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Ooki et al.

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[54] LOADING MECHANISM APPLIED TO THE DRAFTING MECHANISM OF A SPINNING MACHINE

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June 30, 1969 Japan.....44/61021

[52] **U.S. Cl.**.....**19/281**, 19/295
[51] **Int. Cl.**.....**D01h 5/50**
[58] **Field of Search**.....19/280, 281, 282, 295, 266, 19/267

[56] **References Cited**

UNITED STATES PATENTS

2,801,448 8/1957 Anderson et al.....19/281

OTHER PUBLICATIONS

Kubler, German Application 1,066,921 Printed Oct. 8, 1959
Kramer, German Application 1,126,287 Printed Mar. 22, 1962

Primary Examiner—Dorsey Newton
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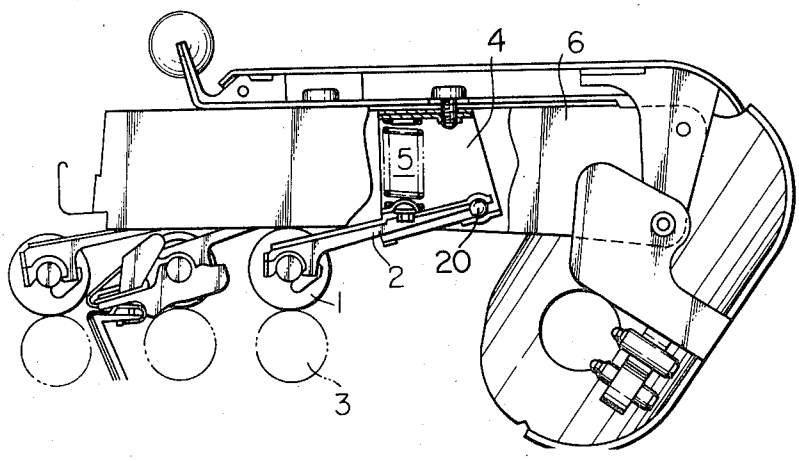
[57] **ABSTRACT**

An improved loading mechanism applied to a third, fourth or back top roller of the pendulum arm type drafting mechanism. The loading mechanism of the invention is provided with means for compensating the unparallelism of the top roller to the cooperating bottom roller. This compensation means utilizes an abutment for receiving a bottom end of a helical spring which imparts a pressure to the top roller for urging the cooperating bottom roller and the abutment is turnably mounted on a guide arm of the pendulum arm mechanism in an eccentric condition with respect to the longitudinal axis of said helical spring.

