

Drive roller for a yarn feed device

This invention relates to a drive roller of the kind defined in the pre-characterizing part of claim 1, for a yarn feed device, especially on knitting machines.

5 A drive roller of this kind is used especially on circular knitting machines and in conjunction with so-called belt feeders. It serves to drive an endless drive belt, which bears over a predetermined wrap angle on the periphery of the drive roller and on a plurality of yarn feed rollers and serves for slip-free, positive feeding of yarns, which are guided for example between the drive belt and associated feed rollers (DE-PS 1 143 294).

10 Alternatively, it would be possible to drive separate additional rollers with the drive belt fixed on the feed rolls, or other yarn feed devices than the described belt feeders. An alteration in the yarn feed speed can then be effected by a change in the diameter of the drive roller, which is however as a rule possible only in the stationary state of the circular knitting machine (DE-PS 2 411 876, DE-PS 1 286 680, DE-PS 2 846 279).

15 Furthermore, a drive roller of the kind initially defined has already been disclosed in which its adjusting device makes relative rotation of the two discs possible even during continuous rotation of the drive roller, i.e. with the circular knitting machine running. However, such drive roller have some deficiencies. In one known drive roller of this kind (DE-OS 2 030 333), the adjusting device includes a stepping motor for example coupled to
20 the drive roller and rotating therewith, which can turn one of the two discs relative to the other disc and which is connected for this purpose to a programmed controller via slip rings. Such an arrangement is of an expensive construction and not always desirable, since it prevents or makes difficult manual adjustment of the yarn speeds when setting up a knitting machine or the like and is prone to faults and expensive on account of the required
25 slip rings. In another known drive roller of this kind (DE 3 931 997 A1) the adjusting device includes in contrast a coupling part fixed on the second disc and an axially movable transmission device which can rotate with the first disc and which is coupled to the coupling part by at least one guide groove running at an angle to the axis and a guide pin projecting into the groove. In order to achieve a large enough range of adjustment, the
30 guide pins must be guided in comparatively steep guide grooves and the sliding parts of the drive must be guided in comparatively steeply formed spiral grooves of one of the two discs, which involves the danger of the two parts being too stiff in movement.

The invention is therefore based on the object of so designing the drive roller of the

kind initially defined that no motor rotating therewith is needed while the actual diameter alteration can nevertheless be effected either automatically or manually and in which a large range of adjustment can be produced with very free running of the various parts.

The characterizing features of claim 1 serve to meet this object.

5 A particular advantage of the invention is seen that the summing or differential gear provided according to the invention makes possible an arbitrarily large path of adjustment and thus small angles for the spiral grooves, while the guide grooves for the adjustment of the two discs can be completely dispensed with, so that very free running of the adjusting device is achieved. Moreover the adjusting element does not have to rotate, so that it can
10 be adjusted in a simple manner manually or by means of a programmed controller. Finally, the drive roller according to the invention can be easily fitted to yarn feed devices already in existence, as a replacement for other drive rollers.

Further advantageous features of the invention appear from the dependent claims.

The invention will now be explained in more detail on the basis of two embodiments
15 and in connection with a circular knitting machine and in conjunction with the accompanying drawings, in which:

Fig. 1 is a partially broken away front view of the parts of a circular knitting machine essential to the invention, with a yarn feed device;

Fig. 2 is a schematic and enlarged plan view of the yarn feed device according to
20 Fig. 1 and of a drive roller associated therewith, with the other parts omitted;

Fig. 3 is an axial section through a drive roller according to the invention in a greatly enlarged scale compared with Figs. 1 and 2; and

Fig. 4 shows a second embodiment of the drive roller according to the invention in a view corresponding to Fig. 3.

25 The circular knitting machine according to Fig. 1 comprises a frame 1 with a base plate 2 and a needle cylinder 3 rotatably mounted thereon. A creel 4 for yarn spools 5 is mounted alongside the frame 1 and yarns 6 are drawn therefrom and fed in the arrowed direction to the knitting needles mounted in the needle cylinder 3.

A yarn feed device is supported on the frame 1 by means of supports 7 and/or a
30 support ring 8 carried thereby. This device includes a tubular support section 9 fixed on the base plate 2, in which a shaft 10 is rotatably mounted, projecting out of the tubular support section 9 at both ends. A gearwheel 11 is fixed on the lower end of the shaft 10 in Fig. 1

and is drivably connected through a gearwheel 12 to a gearwheel 14, which is fitted on a drive shaft 15, which is mounted in the circular knitting machine in a manner not shown in detail and driven with a predetermined transmission ratio synchronously with the needle cylinder 3. The yarn feed device further includes a drive roller 16 fixed on the other end of the shaft 10 (Fig. 2), with an endless drive belt 17 bearing on its periphery over a predetermined wrap angle and further bearing at least partially on the periphery of a plurality of driven feed rolls 18, which are mounted rotatably on the supports 7 or in the support ring 8. Yarn eyes not shown in detail are associated with these feed rolls 18 and serve for example in known manner so to guide the yarns 6 that they each wrap round the feed rolls 18 several times or come to lie between the periphery of an associated feed roll 18 and the drive belt 17 and are therefore fed positively or in forced manner in the arrowed direction.

Yarn feed devices of this kind and their function are generally known (DE-PS 1 143 294, DE 3 931 997 A1 or EP 0 285 828 A1) and thus do not need to be described in more detail.

