March 18, 1947. H. GLEITZ ET AL 2,417,485

MOUNTING FOR TEXTILE MILL SPINDLES

Filed April 18, 1945 2 Sheets-Sheet 1

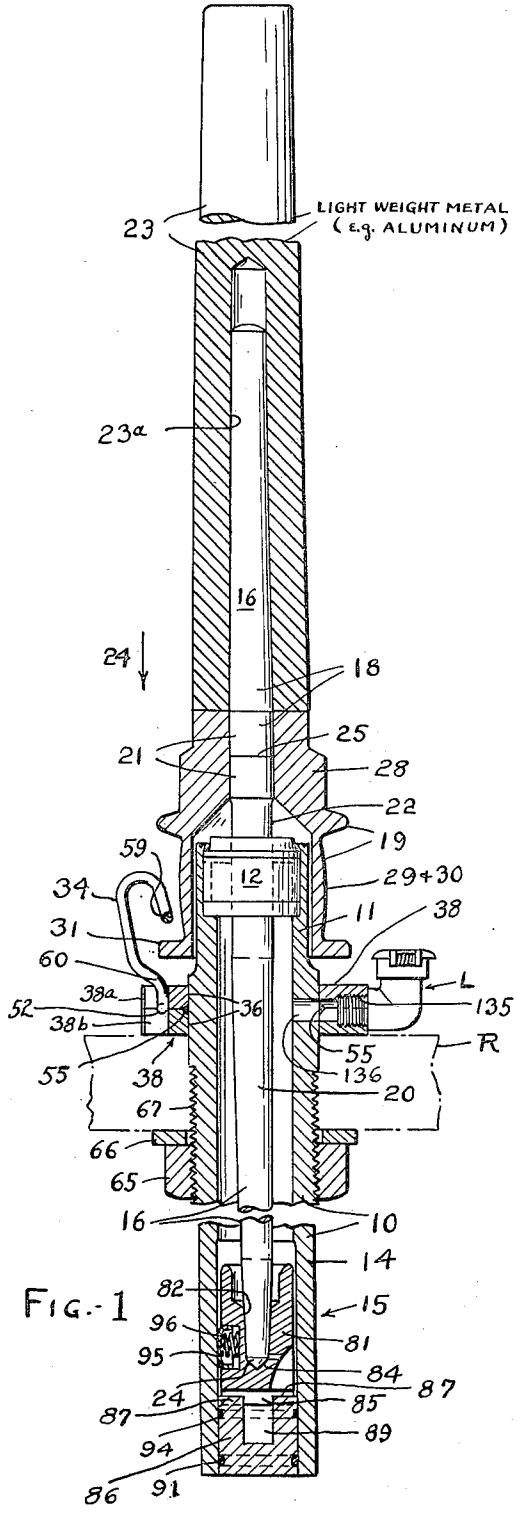


FIG.-1

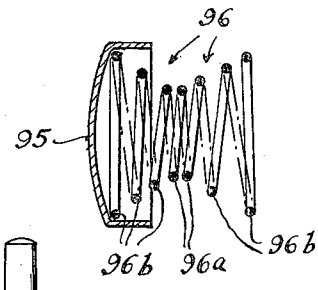


FIG-1a

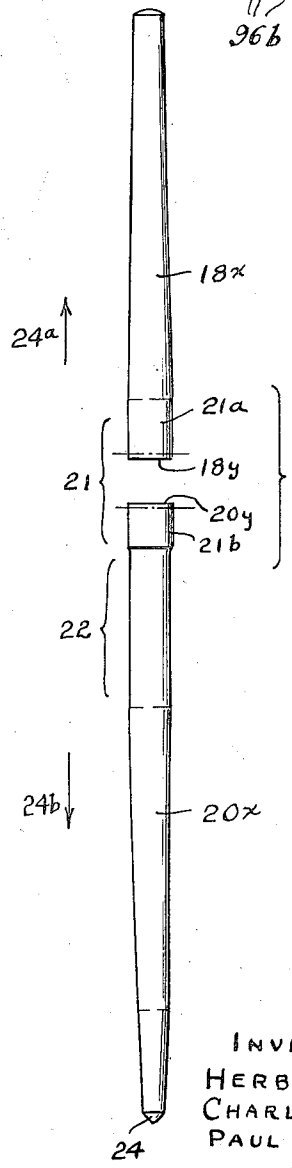


FIG-2

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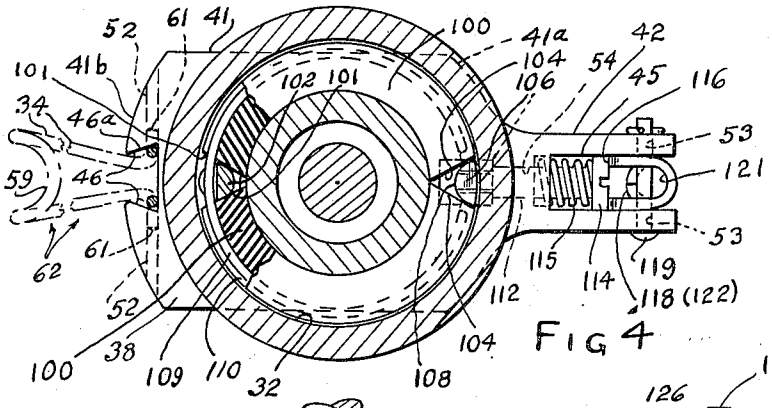


FIG 4

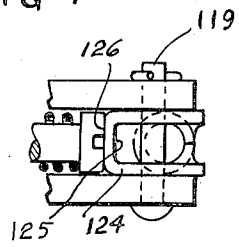


FIG-7

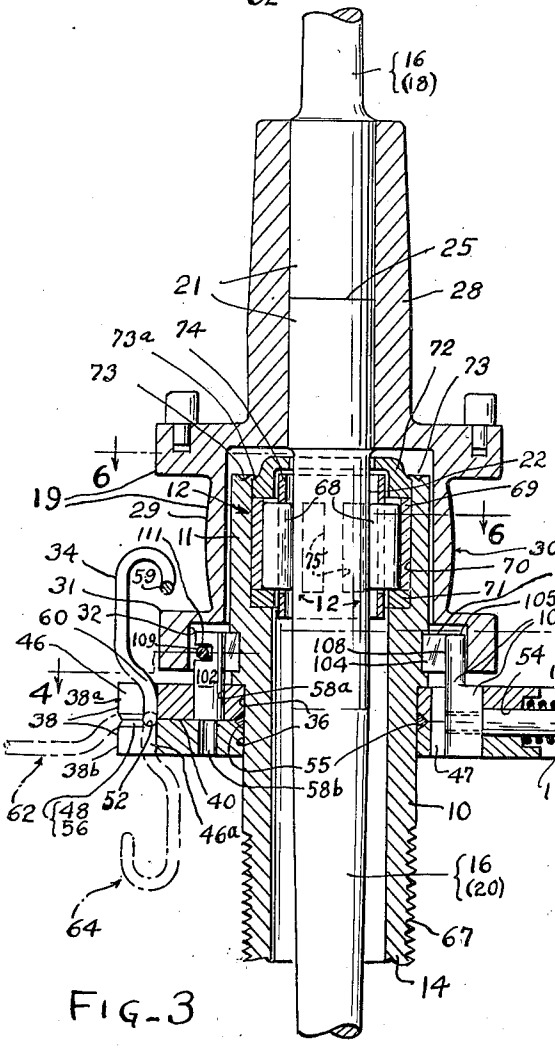


FIG-3

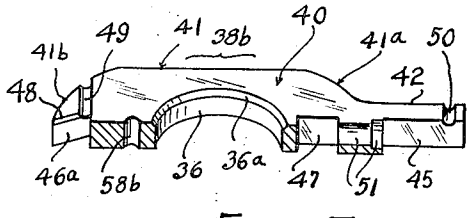


FIG-5

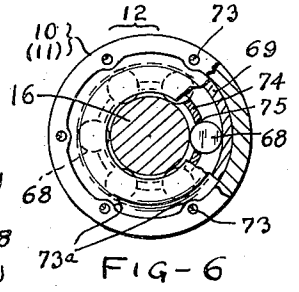


FIG-6

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2,417,485

MOUNTING FOR TEXTILE MILL SPINDLES

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Application April 18, 1945, Serial No. 589,010

9 Claims. (Cl. 57—135)

1

This invention relates to a spindle such as used in textile mills, as for spinning or twisting.

Textile mill spindles have been very highly developed and recent improvements made at the instance of the assignee hereof in anti-friction bolster bearing constructions and resiliently mounted footstep bearings have permitted increases in loading, speed of operation, and life of the unit. Increased speeds and loading have demanded improvements in brake design to provide adequate braking forces without complication of construction. Prior brake structures which have provided the necessary braking forces have not only been relatively expensive, but the operating mechanisms thereof have been subject to occasional failures and have not been as positive in operation as is desired. The cost of high speed spindles has been greatly reduced by forming the bolster case of seamless steel tubing and rigidly securing a main mounting and brake supporting flange thereto. However, further room for improvement was found to exist both in the manner of making such flange and in the manner of attachment thereof to the bolster case. Reduction in the cost of the bolster case has caused the blade to assume a disproportionate share of the cost of the completed spindle, and need has therefore arisen to simplify the method of blade manufacture as well as to render the brake and its supporting structure less expensive while at the same time improving as a whole both the construction and operation of the spindle assembly.

