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COMBINATION OF A TEXTILE SPINNING FRAME OR THE LIKE AND A MECHANISM FOR DETERMINING THE MISALIGNMENT AND TO AID IN THE CENTERING OF A SPINDLE THEREIN

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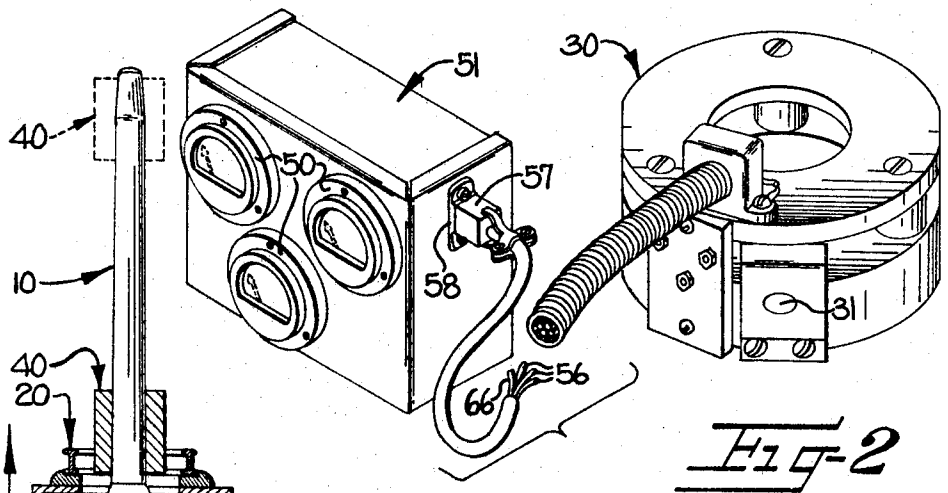


Fig-2

Fig-1

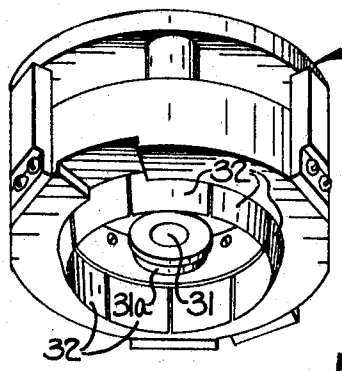


Fig-3

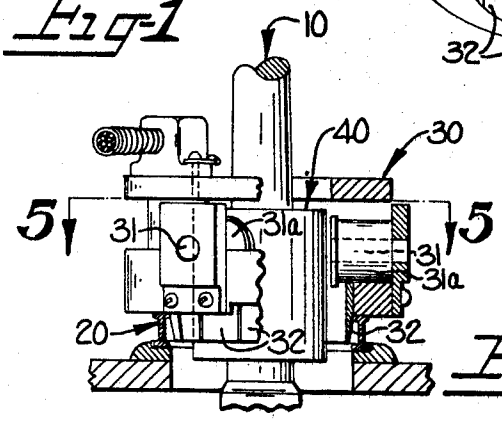


Fig-4

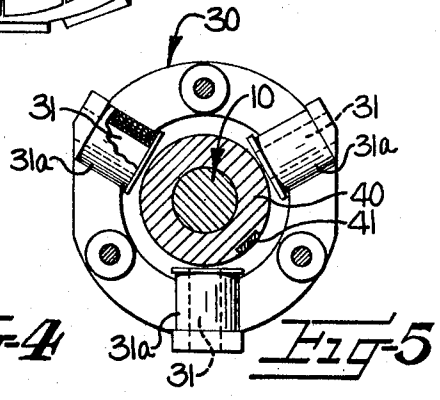


Fig-5

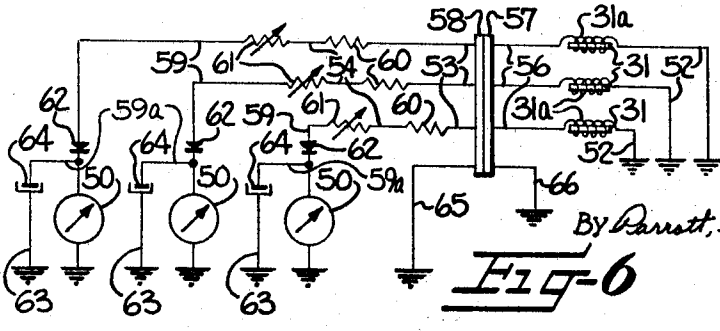


Fig-6

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COMBINATION OF A TEXTILE SPINNING FRAME OR THE LIKE AND A MECHANISM FOR DETERMINING THE MISALIGNMENT AND TO AID IN THE CENTERING OF A SPINDLE THEREIN

