May 19, 1953 L. SABATON 2,638,732

DOUBLE TWIST THROWING SPINDLE DEVICE

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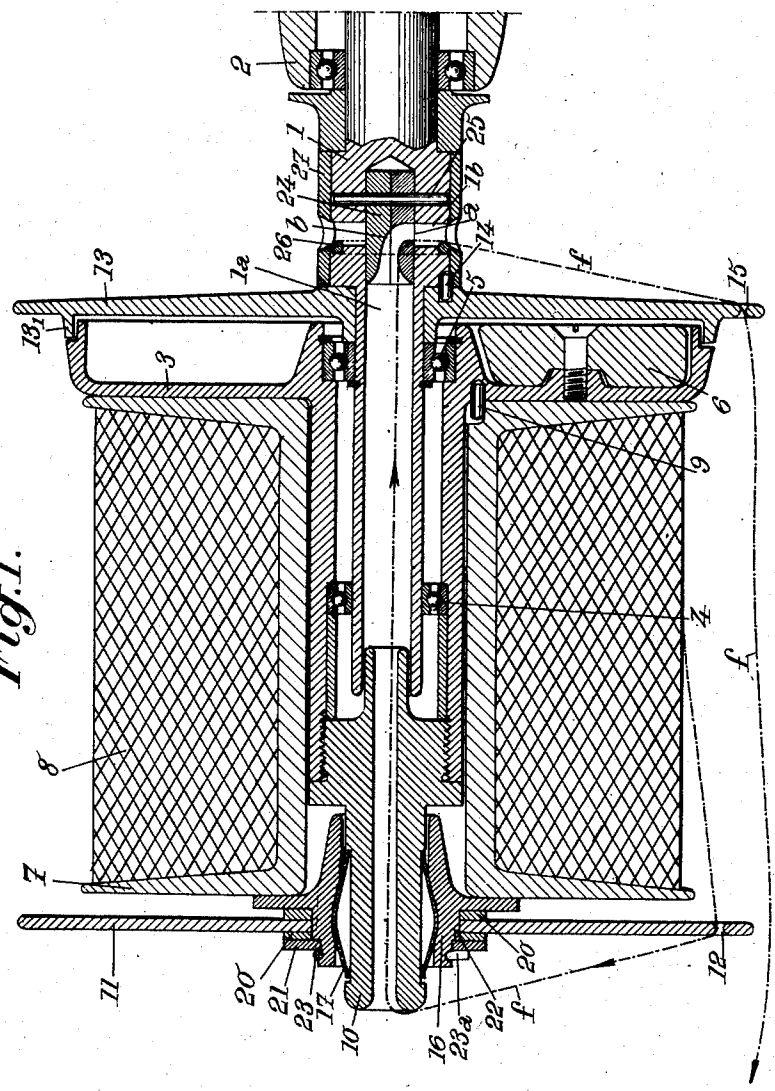



Fig. 1.

