with an opening B^{14} in its top wall which is normally closed by a plate Y. The bed is thickened and rabbeted at the margin of the opening B^{14} to provide ledges or shoulders on which the front and rear edges of the plate Y normally bear. To hold the plate Y snugly in its closed position while readily permitting its movement away from and back to that position, I advantageously rivet, weld, or otherwise attach a bow spring Y′ to the underside of the plate at its inner end. The ends of the bow spring Y′ bear against the bottom surfaces of the front and rear edges of the opening B^{14}. The plate Y may be provided with a finger receiving recess Y^2 to facilitate its operation. The described means for mounting the plate Y and holding it in place are simple and effective, and avoid the possibilty of objectionable frictional resistance to the movement of the plate which would exist with a plate of such width if received in the usual dove-tailed slot and fitted snugly enough therein to avoid the liability of frequent accidental displacement.

In the construction shown in Fig. 1, the height of the cloth or work supporting surface of the bed above the table or like support on which the base member B may be placed, is advantageously kept small, and in practice may well be no greater than is required to provide the necessary clearance between the periphery of the hand wheel C^2 and the table or other support on which the machine may rest. When, as shown in Figs. 1, 2 and 3, the thickness or vertical dimension of the motor frame requires it, an opening B^{15} is formed in the top wall of the bed B through which the upper portion of the motor frame projects. This arrangement has the added advantage of increasing the heat dissipating capacity of the motor and thereby reducing its tendency to become unduly warm at the end of a long period of operation. N represents a conductor coupling device secured to the bed B and shown as projecting through an opening formed in the rim portion of the latter by which the motor M, and the work lighting lamp, (not shown) if any be employed, may be connected to a convenient light socket or other source of current, and to a suitable control device which may advantageously be of the treadle type, and may be placed on the floor in position to be actuated by the foot of the user of the machine.

Various changes may be made in the form of the apparatus shown in Figs. 1, 2 and 3. For example, with a bed BB suitably increased in its vertical dimensions, or with a motor suitably decreased in its vertical dimensions, the motor may be mounted beneath the top wall of the chamber in the bed member in which case the opening B^{15} may be dispensed with as shown in Figs. 4 and 5.

As shown in these figures also, the motor may be controlled by a rheostat or other controller X mounted within the chambered bed. The controller X, as shown, comprises a rheostat lever X′, engaging contact studs X^2 and having an operating end X^3, projecting through a slot formed in the bed portion of the bed BB. The rheostatic controller X as shown in Figs. 4 and 5, is housed in a casing member X^4 of inverted pan form secured, as by means of screws, to the base member AA.

Those skilled in the art will readily understand that the underwork portion of the sewing machine mechanism described is desirably simple and reliable, and I have found in the actual use of such mechanism in conjunction with cooperating parts of standard type mounted in the head of the sewing machine, that the machine sews as well and as rapidly as the best commercial type of rotary hook lock-stitch domestic sewing machines. The described construction permits of an appreciable reduction in bulk and overall dimensions without any reduction in the capacity of the machine to operate on work as thick and as bulky as can be handled by an ordinary domestic sewing machine.

The weight reduction made possible by the simplification of the structure, the formation of the frame casting out of aluminum, and the use of a light weight base member is very substantial. I have found it practically possible to construct a machine in accordance with the present invention which weighs less than half as much as any commercial form or type of motor driven domestic sewing machine known to me, and having similar capacity and giving operative results as good or approximately as good as my improved machine. The work feed may be adjusted easily and accurately by shifting the lever T which is conveniently accessible, and easy access for inspection and repairs of the motor and electrical connections, as well as the controller if the latter is mounted on the base as shown in Figs. 4 and 5, and the entire underwork portion of the sewing machine mechanism may be had, by removing the screws *a* and lifting the frame casting off the base member. In thus opening up the machine it will ordinarily be desirable to remove the belt *m* and it will be understood, of course, that the passage in the rim portion of the bed through which the motor shaft M′ projects should be open at its bottom or large enough to permit the ready separation of the frame casting and base member on which the motor is mounted. The belt *m* is preferably an elastic belt which in practice may well be made of rubber. Such a belt is especially advantageous in my improved sewing machine as it permits of the ready removal and replacement of the belt in separating and re-assembling the frame casting and base member, and does not require any adjustment in belt length or relative position of parts to accommodate the belt stretching which is normally to be expected with a belt of leather or like material.

