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Stumpf

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[54] **ROLL FOR A DAMMING ROLLER TRAIN**

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[30] **Foreign Application Priority Data**

Aug. 16, 1971 Germany ..... P 21 40 921.2

[52] **U.S. Cl.** ..... **29/116 R,** 198/129, 226/190

[51] **Int. Cl.** **B21b 13/02**

[58] **Field of Search** ..... 29/110, 116 R, 121 R, 29/121 A, ; 198/129; 226/190

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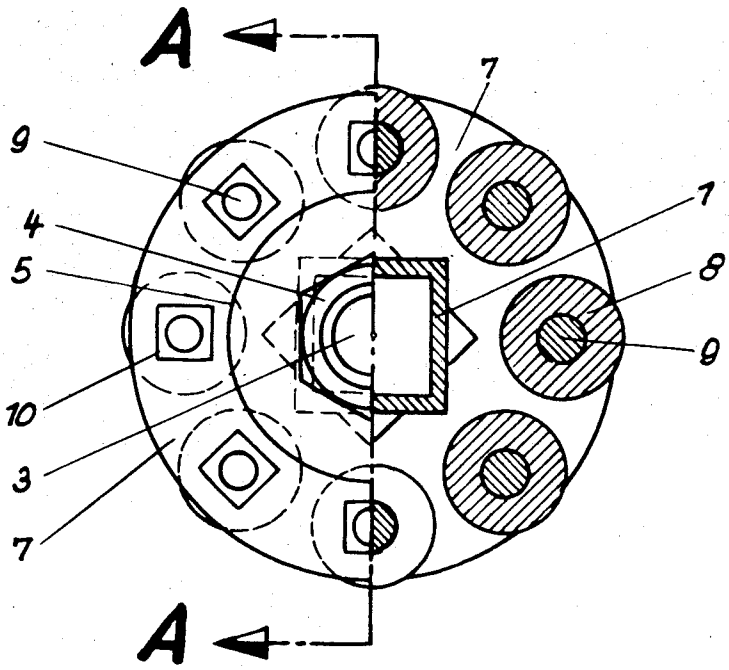
[57] **ABSTRACT**

A roll for use in a damming roller train includes a central shaft having at least two spaced parallel disc members connected therewith. A series of small rollers surround the central shaft, in parallel relation thereto, with such small rollers being mounted between the disc members. The frictional pressure on the small rollers is adjusted to normally prevent as such small rollers from rotating as revolve about the central shaft, during the conveying of material along the roller train. However, when the flow of material along the roller train is dammed, the frictional pressure on the small rollers is overcome and such small rollers rotate about their rotational axes.

