July 9, 1968 J. TUBAU QUINTANA 3,391,714

ACTUATION FOR MULTIPLE-LOOM WEFT INSERTERS

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Fig 1

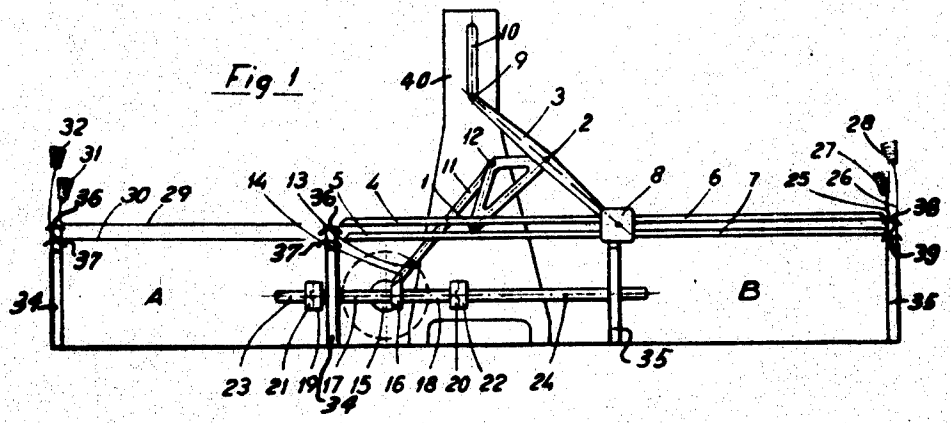


Fig 2

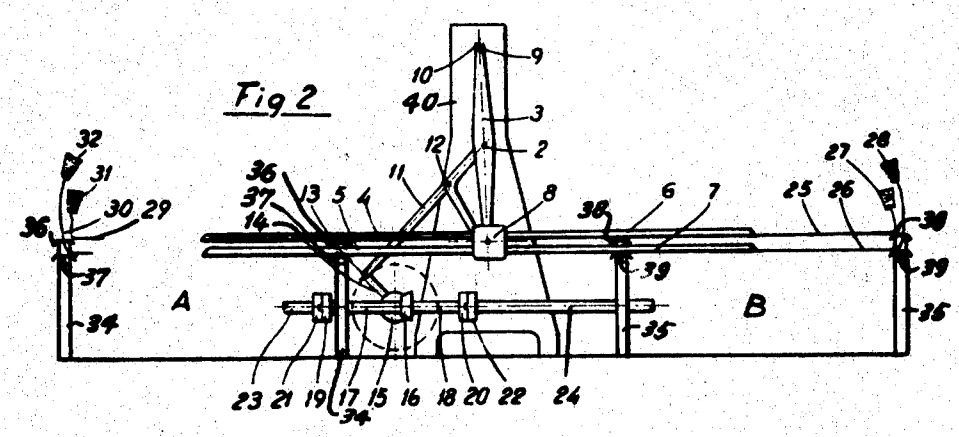
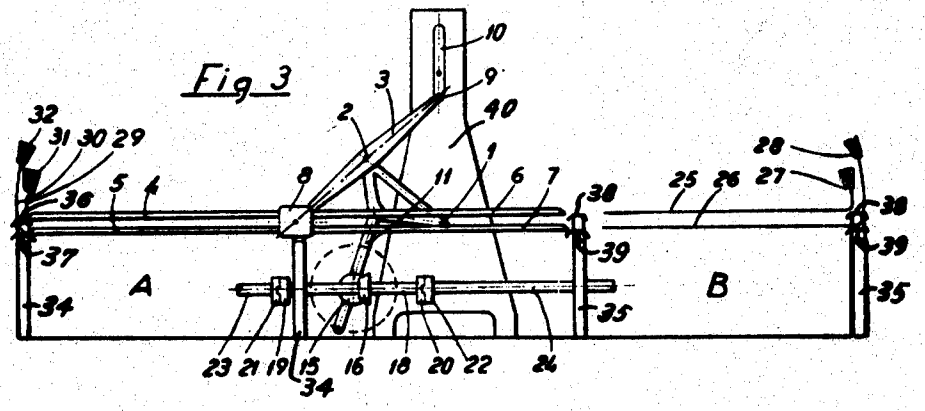


