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(54) A spool for an inked ribbon.

(57) An inked ribbon spool 1 for a printer comprises a drum 2 having a bore 4 for reception of an idler spindle. Flanges 6 are provided on each side of the drum 2 and an annular internal involute bear 10 driven by a pinion 17. The gear drive mechanism allows a positive rotation of the spool 1 to be accurately controlled with low torque for controlled acceleration and deceleration. A ribbon is secured to the spool by engaging a fixing barb 15 in a transverse slot 11 in the drum and/or by engaging a ball shot in a square hole 24 in the drum 2.

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A Spool for an Inked Ribbon

The present invention relates to inked ribbon spools, and in particular to inked ribbon spools for high speed impact printers.

More particularly the invention relates to a spool for an inked ribbon of the type comprising a cylindrical drum around which an inked ribbon is wound and a pair of end flanges on the drum, the spool having engagement means for engagement by a drive means to drive the spool to wind onto, or unwind ribbon from, the drum.

Inked ribbons are used in machines fitted with types operable at high speeds to produce graphic symbols, for example, teleprinters, word processing machines and high speed impact printers generally. As the speed of operation of such printers has increased, problems have arisen in connection with the handling of the inked ribbon. Because the ribbon is advanced intermittedly, step-by-step, it follows that at high speed, positive drive is required with rapid acceleration, deceleration and the ability to change direction. There are many types of drive used with inked ribbon drive spools, none of which are particularly satisfactory. The drive spool is often driven directly by the shaft on which it is mounted. Alternatively, it is driven indirectly by a belt or band between a drive spindle and a hub on the spool. As the driving torque is relatively high, rapid acceleration is difficult to achieve, and, in the case of belt-driven spools, the drive is usually not sufficiently positive.

The present invention is directed towards providing an inked ribbon spool to overcome at least some of these problems.

The invention is characterised in that the engagement means comprises an annular gear provided on the external surface of at least one of the flanges.

Because the spool is driven by a gear mechanism, the drive is positive and the driving torque is relatively low so that relatively quick acceleration and deceleration may be achieved and the operation of the spool is generally more readily controllable.

In one embodiment of the invention an annular gear is provided on the external surface of each flange.

This is a particularly important feature as it allows a spool to be installed on a spindle in either direction so that there is not scope for user error on installation. Usually an inked ribbon is threaded over a print head from one spool to another identical spool. This arrangement also allows drive to be provided on both sides of a spool, if desired.

In a particularly preferred embodiment of the invention the or each gear is an involute internal gear for engagement by a drive means comprising a pinion.

Such a gear construction is more readily formed and less easily damaged than an external gear.

Preferably the gear ratio is approximately 5.77 and preferably the or each annular gear comprises approximately 104 teeth at a root diameter of approximately 84.5 mm.

We have found that these particular gear ratios and dimensions gives particularly good results, in use.

Ideally the spool is integrally moulded from a plastics material.

In a preferred embodiment of the invention the drum includes a ribbon receiving recess for receiving portion of a ribbon and fixing means for securing the ribbon in the recess.

Such an arrangement allows a ribbon to be readily secured to the drum.

In one arrangement the recess comprises a substantially box-shaped recess in the drum and the fixing means comprises a ball shot for securing the ribbon in the recess.

Such a recess is readily formed and a standard ball shot may be readily fitted in the recess.

Alternatively or additionally the recess comprises a transverse slot in the drum, and a pair of inwardly directed walls, forming, in cross section a V-shaped truncated trough, the slot having a lip at the open mouth thereof for reception of a fixing piece having a deformable barb for engagement behind the lip to retain the ribbon in the recess.

Again, such an arrangement allows for ease of fixing of a ribbon to a drum and allows a ribbon to be wound in either direction as it is sufficiently well secured to the drum.

Preferably at least one of the flanges is provided with locating means, such as a hole, for indicating the location of the recess.

The advantage of this feature is in indicating the position of the recess for ease of automatic insertion of a fixing means.

