

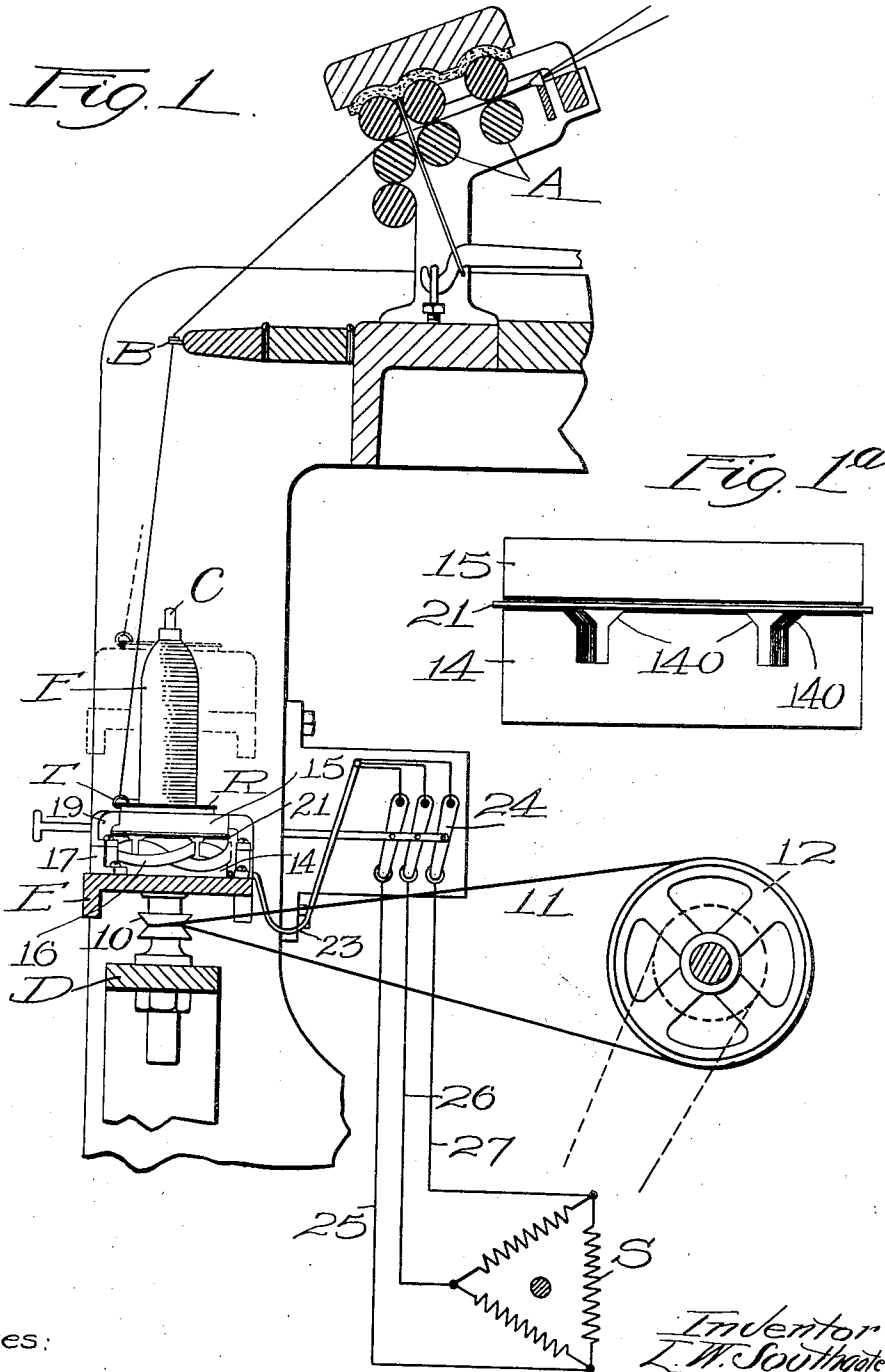
L. W. SOUTHGATE.
SPINNING OR TWISTING APPARATUS.

APPLICATION FILED APR. 5, 1910. RENEWED JUNE 2, 1914.

1,122,167.

Patented Dec. 22, 1914.

