Jan. 4, 1938. G. F. ALBRECHT 2,104,216

BOLSTER

Filed June 6, 1935 2 Sheets-Sheet 1

Fig. 1.

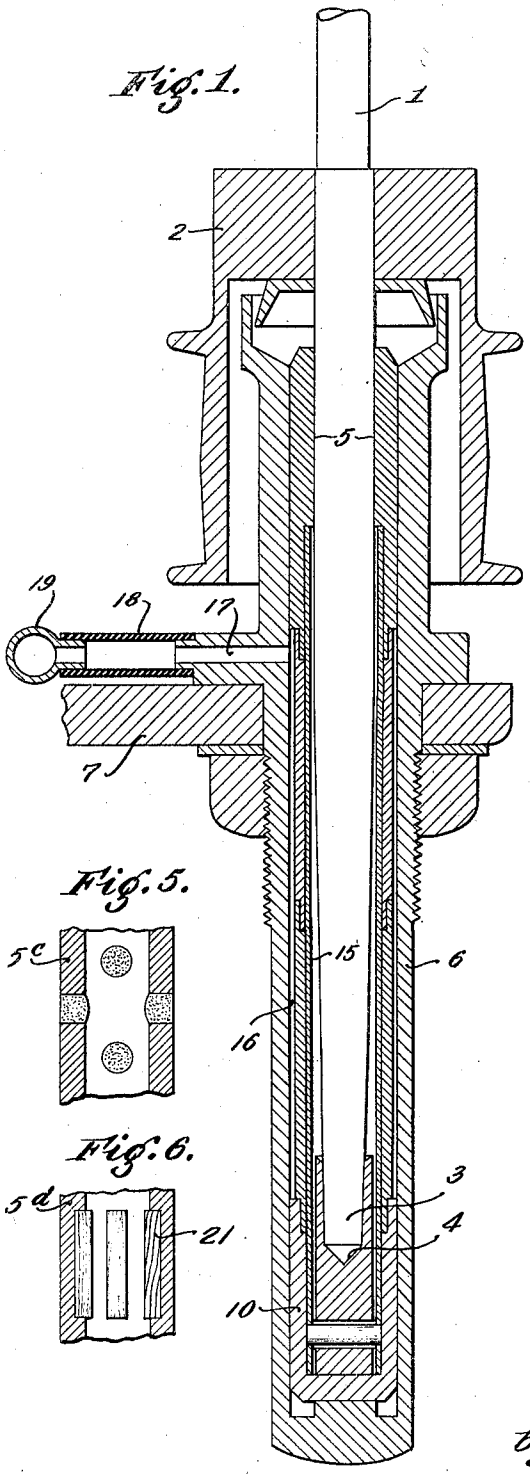


Fig. 4.

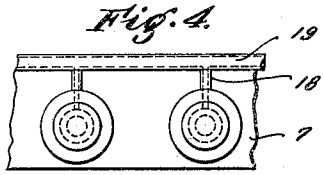


Fig. 2.

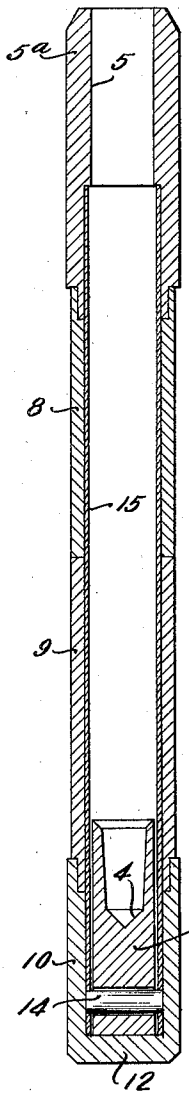


Fig. 3.

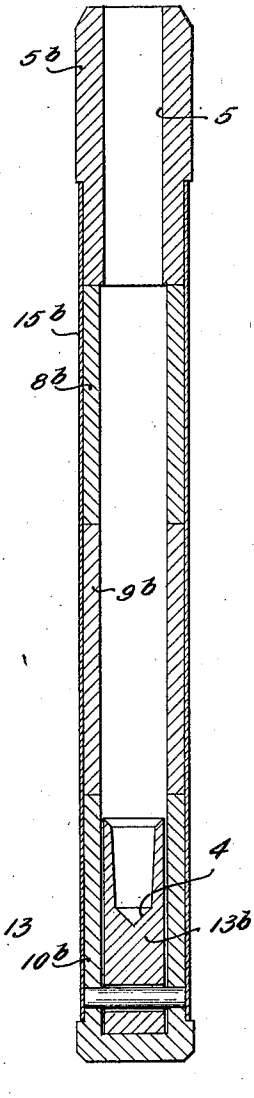


Fig. 5.

