Nov. 19, 1946. K. PERKINS ET AL 2,411,459

SEWING MACHINE FRAME

Filed Feb. 23, 1943 4 Sheets-Sheet 1

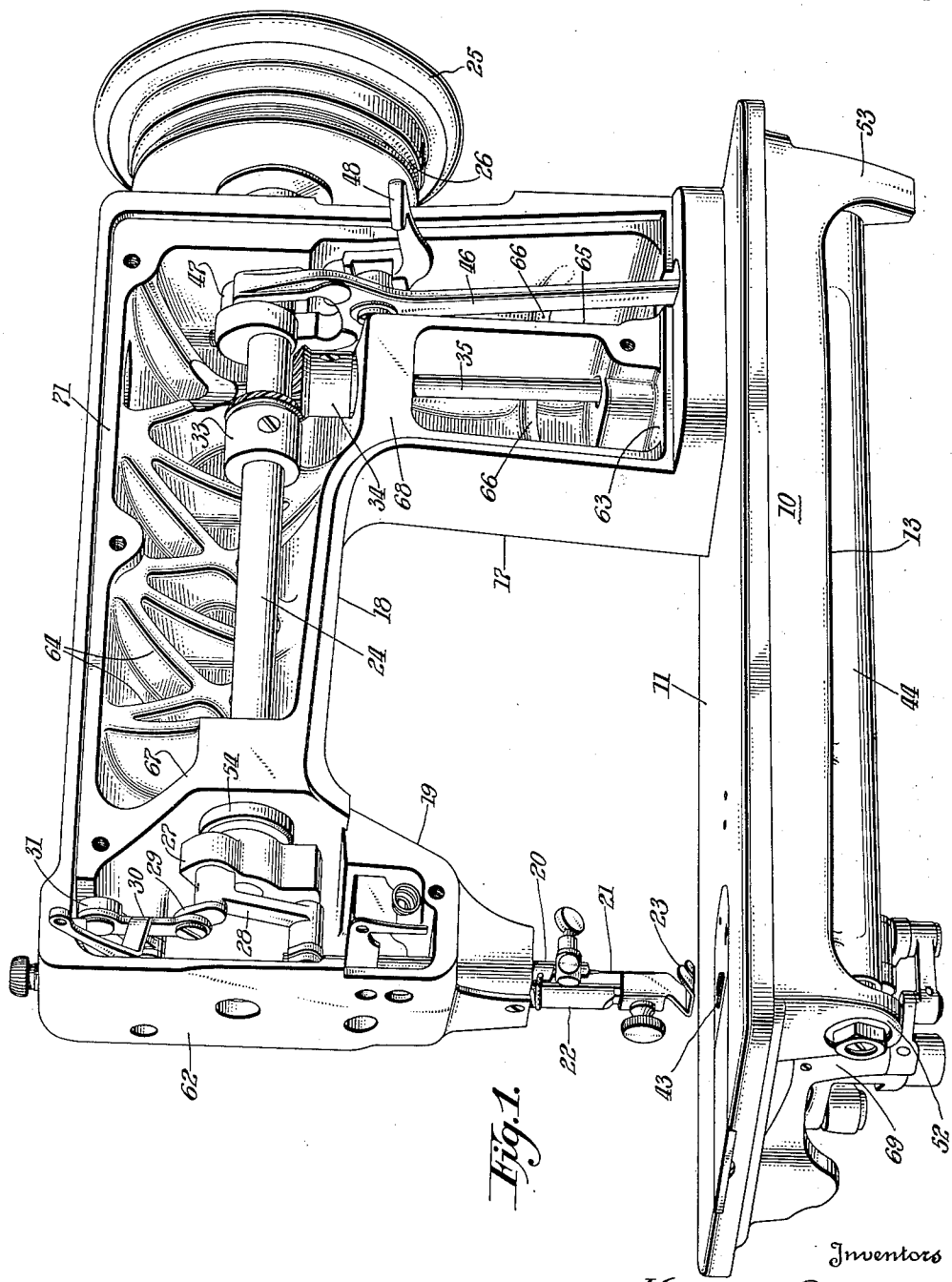


Fig. 1.

