No. 699,152. Patented May 6, 1902.

P. P. CRAVEN.

RING SPINNING, DOUBLING, OR TWISTING MACHINE.

(Application filed May 14, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

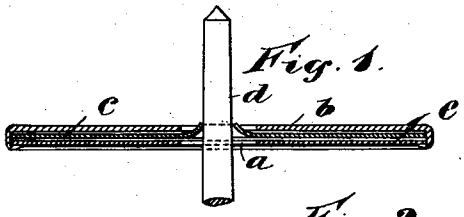


Fig. 3.

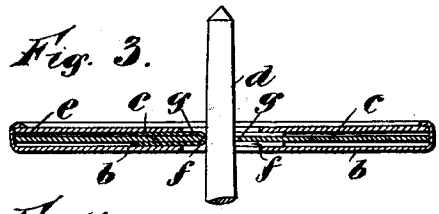


Fig. 2.

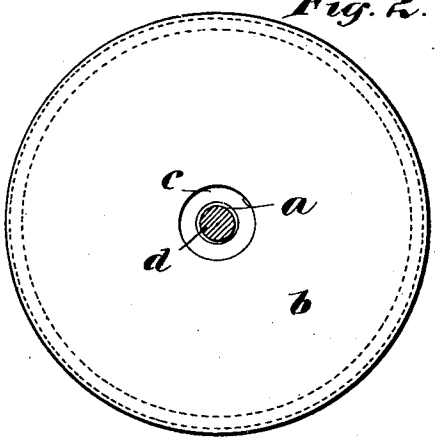


Fig. 4.

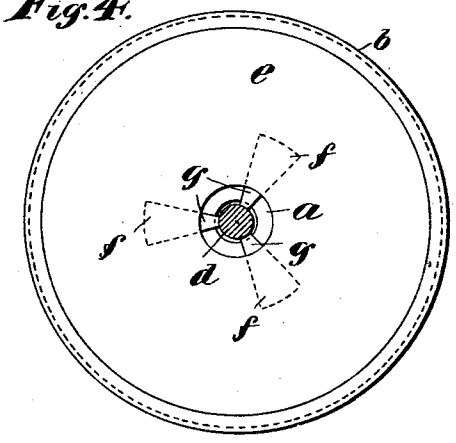


Fig. 5.

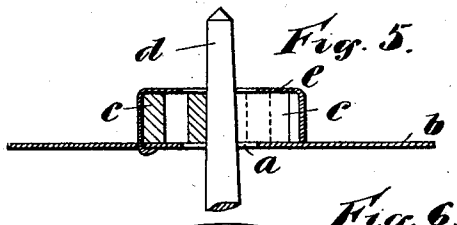


Fig. 7.

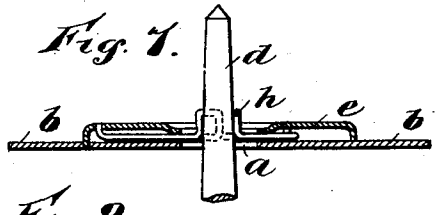


Fig. 6.

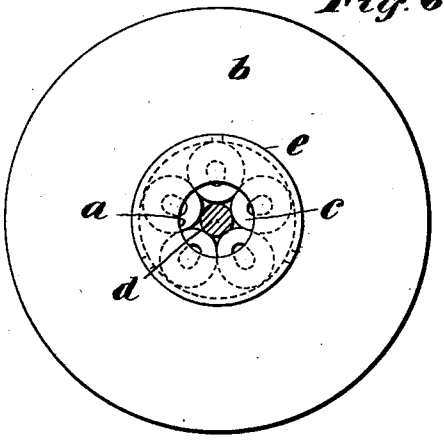
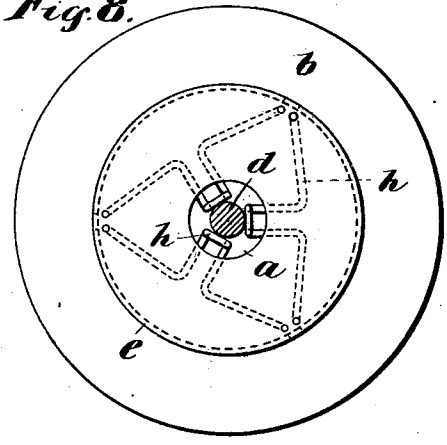


Fig. 8.