As Fig. 2 further shows the drive belt 17 running over the drive roller 16 can be held under tension by means of a tensioning device preferably operating automatically, e.g. a movably mounted tensioning roller 19 which is subject to the action of a force, especially the action of a tensioning spring 20 engaging thereon or a weight acting thereon, so that the drive belt 17 is automatically compensated when there is an alteration in diameter of the drive roller 16.

In order to alter the effective diameter of the section of the drive roller 16 wrapped round by the drive belt 17 the roller comprises according to Fig. 3 a first, preferably plane parallel disc 21, which is connected rotationally fast with the shaft 10, e.g. by means of a key or the like. In Fig. 3 a second disc 22 coaxial with the disc 21, preferably likewise plane parallel, is arranged spaced below the disc 21, being rotatable relative to the first disc 21. The first disc 21 has grooves 23 running radially relative to the shaft 10 on its lower surface facing the second disc 22, whereas the second disc 22 is provided on its upper surface facing the first disc 21 with at least one spiral groove 24. Slide pieces 25 are arranged between the two discs 21 and 22 and form the periphery or the peripheral surface of the drive roller 16 and serve to support the drive belt 17. The effective diameter of the periphery of the drive roller 16 can be altered in that the slide pieces 25 mounted in the

grooves 23, 24 by pins 26 and 27, projections or the like are displaced radially outwards or inwards by rotation of the two discs 21 and 22 relative to one another.

Drive rollers 16 of this kind, which are frequently also denoted regulating discs, and their function are generally known (DE PS 1 286 680 and DE PS 2 846 279) and do not
5 therefore need to be explained in more detail. In order to avoid repetition the last two cited references and DE-PS 1 143 294, DE 3 931 997 A1 and EP 0 285 828 A1 are made subject matter of the present disclosure.

A first embodiment of the adjusting device 31 according to the invention for the drive roller 16 is shown in Fig. 3. It includes a stationary, cup-shaped housing 32 which
10 preferably has a cylindrical cross-section, is open at one end and passes over into a sleeve-like extension at the other end, which forms the tubular support section 9 seen in Fig. 1, in which the shaft 10 is rotatably mounted. The second disc 22 is rotatably mounted like a cover on the front edge of the housing 32 surrounding the open end and is provided to this end with a cylindrical recess 33 for example receiving the edge, while the first disc 21 is
15 arranged on the side of the disc 22 facing away from the housing, coaxial therewith.

The two discs 21 and 22 each have a central middle opening, through which passes one end of the shaft 10. This end of the shaft 10 is on the one hand mounted freely rotatably in the second disc 22. On the other hand the first disc 21 is mounted axially immovably and rotationally fast on the end of the shaft 10, in that for example a hub 34
20 fitted thereon is fixed on the shaft by means of a grub screw 35 or the like.

The adjusting device 31 is formed according to Fig. 3 as a summing or differential gear fitted in the housing 32 and constructed from spur gearwheels. A first gearwheel 36 operative as a drive part is arranged for this on the shaft 10 and in the vicinity of the support section 9 and is connected rotationally fast with the shaft 10 by means of a
25 schematically illustrated key 37. Furthermore a second gearwheel 38 operating as a driven element is mounted to rotate loose on the shaft 10 in the vicinity of the open end of the housing 32. This gearwheel 38 is provided with a collar 39 facing the second disc 22 and fitting over a collar 40 arranged on the second disc 22 and projecting into the housing 32, and is fixed rotationally fast and axially immovably on the collar 40 by means of a grub
30 screw 41.

The first gearwheel 36 engages at its periphery with a third gearwheel 42, which is mounted rotatably on a bearing pin 43 disposed parallel to the axis 10. The bearing pin 43

is for its part fixed eccentrically on a component 44 which is so mounted rotatably on the shaft 10 at a position between the support section 9 and the first gearwheel 36 that the third gearwheel 42 carries out an orbiting movement round the first gearwheel 36 in the manner of a planet wheel and can thus roll on its periphery. To this end the component 44
5 preferably includes a sleeve 45 rotatably mounted on the shaft 10 and an arm 46 projecting radially therefrom and carrying the bearing pin 43.

In order to produce the orbiting movement the component 44 is fixedly connected to a fourth gearwheel 47 which is disposed between the same and the support section 9 for example and is arranged for example on the sleeve 45 and fixed thereto by means of a grub
10 screw 48. Alternatively the component 44 and the fourth gearwheel 47 could equally be integral or be fixedly connected together as a single part. The gearwheel 47 engages with an adjusting element 49 in the form of a further gearwheel, which is fixed on a bearing pin 50 arranged parallel to the shaft 10. This pin is either mounted rotatably in the housing 32 and provided with a handwheel arranged outside the housing 32 or, as is shown in Fig. 3, is
15 in the form of an output shaft of an electric motor 51 fixed in or on the housing 32, preferably in the form of a reversing motor which can be driven selectively in opposite directions of rotation.

The first gearwheel 36 is further operatively connected to the second gearwheel 38 through an idly rotating transfer gearwheel 52 mounted on the shaft 10. To this end the
20 transfer gearwheel 52 is for example on the one hand also in engagement with the third gearwheel 42 and on the other hand with an intermediate gearwheel 53, which is fixed rotatably in a fixed position in the housing 32 on a bearing pin 54 disposed parallel to the shaft 10 and furthermore meshes with the second gearwheel 38. In the embodiment the transfer gearwheel 52 consists of a sleeve mounted rotatably on the shaft 10 between the
25 gearwheels 36 and 38, with separate gearwheels 52a and 52b formed on its ends, one engaging with the third gearwheel 42 and the other with the intermediate gearwheel 53, which has a spacing parallel to the shaft 10 from the third gearwheel 42 corresponding to the spacing of the gearwheels 52a, 52b. Furthermore the gearwheels 42, 53 each have a thickness in the axial direction such that they can be brought into engagement
30 simultaneously with the gearwheels spaced in the axial direction 36, 52a and 52b, 38 respectively. However other constructions are possible in the alternative, since for example the transfer gearwheel 52 can consist of a gearwheel extending over the whole axial length

and each of the gearwheels 42, 53 of two axially spaced but fixedly interconnected gearwheels. It would correspondingly also be possible to make the gearwheels 52a, 52b separate and then to connect them together fast against rotation.