8 Claims, 10 Drawing Figures



Patented May 23, 1972 3,663,992

2 Sheets-Sheet 1

Fig. 1

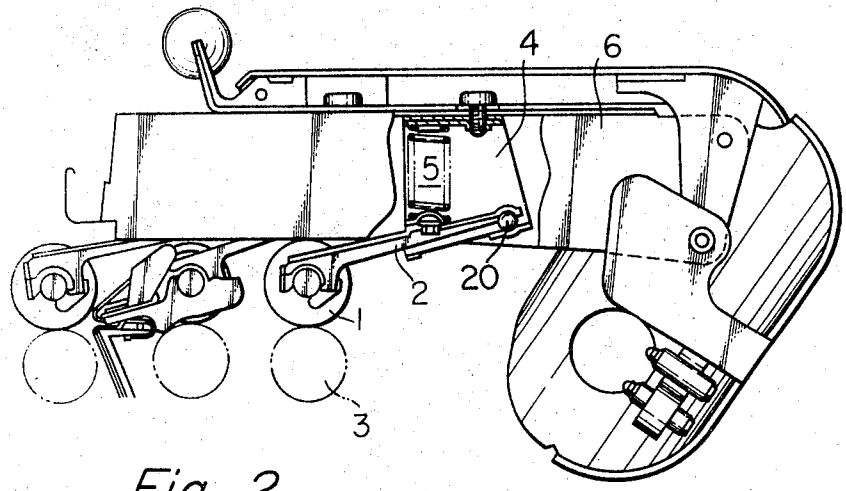


Fig. 2

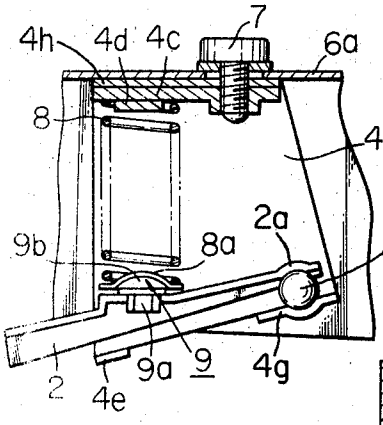


Fig. 3

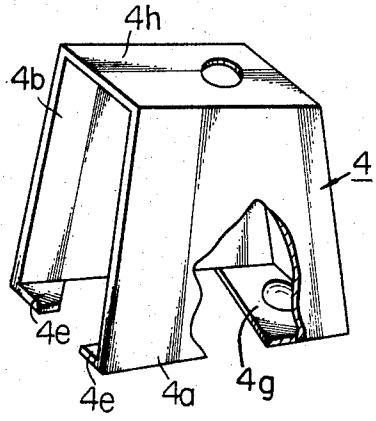


Fig. 4

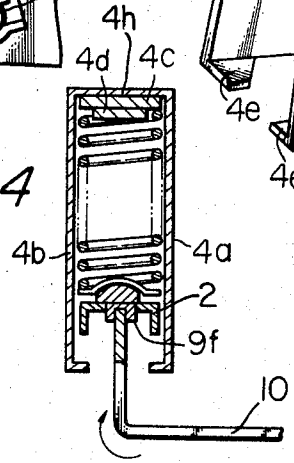


Fig. 5

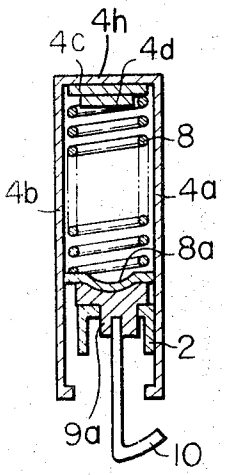


Fig. 6

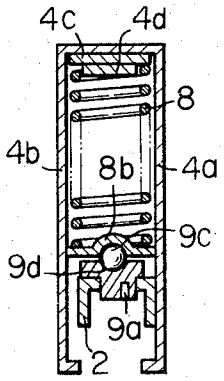


Fig. 7

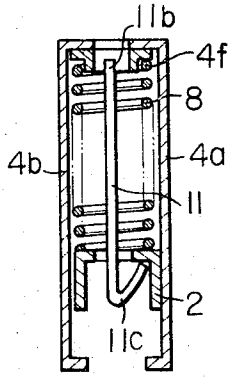


Fig. 8

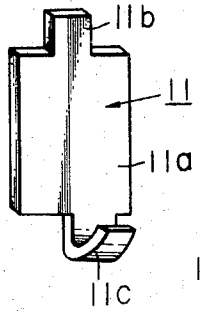


Fig. 10

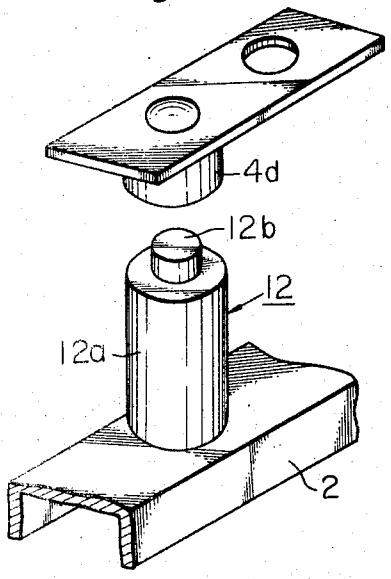
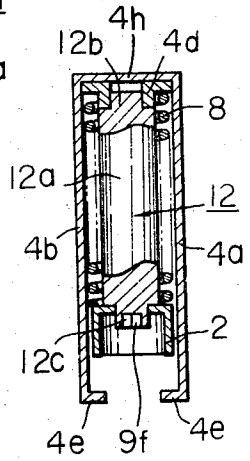


Fig. 9



LOADING MECHANISM APPLIED TO THE DRAFTING MECHANISM OF A SPINNING MACHINE

The present invention relates to an improvement in the drafting mechanism of a spinning machine and more particularly to an improved loading mechanism applied to a third, fourth or a back top roller of the drafting mechanism.