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No. 699,152. Patented May 6, 1902.

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Fig. 11.

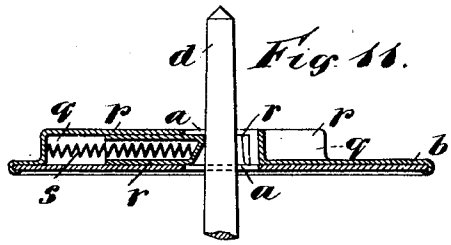


Fig. 13.

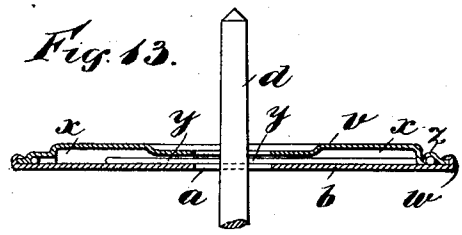


Fig. 12.

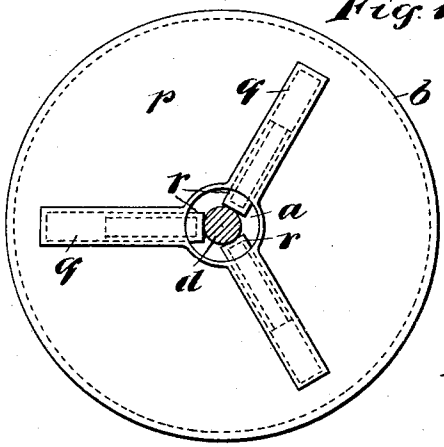


Fig. 14.

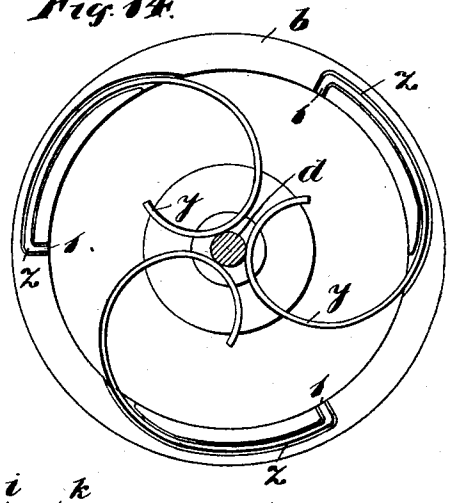


Fig. 9.

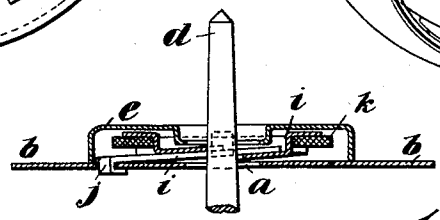
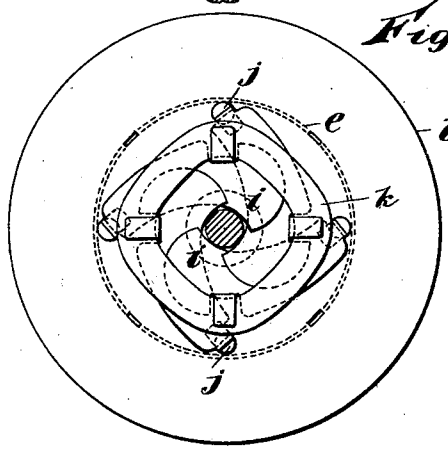


Fig. 10.



