Oct. 1, 1968 B. G. CAMINADA 3,403,502

AUTOMATIC CENTERING AND CENTRIFUGAL DRAGGING DEVICE OF COPS FOR SPINNING AND TWISTING SPINDLES

Filed Aug. 22, 1966 2 Sheets-Sheet 1

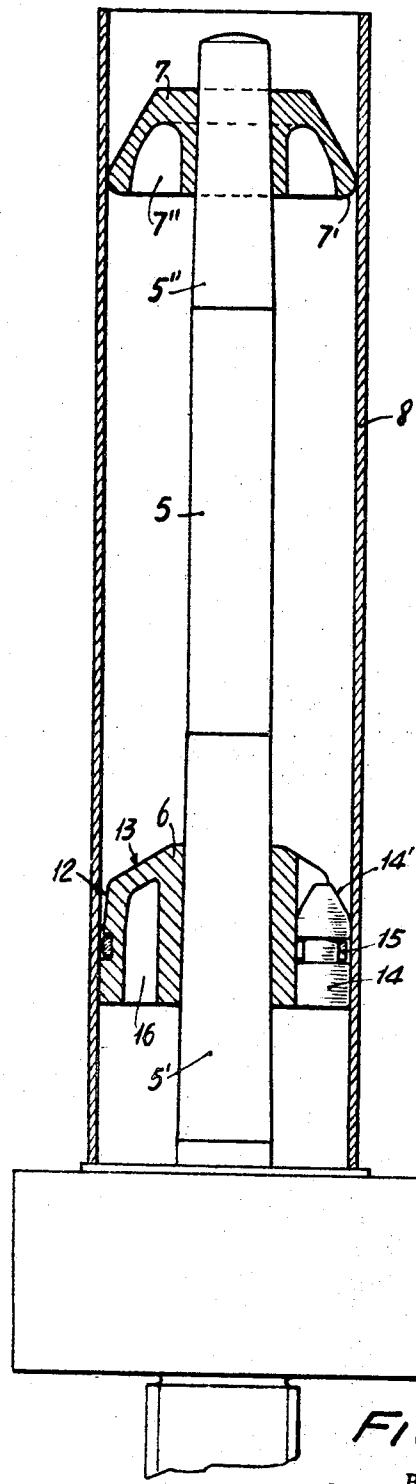


FIG. 1

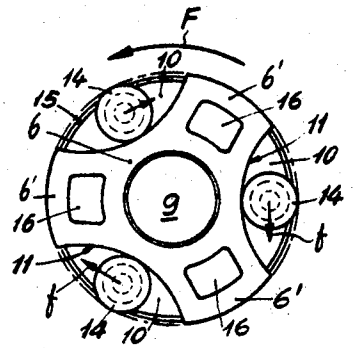


FIG. 2

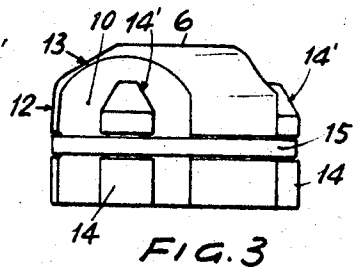


FIG. 3

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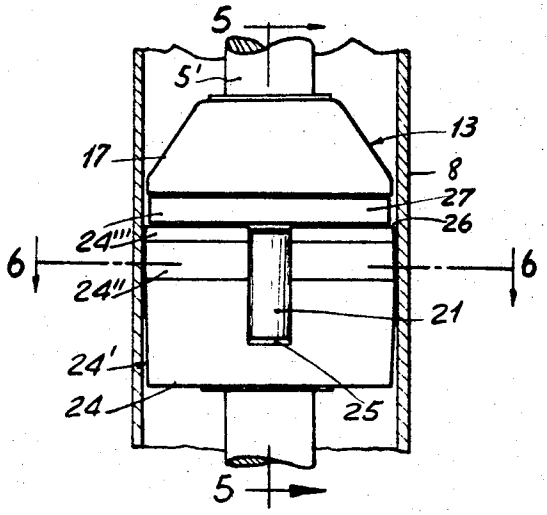


