No. 706,893. Patented Aug. 12, 1902.

F. A. BREEZE.

SPINNING HEAD.

(Application filed Jan. 9, 1902.)

(No Model.)

FIG. 3.

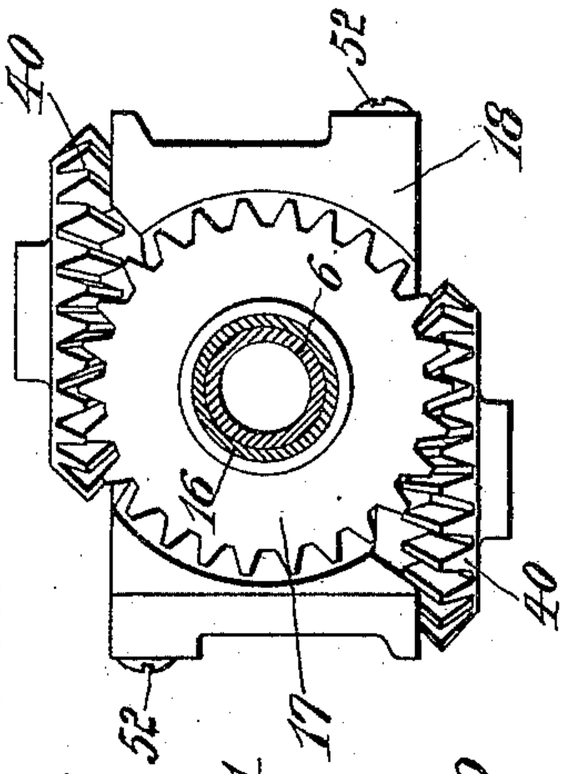


FIG. 4.

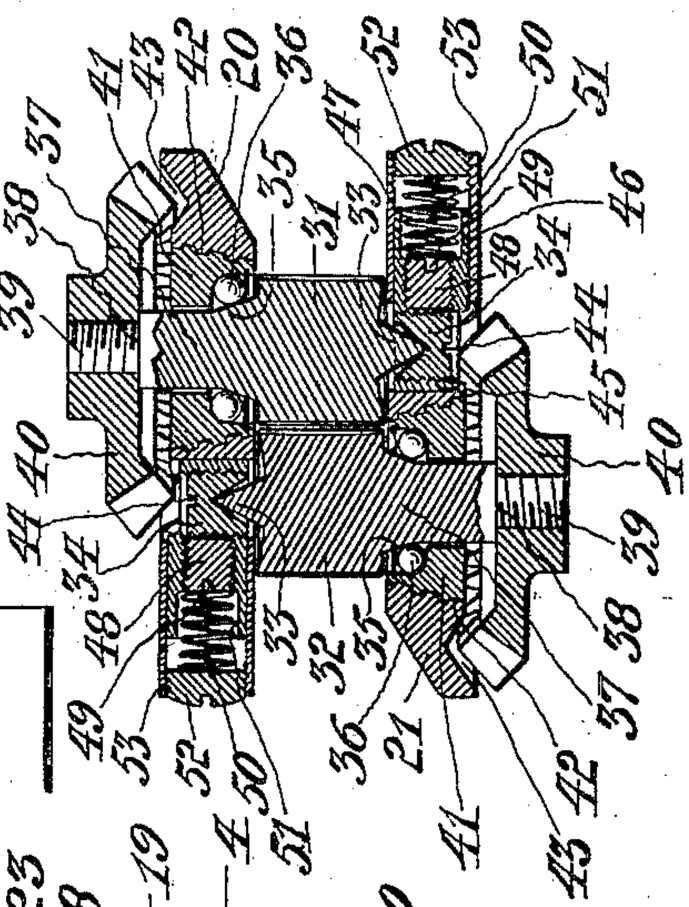


FIG. 2.