In the conventional drafting mechanism for a spinning machine in which the bottom rollers are rotated about respective fixed axes on the machine's supporting frame and the top rollers are rotatably mounted on a carrier arm which is pivoted to the supporting frame for movement toward and away from the drawing area defined by the bottom roller's location, the guide arms are capable of swinging about the respective supporting pin mounted on the respective saddle housing disposed to the carrier arm in such a way that the movement of the guide arms are limited in a plane parallel to a tangential plane in which the sliver moves, and the top rollers are loaded by means of spring loading which permits changes in pressure to be made in predetermined discrete steps. However in the above-mentioned mechanism, it is very difficult to compensate for the unparallel condition of the top rollers, which is caused by the torsional setting of the carrier arm to the cooperating bottom rollers. To eliminate the above-mentioned drawbacks, a pendulum arm mechanism utilizing a spherical supporting mechanism is applied for supporting the guide arms upon the respective supports. However, in the case of the back top roller, the rotation speed of the back bottom roller is so slow that it is very difficult to compensate for the supporting condition of the back top roller in accordance with the rotation of the cooperating back bottom rollers. The above-mentioned drawback is also recognized in third and fourth (back) top rollers in the case of applying a four line drafting mechanism.

The principal object of the present invention is to provide improvements in the known spring-loaded top roller arrangement which is always capable of compensating for the unparallel condition of the top roller to the cooperating bottom roller rotating at a very slow speed.

Further features and advantages of the invention will be apparent from the ensuing description with reference to the accompanying drawings to which the scope of the invention is in no way limited.

FIG. 1 is a side view of a drafting mechanism of the invention in a partly fragmentary elevational section,

FIG. 2 is a side view of the supporting mechanism of the back top rollers shown in FIG. 1, respectively,

FIG. 3 is a perspective view of a support shown in FIG. 2,

FIG. 4 is a side view of the loading mechanism, partly in section, shown in FIG. 2 illustrating a detailed construction thereof,

FIGS. 5 and 6 are side views of the modified loading mechanism, partly in section, according to the present invention,

FIG. 7 is a side view of another modified loading mechanism, partly in section, according to the present invention,

FIG. 8 is a perspective view of an eccentric member utilized for the loading mechanism shown in FIG. 7,

FIG. 9 is a sectional side view of a further modified loading mechanism according to the present invention,

FIG. 10 is an exploded perspective view of elements of the loading mechanism shown in FIG. 9.

Firstly, a typical embodiment of the loading mechanism according to the present invention is hereinafter illustrated.

Referring to FIG. 1 showing a drafting mechanism of a three line system, a pair of back top rollers are coaxially connected by a shaft of smaller diameter and the shaft of the top rollers 1 is rotatably mounted on a roller supporting portion of a back guide arm 2 so that the top rollers 1 are supported in parallel condition to the back bottom roller 3. A pendulum arm mechanism utilizing a spherical supporting mechanism is applied for supporting the guide arm 2 upon a support 4. Therefore, a three-dimensional adjustment of the supporting condition of the top back rollers 1 is possible. The supporting

mechanism is shown in the drawings as comprising a ball 20 seated in a depression in a supporting portion 4*g* of the support 4 and engaging in a depression 2*a* at one end of the guide arm 2. This supporting mechanism is illustrated in detail in the co-pending Patent application Ser. No. 889,250 filed Dec. 30, 1969. In spite of utilizing the above-mentioned supporting mechanism, since the bottom back roller rotates at a very slow speed, it is very difficult to compensate for the unparallel condition of the top rollers to the cooperating bottom rollers when there is an unparallel setting of the back top rollers to the cooperating bottom rollers.

Therefore, particular means for compensating for the above-mentioned unparallel condition of the back top rollers is required. In the present embodiment, an improved loading mechanism 5 is applied to solve the above-mentioned problem.

