Nov. 19, 1957 J. RABEUX ET AL 2,813,547

CIRCULAR LOOM

Filed Dec. 16, 1953 3 Sheets-Sheet 1

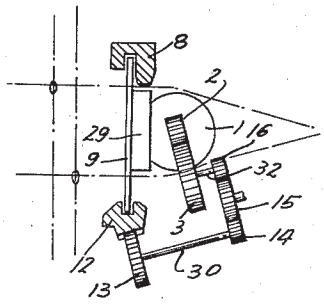

FIG. 1

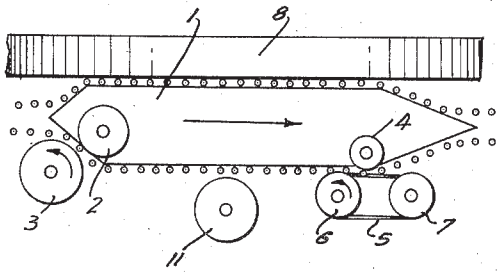

FIG. 2

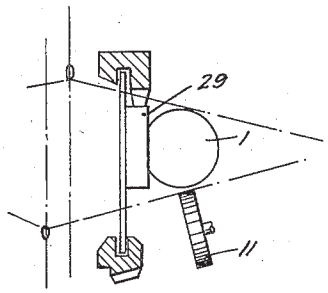

FIG. 3

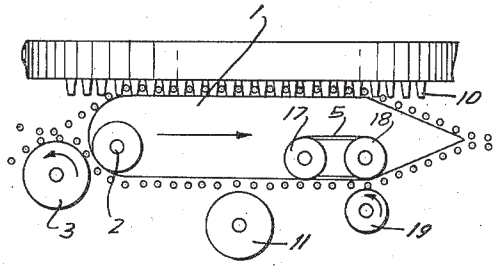

FIG. 4

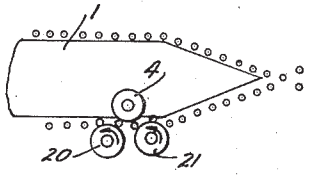

FIG. 5

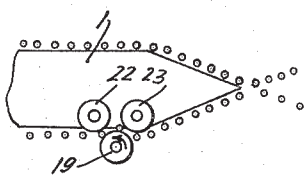

FIG. 6

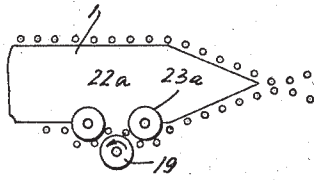

FIG. 6A

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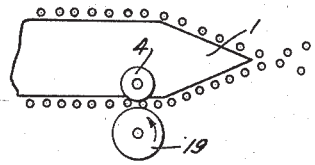

