

(No Model.)

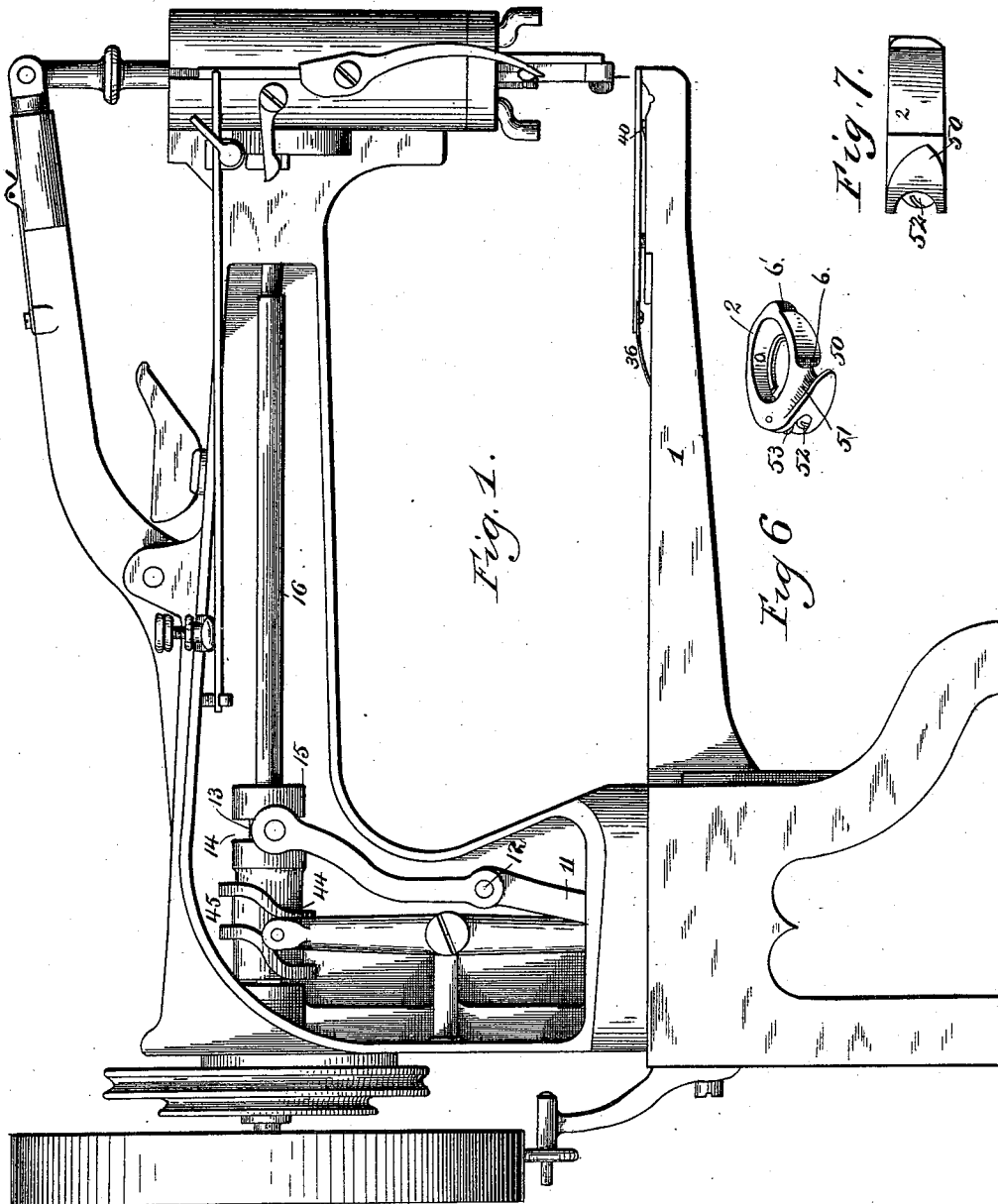
2 Sheets—Sheet 1.

