United States Patent [19]

Rajnoha et al.

[11] **3,793,820**

[45] **Feb. 26, 1974**

[54] **DEVICE FOR RINGLESS SPINNING OF FIBERS**

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Mar. 20, 1969 Czechoslovakia 1980-69

[52] **U.S. Cl.** **57/58.89**

[51] **Int. Cl.** **D01h 1/12**

[58] **Field of Search** 57/58.89, 58.91, 58.93, 57/58.95, 77.3, 77.45

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Primary Examiner—Werner H. Schroeder

Attorney, Agent, or Firm—Michael S. Striker

[57] **ABSTRACT**

A hollow rotary spinning chamber has a shaft fixed therewith and defining an axis of rotation for the chamber. Drive means engages the shaft for rotating it and thereby the spinning chamber. Magnetic means maintains the shaft in a predetermined operative position in lieu of bearings.

24 Claims, 15 Drawing Figures

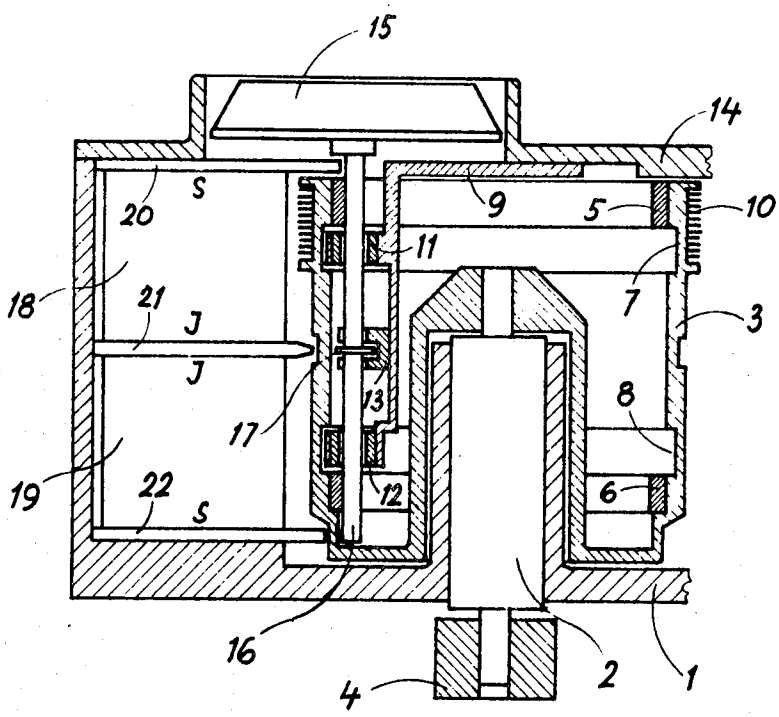
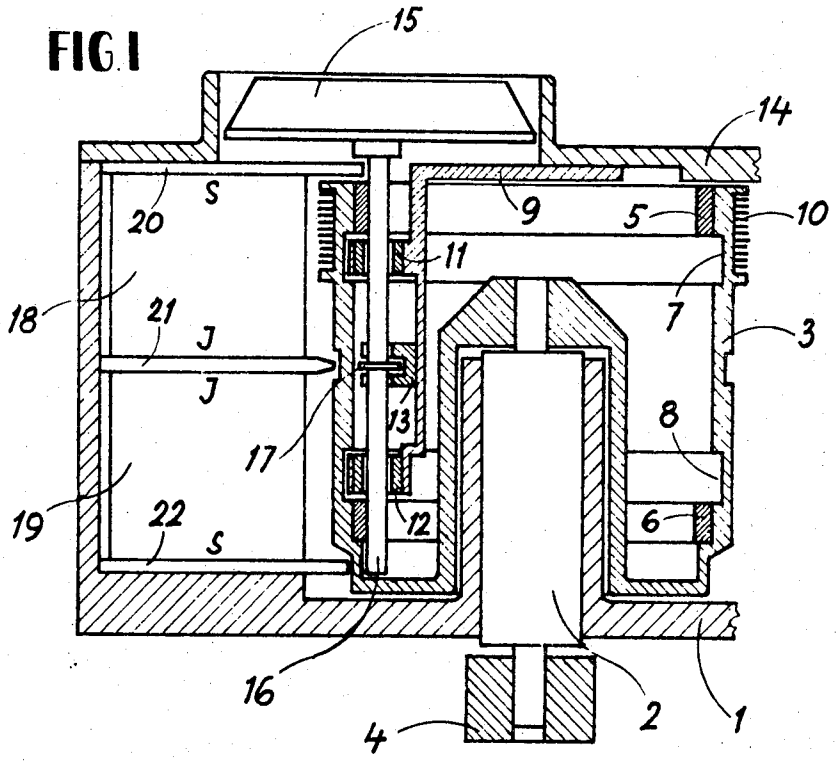