The invention will be more clearly understood from the following description of some embodiments thereof given by way of example only with reference to the accompanying drawings in which:

Fig. 1 is a perspective view from one side of a drive spool according to the invention;

Fig. 2 is a perspective view from the other side of the drive spool of Fig. 1;

Fig. 3 is a front view of the spool of Fig. 1;

Fig. 4 is a front view of the spool in Fig. 1, in use

Fig. 5 is a cross-sectional view along the lines IV-IV; of Fig. 1;

Fig. 6 is an end view of a fixing piece according to the invention;

Fig. 7 is a partial cross-sectional view in the direction of the arrows VII-VII of Fig. 3,

Fig. 8 is a partial cross-sectional view in the direction of the arrows VIII-VIII of Fig. 3; and

Fig. 9 is a view in the direction of the arrow IX of Fig. 8.

Referring to the drawings, there is illustrated an inked ribbon spool indicated generally by the reference numeral 1. The spool 1 comprises a drum 2 having a central tube with a bore 4. The drum 2 is supported on the tube by ribs 3 and webs 5. The bore 4 forms a bearing for mounting on a pivot idler shaft, not shown. Flanges 6 are provided at each side of the drum 2.

The spool 1 has a pair of annular driven gears 10, one provided on the external surface of each of the flanges 6. Each of gears comprises 104 teeth at a diametral pitch of 32, at a pitch diameter of 82.55 mm and a root diameter of 84.534 mm.

The spool 1 is driven by a drive pinion 17, illustrated in Fig. 4. The pinion has eighteen teeth, at a diametral pitch of 32 and a pinion pitch diameter of 14.29 mm. Thus, the gear ratio is 5.77:1.

It will be appreciated that because each annular gear 10 has a larger number of teeth than the pinion 17, the rotation of the spool 1 may be accurately controlled. Further, the driving torque is relatively low, thereby allowing greater drive acceleration and deceleration. In addition to this, because the gears 10 are internal, closer tooth engagement is possible than if it were external, thereby ensuring positive drive and also lengthening gear life.

As an annular gear 10 is provided on each flange 6 the spools may be installed in either orientation. Usually two spools are used, the ribbon being led over a print head from one spool to another and the ribbon is first drawn from one spool to the other until amost all the ribbon is unwound from the first spool. The direction is then reversed, the ribbon being drawn from the second spool to the first. This procedure is repeated until the print quality deteriorates excessively. The spools are then removed and new spools with fresh ribbon installed.

Preferably, the spool is integrally moulded from a plastics material.

Two alternative ways of attaching a ribbon to the spool are illustrated in the drawings. One ribbon-receiving recess 11 is formed by a transverse slot 12 in the drum 2 and a pair of inwardly directed walls 13 forming, in cross section, a V-shaped truncated trough. A lip 14 is provided at the open mouth of the slot 12 for retaining an outwardly directed deformable barb 16 of a fixing piece 15. This arrangement is illustrated in particular in Figs. 5 to 7. A second ribbon-receiving recess 21 in the surface of the drum 2 is of generally rectangular box shape having a base 22 and side walls 23 extending from a square hole 24 in the drum (see Figs. 8 and 9). The ribbon is wedged in position by a force fit ball shot or the like which engages in the recess 21. A guide hole 25 in the web 5 is provided diagonally opposite from the recess slot 12 and adjacent the ribbon-receiving recess 21. Thus, the position for automatic fixing of the ribbon to the spool 1 may be located by a light emitting and detection device which orientates the fixing mechanism in relation to the hole 25. Similarly, one of the flanges may be provided with a guide hole 26 (see Figs. 3 and 8) in alignment with the square hole 24 or the recess slot 12 in the drum 2. Either or both of the fixing recesses may be employed for fixing a ribbon to a spool.

It will be appreciated that either method of securing the ribbon to the spool 1 facilitates the even movement of the ribbon between a pair of spools as there is no protrusion from the surface of the drum.

