Aug. 29, 1933. R. H. JENNY 1,924,282

SPINDLE MOUNTING FOR INSULATING MACHINES

Filed June 4, 1929 2 Sheets-Sheet 1

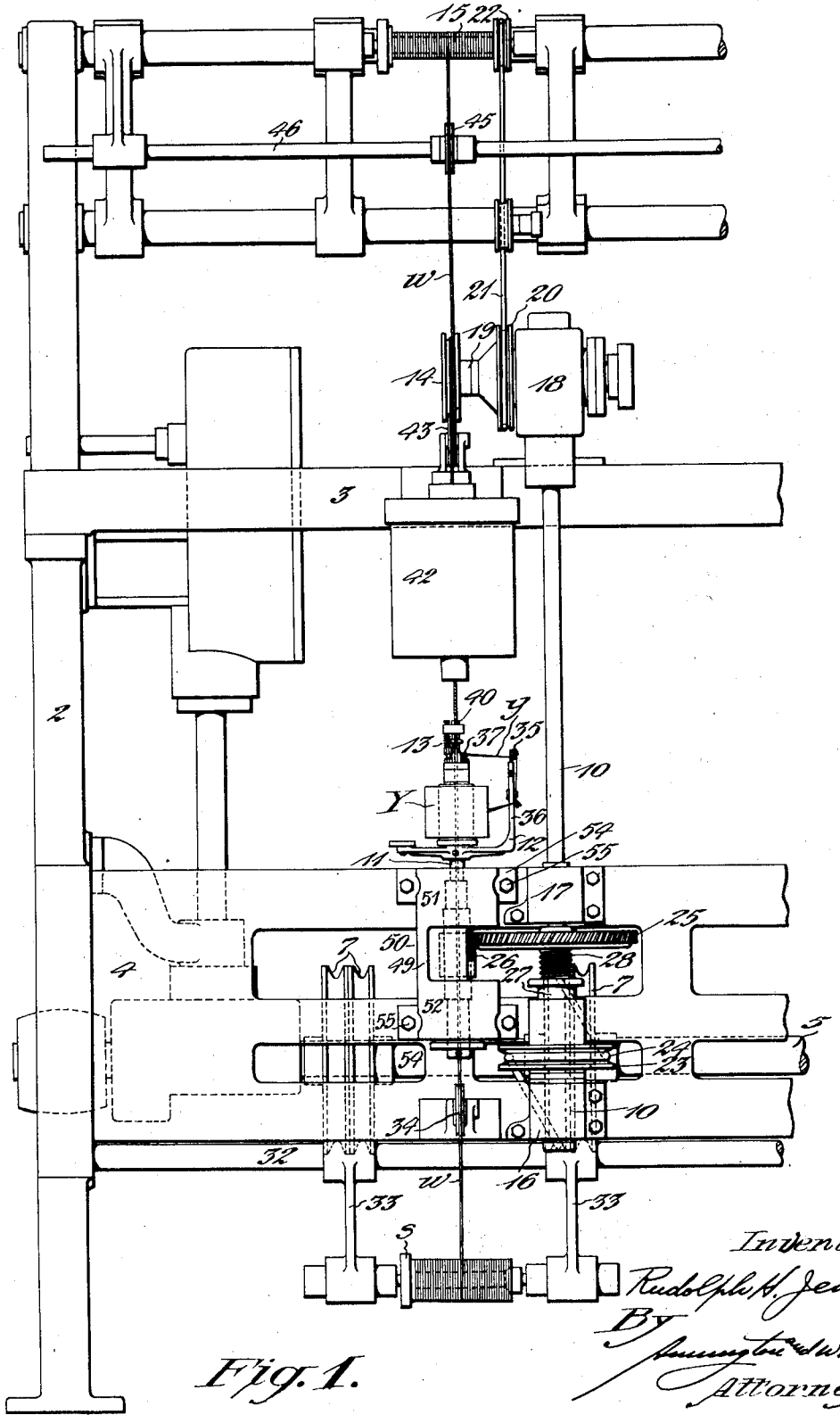


Fig. 1.