FIG. 1



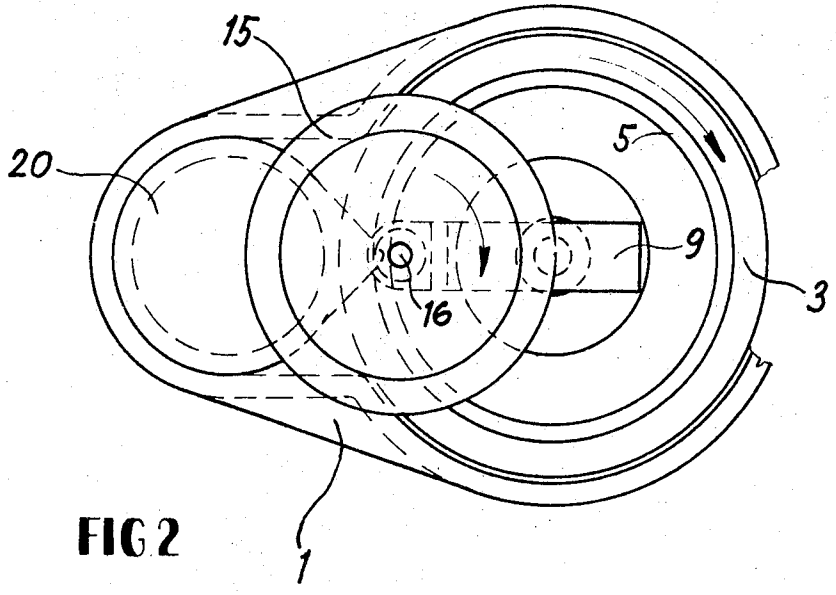


FIG. 2

FIG.3

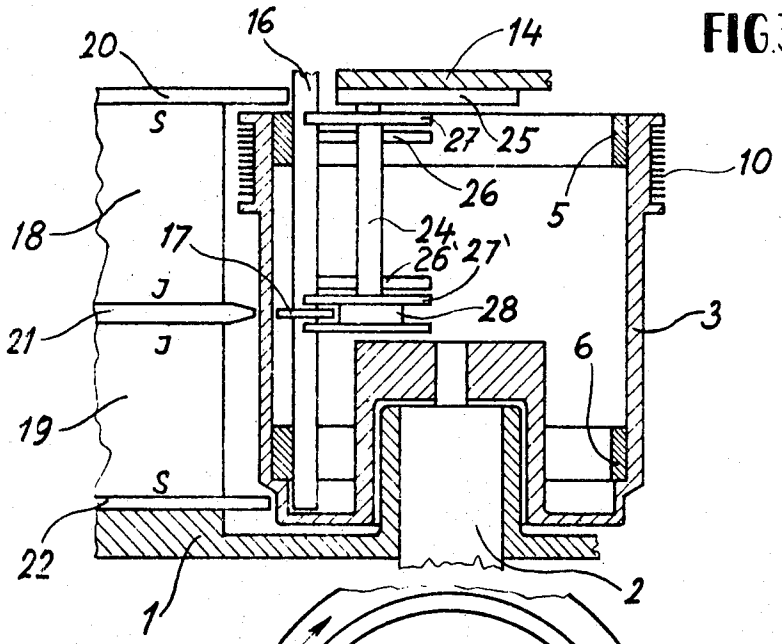


FIG.4

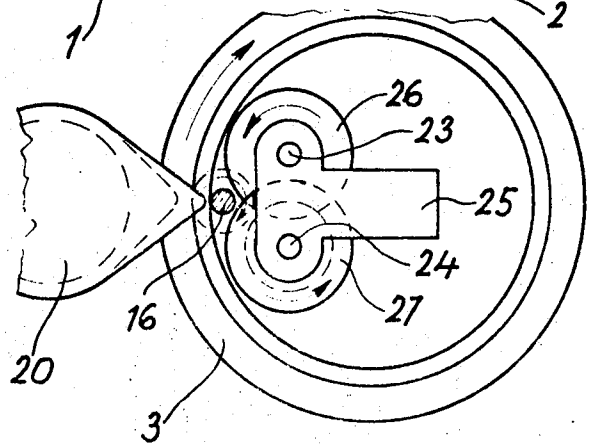


FIG.11

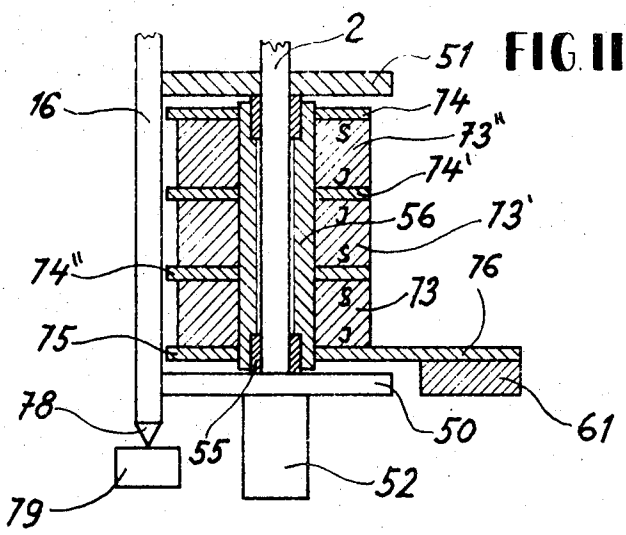
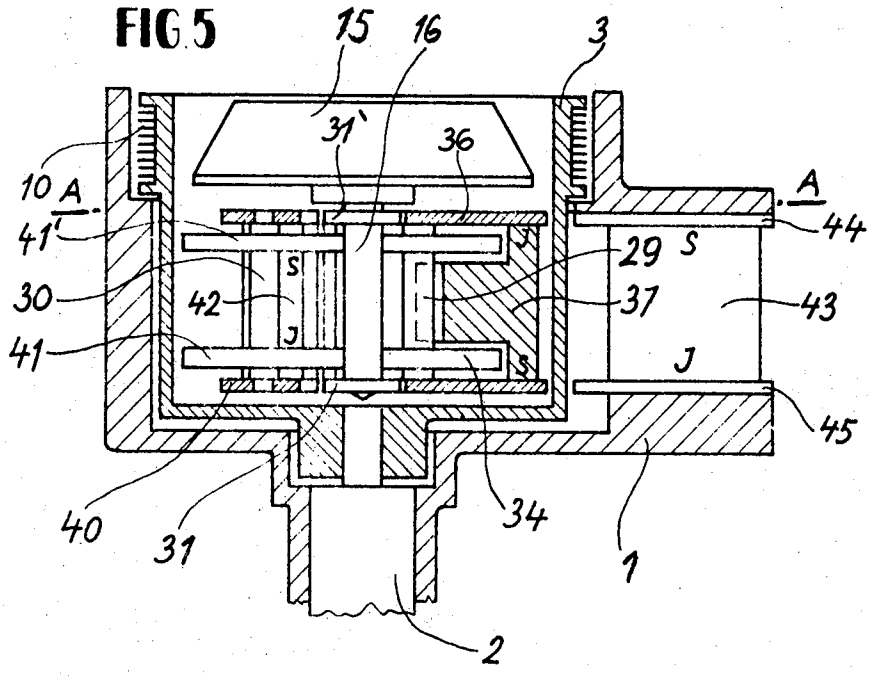