Claims

1. A spool for an inked ribbon comprising
a cylindrical drum around which an inked ribbon is wound, and
a pair of end flanges on the drum, the spool having engagement means for engagement by a drive means to drive the spool to wind onto, or unwind ribbon from, the drum,
characterised in that
the engagement means comprises an annular gear provided on the external surface of at least one of the flanges.

2. A spool as claimed in claim 1 characterised in that an annular gear is provided on the external surface of each flange.

3. A spool as claimed in claim 1 or 2 characterised in that the or each annular gear is an involute internal gear for engagement by a drive means comprising a pinion.

4. A spool as claimed in claim 3 characterised in that the annular gear to pinion ratio is approximately 5.77:1.

5. A spool as claimed in claim 3 or 4 characterised in that the or each annular gear comprises approximately 104 teeth at a root diameter of approximately 84.5 mm.

6. A spool as claimed in any preceding claim characterised in that the spool is integrally moulded from a plastics material.

7. A spool as claimed in any preceding claim characterised in that the drum includes a ribbon receiving recess for receiving portion of a ribbon and fixing means for securing the ribbon in the recess.

8. A spool as claimed in claim 7 characterized in that the recess comprises a substantially box-shaped recess in the drum and the fixing means comprises a ball shot for securing the ribbon in the recess.

9. A spool as claimed in claim 7 characterised in that the recess comprises a transverse slot in the drum, and a pair of inwardly directed walls, forming, in cross section a V-shaped truncated trough, the slot having a lip at the open mouth thereof for reception of a fixing piece having an deformable barb for engagement behind the lip to retain the ribbon in the recess.

10. A spool as claimed in any of claims 7 to 9 characterised in that at least one of the flanges is provided with locating means, such as a hole, for indicating the location of the recess.

