

March 25, 1924.

1,488,234

F. DIEHL ET AL
ELECTRICALLY DRIVEN SEWING MACHINE

Filed Sept. 5, 1921

3 Sheets-Sheet 1

Fig. 1.

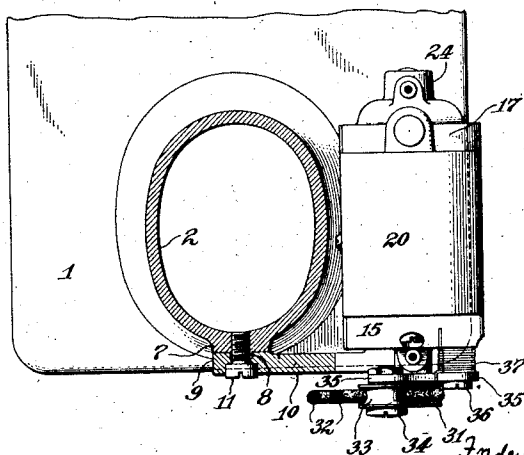
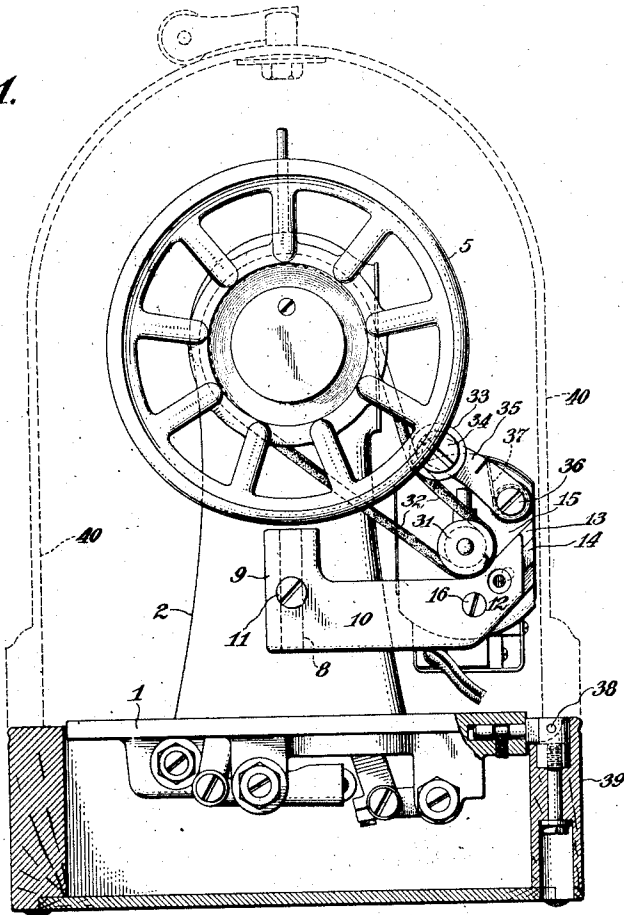


Fig. 2.

WITNESSES:
Godfrey Picina
Lillian M. Miller

INVENTOR
Frederick Diehl & Martin Heuchel
BY *Henry J. Miller*
ATTORNEY

March 25, 1924.