FIG 5


15
16
3
31'
36
10
A
A
41'
44
29
S
30
42
37
43
41
J
45
40
31
34
1
2

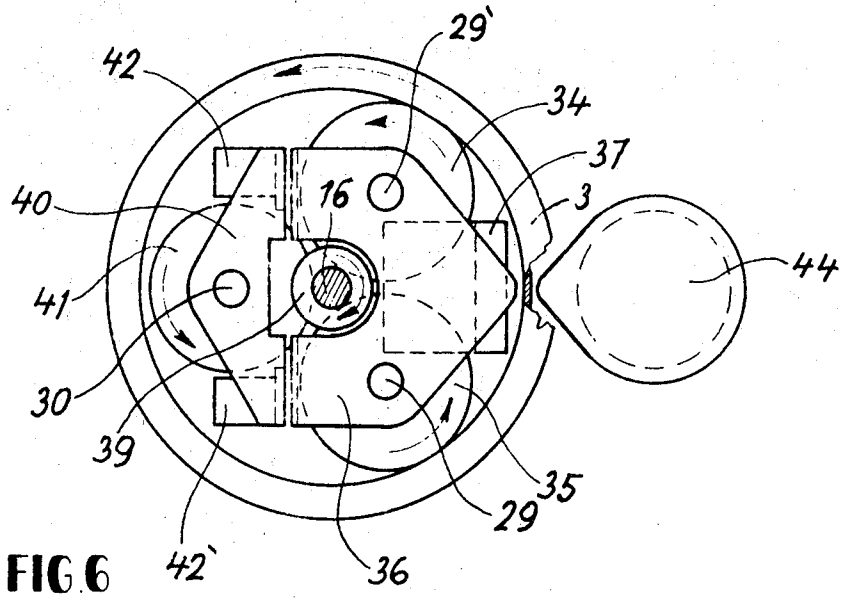
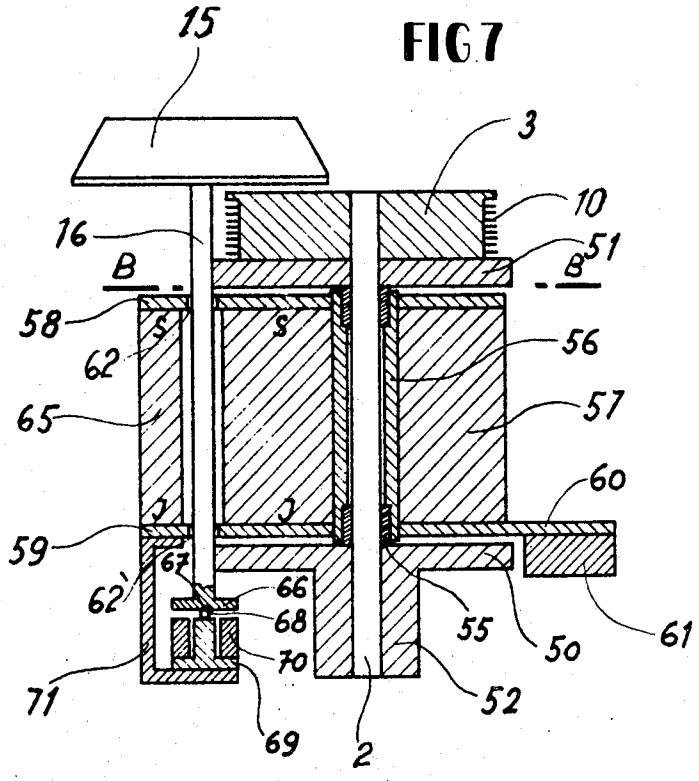

29'
42
34
37
40
16
3
44
41
30
39
35
29
42'
36

FIG 6

FIG.7


15
3
10
16
51
B
B
58
62
65
59
62'
67
66
68
70
71
69
2
52
50
55
56
57
60
61

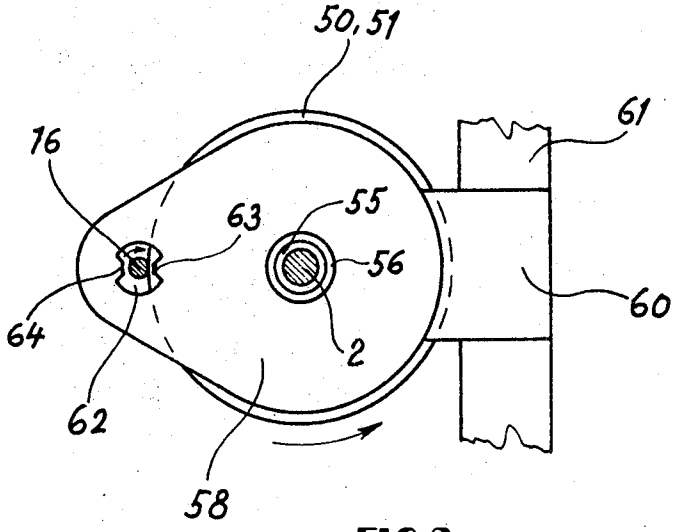
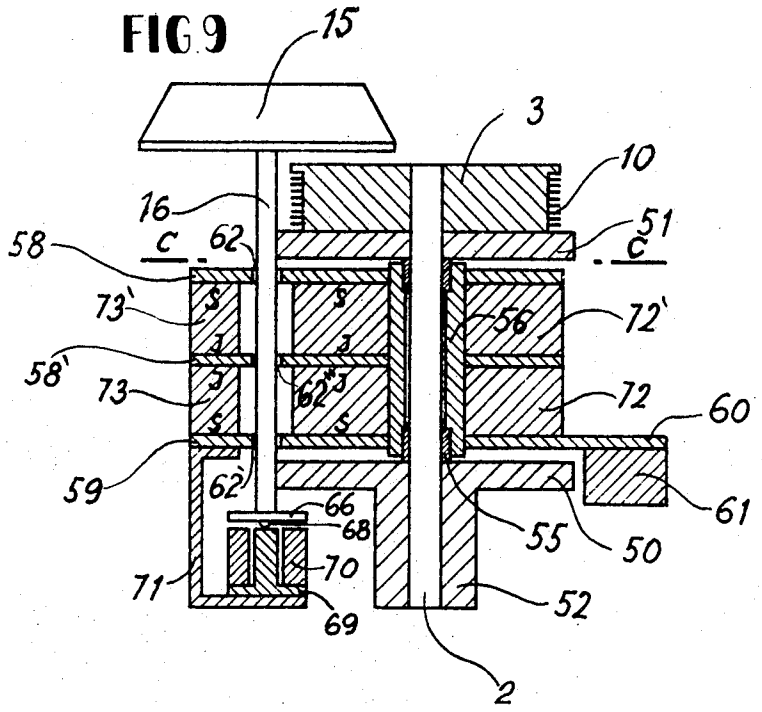

