July 18, 1961 R. K. BUTLER 2,992,555

TOP ROLL WEIGHT TESTERS

Filed June 24, 1959

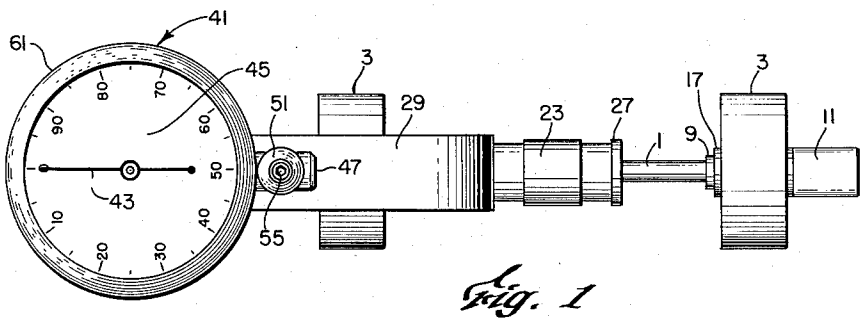


Fig. 1

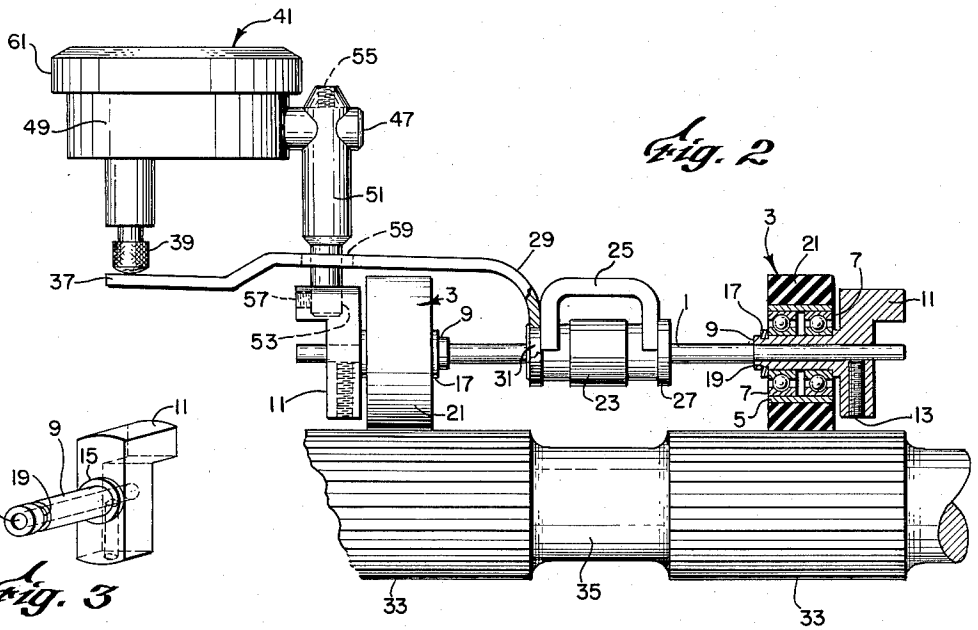


Fig. 2

Fig. 3

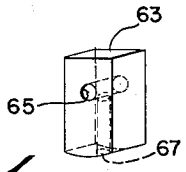


Fig. 4

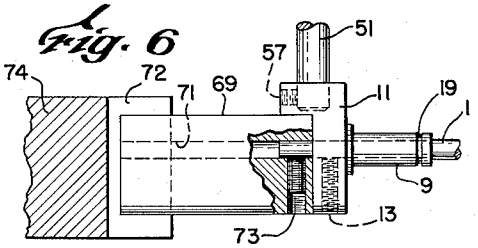


Fig. 6

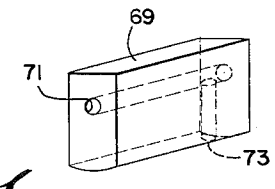


Fig. 5

Richard K. Butler
Inventor
by Robert K. Randall,
Attorney

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TOP ROLL WEIGHT TESTERS

Richard K. Butler, Whitman, Mass., assignor, by mesne assignments, to Machinecraft, Inc., Whitman, Mass., a corporation of Massachusetts

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This invention relates to the drawing rolls used in the spinning of textile fibers into yarns. These rolls are arranged in opposed pairs driven at successively increased rates so as to feed a strand of textile fibers faster by a succeeding pair of rolls than it is fed by the preceding pair, and thus stretch the strand to attenuate it and lay its fibers in parallel relation to each other.