Fig 3



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Fig 4

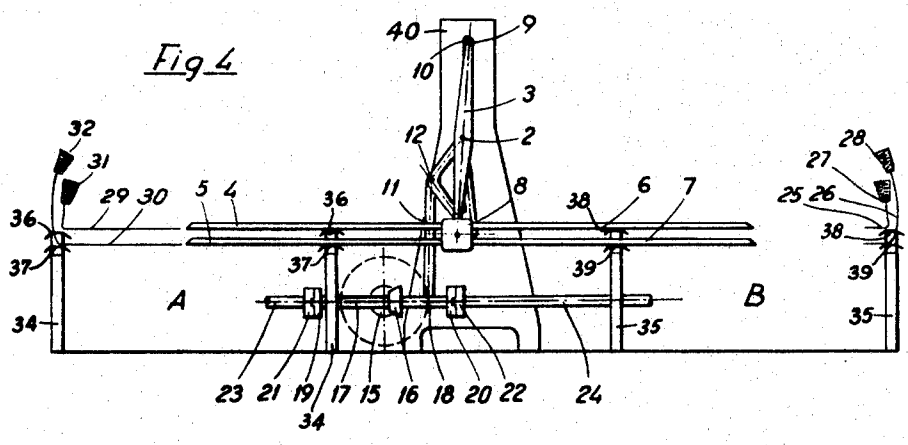
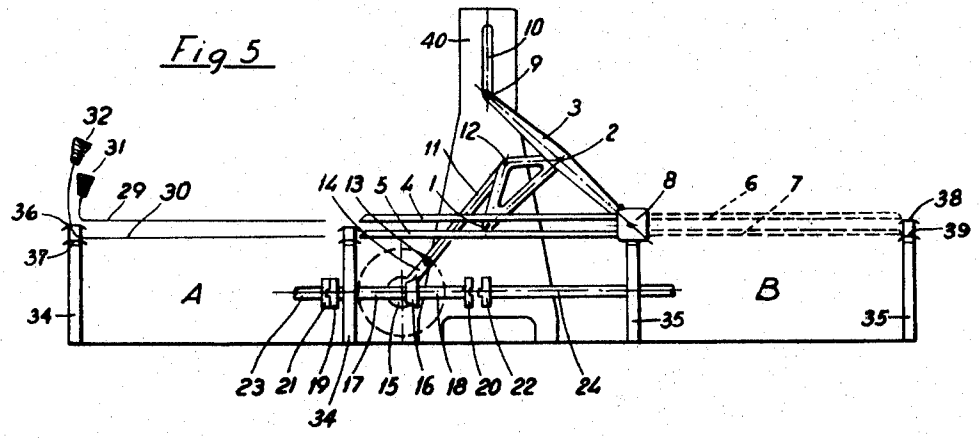


Fig 5



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3,391,714

ACTUATION FOR MULTIPLE-LOOM WEFT INSERTERS

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2 Claims. (Cl. 139—123)

ABSTRACT OF THE DISCLOSURE

Weft inserter driving device for multiple-looms having two loom bodies, each of them provided with at least one group of warp threads adapted to form a shed, a stationary weft thread bobbin, a weft inserter of the gripper type adapted to reciprocate through the shed, and a transverse lay beam, the device comprising a triangular structure connected at the three points of the triangle, respectively, to the loom frame, to the center of an arm whose top end is guided in a slot perpendicular to the weft inserter travel and whose lower end is connected to a weft inserter carrying frame, and through a rod to a crank adapted to impart to the said triangular structure a swinging movement which is transmitted to the weft inserters in the form of a reciprocating movement gradually accelerated from one end to the mid-travel and then gradually decelerated to the opposed end.

This invention is for improvements in or relating to the known systems for operating weft inserters, more particularly in respect of their multiple output. All previous endeavours to increase the number of textile articles which can be produced on a single loom with a single control and a reduction in space and for a given power have come up against practical difficulties which it has been found impossible to overcome completely, since the required mechanisms slowed down output and proved difficult to operate, complicated and uneconomic.

This invention obviates all these disadvantages and enables up to four fabrics to be produced simultaneously by means of a simple, robust and very low-cost mechanism which, relatively speaking, takes up very little room.

There are various systems for inserting weft yarn into the shed of shuttleless looms, on the basis of a weft inserter or weft-carrying arm having grippers at one end to catch the weft yarn from outside the loom, or else two inserters are used each moving through half the shed to opposite hands and meeting at the centre of the shed to transfer the weft yarn from one inserter to the other. Also, projectiles operated by some fluid—as a rule, air or water—have been suggested. In these systems the weft yarn undergoes considerable accelerations from the time when it is caught, and it is difficult to check on weft yarn position. Consequently, if the fabric requires the insertion of more than one weft yarn in a single pick, operation becomes very difficult and only one fabric at a time can be manufactured.