1,488,234

F. DIEHL ET AL

ELECTRICALLY DRIVEN SEWING MACHINE

Filed Sept. 3, 1921

3 Sheets-Sheet 3

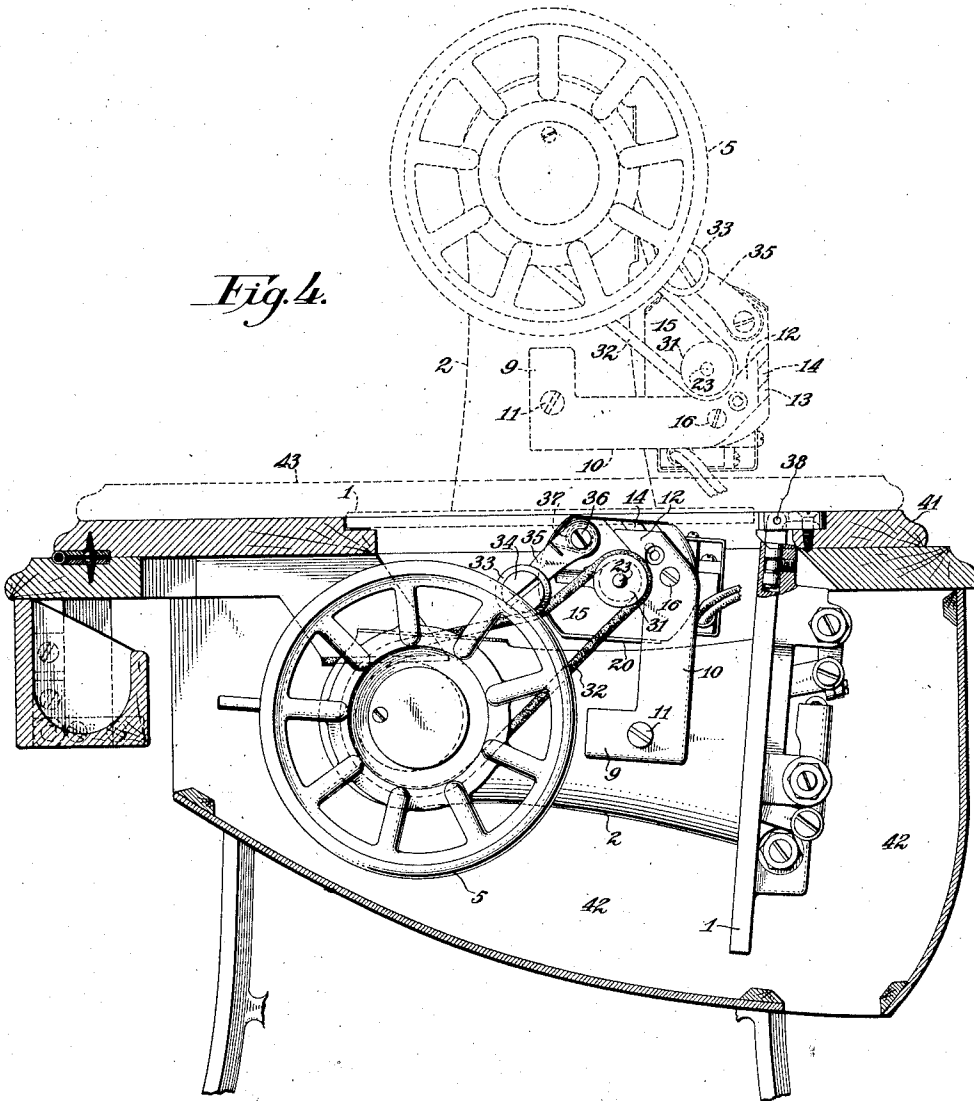


Fig. 4.

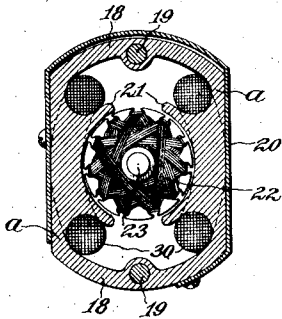


Fig. 6.

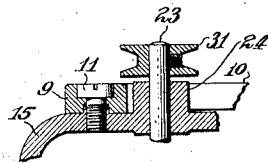


Fig. 7.

WITNESSES:
Godfrey Pecina
Lillian M. Miller

INVENTOR
Friedrich Diehl & Martin Heubler
 BY *Harry J. Miller*
 ATTORNEY

UNITED STATES PATENT OFFICE.

FREDERICK DIEHL AND MARTIN HEMLEB, OF ELIZABETH, NEW JERSEY, ASSIGNORS
TO THE SINGER MANUFACTURING COMPANY, OF ELIZABETH, NEW JERSEY, A COR-
PORATION OF NEW JERSEY.

ELECTRICALLY-DRIVEN SEWING MACHINE.

Application filed September 3, 1921. Serial No. 498,316.

To all whom it may concern:

Be it known that we, FREDERICK DIEHL and MARTIN HEMLEB, citizens of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Electrically-Driven Sewing Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Heretofore it has been common to adopt in a sewing machine driving attachment an electric motor of usual form and of sufficient dimensions to provide the requisite driving power, and to mount such motor upon the sewing machine frame by means of a supporting bracket made in pivotally connected sections or otherwise in such manner as to permit the motor to be shifted from driving position to an inoperative position beneath the overhanging arm of the sewing machine frame for transportation purposes or when the machine was housed in a suitable carrying case or cabinet when not required for operation. In the few instances in the prior art where in an electrically driven sewing machine the driving relation between the motor and the machine did not have to be disturbed for housing purposes when the machine was not in use, the machine construction has had to be altered to receive the motor, as by having its frame recessed or its mechanism provided with special fittings or parts. In certain of these instances, even with the use of such special parts, the motor was obtrusive and in the way of the operator and of the application and use of many of the usual sewing machine attachments and appurtenances.