5 The gearwheels 36, 38, 42, 47, 49, 52 and 53 all consist of spur gears. The first and the second gearwheels 36 and 38 have the same diameter and numbers of teeth and thus have equal modules. The transfer gearwheel 52 or the two gearwheels 52a, 52a preferably have the same diameters as the gearwheels 36 and 38 but a slightly different number of teeth. The third gearwheel 42 and the intermediate wheel 53 are preferably identical to one another in relation to diameter and number of teeth and their module preferably
10 corresponds to that of the gearwheels 36, 38 or equally to that of the gearwheels 52a, 52b. Moreover the gearwheels 36, 38, 47 and 52 (or 52a, b) are preferably all arranged coaxially. The teeth numbers of the gearwheels 47, 49 are in themselves arbitrary but their modules should be the same.

The manner of operation of the summing gear described with reference to Fig. 3 is
15 as follows:

During operation of the circular knitting machine the shaft 10 and therefore the first disc 21 also are driven with a speed of rotation derived from the drive shaft 15 (Fig. 1), while the drive of the disc 22 fitting loose on the shaft 10 is effected via the summing gear. If both discs 21, 22 rotate at the same speed, the adjustment of the diameter of the drive
20 roller 16 remains unaltered. If the disc 22 is turned relative to the disc 21, this diameter is altered.

In a practical embodiment the gearwheels 36 and 38 each have 50 teeth for example while the transfer gearwheel 52 or its gearwheels 52a, b each have 51 teeth. This slight difference is not a problem in spite of the equal diameters of the gearwheels 36, 38 and 52
25 and their meshing with the gearwheels 42 and 53 and can readily be achieved by a tooth profile modification. If therefore the gearwheel 36 is set in rotation by the shaft 10 with a speed which corresponds to the speed of the first disc 21, the gearwheel 52 is turned slower than the gearwheel 36, by an amount corresponding to one tooth per revolution, with the bearing pin 43, in a spatially fixed position or fixed. The directions of rotation of the two
30 gearwheels 36, 52a are identical. On the other hand the gearwheel 38 is driven via the intermediate gearwheel 53 by the gearwheel 52b with a speed of rotation which is greater by the amount of one tooth than that of the gearwheel 52b. The directions of rotation are

also identical here. Accordingly the change of ratio introduced by the gearwheel pair 36, 52a is cancelled by the change of ratio effected by the gearwheel pair 52b, 38, so that the two gearwheels 36, 38 and thus the two discs 21, 22 are also rotated at the same speed and in the same sense as applies to the shaft 10. Once a diameter of the drive roller 16 has been set it thus remains constant.

If the diameter of the drive roller 16 is to be altered, the adjusting element 49 is put into rotation, which can be effected manually or with the aid of the electric motor 51. Through this the arm 46 of the component 44, the bearing pin 43 and thus also the gearwheel 42 are caused to effect an orbiting movement round the gearwheels 36, 52. With the gearwheel 36 stationary, the result of this is that the gearwheel 52 undergoes a slight rotation relative to the gearwheel 36, dependent on the sense of rotation of this orbiting movement, on account of the different number of teeth compared with the gearwheel 36. The same applies when the gearwheel 36 is rotating, so that there is superimposition of the movements. Thus the gearwheel 52 can be turned to a greater or lesser extent relative to the gearwheel 36 with the aid of the gearwheels 47 and 49 than would be the case with a stationary arrangement of the bearing pin 43 of the gearwheel 42.

The additional rotary movement imposed in this way on the transfer gearwheel 52 also acts via the intermediate gearwheel 53 on the gearwheel 38 and thus on the second disc 22. It is thus possible to effect a relative rotation of the two discs 21, 22 and thus an alteration in the diameter of the drive roller 16 by turning the adjusting element 49, it being immaterial whether the shaft 10 is then rotating or stationary. The amount of the alteration in diameter depends on the size of the angle or rotation of the arm 46 in addition to the difference in numbers of teeth of the gearwheels 36, 52 and 38. If the arm 46 or the adjusting element 49 is stopped after a deliberate change in diameter, the diameter of the drive roller 16 remains constant from this moment on.

The drive speed of rotation n_{38} of the described summing gear amounts to:

$$n_{38} = [(n_{36} - n_{46}) \cdot z_{36} / z_{52a} + n_{46}] \cdot z_{52b} / z_{38}$$

where n_x are the speeds of rotation of the various gearwheels with the references x and z_x the corresponding numbers of teeth, while n_{46} is the speed with which the arm 46 and the bearing pin 43 with the gearwheel 42 rotate about the shaft 10. For $z_{36} = z_{38} = 50$ and z_{52a}

$= z_{52b} = 51$, the result with $n_{36} = 300$ rpm and $n_{46} = \pm 10$ rpm is a value for n_{38} of 300.20 rpm or $n_{38} = 299.80$ rpm, depending on the sense of the orbiting movement, from which can be calculated for example the duration for which the electric motor 51 must be turned on in order to effect a selected change in diameter of the drive roller 16. In order to avoid
5 inadvertent further rotation of the component 44 or the gearwheel 42 when the electric motor 51 is stationary, the gearwheel 47 is preferably a worm wheel and the adjusting element 49 a worm, so that there is self-locking.

