Jan. 3, 1967 A. LEIMER ET AL 3,295,736

APPARATUS FOR THE GUIDING AND/OR LATERAL DISPLACEMENT OF MOVING WEBS OF MATERIALS FOR EXAMPLE WEBS OF TEXTILES

Filed Feb. 3, 1965 3 Sheets-Sheet 1

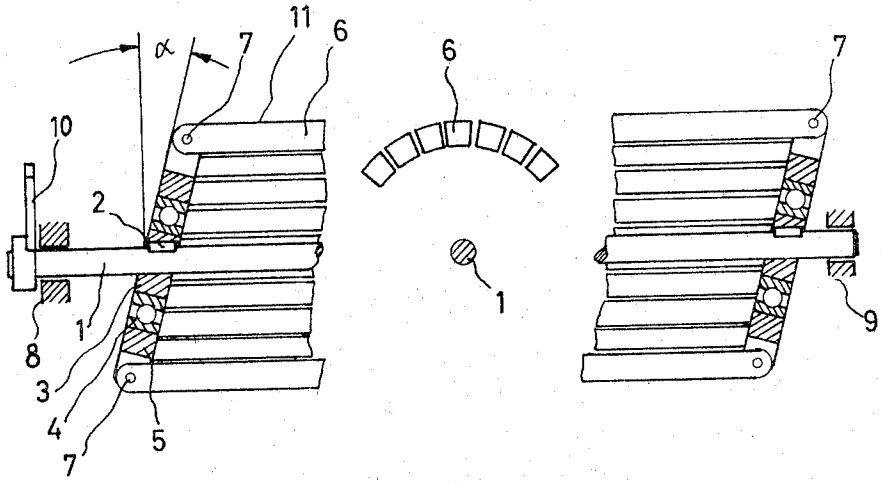


Fig.1

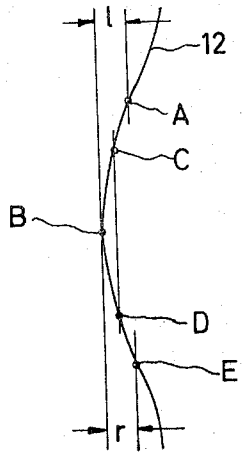


Fig.2

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Filed Feb. 3, 1965 3 Sheets-Sheet 2