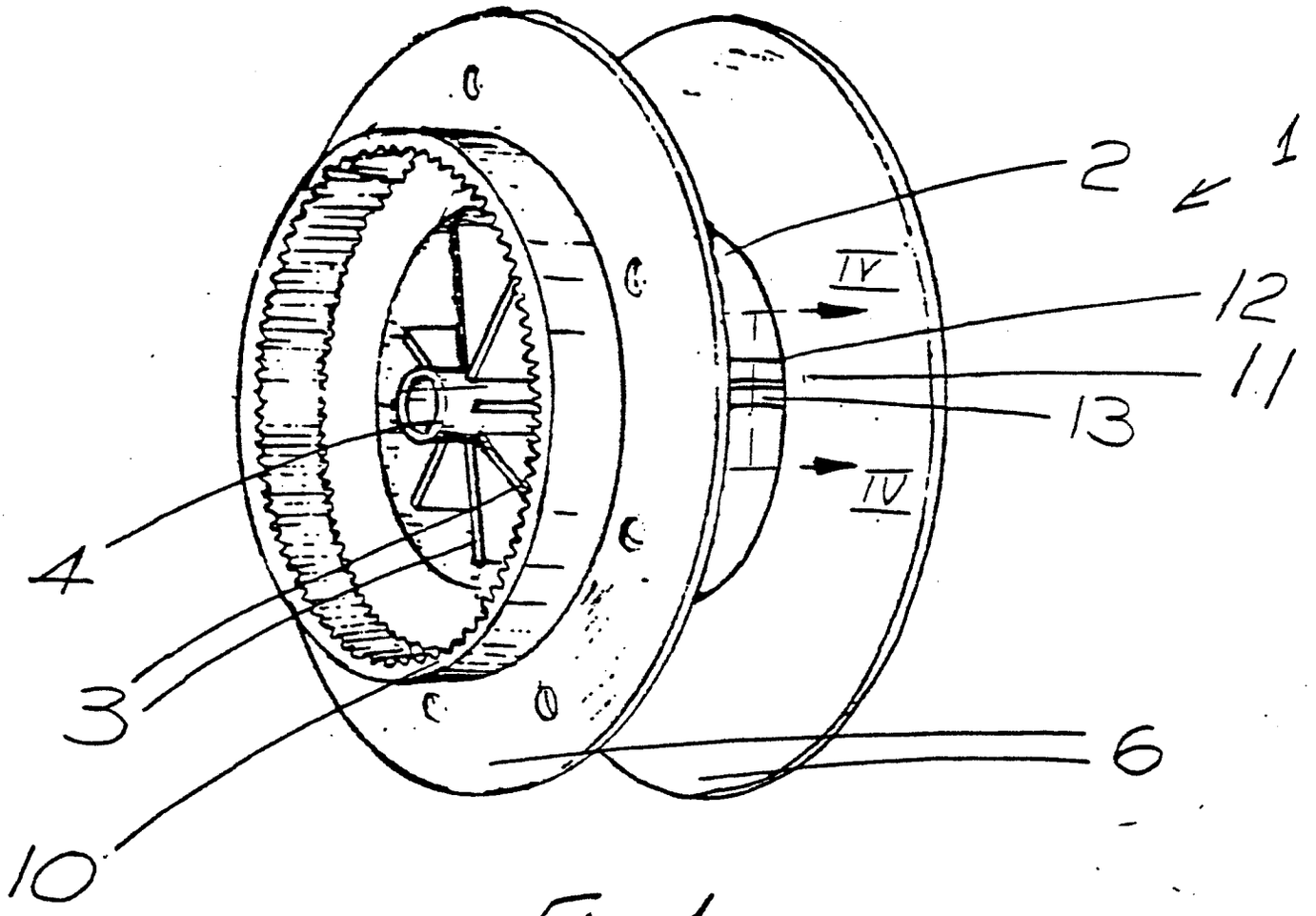

Fig. 1

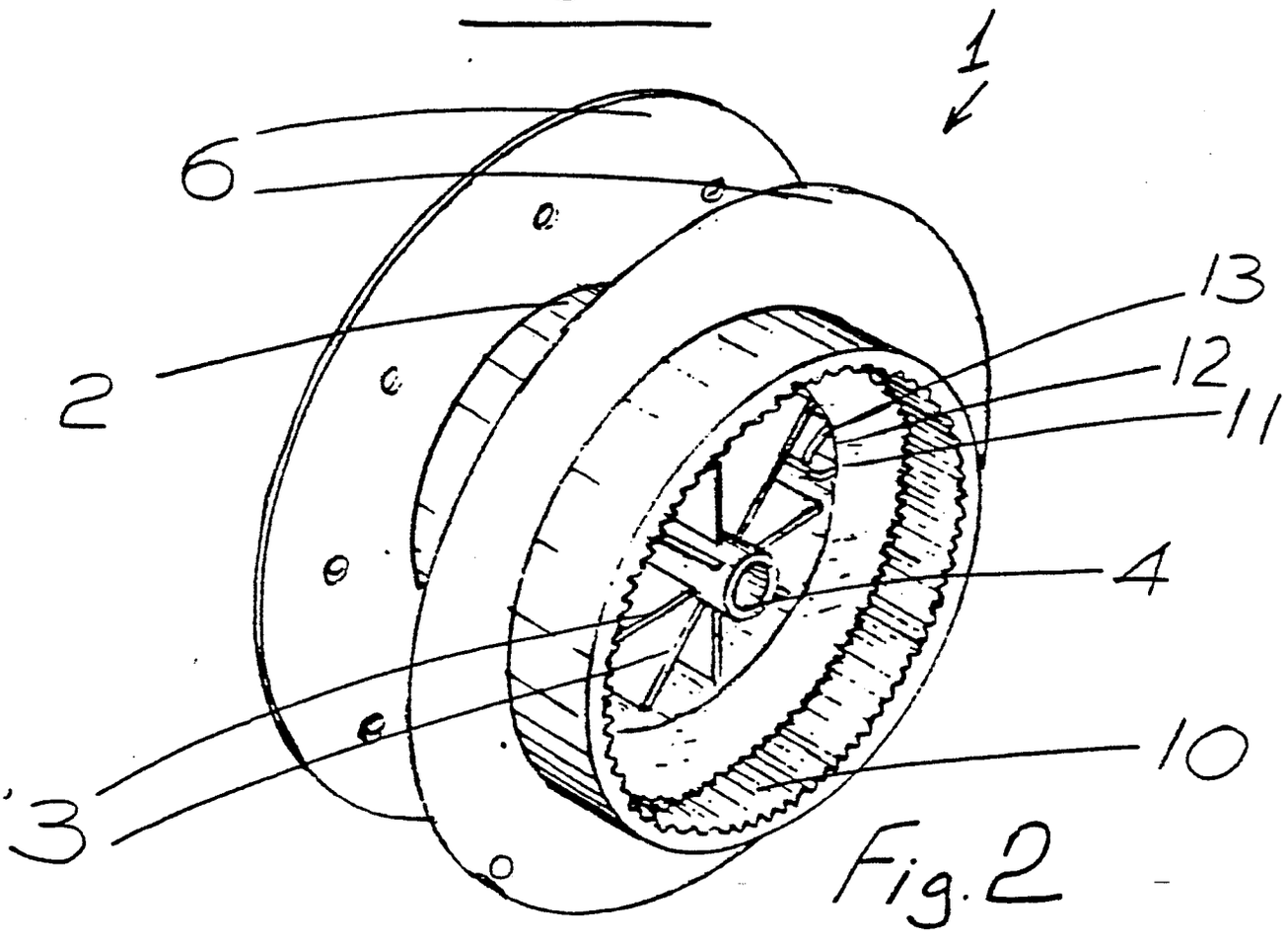

Fig. 2