Fig. 6.

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Fig. 7.

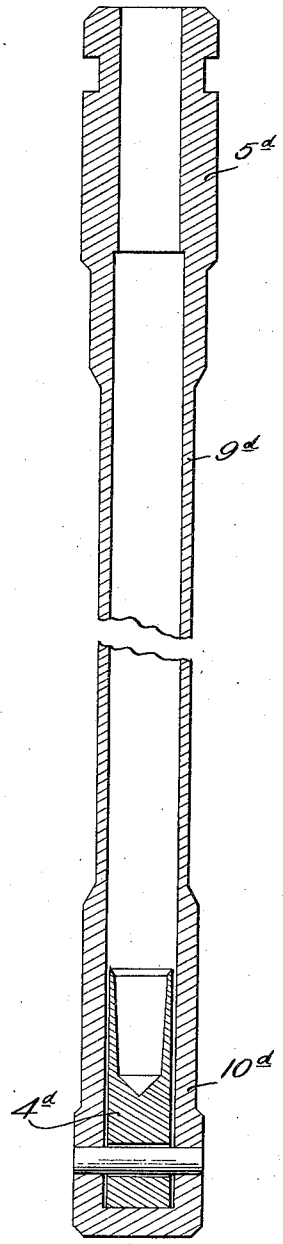
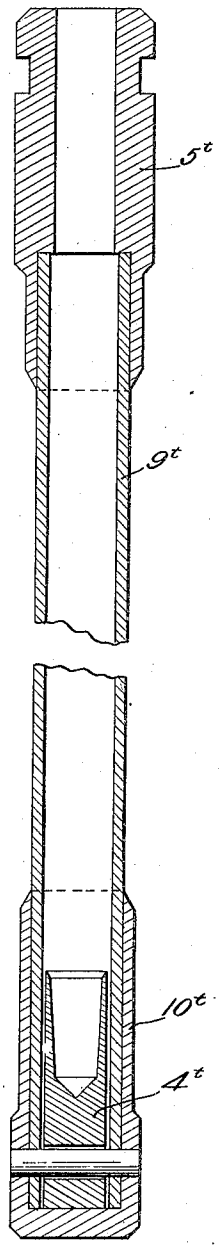


Fig. 8.



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2,104,216

BOLSTER

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Application June 6, 1935, Serial No. 25,279

5 Claims. (Cl. 308—155)

This invention pertains to textile machinery and relates more particularly to an improved bolster for use in a spinning frame. The "blade" or spindle on which the spinning bobbin is mounted is rotated at exceedingly high speed, for example, 10,000 revolutions per minute, and as the load, that is to say, the bobbin with its yarn and eccentrically applied tension, is carried upon the unsupported upper end of the blade, it is a difficult problem to provide proper and adequate bearings for the blade, such as to insure smooth and vibrationless operation.

Commonly the blade is mounted to turn in a long sleeve or bolster, which, in turn, fits more or less snugly in a cast-iron base or bolster casing fixed to the spindle rail of the spinning frame. In order to insure proper lubrication of the running blade, to which the driving whirl is attached at a point just above the upper end of the bolster, it has been customary to provide an oil reservoir adjacent to the upper part of the bolster from which oil flows freely into the bolster casing and thence into the bolster, with the object of lubricating the bearings at the upper and lower parts of the bolster in which the blade rotates. Under ideal conditions such a mode of lubricating the blade is reasonably adequate, but it has been found in practice that if the bobbins are eccentric, either by reason of poor design or workmanship, or through injury or warping in use, or if the bobbin is excessively loaded, or if it be attempted to drive the frame at too high a speed, there is a tendency to pump oil too rapidly into the bearings. In view of the very small clearance tolerable in such high speed bearings, excess lubricant acts as a brake and causes loss of production by seriously retarding the spindle speed. On the other hand, if, under such conditions, the supply of lubricant be reduced, the bearings may become nearly or quite dry, in which event excessive wear takes place, necessitating frequent replacement and causing substantial financial loss.