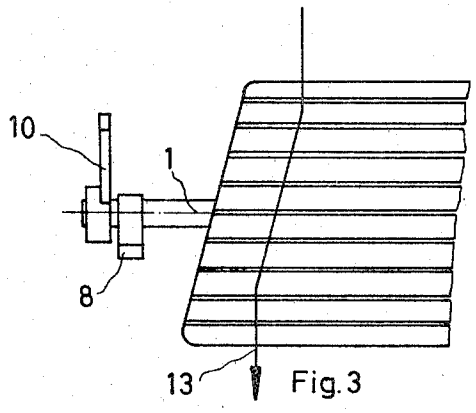


Fig. 3

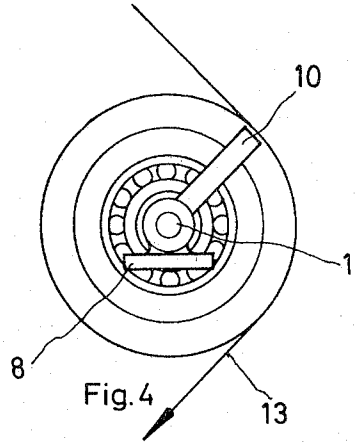


Fig. 4

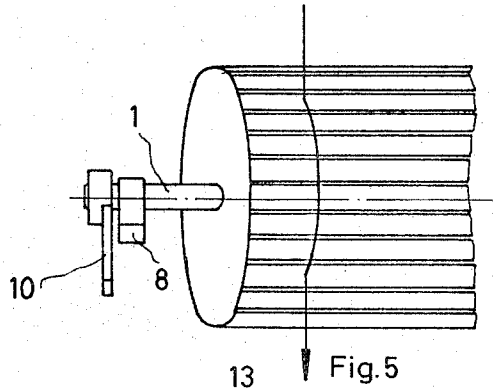


Fig. 5

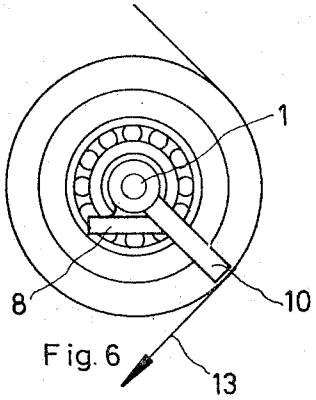


Fig. 6

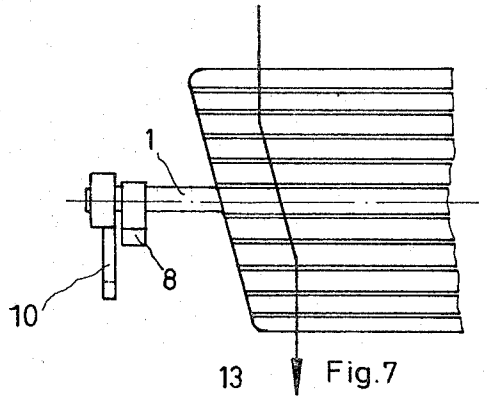


Fig. 7

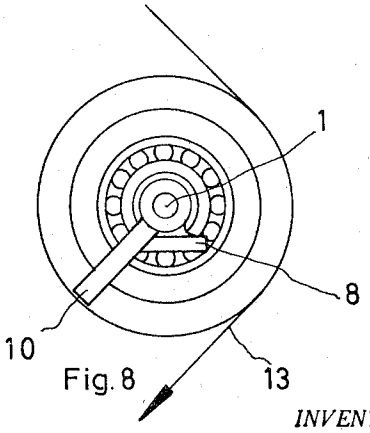


Fig. 8

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Jan. 3, 1967 A. LEIMER ET AL 3,295,736

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Filed Feb. 3, 1965 3 Sheets-Sheet 3

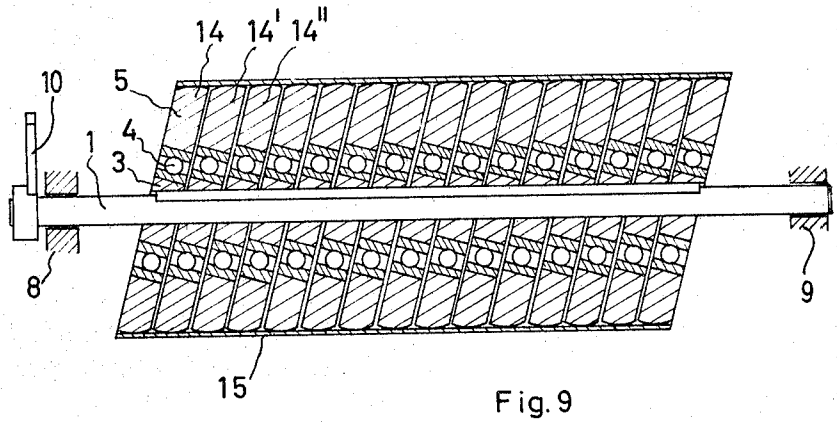


Fig. 9

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3,295,736

APPARATUS FOR THE GUIDING AND/OR LATERAL DISPLACEMENT OF MOVING WEBS OF MATERIALS FOR EXAMPLE WEBS OF TEXTILES

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Claims priority, application Germany, Feb. 6, 1964, E 26,353
18 Claims. (Cl. 226—190)

This invention concerns an apparatus for the guiding of moving webs of materials by means of a roller whose shell consists of several sections which are movable in relation to each other.

Known apparatus for guiding moving webs of materials mostly employed the so-called web guides which move the web of material alternately towards the left or right hand selvedge by means of pairs of rollers mounted inclined to the selvedge of the material.

If this movement takes place close together and in small amplitudes, a fairly accurate and straight guide of the material is obtained. These apparatuses have however, the disadvantages that with various widths of material they have to be adjusted each time to the width concerned. For this purpose auxiliary apparatuses such as supports or the like are necessary. Furthermore, these devices contact the web of material on both sides, i.e., from above and below, which is unfavourable or not even admissable with, for example, webs of layered material.