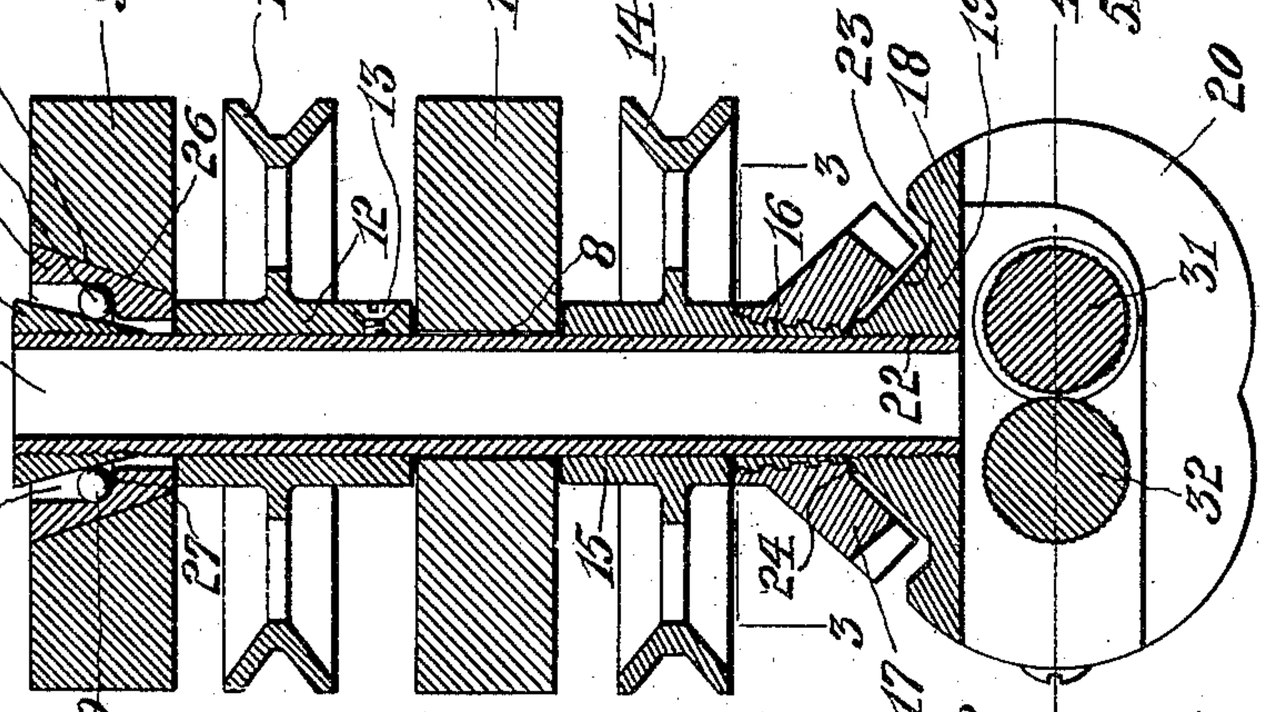


FIG. 1.

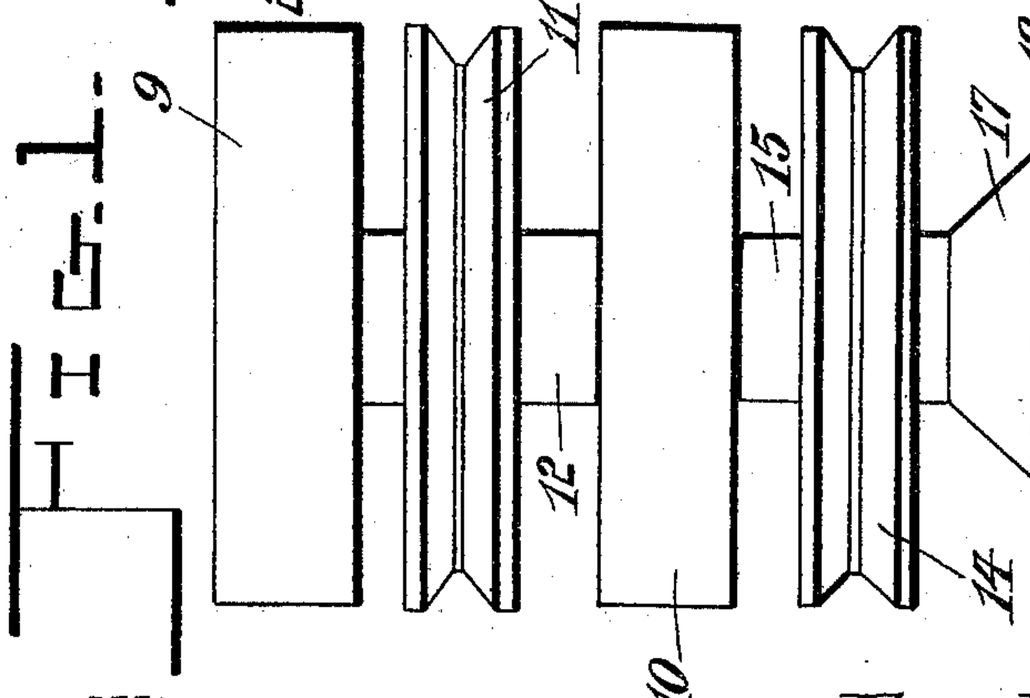
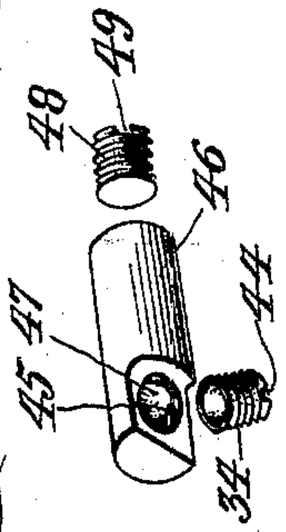