FIG.7

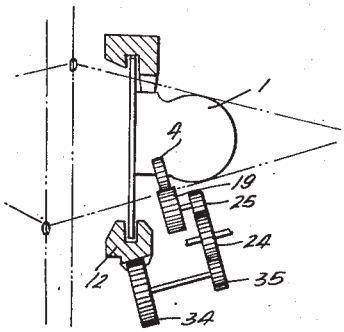

FIG.8

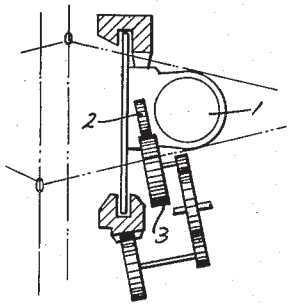

FIG.9

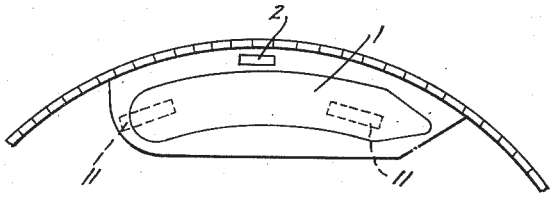

FIG.10

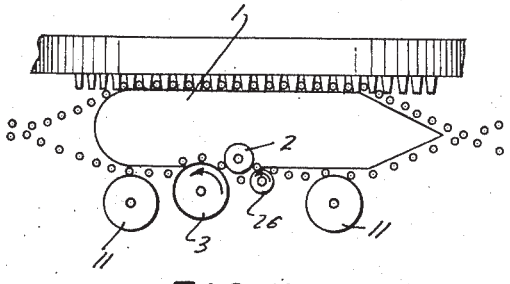

FIG.11

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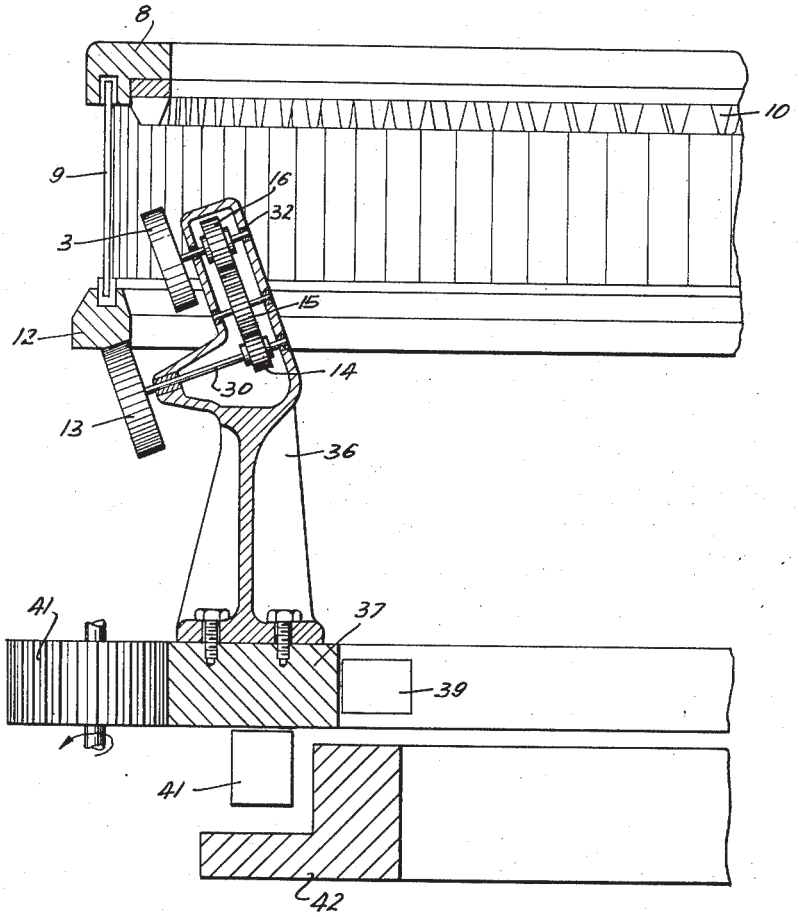

FIG. 12

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2,813,547

CIRCULAR LOOM

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Application December 16, 1953, Serial No. 398,616

Claims priority, application France December 22, 1952

24 Claims. (Cl. 139—13)

This invention relates to looms, and more particularly to means for supporting and guiding shuttles of circular looms, especially of circular looms having a horizontal shed.

Hitherto customary supports and guides for shuttles of circular looms have many disadvantages.

For example there are circular looms on the market wherein the shuttle is guided and held in a U-shaped rail of the type customary in ordinary looms. The proper guiding of the shuttle is obtained by a dovetail shape of the two legs of the U-shaped rail or by any other suitable means; the legs of the rail are often formed by teeth between which the warp threads may lodge themselves. Owing to the precision required for a satisfactory operation of such an arrangement and owing to the substantial frictions between the parts engaged with each other, the manufacture of such an arrangement is rather difficult and the maintenance thereof is cumbersome. On the other hand, the shuttle being not freely mounted cannot be removed from the loom without removing a part of the rail; there is also a great risk of cutting the warp threads between the shuttle and the holding elements.