The present invention has for certain of its objects to provide an electrically driven sewing machine, the motor of which and its means of attachment to the machine-frame are simple in construction and so formed and related to the machine-frame as to require no adjustment of the motor by the user for restoring temporarily interrupted driving relation with the sewing mechanism preparatory to operation.

Another object of the invention is to provide a machine of the class described the motor of which shall be unobtrusive and inconspicuous but attractive in appearance

when in position, and so compact as to enable the machine to which it is applied to occupy a housing cavity in a portable carrying case or drop-head cabinet of the same minimum capacity as is required for the same machine when furnished to be manually driven and thus unprovided with a motor.

A feature of the invention resides in the combination of a sewing machine frame having a standard of hollow flattened cross-section with a hollow flattened motor frame, one flattened side of each being juxtaposed, whereby maximum strength and rigidity is had while the motor is located above and close to the machine bed and below the sewing machine shaft, affording maximum compactness and in the present embodiment maximum length of belt-drive.

A further object of the invention is to provide a motor-driven sewing machine of standard type, including either the usual drop-head cabinet or a portable case, the motor element of which is applied without altering the construction of the machine, and is of such nature that the motor may remain at all times in driving relation with the sewing head, that is, such relation need not be disturbed to enable the sewing head to be housed in its drop-head cabinet or portable case.

Still further, the invention has for an object to so combine the motor and sewing machine that the motor will be unobtrusive and out of the way of the operator when using the machine and will not obstruct the space under or directly in rear of the overhanging bracket-arm needed for accommodation of the work or usual sewing machine appurtenances.

The invention is embodied in a machine of standard type equipped with an electric motor having an armature and field-coil encircling frame which is externally reduced in diameter and flattened on the sides containing the field-magnet pole-pieces; the motor-frame being attached to a supporting bracket in the form of an arm provided with means whereby it may be secured to the sewing machine frame permanently in driving position. The sewing machine frame standard is preferably of flattened cross-section and is formed with a lateral seat to which the motor-supporting bracket is secured

preferably by an interlocking tongue-and-groove connection, and the adjacent flattened face of the motor frame is disposed in substantial parallelism with and in close proximity to the rearward side of the standard, so that the opposite flattened face of the motor-frame extends little, if any, beyond the edge of the machine base or bed-plate.

As so equipped, the sewing machine occupies hardly more space in a container than a machine unprovided with an electric-motor drive, and the attachment is of such form and lies so close to the sewing machine frame standard as to be comparatively inconspicuous while presenting a pleasing appearance. The permanence of the motor mounting obviously insures security against injury of the outfit when boxed for shipment and thus renders practicable the assembling of the motor and machine at the factory in readiness for use.

So far as we are aware no electric sewing machine has heretofore been constructed of which the motor element is applied without alteration of the sewing machine and is permanently associated in unobtrusive driving relation with such machine; it being unnecessary to disturb such relation when the machine is housed for transportation or is housed in the usual carrying case or drop-head cabinet when not in use.

In the accompanying drawings, Fig. 1 is an end view of a sewing machine and driving motor attached thereto in accordance with the present invention, the machine being shown mounted in a portable carrying case. Fig. 2 is a plan of the driving attachment with a portion of the machine-frame, in transverse section through the standard. Fig. 3 is a rear side elevation representing the motor attachment and that portion of the sewing machine adjacent thereto. Fig. 4 is an elevation showing the sewing machine and its driving attachment as applied to a drop-head cabinet. Fig. 5 is a longitudinal sectional elevation of the motor and Fig. 6 a transverse section of the same. Fig. 7 is a view representing, in section, the connection of the motor-frame and its supporting bracket.

In the preferred embodiment of the invention, as illustrated, the sewing machine is constructed with a frame comprising the base or bed-plate 1 from which rises the hollow standard 2 having the overhanging tubular arm 3 extending therefrom. The standard 2 is of flattened cross-section. Fig. 2, that is, its dimension transversely of the sewing machine bed-plate 1 is less than its dimension lengthwise of the bed-plate. Mounted within and longitudinally of the arm 3 is the main-shaft 4 upon which is mounted the balance-wheel 5 provided with the belt-groove 6. The standard 2 of many

sewing machines is customarily formed at the side adjacent the end of the bed-plate with a raised seat 7 and rib 8 to receive a hand driving device. In the present instance it is convenient to use this seat to mount the motor by fitting to such seat the correspondingly grooved and apertured cross-member 9 of a motor-supporting bracket 10 which is fixedly secured in position thereon by means of the screw 11. The bracket 10 is shown in the form of an angular arm one portion of which is secured to the bracket-arm standard and to the other or angularly related portion of which the motor frame is secured. The motor-supporting portion of the bracket may be in the form of a rearwardly and upwardly inclined arm 12 grooved similarly to the cross-member 9 and applied to a seat 13 having the raised tongue 14 entering said groove provided upon the outer face of the end-cover 15 of the driving motor, the end-cover being secured to the bracket by means of a fastening screw 16 entering one of a plurality of apertures in the bracket-member 12 and tapped into the end-cover 15.