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(Application filed May 14, 1901.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 15.

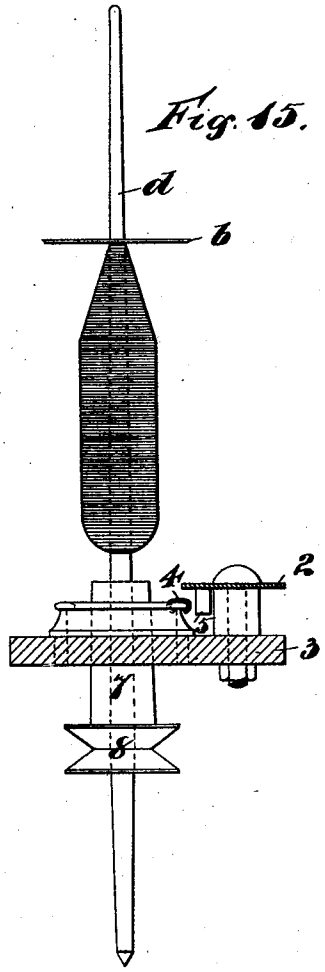
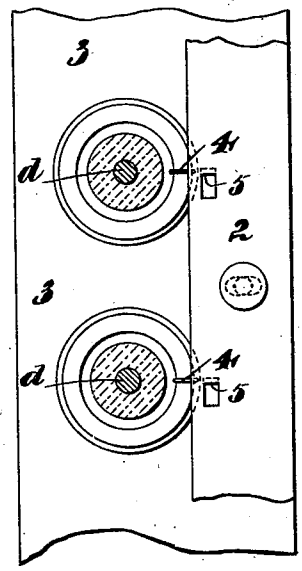


Fig. 16.



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UNITED STATES PATENT OFFICE.

PHINEHAS PEARSON CRAVEN, OF MANCHESTER, ENGLAND.

RING-SPINNING, DOUBLING, OR TWISTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 689,152, dated May 6, 1902.

Application filed May 14, 1901. Serial No. 60,288. (No model.)

To all whom it may concern:

Be it known that I, PHINEHAS PEARSON CRAVEN, gentleman, a subject of the King of Great Britain, residing at 16 Devonshire street, Ardwick, Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Ring-Spinning, Doubling, or Twisting Machines, (for which I have applied for patents in Great Britain dated and numbered respectively, October 8, A. D. 1900, No. 18,591; November 8, A. D. 1900, No. 20,128; March 12, A. D. 1901, No. 5,236, and March 21, A. D. 1901, No. 5,979;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

It is well known that in ordinary ring-spinning machines it is not practicable to spin and wind onto the bare spindle or onto a very thin tube placed on the spindle, by reason of the excessive drag or tension brought upon the yarn or thread when the latter is being wound onto the smaller end of the cop—that is to say, onto those diameters of the cop-chase which approximate more or less nearly to the diameter of the spindle itself. In order to obviate this inconvenience, disks are sometimes mounted on and caused to rotate with the spindles, the yarns or threads on their way from the thread-guide to the ring-travelers and spindles being caused to bear against the edges of the said disks, thereby producing friction between themselves and the disks, which enable the latter to assist the yarns or threads to drag around the travelers, and thereby reduce the tension on the said yarns or threads. When using these disks, however, it is customary for certain reasons to make the spindles of uniform diameter throughout the length of that part of them on which the cops are wound, so that the holes through the centers of the cops are practically cylindrical, and consequently do not fit the pegs of the shuttles ordinarily used for weaving cops spun on mule-spindles, which latter are taper.

The chief object of my present invention is to provide means whereby ring-spinning, doubling, and twisting machine spindles on which the aforesaid disks are used may be made taper, like the ordinary mule-spindles, in order that the cops may have taper holes through them instead of cylindrical, so as to fit the pegs of the shuttles used for weaving cops spun on a mule.

