No. 862,546. PATENTED AUG. 6, 1907.

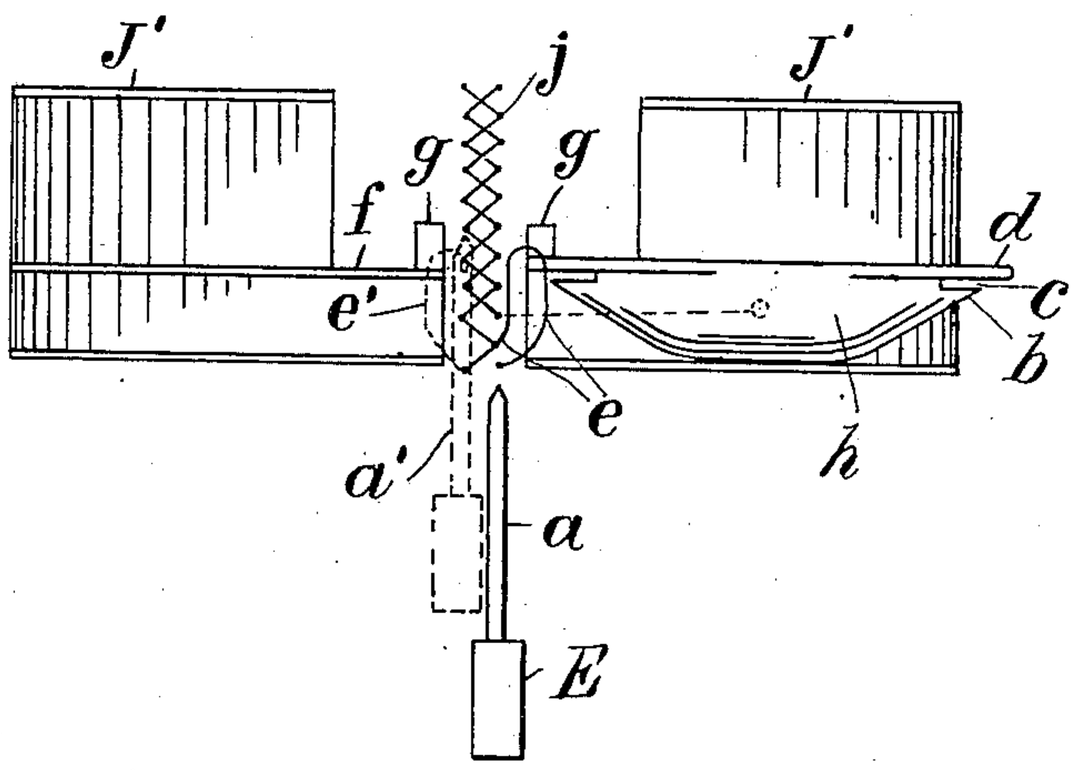
J. E. FEFEL.

SEWING MACHINE SHUTTLE.

APPLICATION FILED MAY 3, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
L. Lee.
J. W. Greenbaum

Inventor.
John E. Fefel, pri
Thomas S. Crane, Atty.

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2 SHEETS—SHEET 2.