For many purposes the most valuable characteristic of the yarn made from a given type of fiber is its uniform strength throughout its length, and this requires a constant number of fibers to be present in its cross-section at all points in its length. To attain this uniform or "level" relation, the drawing rolls must keep a firm grip on the fibers passing between them, so that they will be paid out by the slower-turning pairs of rolls at a uniform rate, and drawn forward by the next pair of rolls at a uniform but faster rate, without any slipping of the fibers in the grip of the rolls, which would let the fibers advance or lag unevenly.

Hence the opposed rolls of each pair are forced together by weighting means applied to each top roll, which in a spinning frame is short and has two bosses each working on a strand of fibers and separated by a neck on which the weighting pressure is applied, the roll thus being pressed against and driven by the corresponding bosses of the bottom roll, which is continuous throughout the length of the spinning frame.

With the advent of long-draft spinning, through the use of aprons on the rolls and otherwise, the increased diameter or volume of the crude strand or roving fed to the drawing rolls has required greatly increased weighting, to keep the fibers from slipping at the nips of the pairs of rolls.

While the proper weighting to prevent slip is indicated within broad limits by the machine builder in the instructions supplied with the spinning frame and to be followed in working on the different fibers and yarns, there has been no adequate means whereby the mills using the spinning frames can tell accurately the amount of pressure actually being applied to a given top roll, so as to set up the desired pressure uniformly at all the 360 or so top rolls in the frame, or can after changed weighting revert accurately at a later date to a weighting found proper in a given case. Even when the rolls are loaded by "dead" (pendent) weights the actual weighting delivered to the individual rolls is unpredictable owing to friction and dimensional variations in manufacture and set-up of the systems of leverage used. In the case of spring weighting as now widely used the problem is much more acute, for lack of any visual indication of the force being applied.

The only means of determining the weighting actually delivered to the top rolls commonly used in practice, to my knowledge, has been to hook a spring-balance under the neck of each roll in succession, pull upward on the spring-balance, and note the force in pounds required to lift both bosses of the top roll clear of the bottom roll. With roll weightings exceeding 100 lbs. per roll required in many cases nowadays, a jack or other hoist for the spring balance is of course required, commonly a bipod or tripod equipped with screw means to effect the lift. In the case of modern capbarless spinning frames the difficulties incident to this slow and awkward method are

complicated by lack of any convenient place to set up the hoist on the spinning frame.

The main object of the present invention is to provide a simple, accurate, speedy, and inexpensive means for testing and indicating the weighting of top rolls, one which is applicable to all kinds of two-boss rolls, whether mounted in cap bars or held by their necks alone.

To this end, the device of the invention consists in essence of a test roll to be substituted momentarily for the top roll of which the weighting is to be determined, and loaded by the weighting device just as was the top roll equipped with a gage indicating visually the amount of deflection of the test roll's shaft by such load, and calibrated to read in pounds or other informative units.

The device is light and compact, of pocket size so that the spinner can if desired carry it with him at all times with both hands free. It has no loose, jointed, or dangling parts, and requires no auxiliary supports to hold it in working position, being held in place, just as is the top roll it replaces, by the bottom drawing roll and the saddle which applies the weight, and the cap bars if such are used in the spinning frame.

It is adapted to be put into use without stopping the spinning frame, and indeed to continue the drawing of the two strands being drawn by the top roll it replaces, if desired, with no more interruption of production here than that caused by the routine removal of a top roll to clear lap-ups or for other cleaning, and with no more physical effort involved.

It can be made to measure with a single instrument a range of weighting from a minimum of 5 lbs. or less up to 100 lbs. or more, or a given tester may be made to cover a lesser range starting at any desired figure, for greater ease in reading and greater accuracy, merely by choice of a shaft of proper stiffness.

Other objects of the invention, and the manner of their attainment, are as made plain hereinafter.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

FIG. 1 is a plan view.

FIG. 2 is a front view of the device in use.

FIG. 3 is a perspective view of one hub for the rollers.

FIGS. 4 and 5 are perspective views of the extension pieces.

FIG. 6 shows the hub of FIG. 3 and the extension piece of FIG. 5 in place on the left-hand end of the tester shaft.