Heretofore in order to cause the disk to rotate with the spindle the latter has been made of triangular or other polygonal section, or of circular section with one or more flats, or with one or more longitudinal grooves on its side or sides, the hole in the disk being shaped accordingly. The spindle at the part where the cop is wound on is, as above stated, parallel-sided in order that the disk as it rises during the formation of the cop may continue to be driven by the spindle, whereas if the spindle were made taper, like a mule-spindle, the disk would cease to be driven by the spindle when it reaches a part of the latter too small in diameter to drive it.

Now according to my present invention I make the spindle tapered, like an ordinary mule-spindle, and in order to cause the disk to rotate with the spindle at whatever part of the latter it may be situated at any given moment during the formation of the cop I provide the disk with a suitable spring or with suitable springs, which bears or bear against the side or sides of the spindle with sufficient force at any part of the effective length thereof to produce friction enough to enable the spindle to rotate the disk. This spring or these springs may be made in any suitable way and of any suitable shape, and they may be connected to the disk or they may be contained in a box mounted on the latter and may be secured or not to such box.

In order that the said invention may be fully understood, I will now proceed to describe the same with the aid of the accompanying drawings, in which—

Figures 1, 3, 5, 7, 9, 11, and 13 are sectional elevations, and Figs. 2, 4, 6, 8, 10, 12, and 14 are corresponding plan views, of disks provided with spring frictional devices in accordance with my invention; and Figs. 15 and 16 devices for raising the disk on the spindle at each upward movement of the ring-rail.

Similar characters of reference relate to like parts in all the figures of the drawings.

In the arrangement shown in Figs. 1 and 2 I form around the central hole *a* in the disk

b a kind of stuffing box or sleeve composed of india-rubber or other suitable elastic material *c*, adapted to press radially inward toward the spindle *d* when the disk is threaded onto the latter, so as to grasp the same with sufficient force to produce friction enough between the spindle *d* and the said elastic material *c* to cause the disk to be rotated by the spindle as the latter revolves, whether the disk is at the thicker or at the thinner part thereof, the elasticity of the said elastic material being sufficient to enable the latter to expand or contract, according to the thickness of the part of the spindle at which it may be at any moment. The elastic material may be suitably secured to the disk or it may be inclosed within a box or casing *e*, secured to the disk *b* by having its edge beaded over the edge of the latter, or the said box or casing may be connected with the disk by any suitable means, such as by riveting, for example.

Instead of the elastic material bearing directly against the sides of the spindle, as shown in Figs. 1 and 2, I sometimes interpose metallic bearing-surfaces between it and the spindle. For example, I may use sheet-metal clamps *f*, (see Figs. 3 and 4,) the bent parts *g* of which bear against the spindle and enable the disk to rise up thereon with greater freedom than when the elastic material—such as india-rubber, for example—comes in direct contact with the spindle. It will be understood that there is sufficient radial elasticity in the elastic material *c* to keep the inner ends *g* of the metallic clamps *f* constantly pressed against the spindle whatever may be the diameter of the part of the latter that the disk may happen to be at.

If desired, the india-rubber or other elastic material *c* and its inclosing box or casing *e* may be made of smaller diameter than the disk instead of nearly the same diameter, as shown in Figs. 5 and 6, in which the elastic material *c* is shown as made in several separate pieces, each adapted to press radially against the side of the spindle *d*.

According to the arrangement shown in Figs. 7 and 8, instead of using elastic material in the form of a stuffing box or sleeve I employ springs—three, for example—*h*, mounted on the disk *b* and adapted to bear at their ends radially against the sides of the spindle *d*, such ends being preferably bent upward and curved toward the spindle, so as to bear against the same at points somewhat above the level of the disk itself, as shown in Fig. 7. These springs may be arranged and shaped in various ways. One arrangement that I have found effective is to form each spring somewhat in the shape of a T, as shown in Fig. 8, the stem of the T forming the part which bears radially against the spindle and the cross part of the T the part which is fixed to the disk, or, as in the figures, to the inside of a shallow box or ring *e*, secured to the disk by riveting or otherwise.

