

Nov. 17, 1931.

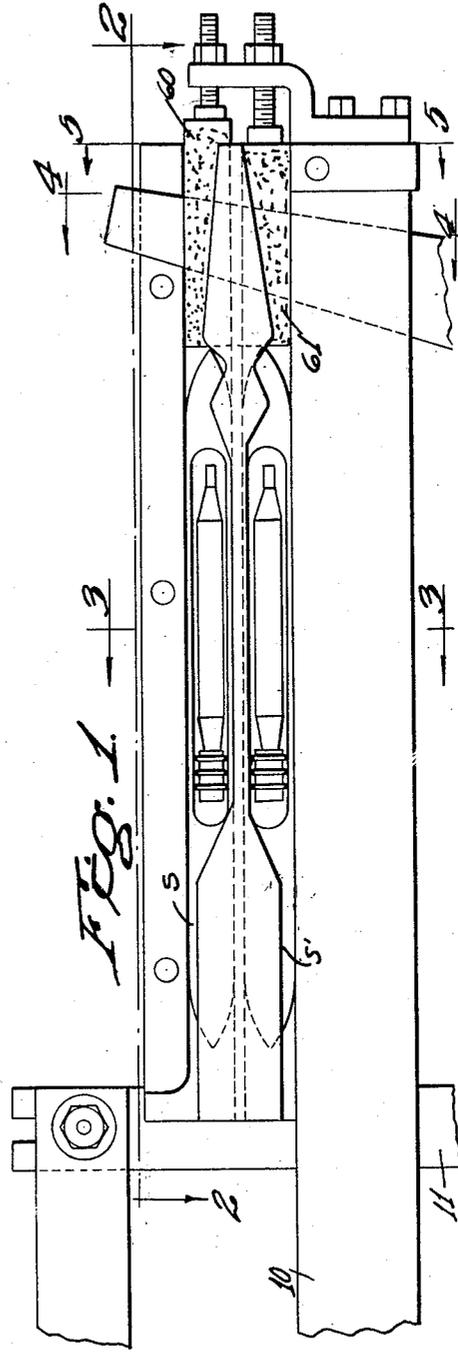
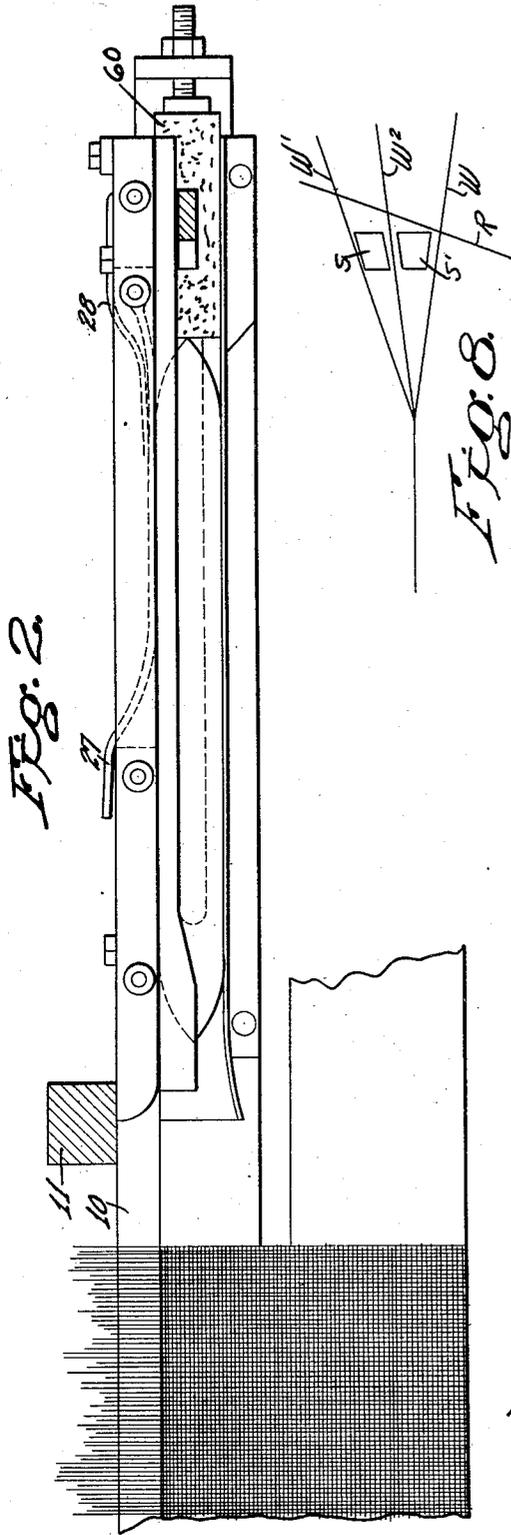
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1,832,596

DOUBLE SHUTTLE LOOM

Filed June 5, 1930

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 5.

