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Strauss et al.

[11] **3,809,130**

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[54] **ARRANGEMENT FOR DRIVING WEFT INSERTION MEANS**

[75] Inventors: **Edgar Strauss**, Ruti; **Charles Karcher**, Kusnacht, both of Switzerland

[73] Assignee: **Ruti Machinery Works Ltd.**, Ruti/Zurich, Switzerland

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[51] **Int. Cl.** **D03d 47/26**

[58] **Field of Search** 139/12, 13, 188, 192

[56] **References Cited**

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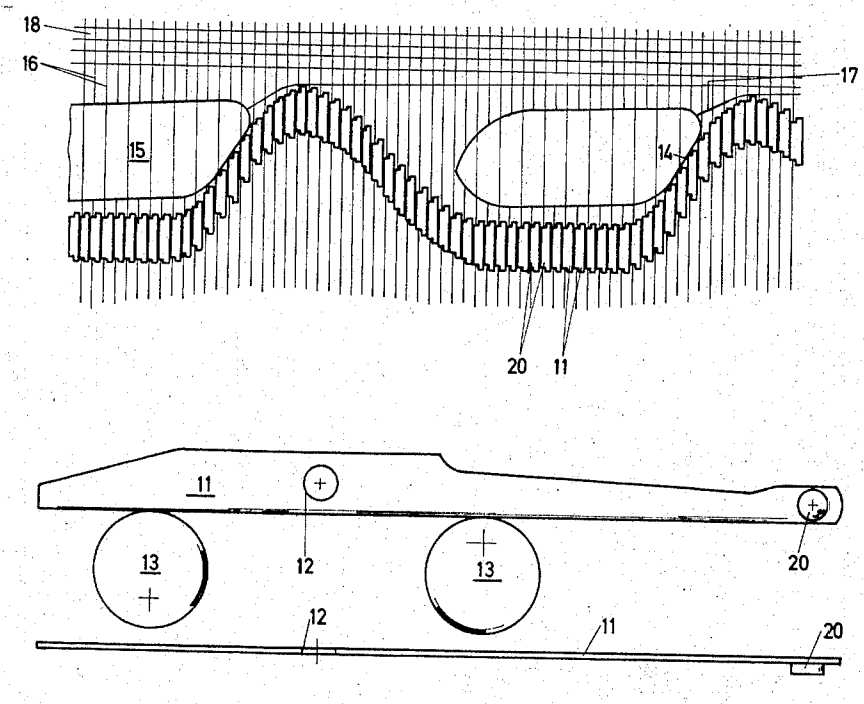
Primary Examiner—Henry S. Jaudon

Attorney, Agent, or Firm—Donald D. Denton

[57] **ABSTRACT**

An arrangement for driving weft insertion means on a wave type loom having a multiplicity of lamellae for driving the insertion means, the lamellae arranged in a row, juxtaposed at their wide sides and, in operation, adapted to pivot, whereby one follows after the other so that, in their entirety, they perform a "wave"-like movement, with the pivoting lamellae impinging in the zone of one of their ends obliquely against an edge of the insertion means so as to displace the latter.