FIG. 4

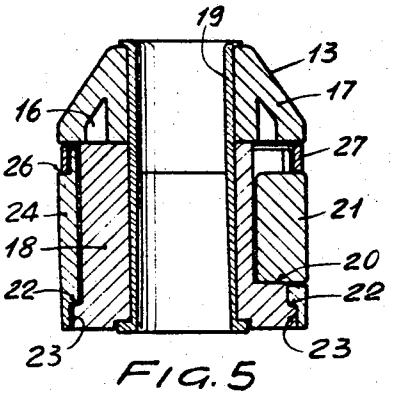


FIG. 5

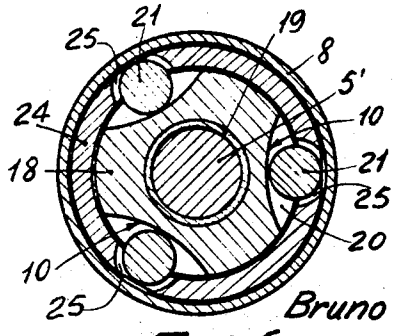


FIG. 6

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AUTOMATIC CENTERING AND CENTRIFUGAL DRAGGING DEVICE OF COPS FOR SPINNING AND TWISTING SPINDLES

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ABSTRACT OF THE DISCLOSURE

Automatic centering and dragging of cops for spinning and twisting of spindles is accomplished by a dragging device comprising upper and lower superimposed elements rigidly connected by an inner bushing sleeve which itself seats on a frusto-conical portion of a spindle shaft. The lower element comprises a body having three recesses each containing a dragging cylinder. A slotted resilient sleeve encloses the lower element and, being in its unrestrained condition of a diameter greater than the cop, is resiliently biased to said cop. The slots allow contact of the cylinders with the cop to effect the dragging.

This invention relates to an improved device for effecting an automatic centering and dragging of cops in spinning and twisting spindles. Said invention does not require any changes in the inner cylindrical cop surface, nor any particular machining of the spindle shaft. Furthermore, it will allow said cop to be unthreaded and inserted without any difficulty and in the simplest natural manner, and will be effective also in case of a fast braking.

Summary of the invention

The device comprises a self-centering dragging body, preferably located in the lower first zone of the spindle shaft, and a centering co-operating ring which is located in the upper second zone portion.

The self-centering dragging body comprises: a hub provided with an axial hole for a forced threading on the spindle shaft; at least three radial extensions or projections of said hub each having a radius slightly less than the inner cop radius; a substantially cylindrically concave portion of the dragging body wall laying between said extensions; an idle ball or roller conveniently placed in each of the spaces resulting from said cylindrical concave recessed portions, said ball or roller being tangential to the circumference of a circle having a radius equal to that of said extensions and centripetally retained by suitable means.

A cooperating centering ring is of a shape suited to make cop threading easy and quick, and is of a diameter equal to that of self-centering dragging body and is formed with a tapering equal to the tapering of the spindle upper second zone portion tapering in order to properly seat on the spindle at its upper zone.

Brief description of the drawing

In the following detailed disclosure, reference is made to the accompanying drawings showing two embodiments of the device.

FIG. 1 is a vertical sectional view of the device of the invention and also a sectional view of the cop, showing a spindle being provided with the first embodiment of said device;

FIG. 2 is a bottom plan view showing dragging body alone;

FIG. 3 is an elevational view of said dragging body in FIG. 2;

FIG. 4 is an elevational view of a dragging body according to a different embodiment;

FIG. 5 is a vertical sectional view of said body according to plane passing through lines 5—5 of FIG. 4; and

FIG. 6 is a transverse sectional view of said body according to plane passing through lines 6—6 of FIG. 4.

