United States Patent

Evers

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[54] **RIBBON WEAVING MACHINE**

[72] Inventor: **Hubertus N. C. Evers**, Nieuwendijk, Heeze, Netherlands

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[52] **U.S. Cl.** **139/136**

[51] **Int. Cl.** **D03d 35/00**

[58] **Field of Search** 139/136–138, 23, 139/121, 196, 199

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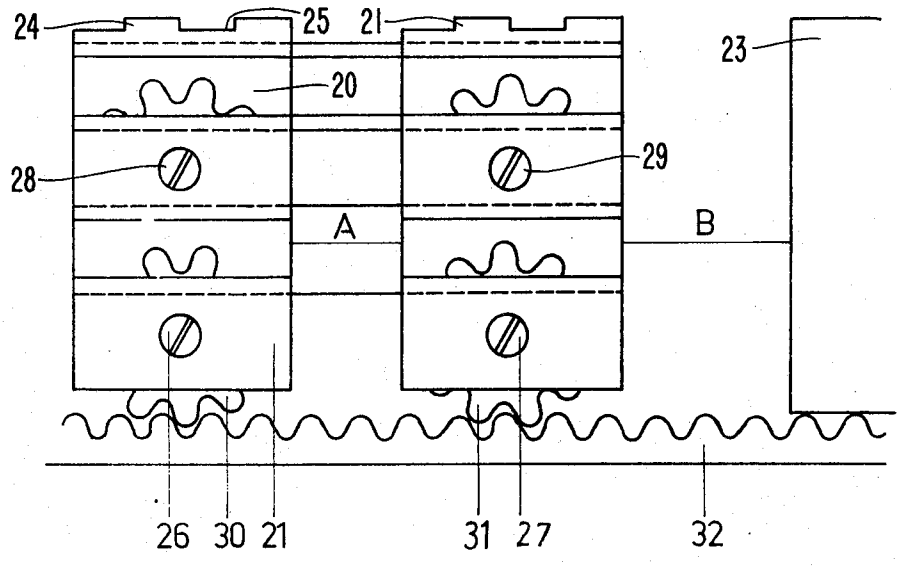
Primary Examiner—James Kee Chi
Attorney—Silverman & Cass

[57] **ABSTRACT**

A batten for a ribbon weaving machine having a plurality of clamps for holding yarn bobbins. Each clamp is formed of at least two identical laterally disposed portions, each portion having a single set of gear wheels to cooperate with one or more toothed racks in shuttles upon which the yarn bobbins are carried. Each portion has at least one channel and the channels of all portions are in line with each other so that a guide path for the soles of the shuttles is formed.