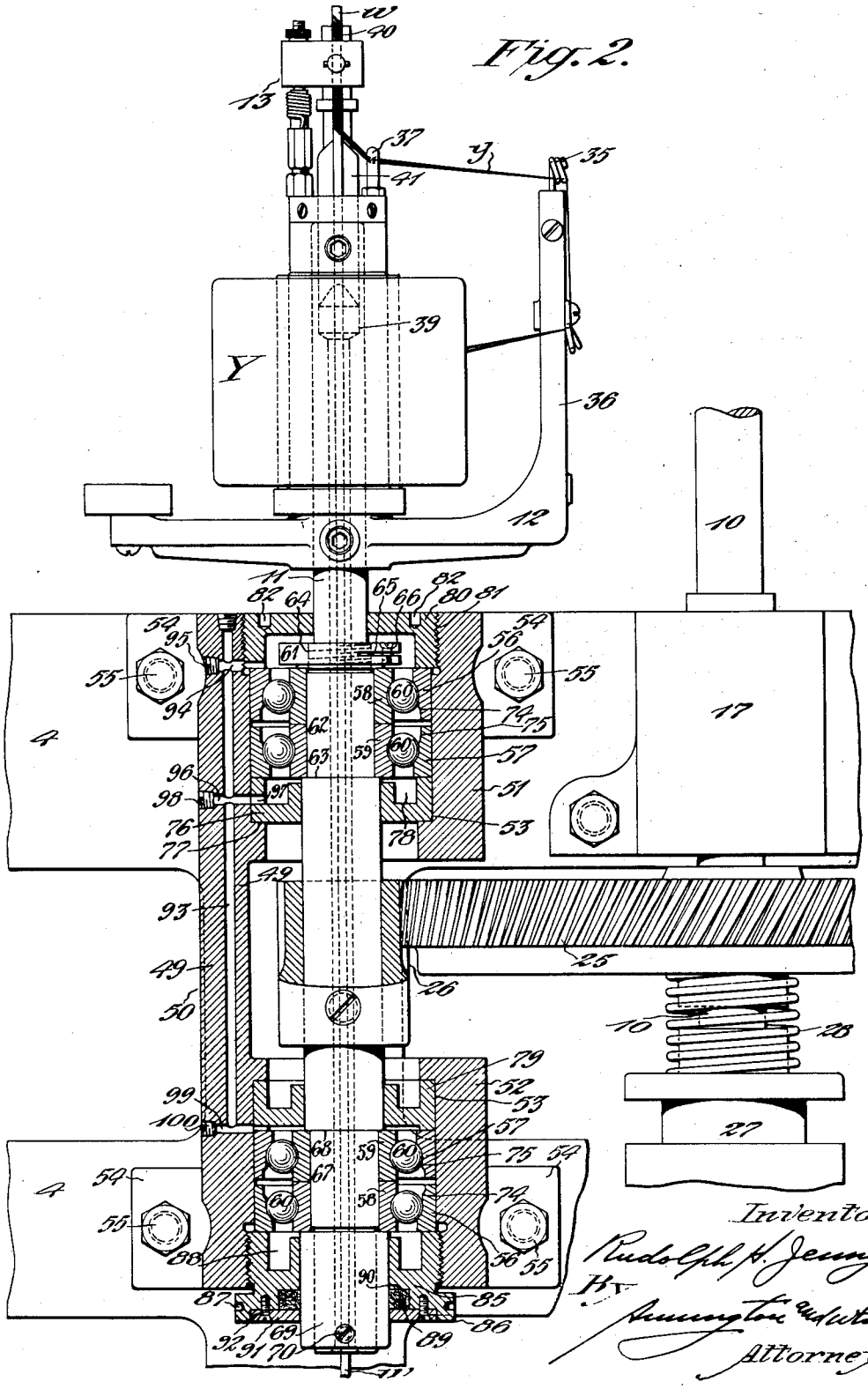
Inventor:
Rudolph H. Jenny
By Cummings & White
Attorneys.

Aug. 29, 1933. R. H. JENNY 1,924,282

SPINDLE MOUNTING FOR INSULATING MACHINES

Filed June 4, 1929 2 Sheets-Sheet 2

Fig. 2.



Inventor:
Rudolph H. Jenny
By
Cummington & Whittemore
Attorneys.

Patented Aug. 29, 1933 1,924,282

UNITED STATES PATENT OFFICE

1,924,282

SPINDLE MOUNTING FOR INSULATING MACHINES

Rudolph H. Jenny, Rome, N. Y.