The novel roll weight tester has as its weight-responsive element a shaft **1** of steel or other material of high elastic limit, which is supported by two rollers **3** each comprising a sleeve or shell **5** in which are press-fitted two ball bearings **7** whose inner races are slidably mounted on a hub **9** fitting closely on shaft **1**. This hub forms a part of a block **11** of L-shape bored at **10** coaxially with the hub **9** to fit over the shaft, and fixed thereon by screw **13** bearing against the flatted underside of shaft **1** to position the roller **3** where desired in the length of shaft **1**. A shoulder **15** between the part **11** and the hub **9** engages the side of the nearer bearing **7** and holds the roller **3** clear of part **11**. The roller is held from movement inwardly along the hub **9** and shaft by a C-clip **17** sprung into a groove **19** around the end of hub **9**.

Each roller **3** is equipped with a thick resilient tread or cot **21** of the same rubber or other composition material used in making the cots of top rolls. The outer surface of shell **5** is knurled and cot **21** is adhesively affixed thereto, in usual top roll manner.

At mid-length of shaft **1** there is fixed, as by press-fitting, a hub **23** corresponding in diameter and shape to the neck of the average top roll. This hub performs the function of the top roll neck of receiving the contact and pressure of the usual saddle employed in spinning frames for weighting the top roll. The saddle indicated herein

at 25 is of a common type of "top arm," so-called, employed in capbarless spinning frames to form the sole means of positioning and supporting the top roll in working position on the bottom roll, in addition to its weighting function. For such purpose, the hub is grooved to leave a shoulder 27 at one end to prevent relative axial movement between the hub and the saddle 25 in one direction. Movement in the other direction is prevented by the attachment thereto of an arm in the form of a strip of stiff metal 29 provided with an aperture in its end, which is press-fitted and fixed on a reduced extension 31 of the hub, the end of extension 31 being thereafter headed over.

When the device is put into place as shown in FIG. 2 with its two rollers 3 respectively resting on the bosses 33 of bottom roll 35, in substitution for a top roll whose weighting is to be determined, the downward pressure of saddle 25 under the influence of the weighing means (not shown) causes shaft 1 to bend in the interval between its spaced points of support by the rollers 3, or, more strictly, between these points and the ends of hub 23. This depresses the hub 23, and with it the strip 29.

The free end 37 of strip 29 is engaged by the end of the plunger 39 of a micrometer gage 41 of standard or any preferred construction. The plunger 39 is urged downwardly by a light spring so as to cause it to follow the movements of the end 37 of the strip 29, the extent of movement thus permitted to or imposed on the plunger being indicated in known manner by needle 43. The dial of the gage is calibrated to read in pounds or any other desired units, this being done in the first instance by applying weights or pressure of known value to the midlength of hub 23 and graduating the dial accordingly. Thus any degree of loading applied to hub 23 by the saddle 25 or its equivalent in the spinning frame is clearly and accurately shown on the dial 45 and read therefrom directly.

Gage 41 is conveniently mounted by a stud 47 fixed in its casing 49 and received in a hole formed therefor in a post 51 fixed in a hole 53 in the horizontal arm of one of the parts 11 fastened on shaft 1. A set screw 55 in the top end of post 51 holds stud 47, while another set screw 57 holds the post in the part 11. The post 51 extends through a hole 59 in strip 29, without making any contact therewith.

The dial 45 of the gage is fixed in the bezel 61 in known manner so that by rotating the bezel the zero mark of the dial may be positioned below the needle 43 in whatever position the latter may stand before the tester is subjected to the load being ascertained. Thus, any distortion or set of the parts through the hard usage the device will receive in the mills is quickly compensated for.

The end portions 11 serve a double purpose. They are used in conjunction with shoulders on the shaft to fix the spaced relation of the rollers 3 as required by the spacing or gage of the two bosses 33 of the bottom roll, as well as to center them over the respective strands of yarn (not shown) being drawn, in cases where it is desired to continue the drafting operation while ascertaining the weighting applied. In such case, each roller serves as the corresponding boss of the top roll which the tester momentarily replaces. The diameter of each roller 3 is made the same as the average diameter of the cots of the top rolls in use in the frame, so that the saddle 25 will retain its normal elevation above the bottom roll. Though the tread surface of the roller 3 shown herein is narrow, as used in frames where the strands are run without traverse, the tread width or axial extent of the rollers 3 may be increased as desired to encompass the full path of the strand when traversed, gage 41 of course being calibrated to allow for the increased resistance of shaft 1 to deflection.