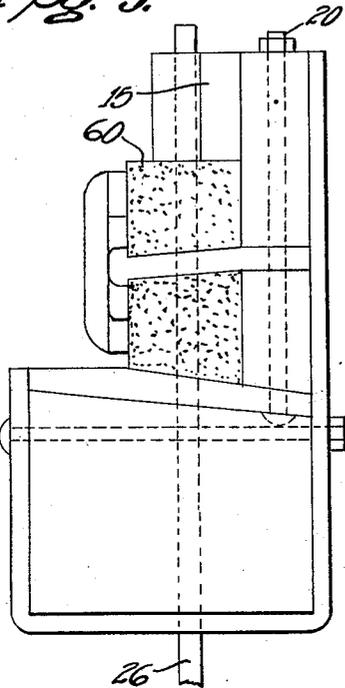


Fig. 4.

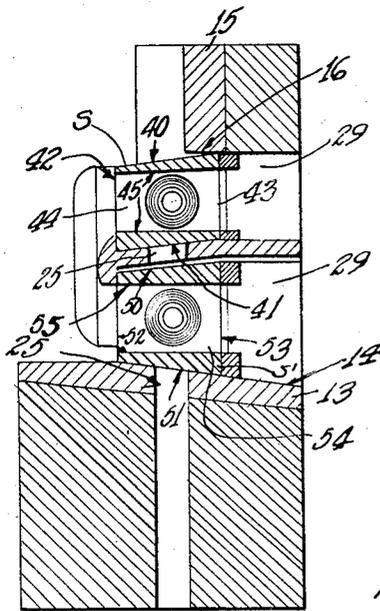
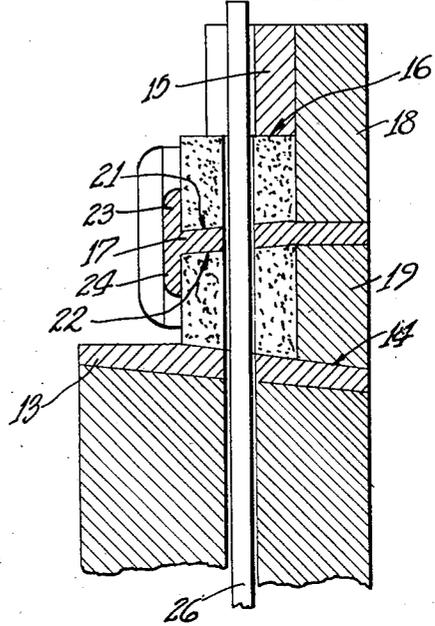


Fig. 3.

Fig. 6.

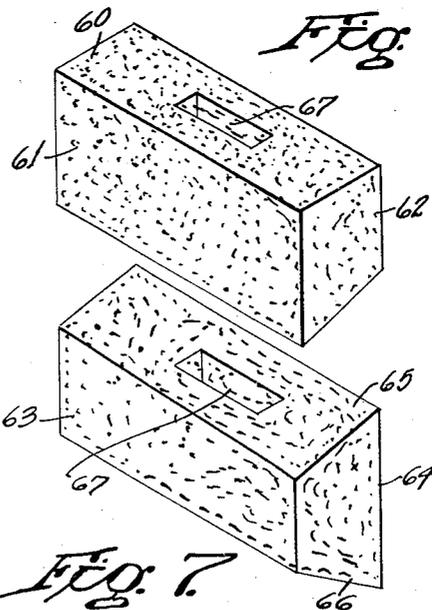


Fig. 7.

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UNITED STATES PATENT OFFICE

RICHARD G. TURNER, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

DOUBLE SHUTTLE LOOM

Application filed June 5, 1930. Serial No. 459,334.

This invention relates to the shuttles and pickers and parts cooperating therewith in a double shuttle loom and it is the general object of the invention to improve the construction of these parts so that the shuttles will be stronger and will be guided more accurately in their flight through the sheds of the loom.