12 Claims, 8 Drawing Figures



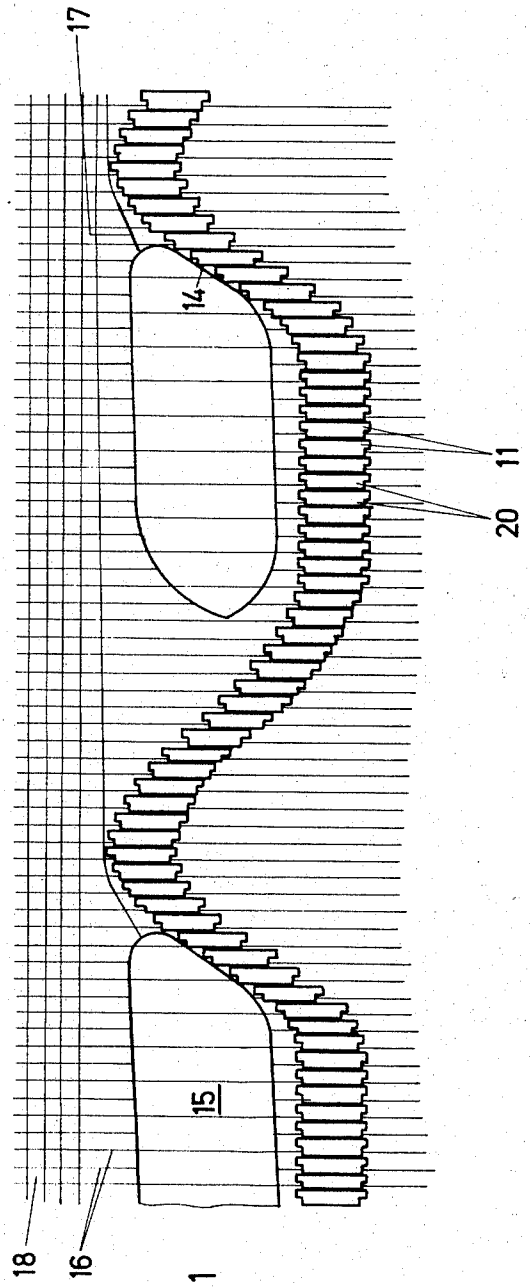


Fig 1

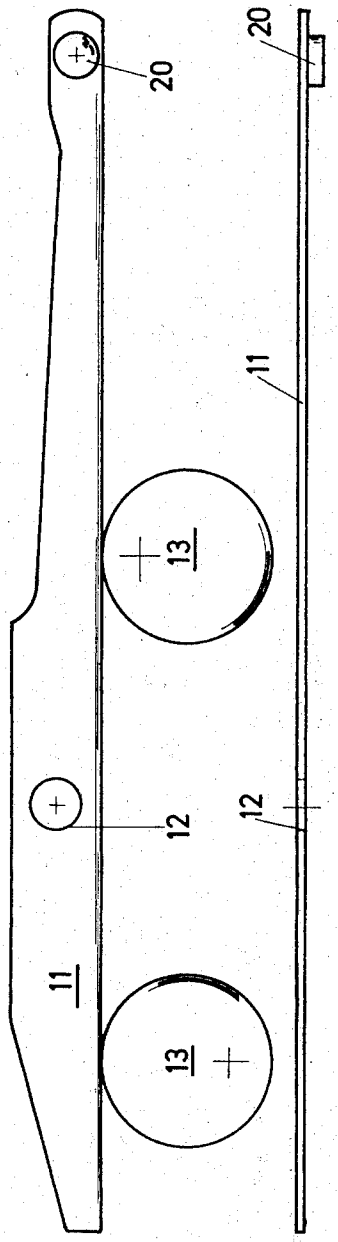


Fig 2a

Fig 2b

Fig 3

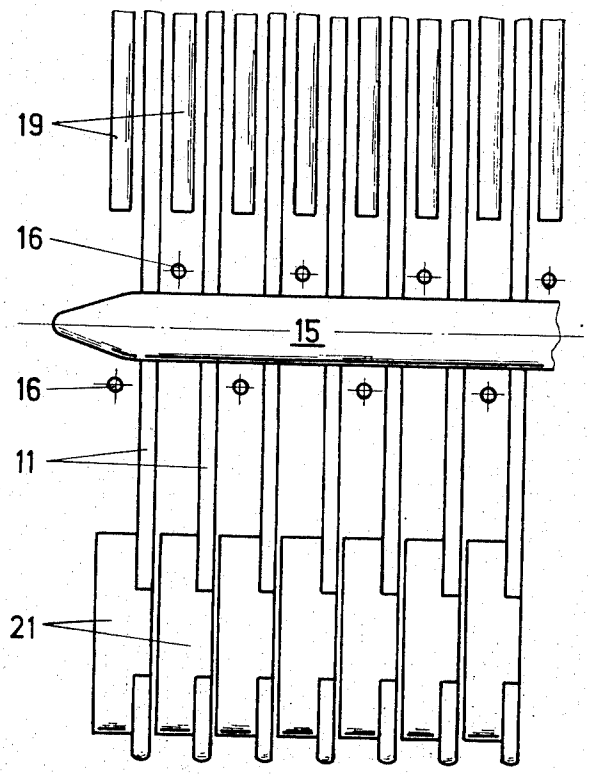


