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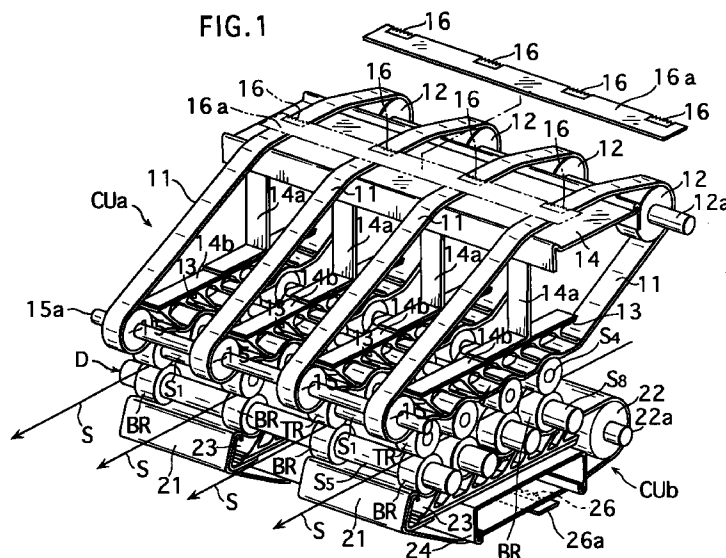
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(54) Clearer unit for draft rollers

(57) In a clearer unit for draft rollers arranged to cause endless clearer belts (11, 21) to travel in contact with the peripheral surfaces of the draft rollers, when a roller gauge is to be changed in accordance with a change of a type of fiber yarn, the adjustment of the locations where urging members (13, 23) for urging the clearer belt (11, 21) is made unnecessary by such an arrangement that each of the urging members (13, 23)

includes a multiplicity of contact pieces (13b, 23b) the number of which is greater than that of the disposed draft rollers and further the contact pieces (13b, 23b) are disposed along the traveling direction of the clearer belts (11, 21) in a draft zone, so that the clearer belts (11, 21) are pressed against the peripheral surfaces of the draft rollers through these contact pieces (13b, 23b).



Description

BACKGROUND OF THE INVENTION

(Field of the Invention)

The present invention relates to a clearer unit for draft rollers built into a drafting device of a spinning machinery so that it can continuously remove fly waste clung to the roller surfaces of the draft rollers.

(Description of the Prior Art)

A drafting device of a spinning machinery such as a fine spinning frame or a drawing frame is sometimes equipped with a clearer unit for removing fly waste on draft rollers (for example, Japanese Utility Model Publication No. SHO 59-32613).

As this type of clearer units, there is known a clearer unit arranged such that a drafting device is provided with mechanisms for driving endless clearer belts 1a, 1b (referred to FIG. 5) and fly waste on the roller surfaces of groups of draft rollers $2a_n$, $2b_n$ ($n = 1$ to 4) are removed by causing the clearer belts 1a, 1b to travel around the rollers. Note, the drafting device is arranged such that upper draft rollers $2a_1 \dots 2a_4$ constituting a group of top rollers are combined with lower draft rollers $2b_1 \dots 2b_4$ constituting a group of bottom rollers so that the group of the top rollers confront the group of the bottom rollers to thereby draft the yarn S at a predetermined draft ratio.

The clearer belt 1a disposed on the upper side of the drafting device is stretched around a drive roller 4a disposed rearward with respect to a draft direction, a guide member 5 disposed forward with respect to the draft direction and a guide member 6a disposed therebetween and travels in contact with the upper draft rollers $2a_1 \dots 2a_4$. The clearer belt 1a is pressed against the group of the draft rollers $2a_n$ by a projection piece 5a formed on the front guide member 5 and a leaf spring 7a with a press piece $7a_1$ secured to the intermediate guide member 6a.

On the other hand, the clearer belt 1b disposed on the lower side of the drafting device is stretched around a drive roller 4b disposed rearward with respect to the draft direction, a guide member 8 composed of a leaf spring disposed forward with respect to the draft direction and a guide member 6b disposed therebetween and travels in contact with the lower draft rollers $2b_1 \dots 2b_4$. The clearer belt 1b is pressed against the group of the draft rollers $2b_1 \dots 2b_4$ through leaf springs 7b, 7b ... with press pieces $7b_1 \dots 7b_3$ secured to the intermediate guide member 6b.

