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H. PELCÉ

Serial No. 338,620

Filed June 3, 1940

2 Sheets-Sheet 1

CHANGE-OVER DEVICE FOR CIRCULAR WEAVING LOOMS

Fig. 1.

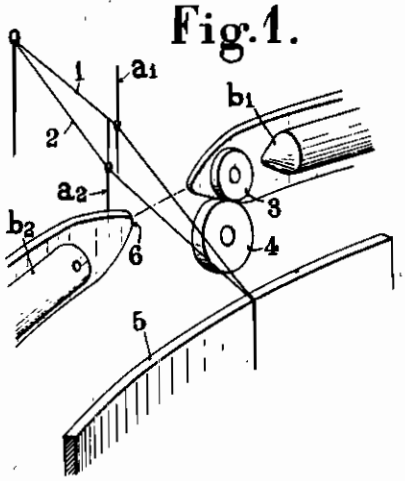

Fig. 2.

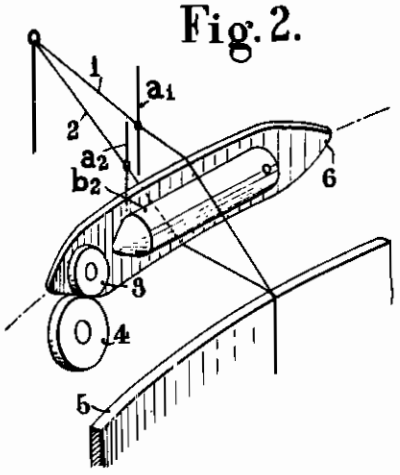

Fig. 3.

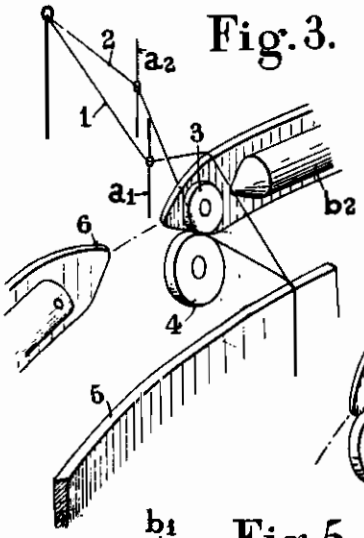

Fig. 4.

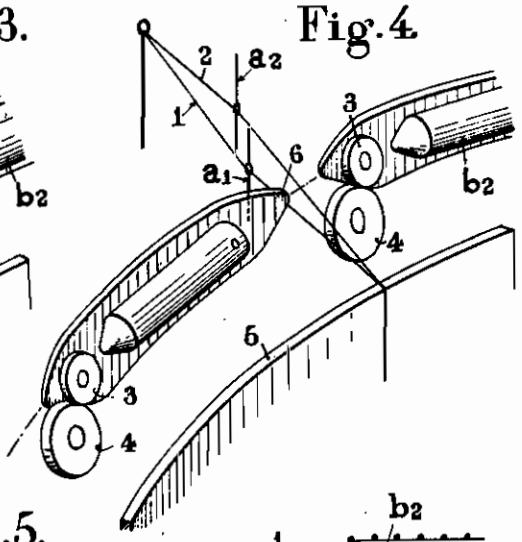

Fig. 5.

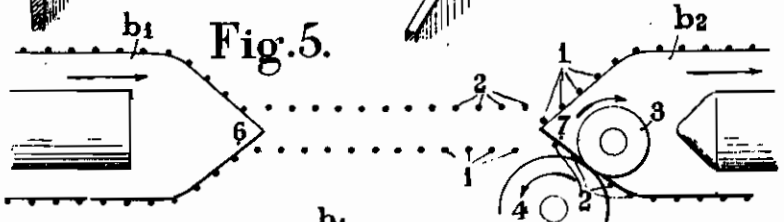

Fig. 6.

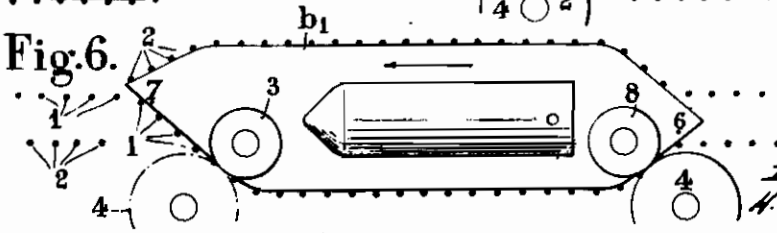

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Fig. 7.

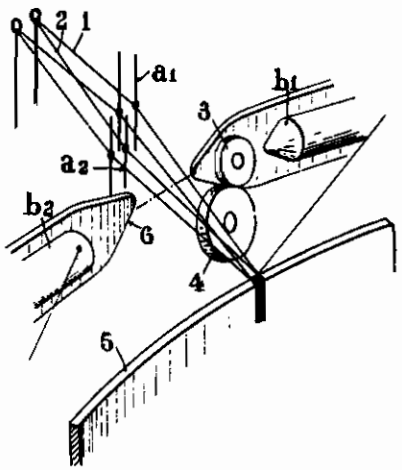


Fig. 8.

