Jan. 27, 1942. E. PFARRWALLER 2,271,205

SHUTTLE BOX

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Fig. 1.

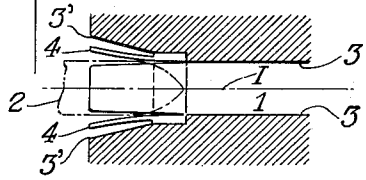

Fig. 2.

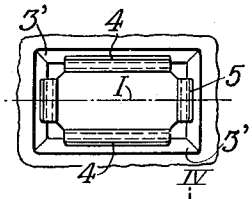

Fig. 3.

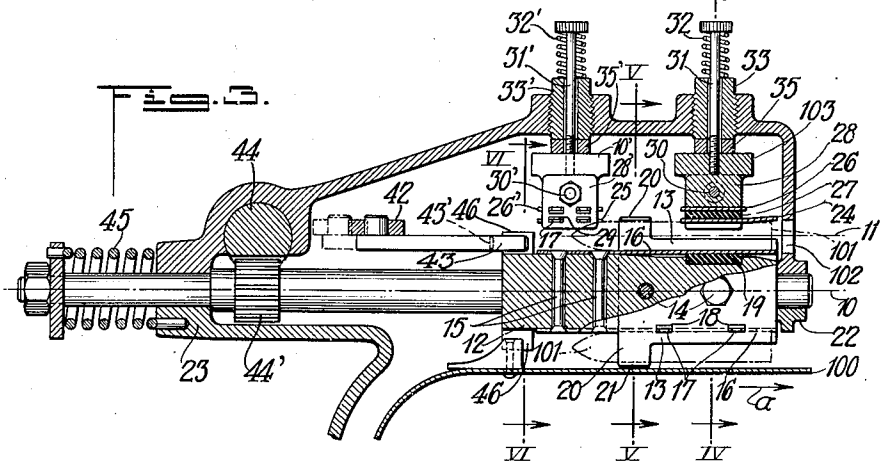

Fig. 4.

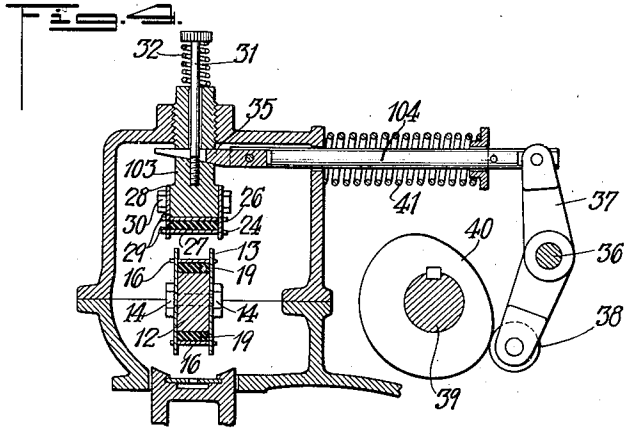

Fig. 5.

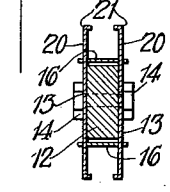

Fig. 6.

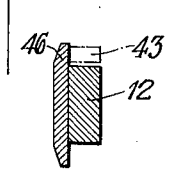

Fig. 7.

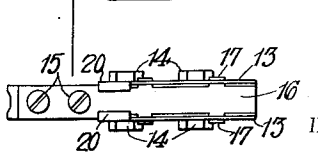

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Fig. 8.

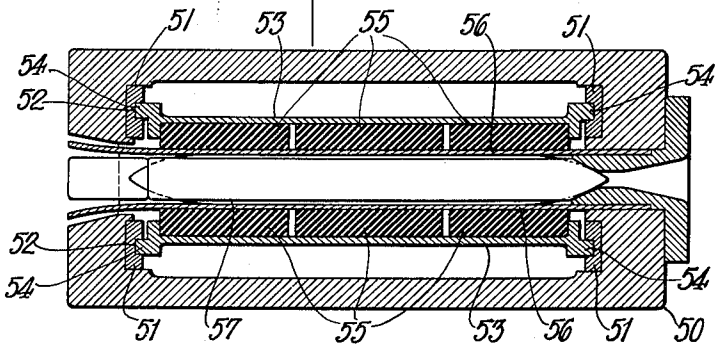


Fig. 9.