The clearer belts 1a, 1b turn in the same direction as that of the rotation of the groups of the respective draft rollers $2a_n$, $2b_n$ at traveling speeds slower than the peripheral velocity of the respective draft rollers $2a_n$, $2b_n$. With this arrangement, fly waste clung to the roller surfaces of the respective draft rollers $2a_n$, $2b_n$ can be

continuously removed. Note, the fly waste transferred onto the respective clearer belts 1a, 1b is exfoliated by combs 9a, 9b disposed in contact with the surfaces of the clearer belts and discharged to the outside of the drafting device.

The leaf springs 7a, 7b urge the respective clearer belts 1a, 1b so that they are pressed against the groups of the draft rollers $2a_n$, $2b_n$. Therefore, an elastic means composed of a soft sheet of sponge, foamed rubber, foamed urethane, plastic, rubber and the like constituting an outer shell and a filler consisting of gas, liquid, gel, sol, powder, fluid and the like sealed therein may be used as the urging means, instead of the above leaf spring. In this case, the elastic means is disposed over a length corresponding to the groups of the draft rollers (for example, Japanese Patent Publication Laid-Open No. SHO 5-9816).

According to the former of the above prior art, when a distance between the draft rollers, that is, a roller gauge is to be changed in accordance with a type of yarn to be processed, positions where the leaf springs 7a, 7b are mounted must be changed to cause the clearer belts 1a, 1b to properly come into contact with the groups of the draft rollers $2a_n$, $2b_n$. Thus, there cannot be avoided a problem that a set up is very troublesome and time-consuming and further a period of time during which operation is stopped for the set up is liable to be excessively prolonged. Whereas, in the latter of the prior art using the elastic member, although the above job for changing the positions of the leaf springs is not needed, since the elastic member is composed of the thin soft outer shell, there is a problem that the elastic member is weak in mechanical strength and liable to be broken.

OBJECT AND SUMMARY OF THE INVENTION

A main object of the present invention made taking these problems of the prior art into consideration is to provide a clearer unit for drafting device which need not change positions where urging members are mounted even if a roller gauge is changed, has sufficient mechanical strength and no possibility of breakage and can be easily handled by realizing urging members capable of pressing clearer belts against the peripheral surfaces of draft rollers in the state that the clearer belts are in contact with the peripheral surfaces of the draft rollers at many positions.

To achieve the above object, the gist of the present invention resides in a clearer unit for drafting device which constitutes groups of top rollers and groups of bottom rollers, the clearer unit including endless clearer belts for removing fly waste on the draft rollers by traveling while coming into contact with the respective draft rollers, drive rollers for driving the clearer belts and urging member for urging the clearer belts against the peripheral surfaces of the draft rollers, the urging member comprising a base disposed in the traveling direction of the clearer belts over a length corresponding to a

draft zone and contact pieces projecting from the base, the number of the contact pieces being greater than that of the disposed draft rollers of the groups of the top rollers or the groups of the bottom rollers, so that the clearer belts are urged against each of the peripheral surfaces of the draft rollers through the contact pieces.

Note, the urging member can be composed of an integrally molded elastic member.

According to the arrangement of the invention, since each of the contact pieces of the urging member are disposed along the traveling direction of the clearer belts in the number greater than that of the disposed draft rollers, the contact pieces can urge the clearer belts so that they come into contact with the draft rollers by even pressure regardless of the change of the roller gauge of a drafting device.

Further, when the urging member is composed of an integrally molded elastic member, it can be more easily manufactured and a manufacturing cost can be lowered.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing an outside view of the present invention;

FIG. 2 is a side elevational view of the present invention;

FIG. 3 is a view explaining operation of the present invention when a roller gauge is changed;

FIG. 4 is a perspective view of a main portion showing another form of an urging member according to the present invention; and

FIG. 5 is a view corresponding to FIG. 2 which shows an arrangement of a conventional clearer unit.

DESCRIPTION OF PREFERRED EMBODIMENTS

In FIG. 1, clearer units are disposed on both the upper and lower sides of a drafting device D. The clearer unit CUa disposed on the upper side is mainly composed of clearer belts 11, 11 ..., drive rollers 12, 12 ... and urging members 13, 13 ... corresponding to the respective clearer belts 11. The clearer unit CUb disposed on the lower side is mainly composed of clearer belts 21, 21 ..., drive rollers 22, 22 ... and urging members 23, 23 ... corresponding to the respective clearer belts 21.