FIG. 5.



Witnesses:
John F. Dewfferwiel.
F. Maynard.

Frank A. Breeze, Inventor,
By Merion & Marion
Attorneys

UNITED STATES PATENT OFFICE.

FRANK ALEXANDER BREEZE, OF FOREST-MILLS, CANADA, ASSIGNOR OF ONE-HALF TO JAMES WILSON, OF RICHMOND, PROVINCE OF ONTARIO, CANADA.

SPINNING-HEAD.

SPECIFICATION forming part of Letters Patent No. 706,893, dated August 12, 1902.

Application filed January 9, 1902. Serial No. 89,023. (No model.)

To all whom it may concern:

Be it known that I, FRANK ALEXANDER BREEZE, a subject of His Majesty the King of Great Britain, residing at Forest Mills, county of Lennox, Province of Ontario, Canada, have invented certain new and useful Improvements in Spinning-Heads; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in a combined drawing and twisting head for spinning-frames adapted to simultaneously draw out and twist a sliver or roving to the proper extent necessary to form a yarn; and I aim by the present invention to simplify the construction of ordinary heads so as to enable the desired result to be obtained by a minimum of structural parts, which occupy also a minimum of space.

My invention is of the type in which a tubular spindle carrying drawing-rolls at its lower extremity and rotating at a high rate of speed is combined with means for rotating the rolls on their axes at the proper relative speed at the same time they are being rotated about the axis of the tubular spindle, the sliver thus drawn out into a yarn being led thence to a cop or bobbin and wound thereon by any suitable mechanism.

One important feature of my invention is the improved means of supporting the rotating head from a single bearing, which may be provided with balls or rollers for diminishing the friction, the single bearing thus provided having only one-half or less than half the amount of friction of the former type of head, wherein two or more bearings were necessary. It will be understood that in a mechanism of this sort it is extremely important to reduce the friction of the rotating parts to the greatest possible extent, whereby to enable the already excessive speed to be largely increased and to correspondingly increase the output of the machine.

Another important feature of my present invention, adapted further to reduce the friction caused by the rotating parts, lies in the transposition of the lower sheave, by which the rolls are rotated on their axes through the medium of gearing carried by said sheave and the lower journal-rail carrying the head, thus avoiding the friction caused by said sheave resting on the said journal-rail. It will be understood that this also causes a great reduction in the friction because of the much slower relative speed of the spinning-head and the lower sheave, so that the friction between the two is much less than the friction between said lower sheave and journal-rail.

Still another important feature of my invention lies in the peculiar formation of the footpiece carrying the drawing-rolls, by a peculiar construction of which I enable the said drawing-rolls to be carried by a ball-bearing on the one side and a sliding coned step-bearing on the other, so as to enable the said rolls while still being held rigidly in their bearings to have a slight pivotal motion about an axis lying at right angles to the axis of the roll and in the plane of the ball-bearing.