There are also different kinds of looms on the market wherein the rail assures merely the guiding of the shuttle while the latter is held in its position by different means, for example by the action of an electromagnet, by sets of wheels lapping over each other, by a combination of said two means, or by the pressure of the sheets of warp threads which the shuttle must separate.

In all of these embodiments the warp threads are subjected to considerable strain. The shuttles slide or roll on the warp threads and the action of the electromagnet increases in the same proportion the crushing of the threads and the catching thereof between the shuttles and the guiding or supporting means thereof.

On the other hand, owing to the arrangement of the sets of wheels the sheets of warp threads are considerably deformed whereby the possibility of breakages caused by overtension in the warp threads is increased. The capacity of the shuttles in the hitherto customary arrangements is greatly reduced for two reasons: firstly the supporting elements represent obstructions and secondly large shuttles cannot be used in said arrangements.

An object of the present invention is to provide a support and guide for shuttles in circular looms which overcomes the above mentioned disadvantages of hitherto customary arrangements.

Another object of the present invention is to provide a support and guide for shuttles in circular looms which may be readily manufactured and may be readily maintained by the user of the looms.

A further object of the invention is to improve in the construction of circular looms as now customarily made.

Other objects and structural details of the invention will be apparent from the following description when read in conjunction with the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a vertical sectional view of a guide and support for a shuttle in a loom with a shed having a small amplitude.

Fig. 2 is a side elevational view of the guide and shuttle shown in Fig. 1,

Fig. 3 is a vertical sectional view of a guide and support for a shuttle in a loom with a shed having a large amplitude,

Fig. 4 is a side elevational view of the guide and shuttle shown in Fig. 3,

Fig. 5 is a side elevational view of a supporting device for a shuttle according to the invention,

Fig. 6 is a side elevational view of a different embodiment of a supporting device for a shuttle according to the invention,

Fig. 6A is a side elevational view of a further embodiment of a support device in accordance with the invention,

Fig. 7 is a side elevational view of still another embodiment of a supporting device for a shuttle according to the invention,

Fig. 8 is a vertical sectional view of a guide and support for a shuttle as shown in Fig. 7,

Fig. 9 is a vertical sectional view of a different embodiment of a guide and support for a shuttle in a circular loom,

Fig. 10 is a top plan view of the guide and shuttle shown in Fig. 9,

Fig. 11 is a side elevational view of the guide and shuttle shown in Fig. 9, and

Fig. 12 is a vertical sectional view, on an enlarged scale, of the drive shown in Fig. 1.

Referring now to Figs. 1 and 2, a first wheel 2 and a second wheel 4 are rotatably mounted on the rear end and front end respectively of a shuttle 1 of a circular loom having one or more shuttles. The shuttle 1 is supported on one hand by the wheel 2 operatively engaged with the driving wheel 3 and on the other hand by the wheel 4 engaged with a belt 5 trained around a pair of wheels 6 and 7. The shaft 32 (Fig. 1) carrying the wheel 3 is inclined; if desired, however, the shaft 32 could also extend in a horizontal direction. One of the wheels 6 and 7 is a driving wheel positively causing a movement of the belt 5. The wheels 2 and 4 of the shuttle 1 are idlers. The shuttle 1 is guided in other respects by the downwardly extending leg of the slide track 8 having the shape of an inverted L and by the reed 9 inserted into grooves of the stationary slide track 8 and a stationary toothed crown 12. Said leg of the slide track 8 is in the shape of a continuous rail.

When the shed having a small amplitude is opened by the outline of the shuttle, the latter slides along the upper sheet of the warp threads which is located between the slide track and the shoe 29 of the shuttle, as shown in Figs. 1 and 2.

If, however the shed has a large amplitude, the warp threads do not touch the shoe 29 of the shuttle 1 and the upper sheet of warp threads escapes into the spaces between the teeth 10 forming the upper leg of the slide track, as shown in Figs. 3 and 4.