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SEWING MACHINE FRAME

Filed Feb. 23, 1943 4 Sheets-Sheet 2

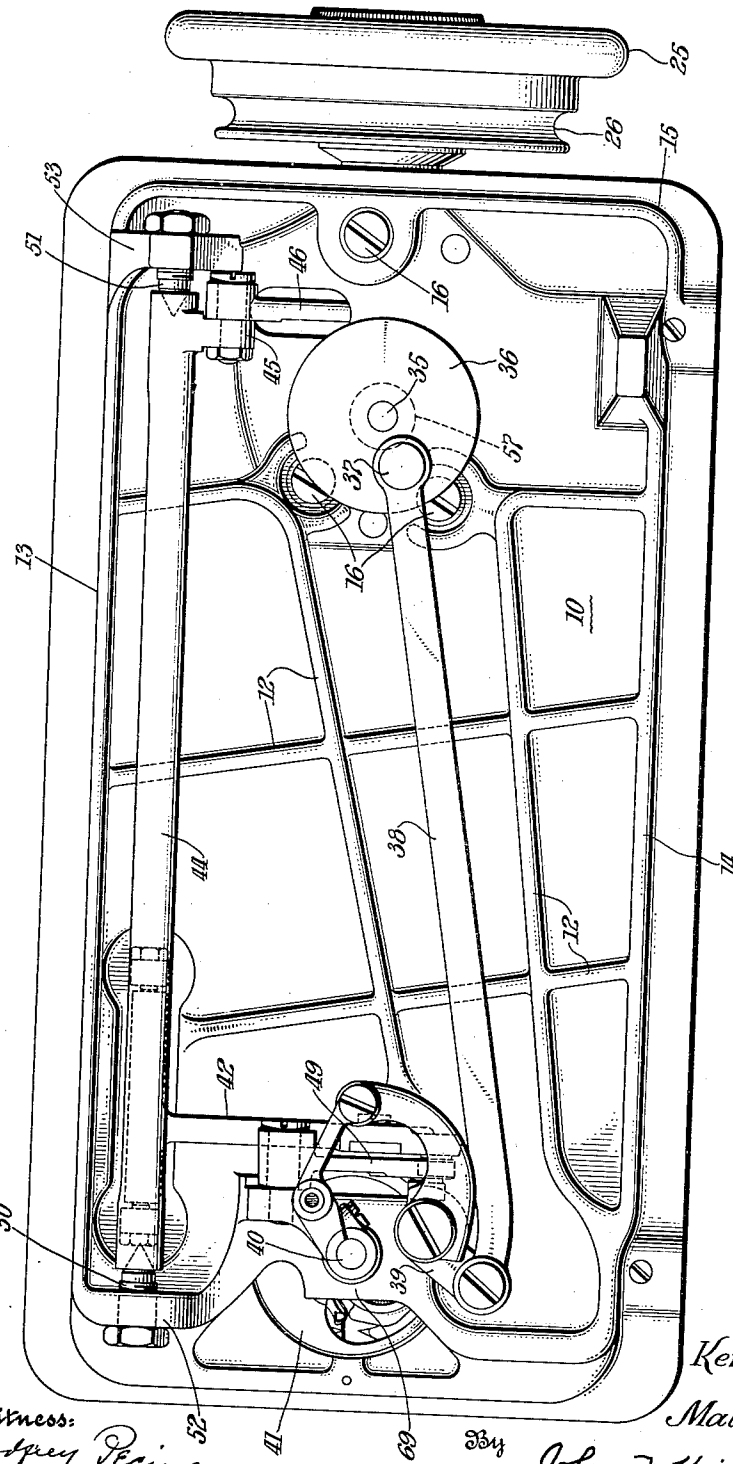


Fig. 2.