The system according to the invention obviates these disadvantages and enables up to four fabrics to be produced simultaneously even though the inserters carry more than one weft yarn at each pick, the weft-yarn-pulling times also being synchronized with some stop times near the catching and leaving of the weft yarn, to help reduce unequal tensions or abruptnesses likely to break the weft yarn or cause defects in the fabric.

The mechanism according to the invention, as well as being very simple and rugged—essential for the task for which it is to be used—takes up very little space as compared with the high output which it makes possible, and

the control of the weft inserters or the like can be varied. The operation of four weft inserters simultaneously by a single control or motor raises output considerably, and the feature is equally of use in vertical and horizontal looms for the production of from one to four fabrics per loom, depending upon the nature of the fabric, for instance, metal fabrics or fabrics in which the weft and warp are fairly thick. A single drive element can enable one fabric to be produced by each body of the loom, and fabrics of normal or standard texture can be produced to the number of two fabrics per loom body, or four fabrics simultaneously.

The mechanism can be placed vertically or horizontally as required and comprises a structure having three coplanar bearing points forming the theoretical vertices of a preferably scalene triangle, such points serving for the same number again of articulated actuations. This structure, which can have the shape appropriate for the particular use concerned, will hereinafter be called "tri-articulated". The bottom vertex serves as a bearing point and as a point for the structure to rotate around itself, and the top vertex is articulated to the centre of an arm whose top end is borne by and slides in a slot perpendicular to the travel of the or each inserter, there being articulated to the bottom end of the latter arm a weft-inserting frame to which the or each weft inserters or the like are joined. The end of a rod is articulated to the third vertex of the triarticulated structure and the other end of the rod receives the rotating movement of a crank which can be driven by any system and which as it rotates reciprocates the tri-articulated structure which in turn forces the or each inserter to move reciprocatingly through the shed, but with intermittent stoppages at the critical times of direction changing, to ensure that the or each weft yarn is not caught and left abruptly.

The or each inserter, which can pull one or more weft yarns simultaneously, performs the regular reciprocation at a time of the shed when the speed at direction changing is substantially zero, since the movement of the rod, at its two opposite maxima which coincide with the times of catching and leaving the weft yarn, drops to zero, its movement and, therefore, the pulling speed, then gradually increasing. The weft yarn is caught at one side of the shed near the point at which the gripper of the or each inserter is moving at substantially zero velocity, and is abandoned in similar fashion at substantially zero speed on the other side of the shed. The yarn is therefore not treated abruptly and experiences a relatively gentle acceleration and deceleration at the same amplitude.

The or each inserter is operated by an arm guided at one end in the slot perpendicular to inserter travel, the arm being connected by way of a central articulation to the top vertex of the tri-articulated structure, the arm oscillating on the fixed-bearing vertex disposed at the place where inserter travel intersects the perpendicular thereto which coincides with the geometric axis of the slot.

The advantage of this system is that the length of the straight slot can readily be much less than the travel of the or each inserter, and even though the system can be positioned horizontally, it is better for it to be placed vertically so that the slot is then disposed near the top of an upright perpendicular to the loom and all the movements of the mechanism are performed in a vertical plane, so that the inertia forces of the guide elements are relatively small and the same do not require any great strengthening, with a consequent reduction in weight and therefore in vibration, while the loom can operate with up to four weft inserters simultaneously without any reduction in speed.

The system thus formed can be used equally satisfac-

torily in vertical looms and in horizontal looms. When the system is used in horizontal looms, the weft-carrying arms are of very reduced height relatively to the loom framings, so that loom operation can be supervised readily.

The mechanisms, such as the slay, healds and so on of the two loom bodies can be driven off a shaft of each loom body via a mechanical or electromagnetic clutch on each side, and the weft inserters can be connected to the weft-inserter frame by mechanical or electromagnetic means, in order that, as required or in case of serious damage, the part corresponding to each loom body can be disconnected immediately from the clutch coupled to the drive element, as can the or each weft inserter or weft-carrying arm connected to the weft-inserter frame.