As shown in FIG. 2, the drafting device D is arranged such that a front top roller TR₁, a second top roller TR₂, a third top roller TR₃ and a back top roller TR₄ which are disposed on the upper side and constitute a group of top rollers are combined with a front bottom roller BR₁, a second bottom roller BR₂, a third bottom roller BR₃ and a back bottom roller BR₄ which are disposed on the lower side and constitute a group of bottom rollers, respectively and these rollers are disposed in a plurality of lines. Note, the group of the respective top rollers TR_n (n = 1 to 4) are pressed

against the group of the bottom rollers BR_n (n = 1 to 4) corresponding thereto with pressure by a waiting arm (not shown). The drafting device D shown here is arranged as 4 lines x 4 rows of draft rollers (referred to FIG. 1) and the top rollers TR₁ ... TR₄ disposed in the respective rows are fixed on common shafts S₁ ... S₄ and the bottom rollers BR₁ ... BR₄ disposed in the respective rows are fixed on common shafts S₅ ... S₈.

Yarn S is introduced into the drafting device D from the rear side thereof and drafted to the front side thereof. That is, the groups of the top rollers TR_n and the groups of the bottom rollers BR_n are rotated in the directions of arrows Ka, Kb shown in FIG. 2, respectively, thus the yarn S introduced from the rear side of the drafting device D is fed forward by being held with the back top roller TR₄ and the back bottom roller BR₄ which are disposed at the trailing end portion. Note, the groups of the respective draft rollers TR_n and BR_n have peripheral velocity which are successively increased from the roller on the rear side toward the roller on the front side.

With this arrangement, the yarn S is drafted at a predetermined draft ratio by passing through a draft zone ranging from the back top rollers TR₄ and back bottom rollers BR₄ to the front top rollers TR₁ and the front bottom rollers BR₁ positioned at the leading end portion.

The upper clearer belt 11 is disposed on the groups of the top rollers TR_n in the state that the belt 11 is stretched around the drive roller 12, an intermediate guide member 14 and a front side guide roller 15. The drive roller 12 is disposed at an upper rear position of the drafting device D and the guide roller 15 is disposed at a front position of the drafting device D. Note, the drive roller 12 is mounted on a shaft 12a which is commonly used by the respective drive rollers and the guide roller 15 is mounted on a shaft 15a which is commonly used by respective guide rollers.

The clearer belt 11 is composed of, for example, raising fabric, felt, non-woven fabric or the like, arranged as an endless belt having the same width as those of the draft roller TR_n of the respective rows and travels in contact with the respective top rollers TR₁ ... TR₄. More specifically, the clearer belt 11 is caused to travel in the direction of an arrow K₂ by driving the drive roller 12 in the direction of an arrow K₁ through the shaft 12a.

The intermediate guide member 14 is composed of a sheet-shaped member disposed as a member commonly used against the respective clearer belts 11, 11 ... in a direction perpendicular to the traveling direction of the clearer belts 11 (referred to FIG. 1) and has an upper surface with a C-shaped cross section. Further, the lower surface of the guide member 14 has legs 14a extending vertically toward the groups of the top rollers TR_n and band-shaped pressing plates 14b are attached to the lower ends of the legs 14a in parallel with the groups of the top rollers TR_n.

The urging member 13 is attached to the lower surface of the pressing plates 14b. The urging member 13

is composed of a multiplicity of contact pieces 13b, 13b ... projecting from a base plate 13a at equal intervals. The contact pieces 13b, 13b ... are molded by employing an integrally moldable elastic member such as, for example, an urethane material, plastic material, rubber material or the like. These contact pieces 13b are formed to a comb-teeth shape inclined toward the traveling direction of the clearer belt 11 and the extreme ends thereof are bent to a hook-shape toward the traveling direction of the clearer belt 11 for reducing a sliding resistance thereof with the clearer belts 11. The urging member 13 can urge the clearer belt 11 by causing the respective extreme ends of the contact pieces 13b, 13b ... to come into contact with the inner surface of the clearer belt 11 so that the clearer belt 11 is pressed against the peripheral surfaces of the top rollers TR₁ ... TR₄.

Note, the contact pieces 13b, 13b ... are disposed in a draft zone in the number greater than that of the top rollers TR₁ ... TR₄ disposed therein as well as the contact pieces 13b, 13b ... are formed at pitches smaller than a minimum diameter of the top rollers TR₁ ... TR₄. The minimum diameter of the top rollers TR₁ ... TR₄ means the smallest diameter among the diameters of a plurality of the top rollers TR₁ ... TR₄ with which the clearer belt 11 comes into contact.