Still another important feature of my invention lies in the improved construction by which the coned step-bearing last referred to is held in the slot provided for it so as to have a slight motion transverse to the axis of the roll, whereby the two drawing-rolls are pressed together, while at the same time providing means for preventing the coned bearing-block from turning and loosening in the sliding holder provided for it.

The invention further consists in the novel combinations of devices and in the construction and arrangement of parts hereinafter described, and particularly referred to in the claims.

My improvements are embodied in the sheet of drawings accompanying this application, wherein—

Figure 1 is a side elevation of my improved spinning-head. Fig. 2 is a vertical central section thereof through the journal-rails in the same plane as Fig. 1. Fig. 3 is a plan section on the line 3 3 of Fig. 2. Fig. 4 is a similar plan section on the line 4 4 of Fig. 2. Fig. 5 is a perspective view of certain details to be hereinafter described.

The same numerals of reference denote like parts in all the figures of the drawings.

The spinning-head is mounted on a tubu-

lar spindle 6, which turns in apertures 7 8, provided in the journal-rails 9 10, forming part of the spinning-frame, the apertures 7 and 8 being provided with suitable bearings in which the tubular spindle 6 turns. The journal-rails 9 10 are spaced apart a suitable distance to allow the insertion between them of a pulley-sheave 11, on which a strap, cord, or other suitable driving mechanism is adapted to run, the said pulley-sheave having a tubular hub 12, which preferably is of nearly the same length as the distance between the journal-rails 9 10, although this is not necessary, as it will be understood that said pulley does not form thrust-bearings for the spindle 6 against the journal-rails, said spindle being supported by other means, to be hereinafter described. The hub 12 of the pulley-sheave 11 is provided with a set-screw 13 or other means for securing it firmly to the tubular spindle 6 to turn the latter.

Immediately below the lower journal-rail 10 there is loosely mounted upon the tubular spindle 6 a second pulley-sheave 14, having the same or approximately the same form as the pulley-sheave 11, the said pulley-sheave having a tubular hub 15, which embraces the tubular spindle 6 and is adapted to turn easily thereon. Said hub 15 is reduced at its lower end and formed with a taper screw-thread 16, on which is screwed a skew gear-wheel 17 by means of a suitable interior thread formed about its axis, as shown. Below the gear 17 there is mounted on the tubular spindle 6 and firmly secured thereto a branched footpiece 18, which consists of a recessed base porton 19, of approximately disk shape, and side flanges 20 21, which are downwardly extended to form bearings for the drawing-rolls, as will be hereinafter described. The base portion 19 is secured fast to the lower end of the spindle 6, as shown at 22, and its upper side is cone-shaped at the center, as shown at 23, at an angle corresponding to the interior face of the gear 17, and at the upper edge of the cone, between it and the shaft 6, there is provided a bearing-surface 24, adapted to receive and sustain the weight of the pulley-sheave 14 and the gear 17, mounted thereon, by means of a similar bearing formed on the interior surface of the gear 17 and the lower portion of the hub 15.

The entire weight of the head, comprising the spindle 6 and the footpiece 18, carrying the drawing-rolls, together with the pulley-sheave 14 and gear 17, loosely mounted thereon, is carried from the upper end of the said tubular spindle 6, which extends through the upper journal-rail 9 and which I have shown provided with a ball-bearing of peculiar type. Said ball-bearing comprises a cone-shaped annular piece 25, adapted to sit in a suitable recess 26, formed for it in the journal-rail 9, and to be held stationary therein, and the interior surface of this annular member 25 is stepped, as shown at 27, to provide the annular recess 28 to receive the balls 29, forming the bearing. On the upper end of the tubular spindle 6 is screwed a second annular member of exterior conical form 30, which is adapted to fit in the recess 28 and to engage and be sustained by the balls in the manner shown in Fig. 2.

