F. L. CORSON.

SEWING MACHINE.

APPLICATION FILED JAN. 11, 1913.

1,197,265.

Patented Sept. 5, 1916.

2 SHEETS—SHEET 1.

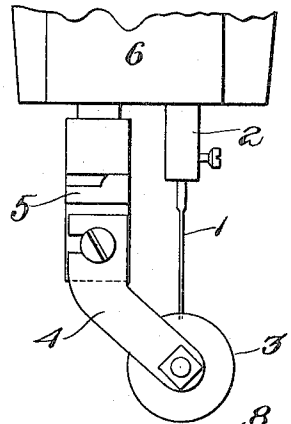


Fig. 1.

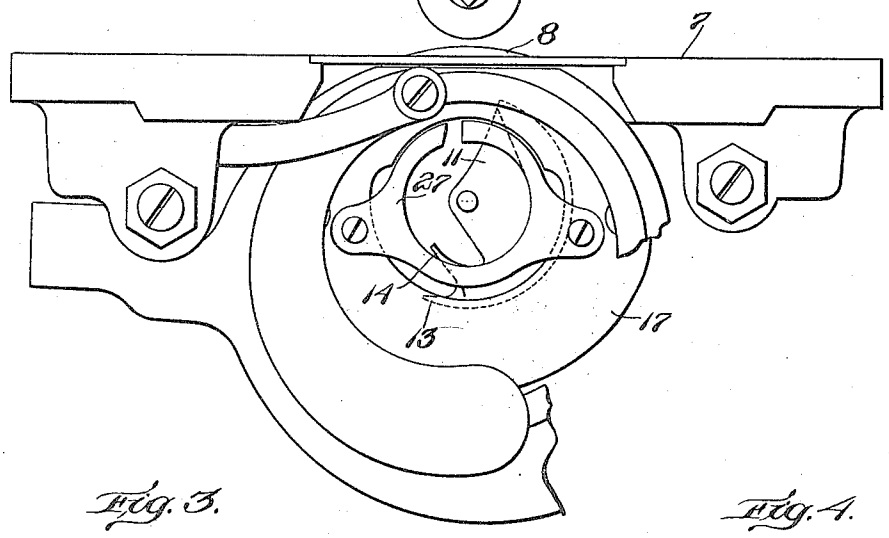


Fig. 3.

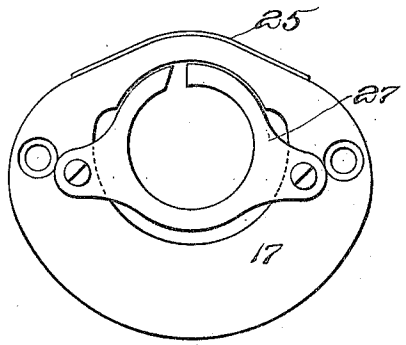
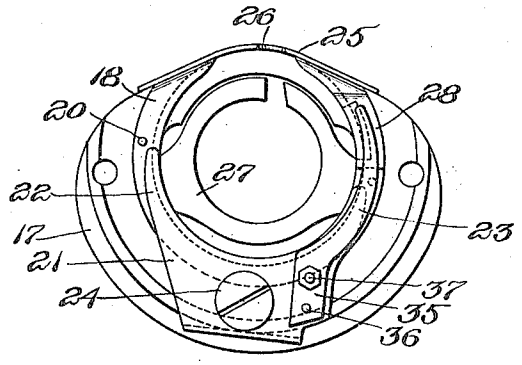


Fig. 4.



Witnesses:
Edward Maxwell
James R. Hodder.

Inventor:
Fred L. Corson,
by Geo. S. Maxwell
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 2.