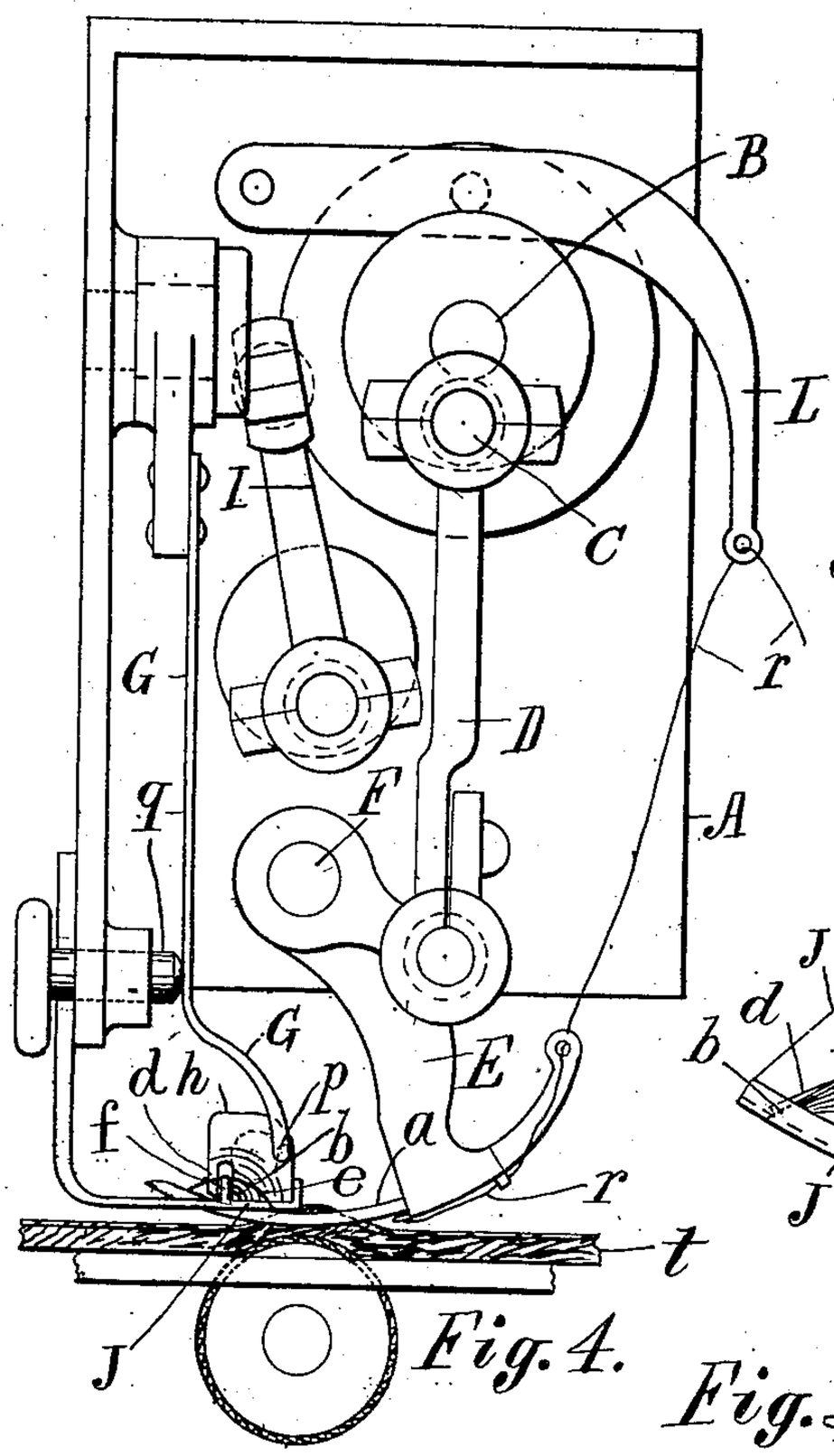


Fig. 4.