10 Claims, 11 Drawing Figures



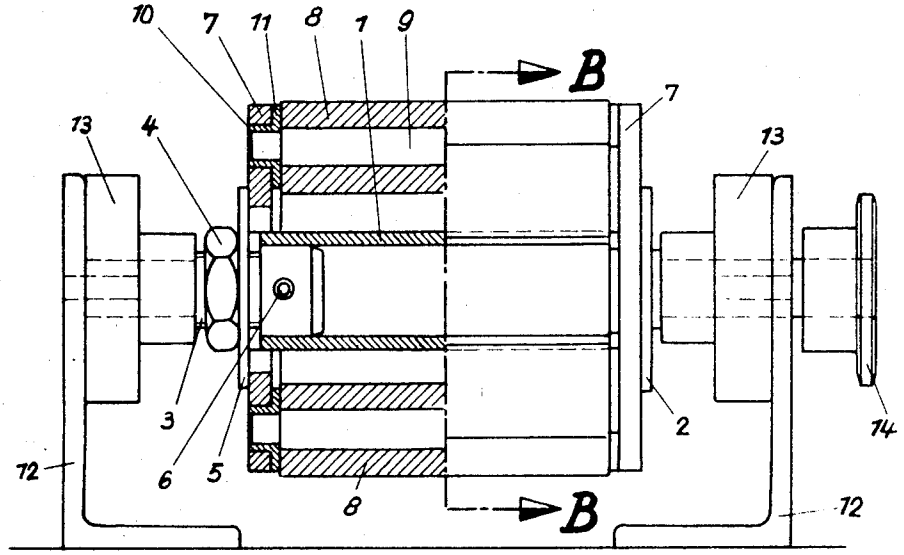


Fig. 1

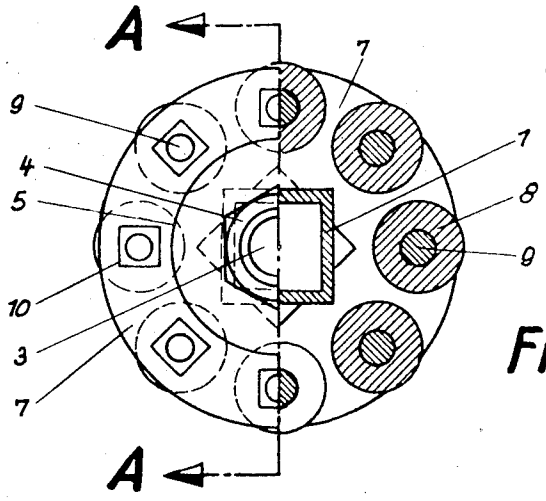


Fig. 2

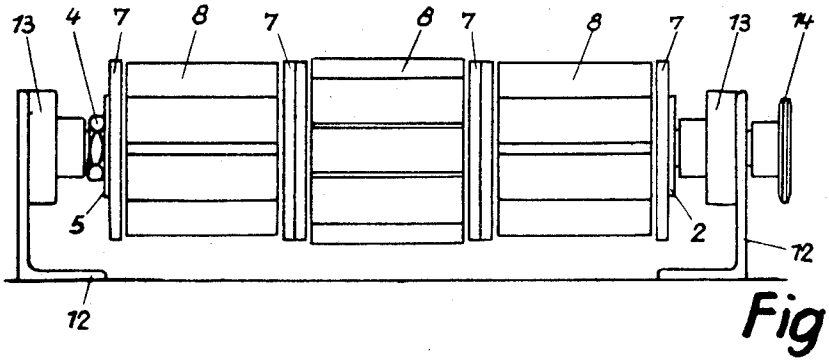


Fig. 3

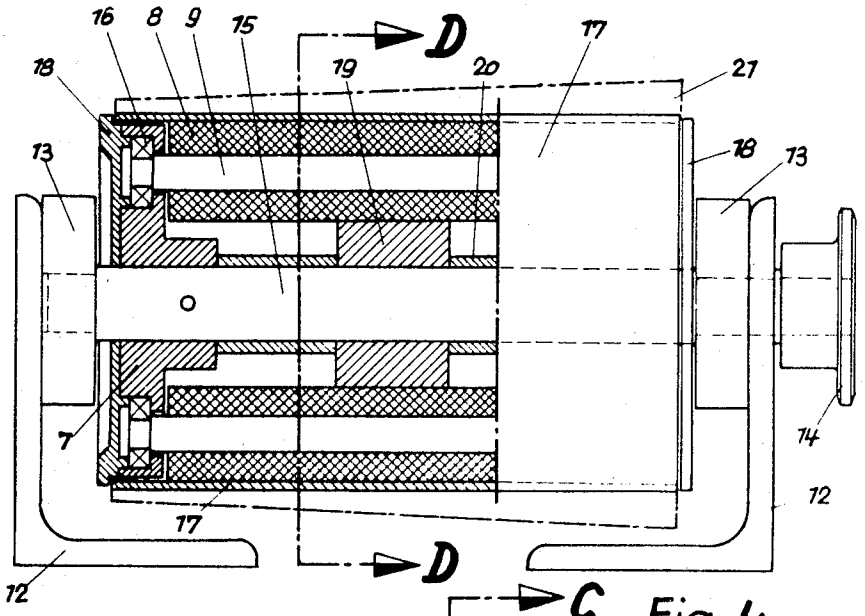


Fig. 4

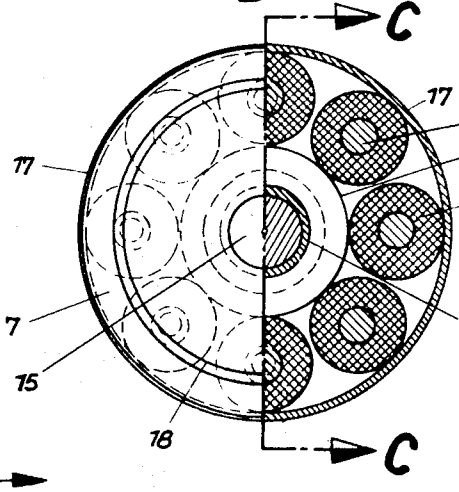


Fig. 5

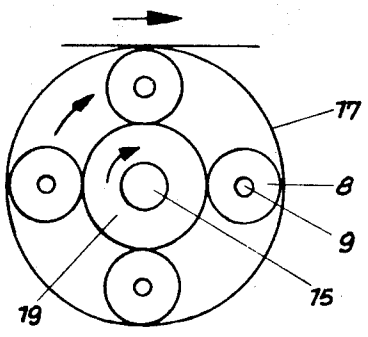


Fig. 6

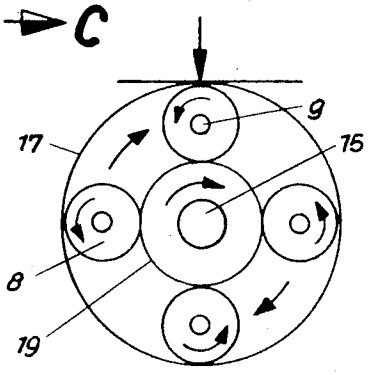


Fig. 7

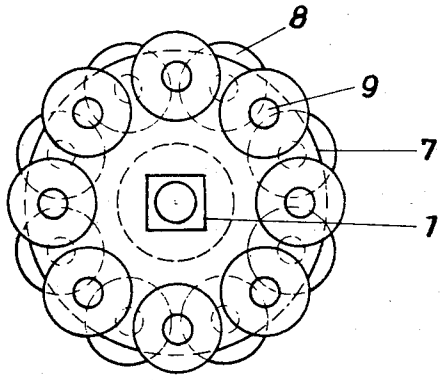


Fig. 8

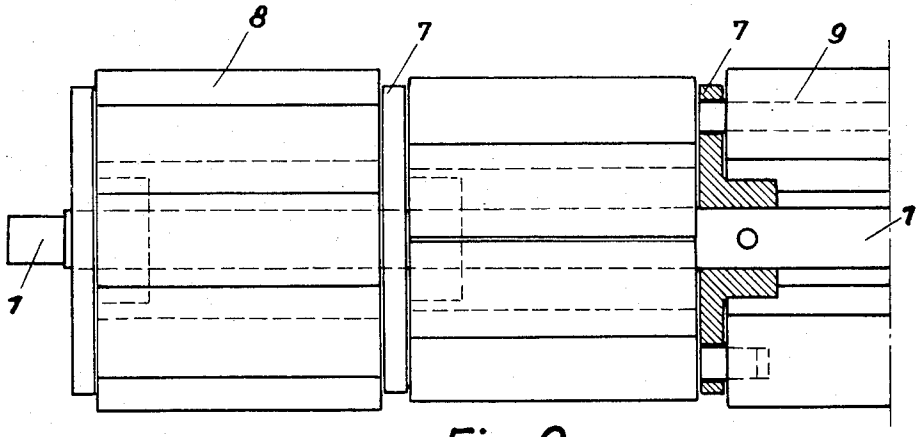


Fig. 9

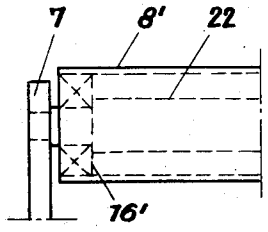


Fig. 10

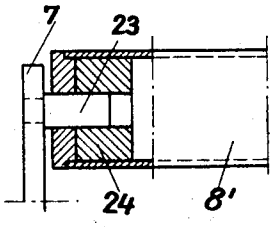


Fig. 11

ROLL FOR A DAMMING ROLLER TRAIN

This invention relates to a conveyor roll and more particularly it relates to a roll for use in a damming roller train. A damming roller train is a roller train of the type wherein material can be conveyed across the surface thereof, but wherein the flow of material can also be dammed temporarily, thus stopping the conveyance of material across the roller train. During this dammed period the material which is conveyed rests upon the surface of one or more rolls of the roller train in a substantially stationary position. Then, when the damming is interrupted, the material on the roller train is once again conveyed forwardly.