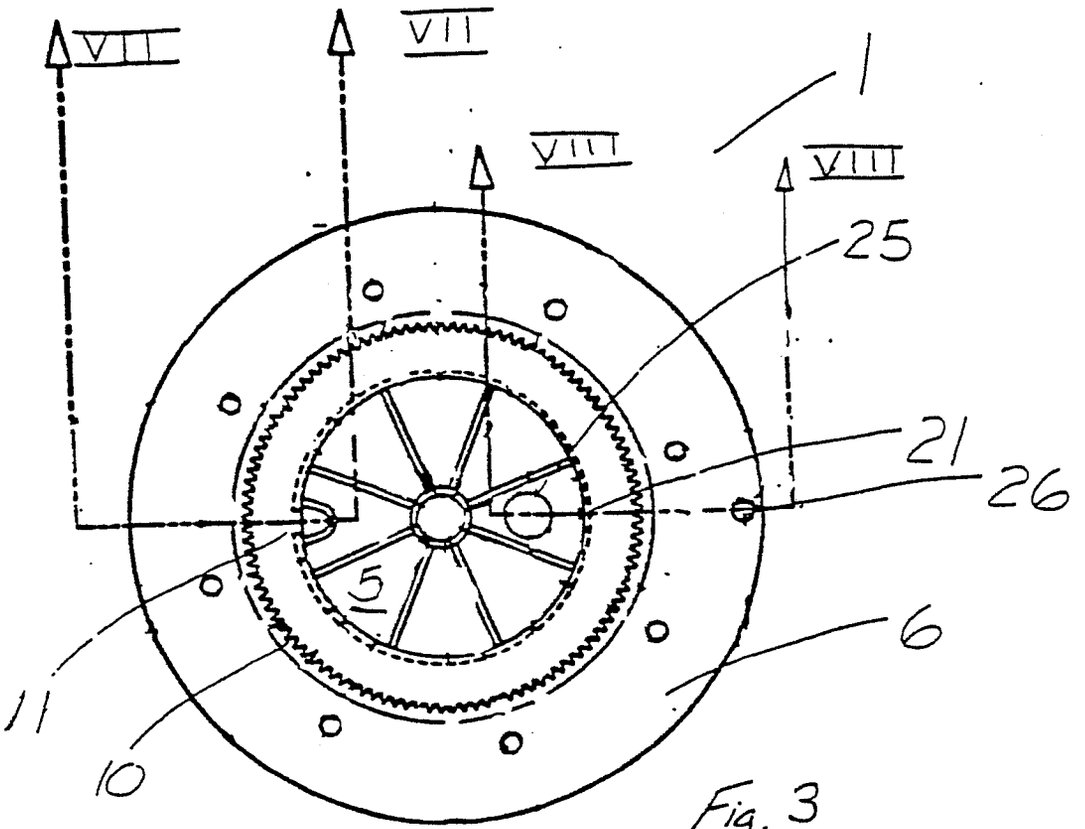

Fig. 3

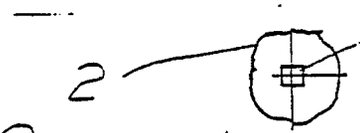

Fig. 9