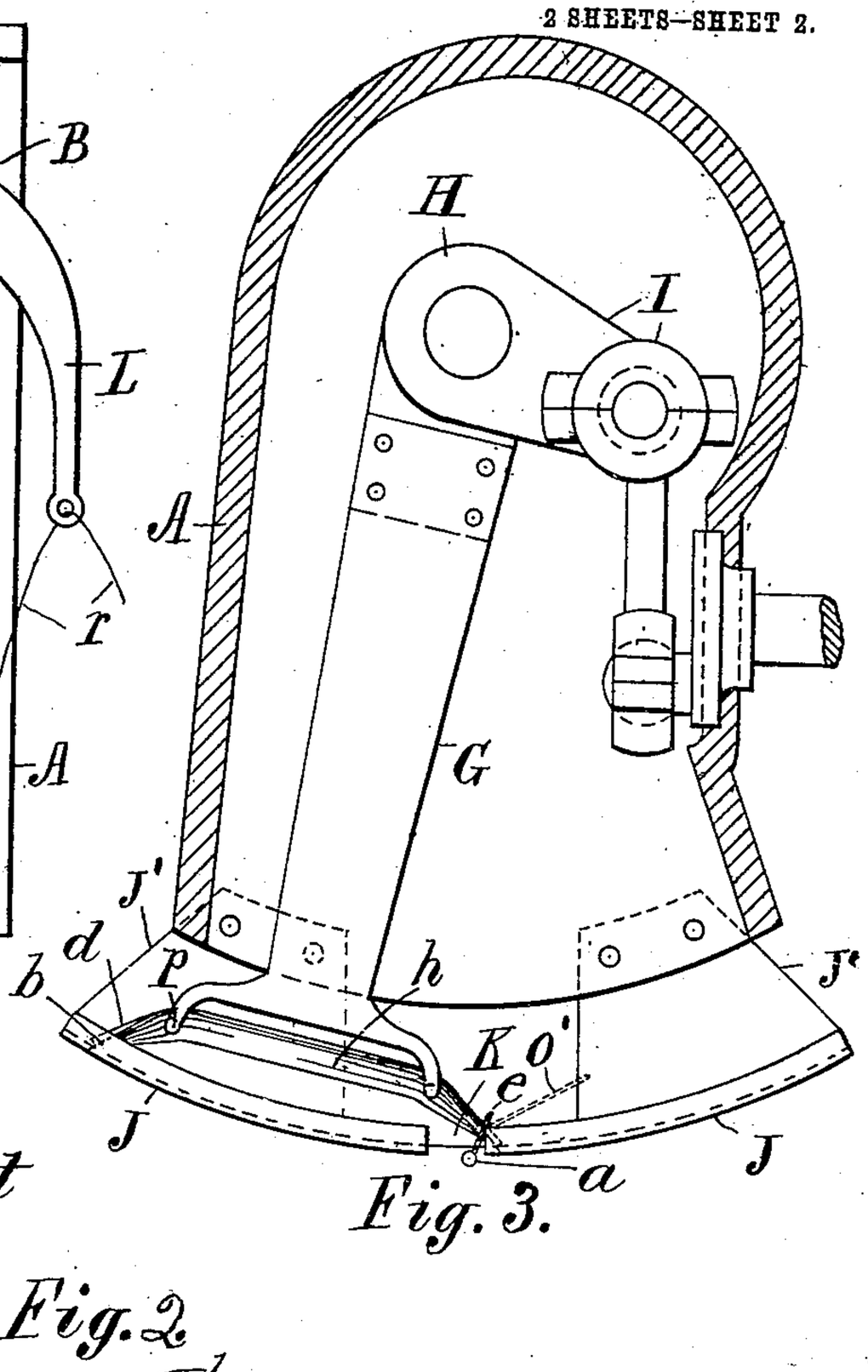


Fig. 3.

Fig. 2.

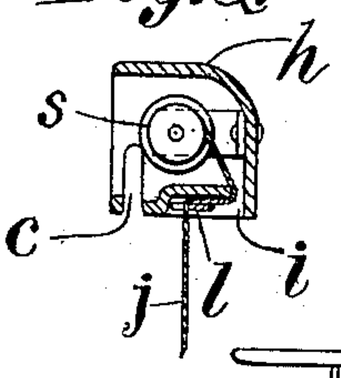


Fig. 7.