W. H. HANNA.

SHUTTLE AND SHUTTLE ACTUATING MECHANISM.

No. 534,263.

Patented Feb. 19, 1895.



Witnesses:

J. B. McGirr.
W. J. Burkard

Inventor.

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By his Attorneys,
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Fig. 2.

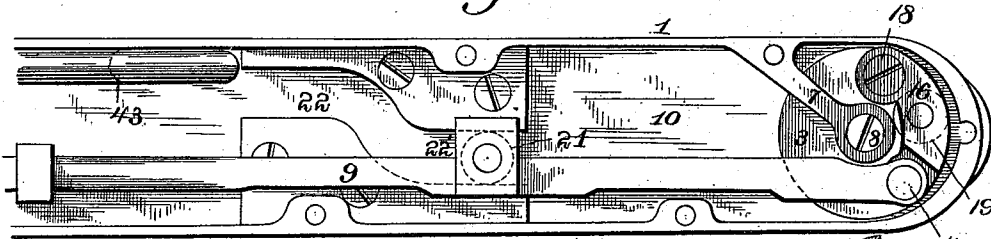


Fig. 8.

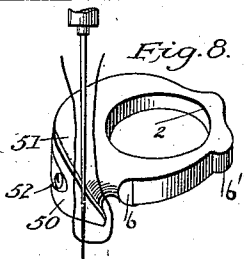


Fig. 10.

Fig. 3.

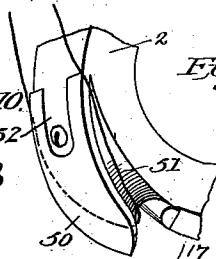


Fig. 9.

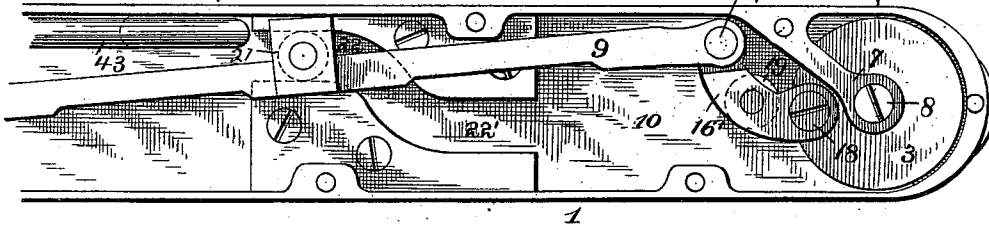
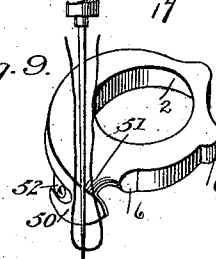


Fig. 4.

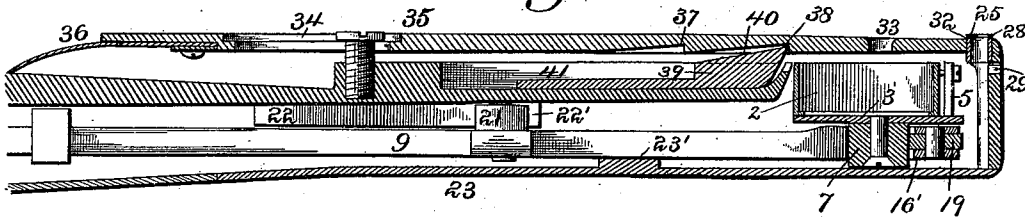


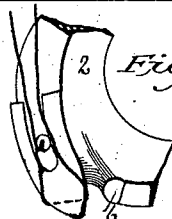
Fig. 5.



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Fig. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM HAMILTON HANNA, OF PETERSBURG, ILLINOIS.

SHUTTLE AND SHUTTLE-ACTUATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 534,263, dated February 19, 1895.

