July 2, 1946. G. F. ALBRECHT 2,403,255

SPINNING AND TWISTING RING

Filed Nov. 4, 1944

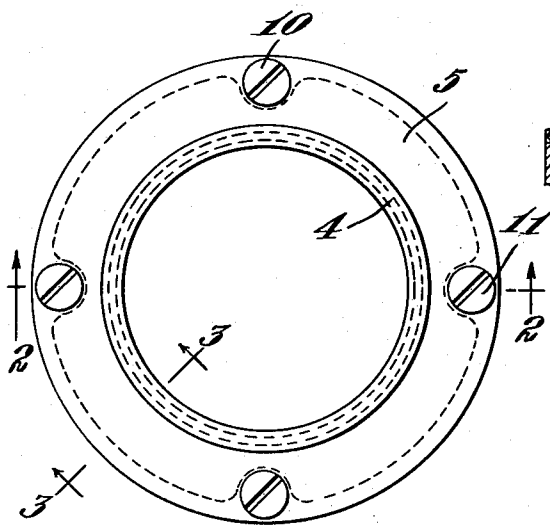



Fig. 1

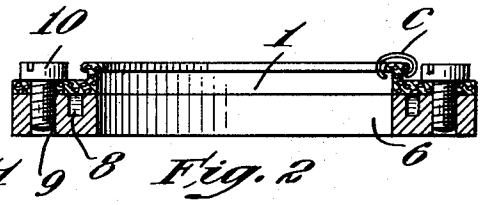



Fig. 2

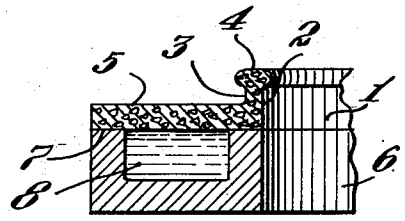



Fig. 3

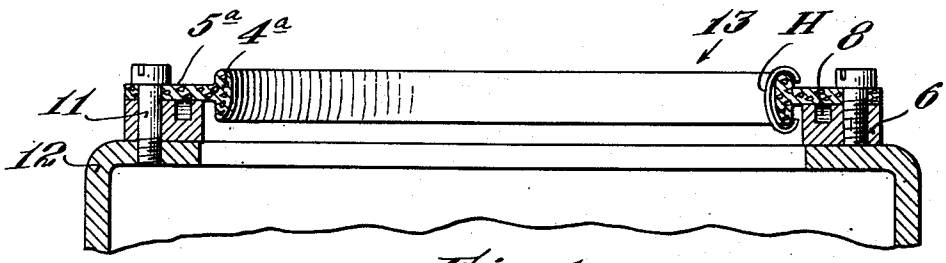



Fig. 4

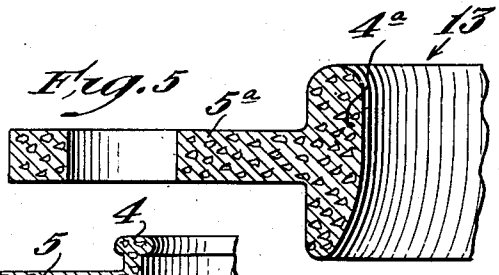



Fig. 5

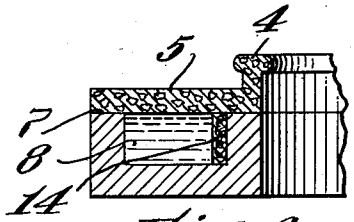



Fig. 6

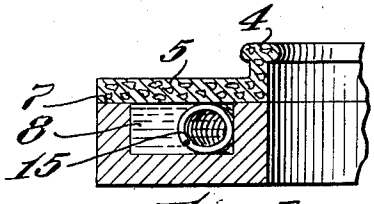



Fig. 7

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## SPINNING AND TWISTING RING

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6 Claims. (Cl. 57—140)

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This invention pertains to spinning and twisting rings such as are employed in ring spinning frames in the preparation of textile yarns, and relates more especially to a ring of the self-lubricating type, the present invention constituting an improvement upon that disclosed and claimed in my Patent No. 2,084,756, issued June 22, 1937.