Due to the fact that the roller trains are customarily provided with some drive means for positively rotating the rolls in a forward direction to effect conveyance, some means or mechanism must be provided for assuring that the roller train or the individual rolls thereof will not be damaged during a damming operation wherein the heavy weight of the material being conveyed may rest upon one or more rolls in the roller train itself. In the past, this was compensated for by providing a damming roller train which included various motors, sprocket wheels, terminal switches, rod locks and various rod systems. Another alternative arrangement for a damming roller train was one where the rolls were driven by a profile belt operated by means of slip clutches. The clutches, in turn, were operated by cable lines by the moving material starting up at swiveling lugs and turning off of the rolls. Springs in the clutches switched the clutches on again when the moving material passed beyond the swiveling lugs. The problem with these known types of damming roller trains was that their design was expensive and costly because of the large number of necessary parts therein. Additionally, failure of anyone part could necessarily affect the operation of the entire damming roller train and the presence of such a large number of intricate and cooperating parts meant that frequent repairs could be expected in which event the roller train was out of operation.

It is an object of the present invention to overcome the difficulties and deficiencies associated with the prior art and to provide instead, a new and improved roll for a damming roller train.

Another object of the present invention is to provide a simplified roll for a damming roller train wherein the number of moving parts and cooperating elements are minimized so that the roll can be expected to have an extended period of maintenance free operation.

Other objects, advantages and salient features of the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the present invention.

The foregoing objects are attained by providing a damming roller train which includes a central shaft having at least two spaced parallel disc members connected therewith. A series of small rollers surround the central shaft, in parallel relation thereto, with such small rollers being mounted between the disc members. The frictional pressure on the small rollers is adjusted to normally prevent such small rollers from rotating as they revolve about the central shaft, during the conveying of material along the roller train. However, when the flow of material along the roller train is dammed, the frictional pressure on the small rollers is overcome and such small rollers rotate about their rotational axes.

Referring now to the drawings:

FIG. 1 is an elevational view of one embodiment of a roll in accordance with the principles of the present invention, shown partially in section as taken along the line A—A of FIG. 2;

FIG. 2 is a partial sectional view of the roll of FIG. 1, taken along the line B—B of FIG. 1;

FIG. 3 is an elevational view showing multiple units of the type shown in FIG. 1 assembled together to form a broad elongated roll;

FIG. 4 is an elevational view, partly in section, of another embodiment of the roll of the present invention, such sectional view being taken along the line C—C of FIG. 5;

FIG. 5 is a partial cross sectional view of the roll of FIG. 4, taken along the line D—D of FIG. 4;

FIG. 6 is a schematic illustration of the manner in which the roll of the FIG. 4 and FIG. 5 embodiment operates during a conveying operation of the roller train;

FIG. 7 is a schematic view, similar to FIG. 6, but showing the roll of the FIG. 4 and FIG. 5 embodiment as it operates when the material being conveyed along the roller train is dammed;

FIG. 8 is an end view of a slightly modified embodiment of the roll of the present invention;

FIG. 9 is an elevational view, partly in section, of a roll of the embodiment shown in FIG. 8;

FIG. 10 is a fragmentary elevational view showing the manner of mounting one of the small rollers; and

FIG. 11 is a fragmentary sectional view showing another means for mounting one of the small rollers.

Referring now to the drawings in further detail, the embodiment shown in FIG. 1 includes a square tubular central shaft 1, the central axis of which forms the central axis for the roll unit. A threaded shaft 3 is mounted in the left end of the square shaft 1 and serves as a mounting means for a nut 4. A tightening pin 6 is used to maintain the threaded shaft 3 within the square shaft 1.

A pair of spaced parallel disc members 7 are provided, each such disc member having a central aperture means therein for receiving the square shaft 1. As can best be seen from FIG. 2, the central aperture in each disc member 7 is formed in the shape of an eight point star.

At one end of the roll, a stop disc 2 is provided, while at the other end of the roll, a washer 5 is interposed between the nut 4 and the disc member 7.