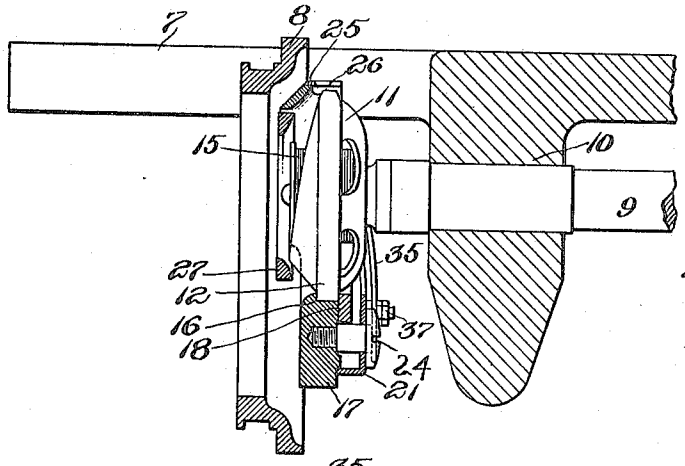
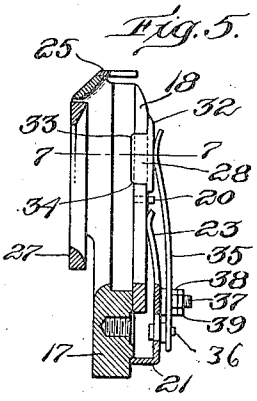


Fig. 5.



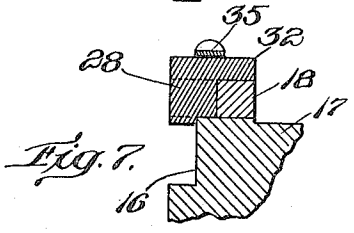


Fig. 7.

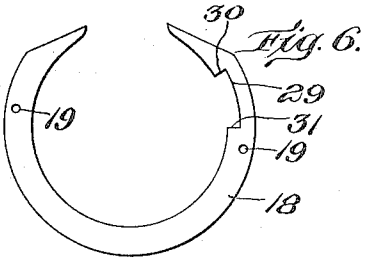


Fig. 6.

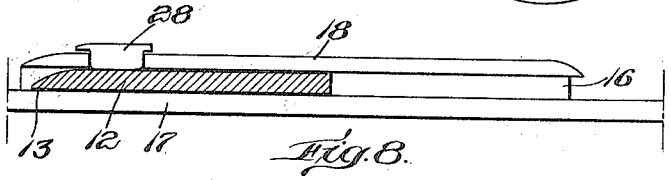


Fig. 8.

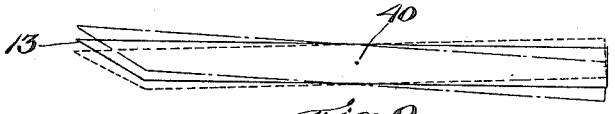


Fig. 9.

Witnesses:
Edward Maxwell
James R. Hodder

Inventor:
Fred I. Corson,
by Geo. S. Maxwell, atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRED L. CORSON, OF ROCHESTER, NEW HAMPSHIRE, ASSIGNOR TO BOSTON MACHINE WORKS COMPANY, A CORPORATION OF MASSACHUSETTS.

SEWING-MACHINE.

1,197,265. Specification of Letters Patent. Patented Sept. 5, 1916.

Application filed January 11, 1913. Serial No. 741,438.

To all whom it may concern:

Be it known that I, FRED L. CORSON, a citizen of the United States, and resident of Rochester, county of Strafford, State of New Hampshire, have invented an Improvement in Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to sewing machines, and more particularly to such machines wherein a shuttle mechanism is employed. In sewing machines of this class, and particularly those designed to be run at high speed and by power, the shuttle mechanism is that part of the entire machine which wears most quickly and requires to be most frequently renewed in order to insure the continued successful operation of the machine. This is particularly true in machines where a heavy thread is used, and a loop of the thread is engaged by the beak of an oscillating shuttle. Heretofore many devices have been tried in the endeavor to make an oscillating shuttle run true and wear evenly, but such prior efforts, so far as I am aware, have been unsuccessful and all devices intended to accomplish such purpose have been unsatisfactory in practical use. It will be readily appreciated that the shuttle mechanism of a sewing machine, and especially of a power driven sewing machine, must run with great evenness and accuracy in order that the pointed beak of the shuttle will engage the loop of thread carried by the sewing needle, and any unevenness or wabbling or varying of the position of the point of the beak during the reciprocations of the shuttle are apt to "drop a stitch," or not to engage the loop of thread. As soon as a machine drops a stitch, it is usually necessary to stop the machine and remove the worn shuttle and substitute a new one. I have discovered that the main cause of dropping a stitch, in this class of machines lies in the wabbling of the shuttle and consequently the displacing of the beak, such wabbling being due to the looseness, or unevenness or wearing away, between the sides of the race or rib of the shuttle and the side walls of the raceway itself, and therefore permitting considerable lateral play of the shuttle in the raceway. The wearing of these bearing parts is probably initiated by the lateral pull or tension caused by the pointed beak of the shuttle engaging the thread loop, and of course as soon as such lateral wear has become sufficient to permit any play, the wearing is rapidly increased during the subsequent oscillations of the shuttle during the continuous movements and high speed at which these machines are ordinarily run, and consequently the shuttle point wabbles to such an extent as to miss the thread loop and drop stitches.

It is an object of my invention to provide a shuttle mechanism which will obviate the difficulties above mentioned and which will eliminate all danger of the shuttle dropping a stitch, and will positively control the direction of movement of the shuttle beak into loop-engaging position at all times, irrespective of play or looseness between the shuttle and its raceway, or the wearing down of the shuttle or carrier; and also which will insure an even running of the shuttle, preventing the displacement of the beak, and furthermore causing the shuttle to run firmly and wear evenly in its raceway.

A further important object of the invention is to hold the shuttle firmly and yieldingly pressed against one lateral wall of the raceway in which it runs, and to automatically compensate for any wearing, by means of said yielding engagement, whereby the shuttle may continue to run accurately without wabbling or without displacing the beak, even though the wearing parts are so worn as to permit wabbling under prior conditions. This feature is of very great importance, as it increases the life or length of use of a shuttle, permitting it to continue to run accurately and evenly, without danger of missing stitches, even when so much worn as to necessitate the shuttle being discarded and thrown in the junk heap under former conditions.

A still further important object of the invention is to provide the shuttle with such a yielding, controlling or truing device which will also be operative to prevent the wabbling or displacement of the beak of the shuttle as it engages the thread loop, but which will not exert an undue tension upon the movements of the shuttle and which will, therefore, preferably allow free oscillation of the shuttle throughout the greater portion of its path of movement when any wabbling movement would be un-

important and when the shuttle itself is not under any lateral stress or strains.

Another feature of the invention is that it may be readily applied to existing shuttle mechanisms which are now commonly used, and that no change of any kind is required in the shuttle itself, or in the shuttle actuating mechanism.

Other novel features of the invention, combinations of parts and details of construction will be hereinafter more fully pointed out and claimed.

In the preferred form of the invention as herein shown, I provide means to control the movement of the shuttle beak into loop-engaging position during the wearing away of the bearings, by the provision of mechanism to exert a sufficient yielding tension upon one side of the shuttle raceway, so as to hold the shuttle in engagement with the opposite side of the raceway, and thereby insure an even running and uniform wearing of both the shuttle-race and raceway. I have discovered that in order to hold the shuttle thus pressed against one side of the raceway and to prevent undue friction, it is only necessary to exert such yielding tension on the shuttle while and during that part of its oscillation that it engages the thread loop, and therefore while it is under the tension of a lateral strain. I preferably employ a yielding member on one side of the raceway to bear against the shuttle and normally press it against the opposite side of its raceway during the loop-engaging portion of the shuttle movement, such yielding member being free of engagement with the shuttle during the rest of its oscillating movement, and therefore exerting no tention, friction, or other retarding action upon it.