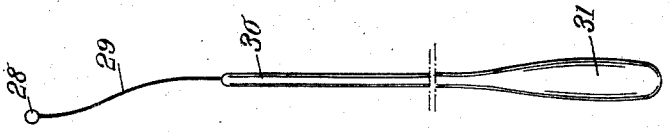



Fig. 3

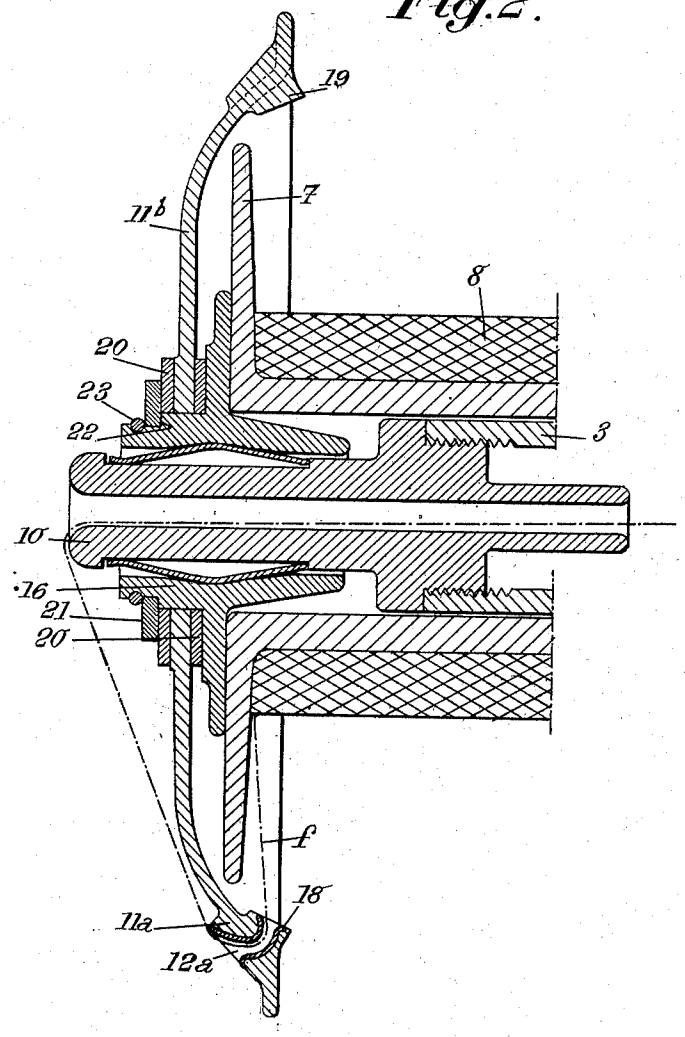
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DOUBLE TWIST THROWING SPINDLE DEVICE

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Fig. 2.




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Fig. 4.

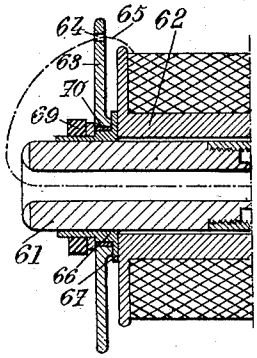



Fig. 5.

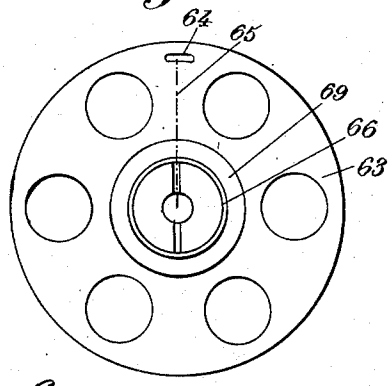



Fig. 6.

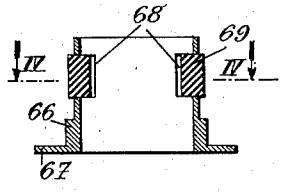



Fig. 7.

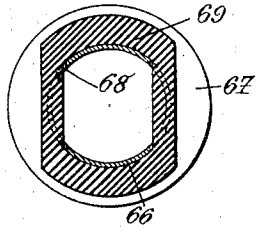
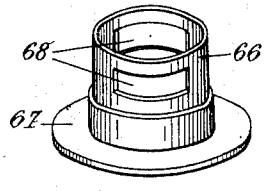



Fig. 8.