The frame of the motor comprises the end-cover 15 and a similar cover 17 between which are clamped the series of field laminations 18 by means of the screw-bolts 19. The field-frame is shown embraced by a sheet-metal casing 20. The laminations 18 are provided with the inwardly extending projections 21 together forming the pole-pieces intermediate which is disposed the armature 22 whose shaft 23 is journaled in suitable bearings 24 therefor in the end-covers in substantial parallelism with the main-shaft 4. The armature is shown provided with the commutator 25 against which are pressed by means of springs 26 the brushes 27 slidingly fitted within the metallic tubular casings 28 sustained by the insulating bushings 29 mounted within the end-cover 17.

The laminations 18 are apertured to encircle the armature and are externally reduced in diameter and flattened upon the sides formed with the pole-pieces 21, as represented in Fig. 6, and the pole-pieces are surrounded by the usual coaxial field-coils 30. As shown, the motor-supporting arm 10 extends beyond and transversely of the inner flattened face of the motor-frame.

To permit the flattening of the field-frame as described without seriously reducing the section of the magnetic path, relatively wide pole-pieces 21 are provided. Upon reference to Fig. 6 it will be clearly seen that these relatively wide pole-pieces join the annular upper and lower portions of the yoke at points abnormally spaced apart and thereby provide a sufficient area at the points *a* to insure a suitable flux density at these points.

The armature-shaft carries a grooved pulley 31 which is frictionally connected preferably by means of the driving belt 32 with the balance-wheel 5 on the main-shaft 4. The belt may be maintained taut by a grooved idler-pulley 33 journaled by means of a screw-stud 34 upon the swinging arm 35 mounted upon the fulcrum-stud 36 which is tapped into the motor end-cover 15 and is pressed toward the belt by means of a spring 37.

As represented in Fig. 1, the sewing machine bed-plate is hinged at 38 within the usual hollow base 39 of a carrying case to which is applied the removable cover 40 made only slightly larger in width than the bed-plate 1. Were the motor frame of the usual rounded form, it would extend laterally so far rearward of the sewing machine frame standard that the supporting bracket-arm 10 would require to be longer and the body of the motor positioned farther from the standard, thereby requiring a much larger housing cavity for the machine and necessitating the employment of a much wider cover than for a sewing machine furnished without the driving attachment. By flattening the motor frame, not only is the body of the motor permitted to be positioned closer to and in substantial parallelism with the adjacent face of the machine standard, but its lateral dimensions are so reduced that it is embraced substantially within the area of the sewing machine bed-plate and is therefore accommodated within a housing cavity customarily made of the minimum dimensions for a sewing head regardless of accessories.

The sewing machine is represented in Fig. 4 as applied to a drop-head cabinet constructed substantially in accordance with the disclosure of the United States Patent to Diehl and Kraemer No. 541,474, of June 25, 1895; being illustrated in full lines in the position which it occupies when the cabinet is closed and in dotted lines in operative or sewing position. In this representation of the improvement, the sewing machine bed-plate has the same form of hinge connection 38 with the apertured table-top 41 beneath which is the cavity 42 in which the machine is housed when not in use, the cavity being closed at the top at such time by the cover-leaf 43. In this outfit the compactness of the motor attachment is emphasized, the motor being mounted sufficiently close to the machine-standard to enable the outer face of the field-frame to lie within the aperture and below the face of the table-top 41, so that the cover-leaf 43 may be closed without interference therewith.

It will be seen that the field-coils 30 and pole-pieces of the motor are so related to the sewing machine standard that the axis or center line of magnetic flux through the

field-coils is transverse to the exterior flattened sides of the motor and to the juxtaposed sewing machine standard and cover walls. The field-coils are thus effectively disposed of in the limited space between said walls without sacrifice of motor characteristics desirable in an electric sewing machine.

Having thus set forth the nature of the invention, what we claim herein is—

1. The combination with a sewing machine having a frame formed with a bed and a hollow bracket-arm standard, and a main-shaft sustained by said frame, of a motor permanently mounted in driving position on said frame and at all times having its power-shaft below the level of and substantially parallel with the sewing machine shaft, said motor having an armature and field coils and a motor-frame encircling and enclosing said armature and field coils and externally flattened vertically at opposite sides of the motor-shaft and disposed with one of its flattened faces closely adjacent to the standard.