In double shuttle looms it is customary to pick one shuttle over the other, both generally travelling in the same direction. The warp threads are divided into three planes, the central one of which defines with the outer planes upper and lower sheds. When the lay is on back center the angle formed with the top shed is quite acute, rendering necessary the use of specially formed shuttles. When bobbin changing attachments for horizontal transfer are used on looms of this type it is necessary to provide a horizontal slot running entirely through the shuttle, and this slot is most efficiently made with parallel sides which are substantially perpendicular to the plane of the reed and to the back of the shuttle box. This slot, in the case of each of the shuttles, must be sufficiently wide to pass a full bobbin. The top and bottom walls of the shuttle are therefore of limited thickness and should be strengthened as much as the shape of the shed will permit.

Immediately after being picked a fly shuttle is a free agent, passing through the shed of the loom under forces imparted to it prior to its delivery from the shuttle box. At the time of picking the lay is moving rearwardly at its greatest rate of speed and immediately thereafter begins to retard, coming finally to a momentary stop at back center. The shuttle, however, having been picked from the shuttle box when the lay is moving at maximum speed, tends to move rearwardly faster than does the lay and it is this fact which causes the rear wall of the shuttle to press against and hug the reed. The shuttle will consequently turn on its longitudinal axis as the angle of the reed changes from a vertical position to a rearwardly inclined position. When the shuttle and lay are in its rear position, the shuttle is turned considerably with respect to the position it had

when delivered from the box and with respect to the angles of the sheds. This is especially true of shuttles in double shuttle looms where the shed angles are acute. As has been explained, the inner surfaces of the top and bottom walls of the shuttles should be substantially perpendicular to the reed. Consequently any strengthening of the shuttle must be effected by changing the angles of the outer surfaces of the top and bottom portions of the shuttle, and such changed angles should conform in a general way to the angles of the sheds.

I form the upper shuttle with a cross-sectional outline substantially that of a rhombus with the walls of the bobbin passage oblique with respect to the top and bottom of the shuttle. By this construction it is possible to have the upper rear part of the top shuttle comparatively large to co-act with a binder which may have a relatively large checking surface, while the front lower wall of the shuttle is correspondingly large to wear against the box front so that the pressures exerted by the binder and tending to move the front wall of the shuttle against the box may be such that substantially the same pressures per unit of area exist with regard to the top shuttle.

In connection with the bottom shuttle the angles of the shed are such that the rear walls of the top and bottom parts of the shuttle are both larger than their corresponding front walls, so that considerably increased areas are available for binders. In this instance, however, the shuttle is formed somewhat like a trapezoid in cross-sectional outline and the pressure of the binder is somewhat analagous to that of pushing a wedge into a wedge shaped pocket and the pressure of the binder is exerted partly against the top and bottom walls of the box and also against the box front. The pressure per unit of area against the front walls of the lower shuttle need not therefore necessarily be higher than those against the back walls.

It is a further object of my present invention to provide shuttles for weft replenishing double fabric looms wherein the sections of the top and bottom portions of the shuttles

have substantially the same areas in cross section even though the shapes for the two different shuttles be dissimilar. In this way uniformly strong shuttles may be provided which will co-act properly in the picking operation and will wear at about the same rates.

The top shuttle of a double shuttle loom is subjected to several interferences not found in ordinary single shuttle looms, and all of which tend to disturb its flight through the top shed. The shuttle will ordinarily be supported only by the middle plane of threads which are not supported by the lay as is the case with the bottom shed, and any slackness in this middle plane of threads will change the path of the top shuttle. Furthermore, ordinarily only one picker stick is employed for both shuttles, so that there is some difference in the propelling force delivered to the two shuttles and this results in some instances in objectionable relative motions between the two shuttles. Also, inasmuch as the top shuttle is farther from the axis of the lay its rearward motion because of momentum acquired at the time of picking will cause said top shuttle to move horizontally through a greater distance than does the lower shuttle and this is found to be a further disturbing factor in the flight of the shuttle in the shed. Because of these various reasons it is desirable to provide a form of picker which will as far as possible direct the path of the shuttle and it is accordingly a further object of my present invention to form pickers which substantially fill the shuttle boxes so as to be guided by the latter with little or no motion either angular or transverse to the axis of the box, thereby delivering the driving force to the shuttles in straight lines which are substantially the same on all picks.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

A preferred form of the invention is shown in the drawings in which,

Fig. 1 is a front elevation of a right hand end portion of the lay and the associated shuttle boxes in a double shuttle loom,

Fig. 2 is a plan view of the parts shown in Fig. 1,

Figs. 3 and 4 are enlarged detail vertical sections, taken along the lines 3—3 and 4—4 in Fig. 1, respectively,

Fig. 5 is an enlarged end elevation with certain parts omitted, taken substantially along the line 5—5 in Fig. 1,

Figs. 6 and 7 are perspective views of the upper and lower block pickers, respectively; and

Fig. 8 is a diagrammatic side elevation in-

dicating the disposition of the warp sheds in a double shuttle loom.