5 Claims, 7 Drawing Figures



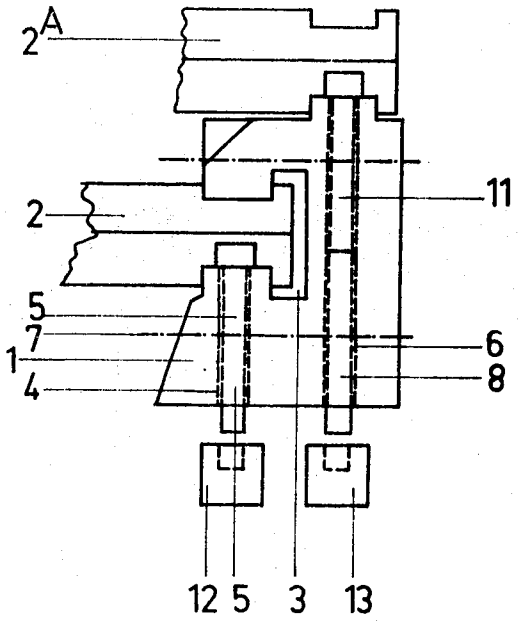


FIG 1

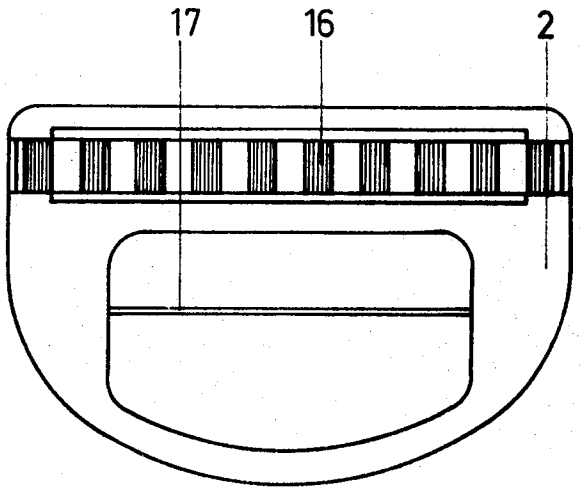


FIG 3

INVENTOR:

HUBERTUS NICASIUS CORNELIS EVERS

BY Silverman & Cass

ATTORNEYS

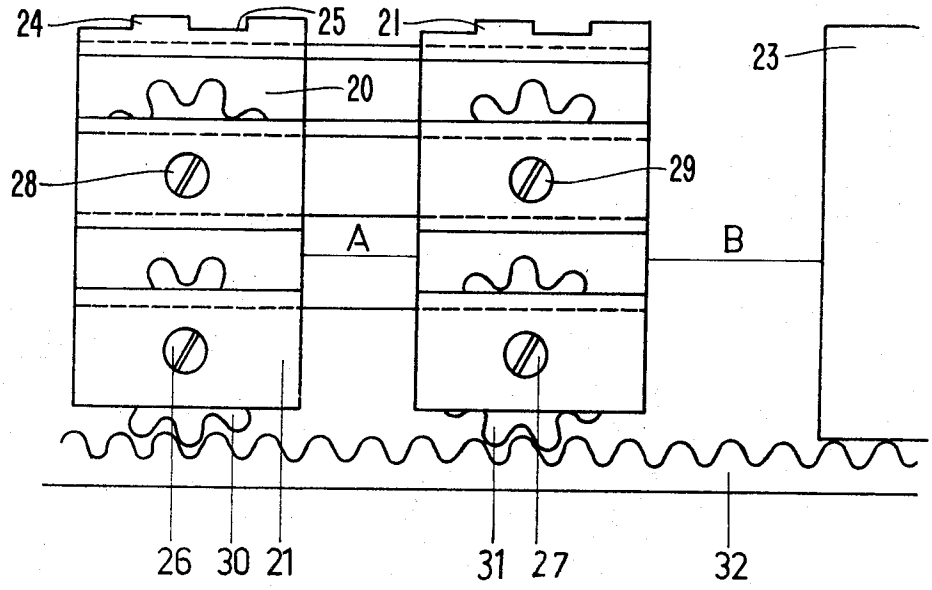


FIG 6

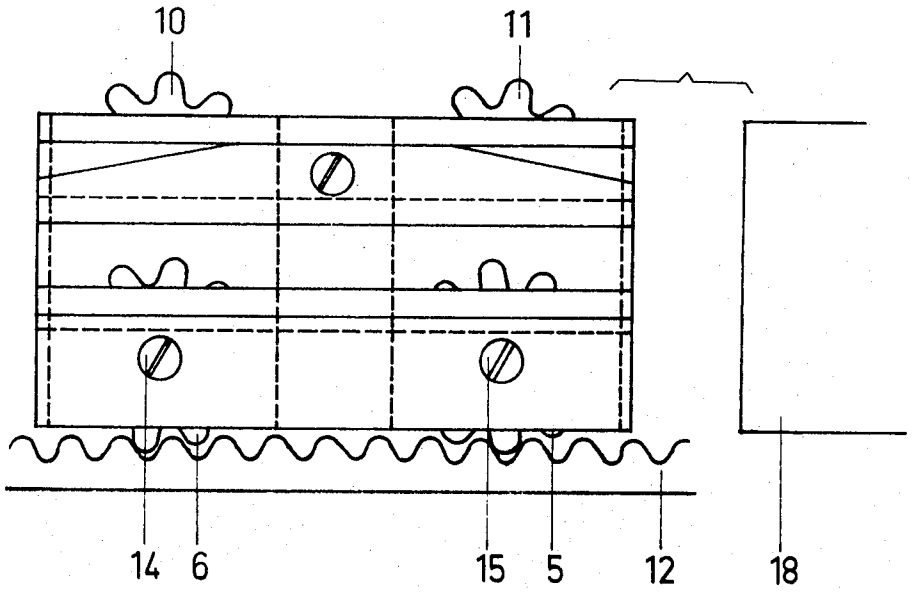


FIG 2

INVENTOR:

HUBERTUS NICASIUS CORNELIS EVERS

BY Silverman & Cass

ATTORNEYS

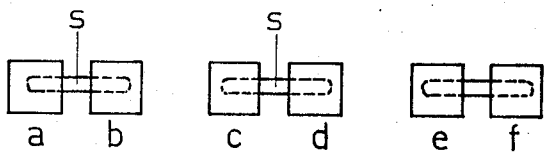


FIG 4

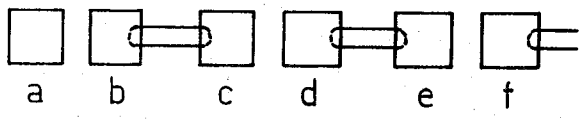


FIG 5

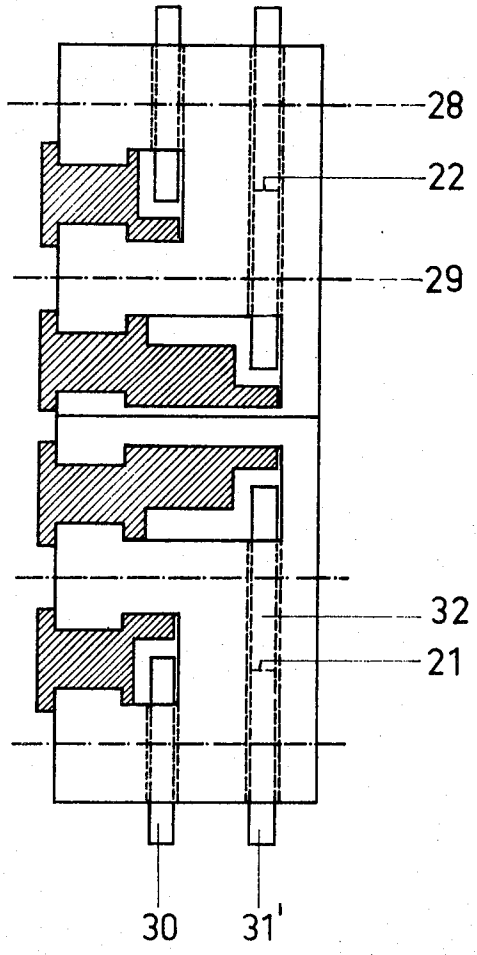


FIG 7

INVENTOR:
HUBERTUS NICASIS CORNELIS EVERS

BY Silverman & Cass
ATTORNEYS

RIBBON WEAVING MACHINE

BACKGROUND OF THE INVENTION

This invention relates generally to ribbon weaving machines, and more particularly to an improved batten for use in such ribbon weaving machines.

Ribbon weaving machines of the type with which the invention is adapted for use comprise a plurality of adjacent weaving units mounted in a preferably common frame, each being capable of weaving a ribbon. Such machines are provided with conventional members such as a mechanism for lifting and lowering the warp yarns to be woven in accordance with a given program in order to obtain a configuration corresponding to said program. The machines have one or more shuttles with bobbins for inserting the warp yarns, which shuttles may contain pirns of differently colored yarns. There is also a reed comb for tightening the warp yarns and, as the case may be, members for lifting the whole frame formed by the warp yarns for moving it into the reach of a plurality of bobbins located at different levels.