Description of the preferred embodiments

In FIG. 1 there is shown a spindle **4**, shaft **5** having at its base a first zone **5'** of a slightly frustum of cone shape, and at the upper end a second zone **5''** also of a slightly frustum of cone shape. Dragging body **6** is forced onto the first zone, while ring **7**, co-operating with body **6** to center the cop **8**, is forced onto the second zone.

Dragging body **6**, which is provided with axial hole **9**, of a frustrum of cone shape complementary in configuration to that of zone **5'** of shaft onto which it is to be forced, has three radial extensions **6'**, and recesses **10** resulting therebetween are defined by a vertical cylindrical wall **11**, the radius of which is substantially equal to the cop radius. Radial extensions **6'** are portions of a cylinder, the radius of which is slightly less than the cop radius, and have in the upper part two horizontal frustrum of cone zones **12** and **13** (FIG. 1) forming a starting step for threading of cop **8**. Internally, the extensions have relieving cavities **16**.

Rollers **14** are seated within recess **10** and idly mounted to body **6**; said rollers are retained by sleeve element **15**, which, being independent, is conveniently placed within corresponding grooves provided both in expansions **6'** and at an equal height in rollers **14**. As shown in FIG. 2, said rollers **14** are in the central rest position tangential to circumference enclosing expansions **6'**, and have the upper end **14'** formed as a frustrum of cone to co-operate with zones **12–13** of body **6**.

Upper centering ring **7** essentially operates to assist lower element **6**, said upper ring having a tapered frustum of cone shape, a lower rounded edge **7'** and an annular relieving cavity **7''**.

Rollers **14** might be replaced by balls. Also the section and shape of recess **10** and extensions **6'** may be different from those shown by way of mere example. In working phase, operation of the device is as follows:

Presuming that spindle **4**, together with device **6**, rotate according to direction of arrow F (FIG. 2), rollers **14** will be urged due to force of inertia in direction of arrow *f* and, owing to the convergency of curve **11** of recess **10** with curve of cop **8**, there will always be, in said direction *f*, a resulting wedge pressure of rollers against the inner wall of said cop **8** whereby said pressure, tending to keep cop **8** and body **6** integral through rollers **14**, will cause cop **8** to be dragged, as a result.

In case of braking, there will be an opposite result; in fact, as soon as shaft **5** is braked, the cop will continue to rotate in the direction of arrow F, rollers **14** will be released of the hold and dragged by the cop as they are being pressed thereto by centrifugal force. A shifting of a few degrees will suffice to re-lock rollers **14** which will wedge between the inner wall of cop **8** and curved wall **11**.

In the embodiment of FIGS. 4, 5 and 6, elements similar to those considered in the previous example are indicated by the same reference numerals, which are not repeated except where they are necessary for the disclosure.

In this different embodiment, the dragging body comprises upper element **17** and lower element **18** which are restrained to each other by bushing **19**.

Upper element **17** is in the form of a cap and has a frustrum of cone shape to provide an inclined periphery

13 as a starting step for threading of cop 8, and may have as well an annular relieving cavity 16.

As in the example of FIG. 1, lower element 18, forming the actual dragging body, has three recesses 10, which do not extend along the whole height of body 18, but only for about ¾ of it, so that a step 20 will result therebelow, onto which a cylinder 21 will rest, said cylinder, owing to said rest, needing no support members and thus being quite cylindrical. Below said step 20, body 18 has an annular step 22 forming an annular seat onto which a corresponding shoulder 23 of sleeve 24 externally enclosing the entire body 18 will rest. From below and externally, said sleeve 24 (FIG. 4) has at first a wide inverted frustrum of cone band 24', then a short cylindrical band 24'' and thereabove, a band 24''' in the configuration of a frustrum of a cone. The sleeve has three slots 25 (FIG. 6) radially arranged and aligned with cylinders 21 and recesses 10. Inwardly, they have chamfered spacing means allowing freedom of cylinder 21 at displacements thereof. In the upper part, sleeve 24 has an annular step 26 providing a seat for ring element 27, thus enclosing the uppermost edge of body 18.