The present invention provides an improved textile mill spindle having all of the advantages of present spindles, and particularly those possessed by the spindle construction described in United States Patent No. 2,351,951, issued June 20, 1944, to Herbert Gleitz and in the copending application of Herman H. Brooksieker and Paul I. Thyreen, filed June 21, 1944, as Serial No. 541,420. The invention also includes an improved bobbin or spool adapter which latter eliminates many disadvantages heretofore considered inherent and which enables the use of a shorter and consequently less costly blade. The spindle of the present invention further comprises an improved and simplified internal brake mechanism capable of exerting the maximum desired braking forces quickly, although gradually, with great uniformity of bearing loading; an improved means for effecting braking force application and release; an improved manner of securing a bolster bearing in place; a novel mounting structure for

2

the brake and the whorl hook, and certain improvements relating to the footstep bearing.

The improvement in internal spindle brakes relates to the operating mechanism including a manual control lever and mechanism disposed between the lever and a pair of outwardly expandable shoes whereby the braking forces are uniformly distributed and more quickly and positively released, and the entire mechanism rendered less subject to binding and rapid wear. A novel main mounting flange or collar, which also supports the brake (when used) and/or the whorl hook and driving band guide and usually an oiling fitting, is of a simplified construction which reduces many of the machining and drilling operations required in the manufacture of spindle mounting flanges or collars and thus eliminates the need for several costly fixtures and makes possible more rapid manufacture. The bobbin or spool adapter for the spindle herein described is made of aluminum or metal of the same type as aluminum instead of wood, as in conventional practice and not only possesses all of the advantages naturally to be expected from such change but also possesses many unexpected advantages which contribute to better operation as well as lower manufacturing and maintenance cost.

An object of this invention is to provide a spindle having the foregoing advantages and features.

Another object is to provide an improved internal braking mechanism for textile mill spindles which mechanism is economical in construction, wherein the braking force is uniformly distributed over the entire brake shoe area and whereby brake application and release are made more certain of rapid accomplishment.

A further object is to provide an improved collar or mounting flange construction for a textile mill spindle.

Another object is to provide a composite collar or mounting flange construction for a textile mill spindle in which complemental parts are formed by a simple punching and coining operation from sheet stock.

A still further object is to provide an improved bolster bearing construction in which rollers are used, and specifically a new manner of securing the bearing assembly against dislocation and undesirable tampering.

A further object is to provide an improved footstep bearing and support and centering means therefor in a bolster case.

Other objects include the provision of a light metal adapter for cooperation with a spindle blade and bobbin, and the provision of a support-

ing collar or mounting flange for a bolster case which is formed of two complemental sections integrally joined together as by welding or copper brazing.

Other objects and advantages will become apparent from the following description of the preferred constructions shown in the drawings, in which:

Fig. 1 is a longitudinal central sectional assembly view of one type of spindle embodying features of the invention;

Fig. 1*a* is an enlarged sectional view of a footstep centering spring assembly with the spring in an abnormally unstressed condition;

Fig. 2 is a view illustrating two finished sections from which the spindle blade is formed by welding;

Fig. 3 is a fragmentary view corresponding to the central portion of Fig. 1 showing a different (larger) type of spindle embodying the brake mechanism;

Fig. 4 is a cross sectional view taken generally at 4—4 on Fig. 3;

Fig. 5 is a central sectional perspective view of one of the two collar or mounting flange sections according to Fig. 3;

Fig. 6 is a sectional plan view of the spindle according to Fig. 3 showing an improved manner of securing the bolster bearing assembly in place in the bolster case; and

Fig. 7 is a fragmentary plan view showing a modified brake operating lever.

General construction

In Fig. 1, showing the simpler form of spindle hereof, a bolster case 10, preferably formed of seamless steel tubing, has an upper portion 11 containing a bolster bearing assembly 12 and a lower portion 14 containing a footstep bearing 15. Rotatably supported by the bearings 12 and 15 is a spindle shaft or blade 16 comprising an upper, bobbin-supporting and drive-connection portion 18 extending through and upwardly from a driving whorl 19 and a coaxial lower bearing-engaging portion 20 extending downwardly from the whorl and into the footstep bearing 15. The portion 18 has lower cylindrical portions 21 and 22 of two different diameters, upon the larger diameter 21 of which the whorl is press or shrink fitted, and an upwardly tapered end portion received in a complementary socket 23*a* of the bobbin or spool adapter 23 to be described later. The lower portion 20 is tapered downwardly for its entire length and has a conical tip 24 at its lower end within the footstep.

