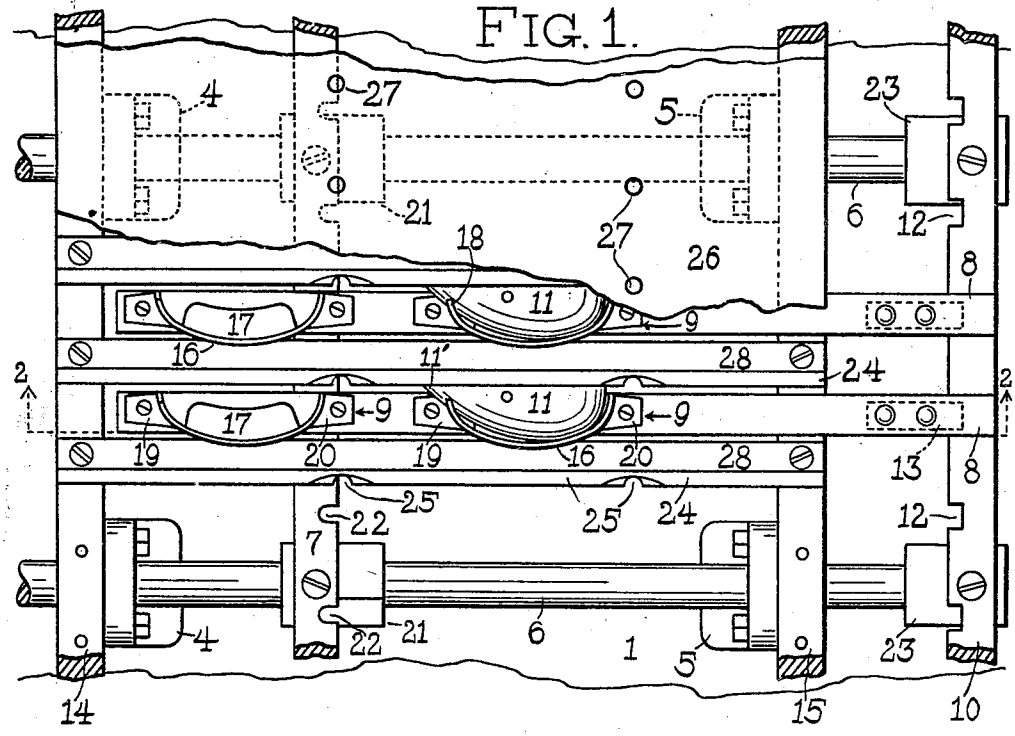
April 28, 1931. G. A. BOETTCHER 1,802,869

FREE FLOATING SHUTTLE HOLDER

Filed Jan. 19, 1929 2 Sheets-Sheet 1

FIG. 1.



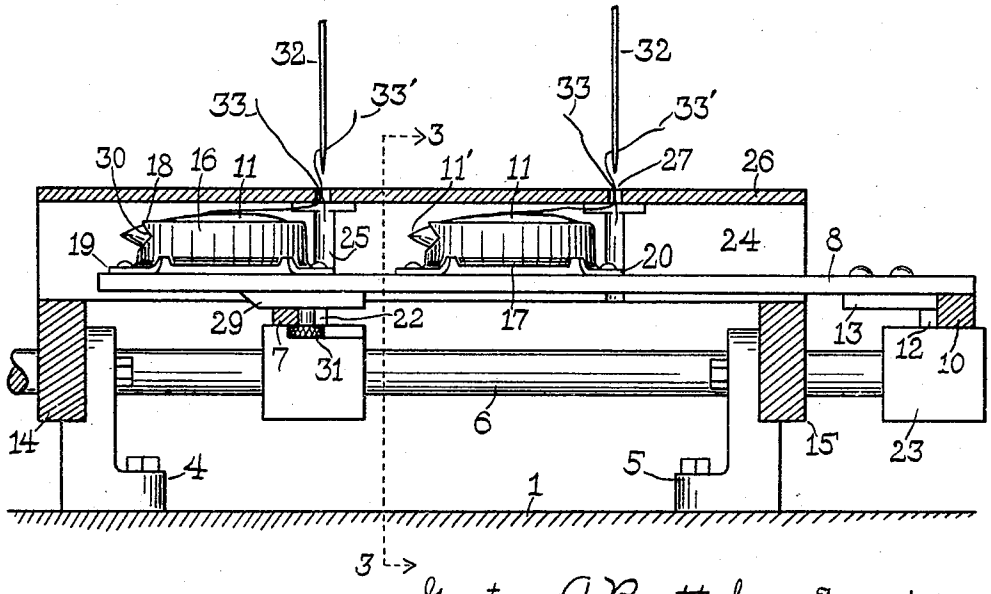


FIG. 2.