As pointed out in the aforesaid patent, spinning and twisting spindles are driven at exceedingly high velocities, and, as a result, the yarn guiding traveler moves around the ring at a linear speed of the order of a mile a minute. Unless the contacting surfaces of the ring and traveler are properly lubricated, the friction developed between the moving parts will burn or wear out the traveler very rapidly, and under ordinary conditions of mill practice, it is necessary to replace the traveler frequently, sometimes as often as several times each day. While lubrication of the contact surfaces of the ring and traveler is necessary, excess lubricant must be avoided, for if the lubricant comes in contact with the yarn or thread, it impairs the value of the latter. Prior to the construction disclosed in my patent above referred to, hand lubrication was customarily employed, but such hand lubrication is unsatisfactory since it does not insure uniformity of lubrication throughout the working period; and is very dirty since, even when done carefully, oil drips or is thrown onto the drive belts, floor, and other parts of the spinning frame, with consequent accumulation of lint. The construction disclosed in my prior patent does provide for uniform and adequate lubrication throughout the working period without danger of damage to the yarn and without requiring constant attention by the operator.

While the ring disclosed in the aforesaid patent represents a very real advance in the art, it is somewhat difficult to manufacture in view of its one-piece construction, and especially because of its irregular transverse section. The present invention has for its principal object the provision of a spinning or twisting ring having all of the desirable characteristics, from the standpoint of lubrication, of the patented ring but which is simpler, easier and cheaper to manufacture. Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawing in which:

Fig. 1 is a plan view of a ring embodying the present invention, the ring shown in this view being designed for use with a traveler of C-shape:

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Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary view to larger scale on the line 3—3 of Fig. 1;

Fig. 4 is a diametrical, vertical section through a ring designed for use with a hook-shaped traveler showing the ring mounted on the ring rail of a spinning frame:

Fig. 5 is a fragmentary, radial section to larger scale showing the traveler guiding element of the ring of Fig. 4;

Fig. 6 is a view similar to Fig. 3 but showing the ring as provided with a wick for delivering oil from the reservoir to the absorbent element of the ring; and

Fig. 7 is a similar view showing another form of oil-transmitting means.

For convenience in description, the ring about to be described is referred to as a "spinning" ring, but is obviously applicable both to spinning and twisting frame, and the description and appended claims are to be construed with this understanding.

In the patented ring, the oil reservoir or chamber is formed within the substance of the one-piece, unitary, traveler-guiding ring. While this is a very desirable construction from the lubricating standpoint, the formation of the oil reservoir within the body of the traveler-guiding ring complicates problems of manufacture, and since the material employed to form the traveler-guide is not as strong as solid metal, the provision of the relatively large oil chamber or reservoir within the traveler-guiding element reduces the strength of the ring so that some care must be taken in its use to avoid breakage from mechanical injury.

In accordance with the present invention, these disadvantages are wholly removed without in any way lessening the value of the ring from the lubricating standpoint, by forming the ring in two separate parts, one of which carries the guide for the traveler, and the other of which contains the oil reservoir. Since the latter part does not contact the traveler, it may be made of any desired material, for example cast iron, steel, or bronze, which is mechanically strong, so that even though the oil reservoir be of substantial dimensions, this part of the ring is amply strong to withstand the stresses of use. On the other hand, that part of the ring which carries the traveler-guide may be of a very simple shape, devoid of large cavities or thin projection so that it is reasonably strong, and may be prepared by methods appropriate to the special material used. The composite ring may be used without any more care as to break-

age than rings of ordinary construction, and is cheaper and easier to construct than the patented ring, which possesses the lubricating characteristic of the latter.