A band-shaped bracket 16a which is commonly used by the respective clearer belts 11, 11 ... is disposed above the guide member 14 in a direction perpendicular to the traveling direction of the clearer belts 11 (referred to FIG. 1) and four combs 16 are disposed to the bracket 16a in correspondence to the respective clearer belts 11 so that the combs 16 are in contact with the clearer belts 11. Since each of the combs 16 has an extreme end formed to a comb-blade shape and disposed to lightly press the clearer belts 11 downward, the comb 16 can exfoliate and removes fly waste clung to the clearer belt 11.

On the other hand, each of the clearer belts 21 on the lower side is disposed over the groups of the bottom rollers BR_n (n = 1 to 4) in the two lines thereunder. The clearer belt 21 travels by being stretched around the drive roller 22 disposed rearward with respect to the draft direction, an intermediate guide member 24 and a front side guide member 25 composed of a leaf spring. The drive roller 22 is mounted on a shaft 22a which are commonly used by the respective drive rollers and the intermediated guide member 24 is disposed in a direction perpendicular to the traveling direction of the clearer belts 21 and commonly used by the respective clearer belts 21, 21 ... (referred to FIG. 1).

The guide member 24 is composed of a sheet-shaped member having a C-shaped cross section and the lower ends of the side walls thereof are folded back inward so that they are in contact with the clearer belts 21 with a small frictional resistance. Further, pressing plate 24a having a width corresponding to the width of the clearer belt 21 is disposed on the upper surface of the guide member 24 in parallel with the groups of the

bottom rollers BR_n and a front guide member 25 projects from the front end of the pressing plate 24a toward a front direction. Note, a comb 26 is attached to the lower surface of the clearer belt 21 through a bracket 26a to exfoliate and remove fly waste clung to the clearer belt 21.

The clearer belt 21 is composed of a material similar to that of the aforesaid clearer belt 11 and formed as an endless belt having a large width so that it can come into contact with the groups of the bottom rollers BR_n in the two lines. More specifically, when the drive roller 22 is driven in the direction of an arrow K3 of FIG. 2 through the shaft 22a, the clearer belt 21 can travel in the direction of an arrow K4.

The urging member 23 is composed of an elastic member of a material similar to that of the urging member 13 and a multiplicity of band-shaped contact pieces 23b which are integrally molded project from a base plate 23a likewise the urging member 13. Note, the urging member 23 is formed to a width adaptable to the width of the clearer belt 21 and there are integrally molded the contact pieces 23b in the number greater than that of the groups of the disposed bottom rollers BR_n and the contact pieces 23b are arranged at pitches smaller than a minimum diameter of the bottom rollers BR₁ ... BR₄. With this arrangement, the urging member 23 can urge the clearer belt 21 through the contact pieces 23b, 23b ... of the urging member 23 so that it is pressed against the peripheral surfaces of the bottom rollers BR₁ ... BR₄.

Note, the upper clearer unit CUa and the lower clearer unit CUb can be opened upward and downward, respectively by an opening/closing mechanism (not shown) using the shafts 12a, 22a of the drive rollers 12, 22 as rotating shafts. Further, the clearer belts 11, 22 can be set at proper locations so that they are pressed against the corresponding draft rollers TR, TR ... in the respective lines ... and the corresponding draft rollers BR, BR ... in the respective two lines (referred to FIG. 2).

When the clearer belts 11, 21 are set at the proper locations thereof, first, the contact pieces 13b, 13b ... of the urging member 13 which corresponds to the top rollers TR₁ ... TR₄ are pressed and bent at a large angle so as to follow the peripheral surfaces of the top rollers and the contact pieces 13b positioned between the top rollers TR₁ ... TR₄ are pressed and bent at a very small angle. With this operation, the contact pieces 13b are pressed and bent irregularly as a whole, so that pressure can be applied to the clearer belts 11 to cause them to travel while sliding on the peripheral surface of the respective top rollers.

Further, the contact pieces 23b, 23b ... of the urging members 23 of the lower clearer unit CUb can apply pressure to the clearer belts 21 in the same way. Consequently, the upper clearer belts 11 and the lower clearer belts 21 can travel while contacting equally with the groups of the corresponding top rollers TR_n and the groups of the corresponding bottom rollers BR_n, respectively, which shows that the respective clearer belts 11

and 21 can securely remove fly waste clung to the draft rollers TR_n , BR_n .