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SEWING MACHINE FRAME

Filed Feb. 23, 1943 4 Sheets-Sheet 3

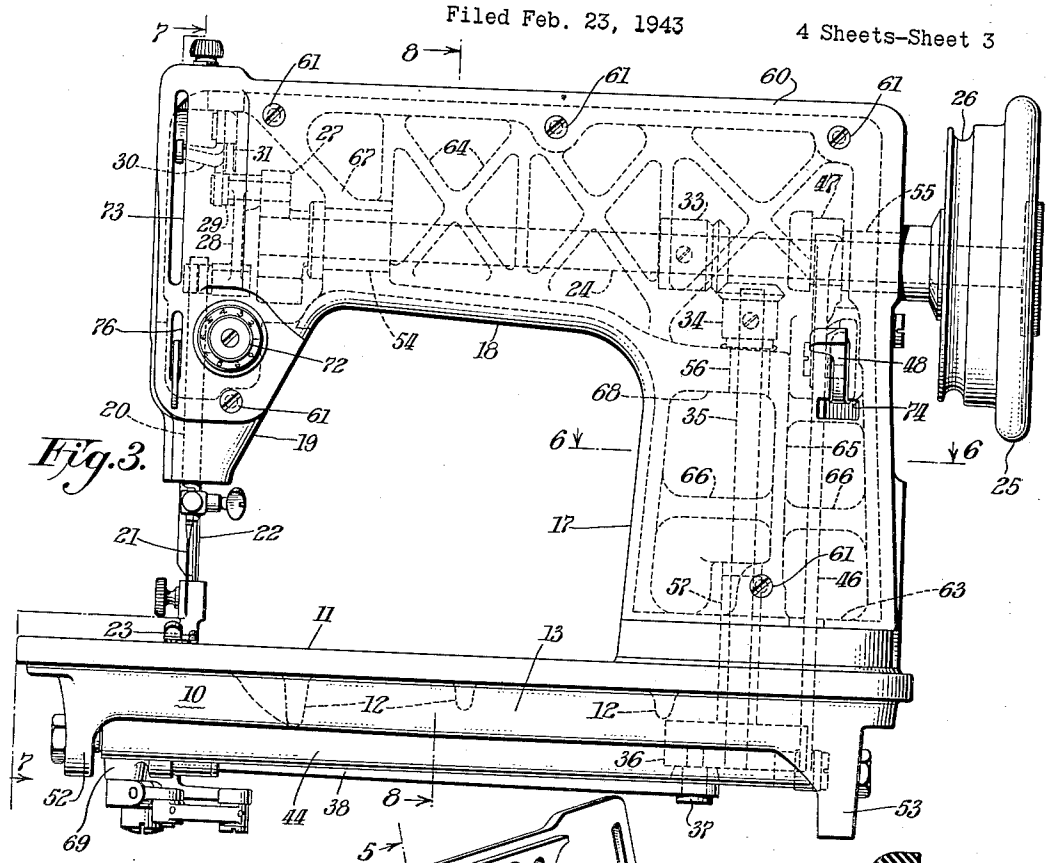


Fig. 3.

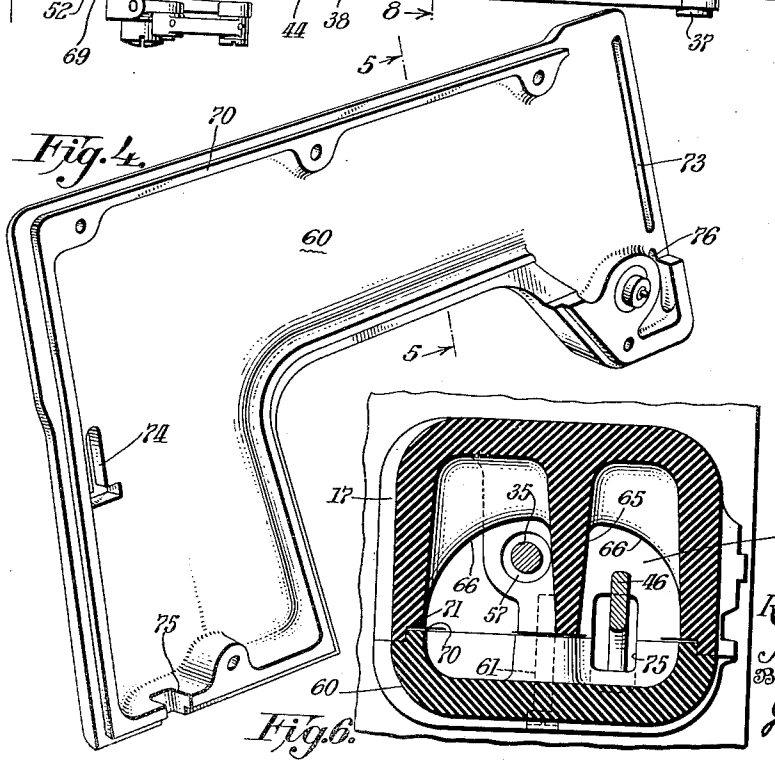


Fig. 4.