The principal object of the present invention is to provide a spindle construction such as to avoid the above difficulties, that is to say, one wherein adequate provision is made for proper lubrication at all spindle speeds and regardless of eccentric loading or the like, and which obviates all danger of oil pumping with consequent reduction of spindle speed.

Another object is to provide a construction of simple and durable type which may be produced at reasonable cost and which may be installed in existing frames without involving substantial alteration of the latter.

Further objects and advantages of the invention will be apparent from consideration of the following more detailed description and by reference to the accompanying drawings, in which certain desirable embodiments of the invention have been illustrated by way of example.

In the drawings:

Fig. 1 is a vertical section through the bolster and spindle base of a spindle structure embodying the present invention;

Fig. 2 is a similar vertical section showing the improved bolster removed from the spindle base;

Fig. 3 is a view similar to Fig. 2 but illustrating a modification;

Fig. 4 is a fragmentary plan view, to smaller scale, showing a portion of the spindle rail of a spinning frame, and illustrating one desirable mode of providing lubricant to the spindles;

Figs. 5 and 6 are fragmentary vertical sections, illustrating modified arrangements of blade-lubricating means in the bolster;

Fig. 7 is a view similar to Fig. 2 but illustrating a modified construction; and

Fig. 8 is another view similar to Fig. 2, illustrating a further modification.

Referring to the drawings, the numeral 1 designates the blade, or spindle proper, with the driving whirl 2 fixed to the spindle. The lower end 3 of the blade or spindle proper is seated in a step bearing 4 while at a point preferably in the neighborhood of the whirl, the blade is supported to turn in a sleeve bearing at 5.

In accordance with the present invention, the bearings at 4 and 5 form portions of a bolster which is arranged at fit snugly within a vertical bore in the spindle base or bolster casing 6. This spindle base or bolster casing is, as usual, arranged to project downwardly through an opening in the spindle rail 7 of the spinning, twisting or other frame to which the spindle appertains. The spindle base 6 is fixedly secured to the rail in any suitable manner and as is usual is closed at its lower end.

The improved bolster, in accordance with the present invention, preferably comprises a plurality of axially aligned tubular sections, the upper section 5a (Fig. 2) having an axial bore whose inner wall constitutes the sleeve bearing 5. The sections 8 and 9, and such further sections as may be interposed between the upper section 5a and the lower section 10, are of tubular construction, but the section 10 is preferably closed at its lower end 12. In order to maintain the several sections of the bolster in proper alignment and to unite them so as to form a unitary structure, a reinforcing member 15 is arranged to extend longitudinally from the uppermost to the lowermost section. As shown in Fig. 2, this reinforcing member is a metallic sleeve 15 which fits snugly within the several sections but whose internal diameter is greater than the diameter of the sleeve bearing 5 so that it does not contact with the blade 1 when the latter is arranged within its bearings. The lower step bearing 4

is preferably provided in a bearing member 13 which fits loosely within the reinforcing sleeve 15, and which is held in place by means of a pin 14 extending transversely through a slot or opening of larger diameter than the pin in the member 13. This lower bearing 4 is thus of the "floating" type well known in the spinning art, although it is contemplated that, if desired, this step bearing may be of any other appropriate construction.

As shown in Figs. 1 and 2, the bolster is of larger external diameter at its upper and lower portions, that is to say, at the sections 5a and 10, than at intermediate points, and these portions of larger diameter fit snugly within the bore in the spindle base 6 and may be held stationary in such bore, that is to say, prevented from turning in the bore by any suitable means if desired, in accordance with usual practice. By reason of the fact that the bolster is of larger diameter at its upper and lower portions than at its intermediate or body portion, an annular oil-receiving chamber 16 is thus provided between the outer peripheral surface of the body portion of the bolster and the inner wall of the bore in the part 6. Preferably the several sections of the bolster, including the part 13 which contains the step bearing, are made of some solid substantially unyielding but porous material capable of absorbing oil or other lubricant, or of some other solid material having therein inserts of such a porous solid lubricant absorbent material. Preferably I use certain metallic alloys, which, while superficially solid and non-resilient, are porous and capable of absorbing lubricant. In thus referring to "solid" oil-absorbent material I intend thereby to designate wear-resistant material sufficiently unyielding and shape-retaining to permit a machine part, for example a rigid bearing bushing or the like, to be made therefrom, and further characterized in having minute and substantially microscopic capillary passages or cavities of fixed dimensions permeating its entire substance, and is to be distinguished from soft, yielding or easily worn substances such as textile fabrics, rubber, wood or the like, wholly unsuited for use in forming accurately dimensioned and durable machine parts.