50, 51
61
16
63
55
56
64
62
58
2
60

FIG.8

FIG. 9


15
3
10
16
51
58
62
73'
56
72'
58'
73
72
60
59
62'
66
68
55
50
61
71
70
52
69
2

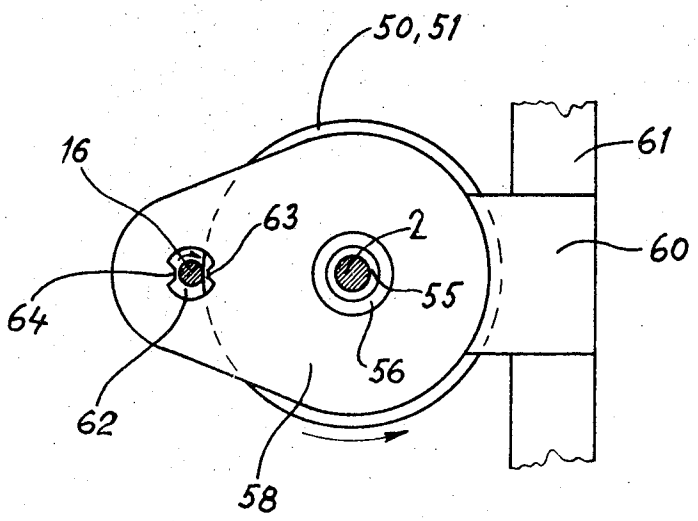

50, 51
16
61
63
2
60
64
55
56
62
58

FIG. 10

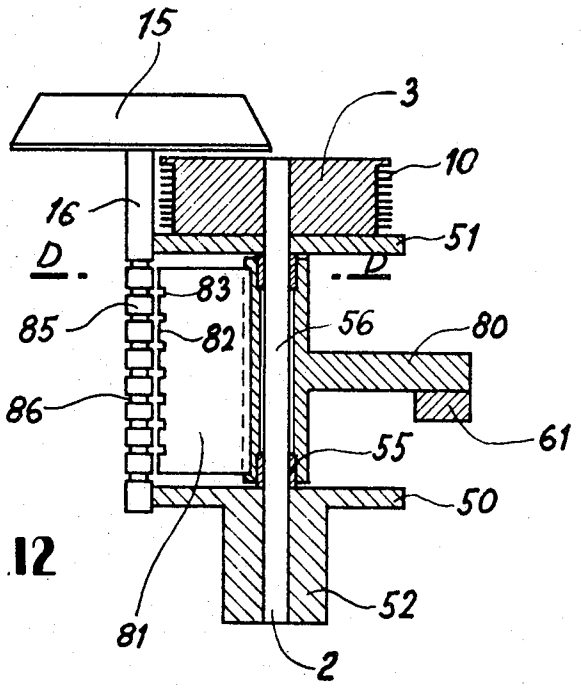

15
3
10
16
51
D
D
83
85
82
56
80
86
61
55
50
52
81
2

FIG.12

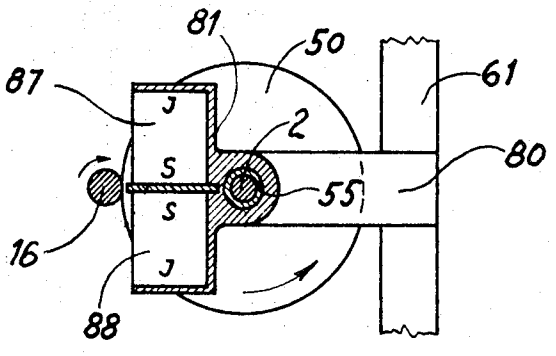
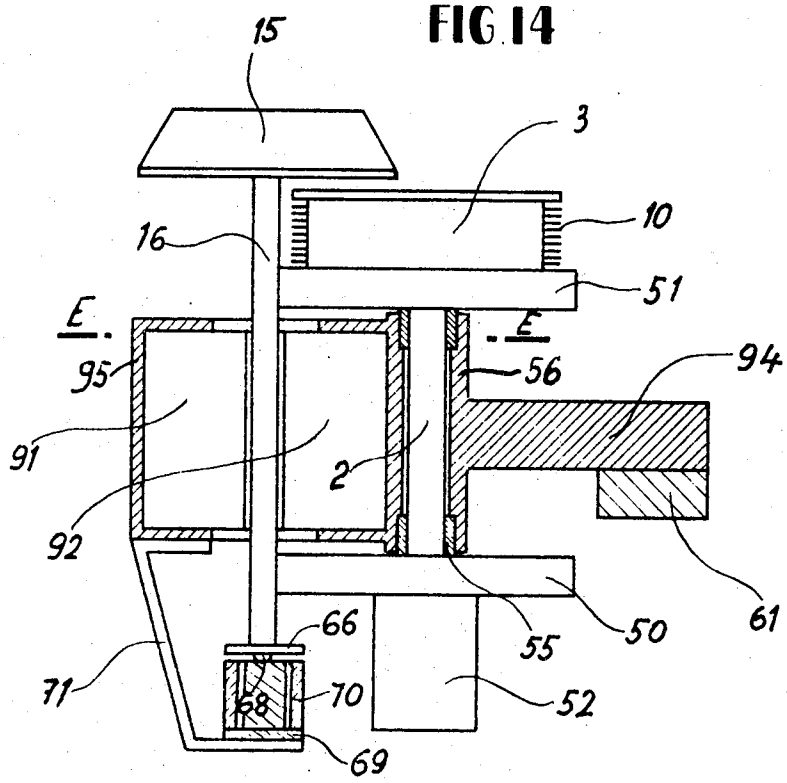

81
50
87
61
J
2
S
80
55
S
16
J
88

FIG.13

FIG. 14


15
3
10
16
51
E
E
95
56
94
91
2
92
61
50
55
66
71
70
68
52
69

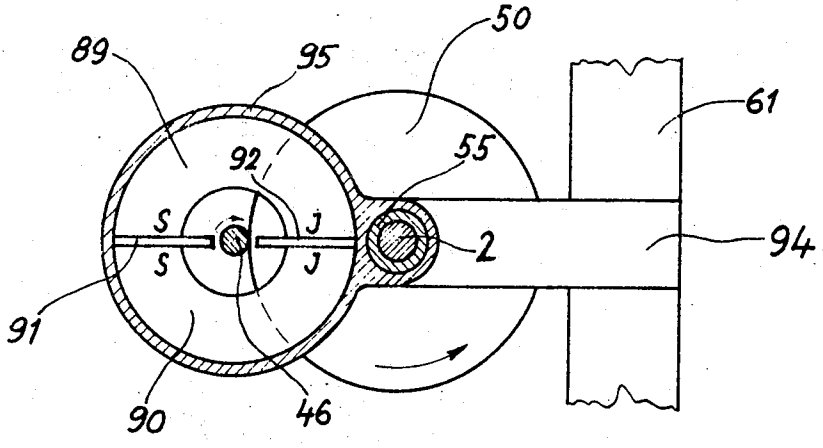

89
95
50
61
92
55
S
J
2
94
S
J
91
90
46

FIG. 15

DEVICE FOR RINGLESS SPINNING OF FIBERS

BACKGROUND OF THE INVENTION

The present invention relates generally to spinning machines, and more particularly to machines for ringless spinning of fibers. Still more particularly the present invention relates to spinning machines using rotary spinning chambers.

Machines of the general type in question herein are already known. They use a generally cup-shaped rotary spinning chamber which is rotated at high speed and onto an inner circumferential wall of which fibers in carded and separated state are deposited in known manner, whereupon these fibers become connected with one another under the influence of centrifugal force and can be withdrawn as a continuous thread from the spinning chamber.