By the means above described it will be observed that the entire weight of the rotating parts is carried by the ball-bearings at the upper end of the spindle, the engagement of the hub 12 with the under side of the annular member 25 serving merely to prevent possible longitudinal movement and to hold the head in place. As the pulley-sheaves 11 and 14 are rotated in the same direction with only a differential velocity, the friction of the bearing 24 will be largely reduced, whereas heretofore the weight of the pulley 14 was carried by the journal-rail 10, and therefore subjected to the friction caused by the entire velocity of said pulley-sheave, and the same was the case with the sides of the hub 15, which was heretofore formed as a sleeve having a side bearing against the journal-rail 10, which latter bearing is now entirely dispensed with by my improved arrangement of parts.

The footpiece 18 is formed with depending flanges 20 and 21, as hereinbefore described, and the said flanged pieces carry removable bearings in which the drawing-rolls are slidably mounted in the manner now to be described. The said drawing-rolls are shown at 31 and 32, being symmetrically located with respect to the axis of the tubular spindle 6 and immediately below the aperture of the same. Each of the drawing-rolls has at one extremity a conical pivot 33, which is mounted in a hardened-steel step-piece 34, this step-piece 34 being mounted in one of the flanges 20 21 to receive a slight horizontal sliding motion therein in the manner to be hereinafter described. The opposite end of the drawing-roll is extended to form a conical journal 35, turning in ball-bearings 36, which are mounted in the opposite flange of the footpiece 18. This end of the drawing-roll 31 is further extended in reduced section, as shown at 37, and is formed with a shoulder 38 thereon and a threaded extension 39, on which is screwed a skew-pinion 40, adapted to mesh with the gear 17, as clearly shown in Figs. 1 and 3.

The ball-bearings 36 are mounted in an annular member 41, whose outer surface is conical in shape and provided with a taper screw-thread 42 and is adapted to be screwed into a corresponding taper aperture extending through the depending flange 20 or 21. The interior surface of the member 41 is adapted to receive balls for the ball-bearings, as shown, and is otherwise formed in the same manner as heretofore described for the ball-bearing upon the upper end of the spindle. The outer side of the depending flange 20 or 21 will ordinarily be extended beyond and around the edge of the gear-pinion 40 and

will be recessed, as shown at 43, so as to receive the edges of the gear-teeth and protect them from injury.

The conical step-piece 34, supporting the opposite end of the drawing-roll, has a cylindrical outer surface on which is formed a screw-thread, and it has a nick 44 in the exterior side thereof by which it may be adjusted in position in its socket 45, which is formed transversely in the inwardly-directed end of a cylindrical bolt 46, which is mounted to have a slight sliding motion in a horizontal cylindrical aperture in the flange-piece 20 or 21 transversely to the axis of the drawing-roll. The said cylindrical bolt 46 is pierced longitudinally by a cylindrical hole 47, in which is mounted a setting-plug 48, which is adapted to be screwed, by means of a nick 49 in its outer side, against the step-piece 34 to hold the same in properly-adjusted position. Against the end of the block 48 presses a coiled spring 50, which is held in position by the cylindrical sides 51 of the bolt 46, and whose other end abuts against a screw-plug 52, which is screwed into the end of the cylindrical hole by suitable interior threads 53, formed thereon. By this means it will be seen that the end of the drawing-roll is provided with a sidewise-yielding bearing which permits of two independent adjustments, the one to tighten or loosen the roll upon its bearings and the other to regulate the tension of the spring pressing sidewise upon the bearing, besides providing means for holding the bearing-piece 34 in place. Moreover, both bearings are readily removable from the footpiece 18 for renewing or cleaning the same. It should be observed that in practice the gear-pinions 40 are given a weight in excess of the drawing-rolls 31 and have a greater statical moment about the ball-bearings 36, so that the centrifugal force exercised by the rotating piece, comprising the drawing-roll, axle, and pinion, will be such as to press the rolls toward each other, and thus tighten their grip upon the sliver. The springs 50 are therefore unnecessary for this purpose, but are desirable in order to coact with the centrifugal force and serve as an independent means for accomplishing the same end, and it is further to be observed that the ball-bearings 36 serve more than the ordinary function of ball-bearings for decreasing the friction in that they permit a slight angular rotation about a vertical axis passing through their plane without in any way rendering the bearings loose, so as to rattle. I have found that this is a great advantage over the former parallel bearings used in this connection, because in order to permit of such slight lateral movement of the roll it was necessary to make the bearings so loose as to rattle and therefore fail to have at all times the proper grip upon the sliver. It is still further to be observed that the axes passing through the planes of the two bearings 36 are symmetrically situated with respect to the axis of the spindle 6, so that the slight lateral rotation thus given to the rolls 31 and 32 will allow them always to remain still in strict parallelism to one another no matter at what distance they may be from one another, while the adjustment thus permitted will enable the rolls to pass over the knots or other swellings in the slivers without excessive jar and without loosening their grip, so as to cause an uneven twist. I find, therefore, that in practice my improved head gives very greatly superior results both in the quality and evenness of the yarn produced by it and in the amount of work which it is capable of turning out, which is far in excess of that of any head heretofore in use so far as known to me.