Referring to the drawings, the lay 10 supported by swords 11 carries the usual reed through which extend the warp threads. The lay has a race plate 13 the upper face 14 of which inclines rearwardly and downwardly when the lay is in the forward position shown in Fig. 4. A box top 15 secured to the lay has a lower surface 16 which may be horizontal when the lay is on front center.

An intermediate box plate or partition 17 has the rear part thereof held securely between top and bottom box backs 18 and 19, respectively, by a bolt 20 fastened to the lay. The forward part of the intermediate plate 17 has upper and lower downwardly and forwardly inclined substantially parallel surfaces 21 and 22, respectively. The front of plate 17 has top and bottom flanges 23 and 24, respectively, which form fronts for the boxes.

The box plates 13 and 17 are provided with vertically aligned slots 25 for a picker stick 26 which in this instance swings around a pivot near the floor. Each of the boxes has a rear shuttle binder 27 acted upon by a flat spring 28. Each binder is provided with a wide horizontal slot 29 large enough to pass a rearwardly moving exhausted bobbin.

The warp threads of a double shuttle loom are divided into three planes, as suggested in Fig. 8. The lower plane W is inclined rearwardly and downwardly during picking, while the top and intermediate planes W' and W², respectively, are inclined upwardly, the top plane more so than the intermediate. The inclined line R shows approximately the position the reed assumes when the lay is on back center.

If shuttles rectangular in cross-section were used, the attempt of the top shuttle to hug the reed would be resisted by the top shed, and to a slightly less extent this would also be true of the lower shuttle. It is an important object of my invention to shape the shuttles so they may travel along the reed and at the same time have maximum strength and wearing qualities.

Accordingly, the top shuttle S has its top and bottom inclined forwardly and downwardly, as at 40 and 41, respectively. The front 42 and back 43 of the shuttle S are substantially vertical when the lay is on front center and parallel to the reed at all times. A bobbin slot 44 passes horizontally through the shuttle, having parallel top and bottom sides 45 substantially perpendicular to the front and back and also the top box back 21 and reed. The parts of the shuttle S shown in Fig. 3 are trapezoidal in form, the rear of the upper part being large to engage the adjacent part of the binder, while the front of the lower part is large to engage flange 23. The upper shuttle is therefore seen to be of rhom-

bus form in cross-section outline to fit the shed and reed and has a horizontal bobbin slot parallel to the front and back of the shuttle to define top and bottom parts as already described.

5 The lower shuttle S' has a forwardly and downwardly inclined top surface 50 but the lower surface 51 is inclined upwardly as well as forwardly. The front and back 52 and 53, respectively, are parallel with each other and the reed, and the horizontal bobbin slot 54 has walls 55 parallel to walls 45 and perpendicular to the front and back of the shuttle.

15 The lower shuttle has its top and bottom parts of trapezoidal section with the large surfaces at the rear to give strength and permit the use of relatively wide binder surfaces. The cross-sectional outline of the lower shuttle is substantially that of a trapezoid.

20 There is necessarily some clearance between the shuttles and the box walls which they can engage, but for the most part the shuttle boxes conform to the shape of the shuttle sections, and the latter are as large as their respective sheds will permit.

Another feature of the invention, especially with reference to the top shuttle, is the shape of the pickers. The upper picker is of block form, having an outline to fit with a little clearance in the top box. The top surface 60 is horizontal to engage the surface 16 on the top box member 15, and in this respect the picker differs in shape from the top shuttle. The parallel front and back surfaces 61 and 62, respectively, and inclined bottom, conform generally to the shape of the top shuttle.

35 The bottom picker has a section substantially the same in outline as that of the shuttle S', having parallel front and rear guide surfaces 63 and 64, respectively, and forwardly extending oppositely inclined top and bottom surfaces 65 and 66, respectively. Each picker has a vertical slot 67. The pickers, because of their form, move through their respective boxes with very little if any lateral vibration and the shuttles are accordingly delivered correctly from their boxes.