Fig 4

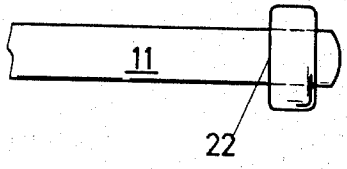


Fig 5

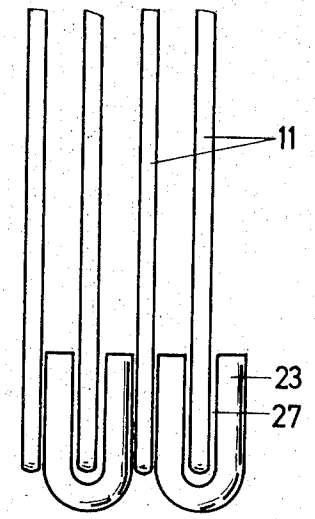


Fig 6

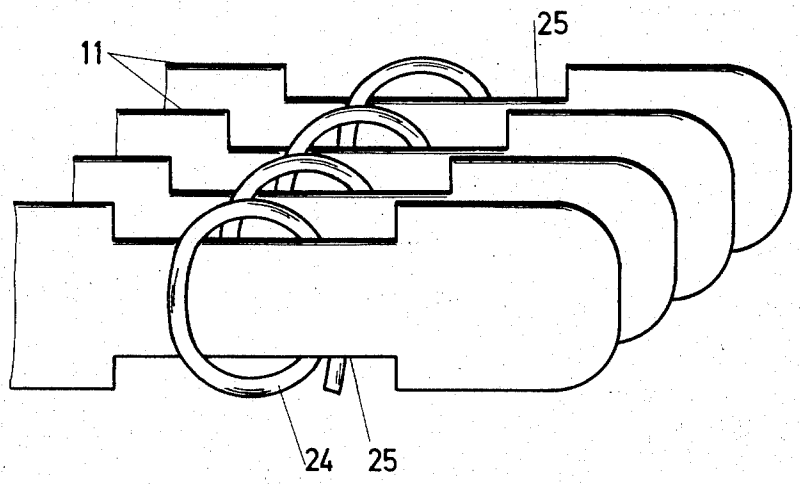
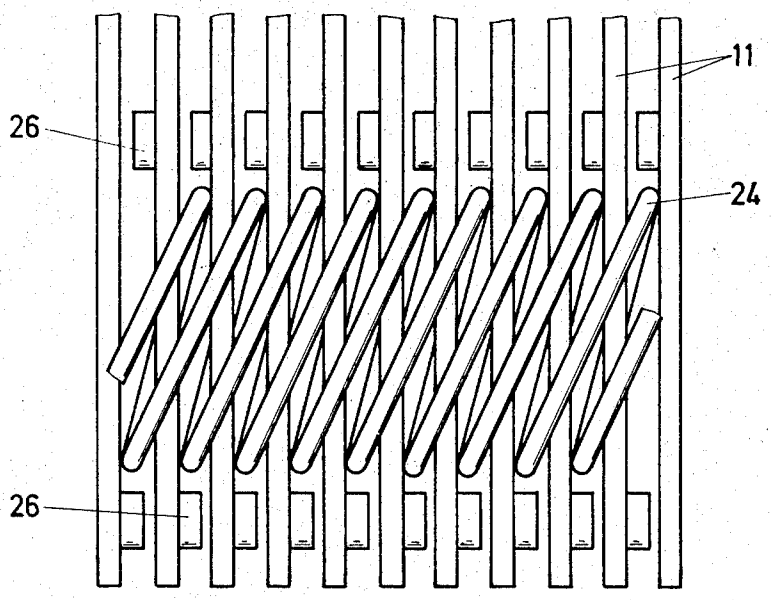