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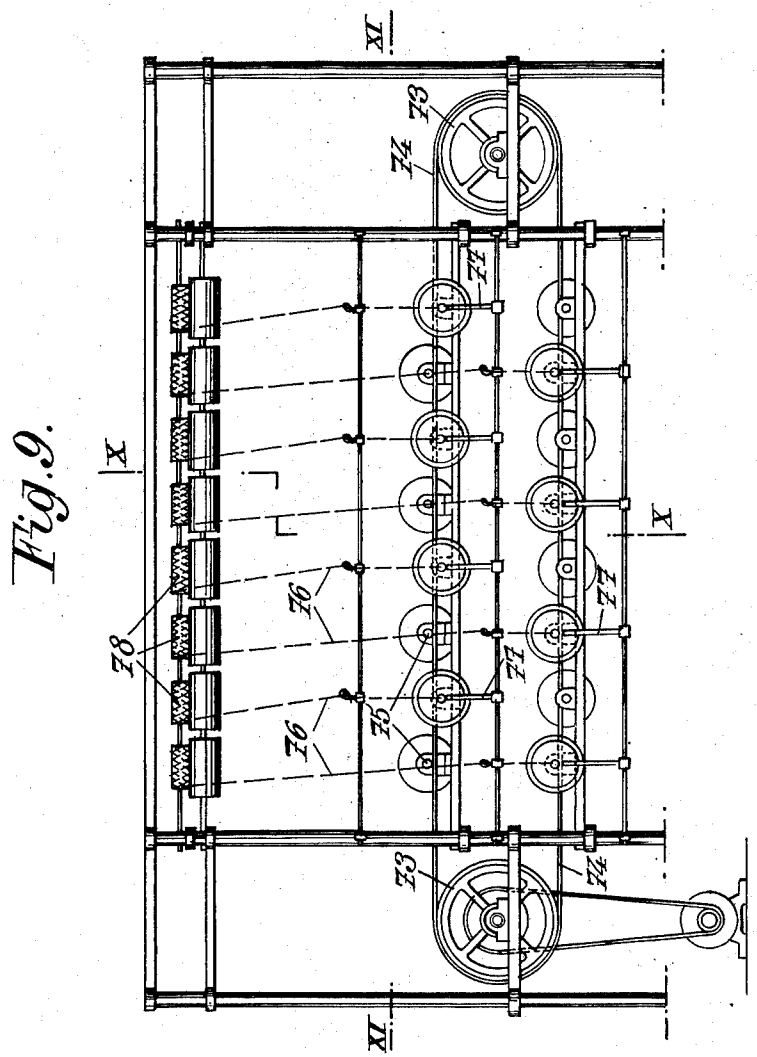



Fig. 9.

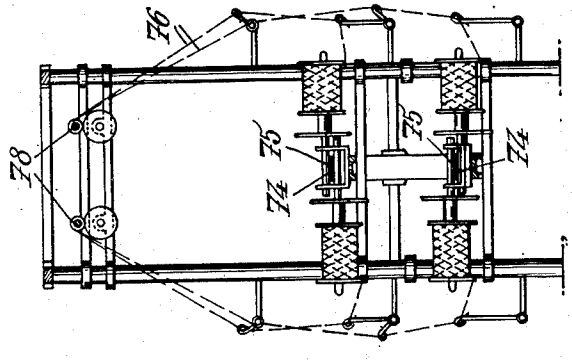



Fig. 10.

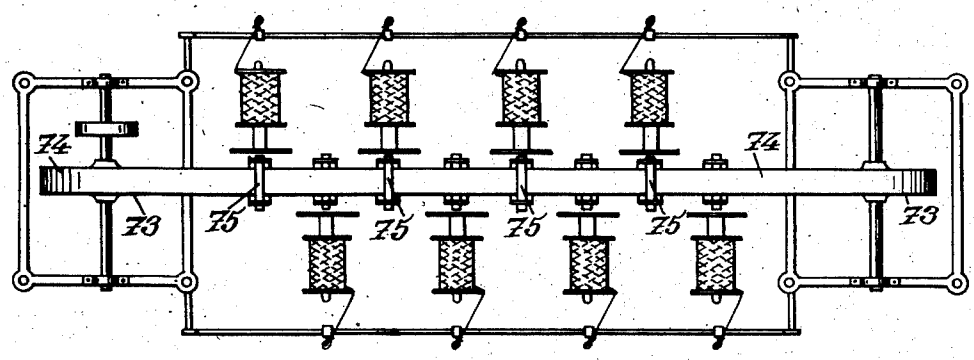
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*Fig. 11.*




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Patented May 19, 1953 2,638,732

# UNITED STATES PATENT OFFICE

2,638,732

## DOUBLE TWIST THROWING SPINDLE DEVICE

Louis Sabaton, Saint-Pierre-sous-Aubenas, France

Application June 9, 1950, Serial No. 167,099
In France June 9, 1949

6 Claims. (Cl. 57—58.83)

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The present invention relates to a double twist throwing spindle device.