In such ribbon weaving machines, the shuttles are adapted to move in guide paths of clamps or cramps fastened to a batten which is common to all machines. The number of clamps arranged side by side depends upon the number of ribbons to be woven simultaneously, and upon the width of each ribbon. The number of ribbons that can thus be woven simultaneously may be 15 to 30. Each pair of clamps arranged side by side cooperates with a set of pirns to form a ribbon. Each pirn set moves during weaving through the free space between the two clamps, the shuttles moving alternately from one clamp to the other while driving toothed racks common to all machines. The racks are in mesh with gear wheels mounted in the clamps, which wheels are in mesh with toothed straight or curved portions of the sole of the shuttles. Each clamp is usually provided with two gear wheels or, if the clamp serves for guiding a plurality of bobbins, with two sets of gear wheels, the axes of which are usually at right angles to the direction of movement of the bobbin and are relatively offset in the direction of length of the clamp over a given distance so that a satisfactory guiding of the bobbins is obtained. When a bobbin is passed through the frame, the shuttle, before it has gone out of the reach of a set of gear wheels of one clamp, is moved into the reach of the gear wheels of the adjacent clamp so the drive is continuously maintained.

A disadvantage of known ribbon weaving machines of the type described is that it is difficult to match different widths of ribbon and hence different dimensions of the bobbins and the shuttles. In general, when changing over to weaving ribbons of different widths, it is necessary to use different bobbins and different matching shuttles and clamps so that a great variety of clamps is required for such cases. Like the shuttles, the bobbins are made of very hard wood and are therefore expensive. The expense of such bobbins also is due to their complicated shape. Series manufacture by pressure-molding of a synthetic resin is not economical, because the series to be manufactured are always fairly small and the manufacture of a jig for each of the clamps to be used is uneconomical.

SUMMARY OF THE INVENTION

The primary object of the invention is to obviate the aforementioned disadvantages of existing machines by a batten in which each clamp is formed from at least two identical portions laterally disposed. Each portion is provided with a single set of gear wheels to cooperate with one or more toothed racks. The portions can all be mounted on the batten by means of fastening members at desired intervals. Each of the portions comprises at least one channel and the channels of all portions are in line with each other so that a guide path for the soles of the various shuttles is formed. Each pair of portions may thus form a single clamp, the length of which may be varied at will for varying the intervals. Each pair includes the space intended for the frame of the ribbon to be woven, where the bobbins reciprocate, the holder being engaged by the gear wheels of one portion before it has left the adjacent portion.

According to a further aspect of the invention, the soles of the shuttles are also made by pressure-molding from a synthetic resin. They may be formed by spray casting in the form of long rails, which are subsequently severed into sections having the length of the sole. The toothing may be provided during this process or afterwards. This has the advantage that the soles of the two shuttles held in one clamp can be made in the same manner although the widths are different. After processing the sole, only part of the material need be removed for obtaining the matching width.

A further advantage of the invention is that the remaining walls of the clamp may be thinner, owing to the higher rigidity of the material, so that the dimensions are smaller. Moreover, the structural depth may be smaller, which is conducive for the passage of the bobbin. The bobbin transfer is furthermore improved by the larger passage and the width of the loom is most effectively utilized so that with larger widths more runs per loom are possible.

The foregoing and other advantages of the invention will become apparent from the ensuing disclosure in which the preferred embodiments of the invention are described in detail and illustrated in the accompanying drawings. It is contemplated that minor variations in structural features and arrangement of parts thereof may appear to the skilled artisan without departing from the scope or sacrificing any of the advantages of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary side elevational view of a typical prior art clamp with a shuttle shown in position thereon;

FIG. **2** is a front elevational view of the clamp illustrated in FIG. **1**;

FIG. **3** is a plan view of one bobbin and shuttle for use with the invention;

FIGS. **4** and **5** are schematic views of adjacent portions of clamp pairs in accordance with the invention showing the cooperation thereof;

FIG. **6** is a front elevational view along line a bipartite clamp constructed in accordance with the invention; and

FIG. **7** is a side elevational view of a pile of two clamps constructed in accordance with the invention.