Application June 4, 1929. Serial No. 368,359

4 Claims. (Cl. 308—189)

This invention relates to insulating machines and particularly to an improved journal mounting for the spindle which carries the flier, polisher and other rotating parts of the wrapping device.

One object of the invention is to provide means for mounting the spindle in friction-reducing journals to adapt it for high speed rotation while minimizing the wear on the running parts.

Another object of the invention is to provide spaced journals for the spindle carried by a barrel-like housing which maintains the bearings in accurate alinement and prevents the spindle from vibrating or running out of true.

Another object of the invention is to provide a mounting for the spindle in which the journal-bearings are adjustable to take out the play and compensate for wear whereby to prevent vibration or chattering of the spindle, and wherein such adjustment may be made with the spindle running without taking down the bearings as is usually required.

Another object of the invention is to provide a journal mounting for the spindle having the moving parts of minimum weight to reduce the effect of inertia and momentum when the spindle is running at high speed, and further to secure greater efficiency and longer life while removing the liability of breakage or damage to the operating parts.

Further objects of the improvement are set forth in the following specification which describes a preferred form of construction of the invention as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a front elevation of a portion of a wrapping or insulating machine showing my improved spindle mounting as used thereon; and

Fig. 2 is a vertical sectional view taken on the axis of the spindle and illustrating the interior construction of the journal mounting.

Referring first to Fig. 1 of the drawings, 2 designates the end upright or frame-member of the insulating or wrapping machine, 3 the upper rail which extends horizontally to connect the frame-members, and 4 the bottom rail on which the spindles are mounted. In the present drawings the arrangement of one spindle only is shown, but it will be understood that the machine may comprise a plurality of spindles, twenty or more in some instances, arranged in series along the frame of the machine.

The machine herein illustrated is of standard type with respect to its general construction and therefore its main elements will not be described in detail. Suffice it to state that it comprises a horizontal drive-shaft 5 carrying grooved sheaves or pulleys 7, each of which is belted to drive an upright shaft 10 constituting the driving means for a spindle 11 with its flier 12 and polishing head 13; a capstan 14 for feeding the wire; and a take-up or wind-on spool 15. As shown in Fig. 1 the vertical drive-shaft 10 is journaled in bearings 16 and 17 bolted to the bottom rail 4, and extends upwardly through a gear box or casing 18 mounted on the top rail 3. Suitable gearing in the box 18 connects the shaft 10 to drive a short horizontal shaft 19 which carries the grooved take-up wheel or capstan 14. The shaft 19 also carries a pulley 20 connected by a belt 21 to a smaller grooved wheel 22 on the take-up spool 15 to drive the latter.

The vertical shaft 10 carries a grooved wheel or whirl 23 near its lower end which is connected by a belt 24 to one of the pulleys 7 on the main drive-shaft 5. Below its bearing 17 the shaft 10 carries a skew-gear 25 which connects it to drive the spindle 11 through the medium of a pinion 26 fast thereon. The gear 25 is normally free to turn on the shaft 10, being connected rotatively therewith by means of a clutch 27 urged into engagement with the gear by a helical spring 28 coiled around the shaft. Suitable means, not herein shown, are employed for declutching the gear 25 from the shaft 10 to arrest the rotation of the spindle 11 and the parts which it carries, these instrumentalities being in accordance with the usual arrangement on machines of the present type.

Extending horizontally of the frame of the machine below the bottom rail 4 is a rod 32 carrying brackets 33 for mounting the supply-spools S which hold the wire w to be insulated. The wire w passes up over a guide pulley 34 and thence through the bore of the hollow spindle 11. Near the top of the spindle 11 is mounted the flier 12 which rotates with the spindle and carries a cop or spool of yarn Y. The strands y from the cop or spool Y deliver through a guide 35 on an arm 36 of the flier and thence to an auxiliary guide 37, the rotation of which with the flier causes the strands to be wrapped around the wire w in the manner as indicated in Fig. 2. As the strand material, such as cotton yarn, paper or the like, is wrapped around the wire w the polisher 13 bears against the side thereof to smooth it into place and polish its surface. The flier 12 and polisher 13 are herein shown as constructed in accordance with my U. S. Letters Patent No. 1,595,198 dated August 10, 1926. It is to be understood, however, that these devices form no part of the

present invention, but may be displaced by others of different type for applying insulation to the wire.