The work feed mechanism and the adjusting provisions therefor, which are disclosed but not claimed herein, are disclosed and claimed in my copending application Serial No. 510,645, filed January 23, 1931.

While in accordance with the provisions of the statutes I have illustrated and described the best form of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of the invention as set forth in the appended claims, and that certain features of the invention may sometimes be employed without a corresponding use of other features.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A portable sewing machine, comprising a frame casting including a chambered bed portion open at its underside, a completely operative work feeding and stitch forming mechanism mounted in said frame, a base member on which said bed portion rests and to which it is detachably secured, a motor mounted on said base member and extending into the chamber space in said bed portion, a sewing machine drive shaft journalled in said bed portion, and means connecting the motor shaft to said drive shaft.

2. A portable sewing machine having a frame casting including a bed portion of inverted pan shape, a sewing machine actuating shaft journalled in said bed portion and having an end projecting through the marginal rim of said bed portion, a base member on which said bed portion normally rests and to which it is detachably secured, a motor mounted on said base and having a shaft normally projecting through said rim and a driving connection extending between the projecting ends of said shafts.

3. A portable sewing machine including a frame casting having a bed portion comprising an upper body part serving as a cloth surface and a marginal rim depending from said body part, a base member on which said rim normally rests and against which it is detachably secured, an actuating shaft journalled in said bed portion and projecting through said rim portion, a motor mounted on said base member and comprising a frame surrounded by said rim and a shaft projecting through said rim, and a belt and pulley connection between the external ends of said shafts.

4. A portable sewing machine comprising a chambered bed adapted to rest upon a table-

like support, an actuating shaft journalled in said bed and having an end projecting through a vertical wall of said bed portion, a pulley carried by the projection end of said shaft, an arm connected to said bed, a needle actuating shaft journalled therein, a connection through which the last mentioned shaft is driven by said actuating shaft, a base member on which said bed rests and to which it is detachably connected, a motor mounted on said base member and extending into the chamber space of said bed and having a shaft projecting through said vertical wall, a pulley wheel secured to the projecting end of said actuating shaft and a belt connecting said pulley wheel and pulley, said bed and base being proportioned relative to said pulley wheel to provide a relatively small clearance between the periphery of said wheel and a table or like support upon which said base may rest.

5. A portable sewing machine, comprising a frame casting including a chambered bed portion open at its underside, a completely operative work feeding and stitch forming mechanism mounted in said frame, a base member on which said bed portion rests and to which it is detachably secured, a motor mounted on said base member and having its major portion, at least, received in the chamber space in said bed portion, a sewing machine drive shaft journalled in said bed portion, and means through which said motor rotates said drive shaft.

6. A motor driven sewing machine comprising a base member, a motor and electrical connections therefor mounted on said member, a frame in which all of the operative parts of the sewing machine are mounted and which includes a hollow bed open at its underside and the top of which forms a work supporting surface, said bed enclosing substantially all of said operative parts below said surface including all portions of said parts requiring enclosure, and being normally secured detachably to said member and then enclosing the major portion at least of said motor.

7. A portable lock stitch sewing machine comprising a frame including a chambered bed portion open at its underside, a completely operative work feeding and stitch forming mechanism mounted in said frame and comprising a hook shaft, a needle bar shaft, speed reducing gearing through which the needle bar shaft is driven at a speed lower than that of the hook shaft, a balance wheel carried by the hook shaft, said hook shaft being received in said chambered bed portion except for a short portion projecting from said bed portion, a base member on which said bed portion rests and to which it is detachably secured, a motor mounted on said base member and extending into the chamber space in said bed portion but having a short portion of its shaft projecting from said bed portion, and a belt connection external to said bed portion between said projecting portions of said hook shaft and motor shaft.

Signed at Brooklyn, in the county of Kings, and State of New York this 23rd day of December, A. D. 1927.

RICHARD K. HOHMANN.