Fig 7



ARRANGEMENT FOR DRIVING WEFT INSERTION MEANS

In arrangements for driving weft insertion means on wave type looms, which are shown and disclosed in U. S. Pats. Nos. 3,263,705 and 3,477,475, at the location of the oblique rear edge of the weft insertion or picking means, the lamellae travel vertically upwardly. As they do so, they impinge against the obliquely arranged rear edge of the insertion means, thereby imparting a forward movement to the latter. In this way, there is set up a reaction force due to which the lamellae are pressed away laterally, i.e., in the direction opposite to that of movement of the insertion means, so that they are thereby flexed. This flexing of the lamellae results in somewhat uneven running of the weft insertion means and also in increased wear of the latter or of the lamellae. In order to reduce such flexing or binding and to decrease wear and in order to keep the spacing between the lamellae as uniform as possible, it is known to arrange the lamellae between flat guide elements in a manner so that one of the ends of the lamellae extends out of the guide elements only as far as is necessary. In this manner, it is possible to keep the lamellae relatively straight.

It has been found that, despite this measure, it is still possible for a small amount of flexing to take place. In order to avoid also this, it is already known to once again guide the ends of the lamellae projecting out of the guide elements between further guide elements. Such an arrangement has, however, the considerable disadvantage that it is an extremely difficult matter to gain access to the weft insertion means located in the shed. Furthermore, in such an arrangement, visual monitoring of the functioning of the insertion means is made difficult.

The above discussed disadvantages are obviated by means of the present invention in which there is attached in the zone of these ends on the lamellae, spacer means establishing predetermined mutual spacing of these ends of the lamellae.

In one special embodiment, the spacer means comprises a spring, one turn of which surrounds each such lamella end. On movement of the lamellae, the spring is drawn apart in a direction substantially perpendicular to its axis. As this takes place, the spring produces the result that the lamellae are, in this direction, retained with "mutually compensated" or equalized spacing. The movement of the lamellae is produced by pivoting the latter about an axis. The pivoting movement is produced by rotating two screw shafts at which the lamellae bear and which have an appropriate profile. Due to this construction of the present invention, there is therefore achieved the supplementary advantage that any inaccuracy in the screw shafts driving the lamellae (which may result for example from irregular wear) is compensated for by the spring. Furthermore, it becomes possible thereby to leave some clearance between the said screw shafts and the lamellae bearing thereon, whereby assembly of the screw shafts and of the lamellae is greatly facilitated.

The invention will now be discussed with reference to examples of preferred embodiments shown in the drawings in which:

FIG. 1 is an elevational view as seen from the front of lamellae and of weft insertion means driven by the lamellae on a loom having "wave-motion" shuttle drive;

FIG. 2*a* shows a lateral elevation of a lamella according to FIG. 1, and the position of the drive shafts;

FIG. 2*b* shows a plan view of the lamella of FIG. 2*a* without the drive shafts;

FIG. 3 is a top plan view of a portion of lamellae showing spacer means and an insertion means;

FIG. 4 shows an embodiment in which spacer means consist of small plates attached to a lamella;

FIG. 5 shows an embodiment in which spacer means is of a cap type;

FIG. 6 is a diagrammatic perspective view showing the spacer means designated as a spring and the mode of securing the spring to the lamellae; and

FIG. 7 is an enlarged schematic plan view of a portion of the lamellae showing the spacer means designated as a spring and an alternate mode of securing it to the lamellae.

In all the figures, like elements have been given the same reference numerals.

FIG. 1 shows a plurality of lamellae 11 arranged in a row, juxtaposed at their wide sides. The lamellae 11 are made from a thin material; the shape thereof can best be seen in FIGS. 2*a* and 2*b*. FIG. 2a shows a lamella 11, as viewed in the direction of the wide side thereof, and FIG. 2*b* shows the same lamella as viewed in the direction of its narrow side. FIG. 1 shows the lamellae 11 from the front, i.e., the figure shows the right-hand end of the lamellae 11 in FIG. 2. Each lamella 11 is formed with an aperture 12 through which extends a shaft. The lamella may be pivoted about the said shaft. The pivoting of the lamellae 11 can for example be effected by driving them by rotating appropriately profiled screw shafts 13, the lamellae bearing continuously against the screw shafts 13 and being thus positively guided by the latter. FIG. 2*a* shows a cross-section of the shafts 13.