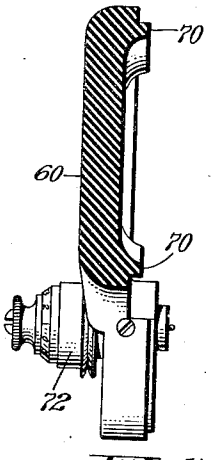


Fig. 5.

Fig. 6.

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SEWING MACHINE FRAME

Filed Feb. 23, 1943 4 Sheets-Sheet 4

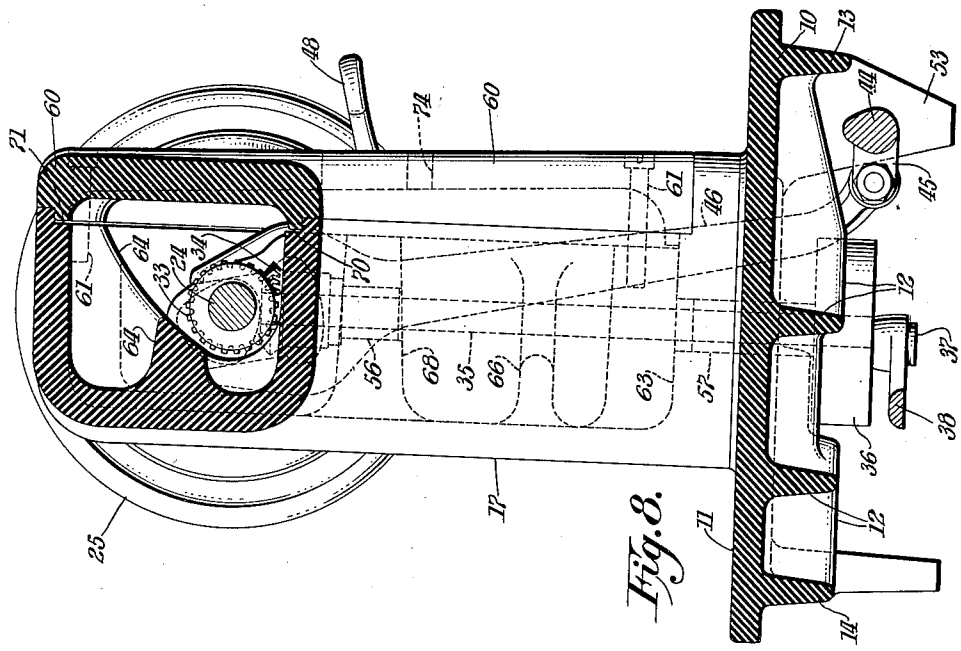


Fig. 8.

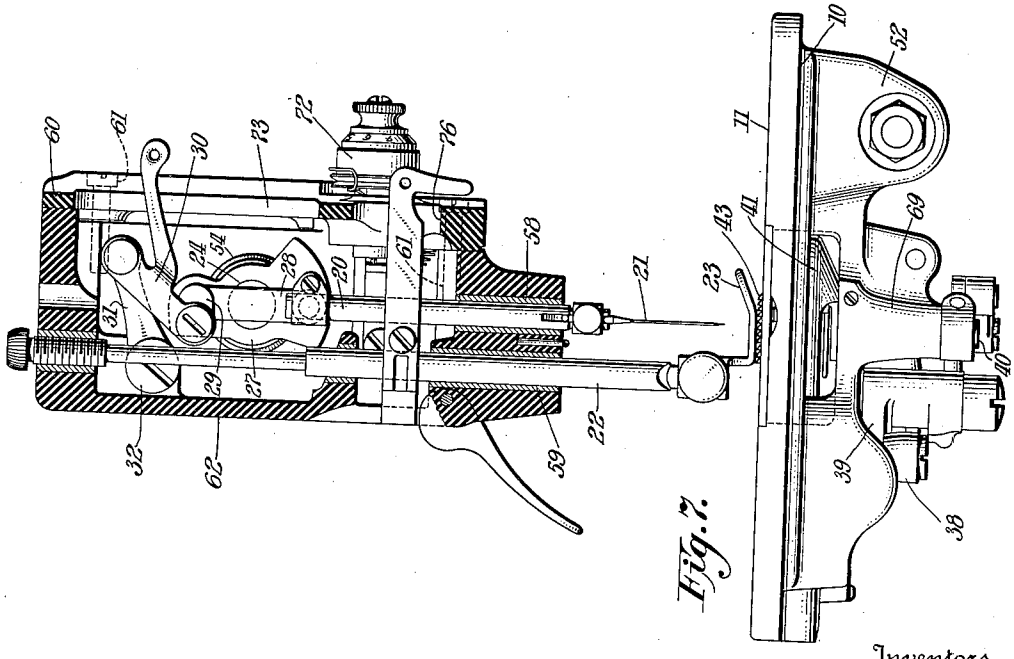


Fig. 7.

