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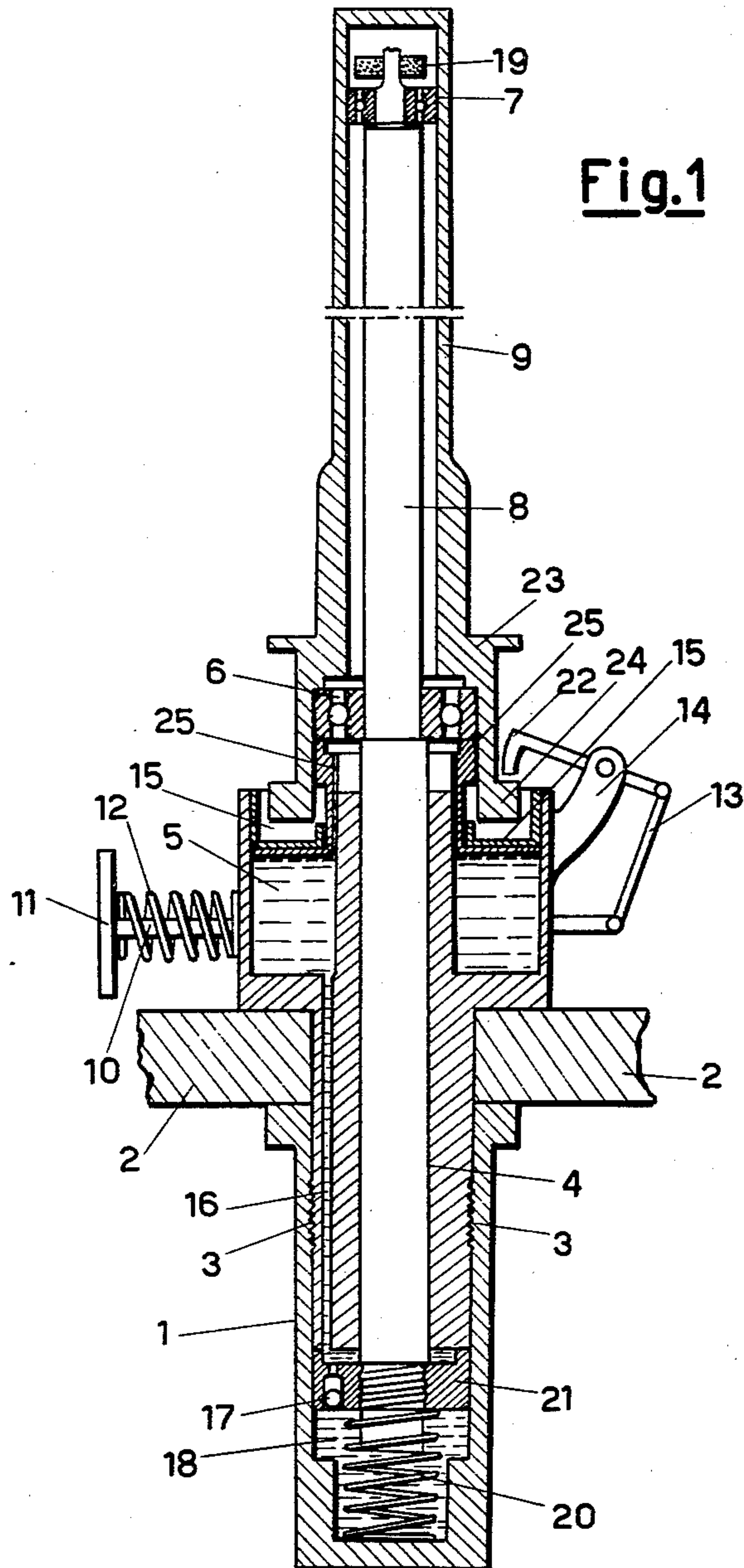
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SPINDLE FOR SPINNING AND TWISTING MACHINES WITH HOLLOW  
ROD FOR LIQUID LUBRICATION OF ROTATING PARTS