If the lamellae 11 are so pivoted that their forward free ends travel upwardly, then the forward free ends impinge as shown in FIG. 1 against the oblique rear edges 14 of the inserter means 15. Thereby, the insertion means are displaced towards the left. They travel through the sheds formed by the warp threads 16 and each such insertion means inserts during its movement a weft thread 17. The warp threads 16 are, for the sake of clarity, shown arranged less dense in the drawing than they actually are. Reference numeral 18 designates the cloth being woven.

On the front lamella ends impinging against the oblique rear edges 14 of the insertion means 15, a force directed towards the right-hand side in FIG. 1 acts on each of the said ends. In order to prevent flexing or bending of the lamellae 11 by such force, according to this invention spacer means are attached to the latter at their front free end. Said spacer means consists, as shown in FIG. 1, of small round plates (i.e., discs) 20. Each lamella 11 is provided with such a disc 20. Due to the provision of such spacer means, each lamella impinges against the disc 20 of the lamella arranged adjacent it to the right. In this way, the lamellae 11 acquire in their entirety a degree of rigidity such that, even if they are extremely thin, they no longer flex or bend laterally. Consequently, the ends of the lamellae 11 bear accurately along the rear edge 14, thereby affording the desired distribution of the drive forces along the said edge to smoothly move the insertion means 15. This has an advantageous effect with regard to wear of

the edge 14 of the insertion means 15 and of the screw shafts 13.

In the plan view of FIG. 3 which, thus, relative to FIG. 1 is a view in the direction from the cloth 18 towards the inserter means 15, there are seen insertion means 15, warp threads 16 and lamellae 11. Each of the lamellae 11 is arranged to be displaceable between two guide elements 19. The latter consist of plates and it is their purpose to prevent lateral flexing of the lamellae 11. The spacer means 21 shown in FIG. 3 consists of small round plates or discs 21 the diameter of which is substantially equal to the width of the lamellae. Each disc 21 is pressed into an associated aperture formed in the front end of a lamellae. Advantageously, during this pressing procedure, the small discs 21 are simultaneously brought to their precise thickness.

The spacer means shown in FIG. 4 consists of small plates 22 welded onto the lamellae 11. The length of the plates 22 is larger than the width of the lamellae 11.

In the case of the embodiment shown in FIG. 5, a spacer element 23 is provided and is applied in cap-like manner on the front end of every second lamella 11. For this purpose, each element 23 is formed with a slot 27, the size of which is adapted to the end portion of the lamellae 11.

For the sake of completeness, it should also be mentioned that the small plates 20, 21, 22 or the caps 23 must, width-wise of the lamella 11, extend at least for such a distance that during all operational phases they bear continuously on the adjacent lamella or on the adjacent lamellae, in order that it may not be possible for these elements to "foul" each other.

Referring to the embodiment shown in FIG. 6, the spacer means comprises a or coil spring 24. From the diagrammatic perspective view of this figure, it will be perceived how each lamella 11 is embraced by a turn of the spring 24. If the spring 24 is designed to be adequately thick, it will produce the result (to correspond to the effect of the elements 20 to 23 of the preceding embodiments) that permanently predetermined mutual spacing is available between the ends of the lamellae 11.

On providing a spring as spacer means, however, there is above all achieved a different form of spacing of the lamellae 11. In the zone of upward and downward movement of the front ends of the lamellae 11, the turns of the spring 24 are drawn apart in the direction perpendicular to the longitudinal axis of the spring. This has the effect that the spring 24 endeavors to compensate or equalize the spacing of the front lamella ends in the warp yarn direction, which is more or less perpendicular to the longitudinal direction of the lamellae 11. If, for example, an individual lamella 11 should, in consequence of faulty operation, cut a groove into a drive shaft (13 shown in FIG. 2*a*) so that the privoting movement thereof becomes inaccurate, then not only is such faulty operation compensated for by the spring 24, but furthermore the formation of such a groove is substantially prevented from the outset due to the presence of the spring 24.

The notches 24 formed in the lamellae 11 as shown in FIG. 6 have the result that the spring 24 cannot be displaced in the longitudinal direction of the lamellae 11.