If required special bearings, e.g. in the form of rolling bearings, can be provided for free-running mounting of the various gearwheels. This is indicated by needle bearings 55 in
10 Fig. 3 for those gearwheels which are driven at the higher speeds. Furthermore, Fig. 3 shows that the gearwheels 47, 36 and 52 are for example retained substantially axially immovable on the shaft 10 in that they are disposed between the gearwheel 38 fixed on the shaft 10 and a sleeve 56 likewise fixed on the shaft 10.

In the embodiment according to Fig. 4, in which the same parts are given the same
15 reference numerals, an adjusting device 57 is provided in the form of a summing or differential gear, which is designed as a bevel gear. In distinction from Fig. 3, a transfer gearwheel 58 has two coaxial gearwheels 58a and 58b, which are of bevel gear form and are open to opposite sides. A corresponding first bevel gearwheel 59 is opposite the gearwheel 58a and a corresponding second bevel gearwheel 60 opposite the gearwheel 58b.
20 The two gearwheels 59 and 60 correspond to the gearwheels 36 and 38 in Fig. 3 and therefore fixedly connected in the same way to the shaft 10 and the second disc 22 respectively, while the transfer gearwheel 58 fits loosely rotatable on the shaft 10. Moreover, on the one hand the first gearwheel 59 and the transfer gearwheel 58 or its gearwheel 58a are operatively coupled at the periphery through a third bevel gearwheel 61
25 and the second gearwheel 60 and the transfer gearwheel 58 or its gearwheel 58b are operatively coupled through an intermediate bevel gearwheel 62. Like in Fig. 3 the third gearwheel 61 is mounted eccentrically to the shaft 10 and on an arm 64 by means of a bearing pin 63, the arm projecting radially from a component 65 which is mounted rotatably on the shaft 10 with a gearwheel 66 made in one piece therewith, which engages with the
30 adjusting element 49. On the other hand the intermediate gearwheel 62 is mounted rotatably but in a fixed position by means of and on a bearing pin 67 fixed to the housing 32.

One difference above all from the embodiment according to Fig. 3 consists in that the bearing pins 63, 67 are arranged substantially perpendicular to the shaft 10, instead of parallel thereto. This has the result that, when the shaft 10 is turned and with the gearwheel 66 stationary, the transfer gearwheel 58 is driven in the opposite sense to the first gearwheel 59 and that the intermediate gearwheel 62 therefore serves to turn the second gearwheel 60 opposite to the transfer gearwheel 58 and thus in the same sense of rotation as the first gearwheel 59. With the gearwheel 66 stationary the gearwheels 59, 60 and the two discs 21, 22 are always driven at the same speed, insofar as the coaxially arranged gearwheels 58a, 58b, 59 and 60 have the same diameters, numbers of teeth and modules. The gearwheels 61, 62 preferably have the same numbers of teeth and diameters.

If the shaft 10 is stationary, by turning on the electric motor 51 in one or the other direction of rotation, rotation of the component 65 and thus an orbiting or planetary movement of the third gearwheel 61 about the stationary first gearwheel 59 can be produced. Through this the transfer gearwheel 58 is set in rotation in each case with same sense of rotation as the component 65, whereby rotation of the second gearwheel 60 and thus also of the second disc 22 in the respective opposite sense is effected via the intermediate gearwheel 62. The disc 22 therefore turns relative to the disc 21, so that the diameter of the drive roller 16 alters correspondingly.

An appropriate change in diameter can also be effected in this embodiment while the circular knitting machine is running. In this case the speed of rotation produced by the orbiting movement of the gearwheel 61 is superimposed on the speed of rotation of the transfer gearwheel 58 determined by the rotation of the first gearwheel 59, for as long as the electric motor 51 is switched on. The manner of operation of the embodiment according to Fig. 4 is otherwise analogous to that of Fig. 3.

The driven speed of rotation n_{60} of the summing gear according to Fig. 4 amounts to

$$n_{60} = n_{59} - 2 \cdot n_{64}$$

where n_{59} and n_{60} are the speeds of rotation of the gearwheels 59 and 60, while n_{64} is the speed of rotation with which the arm 64 or the third gearwheel 61 orbits.

If therefore the gearwheel 59 rotates with a speed of $n_{59} = 300$ rpm for example and

the arm with a speed of ± 10 rpm, the speed of rotation n_{60} of the gearwheel 60 amounts to either 280 rpm or 320 rpm, depending on the direction of rotation of the arm 64. On the other hand, as is the case in Fig. 3, $n_{60} = n_{58}$ for $n_{64} = 0$.

5 The summing gears according to Figs. 3 and 4 can be used to particular advantage as part of a programme-controlled or regulating device. In the case of a programme-controlled device the adjusting element 49 is connected for example to a control member from which it is adjusted in dependence on a knitting pattern to be realised by the circular knitting machine or the like and is stopped between the individual adjusting movements. The electric motor 51 can itself be part of the programme-controlled device and be
10 switched on and off by signals from a pattern device controlling the circular knitting machine. In the case of a regulating device the electric motor 51 or the adjusting element 49 would in contrast be formed as the setting element of control circuit monitoring the yarn tension, the yarn speed or the like, in order to keep the monitored value automatically constant, in that the actual value of this quantity is constantly monitored and compared with
15 a set-point value given by the pattern, and in that a signal controlling the electric motor 51 is derived from the difference between the actual and set-point values.