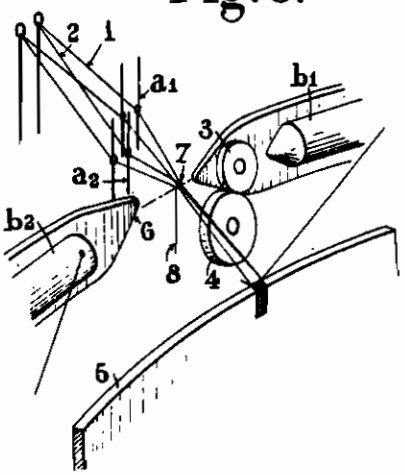
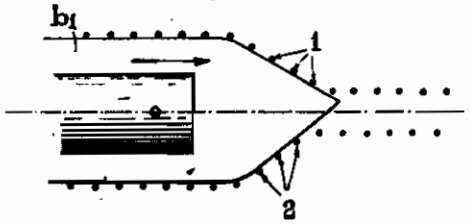


Fig. 9.



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ALIEN PROPERTY CUSTODIAN

CHANGE-OVER DEVICE FOR CIRCULAR WEAVING LOOMS

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Application filed June 3, 1940

Circular weaving looms exist of the type in which the warp threads are fed at right angles or approximately at right angles to the axis of the loom and the shuttles are pushed by rollers located outside the shed, acting, across a sheet of warp threads, on rollers mounted at the rear of the shuttles.

In order that this propulsion should be practically possible at high speed, the warp threads of the sheet trapped between the pushing roller and the pushed roller must be only slightly distorted, and for that purpose, it is necessary:

1. That the pushing roller should rotate on itself in a direction and at a speed such that the sheet of threads which is clamped between both rollers is subjected to no tangential stress;

2. That, at the place where it is clamped between the pushing roller and the pushed roller, said sheet of threads, should be inclined relatively to the horizontal according to an angle equal or approximately equal to that which the tangent common to both rollers forms with the horizontal, at their point of contact.

The condition 2 has already been satisfied by devices for forming the shed by means of needles, heddles or frames controlling only one warp thread, or a small number of warp threads, in such a manner that the distortion imparted to the threads by the passage of the rollers is sufficiently small so as not to damage the said threads. In the second case, the distance between the two extreme threads of one and the same frame can scarcely exceed, for the strongest threads, a small fraction of the diameter of the pushing roller.

Unfortunately these devices which lead to the use of a large number of needles, heddles or frames, necessarily of small dimensions, are costly, difficult to realise mechanically and do not allow of operating at high speed industrially.

The present invention is adapted to allow the use of frames each controlling a large number of threads (in particular, on a length greater than the diameter of the pushing roller) whilst forming, at the place where the sheet of warp threads is clamped between the pushing roller and the pushed roller, a perfect continuous curve thread to thread, having the desired inclination.

The change-over device according to the invention is more particularly characterised by the combination of means for controlling the heddle frames imparting to the latter vertical displacements of small amplitude, with a suitable shaping of the shuttle shoes such that the opening of the shed is accelerated by the sliding of said shoes against the warp threads and that the lower sheet forms, at the place where it is clamped between the pushing roller and the pushed roller, a continuous curve having the desired inclination, and this whatever may be the number of heddles in each frame.

For that purpose the shuttle shoes comprise at the front, a nose arranged to engage in the slightly open shed and to complete the opening of said shed by the sliding movement of its edges on the upper and lower sheets.

But, in circular weaving looms which use, as members for clamping the weft, either combs sweeping over but a small portion of the shed, or pressure needles, or rollers, it frequently happens that owing to the breaking of a warp thread, the strand which has become free lies across the immediately adjacent warp threads, and this owing to the displacement of the shuttles which tend to draw along after them any body which, for any reason whatever, takes a bearing thereon.

The entanglement resulting from this mishap can partly or entirely obstruct, in a certain zone, the passage of the shuttles which follow; the latter naturally cut the obstacles which are in their path. It will be easily understood that the defect produced becomes so much the more serious as the loom takes a longer time to stop.

The interlocked points of the entanglements are always in the axis of the sheds, and the defects produced increase in importance in proportion as said points are removed from the well as the shuttles find it more and more difficult to clear their way. The attaching nose of their distorting shoe which acts in the same way as a cam, or as a plough share cannot alone effect the selection of two interlocked sheets. In its displacement it can only determine the breakages of most of the threads caught in the entanglement, which results in repairs which are often long and, notwithstanding all the care taken, defects which can be frequently detected in the linen cloth.