Gustav A. Boettcher Inventor

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April 28, 1931. G. A. BOETTCHER 1,802,869

FREE FLOATING SHUTTLE HOLDER

Filed Jan. 19, 1929 2 Sheets-Sheet 2

FIG. 5.

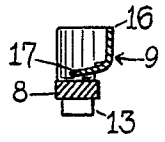


FIG. 8.

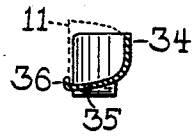


FIG. 3.

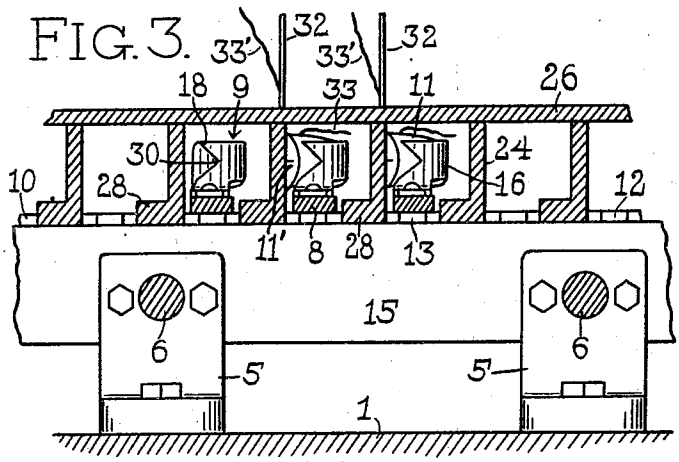


FIG. 4.

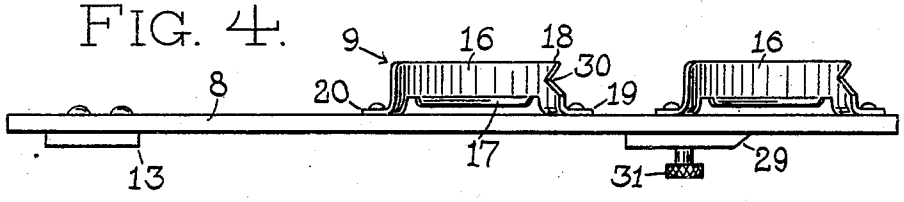


FIG. 6.

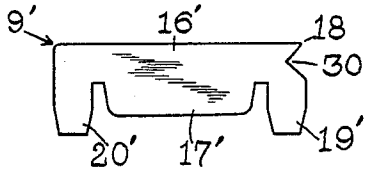


FIG. 9.

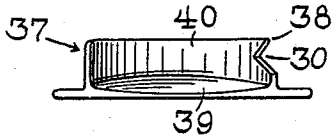


FIG. 10.



FIG. 7.

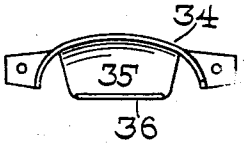


FIG. 11.

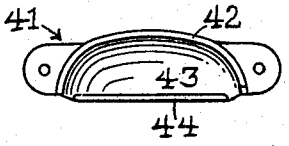
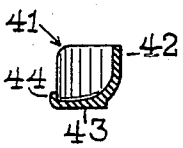


FIG. 12.



Gustav A. Boettcher Inventor

By His Attorney C. F. Wm. Forssberg.

Patented Apr. 28, 1931 1,802,869

UNITED STATES PATENT OFFICE

GUSTAV A. BOETTCHER, OF JAMAICA, NEW YORK

FREE-FLOATING-SHUTTLE HOLDER

Application filed January 19, 1929. Serial No. 332,651.

This invention relates to free floating shuttle holders for sewing and quilting machines, especially of the multi-needle class, and particularly involves the support and partial envelopment of a shuttle in such manner as to drive and guide the same with but trifling contact against one side only of a race on the machine, and, when desired, without any contact with the race whatever.