Note, since the lower clearer belts 21 travel in the same direction as the rotating direction of the groups of the bottom rollers BR_n , they preferably have a traveling velocity sufficiently slower than the peripheral speeds of the groups of the bottom rollers BR_n . Further, although the clearer belts 11 and 21 are intermittently traveled at a suitable cycle in this embodiment, they may be continuously traveled.

As shown in FIG. 3, when a type of the yarn S to be handled is changed, the drafting device D must change the intervals between the draft rollers $TR_1 \dots TR_4$, $BR_1 \dots BR_4$ in the respective rows, that is, the roller gauge (two-dot-and-dash-lines in the drawing show the locations of the draft rollers prior to the change of the gauges). In this case, the respective contact pieces 13b, 13b ... of the urging members 13 are allowed to be deformable to thereby uniformly urge the corresponding clearer belts 11 against the top rollers $TR_1 \dots TR_4$. On the other hand, the urging members 23 can also uniformly urge the clearer belts 21 against the bottom rollers $BR_1 \dots BR_4$ likewise the urging members 13 even if the type of the yarn is changed.

This is because that since a multiplicity of the contact pieces 13b, 13b ..., 23b, 23b ... of the urging members 13, 23 are disposed at the pitches smaller than the minimum diameter among the draft rollers $TR_1 \dots TR_4$, $BR_1 \dots BR_4$ in the traveling direction of the clearer belts 11, 21, at least each one of the contact pieces 13b, 23b can be positioned between the adjacent draft rollers $TR_1 \dots TR_4$ and between the adjacent draft rollers $BR_1 \dots BR_4$, respectively, whereby the clearer belts 11, 21 can be applied with tension by being pressed.

In the embodiment, the respective contact pieces 13b, 23b of the urging members 13, 23 stand on the bases 13a, 23b thereof at an inclining angle of about 45 - 60 with respect to the upper surfaces of the bases so that the contact pieces 13b, 23b can achieve a maximum restoring force and apply a large pressure force to the clearer belts 11, 21. Note, as far as at least each one of the contact pieces 13b, 13b ..., 23b, 23b ... can exist between the adjacent top rollers $TR_1 \dots TR_4$ and between the adjacent bottom rollers $BR_1 \dots BR_4$ to thereby press the clearer belts 11, 21, the contact pieces may be disposed at pitches larger than the minimum diameter among the top rollers $TR_1 \dots TR_4$ and the bottom rollers $BR_1 \dots BR_4$ and need not be necessarily disposed at equal pitches.

Further, the urging members 13, 23 are formed to a length applicable to the longest draft zone in the drafting device D and the widths of the urging members 13, 23 may be formed in accordance with the widths of the clearer belts 11, 21. However, the width of the clearer belts 11 or 21 may be formed to a width corresponding to the width of the top rollers TR , $TR \dots$ or the bottom rollers BR , $BR \dots$ in each line, respective two lines or any arbitrary number of lines greater than two lines of the drafting device D.

The present invention is applicable not only to the drafting device composed of the draft rollers in the 4 lines x 4 rows shown in the above embodiment but also to the drafting device composed of the draft rollers in any lines greater or less than the 4 lines and any rows greater or less than the 4 rows.

Further, the urging members 13, 23 of the present invention may be composed of contact members 13b, 23b inserted into separate bases in place of the contact pieces 13b, 23b integrally molded with the bases 13a, 23b.

FIG.4 shows another embodiment of the urging member of the present invention. The urging member 30 shown in the drawing has contact pieces each composed of a sheet-shaped base 30a, shafts 30b projecting from the base 30a and spheres 30c formed at the extreme ends of the shafts 30b. An advantage similar to that of the present invention can be obtained by providing a set of the urging members arranged as described above and disposing them on both the upper and lower sides of the draft rollers.

More specifically, the innumerable shafts 30b, 30b ... each inclined toward the traveling direction of the clearer belts 11 stand on the base 30a of the urging member 30 and disposed at pitches smaller than the minimum diameter of the top rollers $TR_1 \dots TR_4$ in the traveling direction of the clearer belts 11. With this arrangement, since the innumerable shafts 30b, 30b ... are pushed and bent by coming into contact with the clearer belts 11, forces for restoring them to their original positions act on the shafts 30b, 30b ..., whereby the clearer belts 11 can be uniformly urged to the draft rollers.