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Patented Nov. 19, 1946

2,411,459

UNITED STATES PATENT OFFICE

2,411,459

SEWING MACHINE FRAME

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Application February 23, 1943, Serial No. 476,830

4 Claims. (Cl. 112—258)

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This invention relates to sewing machines and more particularly to a new type of sewing machine frame which is constructed of a moldable plastic material.

The demand for an inexpensive lightweight sewing machine has heretofore never been effectively met, and today, with so much emphasis upon portability, the demand for a compact featherweight sewing machine has been felt more acutely by sewing machine manufacturers. In the past many attempts have been made to cope with this problem as evidenced by the many patents which disclose divers forms of sewing machines designed with that end in view. Of such machines there are three representative types which are characterized by the application of different types of materials used in the construction of the machine frames, one such type being shown in U. S. Patent No. 2,009,998, granted to Ignatz Gonyk on August 6, 1935; another in U. S. Patent No. 2,063,841, granted to Herbert J. Goosman on December 8, 1936; and another shown in British Patent No. 419,916, granted to G. M. Pfaff, on March 12, 1934. By virtue of the particular materials selected and the mode of their use in these machine frames, each of these machines is lighter in weight than its cast iron counterpart. Cast iron has always been the standard material out of which sewing machine frames have been fashioned. However, certain advantageous characteristics inherent in the old cast iron type of machine had to be sacrificed in producing each of the above noted lightweight units.

For example, a machine having the two-part sheet metal casing within which the stitching mechanism is supported, as instanced in the Gonyk patent, supra, makes for a lightweight frame but such a frame does not possess the sound absorbing character of cast iron. Furthermore, such a sheet metal casing is not capable of rigidly supporting the stitching mechanism, and unless internal bracings are freely used the casing will resonate when the machine is operating at high speeds.

In the machine of the Goosman type wherein the frame is made of die-cast aluminum alloy, little machining is required for its production and the unit is relatively light in weight and possesses fair sound absorbing characteristics. However, the cost of such die-cast frames is high as compared to the usual cast iron counterpart.

A machine of the type disclosed in the Pfaff patent comprises a metallic frame supporting the swing mechanism and this frame is covered by

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a two-part plastic housing. If cast iron is used to construct the supporting frame of such a machine a relatively heavy unit will result and little advantage will be realized over the usual type of sewing machine. If, on the other hand, a lightweight aluminum alloy is used the expense of the unit will approach that of the above noted Goosman unit. Furthermore, as in the Gonyk construction, extreme care must be taken in the building of the machine to insure that the two-part casing is well braced so that it will not be subject to undue vibration.

It is therefore, the chief object of the present invention to make it possible to retain all of the advantageous features of a cast iron framed sewing machine but at the same time produce an inexpensive and lightweight machine with a view to eliminating as many as possible of the disadvantages heretofore experienced in the application of such lightweight units.

Another object of the present invention is to provide a sewing machine frame which will require a minimum amount of machining operations in its manufacture, thus keeping the manufacturing expense thereof at a minimum.

A further object of this invention is the provision of a sewing machine frame of a lightweight material having high impact strength and a modulus of elasticity which is low so that the material will readily absorb the vibrations set up by the rapidly moving sewing mechanism.

Still another object of the present invention is to provide a sewing machine frame of a molded resinous material, which frame is so constructed that any initial shrinkage that occurs therein will be controlled to the degree that no warpage of the frame will result therefrom.

The foregoing objects, and others ancillary thereto, have been attained by the provision of an improved sewing machine frame comprising a bed portion, a bracket-arm and standard unit, and an arm side cover-plate, all of said component parts being molded of a resinous material.

It is, of course, not new to fashion certain portions of a sewing machine out of resinous materials as evidenced by the British Patent No. 419,916, granted to G. M. Pfaff on March 12, 1934, and the U. S. Patent No. 1,961,993, granted to C. S. Thompson on June 5, 1934. However, such resinous materials as were heretofore used on sewing machine parts were not adapted to be formed into an entire frame as they were low-strength materials having great moldability but rather poor mechanical properties.