3 SHEETS—SHEET 1.



Witnesses:

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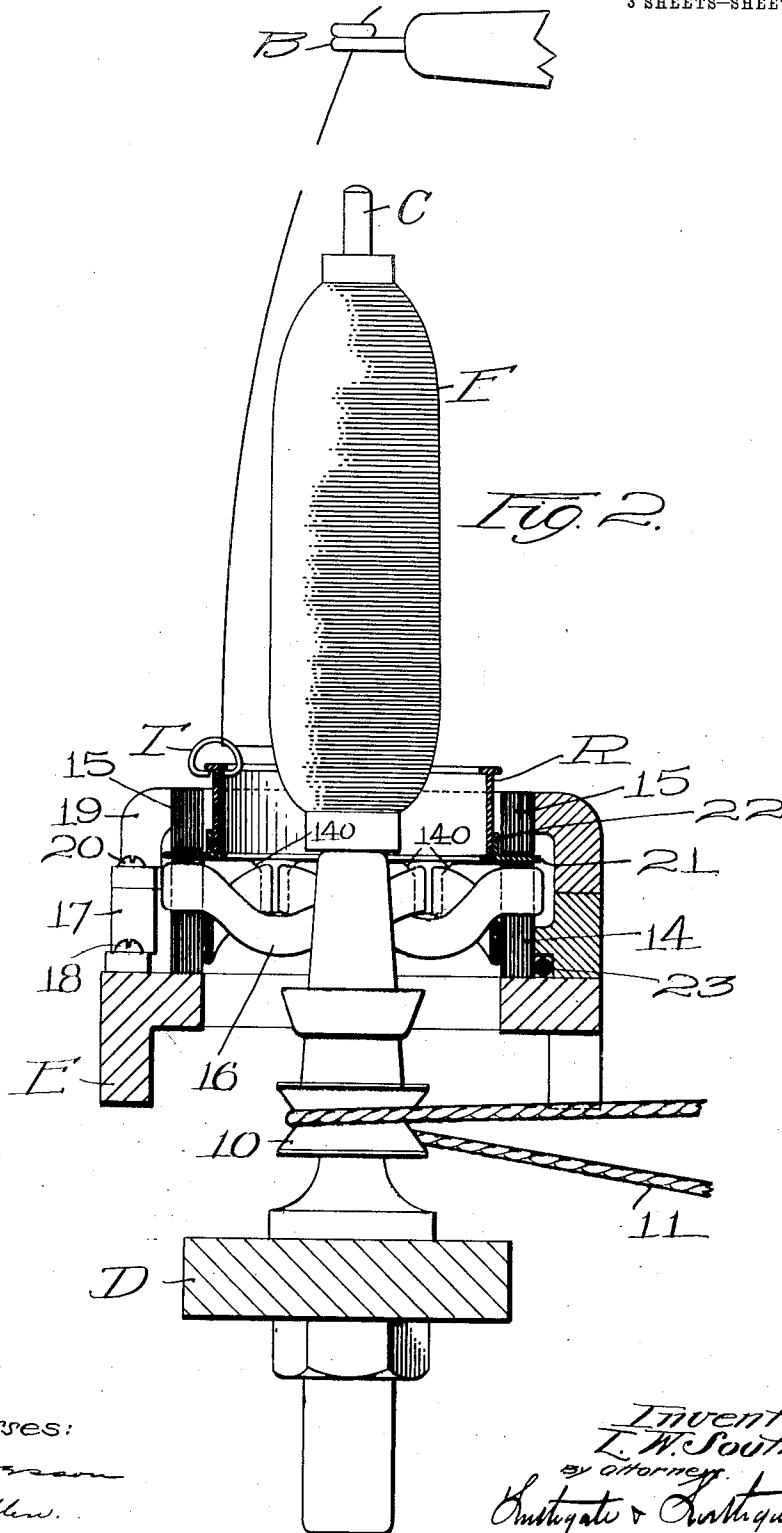
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Fig. 3.