Filed Nov. 4, 1957

2 Sheets-Sheet 1



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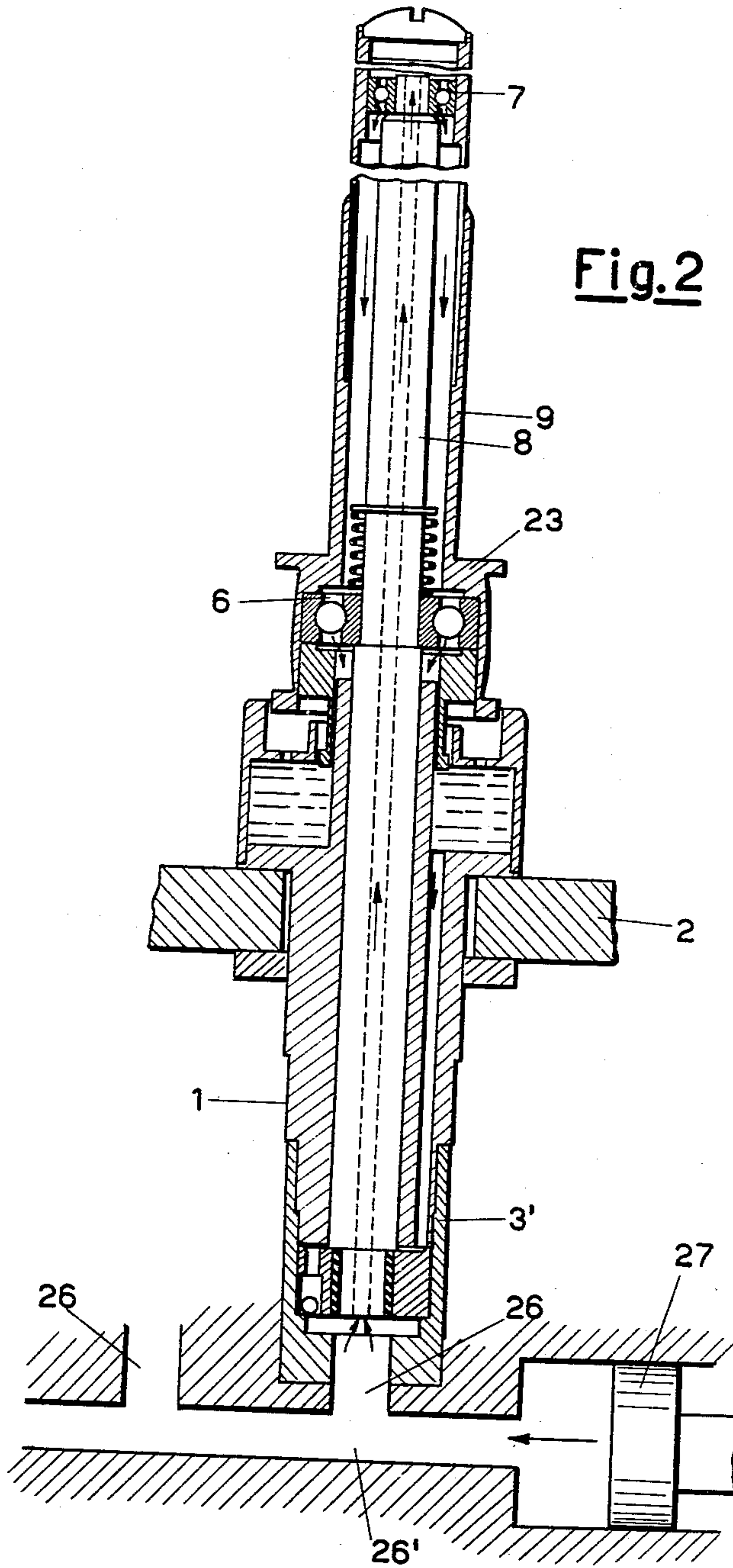
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## SPINDLE FOR SPINNING AND TWISTING MACHINES WITH HOLLOW ROD FOR LIQUID LUBRICATION OF ROTATING PARTS

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Improvements provided by the makers of spindles for spinning frames and twisting machines are prevailing intended to obtain diminution of friction in rotation and better lubrication of the unit.

Lubrication with solid or semi-solid greases has not led to satisfactory results owing to viscosity in operation and non-continuity of said lubrication.