The other function of the parts 11 is to fit into the cap bar slots such as 72, FIG. 6, of a frame in which the top rolls are supported and guided by the journals on their ends. For this purpose, shaft 1 is made of a length to fit the cap bar spacing of the shortest top rolls, for example, 4¾ inch rolls as used in a 2¾ inch gage of spinning frame. A filler block 63, FIG. 4, is applied by means of its hole 65 to each protruding end of shaft 1 so as to fill the internal angle of part 11 and give it a rectangular contour such as will rest securely but slidably in the cap bar slots 72. Block 63 is fixed in place in the angle of part 11 by a set screw threaded into the vertical bore 67 and bearing against the flatted surface of shaft 1. To adapt the same device to a frame using longer top rolls, as for a frame of 4 inch gage, longer blocks such as 69, FIGS. 5 and 6, are similarly fitted into the angle of parts 11, being likewise fixed on the ends of shaft 1 by means of their bores 71 and set screws in the intersecting threaded passages 73. The outward ends of these lengthening blocks 69 are of course received in the slots 72 of the cap bars 74, as before.

The novel roll weighting indicating device is placed under the saddle 25 with its post 51 in the common plane of the axes of the bottom roll and the shaft 1, as determined by eye alone. A slant of up to 10° in either direction from this relation makes no significant error in the indicated weight. With care in observing this simple requirement, the device gives a precise and accurate indication of the weighting, and especially in the case of spring loading is under the influence of the load alone and cannot be coaxed to misstate the weighting. It also stays securely in place, letting the spinner use both hands in correcting the weighting if such is needed.

In the case of cap bar type frames, the device is held in correct reading position by the cap bar slots 72 which receive the extension blocks 63 or 69.

While I have illustrated and described a certain form in which the invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the particular form shown, or to the details of construction thereof, but

What I do claim is:

1. A test roll for spinning frames having top rolls and weighting means therefor, comprising in combination spaced rollers, a shaft connecting such rollers, and a gage mounted on the shaft and adapted to indicate the amount of deflection of the shaft when this roll is put into the spinning frame and loaded by the weighting means.

2. A test roll for spinning frames having top rolls, weighting means therefor, and bottom rolls, comprising in combination spaced rollers to engage a bottom roll, a shaft connecting such rollers, and an indicator connected to the shaft at spaced points in the length thereof and responsive to the amount of deflection of the shaft in the interval between the rollers when the shaft is subjected to loading by the weighting means in such interval and deflected thereby.

3. A test roll for spinning frames having top rolls, weighting means therefor, and bottom rolls, comprising in combination a shaft, spaced rollers thereon for engagement by a bottom roll, and an indicator mounted on the shaft and indicating the deflection of the shaft when the roll is put in the place of a top roll and the shaft is subjected to the load of the weighting means and deflected thereby.

4. A top roll weighting indicator for spinning frames having top rolls, weighting means therefor, and bottom rolls, comprising in combination a shaft, rollers rotatably mounted thereon in spaced relation for engagement with a bottom roll, indicating means mounted on the shaft, and means actuating the indicating means in response to deflection of the shaft when the latter is subjected to the load of the weighting means and deflected thereby.

5. A top roll weighting indicator for spinning frames having top rolls, weighting means therefor, and bottom rolls, comprising a shaft, spaced rollers rotatably mounted on the shaft to rest on a bottom roll, a hub on the shaft for engagement by the weighting means, a gage on the shaft, and an arm on the hub for actuating the gage in response to deflection of the shaft when the hub is loaded by the weighting means.

6. In a spinning frame having top rolls, weighting means for the top rolls including a saddle, and bottom rolls, in combination, rollers to rest on a bottom roll after the top roll cooperating therewith has been removed, a shaft connecting the rollers, a hub on the shaft to be engaged and weighted by the saddle, an arm fixed on the hub, and a gage carried by the shaft, actuated by the arm, and indicating the deflection of the shaft in terms of pounds when the hub is weighted by the saddle.

7. A test roll for determining the weighting of spinning frame top rolls having in combination a shaft, spaced rollers thereon supporting the shaft, an arm on the shaft between the rollers, an arm on the shaft beyond the rollers, and an indicator mounted on one of such arms showing the amount of relative movement of the two arms when the shaft is bent under a load.

8. In a spinning frame having bottom rolls, top rolls, and guiding and weighting means for the top rolls including a saddle and cap bars, in combination, spaced rollers, a shaft connecting the rollers, indicating means carried by the shaft showing the amount of deflection of the shaft when loaded by the saddle and with the rollers supported by a bottom roll, and members on the end-portions of the shaft to engage in the cap bars.

References Cited in the file of this patent

UNITED STATES PATENTS

2,319,299	Converse	May 18, 1943
2,382,289	Burt	Aug. 14, 1945
2,774,114	Gonay	Dec. 18, 1956
2,884,664	Solanas	May 5, 1959