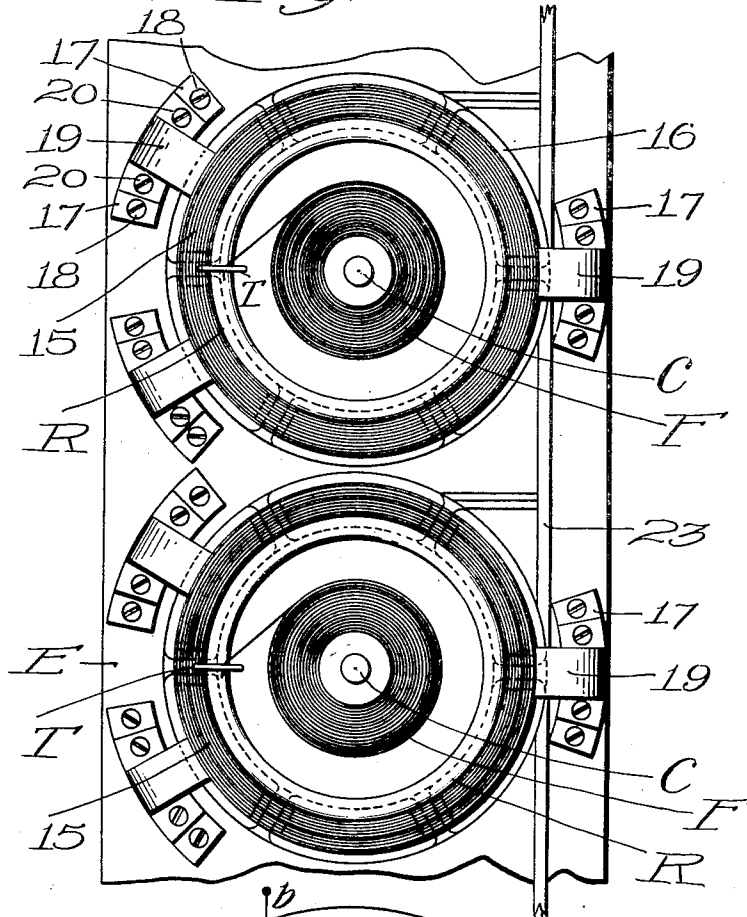
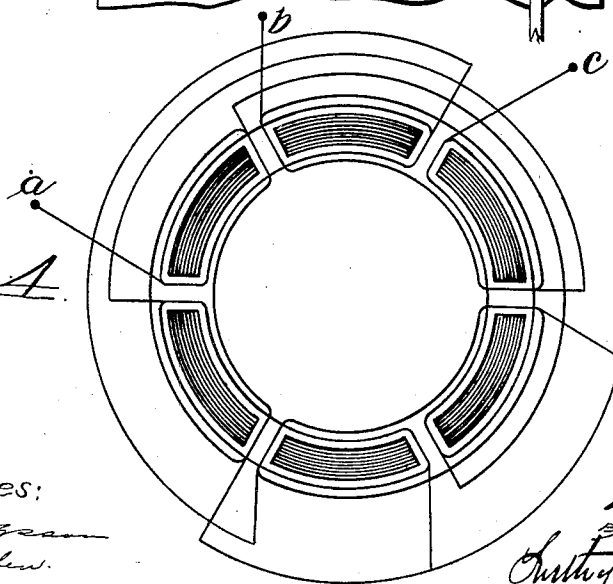


Fig. 4.



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UNITED STATES PATENT OFFICE.

LOUIS W. SOUTHGATE, OF WORCESTER, MASSACHUSETTS.

SPINNING OR TWISTING APPARATUS.

1,122,167.

Specification of Letters Patent.

Patented Dec. 22, 1914.

Application filed April 5, 1910, Serial No. 553,552. Renewed June 2, 1914. Serial No. 842,503.

To all whom it may concern:

Be it known that I, LOUIS W. SOUTHGATE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Spinning or Twisting Apparatus, of which the following is a specification.

The object of this invention is to increase and improve the output of spinning or twisting machines, particularly of the ring type. A ring spinning or twisting machine comprises a frame having a large number of spindles which carry bobbins or cops which are rotated at high speed. Surrounding each spindle is a ring usually T or I-shaped in cross-section. These rings are carried by a ring rail which is raised and lowered relatively to the spindles to lay the yarn on the bobbins or cops. A traveler consisting of a light loop of wire or metal is snapped on each ring. The yarn or material to be spun or twisted is fed to thread-guides arranged concentrically with the spindles and then is led down through the travelers to the bobbins. As each spindle and bobbin is rotated at high speed, each traveler will be dragged around on its ring. The traveler will make the same number of revolutions as the spindle, less a number of revolutions representing the feed of the yarn to the bobbin.