As apparent from the above-mentioned, according to the present invention, since the urging members each having the contact pieces, the number of which is greater than that of the disposed draft rollers, are disposed in the traveling direction of the clearer belts, the urging members can uniformly urge the clearer belts through the contact pieces regardless of the change of the roller gauge of the drafting device. Therefore, when the roller gauge is changed, a job for changing the locations of the urging members becomes unnecessary, thus a setting operation can be simply carried out. Moreover, since the clearer unit has sufficient mechanical strength, an advantage can be obtained in that there is no possibility of the breakage of the clearer unit and the clearer unit can be easily handled.

In a clearer unit for draft rollers arranged to cause endless clearer belts (11, 21) to travel in contact with the peripheral surfaces of the draft rollers, when a roller gauge is to be changed in accordance with a change of a type of fiber yarn, the adjustment of the locations where urging members (13, 23) for urging the clearer belt (11, 21) is made unnecessary by such an arrangement that each of the urging members (13, 23) includes a multiplicity of contact pieces (13b, 23b) the number of which is greater than that of the disposed draft rollers and further the contact pieces (13b, 23b) are disposed

along the traveling direction of the clearer belts (11, 21) in a draft zone, so that the clearer belts (11, 21) are pressed against the peripheral surfaces of the draft rollers through these contact pieces (13b, 23b).

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Claims

1. A clearer unit for draft rollers which constitute groups of top rollers and groups of bottom rollers, the clearer unit including endless clearer belts (11, 21) for removing fly waste on the draft rollers by traveling while coming into contact with the respective draft rollers, drive rollers (12, 22) for driving the clearer belts (11, 21) and urging members (13, 23) for urging the clearer belts (11, 21) against the peripheral surfaces of the draft rollers, characterized in that each of said urging members (13, 23) has a base (13a, 23a) disposed along the traveling direction of said clearer belts (11, 21) over a length corresponding to a draft zone and contact pieces (13b, 23b) projecting from the base (13a, 23a), the number of the contact pieces (13b, 23b) being greater than that of the disposed draft rollers constituting the groups of said top rollers and the groups of said bottom rollers, so that said urging members (13, 23) urge said clearer belts (11, 21) against the peripheral surfaces of said draft rollers through said contact pieces (13b, 23b).

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2. A clearer unit according to claim 1, wherein each of said contact pieces (13b, 23b) is formed to a band shape having a width corresponding to the width of said clearer belts (11, 21).