The main feature of my invention is to provide a machine of the class mentioned with a shuttle holder which so supports a shuttle while driving the same, that at most, the shuttle will make direct contact with a single flat side of a race, thus permitting a great increase in the operation of the machine, due to the lesssened friction and resistance decreasing the strain on the thread of the shuttle.

Another feature is to so form such a shuttle holder that the contact of the shuttle against the race along one side may be nicely adjusted by the design of the holder.

A further feature is to have a shuttle holder which may be designed to entirely carry a shuttle without any contact with a race, so that the latter merely forms a partition between the shuttle and holder and the next adjoining shuttle and holder.

Yet another feature is to have a shuttle holder which consists primarily of a carrying and driving bar upon which a shuttle carriage of my novel construction is secured, the latter being practically a cradle which is either stamped from a single sheet metal blank or cast in one piece.

Further features, and the various objects and advantages of my invention will appear hereinafter as this specification proceeds.

In the accompanying drawings forming part hereof,

Fig. 1 is fragmentary plan view of a multi-needle sewing or quilting machine equipped with shuttle holders made according to my invention and generally embodying the same.

Fig. 2 is a cross section of Fig. 1 on line 2—2.

Fig. 3 is a vertical section of the same machine on line 3—3 of Fig. 2.

Fig. 4 is a view of one of the drive bars detached from the machine and provided with a pair of shuttle cradles thereon so as to form a shuttle holder unit, the same being turned in the opposite position in which it appears in the former views.

Fig. 5 is a vertical section of the shuttle holder of Fig. 4 as seen from the right.

Fig. 6 illustrates a sheet metal blank from which the mentioned shuttle cradles may be formed.

Fig. 7 is a plan view of a modified form of shuttle cradle.

Fig. 8 is a vertical section of the same for comparison with the cradle of Fig. 5.

Fig. 9 is a cast metal shuttle cradle or carriage which corresponds in effect with those shown in Fig. 4.

Fig. 10 is a plan view of the same cast cradle.

Fig. 11 is a view of a modification of said cast cradle and corresponds with the modified cradle of Fig. 7.

Fig. 12 is a vertical section of the cradle of Fig. 11 and corresponds with that in Fig. 8, while in contrast with Fig. 5.

Throughout the views the same reference numerals indicate the same or duplicate parts.

In sewing and quilting machines of the multi-needle type, stationary shuttle races have practically always been depended upon for guiding and often supporting the shuttles during their movement in the machines, while the driving means for the shuttles have, as a rule been solely used for propelling said shuttles. This has resulted in exposing the threads of the machines to abrasive friction between the shuttles and the races and effectively prevented any great speed of operation, due to the ever present danger of thread breakage caused by the strains and the friction thus encountered. The races have also been grooved or otherwise formed to somewhat conform with the shape of the mentioned shuttles, this actually increasing the surfaces in contact and thereby the friction between the said shuttles and the races and the speed of the machine must necessarily be kept down to a point where the breakages were at a minimum in number.

However, it is herein proposed to radically modify the theory of supporting a shuttle while driving the same, so as to practically eliminate the frictional resistance to its propulsion and release of thread during operation in order to permit a tremendous acceleration of the operating speed of the machine involved, in fact a doubling or even trebling of the ordinary rate at which such machines were operated hitherto. The ultimate purpose is, of course, the doubling or tripling the output per hour or day, which means that less space and fewer operators are required for producing a given quantity of work.

In order to accomplish the indicated results, I employ the structures which will immediately be described. A machine bed 1 is provided with a plurality of supporting members 4—4, 5—5 which carry a pair of rigid and corresponding bars 14 and 15. Upon the latter bars the ends of a plurality of spaced races or partitions 24—24 are secured by means of their base portions 28—28, insuring their permanent upright position. A throat plate for the machine is laid upon the upper edges of the partitions at 26, the plate being furnished with a plurality of needle apertures such as 27—27, while beneath said apertures the partitions have corresponding open vertical slots similar to 25; above each aperture and slot a needle 32 is normally mounted, although no means are here shown for supporting or operating the same.