An embodiment of the invention is illustrated diagrammtically and by way of non-limitative example in the accompanying drawings wherein:

FIG. 1 is a front view of the control mechanism as used in a loom comprising two bodies and four weft inserters, the same being shown in the position for catching the weft yarn on one loom body and in the position for leaving the weft yarn on the other loom body;

FIG. 2 is a front view similar to FIG. 1 but showing the four inserters halfway through their travel, two of the inserters pulling their corresponding weft yarns while the other and opposite two are searching for their corresponding weft yarns;

FIG. 3 is a similar front view where the four inserters have travelled their full distance to initiate another picking cycle;

FIG. 4 is a similar front view where the four inserters are again at mid-travel, two of them pulling their corresponding weft yarns while the other and opposite two are searching for their corresponding weft yarns, and

FIG. 5 is a similar front view in which all activity of one loom body has stopped.

Referring to the drawings, there can be seen a triarticulated structure comprising at its bottom pivot a pivot **1** via which the structure is supported and around which it can rotate, and a top support or bearing pivot **2** articulated to the centre of an arm **3** operating weft inserters **4–7** via a weft-inserter frame **8**, end **9** of the arm **3** sliding in a slot **10**, the arm **3** being moved, via a rod **11** supported by and articulated to the third and oscillating pivot **12** of the tri-articulated structure, by a crank **14**. The rod **11** is articulated at its other end **13** to the crank **14** and the same is rotated by a drive shaft via a set of reverse gear wheels **15, 16**, two output shafts **17, 18** being provided and having at their ends clutch plates **19, 20** engageable with clutch plates **21, 22** for simultaneous actuation of the shafts **23, 24** and transmission of the movement to various mechanisms (not shown) which are components of the loom bodies.

The loom frames are shown diagrammatically at **34** and **35**. These frames are provided with guides **36, 37** and **38, 39** for the reciprocating needle like weft inserters **4, 5** and **6, 7**. The structure carrying slot **10** and mounting pivot **1** is shown at **40**.

In FIG. 1, the inserters **6, 7** are catching their weft yarns **25, 26** from bobbins **27, 28**, to pull the yarns through the sheds associated with loom body B, whereas the opposite inserters **4, 5** have left their weft yarns **29, 30** from bobbins **31, 32** in loom body A. Suitable weft inserters and their operation are described, e.g., in Spanish Patent No. 307,145; copending application Serial No. 509,502, filed November 24, 1965, corresponds to that patent.

In FIG. 2, rotation of the crank **14** has acted on the rod **11** to bring the tri-articulated structure substantially into a vertical position, the end **9** of the arm **3** reaching the end position in the slot **10**, with the result that the inserters **6, 7** pulling the weft yarns **25, 26** are at mid-travel in respect of loom body B and the two opposite inserters **4, 5** are also in mid-travel in respect of loom body A.

FIG. 3 shows the arrival of the inserters **4, 5** and the catching of the weft yarns **29, 30** of the bobbins **31, 32** in loom body A simultaneously as the inserters **6, 7** associated with loom body B are leaving the weft yarns **25, 26** derived from the bobbins **27, 28**.

In FIG. 4, the rotation of the crank **14** has so moved the rod **11**, that the tri-articulated structure is substantially in a vertical position and the end **9** of the arm **3** is at the other end position in the slot **10**, with the result that the inserters **4, 5** pulling the weft yarns **29, 30** are in mid-travel across loom body A while the two inserters **6, 7** are in mid-travel searching for the weft yarns **25, 26** of loom body B.

FIG. 5 shows by way of example a loom in which all activity of body B has stopped, the two inserters **6, 7** (shown in chain lines) having been disconnected and the clutch plates **20, 22** having disengaged. However, the whole of loom body A can continue to run normally; similarly, there can be a complete stoppage of activity in the other loom body.

What I claim is:

1. An actuating mechanism for weft inserting means for multished looms, comprising, in combination with weft thread bobbins and a carrying frame mounting said weft inserting means, a triangular structure having a bottom point, a top point, and a third point, means supporting said structure at its bottom point on the loom frame for pivotal movement, a slot formed in the loom frame and disposed to extend perpendicularly to the travel of the carrying frame, a pivotal arm guided at one end in said slot and pivotally connected at its center to said top point of said triangular structure and articulated at its other end to the carrying frame, and a crank-driven rod articulated to said third point of the triangular structure, said rod imparting to said triangular structure a swinging movement which is transmitted to the carrying frame as reciprocating movement which is gradually accelerated from the one end to the mid-travel and then gradually decelerated to the other end.

2. A mechanism as claimed in claim **1** wherein said supporting means is disposed so that its axis is vertically aligned with the vertical axis of said slot and is horizontally aligned along the plane coinciding with the path of travel of said carrying frame.

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HENRY S. JAUDON, *Primary Examiner.*