It is an object of the present invention to provide a spindle for spinning and twisting frames wherein lubrication of the rotary parts is effected by means of a fluid pressed through the spindle rod from bottom to top wherefrom by gravity said fluid descends again downwards to lubricate the rotary parts.

More in particular, the instant spindle for spinning and twisting machines is of the kind essentially constituted by a spindle-carrying support adapted to be fixed to the base of the frame of the machine, a fixed rod arranged coaxially in the support and upstanding therefrom, and a whirl adapted to carry the yarn-carrying tube, fitted over the upstanding part of said rod to rotate on interposed ball or roller bearings, and is characterized in that said rod is hollow axially and is in communication at its lower end with a source of lubricating oil and in that a plunger is provided whose movements cause the intermittent rising of a certain quantity of oil through the hollow of the hollow rod up to the summit of said rod wherefrom it descends by gravity downwards between the external surface of the rod and the internal surface of the whirl, said two surfaces forming an interspace, and lubricates the bearings interposed therebetween.

According to one preferred embodiment said spindle is made with the plunger rigid to the lower end of the hollow rod, the latter being made movable in an axial direction against the action of a spring together with the whirl and with the lubricating oil provided in a lower tank-shaped portion of the support, so that the thrust of the lubricating oil through said hollow rod is obtained by exerting a displacement in the axial sense of said rod.

To make the invention more fully clear, reference is made hereinafter to two preferred embodiments thereof as illustrated diagrammatically, merely by way of example, in the accompanying drawings wherein:

Fig. 1 represents the instant spindle in elevation and section taken along its vertical axis, according to a first embodiment and

Fig. 2 represents the same spindle in a section analogous to that represented in Fig. 1, according to a second embodiment.

With reference to said figures, in which equal reference numerals indicate equal or corresponding parts, it is seen that in Fig. 1 a spindle 1 includes a support that is secured to the base or bench 2 of a frame of a spinning and twisting machine. The support includes a tubular lower portion 3 having a closed lower end and an open upper end and an upper portion 4 which is open at both its upper and lower ends, the upper portion being inserted into and threadedly connected to the lower por-

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tion 3. Said upper portion 4 carries an annular collar 5 defining a ring-shaped storage vessel 5 containing the liquid lubricant. The lower portion 3 of the support has a flange on its upper end which complements the collar 5 in fixedly clamping the portions 3 and 4 of the support to the base 2. A hollow rod 8 is coaxially disposed within the support and is fitted in the bore of the upper portion 4 and extends down towards the lower end of the lower portion 3. The whirl 9 is rotatably circumposed on the upstanding portion of the rod 8. A spring 20 is circumposed on the lower end of the rod and is seated on the closed lower end of the lower portion 3 of the support. The spring bears at its upper end against a piston 21, which is fixed on the lower end of the rod. A soaking pad 19 is secured on the upper end of the rod. Roller bearings 6 and 7 are interposed between the upstanding part of the rod 8 and the whirl 9.

Movement is imparted to the whirl 9 by means of a drive coupling including the sheave 23. The lubricant contained in the upper vessel 5 runs by gravity through a small-diameter conduit 16, through the plunger 21 past the unidirectional valve 17 and fills the lower chamber 18. Said upper vessel 5 is closed at its top by the lid 15 which prevents pollution of the lubricant.

Moreover, said upper portion 4 carries the braking device 10 which by actuation of the button 11 to compress the spring 12, causes rotation of the levers 13 held by the articulation 14 and, consequently, the braking by friction of the braking part 22 against the sheave 23, as well as an axial pressure upon the whirl 9 in correspondence with the projection 24 of said sheave 23, which pressure is transmitted rigidly to the rod 8, which, therefore, shifts axially.

The shifting of rod 8 from top to bottom causes the compression of the spring 20, the closure of the valve 17 and an increase of pressure upon the liquid contained in the chamber 18 which is proportional to the ratio between the diameter of the plunger 21 and that of the bore of rod 8, with respective displacement of the lubricant along the bore of said rod. Then the lubricant leaks from the upper portion to descend by gravity and to lubricate the rotary parts, whereafter it enters again through the coil 25 into the upper vessel 5.