Application filed July 31, 1891. Serial No. 401,308. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HAMILTON HANNA, a citizen of the United States, residing at Petersburg, in the county of Menard and State of Illinois, have invented a new and useful Improvement in Sewing-Machines, of which the following is such a full, clear, and exact description as will enable those skilled in the art to which it pertains to make and use my said invention.

My invention relates to that class of machines known as "universal-feed arm machines."

The objects of my invention are to provide a shuttle of improved construction and novel mechanism for driving same, said shuttle and driving mechanism being wholly contained within the work-arm of the machine; also to so construct and arrange the several parts of the mechanism as to prevent the work placed over or against the end of the arm from being struck or injured by the driving mechanism; also to so reduce the size of the end of the work arm so as to make it practical to work small sized articles thereon, also to provide means to prevent the casting of the needle thread into the recess provided for the shuttle thread tension-spring or into the slot provided in said shuttle to facilitate the threading of the shuttle.

The casting of the thread as above described is a serious objection to machines of this class as now commonly constructed, as it causes frequent breakage of the thread and much annoyance and delay in the operation of the machine. My invention completely obviates this objection.

Another purpose of my invention is to so construct and arrange the shuttle and the driving mechanism that they may be very compact and occupy very small space in the work arm thereby enabling me to materially reduce the size of the end of the work arm of the machine and adapting it to work smaller articles thereon than has hitherto been practical.

Another purpose of my invention is to improve the shuttle driving mechanism, making it more reliable and effective in service.

Another object of my invention is to provide a shuttle so constructed as to prevent the drawing of the needle thread into the

deep sunken recess on the peripheral face of the oscillating shuttle, which recess is located immediately behind and extends partially into the hook and is provided to receive the tension spring, said shuttle being adapted to that class of machines known as the Singer, Universal feed arm machine, the Bradbury and the Poletype machine.

Another purpose of my invention is to provide a shuttle having an elongated hook having its point below the median line of the shuttle, so constructed and disposed that when the needle is set so that its eye shall not be higher than the bottom of the shuttle after the needle has been slightly lifted to form the loop for the shuttle to enter, the point of the shuttle will be adjacent to the largest part of the loop and in position to enter the loop without dragging the thread upon the end of the hook, and the hook will be in such position as to prevent the casting of the needle thread loop into the tension spring recess on the periphery of the shuttle, or into the slot for threading the shuttle, which is a common objection to a shuttle as commonly constructed having a blunt point, said point being on the median line of the shuttle.

My invention consists of certain novel features of construction and combinations of mechanism hereinafter fully set forth and specifically claimed.

In the drawings to which reference is hereby made, I have illustrated my invention as applied to a machine of the Singer make.

Figure 1 is a view of a sewing machine embodying my invention. Fig. 2 is a bottom plan view of the work-arm with the lower face plate removed showing the shuttle driving rod at the end of its outward stroke when turning the shuttle carrier. Fig. 3 is a bottom plan view of the work-arm with the lower face plate removed, showing the driving rod in position at the end of the return stroke, when turning the shuttle carrier. Fig. 4 is a vertical longitudinal section through the horizontal work-arm and connected parts. Fig. 5 is a detached perspective view of the driving rod and the connected segmental link which drives the shuttle carrier. Figs. 6 and 7 are perspective and elevation views of the shuttle detached from its carrier, and show the elongated hook having its point below the

median line of the shuttle. Fig. 8 is an enlarged detached view of the needle during the operation of forming the loop and of the shuttle having the elongated hook, and shows the shuttle entering the loop at its widest part. Fig. 9 is a view of a shuttle having a short hook, its point being on the median line of the shuttle and in the position at which it should enter the loop formed by the needle thread. The shuttle shown in this view is that commonly used prior to my invention and the view illustrates the difficulty arising by reason of the shuttle hook failing to enter the loop. Fig. 10 represents my improved elongated shuttle-hook, with the loop in position on the hook, and shows how the thread is guided back beyond the front end of the tension spring recess by means of the tapering grooves in the sides of the hook so that it is impossible for the thread to be drawn into the tension spring cavity or into the threading slot in the shuttle. Fig. 11 illustrates the short pointed hook commonly used prior to my invention and shows the thread as being drawn in to the tension spring cavity by reason of the thread being caught on the edges of the hook after having reached the end of the grooves in the sides of the shuttle.