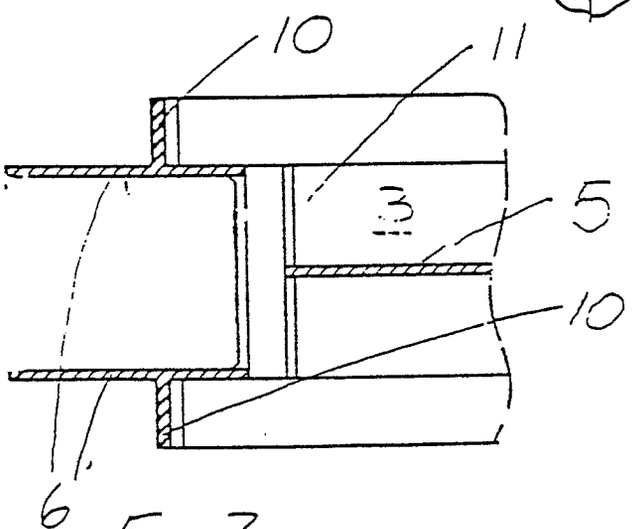

Fig. 7

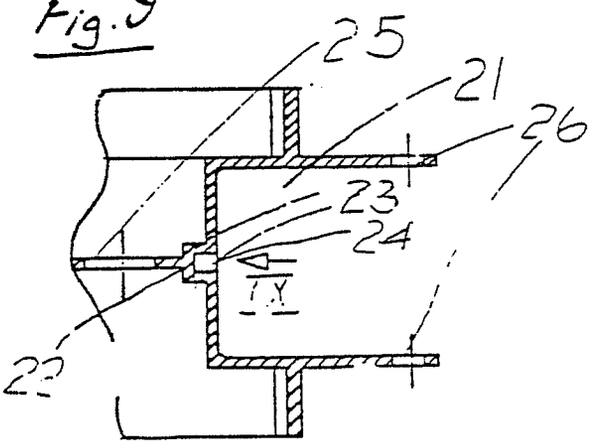

Fig. 8