DESCRIPTION OF THE PRIOR ART AND PREFERRED EMBODIMENTS

Referring to FIGS. 1 and 2 which are exemplary of the prior art, reference numeral 1 designates the body of the clamp, which is usually made of a special type of wood and consists of a plurality of portions screwed or glued together. The clamp body 1 comprises a cavity 3 serving as a guide path and having a generally T-shaped section for receiving the shuttle 2. The sole of the bobbin holder therefore also has a generally T-shaped section. The lowermost cavity of the sole, which extends throughout the length thereof, is provided with teeth adapted to cooperate with a gear wheel 5. Gear wheel 5 is mounted in a flat cavity 4 in the body 1 and is adapted to rotate about a shaft 7, indicated by dot-and-dash lines, which may be fastened by screw thread in the body. The upper side of the teeth of the wheel 5 are in mesh with those of the straight toothed rack of the sole of the shuttle. The lower side of the teeth, where they project outside the body, are in mesh with the teeth of a toothed rack 12, which is common to all adjacent corresponding bobbin supports. The toothed rack, which for clarity is shown in FIG. 1 apart from the wheel 5, is reciprocated in a manner not shown by the driving mechanism in its direction of length so that also the shuttle with the bobbins perform a reciprocatory movement so that they are passed through the frames formed by the warp yarns of the tissue. It will be seen from FIG. 2 that two gear wheels 5 and 6 are provided, both of which cooperate with the toothed rack 12, for which purpose the lower portion of the body 1 is provided with two cavities. The drive is such that when the shuttle starts its right-hand movement from its position in the clamp, it remains in mesh with the gear wheel shown on the right-hand side in FIG. 2 while the shuttle has become engaged by the left-hand gear wheel of the adjacent clamp 18. Clamp 18 is identical in construction to the prior described clamp. The movement of the shuttle is then continued until it has left the free space between the two clamps, where the frame formed by the warp yarns is located, and becomes engaged by the right-hand gear wheel (not shown) of the clamp 18. After the position of the warp yarns has been changed in the desired manner, the shuttle travels to the left by the reversal of the movement of the toothed rack 12 until it regains the initial position, where it is substantially symmetrical to the associated clamp.

The prior art clamp shown in FIG. 1 is constructed so that in order of succession two shuttles can be passed through the frame by using this single clamp. For this purpose two further recesses are provided in the clamp body, one of which is indicated in FIG. 1 by broken lines. The recesses are adapted to receive two meshed gear wheels, of which FIG. 1 shows the gear wheels 8 and 11 in broken lines, and FIG. 2 shows only partly the teeth. The construction shown thus comprises two sets of adjacent gear wheels, each comprising three wheels. The last-mentioned pair of gear wheels serves for driving the second bobbin, the shuttle of which is designated by 2A. The latter is driven by the gear wheel 11, whereas the gear wheel 8 is in mesh with a second toothed rack 13, which like the former is common to all toothed racks of the set. The shuttle 2A is guided on the bottom side by the top side of the clamp. Guiding on the top side is not indicated, but may be obtained by a clamp of the same configuration as the first. It is thus also possible to arrange further shuttles for weaving a single ribbon on the drawer.

In FIG. 3 there is shown a typical bobbin holder or shuttle 2 with the toothing in the sole and the shaft 17 on which the bobbin proper is arranged. Further elements 9 such as used for guiding the yarn are known and not shown in the figure for the sake of clarity.

Each clamp of the invention herein as in FIG. 6 is formed from at least two identical side-by-side portions each provided with a single set of gear wheels cooperating with one or more toothed racks. The said portions can all be mounted on the batten of the invention by means of fastening members at fairly desired intervals. Each of the portions comprises at least one channel and the channels of all portions are in line with each other so that a guide path for the soles of the various shuttles is formed. Each pair of portions may thus form a single clamp, the length of which may be varied at will for varying the intervals. Each pair includes the space intended for the frame of the ribbon to be woven, where the bobbins reciprocate, the shuttle being engaged by the gear wheels of one portion before it has left the adjacent portion as is illustrated in FIGS. 4 and 5, where three pairs of portions *a–b*, *c–d* and *e–f* are shown schematically. The distance between the portions of each pair is adjustable by choosing the fastening place on the batten. Between the portions *b* and *c* and *d* and *e*, respectively, there is a space for the warp yarns of the ribbon to be woven and for the frame formed thereby respectively. FIG. 4 shows the bobbin *s* in the extreme left-hand position, where the shuttle is in mesh with a gear wheel of each of the portions *a–b*, etc. FIG. 5 shows the bobbin in its central position, where it is taken over by the portions *c*, *e*, etc. The bobbin is located at the center of the frame formed by the warp yarns. During the further movement the bobbin is subjected to the action of the whole bipartite subsequent clamp *c–d*.