Such spinning chambers must be rotated at high speeds which requires that they are mounted in special highspeed bearings. Consequently all spinning chambers of the type which have heretofore become known do, in fact, utilize high-speed bearings by means of which the spinning chambers are mounted for rotation. Such bearings, however, are very expensive to manufacture because of the precision requirements which are made of them. On the other hand, they must be constantly and precisely lubricated with special lubricants and despite this they are subjected to considerable heating and friction so that their lifetime is very short. Finally, in operation these bearings are rather noisy.

SUMMARY OF THE INVENTION

It is a general object of the present invention to overcome the aforementioned disadvantages.

More particularly it is an object of the present invention to provide, in a device for ringless spinning of fibers, a construction wherein the rotary spinning chamber need not be journalled in bearings.

Still more specifically it is an object of the present invention to provide such a device wherein the spinning chamber is in effect "journalled" by magnetic means which serves to maintain the spinning chamber in desired position.

In pursuance of the above objects, and others which will become apparent, one feature of the invention resides in a device for ringless spinning of fibers which comprises, briefly stated, a hollow rotary spinning chamber and a shaft which is fixed with this spinning chamber and which defines an axis of rotation for the same. Drive means engages the shaft for rotating the same and thereby the spinning chamber, and magnetic means maintains the shaft in a predetermined operative position in lieu of bearings.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an axial sectional elevation illustrating one embodiment of the invention;

FIG. 2 is a top-plan view of FIG. 1;

FIG. 3 is a view similar to FIG. 1 and illustrating a further embodiment;

FIG. 4 is a view similar to but illustrating the embodiment of FIG. 3;

FIG. 5 is a view similar to FIG. 1 illustrating yet an additional embodiment;

FIG. 6 is a view similar to FIG. 2 but of FIG. 5, and also taken in a partial section on line VI—VI of FIG. 5;

FIG. 7 is another view similar to FIG. 1 but illustrating still a further embodiment of the invention;

FIG. 8 is a section taken on line VIII—VIII of FIG. 7;

FIG. 9 is a view similar to FIG. 7 illustrating still another embodiment of the invention;

FIG. 10 is a section on line X—X of FIG. 9;

FIG. 11 is a view similar to FIG. 9 illustrating still another embodiment of the invention;

FIG. 12 is a view similar to FIG. 7 illustrating an additional embodiment of the invention;

FIG. 13 is a section on line XIII—XIII of FIG. 12;

FIG. 14 is also a view similar to FIG. 7 but illustrating a final embodiment of the invention; and

FIG. 15 is a section on line XV—XV of FIG. 14.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the drawing in detail, and firstly the embodiment illustrated in FIGS. 1 and 2, it will be seen that reference numeral 2 identifies a spindle mounted on or in the body or housing 1. The spindle carries connected thereto for rotation with it a hollow carding roller 3 of known construction, and is provided at its free end with a pulley 4, for instance for engagement by a drive belt or the like (not illustrated) so that the spindle may be rotated about its axis. In the illustrated embodiment the carding roller is provided on its inner circumferential surface with two annular beads or projections 5 and 6 which are circumferentially continuous. A holder is identified with reference numeral 9 and a recess is provided in the separating or carding roller 3 for the bearings 11, 12 of the holder 9.

The outer circumferential surface of the carding roller 3 is provided with a carding configuration, that is it is of such configuration that it cards or separates fibrous sliver fed to it into its constituent fibers. In the illustrated embodiment this is achieved by providing the exterior of the carding roller 3 with the covering 10 having saw-tooth external configuration, although needles, pins or the like could also be provided.

Holder 9 is secured to a lid 14 in which a rotating spinning chamber 15 is mounted. A shank or shaft 16 is rigid with the spinning chamber 15 and provided with an annular projection 17. Bearings 11 and 12 of the holder 9 have a certain clearance, in conjunction with the member 13, permits the necessary adjustment of the spinning chamber 15 and its axial retention. The annular projection 17 of the shaft 16 extends into a corresponding notch provided in the member 13 and the shaft, which extends through the bearings 11, 12 is in contact with the inner side of the beads 5 and 6.

Laterally of the carding roller 3, at the side which is proximal to the shaft 16 of the spinning chamber 15, retaining means is provided in form here of permanent magnets 18 and 19 which in this embodiment may be of annular or circular shape. The magnets are each ad-

jacent to the shaft **16** and their coincident poles are juxtaposed. A pole shoe **21** is provided interposed between the juxtaposed poles, and two further pole shoes **20, 21** each cooperate with the respective poles of the permanent magnets **18** and **19**. All of the pole shoes extend towards the shaft **16**, thus maintaining the same in predetermined operative position. In other words, the shaft **16** is maintained in its predetermined operative position and can deviate from this position only by the clearance value determined by the bearings **11** and **12**, that is to a negligible extent. It is to be understood that the bearings **11** and **12** are not journals for the shaft **16** but only serve to determine the permissible deviation of the shaft **16** from its permanent position. The shaft is thus capable of rotation without being journalled in bearings—keeping in mind what has just been said about the purpose of the bearings **11** and **12**—and the expense of providing high-speed bearings, of lubricating them, and the noise associated with the operation of such bearings are thereby eliminated.

The embodiment illustrated in FIGS. **3** and **4** differs from the embodiment of FIGS. **1** and **2** primarily in that the bearings **11** and **12** of FIGS. **1** and **2** are omitted and the permissible deviation of the shaft **16** from its predetermined position is defined by the illustrated annular disc members. Like elements are again identified with like reference numerals. Here, however, the projection **17** on shaft **16** extends into a recess **28** provided on an annular disc member **27'**. A holder **25** is mounted on the lid **14** and pairs **26, 26'** and **27, 27'** of annular disc members are mounted ON shafts **23, 24** respectively, which in turn are held by the holder **25**. The holder **25** is so arranged that in normal operative position of the shaft **16** the rotating shaft will not be in contact with the disc **26, 26'** and **27, 27'**. The latter, that is the discs just mentioned, serve only to prevent shaft **16** from misalignment—that is from deviating from its predetermined position—during starting and braking of the carding roller **3**.

In this embodiment, as in FIGS. **1** and **2**, radial retention of the shaft **16** against displacement from its operative position is also effected by means of the permanent magnets **18** and **19** with their respective pole shoes **20, 21** and **22**.

The embodiment illustrated in FIGS. **5** and **6** provides for an arrangement of the rotary spinning chamber within the circumferential confines of the carding roller **3**. Again, like reference numerals identify like elements. Here, however, the spinning chamber **15** is mounted with its shaft **16** within the circumferential confines of the carding roller **3**. The shaft **16** is provided with annular radial projections **31, 31'** and is in contact with two pairs of driving discs **34, 34'** and **35, 35'**, respectively. These discs are mounted on the respective shafts **29, 29'** which are secured in a holder **36** of magnetized material which at the same time also constitutes a pole shoe of a permanent magnet **37**. The latter may have cubical or parallelepipedal form and is mounted between the opposite axial end sections of the holder **36**. The projections **31, 31'** serve to secure the shaft **16** in its desired axial position.