The excess of lubricant is absorbed by the pad 19 and is returned thereby gradually and continually.

On the ceasing of the pressure exerted by hand, by means of the levered brake or by another system, on the whirl 9 and, therefore, on the rod 8, the spring 20 returns said rod and the whole device to the starting position.

The embodiment represented in Fig. 2 consists in that the lower end of the hollow rod 8 is directly resting on the bottom of the lower support portion 3', which bottom is perforated so as to place the bore of said rod 8 in communication with a conduit 26 for lubricating oil, serving to a plunger 27 whose movements determine the lubricating cycle as described above with reference to Fig. 1. Obviously in that way it is possible to provide the conduits 26 of a number of spindles in communication with one single main conduit 26' serving to one single plunger for centralized control.

It will be understood that the invention is not limited to the embodiments described and represented in the accompanying drawings, but that on the contrary it embraces all variants thereof.

I claim:

1. A spindle for a spinning and twisting machine comprising a hollow support adapted to be vertically fixed in a part of a frame of a machine, a hollow rod mounted in the support and having an upper end portion upstanding therefrom, a whirl rotatably circumposed on the



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upstanding upper end portion of the rod, bearing assemblies interposed between the upper end portion and the whirl and spacing them apart and supporting the whirl for rotation on the rod, said bearing assemblies being spaced apart axially of the rod and whirl, said support having a closed lower end, a source of lubricating liquid in communication with the lower end below the rod, means producing an intermittent vertical movement of the rod in the support and means responsive to such movements for causing the intermittent rising of a quantity of the lubricating fluid through the rod to its upper end where it spills over and gravitates down between the rod and the whirl to lubricate the bearing assemblies.

2. A spindle for a spinning and twisting machine comprising a hollow support adapted to be vertically fixed in a part of a frame of a machine, a hollow rod mounted in the support and having an upper end portion upstanding therefrom, a whirl rotatably circumposed on the upstanding upper end portion of the rod, bearing assemblies interposed between the upper end portion and the whirl and spacing them apart and supporting the whirl for rotation on the rod, said bearing assemblies being spaced apart axially of the rod and whirl, said support having a closed lower end, a source of lubricating liquid in communication with the lower end below the rod, means producing an intermittent vertical movement of the rod in the support and means responsive to such movements for causing the intermittent rising of a quantity of the lubricating fluid through the rod to its upper end where it spills over and gravitates down between the rod and the whirl to lubricate the bearing assemblies, and means for collecting the liquid and permitting it to return by gravity to the source.

3. A spindle for a spinning and twisting machine comprising a hollow support having an open upper end and closed lower end and adapted to be mounted vertically on the frame of a machine, a hollow rod mounted in the support and having a lower end and an upper end portion extending above the support, resilient means retaining the lower end of the rod above the lower end of the support, said lower end of the support constituting a chamber for a lubricating liquid, a whirl rotatably circumposed on the upper end portion of the rod, bearing assemblies interposed between the rod and the whirl and spaced apart axially of the upper end portion of the rod and the whirl, said bearing assemblies spacing the rod and whirl apart and rotatably supporting the whirl, means producing an intermittent downward, axial movement of the rod to cause the intermittent rising of the liquid in the bottom of the support up through the rod where it spills over the upper end of the rod to gravitate downwardly between the upper end portion of the rod and the whirl and lubricates the bearing assemblies.

4. A spindle for a spinning and twisting machine comprising a hollow support having an open upper end and closed lower end and adapted to be mounted vertically on the frame of a machine, a hollow rod mounted in the support and having a lower end and an upper end portion extending above the support, resilient means retaining the lower end of the rod above the lower end of the support, said lower end of the support constituting a chamber for a lubricating liquid, a whirl rotatably circumposed on the upper end portion of the rod, bearing assemblies interposed between the rod and the whirl and spaced apart axially of the upper end portion of the rod and the whirl, said bearing assemblies spacing the rod and whirl apart and rotatably supporting the whirl, means producing an intermittent downward, axial movement of the rod to cause the intermittent rising of the liquid in the bottom of the support up through the rod where it spills over the upper end of the rod to gravitate downwardly between the upper end portion of the rod and the whirl and lubricates the bearing assemblies and means for collecting the liquid and returning it to the chamber.