It was pointed out in the aforesaid patent that a capillary barrier, interposed in the path of a fluid, cuts down the velocity of flow to a rate which, within wide limits, is substantially independent of the fluid pressure head, so that so long as fluid is supplied at one side of the porous barrier, the rate of delivery from the other side will be substantially uniform regardless of fluctuations in the supply head. In accordance with the present invention, as in the device disclosed in the patent, the traveler-guiding element of the ring is of homogeneous one-piece construction. It consists throughout of a material which, is hard and durable enough to withstand the wear of the moving traveler, and which is capable of taking and maintaining a visually smooth and even polished exterior finish so as to reduce the friction between it and the traveler to a minimum. On the other hand this traveler-guiding part of the ring is of a porous nature, comprising throughout its entire substance a multitude of minute capillary canals or cavities so small as to be visible only with the assistance of a microscope and which are distributed throughout the material with substantial uniformity. This traveler-guiding portion of the ring may be of any suitable substance having the above characteristics, for instance, it may be one of the synthetic resins rendered suitably porous in the final moulding operation by procedures known to those skilled in the art. At present, however, it appears that certain metallic compositions or alloys are preferable, for instance compositions prepared from powdered metal—iron, copper, etc., together with graphite, and highly compressed and sintered. Such an alloy may, for example, be prepared by incorporating 90 parts by weight of copper and 10 parts of tin with 6 parts of graphite and 2 parts of salicylic acid, all in a very finely divided state, the ingredients being thoroughly mixed and then briquetted under high pressure to produce a ring of substantially the desired dimensions. The briquetting pressure is desirably of the order of 75,000 pounds per square inch. After briquetting, the rings are sintered in a non-oxidizing atmosphere for approximately three hours at a temperature of the order of 1425° F. After removal from the sintering boxes, the rings are surfaced and sized, for example by the use of concentric arbor and die members which squeeze and reduce the material of the ring to substantially the final desired dimensions.

The result of this procedure is to provide a ring which in its entirety is porous and capable of slowly transmitting a lubricating medium such as oil from one point to another. The microscopic structure of the ring may be likened to that of a fine sponge, and comprises a multitude of minute cells or canals generally communicating with one another and having walls of a bronze-like alloy. The cells which are exposed at the outer surface of the ring are in most instances open at such outer surface, although the ring is superficially solid, and, except under the microscope, its surface shows no indication of these open cells or pores.

Referring to the drawing the numeral 1 designates the annulus which constitutes the traveler-guiding element of the improved ring. This annulus consists of a single, unitary mass of a porous material such as above described and is of a simple configuration, easily molded to shape. As illustrated in Figs. 2 and 3 this traveler guiding annulus comprises a cylindrical portion having inner and outer concentric walls 2 and 3, and an upper guide portion 4 shaped to receive and to form a guide for a traveler of C-shape indicated at C. This annulus 1 also comprises a preferably flat radial flange portion 5, of a uniform vertical thickness sufficient to afford adequate strength, and having its lower surface finished to provide for close contact with the other element of the ring.

This second element of the ring is a supporting annulus 6 having a central opening of the same diameter as the inner surface 2 of the annulus 1 and preferably the same external diameter as the flange 5 of the annulus 1. This supporting annulus 6 has a finished upper surface 7 with which the flange 5 closely engages, and is provided with a trough-like recess or chamber 8 constituting a reservoir for oil. Probably this chamber 8 extends uninterruptedly circumferentially of the annulus 6, but on the other hand, if desired, this oil reservoir may be made up of a plurality of separated chambers, each of such circumferential extent as may be desired, but with the understanding that collectively they will provide a reservoir of such circumferential extent to supply adequate oil for absorption by the annulus 1.

The flange 5 of the annulus 1 and the annulus 6 are provided with registering openings for the reception of bolts or screws 10 whereby the two annuli are firmly united. As illustrated in Fig. 2 the aperture in annulus 6 are screw-threaded for engagement by the screws 10.

While the traveler guiding annulus 1 is of the porous while absorbent material above described, the annulus 6 may be of any appropriate material, for example, bronze, stainless steel, or the like, such as to impart the desired strength and rigidity to the ring as a whole and which is preferably substantially impervious to oil.