At least one of the two pairs of discs **34, 34'** and **35, 35'** is in contact with the inner circumferential surface of the carding roller **3**. There is further provided an additional holder **40** arranged adjacent the holder **36** in the illustrated manner laterally of the shaft **16** and supporting a shaft **30** on which a further pair **41, 41'** of discs is mounted. A pair of permanent magnets **41, 42**—which may have the form of rods, parallelepipeds or another desired configuration—are located at diametrally opposite sides of the shaft **30** and the discs **41, 41'** (see FIG. **6**). The poles of the magnets **42, 42'** are arranged opposite to magnet **37** and the holder **40** constitutes with its upper and lower portions pole shoes for the magnets **42, 42'**. The purpose of these secondary magnets is to provide for contact of the disc **41, 41'** with the shaft **16** of the chamber **15**.

A main magnet **43** is mounted in the housing **1** exteriorly of the carding roller **3** and has its poles arranged oppositely with reference to those of the magnet **37**, and its pole shoes **44, 45** directed towards the carding roller **3**. The purpose and operation of this embodiment is, of course, the same as before.

In the embodiment of FIGS. **7** and **8** drive-discs **50, 51** and a pulley **52** are mounted on the shaft **2** of the carding roller **3**; the pulley **52** receives rotary motion from a non-illustrated drive. Shaft **2** is rotatably journalled in sleeves **55, 55'** which in turn are mounted and spaced apart in a sleeve **56** surrounding the shaft **2** with clearance. The rotary spinning chamber is identified with reference numeral **15** and it should be emphasized that its particular construction is nowhere disclosed in detail herein, because this construction is well known in the art and is conventional as far as considerations of the present invention are concerned. Reference numeral **16** again identifies the shaft for the spinning chamber **15** and contacts the peripheries of the drive discs **50** and **51**. It extends through openings **62, 62'** provided in the pole shoes **58, 59** which are common both to the main magnet **57** and to the auxiliary magnet **65**. The main magnet **57** is of annular configuration and surrounds the sleeve **56** as well as the sleeves **55, 55'** carried thereby; these sleeves are of non-magnetic material.

A holder **71**, also of non-magnetic material and having a generally rod shape or parallelepiped configuration is connected with the pole shoe **59** below an auxiliary magnet **65**, as mentioned above and is provided with an extension **60** projecting underneath the main magnet **57** and by means of which the entire device is secured to a beam or support **61** of non-magnetic material.

A magnet **70** is mounted on the holder **71** and provided with a pole shoe **69** facing an annular projection at the free end of the shaft **16**. The free end, or the annular projection **66**, is provided with an axial recess **67** and a spherical member or ball **68** is partly received in the recess **67** and in contact with the pole shoe **69**. The shaft **16** is thereby secured against axial displacement.

The main magnet **57** and the auxiliary magnet **65** are so arranged that their like poles are coincident, that is they face in the same direction. The openings **62, 62'** in the pole shoes **58** and **59** surround the shaft **16** with clearance. Their configuration (see FIG. **8**) is such that they each have two oppositely located projections **63, 64** and **63, 64'**, respectively, which are spaced at unequal distances from the shaft **16** in such a manner that the narrower gap—that is the distance which is the smaller—is located at the side of the drive discs **50, 51**. At the side away from the drive discs **50, 51** the gap between the respective projection (here the projections **64, 64'**) and the shaft **16** is larger and this, together with the auxiliary magnet **65** located at the same side,

contributes to stabilization of shaft **16** during its rotary motion.

Coming to the embodiment shown in FIGS. **9** and **10** it will be seen that this is generally similar to the one in FIGS. **7** and **8.** Here, however, two permanent annular magnets **72** and **72'** are employed which surround the sleeve **56** consisting of non-magnetic material. There are further provided two auxiliary magnets **73** and **73'** which may have the form of rods, cubes or parallelepipeds or another suitable configuration and which are located at the opposite side of the shaft **16** from the magnets **72, 72'** (see FIG. **9**). The two pairs of magnets are connected at their identical poles, a pole shoe **58'** being interposed and provided with an opening **62'** having the same shape as the openings **62, 62'** of FIGS. **7** and **8.** The drawing of FIG. **9** clearly shows that the shaft **16** of the spinning chamber **15** thus also passes through the opening **62''.** In other respects the embodiment of FIGS. **9** and **10** is the same as that of FIGS. **7** and **8.**

FIG. **11** shows an alternative embodiment to that of FIGS. **9** and **10.** Here a plurality of circular magnets **73, 73'** and **73''** is provided which surrounds and are mounted upon the non-magnetic sleeve **56.** The magnets **73, 73'** and **73''** are provided with pole shoes **74, 74', 74''** and **75.** The latter, that is the pole shoe **75,** is provided with an extension **76** by means of which the entire device is fixedly secured with a support or beam **61** in suitable manner. Element **61** again consists of non-magnetic material.

Shaft **16** (the spinning chamber **15** is omitted) is provided at its free or bottom end with a tip **78** which engages a support bearing **79** to locate the shaft **16** in desired axial position.

In the embodiment of FIGS. **12** and **13** like reference numerals again identify like elements as in the preceding embodiments. Here, however, there is provided a holder **80** of non-magnetic material which is mounted on the support **61** and provided with a tubular portion **80a** which takes the place of the sleeve **56** in the preceding embodiments and which mounts the sleeves **55, 55'.** The shaft **2** of the carding roller **3** is journalled in the sleeves **55, 55'.** Drive discs **50, 51** are provided as well as a pulley **52** by means of which motion is imparted to the shaft **2** from a non-illustrated source of motion.

A pole shoe **81** is mounted adjacent the tubular portion **80a** between the drive discs **50** and **51.** On the side facing away from the shaft **2** the pole shoe **81** is provided with alternating projections **82** and recesses **83** which may be of identical width—with reference to the axial elongation of the shafts **2** and **16**—or of which the projections **82** may have a greater width than the recesses **83,** or vice versa. Again, the recesses **82** and **83** may be entirely omitted. In the illustrated embodiment, where the recesses **82** and **83** are provided, the shaft **16** of the rotary spinning chamber **15** is provided with corresponding recesses **86** and projections **85** whose dimensions correspond to those of the projections **83** and recesses **83** and which are juxtaposed with their counterparts. Alternately, the shaft **16** may be smooth, that is the recesses **85** and **86** may be omitted. Rod-like permanent magnets **87** and **88** are mounted in pole shoe **81** and their identical poles are located adjacent one another. They serve by means of the pole shoe **81** to provide the axial and radial stabilization of the shank **16** and thereby of the spinning chamber **15** which constitutes the concept of the present invention.