It will be understood that my invention applies to the shuttle mechanism of any sewing machine, but, for convenience of illustration, I have herein shown the same as embodied in a preferred form in a sewing machine of the Singer type, such as is ordinarily run by power at high speed, and is largely used in heavy work, such as the sewing of shoe uppers in shoe factories. In this class of work the wearing on the shuttle is very great and therefore my invention is of especial importance in machines intended for such purpose.

Referring to the drawings, Figure 1 illustrates an end view of a Singer sewing machine wherein my invention is embodied; Fig. 2 is a side view, partly in section, on the needle line of Fig. 1; Figs. 3 and 4 are front and rear views, respectively, of the shuttle mechanism, as shown in Fig. 1; Fig. 5 is a vertical sectional view; Fig. 6 is a view of the ring forming a part of the shuttle race; Fig. 7 is a view considerably enlarged on the line 7—7 of Fig. 5; Fig. 8 is a projection of the shuttle raceway; and Fig. 9 is a diagrammatic projection, showing the oscillations or wabblings of which the shuttle is capable, when portions of its race or the raceway are worn.

As the actuating mechanism of a sewing machine forms no part of my invention, and as the Singer type of sewing machine in which my invention is illustrated is well known, I have simply shown those parts of such sewing machine which immediately cooperate with the shuttle mechanism. These parts include a needle 1, secured to the usual needle bar 2, and a presser 3 carried by a bracket 4, secured to the usual presser bar 5, both needle bar and presser bar being carried by the arm 6 forming a part of the head of the sewing machine, such parts being driven by suitable actuating mechanism (not shown). The level of the work table is indicated at 7, above which the feeding wheel 8 projects, and an oscillating shaft 9, journaled in bearings 10 secured to the frame of the machine in well-known manner oscillates the shuttle 11 by means of appropriate cam mechanism (not shown).

The shuttle 11 is of usual form, and has a race or rib 12 and beak 13, together with a hook member 14 and bobbin holders, on which a bobbin 15 may be held. The shuttle is oscillated in a raceway 16 formed in the shuttle carrier 17. The raceway 16 is of appropriate depth and width to fit the rib or race 12 of the shuttle, and a removable ring 18 forms one side or wall of the raceway 16, and is adapted to hold the shuttle in place. This ring 18 is provided with diametrically opposite holes 19 in proper position to fit over pins 20, projecting from the carrier 17, and the ring 18 is retained firmly in place by a leaf spring 21 having U-shaped arms 22 and 23 bearing upon the ring 18 near the pins 20, which spring is secured to the carrier 17 by means of a headed screw 24. A throat plate 25 provided with a throat 26 therein forms the top of the raceway adjacent to the surface of the work table 7 in the usual manner, and a guard plate 27 is secured to the carrier 17 at the front of the apparatus.

In order to provide the yielding tension at one side of the raceway to hold the shuttle 11 in firm and uniform bearing on the other side of the race, I provide a controller or truing member 28, which may be fitted on either side of the raceway 16, either through the lateral wall of the carrier 17 forming one part of said raceway, or through the ring 18 forming the other part of said raceway. Preferably I fit said member through the ring 18, cutting a notch 29 therefor, having slightly undercut sides 30 and 31. Preferably the member 28 has a flange 32 overlapping the outer surface of the ring 18, and thus affording a means to

prevent said member projecting too far into the path of the raceway 16. The member 28 is preferably formed of sufficient thickness, as shown in Fig. 7 in the enlarged view, to project an appreciable distance into the raceway 16, and the projecting portion of said member is provided with rounded edges 33 and 34, to facilitate its riding up on and over the edge of the rib 12 of the shuttle, as the same is oscillated in the raceway. In order to exert a yielding tension on the member 28, I provide a leaf spring 35, which may conveniently be secured to the spring 21 by a screw or rivet 36 and which spring is preferably provided with an adjustable tensioning device comprising a stud 37 secured to the spring 21 and passing loosely through the spring 35, on which a nut 38 and lock nut 39 is threaded to bear upon the outer portion of the spring 35 to adjust the tension to be exerted thereby on the controller 28.