Blade

The blade 16 is preferably made in accordance with the disclosure of the application of Herbert Gleitz et al., Serial No. 592,868, filed May 9, 1945. The same blade construction in one form is shown herein particularly by Figs. 1 and 2. The blade as shown comprises separate blade sections 18*x* and 20*x*, Fig. 2, having larger diameter cylindrical portions 21*a* and 21*b* constituting the single cylindrical portion 21 in the finished blade. The sections can be made advantageously on an automatic screw machine and later joined along the cut-off faces 18*y* and 20*y* to form the joint 25, Fig. 1, as by electrical resistance butt welding.

Blade (continued) and adapter

Although the blade 16 as shown in Fig. 1 is shorter than those commonly used in the type of spindle illustrated, it is to be understood that the foregoing described construction may be used for blades of any length. Fig. 3 illustrates, in part, the type of spindle construction employing a longer blade. The shortness of the blade 16 of Fig. 1 is enabled by the novel adapter 23 which in the type of spindle shown is preferably joined to the blade or at least so fitted thereto as always to rotate therewith.

The adapter 23 which, for example, may enter and fit the central opening of a tubular fiber or paper thread bobbin (not shown) comprises a slightly tapered sleeve formed of aluminum or suitable aluminum alloy or magnesium having the tapered axial socket 23*a* extending upwardly from the lower or larger end face to approximately the mid-portion of the sleeve. The socket 23*a* receives the tapered part of the upper portion 18 of the blade 16, and the lower end face of the adapter ordinarily rests on the upper face of the whorl 19. A tight fit between the adapter and the blade 16 is preferably accomplished by a shrink fit operation which may comprise first chilling the blade 16 to reduce its diameter, inserting the blade into the socket 23*a*, and then allowing the assembly to return to room temperature. Adapters heretofore have been made of wood and for strength and to prevent distortion such as warping have required the use of a relatively much longer blade than the blade 16. The blades are extended for the entire or nearly the entire length of the adapter. By making the adapter of aluminum it is possible to use a relatively short blade such as 16, and also the disadvantages of prior wooden adapters such as warping, shrinking, and loss of balance are obviated. In addition, the aluminum or light metal adapter weighs no more than the hard wood currently used and permits a positive driving fit to be made between the adapter and blade without the use of keys, pins or other fasteners.

Blade (continued) and whorl

The whorl 19 has a hub portion 28 (compare Figs. 1 and 3) fixed to the blade 16 as by a press-fitting upon the cylindrical portion 21 of the blade. When the blade is made in accordance with application Serial No. 592,868, advantage is taken of the press fitting between the blade and whorl to conceal the weld and assist in holding the two blade portions in alignment. The joint 25 as shown in Figs. 1 and 3 lies approximately centrally between the effective ends of the hub.

A lower part 29 of the whorl surrounds the portion 11 of the bolster case (free therefrom), and may have an approximately cylindrical but barrel-shaped surface 30 for engaging a driving belt or band (not shown). Below the surface 30, the whorl has an enlarged reinforcing and band supporting rim or flange portion 31, the inner cylindrical face of which, as shown only in Figs. 3 and 4, constitutes an internal braking surface 32 for cooperation with shoes of a brake mechanism described below.

Mounting flange and brake

The lower part of the portion 11 of the bolster case 10 is received within aligned openings 36 in substantially identical top and bottom sections 38*a* and 38*b* of a composite flange or collar 38 which serves as a supporting means for the bolster case and mounts the brake mechanism and a whorl hook and band retainer 34. The flange sections 38*a* and 38*b* are integrally joined together for example by spot welding (not shown) or by brazing (described later) with their

complemental face surfaces 40 in face to face contact thus in effect forming an integral flange or spindle collar structure.

Each of the sections 38*a* and 38*b* is preferably formed by a blanking operation from suitable plate or strip stock and has a body portion 41 (Figs. 3, 4, and 5) with curved or obtusely directed end faces 41*a* extending to a lateral projection or tongue 42 and an opposing end face 41*b* which is curved as shown. The projection 42 in each instance has a longitudinal slot 45 having parallel side walls, and a slot 46 formed in the opposite edge portion of the body 41 has inwardly diverging side walls 46*a*. Also diametrically aligned with the opening 36 and having parallel side walls which intersect the peripheral wall of the opening is a slot 47. The opening 36 and the slots 45, 46 and 47 may be formed by a punching operation e. g. simultaneously with blanking of the body from the strip, and a subsequent coining operation may provide at the face 40 a chamfered surface 36*a* around the peripheral edge of the opening 36 as well as oblique, chamfers 48 (one shown in Fig. 5) at the intersection of the walls 46*a* and the respective main faces 40 of each section.