In addition to the openings which receive the screws 10, the flange 5 and the annulus 6 may be provided with other openings for the reception of screws 11 by means of which the ring may be mounted, as illustrated for example in Fig. 4, upon the ring rail 12 of a spinning or twisting frame. However, the ring may be mounted on the rail in any other customary or desirable way.

In the arrangement above described, the ring is designed for use with a C-shaped traveler, but in Figs. 4 and 5 a modification is illustrated wherein the ring is designed for use with a hook-shaped traveler H. In this arrangement the lower supporting annulus, having the reservoir 8, may be substantially identical with the annulus 6 shown in Figs. 2 and 3. However, in this instance, while the traveler guiding annulus comprises a radial flange portion $5^a$ which, like the flange 5 of the annulus 1, closely contacts the upper surface of the annulus 6 and forms a cover for the reservoir, the traveler guiding annulus of this modification comprises a portion $4^a$ integral with the flange $5^a$, having spaced upper and lower edge surfaces for engagement with a traveler H of conventional hook shape.

It may be understood that the traveler engaging portion 4 of the annulus 1, and the traveler engaging portion $4^a$ of the annulus 13 of Fig. 4, is smoothly finished and polished to provide proper surfaces for engagement with the moving traveler.

In the arrangements illustrated and already described, the reservoir 8 will be filled with oil be-

fore the two annuli are assembled. Assuming that the annulus 1 has previously been thoroughly impregnated with oil, for example, by immersing it in oil for a suitable period, the ring may immediately be put into use and as the oil within the substance of the annulus 1 gradually distributes itself over the outer, traveler-contacting surface of the annulus, more oil is absorbed by the flange 5, and by capillary action is gradually transferred to the traveler contacting surface. Even though the oil in reservoir 8 does not actually contact the under-surface of flange 5, the oil will be raised by a surface tension along the exposed vertical walls of the reservoir and will thus creep up and enter the porous material of the flange 5.

While in the arrangement illustrated no provision is made for keeping the reservoir 8 full of oil, it is contemplated, as within the scope of the invention, to provide the ring rail of the frame with a supply reservoir as illustrated, for example, in Fig. 12 of the above-named patent, with suitable conduits leading from this supply reservoir to the reservoir 8 in the individual ring.

In Fig. 6 a slight modification is illustrated, the parts in general being identical with those illustrated in Fig. 3 but in this instance a wick 4 of absorbent material is disposed in the reservoir 8, this wick preferably being of yieldable material and being under some compression so that its upper surface always bears firmly against the under surface of the flange 5. This wick absorbs oil from the reservoir and conveys it to the flange 5, thus insuring an adequate supply to the flange 5 even though the oil in the reservoir 8 may be nearly exhausted.

In Fig. 7 a further arrangement is illustrated, the parts in general being like those shown in Fig. 3 but, in this instance, there is arranged within the reservoir 8 a spiral spring 15 which extends substantially around the circumference of the reservoir and which is of such diameter as to be compressed transversely to a slight degree when the annuli are assembled, so that its turns always bear firmly against the under surface of the flange 5. The turns of this coil thus constitute feeding elements operative to convey oil by surface tension effect to the under side of the flange 5, regardless of the depth of oil in the reservoir.

While it is desirable to provide a reservoir for a body of oil which is gradually taken up by the traveler guiding annulus, reasonably good results may be obtained by the use of the latter annulus alone, mounted directly on the ring rail. A traveler guiding annulus such as here described, if first thoroughly soaked in oil, is self lubricating for a substantial period of time without additional supply of oil. For instance, such a ring, 3.5" in diameter, with a traveler speed of 9200 R. P. M. has remained in highly effective operation for three weeks without additional oil, whereas a usual steel ring, under such conditions if used, would require oiling at least every eight hours.

While certain desirable embodiments of the invention have herein been illustrated and described, it is to be understood that the invention is broadly inclusive of any and all other modifications and variations which follow within the scope of the appended claims.