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ABSTRACT OF THE DISCLOSURE

The combination of a textile spinning frame or the like and a mechanism for determining the misalignment and to aid in the centering and plumbing of a spindle therein comprising a rotatable spindle, a spinning ring, means removably attached to the spinning ring to produce a plurality of magnetic fields equally spaced around the spindle, means attached to the spindle to rotate therewith and to cause to be induced a cycle of electric current in each of the magnetic fields for each rotation of the spindle which is directly related to the nearness of the rotating means to each of the magnetic fields, and means for reading the cycles of electric current to determine the misalignment of the spindle.

This invention relates to a mechanism for determining the misalignment of a spindle in a textile spinning frame or the like and more particularly to aid in the centering or plumbing of a spindle in a textile spinning frame or the like.

Heretofore, spindle centering or plumbing in a textile spinning frame or the like has been performed by an operator through viewing of a spindle in a top position of the spinning ring and a bottom position of the spinning ring with the aid of a plug, the outside diameter of which is slightly less than the inside diameter of the ring. If the spindle appears to be misaligned through either of these visual inspections, the operator would manually center the spindle within the spinning ring to the best of his judgment.

It is important that the spindle be centered within the spinning ring from both a good running standpoint, i.e. minimize end breakage, and to obtain a desired package of yarn during the spinning process. The problem of misalignment of the spindle becomes more acute in high speed spinning operations and the trend in the textile industry at present is definitely toward more and more high speed operations. Also, certain designs of textile spinning frames or the like have rendered the above visual inspection procedure of aligning a textile spindle virtually impossible due to portions of the machine obstructing an operator's view of the spindle within the spinning ring.

It is, therefore, an object of this invention to provide a mechanism for determining the misalignment of a spindle in a textile spinning frame or the like to eliminate the necessity of a visual inspection and to aid in more accurately and precisely aligning or centering the spindle within the spinning ring.

It has been found by this invention, that the above object may be accomplished by providing a mechanism having means adapted to be attached to the spinning ring including a plurality of permanent magnets having surrounding encasing coils to produce a plurality of magnetic fields equally spaced around the spindle, means adapted to be attached to the spindle to rotate therewith and to cause to be induced a cycle of electric current in each of the encasing coils for each rotation of the spindle which is directly related to the nearness of the rotating

means to each of the encasing coils and means for reading the cycles of electric current to determine the misalignment of the spindle, e.g., if the readings of electric current are equal, then the spindle is centered within the spinning ring, or if one or more of the readings of the current is not equal to the other readings, then the spindle is out of alignment and can be manually aligned until the readings are equal.

Some of the objects and advantages of the invention having been stated, other objects and advantages will appear as the description proceeds when taken into conjunction with the accompanying drawings, in which:

FIGURE 1 is a front elevational view, partly in section, of a portion of a spinning frame illustrating a rotatable spindle, a spinning ring, and the means of this invention by which a cycle of current is caused to be induced in a coil surrounding a permanent magnet when the means is rotating on the spindle;

FIGURE 2 is a perspective view illustrating the means of this invention for attachment to the spinning ring to produce a plurality of magnetic fields equally spaced around the spindle and the means for reading the cycles of electric current;

FIGURE 3 is a perspective view of the means of this invention for attachment to the spinning ring, as illustrated in FIGURE 2, and further illustrating spring steel fingers for attachment thereof to the spinning ring;

FIGURE 4 is an enlarged elevational view, partly in section, of the spindle and spinning ring illustrated in FIGURE 1 and showing the means of FIGURE 3 attached to the spinning ring and to the spindle;

FIGURE 5 is a cross sectional view taken substantially along the line 5—5 of FIGURE 4; and

FIGURE 6 is a schematic wiring diagram of the mechanisms illustrated in FIGURE 2.