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 in a very finely divided state, the ingredients being thoroughly mixed and then briquetted under high pressure to produce a bearing element, for example a bushing, of substantially the desired dimensions. The briquetting pressure is desirably of the order of 75,000 pounds per square inch. After briquetting, the bearing elements 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 bushing members are surfaced and sized, for example, by the use of concentric arbor and die members which squeeze and reduce the material of the bushing device substantially to its final dimensions. After being thus sized, the bushings are impregnated with lubricant by soaking them for approximately one and one-half hours in oil having a paraffine base, while keeping them at a temperature of approximately 250° F.

In accordance with the present invention, such portions of the bolster as are made of material of the character above noted, may be impregnated with oil or other lubricant before insertion in the spindle base 6, and if a suitable absorbent material be used, and the impregnation be thorough, such a bolster with its fixed lubricant will operate for a very long time satisfactorily without the addition of further lubricant. However, in accordance with the present invention, I contemplate a continuous supply of lubricant to be absorbed by the porous bolster material and to be transmitted by capillary attraction through the latter to the bearing surfaces. For this purpose the spindle base 6 may be provided with a passage 17 connected by means of a tube 18, preferably flexible to an oil supply line 19, either flexible or rigid, extending longitudinally of the spindle rail. The oil from the supply line 19 passes through the tube 18 and through the passage 17 into the annular chamber 16 where it comes into contact with the absorbent material of the bolster, which takes up the oil and transmits it to the bearing surfaces. It is obvious that with such an arrangement no oil pumping can take place, since the velocity of transmission of the oil from the outer to the inner surface of the bolster is controlled to so large a degree by the capillary action of the bolster material, which precludes an oil velocity great enough to cause over-lubrication, the capillary passages in the material constituting the only means of ingress for lubricant from the exterior to the interior of the bolster. On the other hand, a proper supply of lubricant is assured at all times.

In order that the spindle base may be properly adjusted without interference with the connections leading from the main oil line 19, it is desirable to make the tubes 18 quite flexible, and since I find that metallic tubes, such as tubes of copper or brass, are hardly flexible enough for the purpose, and since natural rubber is injuriously affected by oil, I prefer to employ for the purpose a tube of one of the synthetic rubbers or some similar material which, while flexible, is not attacked by oil.

In the arrangement illustrated in Fig. 3, the bolster comprises the upper section 5b, the intermediate sections 8b and 9b, and the lower section 10b, the latter carrying the step bearing member 13b all in a manner generally similar to that previously described. However, in this instance the reinforce member 15b takes the form of a rigid metallic sleeve which snugly embraces the several sections of the bolster and thus holds them in alignment. In this instance, in particular, it is not needful to make the intermediate sections 8b and 9b of the bolster from porous material, but as in the previous instance the upper and lower sections 5b and 10b are of the porous oil absorbent material and by capillary attraction receive oil from the space 16 so as to keep the bearings properly lubricated.

In Fig. 5 there is illustrated a portion of the upper section 5c of a bolster wherein the section itself may be made of ordinary metal or the like, but which is provided with a series of inserts 20 which may be of the solid metallic oil-absorbent material such as that above suggested, and whose inner ends collectively constitute the bearing surface.

In Fig. 6 a section 5d of a bolster is illustrated wherein the body of the section may be of metal, but in which elongate inserts 21 of the solid lubricant absorbent material are seated, the inner edges of these inserts collectively constituting the bearing surface.

In Fig. 7 there is illustrated a desirable ar-

rangement in which the entire bolster, with the exception of the step bearing and its pivotal support, consists of an integral piece of the porous oil-absorbent bearing material such as that above referred to. Thus the upper bearing section 5^d is integral with the tubular body 9^d which in turn is integral with the lower section 10^d, the latter carrying the floating step bearing 4^d. This step bearing may also be made of the porous bearing material, if desired.

The external diameters of the upper and lower sections 5^d and 10^d are greater than the external diameter of the body portion 9^d, while the interior diameter of the upper section 5^d is slightly less than the internal diameter of the body portion so that the inner surface of the section 5^d constitutes the upper bearing for the blade or spindle, the lower end of which is seated in the step bearing 4^d.