50 From the foregoing it will be seen that I have provided a double shuttle loom wherein the shuttles are made as large as the sheds will permit and the shuttle boxes are made to fit snugly around the shuttles. It will further be seen that the cross section of each part of each shuttle opposite the slot is trapezoidal in form so that it is stronger than a section of similar area having parallel faces. Furthermore, the top surface of the bottom shuttle is substantially parallel to the bottom surface of the top shuttle so that when in the shed the top shuttle may so far as is practicable be supported by the lower shuttle. Also, the pickers are formed so as to fit snugly in their

65 respective boxes and to act more or less as

pistons in cylinders to deliver the force to the shuttles in a straight line.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a double shuttle loom, a pair of shuttle boxes, one of which has its two vertical sides parallel and its bottom surface forwardly and downwardly inclined with reference to the vertical sides, the other shuttle box being formed substantially in trapezoidal cross section.

2. In a double shuttle loom, a pair of shuttle boxes, one of which has its two vertical sides parallel and its bottom surface forwardly and downwardly inclined with reference to the vertical sides, the other shuttle box being formed substantially in trapezoidal cross section, and the adjacent top and bottom surfaces of said boxes being substantially parallel.

3. In a double shuttle loom, a pair of shuttle boxes, one of which has its two vertical sides parallel and its bottom surface forwardly and downwardly inclined with reference to the vertical sides, the other shuttle box being formed substantially in trapezoidal cross section, and a shuttle being provided for each box, each shuttle substantially conforming in cross section to the corresponding shuttle box.

4. In a double shuttle loom, a pair of shuttle boxes, one of which has its two vertical sides parallel and its bottom surface forwardly and downwardly inclined with reference to the vertical sides, the other shuttle box being formed substantially in trapezoidal cross section, a shuttle of substantially rhomboid cross section for the first-mentioned box, and a second shuttle of substantially trapezoidal cross section for the second shuttle box.

5. The combination in a loom as set forth in claim 4, in which each shuttle has a bobbin slot with its upper and lower surfaces substantially perpendicular to the parallel front and rear sides of its shuttle.

6. A pair of shuttles for a double shuttle loom, the upper shuttle having parallel inclined top and bottom surfaces and the lower shuttle having a top surface adapted to support the upper shuttle and inclined substantially parallel to the inclined bottom surface of the upper shuttle, said lower shuttle having a bottom surface inclined in a direction opposite to the top surface thereof, and each shuttle having a substantially horizontal bobbin slot with its top and bottom surfaces oblique with respect to the inclined outer top and bottom surfaces of said shuttle.

7. A pair of shuttles for a double shuttle loom, the upper shuttle having parallel inclined top and bottom surfaces and the lower

shuttle having a top surface adapted to support the upper shuttle and inclined substantially parallel to the inclined bottom surface of the upper shuttle, said lower shuttle having a bottom surface inclined in a direction opposite to the top surface thereof, each shuttle having parallel vertical side walls oblique with respect to said inclined top and bottom surfaces, and each shuttle having a horizontal bobbin slot with its top and bottom inside surfaces substantially perpendicular to the parallel vertical side walls of said shuttle.

8. A shuttle for a double shuttle loom, said shuttle having forwardly and downwardly inclined top and bottom surfaces and substantially vertical side surfaces oblique to said top and bottom surfaces, said shuttle having a substantially horizontal bobbin slot extending therethrough with its top and bottom inner surfaces substantially perpendicular to the vertical side surfaces thereof and enclosing, with said side surfaces and with the inclined top and bottom surfaces of said shuttle, wall portions which are of substantially similar trapezoidal cross section.

9. A shuttle for a double shuttle loom, said shuttle having a forwardly and downwardly inclined top outer surface and a forwardly and upwardly inclined bottom outer surface, said shuttle having substantially vertical side surfaces which are substantially parallel and oblique to each of the aforesaid top and bottom surfaces and said shuttle having a bobbin slot extending substantially horizontally therethrough from one of the vertical side surfaces to the other, said bobbin slot having parallel top and bottom inner surfaces which are substantially perpendicular to the vertical side surfaces of said shuttle, and those portions of the shuttle walls lying between the top and bottom inclined outer surfaces and the top and bottom inner surfaces of the bobbin slot being of trapezoidal cross section.

10. In a double shuttle loom, a shuttle box for the upper shuttle having substantially vertical sides, a substantially horizontal top and an inclined bottom, said side, top and bottom defining a space for the reception of the shuttle, and a picker shaped to fit snugly in said shuttle box and to engage said vertical sides and said top and bottom, thereby preventing angular displacement of the picker as said picker is moved forward to propel the shuttle.

In testimony whereof I have hereunto affixed my signature.

RICHARD G. TURNER.