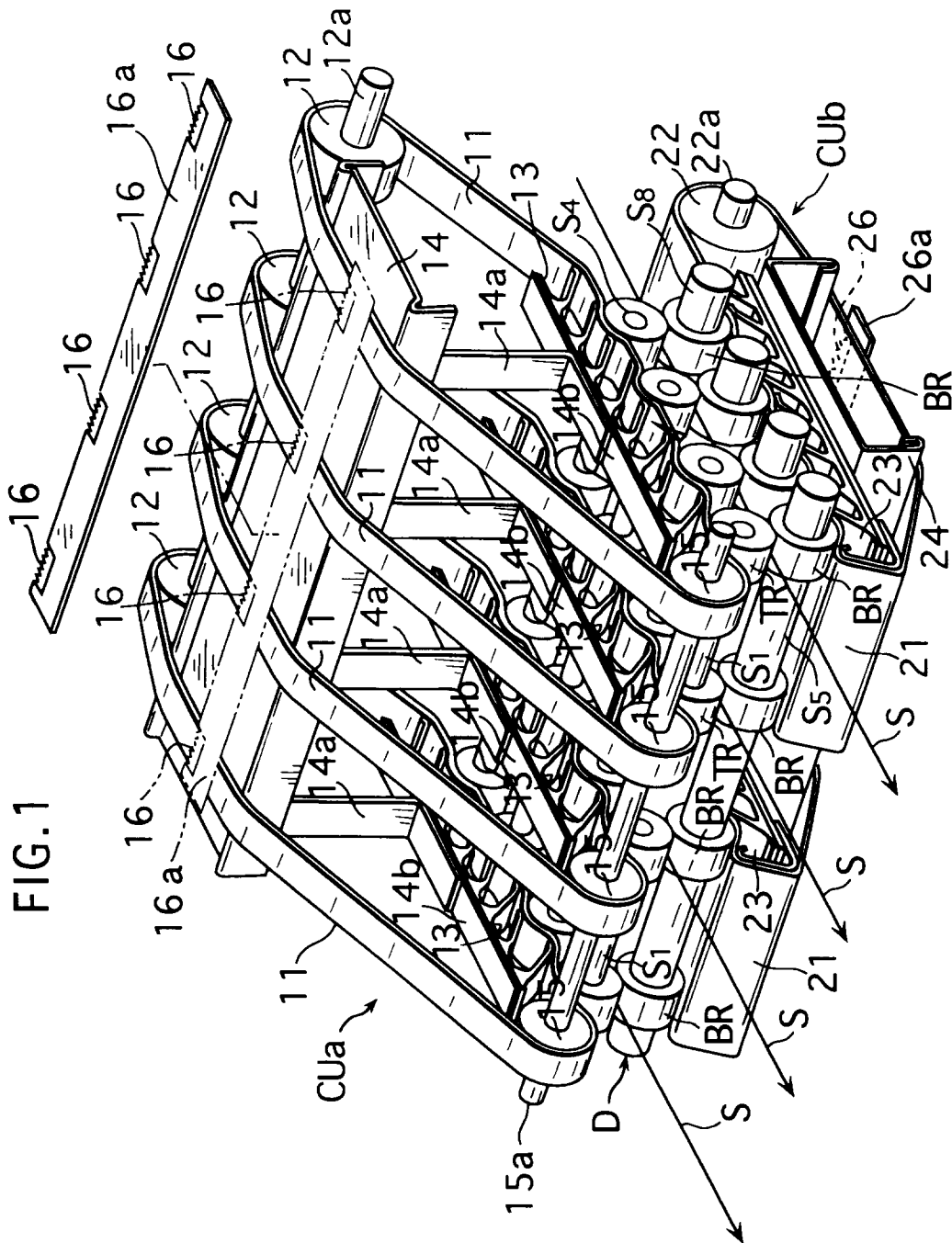
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3. A clearer unit according to claim 1, wherein each of said contact pieces (13b, 23b) comprises a shaft (30b) and a sphere (30c) formed at the extreme end of said shaft (30b).

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4. A clearer unit according to claim 2 or 3, wherein said contact pieces (13b, 23b) are disposed in the shape of comb teeth toward the traveling direction of said clearer belts (11, 21) as well as formed to be inclined on the traveling direction side of said clearer belts (11, 21).

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5. A clearer unit according to any of claim 1 to claim 4, wherein each of a multiplicity of said contact pieces (13b, 23b) comprises an elastic member.

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6. A clearer unit according to any of claim 1 to claim 5, wherein said contact pieces (13b, 23b) are integrally molded with said urging member (13, 23) or said contact pieces (13b, 23b) are combined with said urging member (13, 23) provided separately.