The device according to my invention is characterized by the fact that it includes on the front portion of the spindle a disc of circular periphery mounted in such manner as to be freely rotatable and in which there is provided, at a distance from the center greater than the radius of the bobbin, at least one hole for the passage of the yarn which is being unwound from the stationary bobbin, this disc constituting both an unwinding means, and, through its peripheral edge, a guiding means for the portion of the yarn which is being twisted a second time on its way toward the receiving bobbin.

Preferred embodiments of my invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is an axial section of a first embodiment of a spindle device according to my invention;

Fig. 2 shows a modification of the front portion of the spindle of Fig. 1;

Fig. 3 shows a tool for introducing yarn into the spindle;

Figs. 4 to 8 show another modification of the spindle of Fig. 1, Figs. 4 and 5 being an axial section and a front view of this spindle respectively, and Figs. 6, 7 and 8 an axial section, a cross section and a perspective view of an element thereof;

Figs. 9 to 11 show a multiple spindle device according to my invention, respectively in side view, end view and plan view.

The spindle device includes a rotary spindle 1 supported in a bearing 2 and driven by a belt (not shown on the drawing).

This spindle is arranged to support the bobbin carrying element 3 through ball bearings 4 and 5, in order to prevent the bobbin carrier to be driven by the rotating spindle. The rear end of the bobbin carrier 3 constitutes a casing to receive an eccentric weight 6.

The bobbin 7 which carries the mass of yarn 8 to be twisted rests upon the bobbin carrier 3 and is prevented by a lug 9 from rotating with respect to bobbin carrier 3.

On the front end of the bobbin carrier there is fixed a tubular piece 10, coaxial with spindle 1, which acts, on the one hand, as central inlet guide for the yarn and on the other hand as support for an unwinding disc 11 rotatable with respect to said piece 10 and also, consequently, with respect to bobbin 7 which, under the influence of weight 6, remains stationary.

The yarn *f* to be twisted, after leaving the mass of yarn 8, passes through a hole 12 provided in unwinding disc 11 close to the periphery thereof

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and thence enters axially, through central inlet piece 10, the hollow end 1*a* of the spindle, from which it passes to the outside through a transverse conduit 1*b* extending through the wall of spindle 1.

Yarn *f*, after having thus left the spindle inside which it has undergone a first twisting extends radially away from the spindle and passes, after having again been given another direction, along bobbin 7 toward another receiving bobbin (not shown on the drawing) to undergo a second twisting along this path.

Guiding of the portion of yarn *f* which is located opposite bobbin 7 is ensured by two flat parts which are disposed on either side of said bobbin and which leave this bobbin free, over at least most of its axial length. That portion of these parts which is located in the vicinity of the free end of the spindle is constituted by said unwinding disc 11, of circular outline, while the other part is constituted by a disc 13 connected in rotation by a lug 14 with spindle 1 and which carries, on the side thereof turned toward the bobbin, a circular ridge $13_1$ arranged to stop the gap between the stationary bobbin carrier 3 and the rotating disc 13. Near the periphery of this last mentioned disc 13, there is advantageously provided a hole 15 through which yarn *f* passes. These two discs 11 and 13, which are of light weight and constitute very simple elements, ensure a perfect guiding of the yarn which has already been twisted once and is on its way toward a second twisting. In particular they wholly prevent any interlacing between the yarn portions which have just left the mass of yarn 8 on bobbin 7 and the yarn portions which are in the vicinity of the first mentioned ones and are just undergoing a second twisting.