Referring to Fig. 8, wherein I have illustrated a projection of the circular raceway 16 formed in the carrier 17 and with the ring 18 as one wall thereof, the shuttle rib 12 is also illustrated in projection and in the position of its path of movement in the raceway 16, where its beak 13 has reached the point just prior to the loop-engaging part of its movement. The rib 12 is here shown in engagement with the inner surface of the member 28, which surface normally projects into the raceway 16 as shown in Fig. 5, and illustrates the manner in which said member 28 bears with only a light frictional engagement upon a small portion of the rib 12, but at the most effective position, to hold the shuttle in its desired loop-engaging path and in engagement with the opposite wall of the raceway 16 formed on the carrier 17.

I have also illustrated in Fig. 9, a diagrammatic view, considerably exaggerated, of a projection of the shuttle rib 12, showing the manner in which the beak 13 escapes or misses the thread-loop, and thereby drops a stitch, when the rib or race 12 or the raceway itself 16, is loose or worn to permit wabbling of the beak from its proper loop-engaging path of movement. In Fig. 9 the desired path of movement of the beak 13 and that in which it engages the thread-loop, is shown in full lines, while the extent to which the beak may vary due to the wearing of the rib 12 and raceway 16, is shown in dotted lines at either side. When the beak is displaced to either side of loop-engaging position it will cause the sewing machine to drop a stitch. Such wabbling is of course normally about the center or the axis of the rib of the shuttle indicated at 40, permitting each end of the rib to vary.

In the operation of the invention as herein shown and described, it will be readily seen that the member or controller 28 acts as an automatic truing device to control the path of movement of the shuttle 11, so that the beak 13 thereon will be held at all times in proper position to engage the thread-loop, and all displacement of the beak or wabbling of the shuttle is prevented during the loop-engaging operation. The member or controller 28 acts to force the rib 12 into close engagement with the opposite side wall of the raceway 16, which is formed in the carrier 17, and therefore the beak 13 is held in strict alinement with said wall of the groove when it is oscillated beyond the controlling limits of the groove and under the open space by the throat 26. This is the proper line for most efficient loop-engaging position of the beak in the particular embodiment of the invention herein shown, and therefore the beak will be constantly guided into its loop-engaging path, irrespective of any tendency to wabble, or of any play between the rib 12 and the raceway. The controller 28 is freely lifted in the notch 29, as the shuttle rib 12 engages the rounded corner 34 during its oscillation, and as the tension of the spring 35 can be readily adjusted, the friction of the controller 28 upon the shuttle can be varied at will. In case the sewing machine is operated in very heavy stock, and if a very heavy thread is employed which exerts abnormally great lateral pressure on the shuttle beak, or in case of unusually great play between the rib and its raceway, an extra tension can be readily exerted on the spring 35 to hold the controller more firmly upon the shuttle and consequently to force the shuttle with greater tension upon the lateral wall of the raceway in the carrier 17.

It will also be noted that I have provided a device whereby the liability of the shuttle and its raceway to wear down, and hence to initiate the wabbling action is effectually counteracted as the controller is, from the first in yielding engagement with the shuttle rib, even before the parts commence to wear, and hence both rib and raceway are retained in a true relation much longer than when no such controller is provided. This fact is of very substantial importance in prolonging the life of a shuttle and preventing any wear or unevenness starting in the bearing parts. When, however, in the course of time with the infinite number of oscillations which take place in such machines, some looseness and wear does result, the shuttle is still held in proper loop-engaging path, so that the machine will not drop stitches and so that the worn shuttle may still continue to be successfully used. Also the invention greatly increases the accuracy of operation of the sewing machine, and permits a considerable increase of speed in practice, without danger of dropping stitches. By hav-

ing the controller in substantially the position as shown it becomes operative during the loop-engaging action of the beak 13, and is entirely free of engagement with the shuttle during a considerable part of its oscillation, the beak being retracted beyond the controller, during the non loop-engaging period in its movement, thus preventing undue friction upon the shuttle and undue work upon the rest of the sewing machine mechanism.