Referring now to the drawings, a portion of a textile spinning frame or the like is illustrated in FIGURE 1 and includes a rotatable spindle **10** having the usual whorl **11** to receive a driving tape **12** for rotating the spindle **10**. The spindle **10** is rotatably received in the usual bolster casing **13** which is mounted in an aperture in a spindle or base rail **14** and is held in position thereon by a nut **15** tightened against the bottom of the spindle rail **14** on the threaded portion of the bolster casing **13** so that the spindle rail **14** will be sandwiched between a flange on the upper end of the bolster casing **13** and the nut **15**.

The portion of the textile spinning frame illustrated in FIGURE 1 further includes a spinning ring **20** disposed around the spindle **10** and adapted to move longitudinally with respect to the spindle **10**, in the direction of the arrow shown in FIGURE 1, for purposes well understood by those with ordinary skill in the art.

It is desirable to have the spindle **10** centered within the spinning ring **20** to accomplish the desired spinning action, for reasons well known by those with ordinary skill in the art. As set forth above, this has been heretofore performed by visually inspecting the position of the spindle within the spinning ring at a bottom position of the spinning ring at the bottom of the spindle, as shown in FIGURE 1, and at a top position of the spinning ring at the top of the spindle, not shown.

The mechanism of this invention for determining the misalignment and to aid in centering of the spindle **10** within the spinning ring **20** comprises a hollow measuring head, generally indicated at **30**, which may be constructed of any suitable material and which includes three matched permanent magnets **31** having surrounding, encasing coils **31***a* equally spaced around the measuring head **30** and from the center thereof so that the magnets **31** will produce three magnetic fields equally spaced around the measuring head **30**.

The measuring head **30** includes a plurality of spring steel fingers **32** equally space therearound and conforming substantially to the inside circumference of the spinning ring **20**, but slightly larger. All of the spring fingers **32** are of substantially equal resiliency so that the measuring head **30** may be attached to the spinning ring **20** and frictionally held thereon by the spring fingers **32** inserted within the spinning ring **20**. The equal resiliency of each of the spring fingers **32** will center the measuring head relative to the spinning ring **20** so that the magnetic field produced by the magnets **31** will be equally spaced around the spinning ring **20** and around the desired axis of rotation of the spindle **10**.

The mechanism of this invention further includes a pair of hollow sleeves **40** constructed of a non-ferrous material and having a strip of ferrous, magnetic material **41** extending therethrough in the longitudinal direction on the outer surface thereof. The hollow sleeves **40** are slightly tapered internally and one of the sleeves has an internal circumference conforming substantially to the size of the spindle **10** at the bottom thereof so that the sleeve **40** may be placed on the spindle **10** to frictionally engage the spindle **10** at a bottom position thereon for rotation therewith, as may be seen in FIGURE 1. The other sleeve **40** has a smaller internal circumference conforming substantially to the top of the spindle **10** for frictionally engaging the spindle **10** at a top position thereon to rotate therewith, as may be seen in dotted lines in FIGURE 1.

The spinning ring with the measuring head **30** positioned thereon may be moved from a bottom position in which the measuring head **30** will surround the first sleeve **40** to a top position where the measuring head **30** will surround the second sleeve **40**. In either of these positions, rotation of the sleeve **40** on the spindle **10** with the ferrous, magnetic strip **41** therein will cause a cycle of electric current to be induced in each of the encasing coils **31***a*. This electric current will be directly related to the nearness of the sleeve **40** to each of the encasing coils **31***a*. The current will be equal in each coil **31***a* if the spindle **10** is centered within the spinning ring **20** and the measuring head **30**.

The mechanism of this invention further includes three ammeters **50** contained within a single housing **51**, each of which is electrically connected to a separate encasing coil **31***a*, as set forth below. Therefore, readings of the electric current induced in the encasing coils **31***a* may be read on the separate ammeters **50** to determine whether or not the spindle **10** is centered within the measuring head **30** and the spinning ring **20**. For example, if the readings of electric current are equal, then the spindle is centered within the spinning ring. However, if one or more of the readings of the current is not equal to the other readings, the spindle is out of alignment and can be manually aligned until the readings are equal.

This manual alignment may be performed by loosening the nut **15** and manually moving the spindle **10** within the spindle rail **14** until the readings on the ammeters **50** are equal, at which time the nut **15** will again be tightened on the spindle or base rail **14** to secure the spindle **10** in place.