In Fig. 8 a further modification is illustrated in which the upper sleeve member 5^t and the lower thimble member 10^t (the latter being closed at its lower end and both sleeve member and thimble being of the porous oil-absorbent bearing material above referred to), are rigidly united by a tubular body portion 9^t which may be of metal or any other appropriate material; for example, a tube of the porous bearing material which may be made separate from the upper and lower sections but which is fixedly united to the latter. The lower section 10^t supports the floating step bearing 4^t, also preferably of the solid porous oil-absorbent bearing material, and the exterior diameters of the sections 5^t and 10^t preferably are greater than that of the tubular body 9^t, the inner diameter of the section 5^t being smaller than that of the tube 9^t and constituting the upper bearing for the blade.

While I have herein illustrated certain desirable embodiments of the invention by way of example, I wish it to be understood that the invention is not necessarily limited to the precise arrangements disclosed, but that any modifications thereof, including substitutions of material and variation in proportion and relative arrangement of parts, may be made, all within the scope of the invention as set forth in the accompanying claims.

I claim:

1. A spindle construction for spinning frames or the like comprising a spindle base having a bolster-receiving bore, a bolster seated within said bore in the spindle base, the upper and lower parts of the bolster constituting bearings for a rotary spindle, such upper and lower parts at least of the bolster being of a substantially rigid, oil-absorbent, metalliferous material having a porous structure including a multitude of microscopic capillary passages, and means for delivering oil to the bore in the spindle base for absorption by said bearing portions of the bolster, the bolster being closed at its lower end, the capillary passages in the material of the bolster constituting the only means of ingress for oil from the exterior to the interior of the bolster.

2. A spindle construction for spinning frames or the like comprising a spindle base having a bolster-receiving bore, a bolster seated within said bore in the spindle base, the bolster having a tubular intermediate portion and upper and lower end portions, said upper and lower end portions having therein, respectively, upper and lower bearings for a spindle, the lower of said end portions being closed at its bottom, the tubular body portion and the bearing portions being of substantially rigid oil-absorbent material, and a reinforce tube of stiff, rigid material snugly fitting within said tubular body portion intermediate the bearing portions of the bolster, said bolster being devoid of open passages of visible size from one end to the other.

3. A spindle bolster assembly for spinning frames or the like including means for supplying a limited quantity of oil to a bearing which supports a spindle, said assembly comprising a spindle base having a bolster-receiving bore, a substantially rigid tubular bolster seated in said bore, the base and bolster cooperating to provide an annular oil reservoir about the bolster, the bolster comprising bearing sections adjacent its upper and lower ends respectively, one of said bearing sections affording a hard, wear-resistant, and relatively rigid bearing surface for engagement with a spindle, at least a portion of said surface being provided by metalliferous material which is of a porous character affording numerous microscopic capillary passages communicating with said oil reservoir and terminating at said surface, and an oil duct for supplying oil to said reservoir, whereby oil may continuously be supplied from the reservoir to said bearing surface at a very slow rate determined by the microscopic dimensions of the capillary passages, and whereby the oil thus passing from the reservoir may be replenished through said duct.

4. A spindle bolster assembly for spinning frames or the like including means for supplying a limited quantity of oil to a bearing which supports a spindle, said assembly comprising a spindle base having a bolster-receiving bore, a substantially rigid tubular bolster seated in said bore, the base and bolster cooperating to provide an annular oil reservoir about the bolster, the bolster comprising bearing sections adjacent its upper and lower ends respectively, one of said bearing sections comprising a substantially rigid spindle contacting insert of a metalliferous solid substance having therein a multitude of microscopic capillary passages communicating with said oil reservoir and terminating at the spindle contacting surface of the insert, and an oil duct for supplying oil to said reservoir, whereby oil may continuously be supplied from the reservoir to the spindle contacting surface at a very slow rate determined by the microscopic dimensions of the capillary passages, and whereby the oil thus passing from the reservoir may be replenished through said duct.

5. A spindle construction for spinning frames or the like comprising a spindle base having a bolster-receiving bore, a bolster seated within said bore in the spindle base, the upper and lower parts of the bolster constituting bearings for a rotary spindle, such upper and lower parts at least of the bolster being of a substantially rigid, oil-absorbent, metalliferous material having a porous structure including a multitude of microscopic capillary passages, said lower part of the bolster including a loose step-bearing for the spindle, and means for delivering oil to the bore in the spindle base for absorption by said bearing portions of the bolster, the bolster being closed at its lower end, the capillary passages in the material of the bolster constituting the only means of ingress for oil from the exterior to the interior of the bolster.

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