Also formed in the surface 40 of each of the sections 38*a* and 38*b* and preferably by a coining or similar operation are aligned hemicylindrical, transverse grooves 49 intersecting the respective slots 46 near their inner end walls. A similar pair of grooves 50 are formed in the face 40 of each section intersecting the slot 45 of the extension arms 42. When the sections 38*a* and 38*b* are secured together, in a manner to be described and as shown in Fig. 3, the complemental pairs of grooves 49 and 50 in the respective faces 40 define interrupted, and respectively aligned cylindrical, transverse pin-receiving openings 52 and 53. Additional recesses or grooves 51 (Fig. 5) may be coined or stamped in each section to form, after assembly of the sections, the cylindrical opening 54 (Figs. 3 and 4) radial with respect to the aligned bolster-case-receiving openings 36. The opening 54, however, is rather large for such formation and usually is formed by drilling and counterboring after assembly of the flange 38 onto the bolster case. As indicated on Figs. 1 and 3, the chamfered surfaces 36*a* define an annular V-shaped groove 55 intermediate the outer ends of the aligned openings 36, and the chamfered surfaces 48 define opposed V-shaped notches 56. Additionally, the sections 38*a* and 38*b* are provided with punched openings 58*a* and 58*b*, respectively, which are located between the respective openings 36 and the slots 46 and which constitute the only difference between the two sections. The opening 58*a* as shown is somewhat larger than the opening 58*b*.

From the foregoing it is seen that the composite collar or mounting flange 38 is completely formed without recourse to costly and time-consuming machining and drilling operations. This is of particular importance because the accurate drilling of an interrupted opening such as the opening 52 is an extremely complicated operation requiring skillful machine operation and a costly fixture, and the forming of a groove such as the groove 55 in a one-piece flange or collar would obviously require an expensive boring operation after the bolster-case-receiving opening has been drilled.

In the case of the flange 38 of Fig. 1 the two sections 38*a* and 38*b* are exactly alike. The threaded opening which receives the oiling fitting L and conducts lubricant therefrom to the bolster case as illustrated in Fig. 1 is preferably drilled and tapped after assembly of the flange on the bolster case but even that opening can be partly coined.

Although the preferred method of forming the sections 38*a* and 38*b* of the flange 38 is described herein as comprising stamping, punching, and coining operations, it is to be understood that this invention extends to the novelty of forming a spindle flange or collar in two separate sections and then joining them as by copper brazing into what is in effect an integral structure; and is not to be limited to the use of the precise manufacturing methods above described.

Brazing, as used herein

The above references to brazing and those given below contemplate fusion of the joined metal parts together so that those parts become in effect integral. Such operation and function cannot be accomplished by the "silver solder" methods described in application Serial No. 541,240, identified above. Silver solder alloys usually fuse at around 1300° F. or lower. Copper and copper brazing alloys fuse at 2100° F. and at higher temperatures at which molecular surface changes are believed to occur on most steels such that actual fusion of the joined steel surfaces take place during the brazing operation. A further difference is that solder of all types when used to join ferrous metals requires space in which to operate. Press fitted and shrink fitted generally smooth ferrous parts cannot be made more secure by soldering because the solder cannot penetrate the spaces actually left between ferrous parts so fitted together whereas copper braze will penetrate and fuse the parts. The brazing operations in accordance herewith can be accomplished by heating the assembled parts by induction, by immersion in a fused salt bath and in a controlled atmosphere furnace (substantially non-oxidizing atmosphere).

Whorl hook and mounting

The whorl hook 34 (Figs. 1, 3 and 4) serves as a temporary driving band support in two positions and comprises a cylindrical spring wire bent into a U-shape. The upper or bight end portion 59, Figs. 3 and 4, of the hook is reversably bent upon the remainder of the wire (free therefrom) and intermediate portions of the legs are offset in the same direction as the portion 59 by angularly disposed portions 60. The extreme lower or free end portions 61 of the opposing legs are bent outwardly in axial alignment but in opposite directions and are rotatably received respectively in the spaced portions of the interrupted cylindrical opening 52 defined by the complemental grooves 49 in the sections 38*a* and 38*b*. The hook 34 is preferably mounted upon the flange 38 by forcing the leg portions of the hook toward each other and thus inserting the outwardly bent end portions 61 into respective portions of the opening 52 of the flange. Alternatively, the outwardly bent leg portions 61 can be placed in the interrupted grooves 49 in one of the two flange sections 38*a* and 38*b* before bringing the sections together in face to face contact as above described and welded or otherwise secured into a right flange unit.