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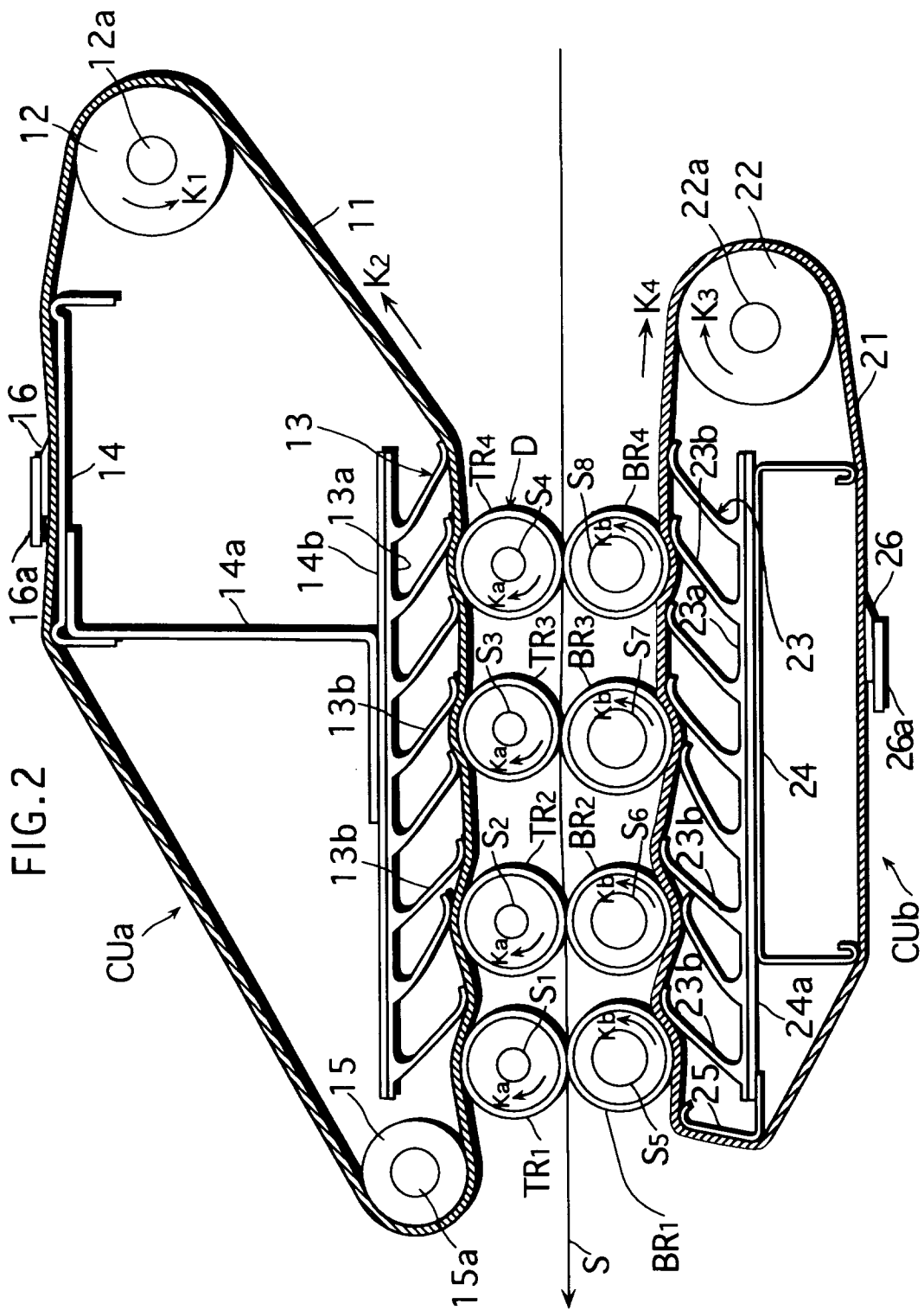


FIG.3

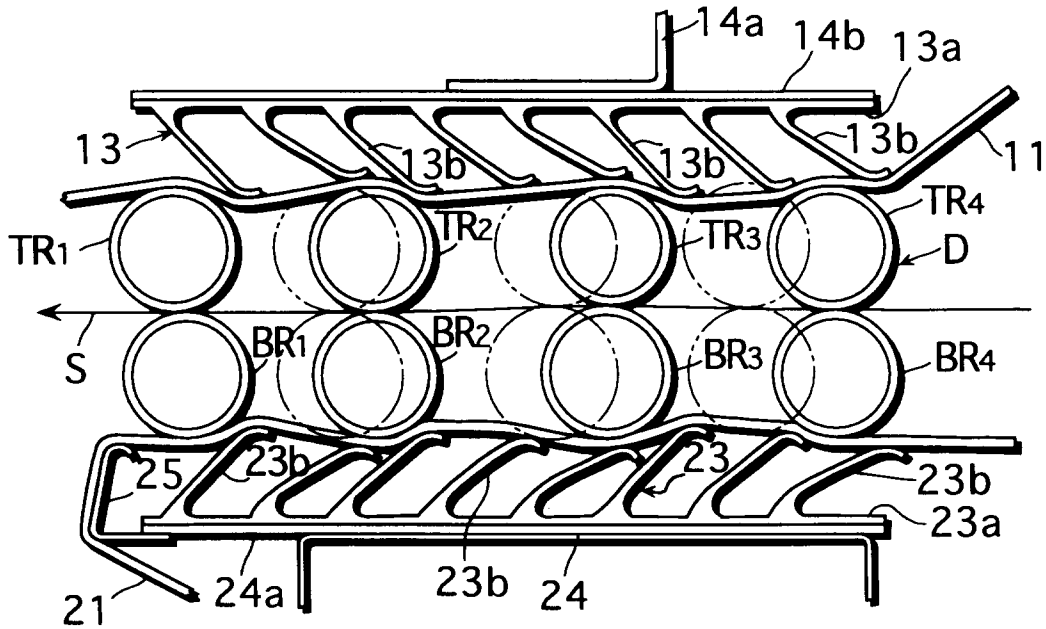


FIG.4