2. The combination with a sewing machine having a frame formed with a bed, an overhanging bracket-arm, and a hollow bracket-arm standard, and a main-shaft sustained by said frame, of a motor mounted on said frame below the level of the overhanging bracket-arm and at all times having its power-shaft substantially parallel with and in permanent driving relation with the sewing machine shaft, said motor having an armature and a motor-frame encircling said armature and provided at opposite sides with internally disposed coaxial field-coils, said motor-frame being externally flattened transversely of the axis of said field coils on the sides adjacent the respective coils and disposed with one of its flattened faces closely adjacent said standard.

3. In combination, a sewing machine comprising a frame formed with a bed, a standard rising therefrom and an overhanging arm extending from the standard, and a main-shaft extending lengthwise of and sustained by said arm, said standard being formed with a seat, a rigid motor-bracket secured to said seat, and a motor having an armature operatively connected with said main-shaft and a frame encircling said armature and rigidly mounted upon said bracket and disposed below the level of said overhanging arm, said motor frame being externally flattened at opposite sides with one of its flattened faces opposed and closely adjacent to said standard.

4. A motor attachment for sewing machines comprising an electric motor composed of an armature and a field-frame encircling the same and reduced in diameter and flattened at opposite sides adjacent its field-coils, and a sustaining bracket formed as a rigid arm having rigidly secured to one

end thereof the field-frame with one of its flattened faces disposed transverse to said arm and having the other end of said arm provided with means for its rigid attachment to a sewing machine frame, the motor being bodily adjustable lengthwise of said arm while maintaining its flattened faces in parallel planes transverse to said arm in all positions of adjustment.

5. The combination with a sewing machine having a frame formed with a hollow bracket-arm standard and a main-shaft sustained by said frame, of a motor belt-connected to drive said main-shaft and having a field frame flattened vertically at opposite sides and disposed with one of its flattened faces adjacent said standard, said motor being rigidly mounted on the sewing machine frame and being bodily adjustable toward and from said standard while maintaining its flattened sides vertical in all positions of adjustment.

6. An electric sewing machine having, in combination, a sewing head including a frame formed with a flat rectangular bed and an overhanging bracket-arm having a hollow standard of flattened cross-section with its shorter dimension transversely of the machine bed and its longer dimension longitudinally of the machine bed, a main-shaft journaled in said bracket-arm, a balance-wheel mounted on said main-shaft, an electric motor mounted on the sewing machine frame in permanent driving position above the sewing machine bed and below the level of said main-shaft, said motor having an armature and power-shaft and a hollow armature-encircling frame externally flattened vertically at opposite sides of said armature and disposed permanently with one of its flattened sides in rear of and closely adjacent the rearward side of the flattened bracket-arm standard.

7. An electric sewing machine outfit comprising, in combination, the usual sewing head housing means, a sewing head adapted to be housed by said means and including a frame formed with a flat rectangular bed and an overhanging bracket-arm having a

hollow standard of flattened cross-section with its shorter dimension transversely of the machine bed and its longer dimension lengthwise of the machine bed, a main-shaft journaled in said bracket-arm, a balance-wheel mounted on said main-shaft, and an electric motor mounted upon the sewing machine frame above the sewing machine bed and below the level of said main-shaft, said motor having an armature and power-shaft and a hollow frame encircling said armature and power-shaft, said motor-frame being externally flattened vertically at opposite sides of said power-shaft and disposed at all times with one of its flattened sides in rear of and closely adjacent the rearward side of the flattened bracket-arm standard, and a pulley on said power-shaft in permanent driving relation with the sewing machine balance-wheel; the sewing head and its driving motor being receivable as a unit within said housing means without the necessity of disturbing the driving relation of the motor to the sewing head.

8. The combination with a sewing head having a frame formed with a substantially flat bed, a hollow standard rising from said bed, an overhanging bracket-arm joined at one end to said standard, a main-shaft, and housing means including a cover having a wall spaced from the rear wall of said standard, of a motor having a pair of coaxial field-coils disposed between and with their axis transverse to said walls, a hollow motor-frame encircling and enclosing said field-coils and having inwardly directed pole-pieces passing through said field-coils, said motor-frame being externally flattened at opposite sides adjacent the respective field-coils and disposed with its flattened sides in juxtaposition, respectively, to said standard and cover walls, and a motor-armature and power-shaft journaled in said motor-frame and at all times connected in driving relation to said sewing machine main-shaft.

In testimony whereof, we have signed our names to this specification.

FREDERICK DIEHL.
MARTIN HEMLEB.