5. A spindle for a spinning and twisting machine com-

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prising a hollow support having an open upper end and closed lower end and adapted to be mounted vertically on the frame of a machine, a hollow rod mounted in the support and having a lower end and an upper end portion extending above the support, resilient means retaining the lower end of the rod above the lower end of the support, said lower end of the support constituting a chamber for a lubricating liquid, a whirl rotatably circumposed on the upper end portion of the rod, bearing assemblies interposed between the rod and the whirl and spaced apart axially of the upper end portion of the rod and the whirl, said bearing assemblies spacing the rod and whirl apart and rotatably supporting the whirl, means producing an intermittent downward, axial movement of the rod to cause the intermittent rising of the liquid in the bottom of the support up through the rod where it spills over the upper end of the rod to gravitate downwardly between the upper end portion of the rod and the whirl and lubricates the bearing assemblies, said upper end of the rod having an absorbent means mounted thereon to absorb the excess of the liquid spilling over the upper end of the rod and discharge it gradually and continually onto the bearing assemblies.

6. A spindle for a spinning and twisting machine comprising a hollow support having an open upper end and closed lower end and adapted to be mounted vertically on the frame of a machine, a hollow rod mounted in the support and having a lower end and an upper end portion extending above the support, resilient means retaining the lower end of the rod above the lower end of the support, said lower end of the support constituting a chamber for a lubricating liquid, a whirl rotatably circumposed on the upper end portion of the rod, bearing assemblies interposed between the rod and the whirl and spaced apart axially of the upper end portion of the rod and the whirl, said bearing assemblies spacing the rod and whirl apart and rotatably supporting the whirl, means producing an intermittent downward, axial movement of the rod to cause the intermittent rising of the liquid in the bottom of the support up through the rod where it spills over the upper end of the rod to gravitate downwardly between the upper end portion of the rod and the whirl and lubricates the bearing assemblies, said support including an upper portion and a lower portion and the upper portion being fixed within the lower portion and the upper end of the upper portion having an annular collar disposed below the whirl and constituting a means for collecting the gravitating liquid and said upper portion having a return passage for the liquid from the collar to the lower end of the lower portion.

7. A spindle for a spinning and twisting machine comprising a hollow support having an open upper end and closed lower end and adapted to be mounted vertically on the frame of a machine, a hollow rod mounted in the support and having a lower end and an upper end portion extending above the support, resilient means retaining the lower end of the rod above the lower end of the support, said lower end of the support constituting a chamber for a lubricating liquid, a whirl rotatably circumposed on the upper end portion of the rod, bearing assemblies interposed between the rod and the whirl and spaced apart axially of the upper end portion of the rod and the whirl, said bearing assemblies spacing the rod and whirl apart and rotatably supporting the whirl, means producing an intermittent downward, axial movement of the rod to cause the intermittent rising of the liquid in the bottom of the support up through the rod where it spills over the upper end of the rod to gravitate downwardly between the upper end portion of the rod and the whirl and lubricates the bearing assemblies, said support including an upper portion and a lower portion and the upper end of the upper portion having an annular collar disposed below the whirl and constituting a means for collecting the gravitating liquid and said upper portion having a



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return passage for the liquid from the collar to the lower end of the lower portion, said lower end of the rod having a piston circumposed thereon to force the liquid in the bottom upwardly through the rod as the rod is moved downwardly and a one-way check valve provided in the passage to prevent return flow of the liquid through the passage as the rod and piston are moved downwardly.

8. A spindle as claimed in claim 4, wherein said whirl is provided with a driving sheave and said means for producing the intermittent downward, axial movement of the rod includes a leverage system acting on the sheave to brake the sheave and means disposed between the rod and the whirl for translating the braking action on the sheave into the axial movement of the rod.

9. A spindle as claimed in claim 4, wherein said rod

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has a piston circumposed on its lower end and the lower end of the support defines a cylinder within which the piston is slidably mounted.

10. A spindle as claimed in claim 4, wherein said means for returning the liquid to the chamber includes a passageway having a one-way check valve operatively mounted therein.

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