A series of small rollers 8 are provided, each of which is mounted rotatably upon its own axle 9. The central axis of the axle 9 constitutes the axis of rotation for the small rollers 8, and each such axis of rotation is parallel to the central axis of the shaft 1, which forms the central axis for the entire roll. The small rollers are mounted between the disc member 7 by having the ends of the axles 9 mounted in friction bearings 10 which are carried in equally spaced relation about the disc member 7, as can be seen best from FIG. 2. The friction bearings 10 include flanges 11 which are interposed between the inner surfaces of the disc member 7 and the ends of the body portions 8 of the small rollers. By tightening the nut 4, the frictional pressure against the small rollers 8 can be increased, to prevent

such small rollers from turning easily about their axles 9.

Standards 12 form a part of the frame for the damming roller train and such standards 12 carry shaft bearings 13 for rotatably mounting the main shaft 1. A projection of the main shaft serves to mount a drive sprocket wheel 14 which is positively driven to effect rotation of the roll. It should be apparent that when the sprocket 14 is positively driven, the main shaft 1 and the disc member 7 connected therewith are rotated about the central axis or axis of rotation of the main shaft 1. As such rotation occurs, the small rollers 8 and their axles 9 are revolved about such central axis. By increasing the pressure of the nut 4 to provide a frictional pressure against the ends of the rollers 8 by means of the bearing flanges 11, the tendency for such small roller bodies 8 to rotate about their axles 9 is decreased.

In forming a damming roller train, a substantial number of roll elements such as the type shown in the FIG. 1 embodiment would be disposed in line with one another so that the upper surfaces thereof provide a means for conveying material. So long as the material is being conveyed due to rotation of the roll about its central shaft, the small rollers will be prevented by frictional pressure from easily turning about their own axes of rotation through the axles 9. However, when the roller train is dammed temporarily, the material which otherwise would be conveyed thereacross might temporarily come to rest on top of the roll element shown in FIGS. 1 and 2. In such instance, as the roll continue to rotate about its central axis, due to the driving force of the sprocket 14, the small rolls 8 can easily rotate about their axes as they pass beneath the resting weight of the conveyed material.

While a roll such as shown in FIGS. 1 and 2 is entirely satisfactory, it may be desirable to provide a wider roll, in which case multiple roll sections of the type shown in FIG. 1 may be used. In the embodiment of FIG. 3 there is provided a roll formed of three separate rolls analogous to those disclosed in FIGS. 1 and 2. It will be noted that in FIG. 3 there are three separate sets of disc members 7, each of which has a series of small rollers 8 mounted therebetween. In order to decrease the polygonal effect, the small rollers can be staggered or angularly offset from one roll to the next. Thus, as one set of disc members 7 and small rollers 8 is slipped onto the square center shaft 1, the edges of the square center shaft engage in four points of the eight point star central aperture. The next adjacent set of rolls is turned in such a way as to fit into the other four points of the eight point star hole. Thus, as shown in FIG. 3, the net result of such arrangement is that the small rollers 8 are staggered from one adjacent roll element to the next.

Referring now to the embodiment of the invention shown in FIGS. 4 and 5, it will be seen that the central shaft 15 is a round shaft and that the holes in the disc members 7 are round, such disc members being fixedly connected to the round shaft by means of a pin as shown in FIG. 4. The axles 9 for the small rollers 8 are mounted in ball bearings carried in spaced relationship about the disc member 7. A cylindrical jacket 17 completely surrounds all of the small rollers and engages against the outer surfaces thereof, as can be seen from FIG. 5 and cover members 18 are attached adjacent the discs 7 to prevent cylindrical jacket 17 from shifting axially with respect to the main shaft 15.

On the main shaft itself, a central ring 19 is rotatably mounted, with such ring bearing against the inner surfaces of the small rollers 8, again as can best be seen in FIG. 5. Spacer bushings 20 loosely surround the shaft 15 and extend between each end of the central ring 19 and the inner end of the disc members 7. The same standards 12, shaft bearings 13 and drive sprocket 14 are provided for driving the roll.

The frictional pressure in the embodiment of FIGS. 4 and 5 is provided by proper dimensioning of the cylindrical jacket 17 and the inner ring 19. Ordinarily, the fit of these parts is tight enough so that as the central shaft 15 rotates, the small rollers 8 will not be rotated about their axles 9. This is illustrated schematically in FIG. 6 which is intended to portray the normal conveying operation of the damming roller train. However, when the material being conveyed by the roller train is dammed so that a downward weight or force is applied, as shown in FIG. 7, such force applies a pressure to the cylindrical jacket which causes such jacket to stop its rotation. In such event, the small rollers 8 will start to rotate along the inside surface of the jacket 17 as the sprocket continues to drive the roll.