Other apparatuses for guiding webs of material use cylindrical guide rollers which are embraced by the web of material at a given angle. These guide rollers, which when at rest are at right angles to the direction of run of the material are pivoted by a given amount from this right angle. These apparatuses have the disadvantage that complicated bearings and adjustment devices are generally necessary. Furthermore, on pivoting of the guide roller a relative movement also arises between the surface of the material and the circumferential surface of the guide roller, which can prove unfavourable to the tension of the material.

Besides these, guide rollers are known, which have an adjustable surface; movable members such as profile bars or rubber bands are provided on the circumference of these guide rollers transverse to the direction of run. These movable members have, however, to be moved in the desired manner by normally complicated kinematic elements such as for example tumbler discs, hydraulic cylinders or cams. These apparatuses are generally expensive to construct and with high wear and tear lead to frequent disturbances and are therefore uneconomical.

The invention proposes, for the elimination of the said disadvantages on an apparatus of the type defined at the commencement hereof, that the sections be attached to one or more annular members surrounding the axle of the roller, the or each member being mounted for free rotation, on an annular bearing surrounding the axle of the roller and which cannot be twisted nor pivoted as against the axle of the roller, for example, constructed as a bush, the said bearing being mounted inclined to the axle of the roller.

A further feature of the invention is that the axle of the roller is adjustable as to speed and/or can be locked in various or desired adjustment positions.

The invention further proposes that two bearings are stationarily mounted on the axle of the roller at a distance apart which corresponds to the effective width of the roller.

The invention is further characterised in that both

bearings have the same inclined position to the axle of the roller.

The invention further proposes that both bearings are adjusted or arranged parallel to each other.

The invention is further characterised in that all rotatable annular members on the bearings each time in the main plane of the members have the same outer diameter.

A further advantage of the invention is that staves, known per se, of equal lengths parallel to one another are each connected by joints on both their ends with the circumferential areas of the members.

The invention further proposes that the members are built as the sections of the shell of the roller substantially in such a way that their surrounding surfaces form annular strip sections of the shell of the roller.

A further feature of the invention is that a plurality of sections is arranged parallel to each other.

The invention further proposes that the sections are surrounded by an endless resilient substantially tubular cover.

A further advance of the invention is that the area of the sections coming into contact with the web of material are such as to facilitate gripping.

The invention is further characterised in that the bearings constructed as bushes each have a central inclined bore for pushing onto the axle of the roller.

A further proposal in the invention is that the axle of the roller and the bearings are provided with key ways so that the bearings can be firmly secured to the axle of the roller by individual keys or a key passing through all of them.

The invention is also characterised in that a revolving bearing, for example, a ball bearing is provided between each bearing and its related member which practically does not allow relative axial movements between the bearings.

The invention further proposes that an adjustment member or lever is provided on the axle of the roller on which manual force, or for example, forces controlled by or dependent on the position of the selvedge of the web of material (or from the lateral wandering of the selvedge of the web of material) can act, for example, having the effect of an adjustment of the lever returning the web of material into the correct position.

The invention further proposes that the axle of the roller be rotated at a constant or variable or if desired programme-controlled speed so that a constant variation (lateral to and fro movements) of the web of material takes place.

Along wtih the gradual correction of the run of the material by alteration of the inclined position of the bearing brackets or of the bearings at the moment of adjustment a lateral displacement of the web of material in the direction for correction of the run of the web by the lateral displacement of the surface of the roller i.e. at the moment of the adjustment of the inclined position of the bearing brackets. Consequently small corrections of the run of the material takes place as soon as the bearing brackets or bearings are adjusted and it is not necessary to wait till the web of material is brought into the desired direction of run by the inclined direction of run of the surface of the roller.

The apparatus according to the invention has the advantage of the employment of very simple constructional elements and makes possible the correction of the run of the material by simple rotation of the axle of the roller due to the type of attachment selected for the bearing brackets or bearings. The device according to the invention can be included as the guide roller for the material in the run of the material of a textile machine and in some circumstances in a paper making machine or a preparatory ma-

chine for paper and artificial material, the correction of the run of the material being carried out by a single adjustment or rotation of the axle of the roller.

The device according to the invention can besides this, and indeed preferably, be used to regulate the run of the material constantly, the axle being constantly adjusted for correction by known means such as magnets, motors, or hydraulic or other means in dependence on lateral movement of the web of material which has taken place or has been sensed.