The present invention is also adapted to remedy these inconveniences, or, at least to limit the seriousness thereof, for that purpose the point of the distorting shoe of the shuttles is offset relatively to the median beating plane of the sheds; in this manner, if an entanglement is produced beyond a certain distance from the well, the two interlocked sheds are both picked up on the same side of the nose, and the weaving does not take place in the region considered.

Of course a slight defect is produced in the linen which will present, at certain places, missed picks, but this defect can be easily repaired; moreover, numerous breakages of the warp

threads are thereby avoided, breakages which follow the passages of the shuttles in the entanglement zones, before the loom stops, as soon as the warp-protector is set in action.

The accompanying drawing diagrammatically illustrates and by way of example only two embodiments of the subject-matter of the invention.

Fig. 1 is a perspective view of part of a circular loom showing a portion only of the central well through which the woven fabric descends, the rear of a shuttle and its pushing roller, the front of the following shuttle and two of the warp threads with the respective heddles.

Figs. 2, 3, 4 shows the same elements at three successive moments of a change-over phase of the threads.

Fig. 5 illustrates an extended vertical section made according to the circumference described by the shuttles.

Fig. 6 is a similar section showing a shuttle of different shape provided in order to produce the complete uncovering of the shuttles by a backward movement of the latter.

Fig. 7 is a perspective view of a portion of a circular loom showing only one position of the central well through which the woven fabric descends, the rear of a shuttle slightly different from the above mentioned shuttles and its pushing roller, the front of the following shuttle and four of the warp threads with the respective hedles.

Fig. 8 is a similar view showing an entanglement caused by the breakage of a warp thread.

Fig. 9 is an extended vertical section made according to the circumference described by the shuttles.

1 and 2 designate two warp threads controlled by two respective heddles a_1 and a_2 which are moved in reverse directions by the frames the vertical reciprocating stroke of which is only of small amplitude.

b_1 and b_2 designate two shuttles the shoe of which carries at the rear a roller 3 against which presses a pushing roller 4 having a continuous circular movement around the well 5.

The shoe of each shuttle terminates at the front in a nose 6 adapted to engage in the slightly open shed (Fig. 1) and to complete the opening thereof by the sliding movement of its edges on the upper and lower sheets (Fig. 2). It results therefrom that, even if each frame comprises a great number of heddles, the respective threads 1 or 2 form sheets the intersection of which by the vertical cylindrical surface over which pass the shoes of the shuttles is a continuous curve, as shown in Fig. 5.

The profile of the rear nose 7 is so chosen that said curve, at the place where the lower sheet passes between the rollers 3 and 4, has the same inclination as the tangent common to the latter.

Of course, the various members of the shuttle liable to come into contact with the upper and lower sheets must be so shaped that during their passage they do not catch the warp threads.

Some of the heddle frames are moved downwardly the others upwardly before the shuttles issue from the corresponding parts of the shed (Fig. 3) so that the threads, still pressed on the shoes, cross between the latter and the heddles until they are abandoned by the rear point of the shoes; thus, the shed in which engages the nose 6 of the following shuttle (Fig. 4) is prepared. The cycle diagrammatically illustrated in Figs. 1 to 4 takes place over again in a similar manner every other shuttle.

The device allows, owing to the suitable shaping of the rear nose 7 of the shoes, of obtaining the automatic and complete uncovering of the shuttles by a simple backward movement of the latter according to a distance at least equal to their length. For that purpose, it suffices that the point of said nose 7 should be above the lower parts of the upper sheet of warp threads, as shown in Fig. 6. Upon the backward movement of the shuttles, all the threads 1 and 2 which are encountered are brought below the shoes so that the shuttles are entirely uncovered. For producing this backward movement, at the front part of each shoe can be provided a second roller 8 against which the pushing roller 4 will act.

It is to be noted that the above described device allows of obtaining the automatic uncovering of the shuttles by another means, relating to the heddle frames and forming the subject-matter of a separate invention.

In the foregoing it has been assumed that the heddle frames were arranged in pairs, for weaving linen, but it is to be understood that the device described can also apply to the use of any weaves. It suffices, instead of having two series of frames, to have a number n thereof greater than two and to suitably combine the eccentrics and the cams which displace them; in this case, the cycle diagrammatically illustrated in Figs. 1 to 4 will take place over again similarly, every n shuttles.

According to the improvement illustrated in Figs. 7 to 9, the front nose 8 of each shuttle is slightly offset relatively to the median beating plane of the sheds, so that if an entanglement 7 due to a broken warp thread 8 occurs at a certain distance from the well 5 (Fig. 8) the two interlocked sheds will both be picked up below the nose 6 which will not risk breaking them.

It is to be noted that neither the means for raising and lowering the heddle frames, nor the support for the pushing roller 4, nor the means for moving said support about the axis of the loom, nor the means for causing said roller to rotate at the desired circumferential speed, have been illustrated in the accompanying drawing because said means form the subject-matter of separate applications and their representation does not seem necessary for the comprehension of the present invention.

HENRI PELCÉ.