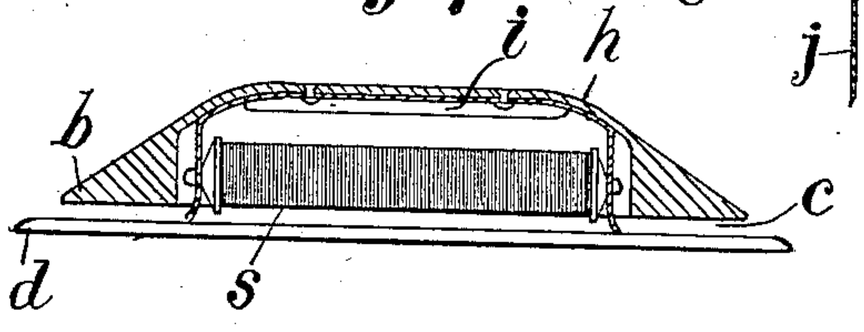


Fig. 5.

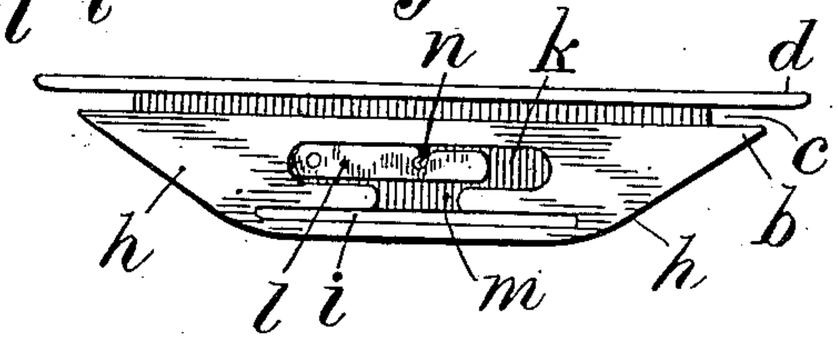


Fig. 8.

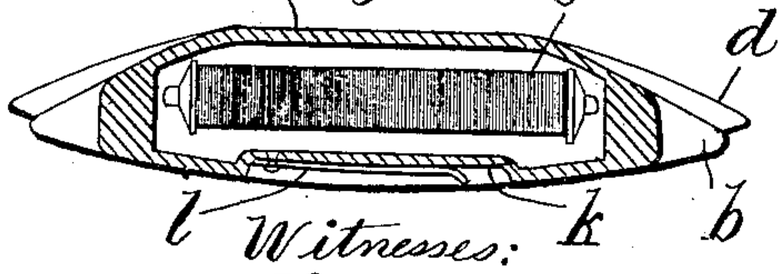
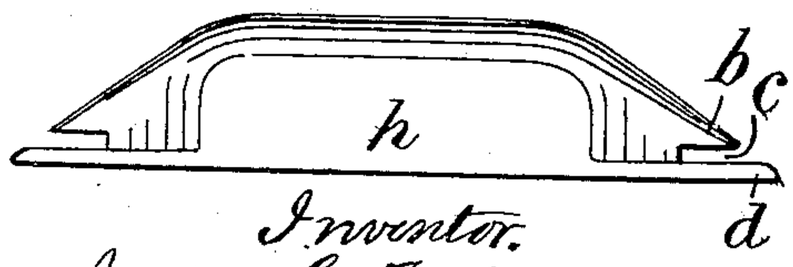


Fig. 6.



Witnesses:
C. Lee.
Daisy D. Purrington.

Inventor.
John E. Fefel, per
Hiram S. Crane, Atty.

UNITED STATES PATENT OFFICE.

JOHN E. FEFEL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO UNITED STATES FELLING MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SEWING-MACHINE SHUTTLE.

No. 862,546. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed May 3, 1906. Serial No. 315,022.

To all whom it may concern:

Be it known that I, JOHN E. FEFEL, a citizen of the United States, of 240 South Ninth street, Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Sewing-Machine Shuttles, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention relates to that class of sewing machines in which the needle and shuttle are both operated above the surface of the work-table, and in which a curved needle is operated so as to enter and leave the surface of the fabric upon the same side, and the shuttle is reciprocated transversely over the needle to engage the loop of the needle-thread. In such construction, a raceway divided in the middle and having a flange at the edge is supported close to the upper side of the fabric, and a needle-thread is disposed upon the upper side of the needle so that its loop may be engaged by the shuttle. It has been found in such machines that the loop of the needle-thread sticks upon the shuttle and is dragged along the raceway for some distance, which prevents stitching rapidly, because the loop forms a slack which cannot be taken up quickly by the take-up device.