It follows from this that any desired alteration of the direction of run of a web of material can be carried out with the device according to the invention, for example oscillating changing of direction of a running web of material.

A particular embodiment of the device according to the invention, consists as already explained in that the two bearing brackets are not connected by bars of profiles but that the whole width of the roller is fitted with such bearing brackets or bearings which are arranged in a row. This embodiment is convenient where particularly high bending forces act on the roller according to the invention.

The invention will be further apparent from the following description, with reference to the accompanying drawings, which show, by way of example only a number of embodiments thereof.

Of the drawings:

FIG. 1 is an elevation in longitudinal section;

FIG. 2 shows the development of a bearing bracket;

FIG. 3 shows a portion of the roller with the axle so rotated that the web of material is led to the right looking in the direction of the run;

FIG. 4 shows a side elevation of the matter of FIG. 3;

FIG. 5 shows a portion of the roller with the axle so rotated that the web of material receives no lateral displacement;

FIG. 6 shows a side elevation of the matter of FIG. 5;

FIG. 7 shows a portion of the roller with the axle so rotated that the web of material is displaced to the left looking in the direction of the run;

FIG. 8 shows a side elevation of the matter of FIG. 7;

FIG. 9 shows a special embodiment of the roller wherein the roller consists of individual rotary discs or the like joined together.

It can be seen from FIG. 1 that a bush bearing member **3** secured against rotation by the key **2** is mounted on the axle **1** which is so designed that its flat face deviates from the vertical by the angle α. The bush **3** carries the ball bearing **4** on which the outer ring or annular member **5** is drawn. The surface of the roller consists of individual staves or segments **6** which are pivotally mounted in the outer ring **5** around the pivot pin **7**. The axle **1** is mounted preferably adjustable, for rotation in the bearings **8** and **9**. The rotation of the axle **1** takes place by a lever **10** or the like.

It can be seen from FIG. 2 that, for example, a point **11** located on the surface of the roller described on one rotation of the roller the evolution **12**. It can further be seen from FIG. 2 that at point A on the surfaces of the staves **6** the web of material running thereon leaves the surface of the staves **6** if a corresponding angle of embrace is selected for the stretch A–B. When the material has left the surface of the roller at point B it has received a lateral displacement of the amount *l*. If the run-on point *c* and run-off point D are selected then no lateral displacement of the web of material will take place should the run-on point B and the run-off point E be selected then a lateral displacement of the web of material is obtained of the amount *r* this displacement of the web of material being in the opposite direction to displacement *l*.

The individual phases are shown again in FIGS. 3–8. FIG. 3 shows a displacement of the web of material **13** to the right looking in the direction of the run of the material. In FIG. 5 no lateral displacement is exerted on the web of material **13** but in FIG. 7 on lateral displacement of the web of material **13** to the left, looking in the direction of the run of the material is effected. The side elevations in FIGS. 4, 6 and 8 show the corresponding movements of the lever **10**, it being understood that the lever **10** may be adjusted into any other desired position which simply alters the amount and direction of the lateral correction of the run of material in a predetermined manner.

An important special embodiment of the apparatus according to the invention is shown in FIG. 9 wherein many individual rotatable discs **14**, **14'**, **14''** and so on are arranged on the axle **1** which each consists of a bush **3**, ball bearing **4** and the outer ring **14** provided with a cylindrical or cambered surface. A shell **15** of resilient material such as for example rubber may be mounted on top of the rotatable discs **14**, **14'** and so on.

It will be appreciated that it is not intended to limit the invention to the above examples only, many variations, such as might readily occur to one skilled in the art being possible, without departing from the scope thereof.

What is claimed is:

1. Apparatus for guiding and laterally adjusting a moving web, comprising, in combination, annular web guiding means having a peripheral web guiding surface of cylindrical configuration having a first axis; bearing means having a second axis intersecting said first axis at an angle, and supporting said annular web guiding means so that said peripheral web guiding surface reciprocates in the direction of said first axis during rotation of said annular web guiding means; and control means for turning said bearing means about said first axis between adjusted angular positions in which different portions of said peripheral web guiding surface are adapted to guide a web so that the guided web is displaced different distances in the direction of said first axis during rotation of said annular web guiding means.

