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(54) Process for controlling the rotation drive of a thread collection system

(57) Process for controlling the rotation drive of a continuous filament thread-collection system, containing a rotating drum, on which at least one rotating bobbin-holder chuck is assembled, a traversing device and a picking roll, arranged according to the thread direction, upstream of the drum, where the picking roll is kept in constant contact with the outside surface of the bobbin, which increases in diameter during the collecting phase, by means of the drum rotation drive, characterized in that:

- the calculation of the diameter (D) of the bobbin is obtained by the following formula:

$$- D = V_{collection}/\pi\, V_{chuck}\, K$$

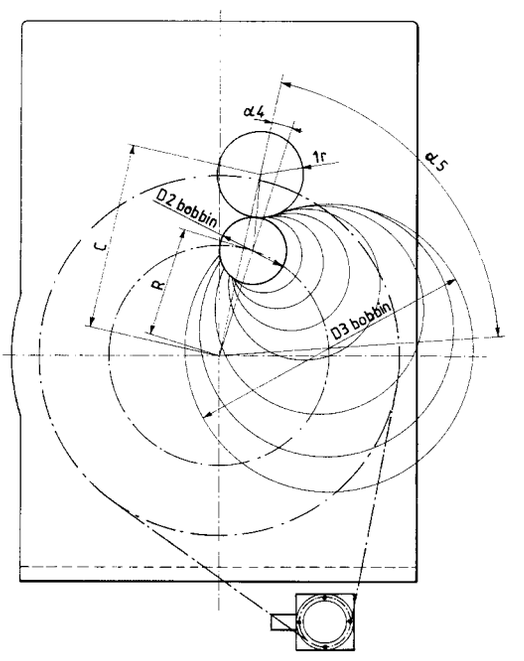
wherein

$V_{collection}$ is the collection velocity of the picking roll, established by the operator,
V_{chuck} is the chuck rotation velocity determined by the control drive signal of the asynchronous chuck motor,
K is a constant experimental coefficient, which can have a value higher than 0.6 and less than 1;

- the determination of the angular position (α) of the drum is obtained by means of the calculated bobbin diameter (D)

so that the rotation drive control of the collection system can be transmitted to bring the drum to the established angular position (α).

Fig.1



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Description

[0001] The present invention relates to a process for controlling the rotation drive of a continuous filament thread collection system containing a rotating drum, on which at least one rotating bobbin-holder chuck is assembled, a traversing device and a picking roll, arranged according to the thread direction, upstream of the drum, where the picking roll is kept in constant contact with the outside surface of the bobbin, which increases in diameter during the collecting phase, by means of the drum rotation drive.

[0002] Processes and devices for controlling this type of drive are already known.

[0003] Patent application EP-374536 of Barmag describes a process of this kind for controlling the rotation drive of a collection system, in which the run of the picking roll, on a slightly movable support, is detected by means of a sensor, and the rotation drive is controlled so as to guarantee a peripheric contact between the picking roll and bobbin envelope.

[0004] The process of said application is configured as a closed regulation circuit.

[0005] Patent application WO-96/01222 of Neumag claims a process for the drive control by means of the following steps:

- calculation of the bobbin envelope diameter by the formation of the quotient between the product of the rotation velocity of the picking roll, detected by means of a sensor, and the picking roll diameter, over the bobbin rotation velocity, detected by the synchronous motor control signal or by a sensor;
- determination of the angular position of the chuck by means of the calculated diameter of the bobbin envelope;
- rotation drive control of the rotating plate so that the bobbin rotates in the angular position determined above.

[0006] Patent application EP-768271 of Georg Sahm claims a winding wheel for continuous filament thread, with a rotating drum on which two chucks are assembled, with a traversing device and a picking roll, in which the distance between the axis of the picking roll and the axis of the bobbin-holder chuck in collecting phase varies increasingly along the increasing diameter of the bobbin, whose characteristics are the following:

- drum rotation regulation device;
- winding wheel with a device for determining the thread velocity and a device for determining the number of revs of the bobbin-holder chuck;
- drum rotation regulation device having a calculation unit for calculating the real diameter of the bobbin and for calculating the real angular velocity between the beginning and end of each calculation cycle.

[0007] All three solutions have costly devices which allow the drum positions to be regulated in real time.