The object of the present improvements is to furnish a means of holding the loop of needle-thread in substantially the same place over the needle during the movement of the shuttle, thus permitting the loop to be formed with the smallest amount of slack.

In the present invention, to prevent the loop from being drawn along in the raceway, a supplemental point is formed upon the shuttle at one side of the shuttle point, and such supplemental point moves outside a flange upon the raceway and forms the outer end of the loop beyond such flange. By projecting a lug from the bottom of the raceway outside of the flange in the path of this portion of the loop, the lug resists the movement of the loop into the raceway within the flange, and holds it in the desired position while the shuttle passes through it. This forms a very short loop which can be readily tightened by the tension device as soon as the shuttle has passed. The supplemental point is formed upon the shuttle by making a channel longitudinally along the shuttle close to one side, to fit over the flange upon the edge of the raceway, the portion of the shuttle outside of the channel forming the supplemental point.

The invention is especially applicable to a shuttle having two adjacent flat sides and the point tapered toward the junction of such sides so as to form the shuttle point at the corner of the shuttle.

The invention will be understood in the annexed drawing, in which a part of the stitching mechanism is shown to illustrate the relation of the needle, the shuttle, and the raceway.

Figure 1 is a plan of the raceway and needle with illustration of the loop formed from the needle-thread; Fig. 2 is a cross section at the middle of Fig. 6; Fig. 3 shows the interior of the sewing machine head with the means for reciprocating the shuttle; Fig. 4 shows the interior of the head viewed from the left hand side of Fig. 3, with the nearer side of the head casing removed, and the nearer half of the raceway; Fig. 5 shows the bottom of the shuttle, Fig. 6 the top of the shuttle, Fig. 7 a plan of the shuttle in section at the center of the bobbin, and Fig. 8 a longitudinal section taken through the center of the spring *l*.

The head A of a sewing machine is shown in Figs. 3 and 4 with a driving-shaft B carrying a crank C which is connected by a rod D with an oscillating needle-carrier E. The needle-carrier is mounted upon a carrier-spindle F, and the needle *a* is curved concentric with such spindle. The raceway J is supported upon the head and divided at the middle with a gap K through which the needle *a* moves, and in which the loop of the needle-thread is formed by the shuttle *h*.

The shuttle-carrier is formed as a leaf-spring G attached at one end to a hub H which is oscillated by a crank and connection I to a shuttle-shaft which in practice is rotated by suitable connections at one-half the speed of the driving-shaft B. With such a vibrating shuttle-carrier, the raceway is mounted concentric with the axis of the hub H, and has a flange *f* at the side where the eye of the needle stands at the completion of each needle movement, with a lug *g* extended from the bottom of the raceway outside of such flange at each side of the gap K.

The raceway and the bottom of the shuttle are shown flat in cross section, and one side of the shuttle (at the left side of Fig. 4) is also shown flat and the body of the shuttle tapered toward the junction of such flat bottom and flat side to form shuttle-points *b*.

The shuttle is formed with a longitudinal channel or groove *c* in the bottom adjacent to the flat side, forming supplemental points *d* upon the shuttle which, when the channel *c* is applied to the flange *f*, as shown in Figs. 1 and 4, lie outside of the raceway, while the points *b* lie inside of the same.

Owing to the tapering of the shuttle toward its flat side, the metal upon the outer side of the channel projects beyond the metal upon the inner side of the channel, so that the supplemental points *d* project a little beyond the points *b* and first engage the needle-thread loop *e* so as to lead the same upon the points *b*, from which the loop slides up over the body of the shuttle in the usual manner.