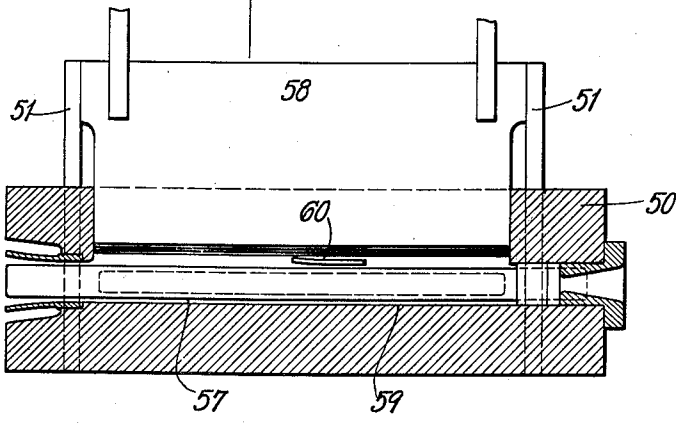
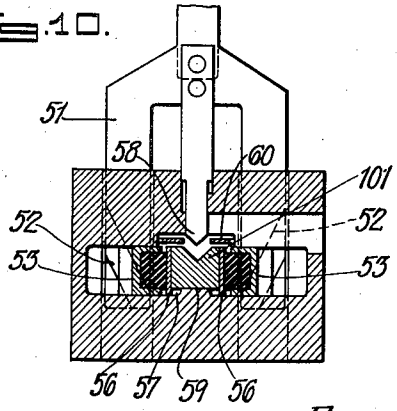


Fig. 10.



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UNITED STATES PATENT OFFICE

2,271,205

SHUTTLE BOX

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Application June 28, 1939, Serial No. 281,516
In Switzerland July 2, 1938

14 Claims. (Cl. 139—183)

The present application relates to a novel construction of shuttle boxes for looms for weaving, more particularly to shuttle boxes having a specially constructed mouth for securely receiving the shuttles and to shuttle boxes which have a revolvable part for receiving a plurality of shuttles within very short time intervals.

Catching of the shuttles after they have inserted a weft thread is usually accompanied by more or less hard knocks. If the shuttle arrives not exactly in the direction of the mouth of the shuttle boxes, it knocks against the solid wall or a solid brake tongue which tongue must be operated by a spring. In order to reduce such knocks it has been proposed to use slender and pointed shuttles. This, however, is not sufficient in high speed looms operating with very high shuttle speeds. The knocks connected with the high speed operation cause rapid wear of vital parts and seriously interfere with the reliable operation of the weft clamps attached to the shuttles. The clamps are likely to open and release the weft thread which then recoils into the shed because of its elasticity.

It is an object of the present invention to provide shuttle boxes having a mouth portion which is elastic in a direction perpendicular to the direction of the pick and at at least two portions of the mouth at which portions there is no rigid guide for the shuttles. By this means the knocks of the shuttles entering the shuttle box are reduced to a negligible amount. The elastic sides of the shuttle box mouth may be formed by laminae extending in the direction of the pick so that their elasticity is active exclusively perpendicularly to the direction of the pick. The laminae may be freely movable adjacent to the mouth and rigidly connected with the interior of the shuttle box. They may be additionally tensioned by resilient members, for example, rubber blocks and the deflection of these resilient members and/or said laminae may be limited by a suitable abutment.

According to the present invention the laminae and/or resilient means may form at the same time a shuttle brake. A plurality of such laminae may be arranged in series for consecutive engagement of the shuttles. The laminae and/or resilient means may be controlled and periodically tensioned or released by means of the loom machinery; their tension may be adjusted by means of a screw or other suitable adjusting means.

In looms for weaving in which the shuttle acts in both directions the shuttle receiving box must also operate as picking box. In this case, according to the present invention, a shuttle guide is periodically inserted into the shuttle box for definitely guiding the shuttle when it is shot out of the box and which is removed from the interior of the shuttle box to make space for an entering shuttle. With such a construction the shuttle guide can extend close to the mouth of the shuttle box.

In looms for weaving in which the shuttles are picked from one side only, according to the present invention, a plurality of shuttle receiving boxes made substantially from laminae are disposed on a revolving support body so that as soon as one shuttle has entered one box another empty box can be brought into the direction of the pick before the previously arrived shuttle has been removed from its shuttle receiving box.