It will be noted from Fig. 2 that the spindle 11 terminates below the polisher 13, its end being counterbored at 39 to receive an extension or nose-piece 41 which is cut away along its side to expose the wire *w* at the point where it is to be wrapped. Above and below the point where the wire is wrapped with the strand material the nose-piece 41 is formed with a narrow groove 40 through which the wire draws to guide and steady it during the wrapping process.

Above the flier and polisher is a cylindrical box or casing 42 adapted to contain several reserve supply cops of yarn which may be slipped down over the central support on the flier. The wire *w* passes through the casing 42 and through the center of the reserve cops contained therein and thence draws over a guide pulley 43 to the capstan 14. The wire makes several turns around the capstan 14 so that the rotation of the latter will feed it through the wrapping device and thence it draws up to a guide-sheave 45 which delivers it to the take-up spool 15 on which it is wound. The guide-wheel 45 is mounted on a reciprocating traverse-bar 46 whereby the wire *w* is traversed longitudinally of the spool 15 to lay it in helical coils thereon.

Referring now to Fig. 2 of the drawings, the present invention is concerned principally with the means for rotatively mounting the hollow spindle 11. As herein shown the spindle 11 is journaled in annular ball-bearings arranged in pairs at the opposite ends of a barrel-like housing 50. The housing 50 is constituted by a pair of axially alined hubs 51 and 52 connected by an integral web-like wall 49 which extends only part of the circumference of the hubs in order to provide a clearance for the driving gear 25 which meshes with the pinion 26 on the spindle 11. At the ends of the hubs 51 and 52 are feet 54 which receive bolts 55 for fastening the housing rigidly to the bottom rail 4.

Both hubs 51 and 52 have enlarged counterbores 53 at their ends to adapt them to receive a pair of outer annular ball-races 56 and 57 which cooperate with opposite inner races 58 and 59 on the spindle 11 to receive the balls 60 therebetween. The inner races 58 and 59 are of identical construction, those for the upper bearing in the hub 51 being secured fast on the spindle 11 by means of a collar 61. The spindle 11 is reduced in diameter at 62 to provide a shoulder 63 against which the side of the lower race abuts, and the collar 61 is screwed onto threads 64 formed on the spindle beyond the reduced portion 62. The collar 61 is split at 65 and provided with a screw 66 by means of which its side portions may be drawn together to lock it in position after it has been screwed up against the face of the upper bearing race 58 to bind the two races against the shoulder 63.

The two lower races 58 and 59 are secured to the spindle 11 in substantially the same manner, the spindle being reduced at 67 to form a shoulder 68 against which the races are clamped. In place of the split collar 61 a longer solid collar 69 is set up against the lower bearing race 58 and secured to the spindle 11 by means of a set-screw 70. The outer ball races 56 and 57 are of right- and left-hand arrangement with the bearing faces for the balls so arranged that by sliding one race toward the other the bearings may be adjusted to take out the play and compensate for wear. For this purpose the outer ball races 56 and 57 have their bearing faces 74 and 75 substantially cone-shaped so that as they are drawn toward each other they will be caused to assume a closer fit with the balls 60 running in the grooves of the inner races 58 and 59. As one feature of the present improvement provision is made for adjusting the races to take up the bearings while the spindle is running, that is without arresting the operation of the machine or taking down the bearings. This feature is most important as providing for the adjustment of the bearings to the proper degree of tightness as determined by the running of the spindle in operation. The arrangement of the adjusting-device is as next explained.

At the lower end of the counterbore 53 in the upper hub 51 is a collar or washer 76 which abuts against a shoulder 77 to locate the lower ball race 57 in position in the hub. The washer 76 is preferably cupped out at 78 to adapt it to serve as an oil-retainer to prevent the lubricant from escaping at this end of the upper bearing. The lower hub 52 also has a washer 79 of substantially the same construction arranged at the upper end of its counterbore 53, being positioned to close the end of the bearing against insinuation of dirt or other foreign matter.