In the operation of the machine the sliver will be brought, by means of suitable feed-rolls, to a point directly over the center of the tubular spindle 6, and being thence carried through the same will be caught and drawn out by the rolls 31 32, while at the same time being twisted by the rotation of the spindle in a manner which will be well understood by those versed in the art, and will thence pass to a suitable ring-rail and be wound on a cop or bobbin in the ordinary manner.

Changes within the scope of the appended claims may be made in the form and proportion of some of the parts while their essential features are retained and the spirit of the invention is embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An improved spinning-head comprising a tubular spindle through which the sliver is adapted to pass, drawing-rolls carried at its lower end, a sleeve carrying a pulley loosely mounted upon the lower end of the spindle above the rolls and supported by the spindle, connections for driving the rolls from the sleeve, and a bearing at the upper end of the spindle supporting the entire weight of the spindle, sleeve and rolls.

2. An improved spinning-head comprising a tubular spindle having at its lower end a footpiece, drawing-rolls carried by said footpiece, a sleeve loosely mounted on the spindle above the footpiece and supported thereby, a gear-wheel mounted on the sleeve and turning therewith, pinions carried by the drawing-rolls and intermeshing with said gear-wheel, and means for independently rotating the spindle and sleeve.

3. An improved spinning-head comprising a tubular spindle through which the sliver is adapted to pass and carrying at its lower end a branched footpiece, drawing-rolls mounted in the footpiece beneath the end of the spindle, a sleeve loosely mounted on the spindle and supported by the same, a gear-wheel carried by the sleeve, gear-pinions on the axes

of the drawing-rolls intermeshing with said gear-wheel, and a thrust-bearing at the upper end of the spindle supporting the entire weight of the head and sleeve.

4. An improved spinning-head comprising a tubular spindle carrying a branched footpiece at the lower end thereof, drawing-rolls mounted beneath the lower end of the spindle between the two flanges of said footpiece, a sleeve loosely mounted on the spindle above the footpiece and supported by the latter, a gear-wheel mounted on the sleeve and turning therewith, gear-pinions carried on the axes of the drawing-rolls and intermeshing with the said gear-wheel, a thrust-bearing at the upper end of the spindle carrying the entire weight of the rotating parts, and pulley-sheaves carried by the spindle and sleeve respectively and adapted to rotate them at differential velocities.

5. In a spinning-frame, a pair of journal-rails supporting a spinning-head, a tubular spindle forming the axis of said head mounted in bearings in said rails, a pulley-sheave mounted on the tubular spindle between the two journal-rails, a footpiece carried by the lower end of the spindle, drawing-rolls mounted in the footpiece beneath the end of the spindle, and means for rotating the drawing-rolls comprising a sleeve having connections therewith and loosely mounted on the spindle between the lower journal-rail and the footpiece and supported by the latter and carrying a pulley-sheave.

6. In a spinning-head, a branched footpiece, a pair of drawing-rolls carried in the flanges thereof, each of said rolls having a ball-bearing upon one side and a sliding-bearing on the other, and means for turning said rolls in unison.

7. In a spinning-head, a branched footpiece, a pair of drawing-rolls rotatably mounted in the flanges thereof, each of said rolls being adapted to have a slight oscillating motion about an axis in the plane of one bearing and an adjustable sliding step-bearing provided for the other end of the roll.