The revolving body set forth in the paragraph next above may carry only three sides of the boxes connected therewith. The fourth side of the boxes may be formed by laminae which may be tensioned by additional resilient means and the tension thereof may be periodically controlled and which laminae are not connected with said revolving part. The revolving support may be connected by means of a torsion spring with a stationary part of the loom.

Further and other objects and advantages of the present invention will be apparent from the accompanying specification and claims and shown in the drawings which, by way of illustration, show what I now consider to be preferred embodiments of my invention.

In the drawings:

Figure 1 is a longitudinal sectional view of a shuttle box mouth according to the present invention.

Figure 2 is a front view of the shuttle box mouth illustrated in Figure 1.

Figure 3 is a longitudinal sectional view of a revolving shuttle box according to the present invention.

Figure 4 is a cross sectional view of the revolving shuttle box device illustrated in Figure 3 and taken along line IV—IV of Figure 3.

Figure 5 is a cross sectional view of the revolving part of the shuttle box illustrated in Figure 3 and taken along line V—V of said figure.

Figure 6 is a cross sectional view of the revolving part of the shuttle box device illustrated in Figure 3 and taken along line VI—VI of said figure.

Figure 7 is a top view of an elastic shuttle box

as used in the revolving shuttle box device illustrated in Figures 3 to 6.

Figure 8 is a horizontal longitudinal sectional view of a modified shuttle box according to the present invention adapted for receiving and picking shuttles.

Figure 9 is a vertical longitudinal sectional view of the shuttle box illustrated in Figure 8.

Figure 10 is a cross sectional view of the shuttle box illustrated in Figures 8 and 9.

Like parts are designated by like numerals in all figures of the drawings.

Referring more particularly to Figures 1 and 2 of the drawings, the center line of the movement of the shuttles is designated by I. The channel 1 which receives the shuttle 2 which is shown in dash and dotted lines is provided with walls 3. The flaring out mouth of the channel 3 is equipped with elastic laminae 4 and 5, the outward movement of which may be limited by means of the rigid pass 3' of said mouth. Figure 2 is a front view of the mouth taken in the direction of the entering shuttle and with the elastic laminae 4 and 5 lining the wall portions of said mouth in its most outward bent position.

Figures 3 to 7 show a modification of the present invention and relate to a shuttle box receiving device whereby the shuttles move from right to left as seen on the drawings. The shuttles are transported back from the shuttle receiving to the shuttle picking side in the direction of arrow *a* in a shuttle conveyor 100.

A support body 12 is revolvable about an axis 10 in bearings 22 and 23, the axis 10 being parallel to the direction of the shuttle movement. Two laterally movable resilient plates 13 are connected to opposite sides of said revolving body 12 by means of screws 14. Further laminae 16 are connected to other opposite sides of the revolving body 12 by means of rivets 15. Laminae 16 are provided with projections or noses 17 which can be seen in Figure 7 and which are inserted into the slots 18 of the plate members 13. Rubber blocks 19 or steel springs are inserted with an initial tension between laminae 16 and the body 12 whereby the noses 17 are pressed on to the outer edge of the slots 18. The resilient plates or laminae 13 are provided with projecting flaps 20. The outer ends of these flaps are bent inward and form the holding rim 21 which can be seen clearly in Figure 5 and which prevents falling out of the shuttles 101 when the revolver 12 is turned.

The incoming shuttles 101 are held by stationary laminae 24 and 25. These laminae act at the same time as brakes and are completely independent from one another.

Resilient members, for example, rubber blocks 27 are individually pressed in between the laminae 24 and 25 and the plates 26 and 26' respectively. The plates 24, 26 and 25, 26' are held in the slots 29, 29' provided respectively in the plates 28 and 28'. The plates 28, 28' are individually connected with the brake bodies 103, 103' by means of screws 30 and 30' respectively. The brake bodies 103 and 103' are held in position by means of screws 31 and 31' respectively and the springs 32 and 32' respectively. The position of the brake blocks is controlled by the periodically operating wedge members 35 and 35'. The vertical extent of the shuttle receiving channel can be changed by adjusting the screw members 33 and 33'.