Like numerals of reference denote corresponding parts in all the figures of the drawings.

1 designates the horizontal work-arm of the machine, 3 the oscillating shuttle carriers, and 2 the shuttle mounted upon and movable with the carrier. The arm 1 is provided near its outer end with a circular shuttle race 4 and the shuttle carrier and its contained shuttle are fitted within this race, and are retained in place by the walls of the race and are free to turn or oscillate in said race.

The shuttle carrier consists essentially of a flat thin disk having means for engaging the shuttle in such manner as to insure the oscillation of the shuttle with the carrier.

One form of means for driving the shuttle with the carrier consists of a rigid flange 5 on the carrier near its edge. This carrier fits between and engages with shoulders 6, 6' in the periphery of the shuttle, which shoulders are formed by a portion of the periphery of the shuttle being cut out as shown. The shuttle is substantially the diameter of the shuttle carrier disk, and lies flush with the same. The peripheral flange 5 fits snugly in the space between the shoulders 6, 6' with the exception that there is space between said shuttle and flange to permit the thread to pass freely between them. The shuttle carrier rests upon the rigid arm or support 7 which is secured to the work-arm 1 and lies below the shuttle carrier. The inner end of the arm 7 is enlarged and is pierced by a vertical hole in which the pivot 8 turns. The pivot 8 is rigidly secured to the shuttle carrier and pivotally supports the carrier in the race 4 so as to permit the carrier to oscillate freely in the race. The shuttle carrier is driven by a rod

9 situated longitudinally within a longitudinal chamber or recess 10 formed in the under side of the arm 1.

The driving rod 9 extends to the rear of the machine where it is pivoted or otherwise suitably connected to the lower end of the shuttle lever 11. This lever is fulcrumed at 12, and has at its upper end a friction roller 13 which works in the irregular groove 14 in the periphery of the shuttle cam 15 on the main drive shaft 16 of the machine.

At the front end of the drive rod 9 is a segmental link 16'. One end of this link is connected with the rod by a pivot 17. The other end of the link is connected with the bottom of the shuttle carrier by a pivot 18. This link is made segmental in form to adapt it to fit snugly around the shuttle carrier in making the throw of the shuttle and to enable it to operate freely within the narrow confines of the shuttle race, and in order also to reduce the friction and the wear on the pivotal support, upon the shuttle carrier and on the link itself. In the concave edge of the segmental link, contiguous to the pivotal support of the shuttle carrier there is a friction roller 19 turning in a slot 20 in the link, thus adapting the roller to turn on the pivotal support of the shuttle carrier and enabling the link to move or ride freely around said support.

A loose friction roller 21 is supported in an intermediate position on the driving rod 9 and moves freely in an irregular groove 22, 22' formed in any suitable manner in the arm 1 and placed in such relation to the shuttle carrier as to insure the proper lateral movement of the driving rod relative to the shuttle carrier and its pivotal supports as the driving rod is reciprocated back and forth by means of the shuttle lever 11 working in the grooved shuttle cam 15. This improved shuttle driving mechanism preferably imparts to the shuttle carrier an oscillation equivalent to at least three fourths of the circumference of the carrier, or in other words to turn the shuttle about three fourths around.

In the first part of the outward stroke of the rod 9 the outer end of the rod occupies a position at one side of the arm 1 and the link 16' occupies a position outside of the shuttle carrier, as shown in Fig. 3. As the arm continues to move outward, the roller 21 moving in the channel is deflected from the part 22 of the channel to the part 22', thereby deflecting the outer end of the rod to the opposite side of the arm 1 and causing the link 16' to push forward and turn around the pivotal support of the shuttle carrier in such manner as to bring the rod, the link and the shuttle carrier in such position relative to each other as is shown in Figs. 2 and 4, thereby imparting to the shuttle carrier and shuttle a movement which is equal to three fourths the circumference of the carrier.