In order to co-operate with the needles on the machine, a corresponding series of shuttles 11—11 are reciprocated past the vertical partition slots 25 by driving bars 8—8 which are disposed individually between the partitions before described. The supporting and guiding mechanism for these driving bars is substantially a transversely slidable shuttle driving frame consisting of two or more parallel rods 6—6 which are slidably supported in bars 14 and 15 and their supports 4—4 and 5—5, the blocks 21—21, 23—23 and a pair of corresponding anchor bars 7 and 10. The blocks mentioned are secured to the rods 6—6, and when the rods are reciprocated move with same and carry the anchor bars with them. The shuttle driving frame just described may be reciprocated by any well known shuttle driving means common to machines of this class, such as are described, for example, in the patent to Beck, dated January 10, 1888, having the Number 376,280, or my own Patent Number 1,218,517 which bears the date of March 6, 1917. However, as the driving means per se are thus amply described already in the art, and in addition form no essential part of this invention, they are omitted to clarify the views.

However, the anchor bar 7 has a series of repeated slots 22—22 and the bar 10 the corresponding slots 12—12 for receiving the headed retaining stud 31 and the locating member 13 of each driving bar 8. Each bar 8 has a block similar to 29 beneath the same for resting on bar 7 and maintaining the driving bar above the level of the rigid partition bars 14 and 15, the construction being such as to permit first, the insertion of the stud into a slot 21 and thereafter the lowering of the locating member 13 into the relatively opposite slot 12 in order to accurately place any one of the mentioned driving bars into position.

Each driving bar has one or more shuttle cradles secured thereon as indicated at 9—9, such a cradle having its forward end 19 and its rearward end 20 secured upon the driving bar by means of screws, rivets or other known means. The cradle has a curved back or rather a side 16 which terminates adjacent end 19 in a slotted end having an open V slot with a retaining finger 18 above for the nose 11′ of a shuttle. The side 16 is curved approximately to conform with the general form of the curved side of the shuttle 11, while permitting the nose 11′ thereof to project out from the slot 30. The cradle is also provided with a shelf 17 which projects from side 16 at a low angle for supporting the body proper of the shuttle, while the degree of inclination will govern the tendency of the shuttle to gravitate toward the adjacent race or partition 24. Hence, when the machine is in operation, the driving bars and shuttle cradles which together thus constitute shuttle holders will be reciprocated between the partitions, carrying the shuttle past the needle apertures and the slots in the partitions as already mentioned, and because of the sole slight guiding contact with one side of its adjacent race or partition allows thread 33 to be easily and swiftly drawn past the shuttle without the common abrading friction usually encountered thereby. It is therefore readily seen that the speed of movement of the driving bars may be greatly augmented without danger of breaking the thread while sewing.

On the other hand, while the inclination of the shelf or bottom of the shuttle cradle at 17 will cause the shuttle to generally gravitate toward the open side of the cradle, the retaining finger of the latter at 18 holding the nose of the shuttle down in position, yet it is also easily possible to entirely do away with the contact of the shuttle with any race or partition, especially when using certain light and very frangible threads. In such a case, it is but necessary to form a cradle 34 with a shelf 35 having a lip 36 along its edge for retaining the shuttle in captive position on the cradle as indicated at 11 in Fig. 8. The principle is substantially the same as before, the support for the shuttle moving with the same instead of being stationary in the form of a rigid race or pair thereof.

In Fig. 9, a cradle similar to 9 is shown

as 37, being here a casting having the side 40, the bottom 39, the retaining finger 38 as before and the slot 30. It is not made as the first, from a stamping 9′ whose tongues 19′ and 20′ are bent to form the ends 19 and 20 and whose main portion 16′ and lip 17′ are also bent to later form the curved side and shelf, respectively, of the cradle, but is cast at once into proper form. A slight modification of the latter casting is also shown in the last two views, where the cast cradle 41 has the curved side 42 as before, the bottom 43 and a lip 44 along the edge of the shelf corresponding with the lip 36 of the sheet metal cradle of Figs. 7 and 8. In this casting, the other features are the same as in 37. For the stamped and formed cradle of the seventh and eighth views mentioned, the lip 17′ of the blank shown in Fig. 6 is the only part which must be altered, and even this only needs a slight lengthening of the same to provide material for the lip 36.

The contrast between my invention and practice as heretofore carried on is evident, for instead of merely driving a shuttle by means of a driving bar and depending upon the frictional contact between the shuttle upon both sides with the races to guide the same in movement, I have provided means for carrying the shuttle in guided manner while driving the same so that slight guiding effect may be had against only one side of one race as a mere auxiliary to the moving guide of the driven shuttle, or may be entirely dispensed with upon occasion.