The wedge members 35 and 35' are individually movably connected to the ends of reciprocatingly operating rods 104. A shaft 39 is driven by the loom driving machinery and carries the cam 40. This cam acts on roller 38 of the two arm lever 37 swinging about a fulcrum 36. The arm of the two arm lever 37 which does not carry the roller 38 is movably connected with the rod 104. A spring 41 is provided which assures engagement of roller 38 and cam 40. Th inclination of the wedge member 35 is such that the mechanism is self-locking and the knocks exerted by the shuttle on the block 103 are not transmitted to the brake operating mechanism 104, 37, 38, etc. After the shuttle 101 has arrived in the receiving box it is brought into a desired position by a special mechanism comprising a plunger 43 operated by a lever 42. When gripper shuttles are used said shuttles are usually pushed back towards the shuttle box mouth 102. For this purpose the secondary brake 25 must be lifted so that the pushing back of the shuttle can be accomplished without much power.

The revolver 12 is held by a spring 45 in such manner that, if the spring is without tension, the shuttle boxes formed by the laminae 13 and 16 are in a plane which is perpendicular to the plane in which the revolving axis 10 and the picking axis 11 lie, i. e., in a horizontal plane as seen on the drawing. The body 12 is oscillated by means of the pinion 44' and the reciprocating rack 44 cooperating therewith. The revolver 12 is locked in correct shuttle catching position by means of spring 44 which presses the nose 46 of the revolver against the pusher or plunger 43; this is illustrated in Figure 6. The pusher 43 is removed into the position 43' shown in dotted lines while the revolver 12 is turned 180° by means of rack 44 and pinion 44'.

In order to reduce the power required for operating the rack 44 the spring 45 is so dimensioned that the time of one-half oscillation of the oscillating system composed of the mass of the revolver 12 and the spring 45 is equal to the motion of the rack 44.

Figures 8, 9, 10 illustrate a third embodiment of the present invention which is adapted for shuttles operating in both directions in the shed. The shuttle box is used for receiving as well as for picking the shuttles.

Four slides 51 are vertically slideably provided in casing 50 of the shuttle box, each slide 51 having inclined grooves 52. The brake bodies 53 are provided with projections 54 which slide in said grooves. Laminae 56 line two sides of the interior of the shuttle box and may be resiliently pressed into the interior by means of one or a plurality of rubber blocks 55 or other resilient means having a like action. The brake members 53 are laterally moved when slide 51 or rather the inclined grooves 12 are moved up and down. By this action the brake laminae 56 are either moved into the interior of the shuttle box and against the shuttle or removed therefrom whereby the shuttle is freed. In order to prevent the laminae 56 from moving too far inward abutments 57 are provided.

When the shuttle passes into the receiving box, according to the present invention, the brakes are applied by pulling upward member 51. Member 51 also carries the shuttle guide 58 which, when the brakes are applied, is removed so that the shuttle has plenty of space to enter the box and cannot knock against the stationary guide 59 or the removable guide 58. The resilient laminae 60 disposed at the upper side of the shuttle receiving channel absorb knocks which would otherwise act on the rigid shuttle guides.

While I believe the above described embodi-

ments of my invention to be preferred embodiments, I wish it to be understood that I do not desire to be limited to the exact details of design and construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. In a loom for weaving, shuttles, a shuttle box having rigid interior wall forming members and a mouth portion through which said shuttles enter said box, said mouth portion having side walls formed by laminae extending in the direction of the movement of the shuttles and being resilient in a direction transverse to said direction of movement, said laminae extending into the interior of said shuttle box and lining interior wall portions thereof, and additional resilient means disposed on the back of said laminae and in between said laminae and said rigid interior wall forming members.

2. In a loom for weaving, a shuttle box as claimed in claim 1, in which said additional means consist of rubber.

3. In a loom for weaving, a shuttle box as claimed in claim 1, in which said additional means consist of a plurality of rubber blocks.

4. In a loom for weaving, shuttles, a shuttle box having rigid interior wall forming members and a mouth portion through which said shuttles enter said box, said mouth portion having side walls formed by laminae extending in the direction of the movement of the shuttles and being resilient in a direction transverse to said direction of movement, said laminae extending into the interior of said shuttle box and lining side walls thereof, additional resilient means disposed on the back of said laminae and in between said laminae and said members, and abutment means associated with said members and with said laminae for limiting movement of said laminae towards the center of said box.

5. In a loom for weaving, shuttles, a shuttle box having a mouth portion through which said shuttles enter said box, said mouth portion having side walls formed by laminae extending in the direction of the movement of the shuttles and into the interior of said box and being resilient in a direction transverse to said direction of movement, said laminae being subdivided into a plurality of laminae adapted to be consecutively engaged by a shuttle entering the box.