By the means which I have described the pivots of the link and the driving rods are kept off the center and friction and wear on

the link, the driving rod, and the shuttle carrier are prevented, and the shuttle carrier is operated regularly and uniformly so as to give a steady and easy movement to the shuttle. A special advantage of this construction is that all of the operating parts are retained in the recess or chamber and the shuttle race of the arm 1, and the parts are so compactly arranged and disposed as to permit material reduction in the size of the end of the arm 1. This is important, since by this means the machine can be adapted to work articles of smaller size than has hitherto been practical.

In the shuttle driving mechanism hitherto commonly used in sewing machines of this class, some of the operating parts protrude or extend beyond the end of the arm 1 and in practice they frequently strike against and damage or disarrange the work when the work is brought close to the end of the arm as is necessary in operating the machine.

In my machine the operating parts are housed or contained wholly within the limits of the arm 1 thereby obviating the objection stated.

The under side of the arm 1 is covered by a plate 23 suitably secured to the arm. On the opposite side of the plate 23 is an enlarged wear surface 23' which serves to support the reciprocating driving rod and the link, preventing them from sagging and relieving them from undue friction and wear.

The tubular throat 25 occupies a vertical position near the outer end of the arm 1. This tubular throat has an enlarged base constructed and inserted in the arm 1 as set forth in a divisional application filed by me on the 31st day of October, 1891, Serial No. 410,489.

Over the upper side of the arm 1 is the vibrating throat plate having near its front end the tubular throat orifices 32, 33 and having near its rear end a longitudinal slot 34, having an enlargement to accommodate the head of a screw 35 which passes through the slot. The upper surface of the screw head is flush with the upper surface of the throat plate so as not to interfere with work on top of the arm 1. A leaf spring 36 is secured to the under side of the throat plate near its rear end. On the under side of the throat plate the inclined notches 37, 38 are formed. The projecting lug 40 on the slide 39 engages with the notches 37, 38. The slide 39 is fitted in a guide way 41 as shown.

The peculiar features of my shuttle which I will now describe are clearly illustrated in Figs. 6, 7, 8 and 9. The shuttle has an elongated hook 50 which extends well forward from the tension spring recess 52. This hook is longer than has hitherto been used. The increased extension of the hook is for the purpose of admitting of grooves 51 being formed in the upper and lower sides of the hook relatively deeper and longer than those hitherto used. These grooves decrease in depth as they run backward and terminate

a little behind the front end of the tension spring recess 52. They serve to prevent the casting of the needle thread into the tension spring recess, or into the slot for threading the shuttle. The increased extension of the hook also admits of the hook being made slimmer and the curves on the point of the hook being made longer and less abrupt than have hitherto been used, thereby preventing the dragging of the thread on the edge of the hook as illustrated in Fig 11. The point of the hook instead of being in the horizontal median plane of the shuttle as has hitherto been the common construction, is situated below that plane and is in the most favorable position to enter the largest part of the loop of the needle thread as the needle rises.

By reference to Figs. 8 and 9 in which the formation of the loop is illustrated, it will be seen that the lower part of the loop is larger than the upper and central parts of the loop and it is obvious that if the point of the shuttle is situated contiguous to the larger lower part of the loop it will enter the loop with more certainty and precision than it would do if situated contiguous to the reduced central or upper portion of the loop. It will therefore be seen that there is practical utility in placing the point of the hook below the horizontal median plane of the shuttle as described.

By lowering the point of the shuttle to a distance above the lower surface of the shuttle equal to about one third the depth of the shuttle I am enabled to cause the point of the hook to engage the loop of the needle thread at the largest part of the loop above the needle eye, as shown in Fig. 8.

The foregoing description in connection with the drawings will enable those skilled in the art to which it pertains to readily understand the operation of my invention.