[0008] We have found a new, simpler process for obtaining the position of the drum, enabling the use of less costly equipment which does not use sensors with a positioning function.

[0009] The process, object of the invention, for controlling the rotation drive of a continuous filament thread collection system containing a rotating drum, on which at least one rotating bobbin-holder chuck is assembled, a traversing device and a picking roll, arranged according to the thread direction, upstream of the drum, where the picking roll is kept in constant contact with the outside surface of the bobbin, which increases in diameter during the collecting phase, by means of the drum rotation drive,
is characterized in that:

- the calculation of the diameter (D) of the bobbin is obtained by the following formula:

$$D = V_{collection}/\pi\ V_{chuck}\ K \qquad (1)$$

wherein $V_{collection}$ is the collection velocity of the picking roll, established by the operator,
V_{chuck} is the chuck rotation velocity, determined by the control signal of the asynchronous chuck motor,
K is a constant experimental coefficient, which can have a value higher than 0.6 and less than 1;

- the determination of the angular position (α) of the drum is obtained by means of the calculated bobbin diameter (D) so that the rotation drive control of the collection system can be transmitted to bring the drum to the established angular position (α).

[0010] From formula (1) it can be seen that the approximation due to the difference between the asynchronous motor control signal and its real velocity is corrected at the moment of calculation with the use of the experimental coefficient K.

[0011] The remaining non-predictable error, however, does not influence the quality of the bobbin as the picking roll is assembled on a moving slide capable of recuperating the calculating errors of the bobbin diameter.

[0012] This experimental coefficient is provided on the basis of the characteristic of the asynchronous motor and the type of stress exerted by the motor.

[0013] A further object of the present invention relates to the winding wheel that can be used in the above process.

[0014] Said winding wheel for thread fed in continuous containing a rotating drum, on which two rotating bobbin-holder chucks are assembled, a traversing device and a picking roll, arranged according to the thread direction, upstream of the drum, where the picking roll is kept in constant contact with the outside surface of the bobbin, which increases in diameter during the collecting phase, by means of the drum rotation drive,
is characterized in that it also comprises an asynchronous chuck motor and a calculation unit for determining both the momentary bobbin diameter and the angular position of the collection system and also for transmitting the signal corresponding to the angular position, without the use however of any specific sensor with a positioning function.

[0015] The invention is illustrated in figures 1 and 2 enclosed.

[0016] Figure 1 shows the elements of a continuous filament thread collection system and the geometrical elements necessary for the process according to the invention.

[0017] The same figure illustrates:

1 the picking roll;
2 the bobbin at the start of the collection;
3 the bobbin at the end of the collection;
4 the drum rotation angle α at the start of the collection;
5 the drum rotation angle α at the end of the collection;
r the radius of the picking roll 1;
R the revolution radius of the chucks;
C the distance between the drum axis and picking roll axis.

$$\text{The formula } D = V_{collection}/\pi\, V_{chuck}\, K \tag{1}$$

can also be written as follows:

$$D = V_{collection}/(\text{chuck frequency value}) \times 60/P \times K \tag{2}$$

wherein P is the number of pole couples.
The angle α can be obtained from the following formula:

$$\alpha = \text{Arc Cos}\ \frac{R^2+C^2-(r+D/2)^2}{2RC} \tag{3}$$

[0018] Figure 2 shows the logical scheme of the control signals and measurement signals used in the process according to the invention.

[0019] The PLC receives the established collection velocity value ($V_{collection}$) and processes a control frequency signal (Sf) of the inverter (I) which feeds the asynchronous chuck drive motor (Mam) .

[0020] From these two values, the PLC can calculate the diameter and positioning angle and emit the control signal (C) to the angular positioner (PA).

Claims

1. A process for controlling the rotation drive of a continuous filament thread collection system containing a rotating drum, on which at least one rotating bobbin-holder chuck is assembled, a traversing device and a picking roll, arranged according to the thread direction, upstream of the drum, where the picking roll is kept in constant contact with the outside surface of the bobbin, which increases in diameter during the collecting phase, by means of the drum rotation drive, characterized in that:

- the calculation of the diameter (D) of the bobbin is obtained by the following formula:

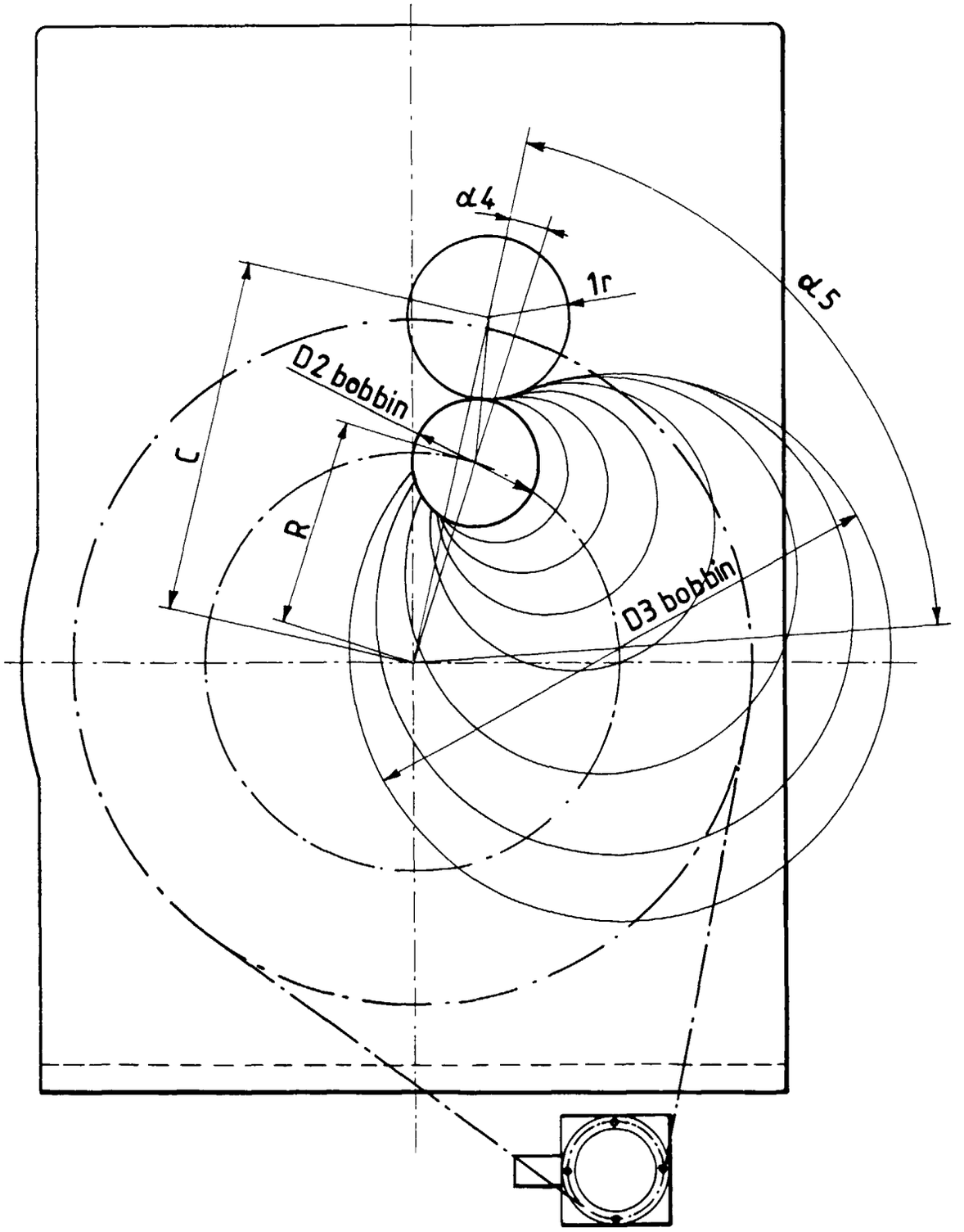
$$D = V_{collection}/\pi\ V_{chuck}\ K$$

wherein $V_{collection}$ is the collection velocity of the picking roll, established by the operator,
V_{chuck} is the chuck rotation velocity determined by the control signal of the asynchronous chuck motor,
K is a constant experimental coefficient, which can have a value higher than 0.6 and less than 1;

- the determination of the angular position (α) of the drum is obtained by means of the calculated bobbin diameter (D) so that the rotation drive control of the collection system can be transmitted to bring the drum to the established angular position (α).