6. In a loom for weaving, shuttles, a shuttle box having a mouth portion through which said shuttles enter said box, said mouth portion having side walls formed by laminae extending in the direction of the movement of said shuttles and into the interior of said box and being resilient in a direction transverse to said direction of movement, and periodically acting laminae actuating means connected to and driven by said loom and periodically actuating said laminae.

7. In a loom for weaving, shuttles, a shuttle box having a mouth portion through which said shuttles enter said box, said mouth portion having side walls formed by laminae extending in the direction of the movement of said shuttles and into the interior of said box and being resilient in a direction transverse to said direction of movement, and a shuttle guide means movably associated with said box and being adapted to be reciprocatingly moved to and from the center line of said box and to guide the shuttle during the pick and to provide a free passage for the shuttle entering the box.

8. In a loom for weaving, shuttles, an element revolvable about an axis parallel to the direction of movement of said shuttles, resilient members connected with said element and forming the side walls of shuttle boxes, a yielding member stationary with respect to said element and forming another wall of said shuttle boxes when said first mentioned members are moved adjacent thereto by revolving said element.

9. In a loom for weaving, shuttles, an element revolvable about an axis parallel to the direction of movement of said shuttles, wall members connected with said element and forming the side walls of shuttle boxes, a wall member stationary with respect to said element and forming another wall of said shuttle boxes when said first mentioned members are moved adjacent thereto by revolving said element, said second mentioned wall member being movable towards and from said element for engaging a shuttle received in a box and disengaging said shuttle and permitting turning of said element and removal of the said first mentioned wall members forming a shuttle box from said second mentioned wall member.

10. In a loom for weaving, shuttles, an element revolvable about an axis parallel to the direction of movement of said shuttles, wall members connected with said element and forming the side walls of said shuttle boxes, a wall member stationary with respect to said element and forming another wall of said shuttle boxes when said first mentioned members are moved adjacent thereto by revolving said element, said first mentioned wall members having a shuttle holding portion adapted to hold a shuttle received between said first mentioned wall members when they are removed from said second mentioned wall member when said element is revolved and said first mentioned members are removed from said second mentioned member.

11. In a loom for weaving, a stationary part, shuttles, an element revolvable about an axis which is parallel to the direction of movement of said shuttles, wall members connected with said element and forming the side walls of shuttle boxes, a wall member stationary with respect to said element and forming another wall of said shuttle boxes when said first mentioned members are moved adjacent thereto by revolving said element, a torsion spring interconnecting said revolvable element and said stationary part of said loom, and an adapted to oscillate mechanism associated with and oscillating said element against the action of said torsion spring.

12. In a loom for weaving, shuttles, an element revolvable about an axis which is parallel to the direction of movement of said shuttles, wall members connected with said element and forming the side walls of shuttle boxes, a wall member stationary with respect to said element and forming another wall of said shuttle boxes when said first mentioned members are moved adjacent thereto by revolving said element, a torsion spring interconnecting said revolvable element and said stationary part of said loom, an oscillating mechanism associated with and oscillating said element against the action of said torsion spring, and a periodically acting locking means associated with said element for periodically locking said element and shuttle boxes in a predetermined operating position.

13. In a loom for weaving, shuttles, an element revolvable about an axis which is parallel to the direction of movement of said shuttles, wall members connected with said element and forming the side walls of shuttle boxes, a wall

member stationary with respect to said element and forming another wall of said shuttle boxes when said first mentioned members are moved adjacent thereto by revolving said element, a torsion spring interconnecting said revolvable element and said stationary part of said loom, an oscillating mechanism associated with and oscillating said element against the action of said torsion spring, and a periodically acting locking and shuttle displacing means associated with said element for periodically locking said element and shuttle boxes in a predetermined operating position and displacing a shuttle received in one of said boxes into a predetermined position.

14. In a loom for weaving, shuttles, shuttle box means having a mouth portion for receiving said shuttles, laminae extending in the direction of movement of the shuttles and being resilient in a direction transverse to said direction and having freely swingable outer ends forming side wall portions of said mouth portion, and a shuttle carrier revolvably connected with said loom and being revolvable about an axis parallel to the direction of movement of said shuttles and forming part of said shuttle box.

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