I claim:

1. A spinning ring comprising two coaxial annuli and means for holding them in assembled relation, one of said annuli being shaped externally



to constitute a guide for a traveler, the other of said annuli having a flat finished upper surface divided into inner and outer concentric portions by an annular trough-like recess defining an open-topped chamber constituting a reservoir for oil, the traveler-guiding annulus having an integral flange of uniform vertical thickness and having a flat under surface which rests upon the flat upper surface of the second annulus and forms a cover for the reservoir, said flange and the second annulus having registering openings for the reception of fastener elements, the traveler-guiding annulus being of a substance hard enough to form an acceptable guide for the traveler and comprising a multitude of capillary pores of visually inappreciable size operative to absorb oil from the reservoir and to deliver it to the traveler-contacting surface of the ring at a substantially uniform and very slow velocity, and fastener elements uniting said annuli.

2. A spinning ring comprising two coaxial annuli and means for uniting them in assembled relation to the ring rail of a spinning frame, one annulus being of a porous metallic substance containing a multitude of oil-receiving capillary passages of visually inappreciable size, said annulus being externally shaped to provide a guide for a traveler and hard enough to form an acceptable guide for the traveler, said annulus having an integral radial flange of a uniform vertical thickness less than the vertical thickness of the traveler-guiding portion of the annulus and having a flat under surface, the other annulus having a flat upper surface on which said flange rests and being provided with a circumferentially extending reservoir in said upper surface which constitutes an oil-receiving chamber.

3. A spinning ring comprising two coaxial annuli, one annulus consisting of a single piece of material hard enough to form an acceptable guide for a traveler and externally shaped to constitute such a guide, said annulus having a multitude of microscopic capillary cavities throughout its substance and having an external radial flange of substantially uniform vertical thickness and having a flat under surface, the other annulus having a flat upper surface which said flange contacts and having a circumferentially extending recess in said upper surface constituting a reservoir for oil, the two annuli having registering openings for the reception of fastening means for holding them in assembled relation on the ring rail of a spinning frame, and means within the reservoir operative to deliver oil to the under surface of said flange.

4. A spinning ring comprising two coaxial annuli, one of said annuli having a flat upper surface divided into inner and outer concentric portions by an annular groove constituting a chamber for the reception of oil, the other annulus consisting of a single unitary piece of metal hard enough to form an acceptable guide for a traveler and externally contoured to constitute such a guide and also comprising a radial flange of uniform vertical thickness which rests upon the upper surface of the first annulus and constitutes a cover for the oil-receiving chamber, the traveler-guiding annulus being of a porous material capable of absorbing oil, and a wick of absorbent material disposed within the oil-receiving chamber and which contacts the under surface of the flange of the traveler-guiding annulus, said wick being operative to deliver oil from the chamber to said latter annulus.

5. A spinning ring comprising two coaxial annuli, one of said annuli having a flat horizontal

upper surface divided into inner and outer portions by an arcuate recess constituting an open chamber for the reception of oil, the other annulus consisting of a single unitary piece of metal hard enough to form an acceptable guide for a traveler and externally contoured to constitute such a guide and also comprising a radial flange of substantially uniform vertical thickness and having a flat under surface which rests upon the flat upper surface of the first annulus and constitutes a cover for the oil-receiving chamber, the traveler-guiding annulus being of a porous material capable of absorbing oil, and a resilient element within the oil-receiving chamber and which is held under compression between the floor of the oil-receiving chamber and the under surface of the cover flange, said resilient element being operative to deliver oil from the chamber to the traveler-guiding annulus for absorption by the latter.



6. A spinning ring of the kind which constitutes the sole guide for a traveler, said ring comprising a traveler guiding portion and a radial flange having substantially flat and parallel upper and lower surfaces, and so designed as to form an acceptable cover for an annular oil reservoir and to form a supporting element for the traveler guiding portion, the flange and traveler guiding portion being integral and consisting of a unitary mass of material which is hard enough to form an acceptable guide for a traveler, but being porous and containing a multitude of capillary passages capable of retaining oil but operative to deliver oil outwardly to the traveler engaging surface at a substantially uniform but very low velocity.

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