Referring to FIGS. 2, 3 and 4, the support 4 has side walls 4*a* and 4*b* and an upper wall 4*h*. The support 4 is adjustably mounted on a top plate 6*a* of a carrier arm 6 by a top plate 4*c* and a fastening bolt 7. A helical spring 8 is connected at its bottom end to an abutment member 9 turnably mounted on an intermediate position of the guide arm 2 and connected at its top end to a cylindrical projection 4*d* projected downward from the top plate 4*c* of the support 4 in a compressed condition. The abutment member 9 comprises an eccentric set screw 9*a* threaded in the guide arm 2 as shown in the drawing. The eccentric set screw 9*a* is provided with a cap 9*b* eccentrically integrated to the top of the set screw 9*a* so that the cap 9*b* is coaxially engaged with a spring washer 8*a* connected to the bottom end of the spring 8. The eccentric set screw 9*a* is provided with a female aperture 9*f* opened downward so that a screwdriver 10 can be engaged. In the above-mentioned embodiment, the size and shape of the helical spring 8 are so designed that the spring 8 is almost restricted in its lateral movement by the side walls 4*a* and 4*b*. Since the guide arm 2 is supported upon the support 4 in the three-dimensionally supporting condition, the above-mentioned unparallel condition of the top rollers 1 against the cooperating bottom rollers 3 can be corrected by adjusting the relative eccentricity of the eccentric set screw 9*a* to the longitudinal axis of the helical spring 8. The above-mentioned adjustment of the relative eccentricity of the eccentric set screw 9*a* to the longitudinal axis of the helical spring 8 can be carried out by turning the eccentric set screw 9*a* applying the manual operation with the screwdriver 10. In the above-mentioned support, the support 4 is provided with a pair of projections 4*e* inwardly projected from the bottom ends of the side walls 4*a* and 4*b*. This projections works as a pair of stop means for restricting the downward movement of the guide arm 2.

Modified embodiments of the loading mechanism are shown in FIGS. 5 and 6. In FIG. 5, the shape of the spring washer 8*a* and the eccentric set screw 9*a* are changed in an opposite way, while in FIG. 6, a ball 9*c* is slidably embraced between the spherical recesses 8*b*, 9*d* formed in the spring washer 8*a* and the cap 9*b* of the eccentric set screw 9*a*.

Other elements having the same function as that of the first embodiment are represented by the same numerals as in the first embodiment shown in FIGS. 2, 3 and 4.

A further modified embodiment of the loading mechanism is shown in FIGS. 7 and 8. In this embodiment, a cylindrical projection 4*f* corresponding to the cylindrical projection 4*d* is provided with a coaxial aperture passing therethrough. The spring 8 is connected with the projection 4*f* and the guide arm 2 and an eccentric plate 11 restricts the space for embracing the spring 8. The eccentric plate 11 is provided with an upper projection 11*b* and a lower curved projection 11*c* integral with a main body 11*a* in such a way that the upper projection 11*b* and the main body 11*a* have a common longitudinal turn axis while the curved projection 11*c* has an eccentrical turning axis with respect to the common axis. The upper projection 11*b* is turnably engaged with the aperture of the cylindrical projection 4*e* while the lower curved projection 11*c* passes through an aperture formed in the guide arm 2 and its curved end con-

tacts the guide arm 2, as shown in FIG. 7. Therefore, if the eccentric plate 11 is turned by turning the upper projection 11*b*, the compensation of the unparallel condition of the top back roller 1 to the cooperating bottom roller 3 can be similarly attained.

A still further modified embodiment of the loading mechanism according to the present invention is shown in FIGS. 9 and 10.

In this embodiment, an eccentric member 12 having a similar function as the eccentric plate 11 (FIG. 7), is utilized. The eccentric member 12 comprises a main cylindrical body 12*a* and an upper cylindrical projection 12*b* and a lower cylindrical projection 12*c*. The main cylindrical body 12*a* and the upper cylindrical projection 12*b* have a common longitudinal axis while the lower cylindrical projection 12*c* has an eccentric axis. The upper projection 12*b* is turnably engaged with an aperture formed in the cylindrical projection 4*d* while the lower projection 12*c* is also turnably engaged with the aperture of the guide arm 2. Since the helical spring 8 is connected to the projection 4*d* and the guide arm 2 in a compressed condition, the compensation of the unparallel condition of the back top rollers 1 to the cooperating bottom rollers 3 can be similarly carried out by turning the eccentric member 12 by means of a tool inserted in slot 9*f* in the lower projection 12*c*.

It is easily understood that the above-mentioned loading mechanism can be applied for compensating for the unparallel condition of the top rollers to the cooperating bottom roller in case these rollers rotate at so slow a speed that the ability of the self-compensation of the unparallel condition is poor.

In the above-mentioned embodiment, the guide arm is spherically supported upon the support. However, in the case of applying a conventional supporting means, such as a supporting means utilizing a pivot pin so as to turnably supporting the guide arm about the pivot pin, it was confirmed that the above-mentioned loading mechanism of the present invention can be satisfactorily applied.