According to the arrangement shown in Figs. 9 and 10, I mount on the disk *b* any suitable number—four, for example—of plates or arms *i*, so shaped and pivoted at *j* to the disk that they can be made to bear against the sides of the spindle *d* by the pressure of a spring—such as the india-rubber ring *k*, for example—so as to grip the same with sufficient force to enable the spindle to carry the disk *b* around with it as it revolves. These plates or arms *i* are adapted to move inward toward or outward from the center of the spindle *d* in order to accommodate themselves to the varying diameters of the spindle when the latter is tapered or to the particular diameter of the spindle when the latter is parallel-sided. The spring or springs urging the plates or arms *i* toward the center of the spindle may be constructed and arranged in any suitable way and of any suitable material, and they, together with the pivoted plates or arms, may be more or less covered by or contained within a box or casing *e*, fixed by any suitable means to the disk *b*.

Instead of the springs bearing directly against the spindle, I employ in some cases intermediate radial bars or other suitably-shaped pieces, on the outer ends or other parts of which the springs may be caused to act.

According to the arrangement shown in Figs. 11 and 12 I make the disk cover-plate *p* of sheet or other suitable metal or material, with three or other suitable number of more or less radial recesses, channels, or grooves *q* formed therein, and in these recesses, channels, or grooves I place sliding plungers *r*, which are constantly urged inward toward the center of the disk (and consequently against the sides of the spindle when the disk is placed on the latter) by means of springs *s*. These plungers are retained in their respective recesses, channels, or grooves by means of the disk *b*, the said disk *b* and cover-plate *p* being connected together by any suitable means, such as by setting or beading the edges thereof over one another, as shown in Fig. 11, for example. The inner ends of the aforesaid plungers *r* are preferably shaped obliquely downward in order to facilitate the threading of the spindle through between the said ends.

According to the arrangement shown in Figs. 13 and 14 I make the disk of two circular pieces of sheet metal, such as steel or brass, or of other suitable material *b v*, so shaped by stamping or otherwise that when they are secured together by any suitable means, such as by beading one over the other around the edge, as shown by way of example at *w*, a hollow space *x* is left between them, and in this hollow space I place the springs *y*, which bear against the sides of the spindle *d*, which latter passes, as usual, through central holes made in the two pieces *b v*, composing the disk. These springs *y* may be of any shape that will enable them to exert the required elastic pressure against the sides of the spin-

dle—such as the curved shape shown in Fig. 14, for example—and there may be any suitable number of them; but generally I prefer three, as giving the most uniform pressure in all directions. In order to hold these springs in their proper relative positions in the space between the two parts *b v*, composing the disk, I form recesses *z* by stamping or otherwise in the part *v* and place the fixed ends of the springs in these recesses. Then when the two parts *b* and *v* of the disk are fastened together the inner face of the one part *b* retains the springs in the recesses of the other part *v* without the necessity in most cases of riveting, soldering, or otherwise securing the springs to either part, it being generally sufficient to form the recesses *z*, as shown at 1, and to bend the rear end of the springs at right angles to fit into these parts of the recesses. Nevertheless the springs may be riveted or otherwise secured, if found desirable. It will be understood that the recesses *z* for holding the springs *y* must be so arranged that they leave the acting ends of the springs free to bear properly against the sides of the spindle. In Fig. 14 the part *b* is supposed to be removed in order to show the construction of the other part *v* more clearly.

Whatever arrangement of springs is employed the latter must be so adapted as to allow the disk to be easily raised on the spindle and to cant or tilt when pressed upward by contact with the traveler or with the lifting device hereinafter described at each upward movement of the ring-rail in order that the disk may be lifted to the required extent without jamming on the spindle.