It is, of course, within the scope of the invention to provide the controller at any other part of the path of movement of the shuttle, or to provide a plurality of such controllers as well as to utilize the ring 18 as yieldingly held, but I prefer the employment of a separate member 28 as the controller, and in substantially the position with relation to the throat 26 as shown.

I believe it to be a distinct novelty in the sewing machine art to provide mechanism which will eliminate the danger of dropping stitches due to any inaccuracies of movement of the shuttle, by providing means to so control the movement of the shuttle as to insure the beak engaging the thread-loop at all times, and irrespective of any wearing in the bearing parts of the mechanism, and I desire to claim the same broadly. I also believe it to be a distinct novelty to provide a yielding tension on a moving shuttle to hold it firmly, but without undue friction, against one side of its path of movement, and thus to prevent any wabbling, irrespective of the looseness or play between the guiding walls of the shuttle path, and the parts of the shuttle guided thereby, and I desire to claim this feature of my invention broadly.

A further advantage of very decided importance, resulting from the tension exerted by the member 28 upon the rib of the shuttle, consists in preventing the shuttle from rebounding or "jumping back" as it is reversed in its oscillations. During the actuation of the shuttle by the oscillating shaft 9 as the shuttle reaches the limit of its oscillation in one direction and is reversed to oscillate in the other direction, the shuttle, being run at high speed, ordinarily springs back slightly or "jumps", but the restraining action of the spring tension exerted thereon through the member 28, prevents any such jumping or rebounding movement of the shuttle and insures a steady even oscillating movement. During such rebounding action the thread-loop is sometimes caught between the foot or throat of the beak and the engaging prong from the oscillating shaft 9, but by means of my invention, wherein such rebounding is prevented, the danger of the thread being so caught is eliminated.

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

1. In a sewing machine, a raceway for a shuttle, a movable shuttle having its edge portion adapted to reciprocate in said raceway, a beak on said shuttle to engage a thread-loop, yielding means comprising a part of the wall of the raceway coöperating with the fixed opposite wall of the raceway on the edge portion of the shuttle to hold said beak in its loop-engaging path during the loop-engaging part of the shuttle reciprocation, irrespective of the path of movement of the shuttle during the remaining part of its reciprocation.

2. A shuttle carrier having a raceway formed therein, a shuttle adapted to traverse said raceway, and a controller movable relatively to the fixed walls of the raceway and through one portion thereof, constructed and arranged to exert a guiding action on the shuttle during only the loop-engaging part of its movement.

3. A shuttle carrier having a raceway formed therein, a shuttle adapted to traverse said raceway, a controller movable relatively with the raceway, through one of the walls of said raceway and adapted to bear upon a portion only of the shuttle during its traversing movement.

4. A shuttle carrier having a raceway formed therein, a shuttle adapted to traverse said raceway, a controller movable through one wall of the raceway, yielding means to move said controller into the path of movement of the shuttle, and means to limit said yielding movement.

5. A shuttle carrier, having a raceway formed therein, a removable ring adapted to form a part of the raceway, a slot in said ring, a member movable through said slot relatively with said ring and normally projecting in the raceway in combination with means to hold the member yieldingly in its normal position, whereby said member will be engaged by the shuttle during the movement of said shuttle.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FRED L. CORSON.

Witnesses:
EDWARD MAXWELL,
JAMES R. HODDER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."