In the upper hub 51 one outer race 56 is adjusted toward its companion race 57 by means of a cap 80 screwed into the end of the bore in the hub. The bore 53 of the hub is enlarged and interiorly threaded at 81 to receive the exterior threads of the cap 80, and the latter has suitable pockets 82 in its end for receiving the projections of a spanner-wrench by means of which it may be turned; it being further noted that the cap 80 is cupped out on its underside to adapt it to clear the split collar 61.

The races in the lower bearing are adjusted in the same manner by means of a cap 85 screwed into the threaded end of the counterbore 53 in the hub 52. The cap 85 is formed with an annular flange 86 having holes 87 in its periphery for the spanner-wrench. The cap 85 is cupped out at 88 between its hub and rim to provide a chamber for collecting the lubricant, being preferably provided with an oil ring or packing 89 to prevent the oil from leaching out along the the collar 69. As herein shown the packing 89, of felt or similar resilient material, is held in a counterbore 90 by means of a washer or plate 91 let into a recess in the end of the cap 85 and fastened in place by screws 92.

To provide for convenient lubrication of the bearings in the hubs 51 and 52 suitable oil-ducts are arranged to lead thereto. Conveniently, a hole or duct 93 is drilled down through the hub 51 and continued through the web 49 to the hub 52. An upper cross-duct 94 is drilled through the side of the hub 51 to lead to its interior above both sets of ball-races. The outer end of the duct 94 is closed by a plug 95 screwed thereinto. A second cross-duct 96 is drilled through the side of the hub 51 to register with a hole 97 leading from the pocket in the oil-collecting washer 76, the outer end of the duct being closed by a screw-plug 98. This cross-duct 96 serves as a means for draining off the oil that may collect in the collar 76. At the lower end of the vertical duct 94 is a cross-duct 99 leading to the interior of the hub 52 above the two lower ball-races, the outer end of this duct being closed by a screw-plug 100.

In the operation of the machine the drive is

communicated from the shaft 5 through the belt 24 to rotate the vertical shaft 10. The shaft 10 drives through its clutch 27 and gear 25 to rotate the spindle 11 by means of the pinion 26. The flier 12 is carried fast on the spindle 11 and is thereby rotated therefrom to wrap the strand material *y* around the wire *w* as it feeds up through the axial bore of the spindle.

The wire is fed through the wrapping device by the turning of the capstan 14 which is driven from the shaft 10 through the gearing in the casing 18, while the shaft 19 carrying the capstan 14 also drives the take-up spool 15 through the medium of the pulleys 20, 22 and the belt 21. As the wire is drawn through the machine and wrapped with insulating material it is wound onto the spool 15 and traversed longitudinally thereof by the guide 45 on the traverse-bar 46.

As well known by those versed in the present art, the flier spindles must be driven at very high speed in order to provide for a rapid rate of production of the machine. With my present improvement the machine is capable of a spindle-speed of from twenty per cent. to fifty per cent. greater, dependent upon the character of the material being used for insulation, than on previously used machines of similar type. This increase in speed is made possible by the improved mounting for the spindle which eliminates all vibration and chatter. By providing twin bearings at either end of the barrel-housing the spindle is journaled to rotate on its true axis, without chance of its throwing out of alinement. Further, by providing for a minute and accurate adjustment of the ball-bearings, all looseness and play may be taken out so that the spindle cannot run out of true to cause it to vibrate and chatter.

As another feature of the improvement the twin bearings at either end of the housing provide for greater rigidity and therefore prevent the spindle from being sprung or drawn out of alinement to cause its upper end to run out of true. It will be noted that the spindle is supported in the two separated bearings which are spaced at a distance apart practically equal to the whole length of the overhanging or upstanding portion of the spindle. The two hubs of the bearings are connected and braced by a rugged web or wall 49 and the housing being securely bolted to the rail 4, the whole forms a particularly stiff and rigid mounting for the spindle.

The provision of double or twin bearings in place of single ones at either end of the housing is a further insurance against play or lost motion and in addition makes for a greater durability so that the spindles will run true over long periods if care is taken to adjust the bearings to compensate for wear.