The invention is not limited to the described embodiments, which can be modified in many ways. This applies for example to the arrangement of the grooves 23, 24 in the discs 21 and 22, which can also be interchanged. Furthermore the summing gears according to
20 Figs. 3 and 4 are only given by way of example. In particular the given tooth numbers can be altered, so that the tooth numbers of the gearwheels 36, 38 can even be greater than the tooth numbers of the transfer gearwheel 52 for example. Moreover it is not necessary that the tooth numbers are so selected that a transmission ratio of 1:1 results between the respective driving and driven parts (36, 59 and 38, 60) of the summing gear in the
25 stationary state of the arm 46 or 64, since it can be arranged that a transmission ratio of 1:1 is set in normal operation by suitable regulation of the electric motor 51 when the transmission ratios deviate. Instead of ordinary electric motors, servo or stepping motors or even other electric drives could be employed. Furthermore, instead of the described toothed gearwheels wheels with friction rollers could be used or be provided with spur or bevel
30 wheel friction wheels. In addition, the use of planetary gears is possible. Finally, it will be understood that the various features can also be used in combinations other than those shown and described.



CLAIMS

1. A drive roller for a yarn feed device, especially a circular knitting machine, consisting of a first disc (21) rotatably mounted about an axis, a second disc (22) coaxial therewith and rotatable relative thereto about the axis, and slide pieces (25) arranged between the two discs (21, 22) and forming the periphery of the drive roller (16) and which are so guided by the discs (21, 22) that an enlargement or reduction of the diameter of the periphery is produced by relative rotation of the two discs (21, 22), and an adjusting device (31, 57) provided with an adjusting element (49), which facilitates relative rotation of the two discs (21, 22) during continuous rotation of the drive roller (16), characterized in that the adjusting device (31, 57) includes a summing gear which comprises a driving part (36, 59) coupled to the first disc (22), a driven part (38, 60) coupled to the second disc (22) and the adjusting element (49).
2. A drive roller according to claim 1, characterized in that the summing gear is arranged in a closed housing (32), which has a rotatable cover forming the second disc (22).
3. A drive roller according to claim 2, characterized in that the first disc (21) is arranged outside the housing, spaced from the second disc (22) and is fixed on a rotatable shaft (10) passing through the housing (32) and the second disc (22).
4. A drive roller according to any of claims 1 to 3, characterized in that the summing gear is in the form of a spur wheel gear.
5. A drive roller according to any of claims 1 to 3, characterized in that the summing gear is in the form of a bevel wheel gear.
6. A drive roller according to claim 4 or 5, characterized in that the driving part (36, 59) is a first wheel fixed on the shaft (10) and the driven part (38, 60) is a second wheel arranged rotatably on the shaft (10) and fixed to the second disc (22).



7. A drive roller according to claim 6, characterized in that the summing gear includes a third wheel (42, 61) orbiting coaxially round the driving part (36, 59) and in engagement therewith and which is coupled to the driving part (36, 59) and to at least one transfer wheel (52, 58) which is operatively coupled to the driven wheel (38, 60).
8. A drive roller according to claim 7, characterized in that the transfer wheel (52, 58) is rotatable on and coaxial with the shaft (10).
9. A drive roller according to claim 7 or 8, characterized in that the transfer wheel (52, 58) is coupled to the driven wheel (38, 60) through an intermediate wheel (53, 62) mounted rotatably in the housing (32) on a positionally fixed axis of rotation.
10. A drive roller according to any of claims 7 to 9, characterized in that the third wheel (42, 61) is mounted eccentrically on a component (44, 65) mounted rotatably and coaxially on the shaft (10).
11. A drive roller according to claim 10, characterized in that a fourth wheel (47, 66) mounted rotatably on the shaft (10) is associated with the component (44, 65).
12. A drive roller according to any of claims 7 to 11, characterized in that the adjusting element (49) is operatively coupled to the third wheel (42, 61).
13. A drive roller according to claim 12, characterized in that the adjusting element (49) is a wheel engaging with the fourth wheel (47, 66) .
14. A drive roller according to any of claims 1 to 13, characterized in that the adjusting element (49) is provided with a handwheel.
15. A drive roller according to any of claims 1 to 13, characterized in that the adjusting element (49) is coupled to an electric motor (51).



16. A drive roller according to any of claims 6 to 15, characterized in that the first and second wheels (36 and 38) are spur gearwheels with the same diameters and numbers of teeth, while the transfer wheel (52) consists of a spur gearwheel which has the same diameter as the first and second wheels (36 and 38) but a number of teeth differing from them.
17. A drive roller according to claim 16, characterized in that the third wheel (42) consists of a spur gearwheel meshing with the first wheel (36) and the transfer wheel (52) and the intermediate wheel (53) consists of fifth spur gearwheel meshing with the transfer wheel (52) and the second gearwheel (38), wherein the third and fifth spur gearwheels are mounted rotatably about axes arranged parallel to the shaft (10) on the component (44) and the housing (32) respectively.
18. A drive roller according to any of claims 6 to 15, characterized in that the first and second wheels (59 and 60) as well as the transfer wheel (58) consist of bevel gearwheels with the same diameters and numbers of teeth.
19. A drive roller according to claim 18, characterized in that the third wheel (61) consists of a bevel gearwheel meshing with the first wheel (59) and the transfer wheel (58) and the intermediate wheel (62) consists of a fifth bevel gearwheel meshing with the transfer wheel (58) and the second wheel (60), where the third and fifth bevel gearwheels are mounted rotatably on axes perpendicular to the shaft (10) on the component (65) and the housing (32) respectively.
20. A drive roller according to any of claims 1 to 19 with a drive belt (17) wrapping at least partially around its periphery for driving a plurality of yarn feed devices (18), characterized in that an automatically operating tensioning device is associated with the drive belt (17).
21. A drive roller according to claim 20, characterized in that the tensioning device consists of a tensioning roller (19) wrapped round at least partially by the drive belt



(17).