A supporting wheel 11 capable of holding the shuttle in its position becomes effective only upon stoppage of the loom. During the operation of the shuttle the supporting wheel 11 arranged below the shuttle 1 does not come into engagement with the warp threads of the lower sheet.

When the loom is started, the shuttle 1 automatically resumes its place in the slide track and on the wheels by the driving action of the driving wheel 3 and by the action of the centrifugal force.

Figs. 1 and 12 illustrate an embodiment of a drive of the driving wheel 3 keyed to a shaft 32 journalled in bearings of a support 36 secured to a toothed ring 37 rotat-

able around the longitudinal axis 38 of the loom. Said ring 37 engaged with rollers 39 and 40 rotatably mounted on a stationary member 42 of the loom may be rotated by means of a driving pinion 41 meshing with teeth of the ring 37. A shaft 30 rotatably mounted in bearings of the support 36 is rigidly connected with a pinion 13 meshing with teeth of the stationary crown 12. Furthermore said shaft 30 is rigidly connected with a pinion 14 operatively connected with the driving wheel 3 through the meshing pinions 15 and 16, the pinion 16 being keyed to the shaft 32 carrying said driving wheel 3. Thus, upon rotation of the ring 37 by the pinion 41, the stationary crown 12 drives through the medium of the pinion 13 secured to the shaft 30 the train of gears 14, 15, 16 and the driving wheel 3 mounted on the shaft 32 rotated by said train of gears. The desired direction of rotation and speed of the wheel 3 may be readily obtained by a suitable arrangement of the train of gears and a suitable selection of the dimensions of the gears.

The means for supporting the shuttle 1 shown in Fig. 4 are somewhat different from that shown in Fig. 1. According to Fig. 4, the belt 5 is trained around two idling wheels 17 and 18 rotatably mounted at the front end of the shuttle 1. Said belt 5 rests on the single supporting wheel 19 positively driven by a suitable driving mechanism.

According to the embodiment shown in Fig. 5 a wheel 4 rotatably mounted at the front end of the shuttle 1 is supported by two wheels 20 and 21 positively driven by a suitable mechanism.

Fig. 6 illustrates a reversed arrangement, wherein two wheels 22 and 23 rotatably mounted at the front end of the shuttle 1 are supported by a single supporting driving wheel 19.

Fig. 6A shows two spaced idling wheels 22A and 23B rotatably mounted on the lower portion of the shuttle at the center thereof.

According to the embodiment shown in Figs. 7 and 8, there is only a single driving wheel 19 in engagement with a single wheel rotatably mounted at the front end of the shuttle 1. The tangent common to both wheels at the point of contact is substantially horizontal.

The above described wheels 6 (Fig. 1), 19 (Figs. 4, 6 and 7), 20 and 21 (Fig. 5) are positively driven in the same manner as the driving wheel 3 shown in Figs. 1, 2 and 4. Fig. 8 illustrates such a drive of a wheel 19. The crown 12 rotates the wheel 19 through the medium of a train of gears 34, 35, 24, 25. The construction of the drive of the wheel 19 corresponds fully to the drive of wheel 3 shown in Figs. 1 and 12.

Figs. 9–11 illustrates a shuttle having a center drive. In this case the driving wheel 3 is combined with a supporting wheel 26 which is likewise positively driven. Both wheels 3 and 26 cooperate with a wheel 2 journalled on the shuttle 1 substantially in the center thereof. The described arrangement of the wheels 2, 3, 26 assures the propelling and the supporting of the shuttle during the operation of the loom. When the loom is stopped, the shuttle is held in its position by one or two supporting wheels 11.

If desired, it is also possible to use a reversed arrangement for a center drive and support of the shuttle. In such a case a positively driven driving wheel is in operative engagement with two idling wheels rotatably mounted at the center portion of the shuttle.

The above described arrangements according to the present invention avoid any mechanical friction of the lower portion of the shuttle with metal teeth or sheets of threads. Furthermore, the play operation of the shuttle may be readily regulated in proportion to the wear and tear of the elements contacting each other by an appropriate adjustment of the elevation of the supporting and propelling members. Thus, the best conditions for operation of the shuttle may be maintained without frequent interventions by a mechanic and, on the other hand, the

manufacture of the assembly does not require such a great precision as necessary for hitherto customary devices.