The spindle further includes a holding sleeve 16 which is fixed in a removable manner, for instance by means of a holding spring 17, on the front end of piece 10. This holding sleeve is also advantageous as a support of unwinding disc 11, this disc being rotatable with respect to said sleeve which remains stationary together with piece 10.

In order to avoid rapid wear and tear of the edges of the inlet aperture of piece 10 it is advantageous either to constitute this piece of a high resistance plastic material such as nylon or highly to polish the inlet edge of this piece when it is made of hard steel.

Advantageously, the friction which acts upon unwinding disc 11 when this disc rotates under the effect of the unwinding of yarn *f* is made variable. For instance I may vary the braking of the unwinding disc according to the tension to be given to the yarn undergoing twisting,

which tension depends upon the quality of the yarn, the number of twists per meter, the thickness of the yarn and the number of twists per minute.

I provide, at least, on one side and preferably on both sides of the unwinding disc 11 mounted on holding sleeve 16, interchangeable friction rings 20 of suitable diameter and/or thickness and/or material. These rings, together with disc 11 which is located between them, are held in position on sleeve 16 by means of a positioning disc 21 which is interposed between a shoulder 22 of sleeve 16 and an abutment 23 constituted, for instance, by an elastic clip engaging a groove 23a of sleeve 16.

Furthermore, it is advantageous to provide on the inside of the tubular portion of spindle 1, opposite transverse conduit 1b, a guiding element 24 made of a material having a high resistance against the friction produced by the yarn portion which is leaving the spindle, in order to facilitate, on the one hand, the passage of the end of the yarn through the spindle (starting of the spindle) and, on the other hand, to prevent direct contact of yarn *f* with the matter of spindle 1 in conduit 1b. Said guiding element may be made of a moldable plastic material having the desired characteristics, such as nylon, ceramic matter, glass, etc. Preferably said element is made of two separate pieces assembled along the horizontal plane in which is located the axis of the spindle (see Fig. 1). The two pieces of element 24 leave between them a channel the outlet *a* of which is smaller than the cross section of conduit 1b, so as to prevent yarn *f* from rubbing against the spindle and the rear wall *b* of which constitutes the guiding surface which facilitates the insertion of the yarn into the spindle. The two pieces of element 24 are kept in position inside the spindle by means of a transverse fixation piece 25.

In order also to prevent friction between yarn *f* and the outlet edge of conduit 1b, I house, in a circumferential groove of spindle 1, a friction ring 26 of high resistance tempered and polished steel (resistance for instance higher than 240 kgs. per square millimeter), or of glass, plastic material or ceramic material. This ring is preferably made of two portions each of which extends over an arc of 180°, which facilitates the insertion of the ring into said groove. The two halves of the ring and fixation piece 25 are advantageously kept in position by a sleeve 27 which surrounds spindle 1, at the places where said ring and piece are located.

Of course the above described spindle is advantageously fitted with a safety device (not shown on the drawing) capable of stopping the spindle as soon as the bobbin support with the eccentric weight and the bobbin start rotating about the axis of the spindle. This safety device may be constituted, as already described in applicant's French Patent No. 949,819, by a rod sliding under the effect of gravity and which, when coming into contact with a fixed abutment, stops rotation of said elements before their angle of rotation has become 180°.

According to the modification illustrated by Fig. 2, the peripheral portion 11a of unwinding disc 11b is given a curved shape so that this peripheral portion covers the end of bobbin 7. I thus avoid any friction of yarn *f* against the front face of the bobbin.

In some cases, in particular when the yarn is unwound at high speed, up to one half of the axial length of bobbin 7 may be covered by the edge of unwinding element 11a.

Preferably, this unwinding element is made of a moulded plastic material and I fix, in the hole 12a of the unwinding disc, a friction sleeve 18 made of a material having a high resistance to friction of the yarn. I may provide diametrally opposed to the boss in which hole 12a and friction sleeve 18 are formed, a balancing boss 19 which may be provided or not with a passage and a friction sleeve analogous to hole 12a and sleeve 18.