2. An apparatus according to claim **1** wherein said annular web guiding means includes two annular members spaced along said first axis, and a plurality of circumferentially spaced support bars extending parallel to said first axis and pivotally connected at the ends thereof with said annular members, said support bars forming said web guiding surface; and wherein said bearing means include two bearing members respectively supporting said annular members for rotation about parallel second axes intersecting said first axis at the same angle.

3. An apparatus according to claim **1** wherein said annular web guiding means include a plurality of annular web guiding members located adjacent each other and having peripheral surfaces of circular configuration having the same diameter and centers located in said first axis; and wherein said bearing means include a plurality of bearing members respectively supporting said annular members for rotation about parallel second axes intersecting said first axis at the same angle.

4. An apparatus according to claim **3** and including a cylindrical tubular cover surrounding said peripheral surfaces of said annular members and adapted to support and guide a web.

5. An apparatus according to claim **1** wherein said control means include a control shaft located in said first axis and fixedly carrying said bearing means, said control shaft being operable for turning said bearing means between said angular positions.

6. An apparatus according to claim **1** wherein said web guiding means include at least two annular members; wherein said bearing means include at least two bearings respectively supporting said annular members for rotation about parallel second axes intersecting said first axis at the same angle; and wherein said control means include a control shaft having an axis coinciding with said first axis and fixedly carrying said bearings spaced

along said first axis, said bearings being inclined at the same angle to said first axis and to said shaft.

7. An apparatus according to claim 6 wherein said bearings are located in parallel planes which are slanted to said first axis and perpendicular to said second axes.

8. An apparatus according to claim 7 wherein said annular members are located in said parallel planes of the respective bearings supporting the same, and have in said planes the same outer diameter.

9. An apparatus according to claim 6 and including a plurality of staves of equal length extending equidistant from and parallel to said first axis; and including joints for connecting the ends of said staves, respectively, with the peripheral portions of said two annular members so that said staves form said web guiding surface.

10. An apparatus according to claim 6 wherein said annular members are disposed adjacent each other and have the same diameter so that the annular peripheries of said annular members form annular strip shaped sections of said web guiding surface.

11. An apparatus according to claim 10 and including a resilient tubular cover surrounding said peripheral portions of said annular members.

12. An apparatus according to claim 6 wherein said web guiding surfrace has means for increasing friction between a web and said surface whereby gripping of the web by said surface is facilitated.

13. An apparatus according to claim 6 wherein said annular members have cambered peripheral surfaces of circular configuration having the same diameter and centers located in said first axis.

14. An apparatus according to claim 6 wherein each of said bearing includes an inner bushing having a bore coaxial with said first axis, and end faces located in parallel planes slanted to said first axis; and wherein said control shaft is located in said bore and is secured to said bushing.

15. An apparatus according to claim 14 wherein said bore in each bushing has a key groove, wherein at least the portions of said shaft located in said bores have key grooves, and including key means located in said key

grooves for securing said bushings and bearings to said shaft.

16. An apparatus according to claim 15 wherein each bearing includes an antifriction bearing having an inner ring secured to the respective bushing, and an outer ring secured to said annular member.

17. An apparatus for guiding and laterally adjusting a moving web, comprising, in combination, web guiding means having a plurality of web guiding surfaces of cylindrical configuration having a first axis, said web guiding means including a plurality of annular members located in parallel planes slanted to said axis and having circular peripheries having the same diameter; a plurality of bearing respectively supporting said annular members for rotation about second axes respectively perpendicular to said planes and intersecting said first axis at an angle so that points of said circular peripheries reciprocate in the direction of said first axis during rotation of said annular members about said second axes, respectively, said bearings being respectively located in said slanted parallel planes, and including an inner bushing having a bore concentric with said first axis; and control means including a control shaft extending along said first axis passing through said bores in said bushings and being secured to the same, and means for turning said control shaft with said bushings about said first axis between adjusted angular positions in which different portions of said peripheral web guiding surface are adapted to guide a web so that the guided web is displaced different distances in the direction of said first axis during rotation of said annular members.

18. An apparatus according to claim 17 wherein said control means include a lever secured to said control shaft and adapted to be manually operated.

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SAMUEL F. COLEMAN, *Primary Examiner.*