Coming, finally, to the embodiment illustrated in FIGS. **14** and **15** it will be seen that this is again rather similar to the embodiment of FIGS. **7** and **8.** Here, a holder **94** is provided one of the ends of which is secured to the support **61.** Its tubular portion **94***a* corresponds to the sleeve **56** and journals the sleeves **55** and **55'** in which the shaft **2** of the carding roller **3** is mounted for rotation. Drive discs **50, 51** are mounted also on the shaft **2** for rotation therewith and contact the shaft **16** of the spinning chamber **15.**

Mounted in a cylindrically configurated portion **95** of the holder **94** are two semi-circular or horseshoe-shaped permanent magnets **89** and **90** with pole shoes **91** and **92** being interposed between them which extend in the direction towards the shaft **16** to thereby secure the same radially against movement. The magnets **89** and **90** are arranged adjacent the pole shoes **91** and **92** with their like poles being coincident. Axial stabilization of the shaft **16** against movement is the same as in the embodiment of FIGS. **7** and **8.**

The various embodiments having been described with respect to their structural features, the operation of the device according to the present invention will now be explained. In the embodiments of FIGS. **1** and **2** rotary motion is transmitted to the shaft **2** of the carding roller **3** by means of the pulley **4** from a non-illustrated source. As the carding roller **3** moves it transmits motion to the shaft **16** of the spinning chamber **15** which is in engagement with and rolls on the beads **5** and **6.** It will be appreciated that in all embodiments suitable passages will be provided, connecting the carding roller with the spinning chamber so that fibers can move from the former to the latter. Such passages, and the flow-direction of the fibers, are shown in FIGS. **1, 2** and **5.** A detailed description is not, however, believed necessary because the passages per se are already known from the art, for instance from U.S. Pat. No. 3,455,097 to which reference may be had for further information. The position of the shaft **16** is stabilized on the one hand by the bearings **11** and **12** and the projection **17,** and on the other hand by the permanent magnets **18** and **19** the pole shoes **20, 21** and **22** of which attract the shaft **16** of the spinning chamber **15** to the projections **5, 6** and thus stabilize it in its desired position.

In the embodiment of FIGS. **3** and **4** the position of the shaft **16** is stabilized by the discs **26, 26'** and **27, 27'** of which at least one pair, in this embodiment of the discs **27, 27',** is associated with the projection **17** at such time as the shank **2** is started or stopped in its rotation. After the starting phase is completed, shaft **16** is no longer in contact with discs **26, 26'** and **27, 27'** and is maintained in engagement with the projections **5** and **6** of the carding roller **3** exclusively by the permanent magnets **18, 19** and their pole shoes **20, 21** and **22.** When the rotation of the shaft **2** and the carding roller **3** is stopped, so that motion transmitted to the shaft **16** by means of the beads **5** and **6** is interrupted, the shaft again contacts the discs **26, 26'** and **27, 27'.**

In the embodiment of FIGS. **5** and **6** rotary motion is transmitted to at least one of the pairs of discs **34, 35** when the shaft **2** is started, by contact with the inner wall surface of the carding roller **3.** The shaft **16** is pressed by the action of the discs **41** and **41'** against the two pairs of discs **34, 35** because of the mutual attrac-

tion of the permanent magnet **37** and the permanent magnets **42, 42'** via the holders **36** and **40,** which constitute the pole shoes of the magnet **37** or the magnets **42, 42'** respectively, which magnets are arranged with their opposite poles towards one another. Securing of contact of at least one of the two pairs of discs **34, 35** with the inner circumferential surface of the rotating carding roller **3** is thus an inevitable condition for achieving rotation of the shaft **16** as well as the stabilization of its position. It is achieved by the provision of the main magnet **34** located outside the carding roller **1** and acting with its pole shoes **44** and **45** upon the holder **56** which in turn forms a pole shoe of the magnet **37** the poles of which are arranged oppositely with respect to the signs of the poles of the magnet **43.**

In the embodiment of FIGS. **7** and **8** rotation of the carding roller **3** and discs **51** and **52** is imparted to the shaft **16** of the spinning chamber **15.** The shaft **16** is radially secured by the magnet **57** and the magnet **65.** They both act upon shaft **16** with their common pole shoes **58** and **59** and with the pole shoes **63, 64** and **63', 64'** respectively. The shaft **16** is axially secured by the magnet **70,** the spherical member **68** and the recess in which the latter is received.

In the embodiment of FIGS. **9** and **10** rotation of the carding roller **3** results in the rotation of the discs **50** and **51** which, being in contact with the shaft **16,** rotate the latter. The permanent magnets **72** and **72'** act upon the shaft **16** magnetically to radially secure it. Permanent magnets **73** and **73'** act on the shaft **16** via the pole shoes **63, 64, 63', 64', 63''** and **64''** in the openings **62, 62'** and **62''** of the common pole shoes **58, 58'** and **59.** The shaft **16** is axially secured against displacement in the same manner as discussed above with respect to the embodiment of FIGS. **7** and **8.**

In FIG. **11** the drive discs **50** and **51** transmit rotary motion from the shaft **2** of the carding roller **3** to the shaft **16.** The magnets **73, 73'** and **73''** with their pole shoes **74, 74', 74''** and **75** act upon and secure the shaft **16** in radial direction, whereas the bearing **79** maintains the shaft **16** against displacement in axial direction.

In FIGS. **12** and **13** rotary motion to the shaft **16** is imparted by the discs **50** and **51** in response to the rotation of the shaft **2.** Radial and axial maintaining of the shaft **16** in its predetermined location takes place via an open magnetic circuit by means of the pole shoes **81** through the permanent magnets **87** and **88,** whereas the pole shoe **81** as well as the shaft **18** cannot be provided with projections **82** or **85,** and recesses **83** or **86** which have been described earlier with respect to these Figures.