Another embodiment of the means which keep the unwinding disc in position is shown by Figs. 4 and 5. In this modification, the unwinding disc 63 includes a hole 64 through which the yarn from bobbin 62 comes. The unwinding member 63 rotates freely on sleeve 66 which is fitted on piece 61 and bears through its flange 67 against the side face of bobbin 62. This sleeve 66 includes in the cylindrical wall at least one aperture 68. By placing around it and opposite this aperture a rubber ring 69 or any other sufficiently stretched elastic annular part, it is coupled with piece 61, whereby, when the spindle rotates, unwinding device 63, under the effect of the yarn 65 unwound from the bobbin 62, can rotate without driving said bobbin.

In order to facilitate rotation of unwinding device 63 on sleeve 66, a bronze ring 70 may be interposed between them.

As in the preceding embodiment, the circular edge of unwinding member 63 acts as a guide for the portion of the yarn which is being twisted a second time.

Fig. 3 shows a tool intended to facilitate the insertion of the yarn in the spindle, by cooperating with the guiding surface *b* of element 24. This tool includes a ball 28 mounted at the end of an elastic wire 29, carried in a sleeve 30 provided at its end with a handle 31. By introducing this tool in the inner passages of pieces 10 and 1 (see Figs. 1 and 2), ball 28 comes into contact with the curved wall *b* of the passage provided in element 24 and finally projects to the outside through transverse conduit 1b, owing to the elastic flexibility of wire 29. The spherical surface of the wall avoids any possibility of injury to surface *b*. The tool acts as a guide for the yarn the end of which is fixed to said tool.

When the spindle device includes several double twist spindles, it is advantageous to dispose these spindles on the frame that supports them (spinning machine) in staggered relationship as shown by Figs. 9 to 11.

The belt 74 driven by motor 72 through drum 73 causes spindles 75 to rotate. These spindles are disposed on one of the faces of the machine under the belt for the upper row and below the belt for the lower row. On the other face of the machine the spindles are disposed in the reverse fashion.

All the spindles thus rotate in the same direction. A slight offsetting of the spindle supports on the row gives the belt the slight bending necessary for the drive.

The yarn 76 issuing from the bobbin is guided by eyelets 77 toward the winding spool 78, the eyelet supports 77 being tiltable to make it possible to remove the empty bobbin.

This staggered arrangement makes it possible to house in the machine a number of double twist spindles equal to that of single twist type spindles despite the fact that double twist spindles occupy more space than single twist spin-

dles. Furthermore the staggered arrangement in the horizontal direction also has the advantage of making it possible to increase the weight of the bobbin up to 1 kilogram.

What I claim is:

1. In a double twist throwing device, the combination of a frame, a spindle journalled in said frame with its axis making an angle with the vertical, one end of said spindle projecting from said frame and said end being tubular, a bobbin, a bobbin carrier carried by said spindle coaxially therewith, means for opposing rotation of said bobbin carrier about said axis, a tubular part rigid with said bobbin carrier and in line with said tubular spindle end, a sleeve coaxially surrounding said tubular part, radially yieldable spring means interposed between said tubular part and said sleeve so as to oppose relative rotation of said two elements with respect to each other, a disc carried by said sleeve rotatably thereon, and said disc being provided, at a distance from its center greater than the radius of the bobbin, with a hole for the passage of the yarn unwinding from said bobbin, whereby said disc cooperates both in the unwinding of the yarn and in the twisting thereof.

2. In a double twist throwing device, the combination of a spindle mounted with its axis making an angle with the vertical, a bobbin rotatably carried by said spindle coaxially therewith, means for opposing rotation of said bobbin about said axis, a disc carried by said spindle rotatable about the axis thereof, a part fixed in rotation with respect to said spindle, and friction means interposed between said part and said disc, said disc being provided, at a distance from its center greater than the radius of said bobbin, with a hole for the passage of the yarn unwinding from said bobbin, whereby said disc cooperates both in the unwinding of the yarn and in the guiding thereof.