It is obvious that changes in the mechanism herein described as an embodiment of my invention may be made without departing from the spirit or sacrificing the advantages of the same.

I do not herein claim the tubular throat, the vibrating throat plate, nor the mechanism for moving said throat plate, as the same are shown, described and claimed in a divisional application filed by me on the 31st day of October, 1891, Serial No. 410,489.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a shuttle for sewing machines, the combination of the body of the shuttle, the elongated hook having its point below the horizontal median plane of the shuttle, the tension spring recess in the butt of said hook and the deep grooves extending backward along the upper and lower sides of the shuttle body, as set forth and for the purpose stated.

2. In a shuttle for sewing machines, the combination of the body of the shuttle, the elongated hook having its point below the

horizontal median plane of the shuttle, the tension spring recess in the periphery of the shuttle having its front end in the butt of the hook, the spring in the recess and the deep
5 grooves in the upper and lower sides of the shuttle terminating to the rear of the front end of the tension spring recess, as set forth and for the purpose stated.

3. In a sewing machine, the combination of
10 a shuttle carrier pivoted to a central rigid support, a driving rod, a segmental link connected with the driving rod and shuttle carrier and having a friction roller journaled between its ends which is adapted to ride later-
15 ally around the rigid support, and means for giving the driving rod lateral movement and longitudinal reciprocation, substantially as and for the purpose stated.

4. In a sewing machine, the combination of
20 a shuttle carrier pivoted centrally to a suitable rigid support, the reciprocating driving rod having a guide pin or roller, the segmental link pivoted to the rod and the shuttle carrier, and adapted to move around the
25 central support for said shuttle carrier, and the stationary irregular way or guide receiving the guide roller or pin on the driving rod to deflect said rod laterally as it moves back and forth, substantially as set forth.

30 5. In a sewing machine, the combination of

a recessed arm, a plate connected with said arm and provided with a wear surface, a shuttle carrier pivoted centrally to a suitable support, the reciprocating driving rod resting on
35 the wear surface of the plate and carrying the guide pin or roller, a segmental link pivoted to the driving rod and the shuttle carrier, and the stationary irregular way or guide which receives the guide pin or rollers of the driving rod and serves to deflect the same later-
40 ally as it moves back and forth, as and for the purpose stated.

6. In a sewing machine, the combination with a support or arm, of a horizontal shuttle carrier pivoted centrally in said support or
45 arm, a reciprocating driving rod and a segmental link pivoted to the driving rod and connected to the shuttle carrier at a point to one side of its center and having means adapted to ride or bear against the pivotal
50 support of the shuttle carrier when the link is moved with the carrier around its support, as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM HAMILTON HANNA.

Witnesses:

IRA N. ROBERTS,
LAURA SHIPP.

It is hereby certified that in Letters Patent No. 534,263, granted February 19, 1895, upon the application of William Hamilton Hanna, of Petersburg, Illinois, for an improvement in "Shuttles and Shuttle-Actuating Mechanism," errors appear requiring correction as follows: The drawings forming a part of said patent should have been corrected, as directed by the patentee in an amendment duly filed before the issue of the patent, as follows: In Fig. 1, the numerals 11, 12, 13, 14, and 15, are erroneously used to designate the "curved throat-plate arm," the "pivot on which it turns," the "friction roller," the "groove in the throat-plate cam," and the "throat-plate cam," respectively. The numeral 11 should designate the *straight shuttle arm*, the numeral 12 should designate the *pivot on which the straight arm turns*, the numeral 13 should designate the *friction roller on the upper end of the straight arm*, the numeral 15 should designate the *shuttle cam adjacent to the bearing of the shaft 16*, and the numeral 14 should designate the *irregular groove in the periphery of the shuttle cam 15*; and that the drawings and the patent should be read as herein set forth that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 8th day of October, A. D. 1895.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

S. T. FISHER,
Acting Commissioner of Patents.