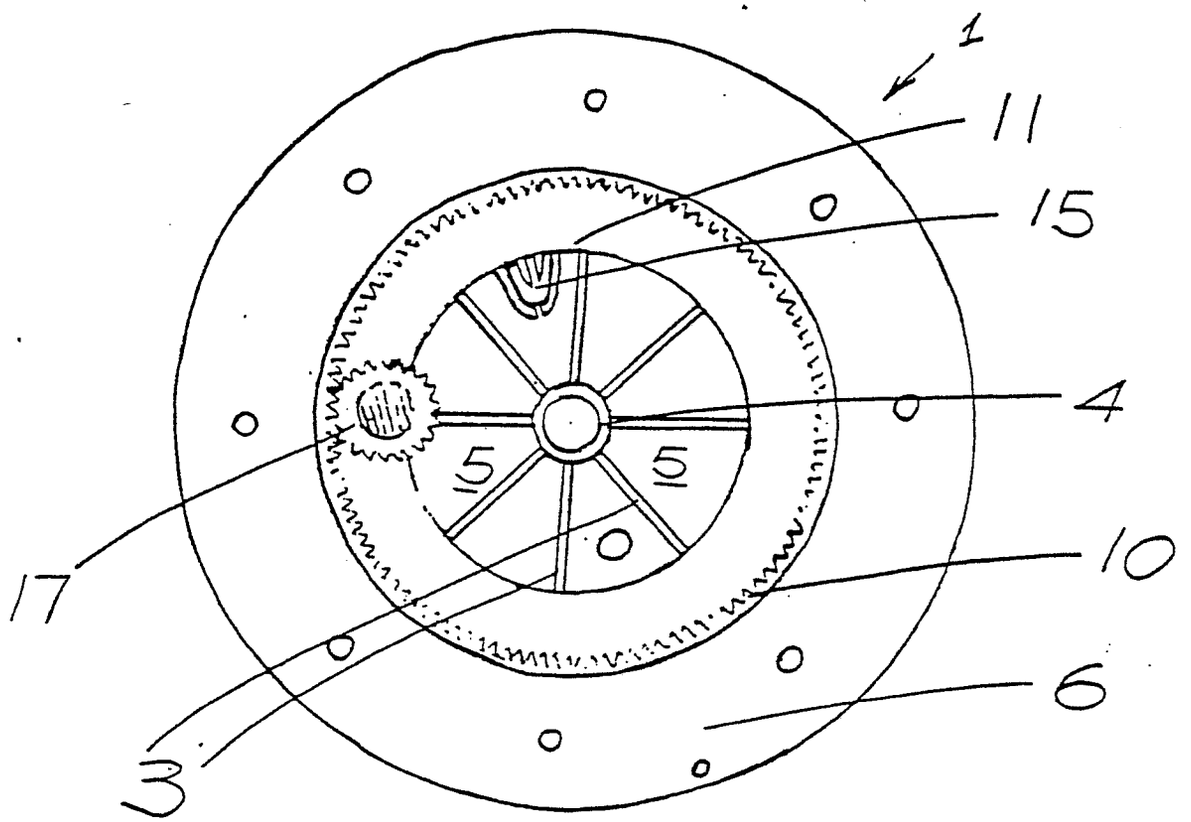

Fig. 4

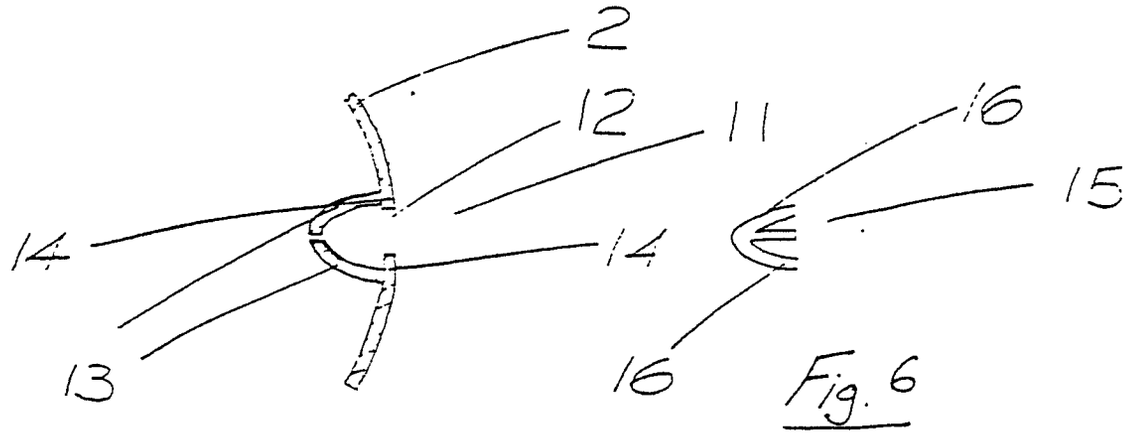

Fig. 6

Fig. 5