In order to disconnect the spindles from the driving band at times it is of advantage to be able to move the belt or band (not shown) away

from the surface **30** and to retain it in its removed position. The hook **34** as shown may be rotated counterclockwise to an intermediate position shown by broken line **62** (Figs. 3 and 4), and to extreme lower position (not ordinarily used) indicated, in Fig. 3, by the broken lines **64**. The inwardly diverging walls **46***a* releasably but strongly hold the hook **34** in the normal operating position shown by solid lines in each of Figs. 1 and 3. When the whorl hook is moved to the horizontal position **62**, the opposing legs are bent inwardly toward each other by camming action of the walls **46***a*, and when the position **62** is reached the legs spring outwardly into the respective V-shaped notches defined by the chamfered surfaces **48**. Thus the hook does not have to be supported by the spindle rail, as usually is the case, in order to be retained in a horizontal position.

Bolster case—further features

As shown in Fig. 1, the flange or collar **38** is clamped against the top side of the usual fixed spindle rail R as by a suitable nut **65** and washer **66**, the nut fitting threads **67** formed on the portion **14** of the case. The brazed joint between the collar and case is provided by inserting a wire or strip of brazing alloy (e. g. copper) in the annular groove **55** defined by the opposing chamfers **36***a*, sliding or pressing the collar **38** into position; heating the assembly as previously described, causing the brazing metal to flow throughout the space between the collar and case as well as between the faces **40** of the flange sections **38***a* and **38***b*, and then cooling the assembly. The portion of the brazing alloy caused to flow between the faces **40** is sufficient to hold the sections **38***a* ad **38***b* integrally together in event they have not been previously brazed or welded to join them into a self-sustaining subassembly as may sometimes be practiced.

Attention is called to the fact that, in Fig. 1, there is no shoulder on the upper non-threaded part of the bolster case against which the composite flange or collar **38** abuts. That surface can be and usually is the original cylindrical unturned surface of the bar or tube stock from which the bolster case is formed. The abutment shoulder in the construction according to Fig. 3 is mainly to definitely locate the operating parts of the brake with reference to the position of the brake shoes **100** (described later). Formation of the threads **67** in any case can be reduced in cost by rolling instead of cutting or grinding.

Bolster bearing and staked-in retainer cap

The bolster and footstep bearings **12** and **15**, Fig. 1, may be of any suitable type but are shown to be and preferably are very similar to those described and claimed in the previously identified patent and copending application. Considering the bolster bearing **12**, the reduced lower end portion **22** of the blade **16** extends for some distance downwardly from the whorl hub **28** and serves as the inner race surface in respect to a set of rollers **68**, Figs. 3 and 6, preferably bearing directly on the inner polished surface of a tubular member **69** received in a counterbore **70** of the bolster case **10**. The member **69** is clamped between a ring or collar **71** which is press-fitted into the counterbore against the bottom thereof and a top cap **72** which is pressed or shrink fitted into the upper end portion of the counterbore. The lower end faces of the rollers **68** rest on the smooth upper surface of the collar **71**. A roller

retaining and spacing cage **74** formed of a cylindrically shaped (curled up) strip of sheet metal and having roller-receiving, vertically disposed slots **75** defined by radially inwardly converging surfaces of the slots hold the rollers against inward movement toward the axis of the bolster case when the spindle blade is removed.

The roller retainer or cage **74** freely occupies the space horizontally between the race forming inner wall surface of the member **69** and the race portion of the blade **16**.

The upper end portion of the cage **74** is received loosely within a counterbore **79** of the top cap **72**. The outer marginal area of the lower end face **80** of the top cap bears against the member **69** and the inner marginal area serves to limit upward travel of the rollers **68** to a very slight movement. To avoid expensive threading operations, to avoid application of heat incident to welding such as might damage the bearing race surfaces or those of the rollers and to make the rollers etc. removable and replaceable for authorized service, the top cap is simply staked into place by a series of punch indentations **73**, Figs. 3 and 6, in the top of the bolster case. The indentations cause small portions **73***a* of the bolster case metal to overhand and force against the outer rim portion of the top cap as will be clearly apparent. The staking indentations are done simultaneously by a suitable gang punch operation in a press. When replacement of bearing parts becomes necessary the portions **73***a* are cut away; and later the re-staking is done in new positions around the rim of the bolster case. A completely turned in flange such as previously proposed on bolster bearing retainer caps cannot be removed and replaced as a practical matter usually because the turned in flange is destroyed in removing it.