In FIGS. **14** and **15,** finally, shaft **16** is rotated by contact with the discs **50** and **51** which in turn are rotated in response to rotation of the shaft **2.** Shaft **16** is radially maintained in its predetermined position by a closed magnetic circuit with the pole shoes **91** and **92** which are directed towards shaft **16** from two opposite sides, in response to the action of two semi-circular or horseshoe-shaped magnets **89** and **90** which surround the shaft **16** over part of its length. The axial maintenance of shaft **16** in its predetermined position is the same as described with respect to FIGS. **7** and **9.**

It will be clear from what has been set forth that by resorting to the present invention there is obtained a very simple construction, eliminating the need for high-speed bearings for journalling the shaft **16.** The reliability in the transmission of rotary motion in these constructions according to the present invention is superior to what is known from the art, and the maintenance of the shaft in the correct operating position—and therefore of the spinningchamber—with respect to radial and axial positioning, is accomplished in a very simple and highly efficient manner. All of this contributes in a significant improvement in the operation of a machine utilizing an arrangement and in a consequent improvement of the thread or yarn quality produced with the arrangement on such a machine.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a device for ringless spinning of fibers, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. In a device for ringless spinning of fibers, in combination, a hollow cylindrical carding roller having an inner circumferential surface and being mounted for rotation about a first axis; a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining for the same a second axis of rotation axially paralleling said first axis, said shaft extending in part into said carding roller; magnetic means maintaining said shaft in a predetermined operative position in lieu of bearings; and drive means, comprising motion-transmitting elements on said inner circumferential surface, engaging said shaft for rotating the same and said spinning chamber in response to rotation of said carding rollers.

2. In a device as defined in claim **1,** said motion-transmitting elements comprising at least two circumferentially complete annular beads provided on said inner surface axially spaced from one another and in engagement with an outer surface of said shaft.

3. In a device as defined in claim **1;** further comprising retaining means operative for retaining said shaft at least substantially against movement to positions in which it is skew with reference to said predetermined position, during starting and stopping of said rotation.

4. In a device as defined in claim **3,** said retaining means comprising annular retaining members surrounding said shaft with predetermined radial clearance and being fixedly mounted in said carding roller.

5. In a device as defined in claim **1** said motion-transmitting elements comprising at least two pair of coaxial motion-transmitting annuli surrounding said shaft in motion-transmitting relationship therewith, at least one of said pairs contacting said inner surface and

receiving rotary motion in response to rotation of said carding roller.

6. In a device as defined in claim 1, said magnetic means comprising at least two permanent magnets having like poles which face one another, and pole shoes facing said shaft.

7. In a device as defined in claim 6, said permanent magnets being rod shaped.

8. In a device as defined in claim 6, said permanent magnets being circumferentially complete annular magnet members of circular outline.

9. In a device as defined in claim 6, said permanent magnets being circumferentially incomplete annular magnet members of semi-circular outline.

10. In a device as defined in claim 6, said permanent magnets being of substantially cubical configuration.

11. In a device as defined in claim 6, said permanent magnets being of parallelepipedal configuration.

12. In a device as defined in claim 5; said magnetic means comprising a main magnet and three auxiliary magnets, a holder for said main magnet supporting the latter exteriorly of said carding roller adjacent the wall of the same, said holder constituting a pole shoe for one of said auxiliary magnets located within said roller and having two poles arranged oppositely said main magnet, and a pair of permanent reinforcing magnets mounted on said motion-transmitting annuli and having poles positioned in coincident relationship with those of said main magnet, and an additional holder holding said reinforcing magnets and constituting a pole shoe for the same.

13. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a first shaft fixed with said spinning chamber and defining an axis of rotation for the same; magnetic means maintaining said first shaft in a predetermined operative position in lieu of bearings; a carding roller having a second shaft and being mounted for rotation in axial parallelism with said axis of rotation of said chamber; and drive means, comprising at least two annular drive members surrounding and fixed to said first shaft and operatively associated with said second shaft for receiving rotary motion from the same.

14. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining an axis of rotation for the same; drive means engaging said shaft for rotating the same and said spinning chamber; and magnetic means maintaining said shaft in a predetermined operative position in lieu of bearings, said magnetic means comprising a plurality of permanent magnets arranged above one another and having respective coincident poles, and pole shoes connecting said coincident poles.

15. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining an axis of rotation for the same; drive means engaging said shaft for rotating the same and said spinning chamber; and magnetic means maintaining said shaft in a predetermined operative position in lieu of bearings, said magnetic means comprising a plurality of permanent magnets arranged above one another at opposite sides of said shaft, and pole shoes on said magnets and cooperating with said shaft for maintaining the same in said predetermined position.

16. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining an axis of rotation for the same; drive means engaging said shaft for rotating the same and said spinning chamber; and magnetic means maintaining said shaft in a predetermined operative position in lieu of bearings, said magnetic means comprising a plurality of permanent magnets arranged adjacent one another all at one side of said shaft and having respective coincident poles, and a pole shoe extending longitudinally of said shaft and connecting said coincident poles.

17. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining an axis of rotation for the same; drive means engaging said shaft for rotating the same and said spinning chamber; and magnetic means maintaining shaft in a predetermined operative position in lieu of bearings, said magnetic means comprising a plurality of permanent magnets surrounding said shaft and having respective coincident poles, and pole shoes extending longitudinally of said haft directed towards the same and connecting said coincident poles.

18. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining an axis of rotation for the same, said shaft having an upright orientation and a free lower end; a bearing below said lower end, supporting and journalling the same; drive means engaging said shaft for rotating the same and said spinning chamber; and magnetic means maintaining said shaft in a predetermined operative position in lieu of bearings.

19. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining an axis of rotation for the same, said shaft having an upright orientation and a free lower end; a permanent magnet cooperating with said lower end for maintaining it in a predetermined position; drive means engaging said shaft for rotating the same and said spinning chamber; and magnetic means maintaining said shaft in a predetermined operative position in lieu of bearings.

20. In a device as defined in claim 19, said permanent magnet being located below said free end and an upwardly facing pole shoe; and further comprising a reinforcement portion provided on said free end, a recess provided in said reinforcement portion having an open side facing downwardly towards said pole shoe, and a spherical member of magnetizable material partially received in said recess and in magnetic engagement with said pole shoe.

21. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining an axis of rotation for the same; drive means engaging said shaft for rotating the same and said spinning chamber; and maintaining means maintaining said shaft in a predetermined operative position in lieu of bearings, said maintaining means comprising permanent magnet means having a pole shoe extending along but slightly spaced from said shaft, a plurality of circumferential first recesses and first projections provided on said shaft alternating in axial direction thereof, and a plurality of second recesses and second projections provided on said pole shoe, each of said second recesses being

juxtaposed with one of said first recesses and each of said second projections being juxtaposed with one of said first projections.

22. In a device as defined in claim **21,** wherein said projections and recesses are of identical width in axial direction of said shaft.

23. In a device as defined in claim **21,** wherein the width of said projections in axial direction of said shaft is greater than the corresponding width of said recesses.

24. In a device for ringless spinning of fibers, in combination, a hollow rotary spinning chamber; a shaft fixed with said spinning chamber and defining an axis of rotation; drive means engaging said shaft for rotating the same and said spinning chamber; and magnetic means maintaining said shaft in a predetermined operative position in lieu of bearings, said magnetic means comprises a plurality of permanent magnets at least one of which has a magnetic force which is lower that that of the others.

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