FIG. 7 shows, once again, the front ends of lamellae 11, as a plan view drawn to an enlarged scale. As spacer means, once again a spring 24 is provided. According to this embodiment, there are attached on each lamella two abutments or small plates 26 in the form of a spring positioning means, whereof one prevents the spring 24 from sliding forward and the other prevents it from sliding rearward. It is of course also possible to "make do" with a single abutment per lamella. In this case, the abutments or stops are disposed within the turns of the spring 24, i.e., they are arranged coaxial to the axis of the spring 24 and a stop or abutment is secured to each lamella. It is also possible to so dimension the stops 26 that they exactly fill the spacing between two lamellae. Then, the stops 26 act as spacer means for the mutual spacing of the ends of the lamellae 11. The spring 24 serves, in this case, for equalizing the lamella spacings parallel to the warp direction. For spacing the lamellae 11 by means of stops 26 arranged to correspond to the example of FIG. 7, it is per se adequate if at least those of the stops 26 which are more remote from the front ends of the lamellae and thus nearer to the inserter means 15 extend to the desired extent, as a rule completely, over the intermediate space between adjacent lamellae 11.

The drawing-in or drafting of the warp threads between the lamellae 11 is greatly facilitated if the thickness of the small plates 20, 21 and 22 is smaller by a minimum value than the intermediate spaces between adjacent lamellae. The same applies also to the caps 23.

It will be appreciated that various changes and modifications may be made within the skill of the art without departing from the spirit and scope of the invention illustrated herein.

What is claimed is:

1. An arrangement for driving weft thread insertion means on a wave-type loom by means of a plurality of lamellae arranged in a row, juxtaposed at their wide sides, and, in operation, adapted to be pivoted in the zone of one of their ends whereby one follows after the other and the said lamellae produce in their entirety a wave-like movement, and the said pivoting lamellae impinge in the zone of the other of their ends against an obliquely positioned edge of said insertion means so as to displace the latter, there being attached to at least some of said lamellae in the zone of their ends said other spacer means, said spacer means presenting for each lamella a spacer element, said spacer elements being all alike and providing predetermined mutual spacing of these ends of the lamellae during operation thereof, thereby preventing bending of the lamellae which would otherwise be caused by their impinging against said obliquely positioned edges.

2. The arrangement according to claim 1 in which said spacer elements comprises small plates positioned so as to bear on a lateral wall of each lamella so as to provide uniform, reciprocal spacing between lamellae adjacent the said other ends.

3. The arrangement according to claim 2 in which said small plates are of circular shape and their diameter is at least approximately equal to the width of the lamellae.

4. The arrangement according to claim 2 in which said plates are of elongate shape and extend in their longitudinal direction at least over the width of said lamellae.

5. The arrangement according to claim 2 in which said small plates are secured by being pressed into an

aperture formed in said lamellae and are brought by a pressing step to the exact thickness.

6. The arrangement according to claim **1** in which said spacer means comprises a plurality of spacer elements, each of which is formed with a slot, and through the agency of its slot, a spacer element is pushed over said other end of each second lamella and is applied in cap-like manner thereon so as to produce mutual spacing between the ends of adjacent lamellae.

7. The arrangement according to claim **1** in which said spacer means comprises a coil spring arranged along the row of lamellae, each of said lamellae being surrounded by a turn of said coil spring so as to produce adjacent, said other ends of said pivoted lamellae predetermined, mutual spacing in the direction of the warp threads and uniform, mutual interspaces.

8. The arrangement according to claim **7** in which coil spring positioning means is provided for preventing displacement of said spring in the longitudinal direction of the lamellae.

9. The arrangement according to claim **8** in which said coil spring positioning means is in the form of notches in the zone of said other end of each of the lamellae extending parallel in the longitudinal direction of said lamellae for retaining said coil spring to prevent displacement thereof.

10. The arrangement according to claim **8** in which said coil spring positioning means comprises a stop attached to said each lamellae in the zone of said other end and disposed externally of the turns surrounding said lamellae, and each stop is secured to said lamella at that side at which the turn portion adjacent the stop bears on the lamella.

11. The arrangement according to claim **8** in which said spring positioning means is formed from stops positioned on said lamellae and disposed within the turns of the coil spring.

12. The arrangement according to claim **11** in which said stops further remote from said other ends of the lamellae are so dimensioned that they extend over the intermediate space between adjacent lamellae and serve as spacer means.

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