Footstep bearing

Referring to the footstep bearing **15**, the body **81** thereof is appropriately bored and polished at **82** and **84** to receive respectively the tapered portion and the conical tip end **24** of the spindle blade, the latter and the tapered hole being in close running fit at the lower part of the blade. The body **81** is held against turning by, for example, a diametrally extending slot **85** formed on its lower face and loosely receiving a complementary cross tongue **87** formed on the upper face of a closure plug **86**. The plug has an axial hole **89** in its upper face providing a sludge sump, and the hole divides the tongue **87** into two parts.

The plug **86** is high wear resisting metal, preferably Nitralloy or other metal that will adequately resist damage when the bolster case and plug assembly is subject to the brazing temperature. The brazing metal or alloy, e. g. copper strip of wire is placed prior to assembly in an annular groove **91** formed in the peripheral surface of the plug close to the lower end face of the bolster case. After the plug is properly positioned, being limited during press or shrink fitting by a precision formed mandrel temporarily placed inside the main bore of the bolster case and shouldered against the bolster bearing support counterbore, the footstep plug and bolster case are heated to fuse the brazing metal which flows between the bolster case and plug where it virtually fuses the plug rigidly in position and fills any space which might enable oil leakage. An annular groove **94** provided near the top of the plug **86** effectively prevents the brazing metal from flowing to the cross slots which receive the projections **85**.

The centering means for the footstep body **81**

comprises a plurality of radially guided buttons **95** biased outwardly by respective calibrated coil springs **96**, one of which is shown in non-stressed condition in Fig. 1*a*. The spring **96**, as shown, is of hour glass shape having small central coils **96***a* and gradually increased diameter coils **96***b* at both ends. The adjacent coils **96***b* are so related to each other and two of the coils **96***a* are so related to adjacent coils **96***b* that the coils nest or radially overlap whereby a considerable number of coils of fairly strong spring wire can be used in the rather small space allowed for accommodating the spring. The enlargement of the coils at both ends of the spring assists greatly in preventing the spring from becoming skewed in position during assembly and in service.

Spindle brake (continued)

The brake as shown in Figs. 3 and 4 comprises two identical arcuate shoe members **100** slidably received in a shallow, annular groove in the bolster case opposite the flange portion **31** of the whorl **19**. One pair of spaced, non-radial (inwardly converging) end faces **101** (Fig. 4) of the shoes **100** are slidably disposed on opposite sides of a fixed cylindrical pin **102**, and the other similar pair **104** of inwardly converging end faces are likewise disposed on opposite sides of a reduced head portion **105** of a brake operator or pin **106** having an inwardly directed, hemi-cylindrical face surface **108**. The shoes **100** are formed of substantially rigid friction material, as in the above mentioned application, and are normally pressed inwardly into non-braking position by a C-shaped spring wire **109** which lies in a groove **110** formed in the outer peripheral surface of the shoes and extending around the entire periphery of the two shoes. The pin **102** which is cut away at **111** to provide clearance for the spring, and is secured as by a press fit into the opening **58***a* in the mounting flange section **38***a* and rests on an annular shoulder defined by the aligned openings **58***a* and **58***b* which latter opening provides space for a tool such as may be used to drive the pin **102** out in servicing the brake. The lower body portion of the operator pin **106** is slidably received in the aligned slots **47** of the flange sections and has a threaded socket which receives a complementary, reduced threaded inner end portion of a pin **112**. The pin **112** is slidably received in the opening **54** and has an outer terminal flange **114** between which and the inner transverse wall surface of the slots **47** a compression coil spring **115** is disposed. As shown, the spring surrounds the shank of the pin **112** and biases the pin outwardly to a released position of the brake. The pin **112** is moved inwardly against the bias of the spring **115** by generally circular cam surfaces **116** of a generally channel-shaped manual lever **118** pivoted near its upper end on a pin **119** received in the opening **53**. Movement of the pin **112** inwardly moves the pin **106** inwardly to force the end portions of the shoes **100** which lie adjacent the end faces **104** outwardly against the braking surface **32**, and, concurrently, the opposite ends of the shoes **100** are forced against the surface **32** with equal force as the end faces **101** slide on the pin **102**.

The cam surfaces **116** as shown in Figs. 3 and 4 are formed on the edge surfaces of side walls **120** of the lever **118** at the upper end portion thereof near the pivot, the lever **118** having a curved bight portion **121** and having its side walls **120** below the cam surfaces curled inwardly as at **122**. If desired a lever **124** partially shown in Fig. 7 may be used instead of the lever **118**. The lever **124** is pivoted in the same manner as the lever **118** and is also channel-shaped, but is in a relatively reversed position and has the upper end part of its bight portion **125** curved to define a cam surface **126** which functions as do the paired cam surfaces **116** on the head of the pin **112**.