8. In a spinning-head, a branched footpiece, a pair of drawing-rolls journaled in the flanges thereof, each drawing-roll being extended outwardly through the side of one flange and having turning means upon its outer end, a sliding bearing provided for the other end of the roll comprising a coned step-piece for the roll and a transverse sliding member in which the coned step-piece is mounted.

9. In a spinning-head, a branched footpiece, drawing-rolls journaled in the flanges thereof, each flange being provided with a removable annular bearing-block for one end of one roll, and a sliding coned step-bearing for the opposite end of the other roll.

10. In a spinning-head, a branched footpiece, a pair of drawing-rolls journaled between the flanges thereof, a removable annular bearing-block provided with ball-bearings on its interior surface and a taper screw-thread on its exterior surface located in one side of each flange, and a sliding bearing located in the other side of each flange for the opposite ends of the drawing-rolls, said sliding bearing consisting of a bolt having a lateral transverse motion in an aperture in the flange, and a screw-threaded step-bearing adjustably fitted in said bolt.

11. In a spinning-head, a branched footpiece, a pair of drawing-rolls journaled between the flanges thereof, and a sliding step-bearing for one end of a roll located in each of said flanges, said bearings consisting of a bolt sliding in a transverse aperture in the flange, a step-bearing block having a screw-thread on its outer surface and adjustably screwed into a transverse aperture in said bolt, and a set-screw plug adjustably mounted in a longitudinal aperture in said bolt and abutting against said bearing-block.

12. In a spinning-head, a branched footpiece, a pair of drawing-rolls journaled between the flanges thereof, and a sliding step-bearing for one end of a roll located in each of said flanges, said bearings consisting of a bolt sliding in a transverse aperture in the flange, a step-bearing block having a screw-thread on its outer surface and adjustably screwed into a transverse aperture in said bolt, a set-screw plug adjustably mounted in a horizontal aperture in said bolt and abutting against said bearing-block, a compression-spring bearing inwardly against said bolt, and a screw-plug closing the outer end of the aperture in the flange and forming an abutment for the opposite end of the spring.

13. In a rotating spinning-head, a branched footpiece, drawing-rolls journaled between the flanges thereof, each of said drawing-rolls having an axle extending through one flange and carrying a gear on the other side of the flange, a removable annular bearing-block carrying ball-bearings for said axle, and a sliding step-bearing for the opposite end of the roll comprising a cylindrical bolt sliding in a transverse aperture in the flange, a coned bearing-block adjustably mounted therein, a set-plug adapted to hold said bearing-block from turning, and a spring pressing inwardly upon said bolt to press the two drawing-rolls toward each other.

14. An improved spinning-head comprising a tubular spindle and rotating means therefor, a branched footpiece carried by the lower end of the spindle, drawing-rolls mounted in and beneath the end of the tubular spindle, a sleeve loosely mounted on the tubular spindle and supported by a bearing on the footpiece and carrying a gear-wheel, gear-pinions on the outer ends of the rolls intermeshing with said wheel, a ball-bearing in each flange for the wheel end of a roll permitting of a slight lateral motion, and an adjustable sliding bearing for the other end of the roll carried by the opposite flange.

15. An improved spinning-head comprising a tubular spindle and rotating means

therefor, a branched footpiece carried by the lower end of the spindle, drawing-rolls mounted in and beneath the end of the tubular spindle, a sleeve loosely mounted on the tubular spindle and supported by a bearing on the footpiece and carrying a gear-wheel, gear-pinions on the outer ends of the rolls intermeshing with said wheel, a ball-bearing in each flange for the wheel end of a roll permitting of a slight lateral motion, and a sliding bearing for the other end of the roll comprising a bolt sliding in a transverse aperture in the opposite flange, an adjustable step-bearing block mounted in said bolt, a set-plug for the bearing-block, a spring pressing inwardly against said bolt, and a screw-plug closing said aperture and forming an abutment for the other end of the spring.

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

FRANK ALEXANDER BREEZE.

Witnesses:

DAVID B. WILSON,

GERTRUDE E. WALKER.