Moreover, the elimination of half of the friction between the shuttle and mechanical elements, in comparison with hitherto customary devices, results in a substantial reduction of the force necessary for the propelling of the shuttle and, consequently, of the power required for the operation of the loom.

Moreover, the use of a crown arranged on the slide track for causing the advancing movement of the shuttle results in a simplified construction of this part of the loom with respect to hitherto known devices.

With respect to the weaving it is of importance that the warp threads of the lower sheet besides passing between the propelling elements and the supporting elements driven at a suitable speed do not sustain any strain which could be caused by their friction on the shuttles and by their separation into laminae between said shuttles and the slide track in a loom with a shed of small amplitude, or which could be caused by their passage through spaces between teeth of the slide track with the risk of breakage which is always present in such an arrangement in a loom with a shed of large amplitude.

Furthermore, owing to the great reduction of the strain on the warp threads and the risk of breakage of the warp threads, the device according to the invention has the advantage of rendering possible the use of fine and fragile threads and the weaving of tightly woven cloth.

Moreover, the arrangement of a central supporting and propelling device shown in Figs. 9–11 permits the utilization of the total capacity of the shuttle as the driven wheel does not occupy space to a great length. Thus, the output of the loom is improved without increase in the length of the shuttles. It is possible to use a cop which is less curved and may be more readily wound off by the tip.

In all embodiments of the invention the shuttle remains perfectly accessible and may be readily removed or reinserted without any mechanical operation.

We have described preferred embodiments of our invention, but it is understood that this disclosure is for the purpose of illustration and that various omissions or changes in the shape, proportion and arrangement of parts, as well as the substitution of equivalent elements for those, herein shown and described, may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What we claim is:

1. A circular loom comprising in combination: a circular track, at least one shuttle movable along said track around the longitudinal axis of said loom, driving means for propelling said shuttle, supporting means for supporting said shuttle during a movement thereof, said supporting means being movable simultaneously with said shuttle around said longitudinal axis of the loom, means on the upper portion of said shuttle for slidable engagement with said track, and additional means on the lower portion of said shuttle for operative engagement with said driving and supporting means.

2. In a circular loom as claimed in claim 1, said means on the upper portion of said shuttle being disengageably engaged with said track, and said additional means being disengageably engaged with said driving and supporting means.

3. In a circular loom as claimed in claim 1, said circular track having a cross-section in the shape of an inverted L.

4. In a circular loom as claimed in claim 1, the portion of said track arranged for engagement with said means on the upper portion of the shuttle being in the shape of a continuous rail.

5. In a circular loom as claimed in claim 1, a series of spaced teeth arranged on said track, and said means on the upper portion of said shuttle being in slidable engagement with said teeth.

6. A circular loom comprising in combination: a cir-

cular track, at least one shuttle movable along said track around the longitudinal axis of said loom, driving means for propelling said shuttle, supporting means for supporting said shuttle during a movement thereof, said supporting means being movable simultaneously with said shuttle around said longitudinal axis of the loom, a surface on the upper portion of said shuttle being in slidable engagement with said track, and additional means on the lower portion of said shuttle for operative engagement with said driving and supporting means.

7. In a circular loom as claimed in claim 1, said shuttle including a shoe, and said means on the upper portion of said shuttle slidably engaged with said track being on the upper portion of said shoe.

8. A circular loom comprising in combination: a circular track, at least one shuttle movable along said track around the longitudinal axis of said loom, driving means for propelling said shuttle, supporting means for supporting said shuttle during a movement thereof, said supporting means being movable simultaneously with said shuttle around said longitudinal axis of the loom, means on the upper portion of said shuttle for slidable engagement with said track, and additional means arranged on the lower portion of said shuttle substantially in the center thereof for operative engagement with said driving and supporting means.