A winding wheel for thread fed in continuous containing a rotating drum, on which two rotating bobbin-holder chucks are assembled, a traversing device and a picking roll, arranged according to the thread direction, upstream of the drum, where the picking roll is kept in constant contact with the outside surface of the bobbin, which increases in diameter during the collecting phase, by means of the drum rotation drive, characterized in that it also comprises an asynchronous chuck motor and a calculation unit for determining both the momentary bobbin diameter and the angular position of the collection system and also for transmitting the signal corresponding to the angular position, without the use however of any specific sensor with a positioning function.

Fig.1



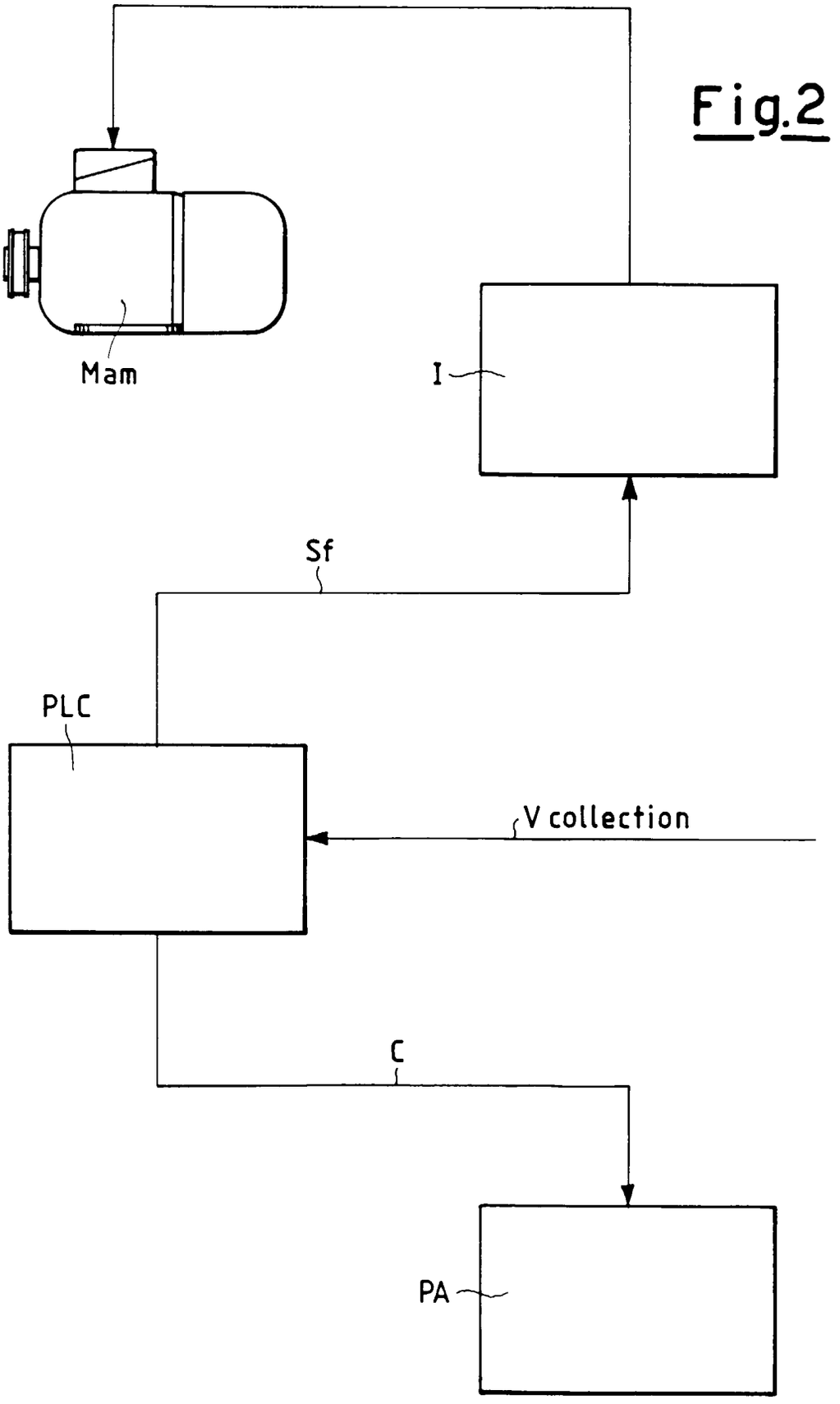


Fig.2