3. In a double twist throwing device, the combination of a frame, a spindle journalled in said frame with its axis making an angle with the vertical, one end of said spindle projecting from said frame and said end being tubular, a bobbin, a bobbin carrier carried by said spindle coaxially therewith, means for opposing rotation of said bobbin carrier about said axis, a tubular part rigid with said bobbin carrier and in line with said tubular spindle end, a sleeve coaxially surrounding said tubular part, radially yieldable spring means interposed between said tubular part and said sleeve so as to oppose relative rotation of said two elements with respect to each other, and a disc carried by said sleeve rotatably thereon, friction means interposed between said sleeve and said disc for braking the rotation of said disc, said disc being provided, at a distance from its center greater than the radius of the bobbin, with a hole for the passage of the yarn unwinding from said bobbin, whereby said disc cooperates both in the unwinding of the yarn and in the twisting thereof.

4. In a double twist throwing device, the combination of a frame, a spindle journalled in said frame with its axis making an angle with the vertical, one end of said spindle projecting from said frame and said end being tubular, a bobbin, a bobbin carrier carried by said spindle coaxially therewith, means for opposing rotation of said bobbin carrier about said axis, a tubular part rigid with said bobbin carrier and in line with said tubular spindle end, a disc carried by said tubular part so as to be rotatable about said axis, said disc being provided, at a distance from its center greater than the radius of the bobbin, with a hole for the passage of the yarn unwinding from said bobbin, said spindle being provided with a radial channel connecting the inside of its tubular portion with the outside, whereby the yarn coming from said hole can pass through both said tubular part and said hollow portion of the spindle and pass out through said radial channel, a second disc carried by said spindle to rotate together therewith provided near its periphery with a hole for the passage of the yarn coming from this radial channel, and yarn friction resisting guiding means in said spindle opposite the inner end of said radial channel, said guiding means being made of two portions assembled together along a plane passing through the spindle axis and at right angles to the direction of said radial channel, said portions being made of a material different from that of said spindle and especially adapted to resist the friction of the yarn.

5. In a double twist throwing device, the combination of a frame, a spindle journalled in said frame with its axis making an angle with the vertical, one end of said spindle projecting from said frame and said end being tubular, a bobbin, a bobbin carried carried by said spindle coaxially therewith, means for opposing rotation of said bobbin carrier about said axis, a tubular part rigid with said bobbin carrier and in line with said tubular spindle end, a disc carried by said tubular part so as to be rotatable about said axis, said disc being provided, at a distance from its center greater than the radius of the bobbin, with a hole for the passage of the yarn unwinding from said bobbin, said spindle being provided with a radial channel connecting the inside of its tubular portion with the outside, whereby the yarn coming from said hole can pass through both said tubular part and said hollow portion of the spindle and pass out through said radial channel, a second disc carried by said spindle to rotate together therewith provided near its periphery with a hole for the passage of the yarn coming from this radial channel, and a ring of a yarn friction resisting material mounted with respect to the spindle so as to project from the wall of said radial channel, at the place where the yarn is to be guided in said channel and to prevent contact of the yarn with the edge of said channel.

6. A device according to claim 5, including a part concentrically fitted on said spindle, one of these two last mentioned elements being provided with a groove opening into said radial channel and arranged to house a portion of said ring so that the remainder of said ring projects into said radial channels, the other of said two elements being mounted adjacent to said groove to hold said ring therein.

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**References Cited** in the file of this patent

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,662,649 | Werber | Mar. 13, 1928 |
| 2,374,085 | Gwaltney et al. | Apr. 17, 1945 |
| 2,467,258 | Fane | Apr. 12, 1949 |
| 2,524,217 | Ancet | Oct. 3, 1950 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 267,839 | Great Britain | Mar. 24, 1927 |