Each portion of a clamp comprises preferably two uninterrupted channels so that two shuttles with the associated bobbins can be received. The number of bobbins to be used for a single ribbon can be readily increased in accordance with the invention by stacking up a number of portions, the shape thereof being particularly appropriate for this purpose.

The two portions 20 and 21 of the clamp of FIG. 6 are completely identical preferably and are made of pressure-molded synthetic resin. The shape is chosen so that molding can be carried out with the aid of a single mold in a manner known without appreciable complications. The molding can be manufactured in a simple manner and, as the case may be, with further parts such as inserts, stamps, etc. The series manufacture of the parts is therefore inexpensive and matching of different machines and different widths of the ribbon to be woven is convenient. The second clamp 23 cooperates with the first in the manner described and is completely identical thereto. The interval B between the clamps is adjustable in the same manner as the interval A between the portions 20 and 21 and is chosen to correspond to the width of the ribbon to be woven. The foremost gear wheels, projecting into the lower channel and driven on the bottom side by the toothed rack 32, are designated as 30 and 31. Gear wheels 30,

31 are journalled on screw-threaded shafts 26 and 27, the ends of which project from the bottom side and may serve simultaneously for the connection with the batten. Also, the lowermost and hindmost gear wheels 31' (FIG. 7) are journalled thereon, the downwardly projecting teeth of which are in mesh with a second toothed rack, which is common to all adjacent clamps. These gear wheels are in mesh with gear wheels 32 (FIG. 7) provided for driving the second topmost and hindmost shuttle and being arranged on shafts 28 and 29, which are also provided with screw threads for fastening to the drawer.

The top sides of the bodies 20 and 21 are provided with two transverse elevations 24, the width of each being equal to the width of the interval 25 so that the top sides of two stacked portions can engage each other. This is important for mounting and dismounting the portions of the clamp. After removal of the shafts 26,28 and 27,29 respectively, an upward movement is allowed so that the engagement with the toothed rack is obviated and the portion to be displaced can be readily shifted to the front and be removed from the machine. This will be more apparent from FIG. 7, where some space is left between two portions lying one above the other so that a vertical displacement is possible and the ridges 24 are mated with the interstices 25 of the upper portion, a movement of the lower portion (to the left in FIG. 7) being thus readily possible.

What is claimed and desired to secure by Letters Patent of the United States is:

1. A batten for use in a ribbon weaving machine having one or more ribbon weaving units mounted side by side in a preferably common set, the machine including a pair of toothed coplanar racks for driving the weaving units, said batten comprising, a plurality of shuttles and bobbins mounted thereon for retaining the yarn to be woven into said ribbon, a bobbin clamp for guiding the shuttles during operation of the machine, said clamp being formed of at least two identical laterally spaced but independent portions, each said portion having a single set of gear wheels in mating engagement with said racks, means to secure each portion to said batten in one of a selected number of locations, the transverse distance between each of said identical clamp portions thereby being adjustable with respect to the other such that said clamp may be adapted, by varying the distance between the portions, to produce any desired width of woven ribbon.

2. A batten as claimed in claim 1 in which each portion is of generally cube-shaped configuration and is provided on one side thereof with two or more channels for guiding two shuttles, the channels of all portions being aligned with each other to provide a guide path for movement of said shuttles.

3. A batten as claimed in claim 9 in which said portions are constructed of pressure-molded synthetic resin.

4. A batten as claimed in claim 9 in which said gear wheels are journalled on shafts and said shafts also serve for fastening said portions to the batten.

5. A batten as claimed in claim 2 in which the top surface of each portion is provided with ridges, said ridges in each portion forming depressions therebetween, each portion being engageable with another thereabove by interlocking of said ridges with said depressions.

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