As shown in the schematic wiring diagram of FIGURE 6, each of the coils **31***a* is connected by lines **52** to ground and by lines **56** to a male plug **57** which is inserted into a female plug **58** on the casing **51** for the ammeters **50**, as shown in FIGURE 2. The female plug **58** has lines **53** leading therefrom to resistors **60**. Lines **54** then lead from resistors **60** to separate variable resistors **61** and then to lines **59** and diodes **62** to the ammeters **50** and then to ground. Separate lines **63** are used to connect each line **59***a* through capacitors **64** to ground. To complete the electric circuit, a line **65** leads from ground to the female plug **58** and connects through the male plug **57** to another line **66** leading to ground. The variable resistors **61** are utilized to equalize the ammeters **50** to insure that

equal readings are obtained thereon when equal electrical currents are induced within coils **31***a*.

The ammeters **50** are calibrated into microamperes from 0–100 and each microampere represents generally 0.001 of an inch at a given spindle speed between the sleeve **40** and the magnetic coils **31** so that the exact amount of misalignment of the spindle **10** may be determined.

Thus it may be seen, that a mechanism is provided for measuring the misalignment of a spindle in a textile spinning frame or the like to eliminate the necessity of a visual inspection and to provide an aid in very accurately and precisely aligning or centering the spindle within the spinning ring.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

What is claimed is:

1. The combination of a textile spinning frame or the like and means for determining the misalignment and to aid in the centering and plumbing of a spindle on the spinning frame, the combination comprising:

(a) a textile spinning frame;

(b) a rotating spindle on said frame adapted for use in spinning textile yarns;

(c) a spinning ring on said frame disposed around said spindle and adapted to move longitudinally with respect to said spindle for use in spinning textile yarns;

(d) means removably attached to said spinning ring including a plurality of permanent magnets having surrounding encasing coils, said magnets producing a plurality of magnetic fields equally spaced around said spindle;

(e) means removably attached to said spindle to rotate therewith and to cause to be induced a cycle of electric current in each of said encasing coils for each rotation of said spindle which is directly related to the nearness of said rotating means to each of said encasing coils; and

(f) means for reading the cycles of electric current to determine the misalignment of said spindle and to aid in centering or plumbing thereof.

2. The combination, as set forth in claim **1**, in which said means for producing a plurality of magnetic fields comprises a hollow measuring head removably attached within said spinning ring around said spindle and having at least three permanent magnets having surrounding encasing coils equally spaced around said spindle and from the desired axis of rotation of said spindle, said measuring head further including a plurality of spring steel fingers equally spaced therearound and of substantially equal resilience and removably inserted within said spinning ring to frictionally secure and center said measuring head to said spinning ring and around the desired axis of rotation of said spindle.

3. The combination, as set forth in claim **1**, in which said means for inducing a cycle of electric current in each of said encasing coils comprises a hollow sleeve constructed of non-ferrous material and having a strip of ferrous, magnetic material thereon and adapted to be frictionally attached around said spindle.

4. The combination, as set forth in claim **1**, in which said means for reading the electric current comprises ammeters connected to each of said encasing coils.

5. The combination of a textile spinning frame or the like and means for determining the misalignment and to aid in the centering of a spindle on the spinning frame, the combination comprising:

(a) a textile spinning frame;

(b) a rotatable spindle on said frame adapted for use in spinning textile yarns;

(c) a spinning ring on said frame disposed around said spindle and adapted to move longitudinally with respect to said spindle and adapted to be used in spinning textile yarns;

(d) a hollow measuring head having a plurality of spring steel fingers equally spaced therearound and of substantially equal resilience and removably inserted within said spinning ring to frictionally secure and center said measuring head to said spinning ring and around the desired axis of rotation of said spindle and having at least three permanent magnets having surrounding encasing coils equally spaced around said spindle and from the desired axis of rotation of said spindle for producing at least three magnetic fields equally spaced around said spindle, said spinning ring and said measuring head being adapted to be moved from a bottom position around said spindle to a top position around said spindle;

(e) a pair of hollow sleeves constructed of non-ferrous material and having a strip of ferrous, magnetic material thereon and adapted to be frictionally attached around said spindle at a bottom position thereon and at a top position thereon to rotate therewith to cause to be induced a cycle of electric current in each of said encasing coils for each rotation of said spindle which is directly related to the nearness of said sleeves to each of said encasing coils; and

(f) an ammeter connected to each of said encasing coils for reading the cycles of electric current induced therein to determine the misalignment of said spindle at each of the positions of said sleeves.

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