I generally prefer three springs to bear directly or indirectly against the spindle, because the pressure at three points equidistant around the spindle is more uniform than pressure applied at a greater number of points, and consequently the disk or ring is held more steadily on the spindle by three springs than by any other number. Nevertheless I do not confine myself to three, as other number may be used.

If and when desired, the springs on the disks may be used in connection with spindles having a polygonal section, a circular section with a flat or flats, or any section having a longitudinal groove or grooves therein for the purpose of driving or assisting to drive the disks, the springs being in that case auxiliary to such driving devices. The above-described improvements are also applicable to parallel-sided spindles as well as to taper spindles.

When disks are employed on the spindles for the purpose above referred to, they are usually raised step by step on the spindles at the end of each upward wind-on of the thread on the chase of the cop by the travelers coming in contact with the under side of the disks. Now in ordinary working there is an open space of about one-sixteenth of an inch, more or less, between the crown of the ring and that part of the traveler immediately over it, and when the traveler by the upward motion of the ring-rail is brought into contact with the disk its upward motion is stopped and the ring closes up under it, doing away with the aforesaid space. The consequence of this is that more yarn than is desirable is delivered for a moment onto one place on the nose or point of the cop, and such nose or point is thereby made weaker and softer than it should be. To obviate this defective action, I attach to the ring-rail (see Figs. 15 and 16) a piece of metal or other suitable substance 2, of such a form and so placed that as the ring-rail 3 rises the said piece comes in contact with the disk *b* sooner than the traveler 4 would do if the said piece were not present, and therefore lifts the disk *b*, so that the traveler 4 does not come into contact with the latter at all. The consequence of this is that a lesser quantity of yarn is delivered onto the nose or point of the cop, and the said nose or point of the cop is made stronger and harder than would otherwise be the case. The piece 2 is preferably made long enough to act upon the disks of several spindles or even upon the disks of all the spindles on one side of the machine, or a separate piece may be used for each disk. I sometimes adapt these disk-lifting pieces so that they act as clearers for clearing the travelers of fluff or fiber. For this purpose I construct them with a downwardly-projecting part 5, (see Figs. 15 and 16, the latter of which is a plan of part of one of the lifting-pieces,) placed opposite to each ring and near enough thereto to catch any fluff or fiber that may have attached itself to the traveler as the latter is carried around past the said downwardly-projecting part. The latter part may be produced in a variety of ways, such as by partially punching out and bending down a part of the lifting-piece, as shown, or by riveting a stud to the lifting-piece.

Where I state in the claims that the disk-springs exert pressure upon the spindle, I mean that this pressure is exerted by the springs bearing either directly or indirectly upon the spindle.

I claim—

1. In combination in the disk of a ring-spinning, doubling, or twisting machine spindle, the disk-springs adapted to exert pressure upon the sides of the spindle and a case or cover inclosing the said springs between itself and the disk substantially as described.

2. In the disk of a ring-spinning, doubling, or twisting machine spindle the construction of the disk in two pieces *b*, *v* of sheet metal or other suitable material, having the springs *y* inclosed between them, one of the said pieces *v* being formed with recesses *z* adapted to receive and hold the fixed ends of the springs *y* substantially as described.

3. In ring-spinning, doubling or twisting machines the combination with the ring-rail 3 and spindle-disk *b* of a lifting-piece 2 at

tached to the ring-rail 3 and adapted to come in contact with the under side of the disk *b*, as the ring-rail 3 approaches the end of each upward movement, before the traveler 4 reaches the said disk, substantially as described.

4. In ring-spinning, doubling, or twisting machines the combination with the disk-lifting piece 2, of the traveler-clearing device 5 said lifting-piece 2 being arranged to lift the disk and prevent engagement of the traveler therewith substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

PHINEHAS PEARSON CRAVEN.

Witnesses:

ELDON ALFRED KING,

JOHN RICHMOND HARPHAM.