22. A drive roller according to claim 21, characterized in that the tensioning roller (19) is subject to a force, especially a spring force (20).

DRIVE ROLLER FOR A YARN FEED DEVICE

ABSTRACT

The invention relates to a drive roller for a yarn feed device, especially a circular knitting machine. The drive roller consists of a rotatably mounted first disc (21), a second disc (22) coaxial therewith and rotatable relative thereto and slide pieces (25) arranged between the two discs (21, 22) and forming the periphery of the drive roller (16) and which are so guided by the discs (21, 22) that an enlargement or reduction of the diameter of the periphery is produced by relative rotation of the two discs (21, 22). An adjusting device (31) which facilitates relative rotation of the two discs (21, 22) during continuous rotation of the drive roller (16), includes in accordance with the invention a summing gear which comprises a driving part (36) coupled to the first disc (22), a driven part (38) coupled to the second disc (22) and an adjusting element (49).

Figure 3

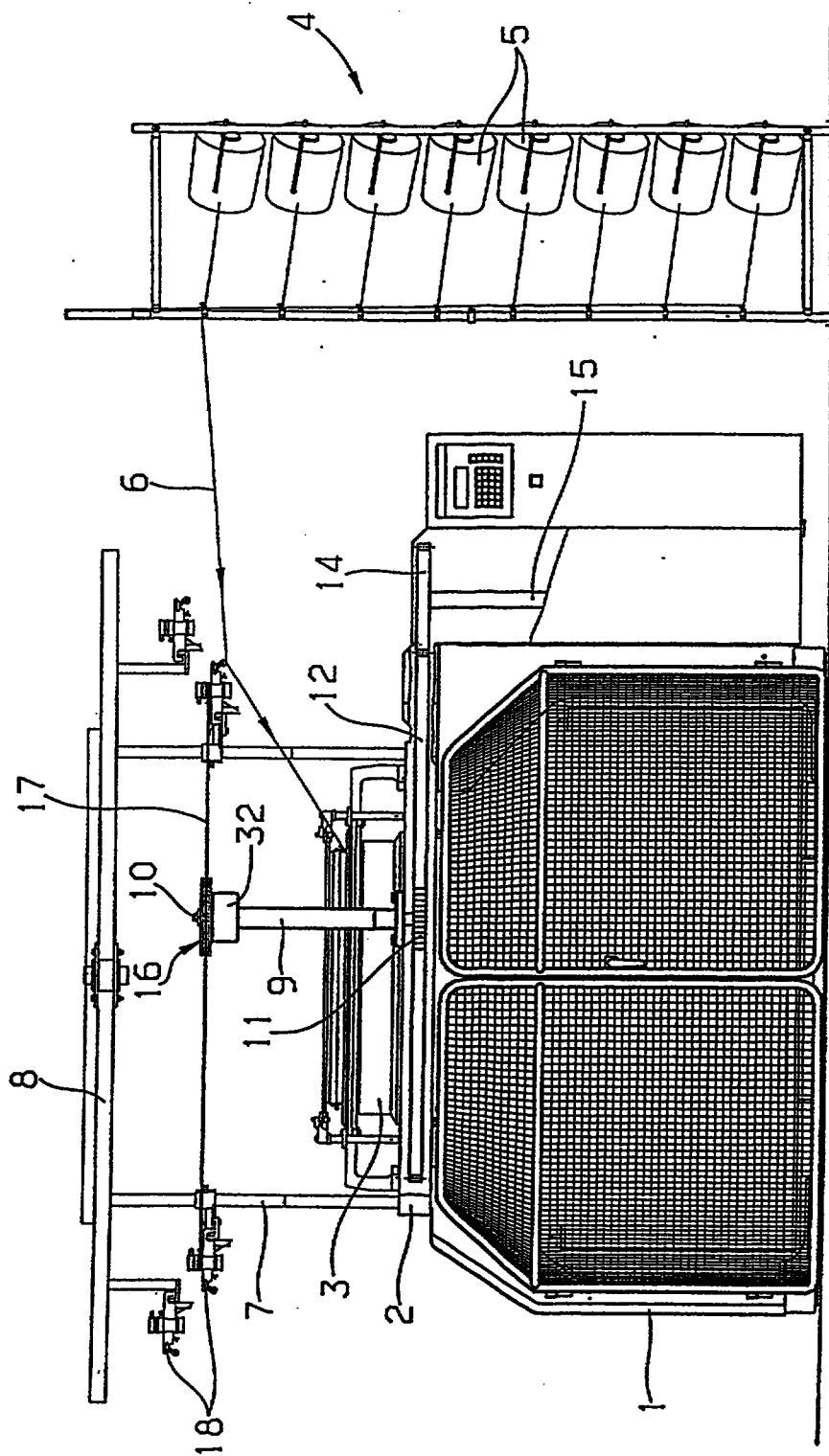


Fig. 1

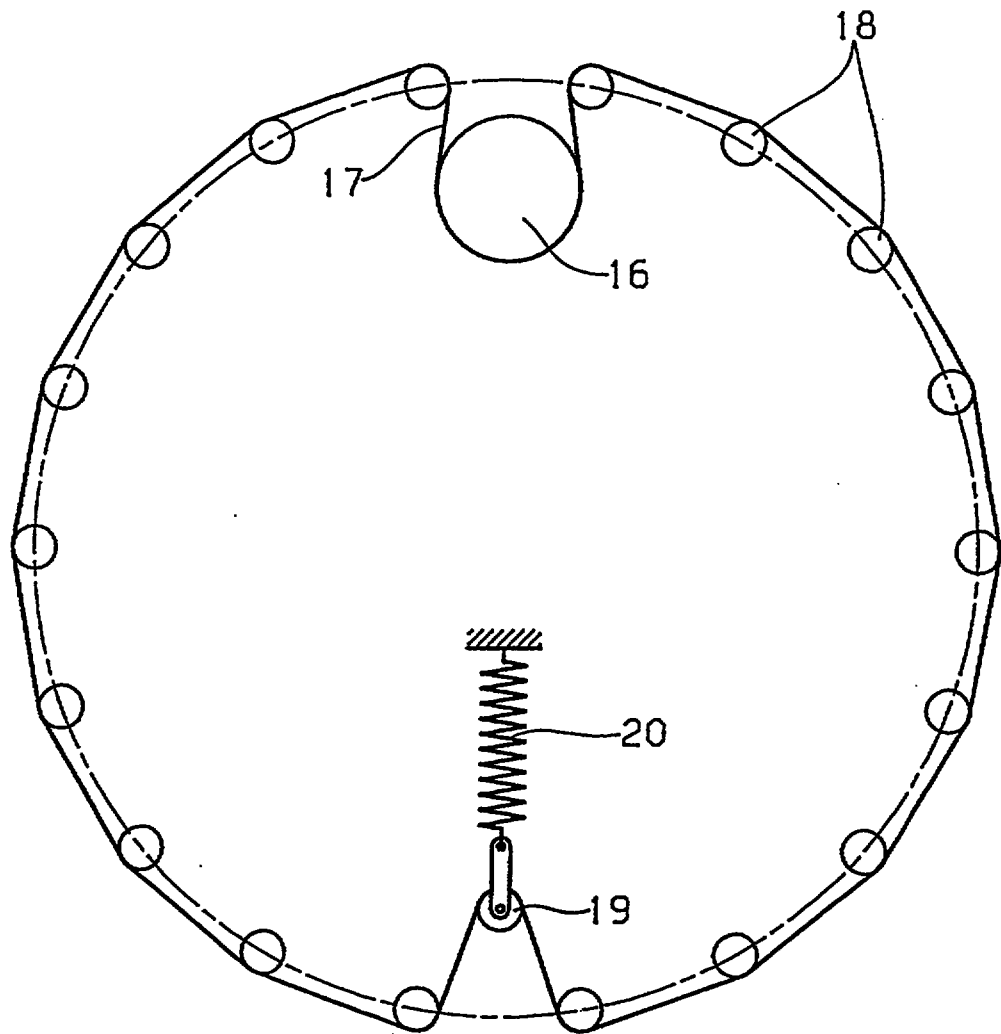


Fig. 2

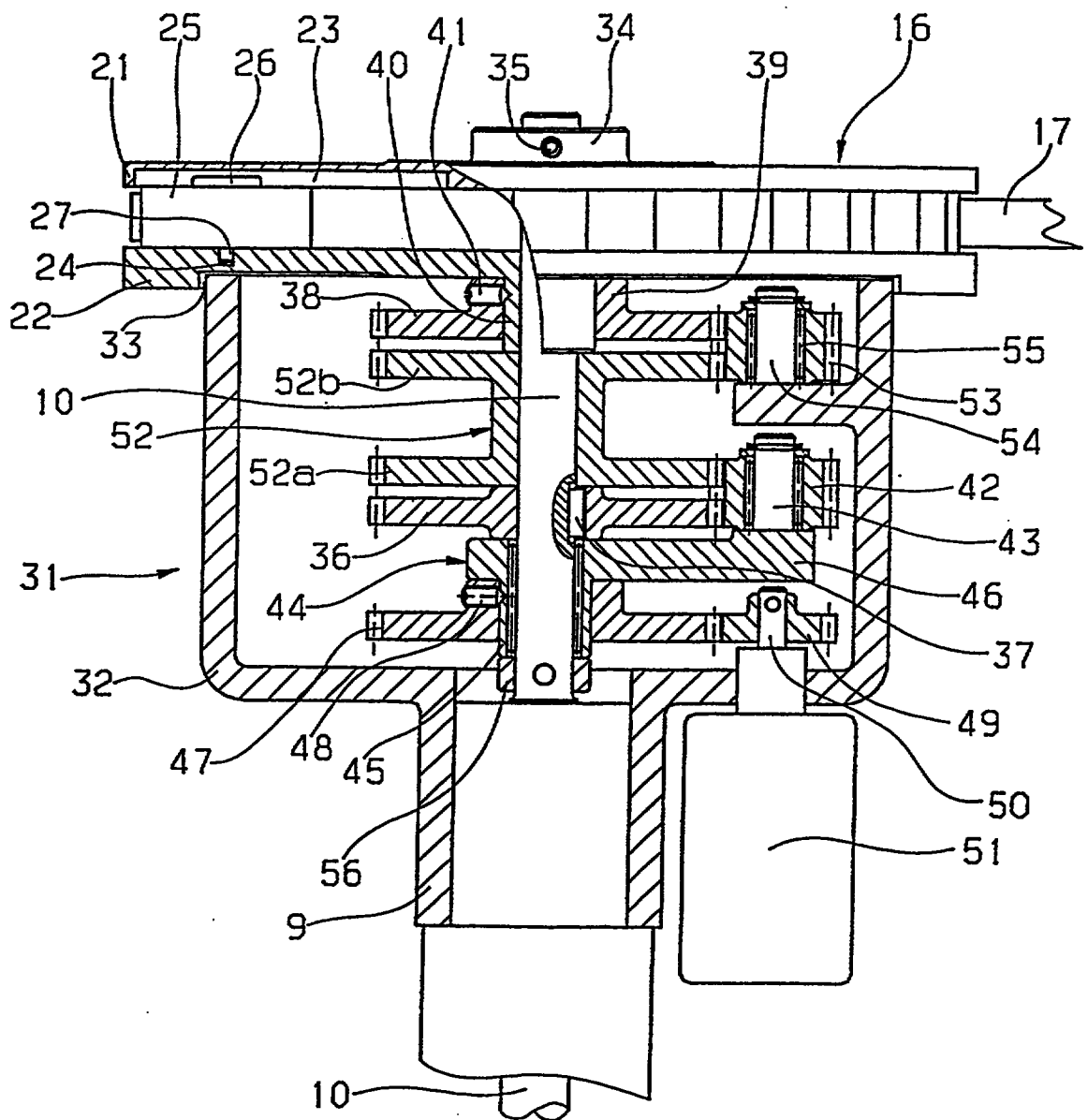


Fig. 3

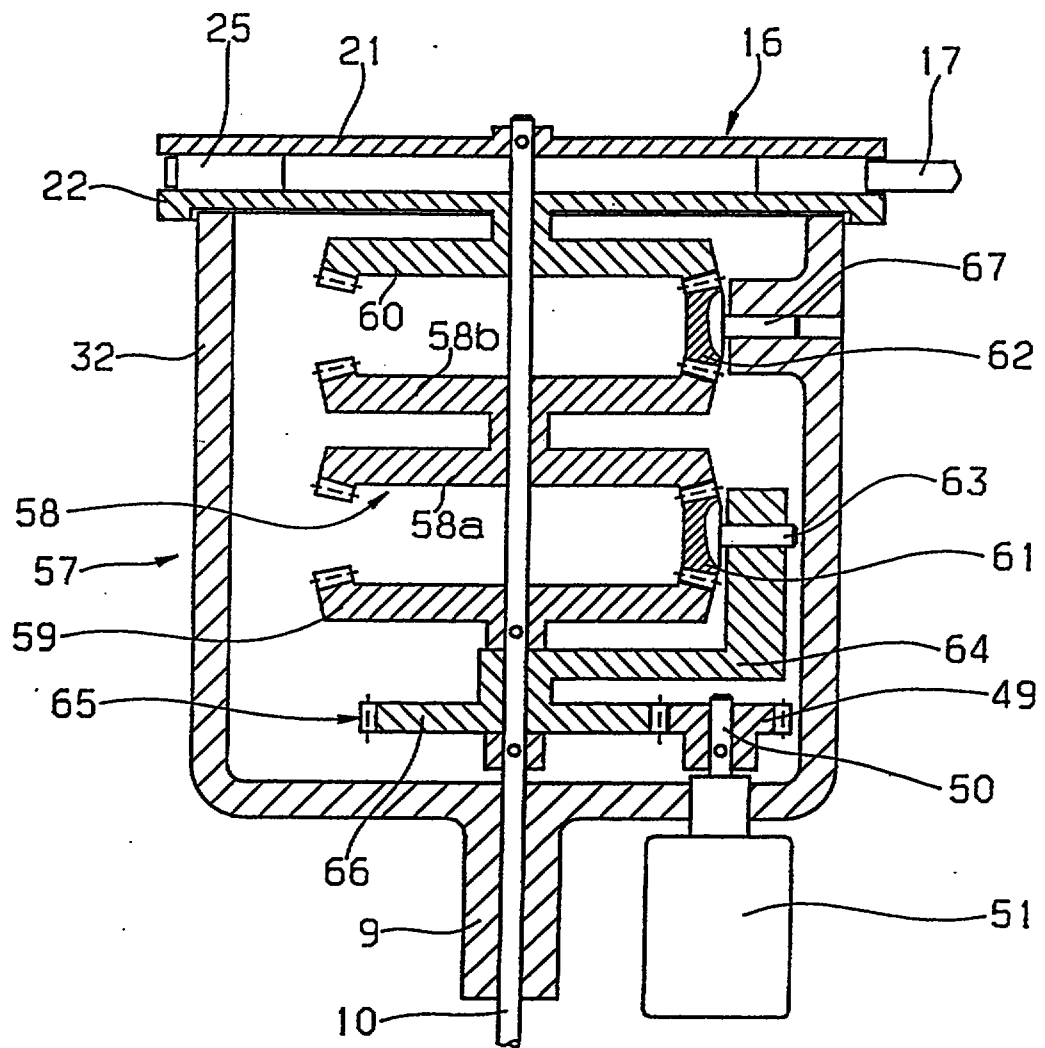


Fig. 4