The applicants have found that if they mold their frame of a base material having long fibers therein the resulting product will possess a relatively high impact strength. By properly molding such a long fibered base material the orientation of the fibers will not be uniform but they will mat or interlock with each other in all directions thus imparting tremendous strength to the sewing machine frame. In a preferred form of the invention unground wood fibers or paper making stocks are used as a base material in preference to a ground wood flour or the like substance.

To properly bind these long matted fibers into a hardened mass a suitable content of resin is mixed with the fibers prior to the molding of the same. Any resin may be used without departing from the principle and scope of the invention, but we prefer to use a liquid synthetic resin of the heat hardening type, such as a phenol-formaldehyde resin, rather than a resin of the thermo-plastic type. However, resins of a thermo-plastic nature may be used if desired.

A preferred manner of forming the present sewing machine frame is to mix the fibers in the form of a wet pulp with liquid resin, felt the same upon a suitable die, abstract the water from the matted mass, and thereafter mold the same under sufficient heat and pressure to form an infusible hardened product. The felting or preforming of the wet resin-impregnated pulp results in a preformed unit roughly the shape of the finished article. Upon drying this preformed unit it is ready to be placed between the molding dies which will, upon application of heat and pressure, produce the finished article.

It is to be understood that in the usual process of hot molding, the material which is placed between the dies is required to flow, under pressure of the dies, into its final shape. This flow of the material under pressure of the dies is deleterious to a long fibrous material as it breaks or separates the fibers wherever the flow occurs, with the result that the finished article is weak. Therefore, by preforming the pulp, as above described, a stronger unit will result as less flow will be necessary in order to make the pulp conform to the shape of the molding dies. This is a particularly important consideration in the forming of the bracket-arm and standard unit of the present machine as it is of a rather intricate shape and would, if improperly molded, require much flowing of the pulp before it could be rendered infusible under heat and pressure. Color may be imparted to the product by the addition of the proper pigments to the above noted solution.

For a more complete understanding of this type of molding process reference may be had to Patent No. 368,794, August 23, 1887, to Tobey, and Patent No. 1,160,362, November 16, 1915, to Baekeland.

The resulting product has a relatively low period of vibration, and, therefore, makes for a sound-absorbing sewing machine frame.

The invention both in structure and in operation, as well as ancillary objects thereof, will be best understood from the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a perspective view of the front side of the improved sewing machine with the arm side cover-plate removed.

Fig. 2 is a bottom plan view of the present machine.

Fig. 3 is a front side elevation of the machine.

Fig. 4 is a perspective view of the inside face of the arm side cover-plate.

Fig. 5 is a vertical section of the arm side cover-plate taken substantially along line 5—5 of Fig. 4.

Fig. 6 is a horizontal section taken substantially along line 6—6 of Fig. 3.

Fig. 7 is a transverse vertical section taken substantially along line 7—7 of Fig. 3.

Fig. 8 is a transverse vertical section taken substantially along line 8—8 of Fig. 3.

As illustrated in the drawings the sewing machine frame comprises a substantially rectangular shaped base or bed, indicated generally as 10, having a work-supporting plate 11 provided on its under face with a grid of strengthening ribs 12, downwardly extending side-walls 13 and 14, and an end-wall 15 which connects the side-walls 13 and 14.

Fixed to the bed 10 by the screws 16 is an upright standard 17 which carries the overhanging bracket-arm 18 terminating in a hollow needle-bar mechanism compartment 19 carrying the usual reciprocatory needle-bar 20, needle 21, presser-bar 22 and presser-foot 23. Disposed within and lengthwise of the overhanging bracket-arm 18 is the sewing machine main shaft or needle-bar actuating shaft 24 having a balance-wheel 25 fixed thereto and adapted to be driven by a belt, not shown herein, which may be received within the belt-groove 26 of the balance-wheel. The forward end of the shaft 24 carries a crank 27 connected by a pitman 28 with the needle-bar 20 for the purpose of reciprocating the same. The crank 27 is also connected by means of a link 29 to the usual needle-thread take-up member 30 which in turn is pivotally secured to one end of a guide link 31 the other end of which is pivoted to the machine frame at point 32.