It will be noticed that the traveler will have a strong outward throw from centrifugal action as it is rotated around on its ring. It also will be noticed that the yarn has to drag or pull the traveler around the ring. When it is attempted to increase the speed of the spindles, this centrifugal throw puts so much pressure on the travelers that they rapidly wear or burn off, and as the co-efficient of friction greatly increases, as the parts become heated, a heavy strain or pull is put upon the yarn, which leads to breakages and which interferes with the output. Each traveler has to be made light because it has to be rotated by the thread or yarn and the friction of its small bearing surface on the ring and the strain of dragging the same around on the ring is the limiting factor of speed of spinning spindles as now built, although the spindles could be rotated much faster and the yarn could be fed much faster than at present if the yarn and travelers would stand the additional strain due to increased speed. Moreover, owing to the drag of the traveler

and the strain of the yarn above pointed out, it is impracticable to spin light or loosely twisted strands on ring spinning frames because the strands are not strong enough to drag the traveler around against its friction. I have discovered that these difficulties can be overcome and that the speed of the spindles can be increased and better and finer work can be done by arranging or connecting each ring as the rotor of a small electric motor, preferably of the induction type. This motor preferably is driven at a speed somewhat under the speed of the spindle. For illustration, the speed of the ordinary ring spinning spindle is somewhat under ten thousand turns per minute. Supposing that it is desired to increase this to fifteen thousand turns per minute, then the rotor ring would be driven at a speed say from twelve to fourteen thousand turns per minute. By this arrangement the yarn will only have to pull the traveler around on the ring, (omitting from consideration the feed of the yarn), a number of turns equal to the difference of speed between the spindle and the rotor ring; say, with the figures above given, from one to three thousand turns per minute. This the yarn can easily do, and as the relative speed between the traveler and ring is thus reduced to a relatively low figure, the traveler by its rotation on the ring will not become heated.

An induction motor is admirably adapted for the use above described, as it has no commutator or collector and as there is no sparking.

The way the invention is preferably applied is to arrange each ring as part of the rotor of such induction motor and to arrange these induction motors on the raising and lowering ring rail. The wiring for the motors is carried along the ring rail and the wiring is connected by flexible conductors to a generator, preferably of the multipolar type, so that the generator can be driven at a less speed than the great speed required for the rotors of the induction motors.

The best form now known to me in which the invention can be practised is illustrated in the accompanying three sheets of drawings forming part of this application for patent in which,

Figure 1 is a sectional elevation of part of a spinning frame with my invention applied thereto. Fig. 1^a is a detail of the pole

pieces of the motor. Fig. 2 is a sectional view on an enlarged scale through one spindle, illustrating the construction of ring rotor and pole pieces. Fig. 3 is a plan view illustrating the arrangement of two spindles, and Fig. 4 is a plan view illustrating the wiring diagram of the lower pole pieces of the motor.

Referring to the drawings and in detail, 10 A designates the ordinary top or feed rolls which feed the yarn or strands forward to the thread-guides B which are carried by the usual thread-guide supports.

C designates the spindles which are 15 mounted on the spindle rail D. Each spindle is provided with a whirl 10 driving which is a quarter turn belt 11 which passes around the driven drum or cylinder 12.

E designates the ring rail and F the bobbins or cops which are placed on the spindles. 20 The ring rail is bored out or perforated so that the spindles project up through the same. These parts are arranged in any ordinary or usual manner.

Mounted so as to carry each ring as a part 25 of its rotor is the electric motor of the induction type now described. The same consists of lower and upper ring-shaped pole pieces 14 and 15. These pole pieces are 30 preferably made laminated, which can be done by winding the pole pieces from thin strips of soft iron so that the windings will be insulated from each other as by varnishing the strips or by placing strips of insulating material between the windings.

The lower pole piece 14 has six slots cut therein and wound around these slots are coils 16. The winding of these coils is such as to make the lower ring-shaped pole piece 40 14 into a field which will give a rotary field effect. The winding which I preferably employ is of the three-phase type and the same is represented diagrammatically in Fig. 4 with the three projecting terminals represented by *a*, *b* and *c*. The upper ring-shaped 45 pole piece 15 is supported above the lower ring-shaped pole piece which carries the wiring. The pole piece 14 is held in position by brackets 17, three being shown, which 50 brackets are held by screws 18 to the ring rail B. These brackets may be soldered or otherwise secured to the pole piece 14. Resting on top of the brackets 17 are brackets 19 which are secured to the brackets 17 55 by screws 20. These upper brackets carry and support the upper pole piece 15. The brackets are preferably made of brass. The construction above described is provided so that the motor can be easily assembled or 60 taken apart.

The rotor of the motor is shown at 21. This rotor is made in the form of a flat ring and is arranged between the pole pieces 14 and 15. This rotor is preferably made out 65 of bronze, brass, aluminum or other non-

magnetic material so that it will not stick to the pole pieces. The rotor 21 rests on the lower pole piece 14 and the edges of the slots thereof are beveled away, as shown at 140 in Fig. 1^a, so that the rotor by its great speed 70 will have a tendency to draw air in between the same and the top of the pole piece 14 and thus provide an air cushion on which the rotor will turn.