9. A circular loom comprising in combination: a circular track, at least one shuttle movable along said track, a driving wheel for propelling said shuttle, supporting wheels for supporting said shuttle during a movement thereof, means on the upper portion of said shuttle for slidable engagement with said track, and an idling wheel rotatably mounted on the lower portion of said shuttle substantially in the center thereof for operative engagement with said driving and supporting wheels.

10. In a circular loom as claimed in claim 9, driving means operatively engaged with said driving wheel for rotating same.

11. In a circular loom as claimed in claim 9, first driving means operatively engaged with said driving wheel for rotating same, and second driving means operatively engaged with said supporting wheels for rotating the latter.

12. A circular loom comprising in combination: a circular track, at least one shuttle movable along said track, a driving wheel for propelling said shuttle, means on the upper portion of said shuttle for slidable engagement with said track, and a pair of spaced idling wheels rotatably mounted on the lower portion of said shuttle substantially in the center thereof for operative engagement with said driving wheel.

13. A circular loom comprising in combination: a circular track, at least one shuttle movable along said track around the longitudinal axis of said loom, driving means for propelling said shuttle, supporting means for supporting said shuttle during a movement thereof, said supporting means being movable simultaneously with said shuttle around said longitudinal axis of the loom, first means on the upper portion of said shuttle for slidable engagement with said track, second means arranged on the lower portion of said shuttle at the rear end thereof for operative engagement with said driving means, and third means arranged on the lower portion of said shuttle at the front end thereof for operative engagement with said supporting means.

14. In a circular loom as claimed in claim 13, said driving means including a driving wheel, and said second means including an idling wheel rotatably mounted on said shuttle.

15. In a circular loom as claimed in claim 13, said supporting means including a pair of rollers and a belt trained around said rollers, a drive operatively connected with at least one of said two rollers for rotating same, and said third means including an idling wheel rotatably mounted on said shuttle.

16. In a circular loom as claimed in claim 13, said supporting means including a driving wheel, and said third means including a pair of rollers rotatably mounted on said shuttle and a belt trained around said rollers.

17. In a circular loom as claimed in claim 13, said supporting means including a pair of spaced wheels, driving means operatively connected with at least one of said two wheels, and said third means including an idling wheel rotatably mounted on said shuttle.

18. In a circular loom as claimed in claim 13, said supporting means including a driving wheel, and said third means including a pair of spaced idling wheels mounted on said shuttle.

19. In a circular loom as claimed in claim 1, at least one additional supporting member arranged below said shuttle, said additional supporting member being in engagement with said shuttle when the latter is arrested and being disengaged from said shuttle during a movement of the latter.

20. In a circular loom as claimed in claim 13, said supporting means including a driving wheel, and said third means including an idling wheel rotatably mounted on said shuttle.

21. A circular loom comprising in combination: a circular track, at least one shuttle movable along said track around the longitudinal axis of said loom, driving means for propelling said shuttle, supporting means for supporting said shuttle during a movement thereof, said supporting means being movable around said longitudinal axis of the loom, means on the upper portion of said shuttle for slidable engagement with said track, additional means on the lower portion of said shuttle for engagement with said driving and supporting means, and a drive for driving said supporting means around the longitudinal axis of the loom.

22. In a circular loom as claimed in claim 21, said supporting means including a wheel rotatable about its own axis, and said drive including means for driving said wheel around said longitudinal axis of the loom and for rotating simultaneously said wheel around its own axis.

23. In a circular loom as claimed in claim 21, said driving means being movable around said longitudinal axis of the loom, and an actuator for driving said driving means around the longitudinal axis of the loom.

24. In a circular loom as claimed in claim 21, said driving means being movable around said longitudinal axis of the loom and including a first wheel rotatable about its own axis, said supporting means including a second wheel rotatable about its own axis, said drive including means for driving said second wheel around said longitudinal axis of the loom and for rotating simultaneously said second wheel around its own axis, and an actuator for driving said first wheel around said longitudinal axis of the loom and for rotating simultaneously said first wheel around its own axis.

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