Mounted upon the shaft 24 is a bevel gear 33 meshing with a similar gear 34 mounted upon the upper end of a vertical rotary or loop-taker actuating shaft 35 which is journaled in the upright standard 17. Secured upon the lower end portion of the shaft 35 is a crank disk 36 upon which a pin 37 is eccentrically mounted for the purpose of pivotally engaging and actuating one end of an oscillatory hook-driving pitman 38. The other end of the pitman 38 is pivotally connected to an arm 39 which actuates the rocking hook-shaft 40 in the usual manner. Upon the upper end of the vertical hook-shaft 40 is secured an oscillatory hook or loop-taker 41 which cooperates in the normal fashion with the needle 21 in the formation of stitches.

A feed-bar 42 carrying a feed-dog 43 is reciprocated horizontally by a rocking feed-shaft 44, having at its rear end an arm 45 to which is pivotally connected the lower end of a feed fork 46 operated from a cam or eccentric 47 on the shaft 24. The length of the feed-dog movements in the horizontal direction may be adjusted by means of the usual adjusting lever 48 and its accompanying mechanism. The vertical movements of the feed-bar are imparted thereto from a bar 49 which is actuated by means of the hook-driving mechanism. The rock-shaft 44 is supported on pivot-lugs 50 and 51 threaded respectively into the bearing supports 52 and 53 which are formed integrally with the bed 10.

For a more complete disclosure of the above described sewing machine feeding and stitching mechanisms reference may be had to the U. S.

Patent No. 663,696, to Diehl et al., dated December 11, 1900.

In the present form of the invention all of the moving elements and a majority of the remaining elements of the feeding and stitch-forming mechanisms are journaled or held within the plastic frame by means of metallic bushings. Figs. 3, 7 and 8 best illustrate the use of such metallic bushings. For example, the rotary main shaft **24** is journaled directly in bushings **54** and **55**; the vertical hook-actuating shaft **35** is journaled in upper and lower bushings **56** and **57**; the needle-bar **20** is vertically slidable in bushing **58**; and the presser-bar **22** vertically slidable in bushing **59**. All of these bushings may be press-fitted into place after the frame has been completely molded, but if desired the bushings may be inserted into the preformed mat and have, in effect, the frame molded thereabout.

As hereinabove noted, the present frame comprises three separately molded parts, namely, the bed unit **10**, the standard and bracket-arm unit **17** and **18**, and the arm side cover-plate **60**, which latter unit is adapted to be secured by screws **61** to the open sided standard and bracket-arm unit **17** and **18**. The standard and bracket-arm unit, or gooseneck, is formed as an open L-shaped trough and as best seen from Figs. 6 and 8 it is substantially C-shaped in cross section. In order to impart the maximum amount of strength to this gooseneck the portion **62** of the gooseneck head, which is normally called a sewing machine face-plate, is formed integrally therewith, thus forming a trough-like unit bounded by continuous and substantially unbroken side walls on all sides including the ends at the head and base. In this connection it is to be noted that even the bottom portion of the gooseneck is closed as at **63**.

To further strengthen the gooseneck and to prevent uneven shrinkage therein during the curing period thereof, there is provided within the hollow portion of the bracket-arm a plurality of intersecting or web-like interlocking concave ribs **64**, and within the hollow standard portion, the vertical rib **65** and the horizontal concave ribs **66**. The enlarged apertured lugs or webs **67** and **68** form bearing blocks for a respective one of the shafts **24** and **35**.

As may be seen from Fig. 1, the enlarged lugs **67** and **68** form with the unbroken side wall of the gooseneck and rib **65**, three separate comparts within the confines of the trough. Also it may be seen that the needle-bar actuating means, including the crank **27** and link **28** are entirely disposed within that compartment defined by the end-closure plate **62** and the transverse lug **67** which is formed at the juncture of the head **19** and the bracket-arm **18**.

As also hereinabove noted the bed or base **10** is formed with a plurality of intersecting reenforcing ribs **12** projecting from the bottom face thereof, as well as the downwardly extending side walls **13** and **14** and the end wall **15**. As may be best seen from Figs. 2 and 7 the side walls **13** and **14** extend about the left-hand end of the base to form a boss **69** in which the hook-shaft **40** is journaled. As these side and end walls, ribs, and flanges as well as the boss are all molded to size in the above noted molding process, little if any machining is required in the manufacture of this base **10**.