The spinning ring itself is carried by, or formed with, the rotor. One way this can be arranged is shown in Fig. 2. In this figure, the rotor 21 is provided with an upwardly extending rib 22, the outside of which projects into the upper pole piece 15 and thus keeps the rotor in place laterally. The spinning ring R, in the construction illustrated, is made T-shaped in cross-section. The ring fits tightly down inside the rib 22 and the ring and the rotor may be 85 held together simply by driving the ring into the rotor or by otherwise securing the ring thereto. The ring R preferably is made of steel hardened in the usual manner.

T designates the traveler which may be of 90 any of the ordinary constructions and which may be mounted or snapped on the ring R.

A cable 23 carrying three wires is arranged along the ring rail and may be clamped in place by the rear brackets 17. 95 The terminal wires *a*, *b* and *c* of the motors are connected to this cable. The end of the cable is connected to a switch 24 which may be mounted on the frame and which can be operated by a handle extending to any suitable position. The connection or portion of 100 the cable between the switch and the ring rail is made flexible so that the ring rail can move up and down relatively to the bobbin.

The switch connects to three wires 25, 26 and 27 which lead to a generator S of any approved form. The generator preferably employed is a multipolar generator of the three-phase type. This style of generator is 110 employed so that the generator will not have to turn at the tremendous speed at which the rotors of the induction motors are driven. The generator may be driven directly from the shaft of the cylinder 12 or may be located and driven at any convenient point. 115

In large spinning mills it is preferred to put the generator in the power plant and carry the currents around under high voltage and step the same down by transformers 120 for various sections of the spinning frames. The three-phase arrangement of motor, generator and transformers is preferably employed, as the same lends itself very readily to the development of high speed. 125

In practice, as the spindles are started in operation, the induction motors are also started in operation. The free mounting of the travelers on the spinning rings will provide for such slippage or adjustment as may 130

be necessary to bring the parts up to proper and relative speeds. As the parts come into operation, the thread or yarn will be spun in the ordinary way with the exception that the rings will be driven at a high speed, preferably just under that of the speed of the spindles. Then the only work which the yarn will have to do will be to draw or pull the travelers around on the rings at a speed necessary to keep the travelers at the right speed relatively to the spindles. As above explained, this puts very little strain on the yarn and gives the yarn very little work to do, as the relative rotation of each traveler on its ring is small and as by reason of this small relative rotation the traveler will not become heated, whereby coefficient of friction will be kept small.

The arrangements above described are such that each ring R can be readily taken out for adjustment or replacement and so that each motor can be very easily taken apart or substituted by a new one. In some cases in practice, the motor is covered with a light casing or cap. The spinner does not have to make any new adjustments with the device, as the travelers can be threaded and the travelers snapped on and off the rings in the ordinary ways.

Many other arrangements may be worked out for practising my invention without departing from the scope of my invention as expressed in the claims.

Having thus fully described my invention, what I claim and desire to secure by Letters-Patent is:—

1. In a spinning or twisting machine, an electric motor mounted on the ring rail, and a spinning ring connected to the rotor thereof.

2. In a spinning or twisting machine, an induction electric motor mounted on the ring rail, and a spinning ring connected to the rotor thereof.

3. In a spinning or twisting machine, an electric motor mounted on the ring rail and having a rotor encircling the spindle, and a spinning ring connected to the rotor thereof.

4. In a spinning or twisting machine, an induction electric motor mounted on the ring rail and having a ring-shaped rotor encircling the spindle and a spinning ring carried by the rotor thereof.

5. In a spinning or twisting machine, an electric motor mounted on the ring rail and having a ring-shaped rotor encircling the spindle and a spinning ring detachably connected thereto.

6. In a spinning or twisting machine, an induction electric motor having its pole pieces secured to the ring rail and a ring-shaped rotor surrounding the spindle, and a spinning ring carried by said rotor.

7. In a spinning or twisting machine, an induction electric motor mounted on the ring rail comprising upper and lower pole pieces, the lower pole piece being slotted to receive the windings, a flat ring-shaped rotor arranged between the pole pieces, and a spinning ring carried by the rotor, the edges of the slots of the lower pole piece being beveled off for the purpose described.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

LOUIS W. SOUTHGATE.

Witnesses:

C. FORREST WESSON,
E. M. ALLEN.