Having now fully described my invention, I claim:—

1. A shuttle driving mechanism for sewing or quilting machines including the combination, with a slidable driving bar support, of a driving bar arranged upon said support, a shuttle, a shuttle cradle mounted upon said driving bar for longitudinally enveloping and enclosing said shuttle along one side from one end toward the other end thereof, means upon said cradle for retaining said other end of said shuttle against lifting movement, means rigidly associated with said cradle intermediate the ends thereof for supporting said shuttle, and stationary means arranged in spaced relation to one side of said driving bar for uniformly guiding said shuttle and retaining the same within said cradle in movement.

2. A sewing or quilting machine provided with a rigid race having a generally flat side in combination with a driving bar movably supported in spaced relation along said race, a shuttle having a convex side and an opposite and relatively straighter side adapted to engage against said generally flat side of said race, a shuttle cradle mounted upon said driving bar having a continuous enclosing wall enveloping said convex side of said shuttle longitudinally from end to end, the extremities of said enclosing wall being directed toward said race, and a supporting member rigid with said cradle intermediate the extremities thereof for supporting said shuttle within the cradle and said enclosing wall, and against said race.

3. A sewing or quilting machine provided with a rigid race having a generally straight side, in combination with a driving bar movably supported in spaced relation to said race, a shuttle having a convex side and an opposite and relatively straighter side adapted to engage against the generally straight side of said race, a shuttle cradle secured upon said driving bar having a continuous enclosing wall arched longitudinally about the convex side of said shuttle so that the ends of said wall are directed toward said race and expose the relatively straighter side of said shuttle to the side of said race, there being an undercut slot in one end of said enclosing wall permitting one end of said shuttle to project therethrough, and a supporting member integral with said enclosing wall extending between the extremities thereof for supporting said shuttle.

4. A sewing or quilting machine provided with a rigid race in combination with a driving bar movably mounted in spaced relation along said race, a shuttle having a convex side and a relatively straighter opposite side, a shuttle cradle secured upon said driving bar having an enclosing wall arched longitudinally in curved manner from end to end about the convex side of said shuttle, the nose of said shuttle projecting beyond said wall at one end thereof, a supporting shelf for said shuttle extending down from said wall intermediate the ends thereof in inclined manner so as to impart a tendency to said shuttle to lie with its relatively straighter side against said race, and means arranged to be movable with respect to said race for supporting said driving bar.

5. In a sewing and quilting machine, the combination with a rigid supporting frame, of a plurality of races rigidly secured upon said frame, and a shuttle driving mechanism, including a shuttle driving frame slidably supported upon said rigid frame and having a pair of spaced parallel bars arranged transversely with respect to said races, there being a row of slots on the edge of each of said parallel bars facing the other bar, and said slots in one bar corresponding with those of the other bar and with said races, a shuttle driving bar normally overlying each pair of opposite slots so as to provide one driving bar adjacent each race, a downward projection disposed beneath each driving bar and projecting into one of the row of slots in one parallel bar, a corresponding headed projection spaced spaced beneath each driving bar from its first downward projection and normally engaging in a correspondingly oppo-

site slot of the row in the other parallel bar, whereby to render said driving bars detachable at will and also normally locate the same upon said parallel bars in proper relation to said races, and a shuttle cradle secured upon each of said driving bars for carrying a shuttle individually along said races.

6. In a sewing or quilting machine, the combination with a rigid supporting frame, of a race secured to said frame, and a shuttle driving mechanism including a second frame reciprocably supported upon said rigid frame and having a pair of opposite spaced members, a driving bar normally lying upon said spaced members adjacent said race, means associated with said spaced members and said driving bar for detachably locating the same upon said spaced members, and means upon said driving bar for supporting and retaining a shuttle in association therewith, including a shuttle cradle secured upon said driving bar.

7. An an article of manufacture, a shuttle cradle adapted to be secured upon a driving bar for a sewing or quilting machine and formed of a unitary piece of suitable material, including an erect wall arched in curved manner about a general vertical axis, a terminal tongue projecting horizontally from each end of said wall to provide a pair of oppositely extending feet for said shuttle as a whole, and a shuttle supporting shelf extending from the lower edge of said wall into a position generally intermediate said feet and within the curvature of said wall.

In testimony whereof, I have signed my name to this specification.

GUSTAV A. BOETTCHER.