Heretofore in machines of the present type it has always been necessary to take the spindle bearings down when it is required to adjust them for play or wear. In the present construction the bearings at the ends of the housing may be adjusted while the spindle is running by simply turning the adjusting caps or nuts 80 and 85 by means of suitable spanner wrenches. This is a most important consideration, not only to avoid loss of production from the stopping of the machine, but principally to provide for a more accurate and precise setting of the bearings. That is to say, by making the adjustment while the spindle is running at high speed the bearings may be set with just the proper degree of clearance to allow free turning while preventing any tendency of the spindle to vibrate or chatter. Heretofore it has been the usual practice to leave the bearings fairly free to prevent them from binding and in such case there will be more or less vibration of the spindle which necessitates reducing its speed. This limitation in speed of the spindle restricts the speed of the whole machine, which can run no faster than its weakest spindle. With the present construction of the spindle bearings the speed of the whole machine may be maintained at the maximum for there will be no "weak sisters" among the spindles since each is adjusted to prevent its vibration.

The elimination of vibration of the spindles not only provides for a higher speed of operation and a consequent increase in the rate of production of the machine, but further it makes for a higher quality of product. Where the spindle is run without vibration the tension on the strand material is maintained more uniform so that a heavier tension may be applied to give a tighter wrap and a more uniform lay of the insulation on the wire. In this way the product is improved and, furthermore, economy is realized in the amount of material used for a given length of wire. As further tending to increase the productive capacity of the machine, the greater uniformity of tension tends to eliminate breaks in the strand material or paper used for the covering of the wire and thus reduces the loss in production due to stoppages for repairing breaks.

It will also be observed that the present improved journal mounting for the spindle is constructed with its elements of minimum weight while still being adequate to maintain the bearings in accurate alinement and prevent the spindle from vibrating or running out of true. In fine, the present improvement provides a spindle mounting wherein the bearings may be accurately adjusted to eliminate vibration and chattering to provide for greater speed and efficiency of operation, to insure longer wear, and in general to materially increase the productive capacity of the machine on which it is used.

While I have herein described and illustrated a preferred form of construction of the improved spindle mounting it is to be understood that various modifications may be made in the form and arrangement of the parts thereof, and alterations also made in the character of the elements with which it is used, without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a machine of the type specified, the combination of a vertical flier spindle, a bearing housing for the spindle comprising spaced hubs connected by an integral wall, a pair of adjacent outer ball-races mounted in each hub, a pair of adjacent inner races in each hub carried by the spindle in cooperative relation with the outer races, balls revolvable between said races, a cupped oil-collecting member inserted in the bore of each hub beneath the bearings, a cap closing the opposite end of the bore in the upper hub, a vertical oil duct extending through the wall for connecting the lower bearing with the upper bearing for lubrication by gravity therefrom, and lateral ducts connecting the cupped washers and the main oil duct.

2. In a bearing for a vertical spindle of a high speed insulating machine, a pair of spaced hubs connected by an integral wall, a shoulder on the spindle in each hub, a pair of inner races on the spindle abutting each shoulder, a pair of outer races in each hub opposite the inner races, anti-friction members between the races, a collar en-

gaging threads on the spindle for retaining the inner races against the shoulders, a washer in each hub for seating the outer races, and a cap adjustably mounted in each hub and surrounding the adjacent collar for retaining the outer races in operative relation with respect to the inner races.

3. In a bearing for a vertical spindle of a high speed insulating machine, a pair of spaced hubs connected by an integral wall, a shoulder on the spindle in each hub, a pair of inner races on the spindle abutting each shoulder, a pair of outer races in each hub opposite the inner races, antifriction members between the races, a collar engaging threads on the spindle for retaining the inner races against the shoulders, a washer in each hub for seating the outer races, a cap adjustably mounted in each hub and surrounding the adjacent collar for retaining the outer races in operative relation with respect to the inner races, and means in the wall of the bearing for connecting the lower hub and races with the upper hub and races for lubrication by gravity feed therefrom.

4. In a bearing for a vertical spindle of a high speed wrapping machine, a pair of spaced hubs connected by an integral wall, a shoulder on the spindle in each hub, a pair of inner races on the spindle abutting each shoulder, a pair of outer races in each hub opposite the inner races, antifriction members between the races, a collar engaging threads on the spindle for retaining the inner races on the shoulders, a washer in each hub for seating the outer races, a cap adjustably mounted in each hub and surrounding the adjacent collar for retaining the outer races in operative relation with respect to the inner races, and a system of oil ducts in the wall of the bearing for connecting the lower hub and races with the upper hub and races for lubrication by gravity feed therefrom.

RUDOLPH H. JENNY.