This retaining ring 27 restricts sleeve expansion due to centrifugal force.

As to operation, it does not differ from that shown in the examples of FIGS. 1–3. However, as a difference, it may be added that in this embodiment sleeve 24 will adhere to the inner face of cop 8 and will be dragged by the latter upon starting or braking, thus defining displacement of cylinders 21 within the respective seats until they will contact the inner face of the cop, so that conditions already described for the previous type will then occur.

The dragging body, as described and shown in FIGS. 4–6, has greater clearances between the various elements, with the result of making threading and removal of cop 8 from spindle easier and quicker.

It is, of course, to be understood that the present invention is, by no means limited to the particular arrangement shown in the drawings, but also comprises any modifications within the scope of the appended claims.

What is claimed is:

1. An automatic centering and dragging device for cops in spinning and twisting spindles comprising,
- a body with an axial hole therethrough,
- said body comprising an upper cap element and a lower element,
- said upper and lower elements being rigidly held together by a cylindrical bushing passing through said hole, said bushing having an inside diameter adapted to conform to said spindle, said lower element having at least three radial extensions intercalated with recesses,
- dragging cylinders being seated in said recesses,
- and an outward cylindrical resilient sleeve externally enclosing the entire lower element,
- said sleeve adapted to have a maximum diameter slightly larger than the inner diameter of the cop so that said sleeve will be resiliently biased against said cop,
- said sleeve having slots radially arranged and aligned with said recesses and dragging cylinders.

2. An automatic centering and dragging device according to claim 1 wherein said upper cap element is in the form of a frustrum of a cone whereby an inclined periphery is provided which protects said lower element and also expedites attachment and removal of the cops.

3. An automatic centering and dragging device according to claim 1 wherein said outward sleeve has integral, lower, upper central and upper portions,
- said lower portion being in the configuration of an inverted frustrum of a cone,
- said upper central portion being in the form of a cylindrical band and said upper band portion being in the shape of an upright frustrum of a cone.

4. An automatic centering and dragging device according to claim 3 wherein said slots on said resilient sleeve extend from the upper edge of said sleeve, through said upper band and central portions into said lower portion,
- said sleeve portions between said slots being resiliently biased so that in an unrestrained condition they have a maximum diameter greater than the diameter of said cop.

5. A spinning and twisting spindle comprising in combination a base, a shaft, a dragging device, a centering ring and a cop;
- said shaft having a lower first zone in the shape of a frustrum of a cone,
- a central cylindrical portion having a diameter equal to the upper smaller diameter of said frustrum of a cone, and an upper frusto-conical portion, the largest diameter of which is equal to the diameter of said cylindrical portion;
- said dragging device being mounted on said lower first zone of said shaft and comprising a body with an axial hole therethrough,
- said body comprising an upper cap element and a lower element,
- said upper and lower elements being rigidly held together by a cylindrical bushing passing through said hole, said bushing having an inside diameter adapted to conform to said frusto-conical configuration of said lower first zone,
- said lower element having at least three radial extensions intercalated with recesses,
- dragging cylinders being seated in said recesses and an outward cylindrical sleeve externally enclosing the entire lower element,
- said sleeve having slots radially arranged and aligned with said recesses and dragging cylinders;
- said centering ring being circular and having an axial frusto-conical hole therethrough which is complementary to and seats on the upper frusto-conical portion of said shaft,
- a cylindrical cop resting on said base and having an internal diameter substantially equal to the outside diameter of the upper central portion of the cylindrical sleeve of the lower dragging body,
- whereby said sleeve adheres to the cop so that as soon as the rotation of the shaft and dragging device begins, the dragging cylinders are immediately drawn against the cop and there is no sliding between the dragging body and the cop.

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