The arm-side cover-plate **60** is provided with a bead **70** upon the marginal portion of the inner face thereof, which bead mates with the groove

71 provided about the marginal portion of the gooseneck. Thus when the cover-plate **60** is positioned and secured in its proper place it lends added rigidity to the frame. The usual type of needle-thread tension device **72** may be mounted upon the cover-plate **60**, and further, the latter element may be slotted as at **73**, **74**, **75** and **76** to permit various elements of the sewing machine mechanism to protrude therethrough.

By thus molding each of the three component parts of this sewing machine frame of a long fibered base substance bonded by means of a resinous material, a product is formed having great impact strength because of the orientation of its fibrous structure. Further, the finished article has a polished appearance due to presence of the heat-hardenable resin. Although this molded frame is of sufficient hardness to withstand normal bending stresses, its modulus of elasticity is low enough to enable it to absorb a great amount of vibration. Also, as hereinabove noted, the novel bracing of the gooseneck, namely the use of the intersecting ribs and the trough-like outline thereof, imparts great strength to the frame as well as an ability to withstand an initial shrinkage without any accompanying warpage.

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

1. A sewing machine gooseneck comprising a substantially L-shaped molded unit of a hard fibrous composition having an intermatted fibrous structure bound by a fused resin uniformly distributed throughout the unit, said gooseneck being bounded by continuous and substantially unbroken side walls on all sides, including the ends at the head and base, and excepting the front thereby to form a trough shaped structure having a substantially C-shaped transverse cross-section, a plurality of spaced apertured lugs molded integrally with said unit thereby to divide said trough into a plurality of separate compartments, a plurality of web-like ribs formed within said trough between said apertured lugs, and a cover-plate removably secured to said side walls thereby to enclose said trough.

2. A sewing machine comprising a substantially flat work-supporting bed, a loop-taker and loop-taker actuating means carried beneath said bed, an L-shaped gooseneck mounted upon said bed and formed of a hard fibrous composition comprising an intermatted fibrous structure bound by a fused resin, said gooseneck being bounded by continuous and substantially unbroken side walls on all sides, including the ends at the head and base, and excepting the front thereby to form an open-sided trough, a plurality of web-like reinforcing ribs formed within and throughout the length of said trough, a plurality of spaced bearing supports molded integrally with and disposed within said trough, a main shaft disposed within said trough and journaled in at least one of said bearing supports, a reciprocatory needle-bar, and needle-bar actuating means including a needle-bar crank and link, said last mentioned means being operatively connected to said main shaft and being entirely disposed within said trough.

3. A sewing machine comprising a work-supporting bed unit, a loop-taker and loop-taker actuating means carried beneath said bed unit, a gooseneck mounted upon said bed unit, said gooseneck being molded of a hard fibrous composition comprising an intermatted fibrous structure bound by a fused resin, said gooseneck being bounded by continuous and substantially un-

broken side walls on all sides, including the ends at the head and base, and excepting the front thereby to form a trough-shaped structure having a substantially C-shaped transverse cross section, a plurality of spaced apertured lugs molded integrally with said gooseneck thereby to divide said trough into a plurality of separate compartments, a plurality of concave interlocked ribs molded between said apertured lugs, a main shaft journaled in at least one of said apertured lugs and being disposed within said trough, a needle-bar, needle-bar actuating means including a crank and link carried at one end of said main shaft and being entirely disposed within one of said compartments, and a cover-plate removably secured to said side walls thereby entirely to enclose said trough.

4. A sewing machine gooseneck, comprising, a substantially L-shaped unit, bounded by continuous and substantially unbroken side walls on all sides, including the ends at the head and base thereof, and excepting the front thereby forming

a trough-shaped structure having a substantially C-shaped transverse cross-section, the marginal portion of said gooseneck being provided along the major portion thereof with a groove, a cover-plate provided with a marginal bead and being removably secured on said side walls with said bead and said groove in mating registration, a plurality of spaced apertured lugs integrally formed within said trough thereby to divide the trough into a plurality of compartments, and a plurality of concave interlocked ribs formed within said trough and disposed between said apertured ribs, said gooseneck and said cover-plate each comprising a body of material containing long fibers intimately mixed within a resinous binder and compressed and hardened to its final form under heat and mechanical pressure, said long fibers being uniformly distributed throughout the product but having an interlocked orientation therein.

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