The bobbin *s* is pivoted removably in the shuttle,

and a slit *i* is made through the bottom of the shuttle parallel with the channel *c*, to discharge the shuttle-thread *j*. A recess *k* is formed in the bottom of the shuttle between the channel *c* and slit *i*, and a flat tension-spring *l* presses upon the bottom of the recess, being riveted therein at one end. A passage *m* is cut in the bottom to connect the slit *i* and recess *k*, and a notch *n* is formed in the edge of the tension spring *l* on the side opposite to the passage *m*, and the end of the spring turned up slightly from the bottom of the recess. The shuttle-thread is placed in the notch *n* by drawing it from the bobbin *s* through the slit *i* and the passage *m*. The supplemental points *d* upon the shuttle are shown raised above the bottom a little more than the shuttle-points *b* as shown in Fig. 3, to compensate for the upward curve of the needle where the shuttle passes over it; which with a horizontally disposed raceway as shown in Fig. 4, places the farthest corner of the shuttle closest to the needle.

The blind-stitching or overseaming is commonly done in such machines by shifting the needle laterally between the successive stitches to form a zigzag row of stitching formed of the needle-thread *r* and shuttle-thread *j*, as shown in Fig. 1, the gap K in the raceway being made of sufficient width to permit such lateral shifting of the needle. This shifting is, in practice, effected by a longitudinal motion of the needle-carrier spindle F, and the shuttle is arranged to form the loop of the needle-thread just when the shuttle crosses the gap K.

The operation of this improved shuttle is as follows: The eye of the needle is carried sufficiently beyond the flange *f* of the raceway in making each stitch (as shown in Fig. 4) to slacken the thread upon the first retraction of the needle, and form a loop *e* which is engaged first by the supplemental point *d* and next by the shuttle-point *b*.

Fig. 3 shows the needle operating adjacent to the right hand section of the raceway and both the advanced points of the shuttle slightly engaged with the loop. If the point of such shuttle traveled exclusively within the raceway, its tendency would be to draw the loop between the flanges of the raceway into the position shown by the dotted lines *o'* in Fig. 3, thus stretching out the loop unduly, and delaying the operation of the take-up, and the formation of successive stitches.

Fig. 1 shows that a portion of the loop *e* lies outside of the raceway in contact with the lug *g* which is extended outside of the flange *f* for that purpose, and such portion of the loop cannot therefore be dragged within the flange *f* nor within the raceway, but the loop is held nearly in the place where it is first engaged by the shuttle, and the shuttle passes through it without greatly enlarging it.

With a double-pointed shuttle, the return movement also engages a loop of the needle, the needle then operating at the opposite side of the gap K in the raceway and the shuttle forming a loop *e* adjacent to the opposite lug *g*, which produces the same effect in connection with the flange *f*, to hold the loop in the position where it is first formed.

The shuttle is provided with the channel *c* to engage the flange *f* of the raceway, and thus carry the supplemental points *d* outside of the raceway. The supplemental points thus engage the loop first and press it against the lug *g* before the shuttle-points *b* have obtained a grip upon the loop which could drag it within the raceway. This operation of the supplemental points is aided by arching them a little more upon the outer side than the shuttle-points *b*, so that the chief pressure of the loop is sustained by the supplemental points, and less friction encountered by the loop in slipping over the shuttle-points *b*. The loop is thus formed and held in place in the most advantageous manner while the shuttle passes through it, and a great increase of speed can thus be secured in the operation of the needle and shuttle.

The prongs *p* upon the ends of the shuttle-carrier which embrace the shuttle, are shown applied to the side of the shuttle opposite to that having the channel *c*, and the elastic leaf G of the shuttle-carrier is arranged to hold the shuttle lightly against the flange *f* of the raceway.

A push-pin *q* is shown in the head A adjacent to the carrier-spring G and the pushing inward of such pin detaches the prongs *p* from the shuttle and permits the shuttle to be removed from the raceway by slipping it out of either end of the same.