Positive releasing action of the brake operating mechanism is assured because the spring wire **109** need only exert sufficient force to move the shoes **100** to brake-released position, the other moving parts of the brake mechanism being returned to brake-released position by the spring **115**.

Lubricator

For lubrication of the spindle shown in Fig. 1, a sufficient volume of oil is preferably introduced into the bolster case as through an oil gland or nipple L on the collar **38**, previously referred to, so that the portion of the blade above the footstep bearing is maintained immersed. As the oil level recedes, enough oil for lubrication of the bolster bearing climbs the slightly tapered portion of the blade portion **20**. Common practice is to introduce oil into a similar bolster case of spindles not provided with brakes through a nipple on a case-supporting collar. The improved oiling collar and mounting flange of Fig. 1 is constructed in a manner similar to the flange **38** of Fig. 3 so as to permit the advantages and economies of coining operations to be realized. The sections **38***a* and **38***b* of Fig. 1 are essentially the same as those of Fig. 3 except that no provision for supporting a brake is made. It will be apparent that the flange **38** of Fig. 3 can be provided with an oiler the same as is the corresponding flange of Fig. 1. The partially threaded opening **135** which aligns with and opens into a radial bore **136** of the bolster case **10** to form an oil duct can, as previously stated, be partially coined into the matching sections **38***a* and **38***b* although it is not believed practical to coin the threads in that manner.

Reference is directed to the following co-pending applications claiming subject matter originally disclosed by this case: Herbert Gleitz et al., Serial No. 638,944, filed January 4, 1946, entitled "Method of making textile spindle elements"; Herbert Gleitz et al., Serial No. 647,721, filed February 15, 1946, entitled "Spindles for textile mill use"; and Herbert Gleitz et al., Serial No. 647,722, filed February 15, 1946, entitled "Spindles for textile mill use."

We claim:

1. In a mounting flange construction for a textile mill spindle, a pair of substantially identical flange sections, each having a central opening and a substantially planar face surface, complemental cavities on said face surfaces, respectively, and means securing said sections together with said face surfaces in face to face contact and said cavities in complemental relation.

2. In a flange construction for a textile mill spindle, a pair of substantially identical flange sections, each having a central opening and a substantially planar face surface, chamfers formed about the periphery of said openings at said face surfaces, respectively, and means securing said sections together with said face surfaces in face to face contact and said openings in axial alignment, whereby said chamfers define a groove about the peripheral wall of said aligned openings.

3. A flange construction in accordance with

claim 2 characterized in that said chamfers are die formed depressed in said face surfaces, respectively.

4. In combination, a bolster case adapted to be turned from metal bar stock, and a mounting flange for the bolster case having an opening tightly fitting the bolster case and fused to the case by relatively high melting point brazing metal.

5. In a textile mill spindle, a pair of substantially identical flange sections having respective face surfaces in face to face engagement, bolster case-receiving, aligned openings in said sections, aligned slots in said sections, respectively, complemental grooves in said face surfaces, respectively, transverse to and intersecting said slots, respectively, said aligned slots being adapted to receive and support a brake-operating lever, and said complemental grooves being adapted to receive and support a pivot for such lever.

6. In a textile mill spindle, a bolster case having a mounting flange and bearings for a blade, a blade having a whorl, said blade and whorl being removably carried by the bearings, a slot extending into one edge of the flange and having side walls diverging inwardly from said edge toward the bolster axis, aligned openings intersecting the side walls of the slot, a whorl hook of spring material with shank portions pivotally engaging said aligned openings respectively, and recesses in said side walls positioned for spring engagement with shank portions of the hook when the hook is in a generally horizontal position.

7. A bolster case for a textile mill spindle comprising a central hollow metal body adapted to support a spindle blade for rotation and a body-supporting flange comprising a pair of sheet metal stampings with mutually registering apertures arranged to receive said body, means rigidly joining the two stampings together in face to face relationship, and means joining the resulting flange unit to the body adjacent the apertures.

8. A bolster case for a textile mill spindle assembly, said case comprising a central hollow metal body adapted to support a spindle blade for rotation, and a body-supporting flange comprising separate laminated metal sections apertured to receive the body, said portions being intimately joined together by fused metal and attached to the body by fused metal at the wall surfaces which define the apertures.

9. A bolster case for a textile mill spindle assembly, said case comprising a central tubular metal body adapted to support a spindle blade for rotation, a body-supporting flange comprising laminated metal sections with registering apertures to receive the bolster case, intimately joined together in face to face relationship and secured to said body adjacent the apertures, the joined faces of the sections having mutually registering depressions therein which together function to provide a receiving bore or socket parallel to the principal plane of the flange for carrying a part ancillary to the spindle assembly.

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