As shown in phantom lines in FIG. 4, a cone member 21 can be applied across the outside of the cylindrical jacket 17. This is particularly useful for forming curves in the roller train. In so using the cones, the diameter of the rolls in the roller train can increase from the inside radius of the curve toward the outside radius of the curve, thus facilitating conveying of the material about the curve.

In a simpler embodiment of the invention, as shown in FIGS. 8 and 9, the disc member 7 and the small rollers 8 can be formed of plastic material and this type of embodiment is not only simple to manufacture, but is easily used for conveying and damming of light weight materials. Each disc member 7 is provided with double the number of bores or holes than there will be small rollers. That is, in the FIG. 8 embodiment, each disc member 7 is provided with 16 holes even though any one disc member will be used to mount only eight small rollers. The axles 9 can be fabricated of a steel material and such axles project beyond the roller bodies 9 and fit into the holes in the plastic disc member 7. Alternatively, as shown in the lowermost right hand corner of FIG. 9, the axle need not be continuous, and instead, a small round metal pin may extend between the hole in the plastic disc member and a blind hole in the end of the roller body 8.

Still other means for mounting the small rollers to the disc members are shown in FIGS. 10 and 11. In FIG. 10, the small roller body 8′ is formed as a hollow steel tube through which the axle 22 passes. A ball bearing 16′ is mounted between the tube and the axle and the axle itself can then be non-rotatably connected to the disc member 7. In FIG. 11, the small roller can again be formed as a hollow steel tube 8′ having a friction bearing 24 fit into the end thereof and having a pin 23 extending from such friction bearing into the hole in the disc member 7. The friction bearing 24 can be formed of sintered metal.

After reading the foregoing detailed description, it should be apparent that the objects set forth at the outset hereof have been successfully achieved by the present invention.

What is claimed is:

1. A roll for a damming roller train comprising:

a main shaft having an axis of elongation which forms the central axis of the roll;

shaft bearings supporting said main shaft to permit rotation thereof about said central axis;

driving means connected with said main shaft for rotating said roll about said central axis;

disc means connected to said main shaft for concurrent rotation therewith, said disc means including at least a pair of spaced parallel disc members;

a plurality of small rollers disposed with their rotational axes in spaced parallel relationship to said central axis;

mounting means supporting the ends of said small rollers on said spaced parallel disc members; and

means for adjusting the frictional pressure on said small rollers to normally prevent said small rollers from rotating about their rotational axes as they revolve about said central axis.

2. A roll as defined in claim **1** wherein said mounting means comprises bearings connected to said spaced parallel disc members.

3. A roll as defined in claim **2** wherein said bearings include flanges interposed between each disc member and small roller and wherein said means for adjusting the frictional pressure includes an adjustable nut which can be tightened to press said disc member against said flanges, thus increasing the frictional pressure of the flanges against the small rollers.

4. A roll as defined in claim **1** wherein two pairs of spaced parallel disc members are provided and wherein the small rollers between one pair of disc members are angularly offset from the small rollers between the other pair of disc members.

5. A roll as defined in claim **1** wherein said means for adjusting the frictional pressure on said small rollers comprises:

a ring member rotatably mounted on said main shaft and engaged against the inside surface of said small rollers, and

a cylindrical jacket surrounding said small rollers and engaged against the outside surface of said small rollers.

6. A roll as defined in claim **5** further including spacer bushings rotatably mounted on said main shaft between each end of said ring member and the adjacent disc member, to prevent said ring member from shifting axially along said main shaft.

7. A roll as defined in claim **5** further including cover members connected with each disc member and engageable with the ends of said cylindrical jacket to prevent said jacket from shifting axially with respect to said main shaft.

8. A roll as defined in claim **1** wherein said main shaft is square in cross-section and wherein said disc members each have an aperture therein for passage of said main shaft, said apertures having the shape of an eight point star.

9. A roll as defined in claim **1** wherein said small rollers include a body portion and a central axle portion having ends projecting beyond said body portion.

10. A roll as defined in claim **9** wherein said body portions and said disc members are fabricated of plastic.

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