In Fig. 1, the needle is indicated in full lines at *a*, moving adjacent to the right hand side of the gap K, and is indicated in dotted lines *a'* adjacent to the left hand side of the gap. Several stitches of the needle-thread *r* and shuttle-thread *j* are indicated, a loop *e* of the needle-thread being shown in the position in which it is formed by the shuttle, which is represented as having moved entirely through the loop. In such case, the loop would be closed by the tension of the needle-thread, but is left open to illustrate its position when formed, with its farther end in contact with the edge of the lug *g*, where it is held throughout the movement of the shuttle by the flat portion of the body which lies outside of the raceway.

A loop *e'* is indicated by dotted lines at the left hand side of the gap, the needle *a'* being shown retracted sufficiently to form a loop, while the needle *a* is shown drawn almost wholly from the fabric, only the point remaining in the same. This illustration, with that in Fig. 3, shows how the loop is kept from dragging forward with the shuttle, by that portion of the loop which is held outside of the raceway throughout the entire shuttle movement, and the operation of forming and closing the stitches is thus greatly facilitated.

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

1. A shuttle having a longitudinal channel adjacent to the point adapted to embrace a guide-flange upon a raceway, the metal upon the outer side of the channel forming a supplemental point projected beyond the point of the shuttle to first engage the needle-thread loop and lead the same upon the shuttle point.

2. A shuttle having a longitudinal channel adjacent to the point and extended throughout the length of the shuttle to engage a guide-flange upon the raceway, the metal at the outer side of such channel forming a supplemental point projected beyond the point of the shuttle to first engage the needle-thread loop and lead the same upon the shuttle point.

3. A shuttle having a flat side, its body tapered toward such flat side to form a point, and a channel extended

along the shuttle adjacent to such flat side forming a supplemental point for the purpose set forth.

4. A shuttle having a flat side, its body tapered at both ends toward such flat side to form points at both ends, and a channel extended along the shuttle adjacent to the flat side, forming a supplemental point adjacent to each of the shuttle points for the purpose set forth.

5. A shuttle having a flat bottom to rest upon a flat raceway, a side adjacent to the bottom with the body tapered toward the bottom and side to form a point at the corner, and a channel extended through the bottom adjacent to the flat side, forming a supplemental point for the purpose set forth.

6. A shuttle having a flat bottom to rest upon a flat raceway, a flat side adjacent to the bottom with the body tapered toward the bottom and side at both ends to form a double pointed shuttle, and a channel extended through the bottom adjacent to the flat side forming supplemental points at both ends for the purpose set forth.

7. A shuttle having a flat bottom to fit a raceway, an adjacent flat side with opening to introduce a bobbin, and the body tapered toward such bottom and side to form points at both ends, a slit through the bottom parallel with the bobbin to lead the thread therefrom, a recess in the bottom with tension spring seated in the recess having a notch at the middle of the bobbin's length, whereby only the thread required for each stitch is drawn from the bobbin at each movement of the shuttle.

8. A shuttle having a flat bottom to fit a raceway, an adjacent flat side with opening to introduce a bobbin, and the body tapered toward such bottom and side to form points at both ends, a slit through the bottom parallel with the bobbin to lead the thread therefrom, a recess in the bottom with tension spring seated in the recess with a notch therein and pressed toward the bottom to regulate the movement of the shuttle-thread.

9. A shuttle having a flat bottom to fit a raceway, an adjacent flat side with opening to introduce a bobbin and the body tapered toward such bottom and side to form points at both ends, the body having a slit through the bottom parallel with the bobbin, and a recess in the bottom with notch at the side leading to such slit, and the tension spring riveted at one end within the recess and provided with the notch *n* to guide the thread, the spring regulating the tension as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN E. FEFEL.

Witnesses:
D. D. PURRINGTON,
THOMAS S. CRANE.