What is claimed is:

1. In a drafting mechanism for a spinning machine having a pair of bottom rollers and a cooperating pair of top rollers having a shaft, means for loading said top rollers against said bottom rollers, comprising a common carrier member, a support having a top plate, spaced side walls and a lower arm-supporting portion, means for mounting said support by its top plate on said common carrier, a guide arm bearing at one end on said top roller shaft and having a portion received between said side walls of said support with play between said side walls and said arm portion, means supporting the opposite end of said guide arm on said lower arm-supporting portion of said support for pivotal movement about said supporting means and for lateral movement of said guide arm, an abutment member disposed on a portion of said arm intermediate its ends and between said side walls of said support, a spring-receiving member on said top plate on said support, a helical compression spring received between said abutment member and said spring receiving member, said spring being received snugly between said side walls and having a diameter greater than the width of said arm portion received between said side walls, whereby lateral movement of said spring is restricted by the side walls of said support, said abutment member comprising an eccentric member rotatably engaged with said guide arm, said eccentric member being eccentric with respect to the longitudinal axis of said helical spring and being provided with turning means at its bottom accessible from below said arm, whereby said eccentric member is turned by means of said turning means to adjust the position of said guide arm and compensate for nonparallelism of said top rollers.

2. An improved loading mechanism according to claim 1, wherein stop means provided at lower extremities of said side walls limit downward movement of said guide arm.

3. An improved loading device according to claim 1, wherein said means supporting said opposite end of said guide arm comprises opposite recesses in said arm and said lower arm-supporting portion of said support and a ball disposed between said arm and said support engaging in said recesses.

4. An improved loading mechanism according to claim 1, wherein said abutment member further comprises a spherical contacting member receiving a bottom end of said helical spring, said eccentric member is provided with a spherically shaped portion formed at a top thereof, a central axis of said spherically shaped portion is eccentric from a turning axis of said eccentric member, said spherical contacting spring movably contacts said spherically shaped portion directly.

5. An improved loading mechanism according to claim 1, wherein said abutment member further comprises a contacting member receiving a bottom end of said helical spring, said contacting member is provided with a recess, said eccentric member is provided with a projection formed at a top thereof, a central axis of said recess is eccentric from a turning axis of said eccentric member, said recess of said contacting member movably contacts said projection directly.

6. An improved loading mechanism according to claim 1, wherein said abutment member further comprises a contacting member receiving a bottom end of said helical spring, said contacting member is provided with a downward projection, said eccentric member is provided with a recess formed at a top thereof, a central axis of said projection is eccentric from a turning axis of said eccentric member, said projection of said contacting member movably contacts said recess of said eccentric member directly.

7. An improved loading mechanism according to claim 1, wherein said abutment member further comprises a spherical member receiving a bottom end of said helical spring and a ball embraced between said spherical member and said eccentric member, said spherical member and said eccentric member are provided with a spherical shaped recess for movably contact said ball, respectively, said spherical shaped recess of said eccentric member is eccentrically formed at a top of said eccentric member.

8. In a drafting mechanism for a spinning machine having a pair of bottom rollers and a cooperating pair of top rollers having a shaft, means for loading said top rollers against said bottom rollers, comprising a common carrier member, a support having a top plate, spaced side walls and a lower arm-supporting portion, means for mounting said support by its top plate on said common carrier, a guide arm bearing roller shaft and having a portion received between said side at one end on said top roller of said support with play between said side walls and said arm portion, means supporting the opposite end of said guide arm on said lower arm-supporting portion of said support for pivotal movement about said supporting means and for lateral movement of said guide arm, an eccentric member disposed on a portion of said arm intermediate its ends and between said side walls of said support, a spring-receiving member on said top plate on said support, a helical compression spring received between said guide arm and said spring receiving member, said spring being received snugly between said side walls and having a diameter greater than the width of said arm portion received between said side walls, whereby lateral movement of said spring is restricted by the side walls of said support, said spring receiving member on said top plate of said support having a circular aperture coaxial with said spring, said eccentric member comprising a portion extending along the longitudinal axis of said helical spring between said guide arm and said top plate of said support, an integral projecting portion turnably engaged in said circular aperture in said top plate and an eccentric portion rotatably engaged with said guide arm, said eccentric portion being eccentric with respect to the longitudinal axis of said helical spring and being provided at one end with turning means accessible from one end of said eccentric member, whereby said eccentric member is turned by means of said turning means to adjust the position of said guide arm and compensate for nonparallelism of said top rollers.

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