United States Patent

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[33] Switzerland
[31] 7682/68

[54] **TWISTING MACHINE**
14 Claims, 6 Drawing Figs.

[52] U.S. Cl. 57/1, 57/136, 248/22
[51] Int. Cl. D01h 1/14, D01h 7/10
[50] Field of Search 57/1, 34, 36, 75, 76, 88, 99, 104, 105, 135, 136; 248/20, 22

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ABSTRACT: The spindles of the twisting machine are mounted on spindle rails which are directly or indirectly mounted on the machine frame by omnidirectally acting damping members such as rubber pads. In addition, a cover can be disposed about the spindle rails and spindle drives to damp noise. Finally, a damping element can be secured about the spindle rail to damp noise.

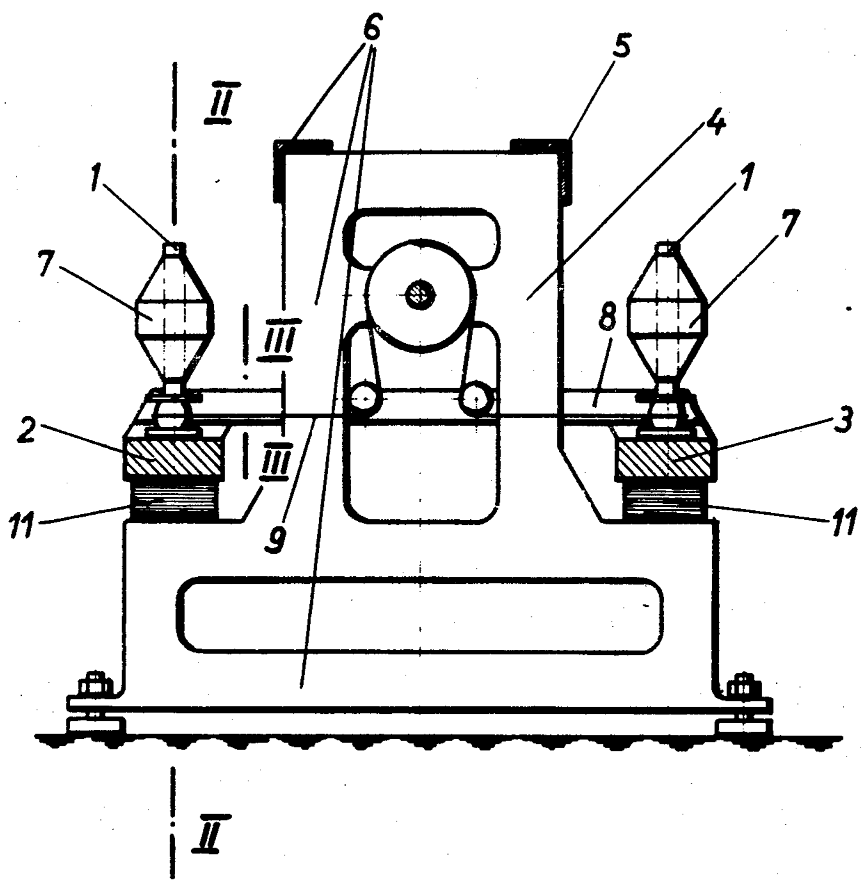

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Fig. 1

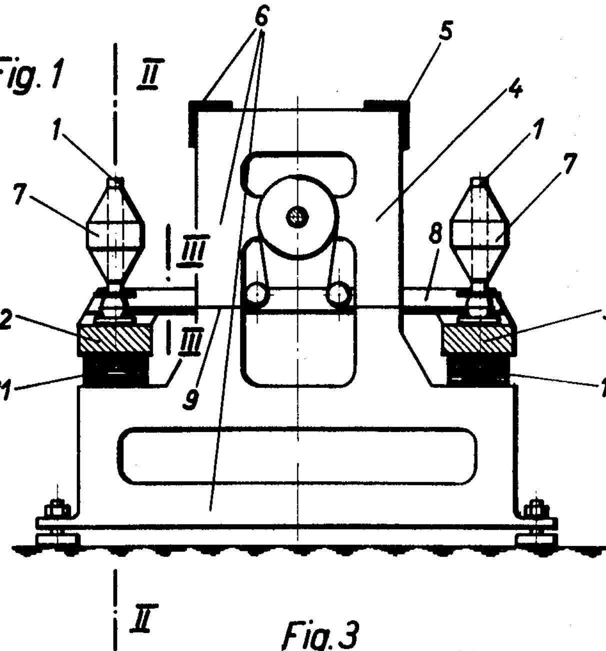

Fig. 3

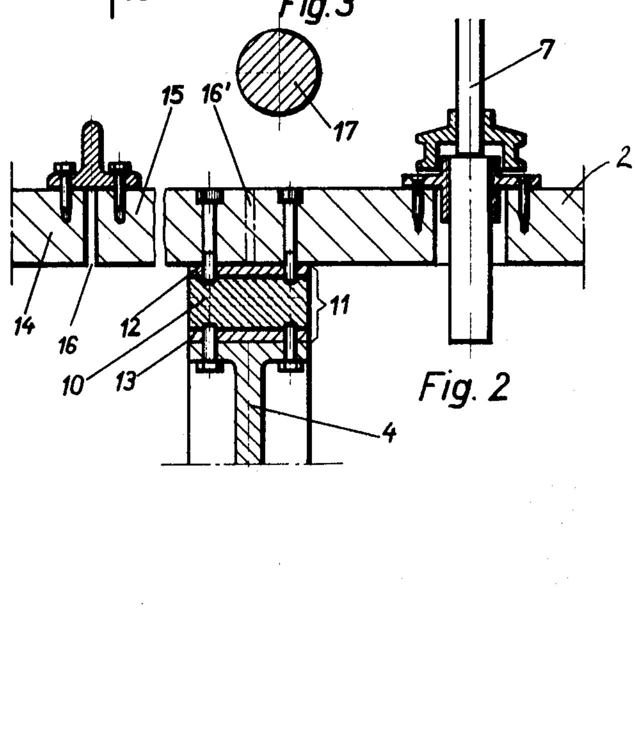

Fig. 2

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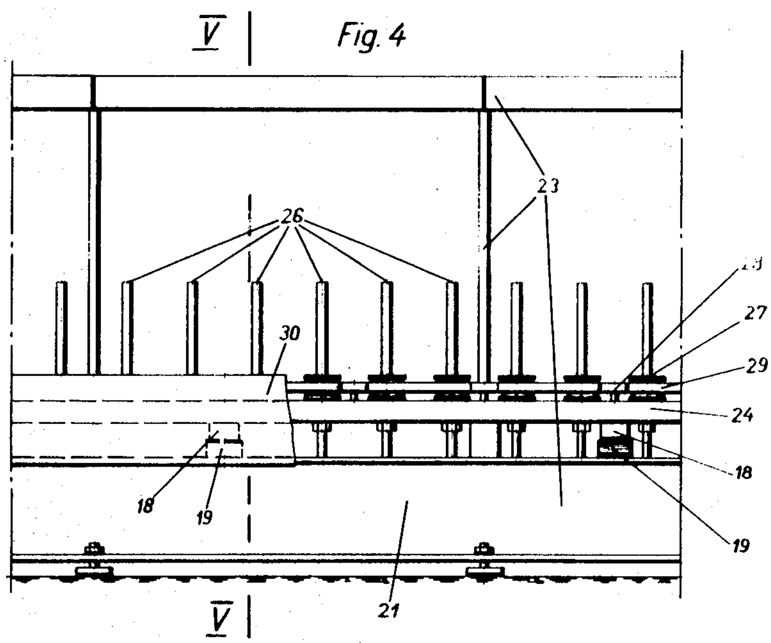

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Fig. 5

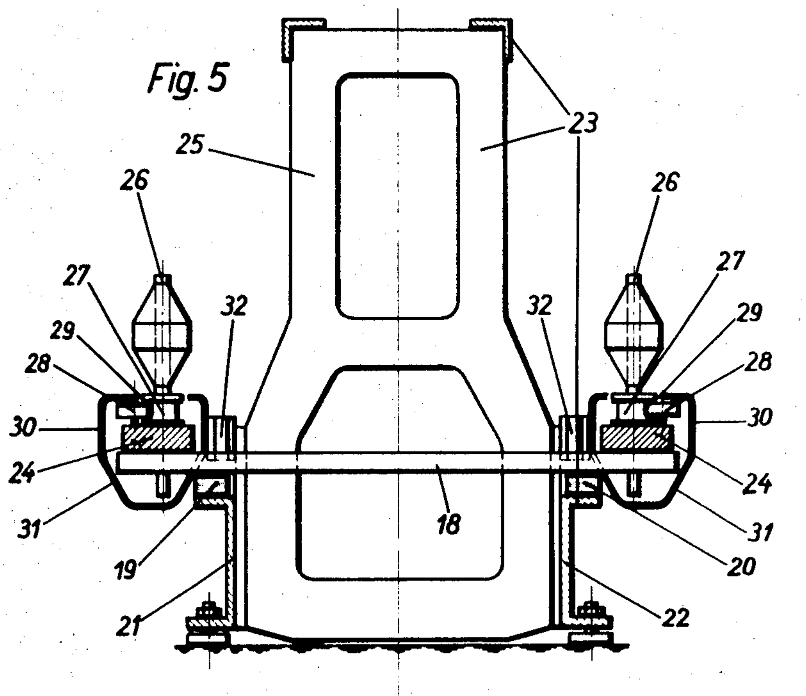
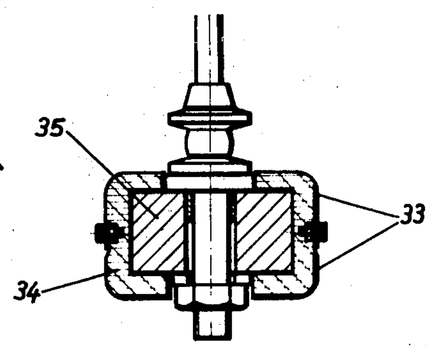


Fig. 6



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TWISTING MACHINE

This invention relates to twisting machines and more particularly to twisting machines on which a thread is wound or unwound from a bobbin.

Heretofore, various twisting machines have been in use for imparting a twist into a thread. However, these machines have had the disadvantage of emitting a large degree of noise due to vibration during operation. For example, in some instances, spindle rails on which a number of rotatable spindles are mounted have been rigidly mounted on the machine frame. In this arrangement, the spindles have produced vibrations which have been transmitted to the machine frame and have been partially emitted as noise by the whole vibrating system formed by the spindle rail and the remainder of the machine. In addition to the undesireable noise generation, this arrangement also has presented the considerable disadvantage that all the elements not mounted rigidly to the machine frame have been excited at the vibration frequency and constantly bump onto the frame to cause a disturbing noise. In other machines, two spindle rails have been mutually connected by connecting crossmembers and have been traversed up and down relative to the machine frame in vertical guides. In this arrangement, no rigid connection has been provided in the vertical direction between the spindle rails and the machine frame; however, the spindle rails have remained in close contact with the vertical guides of the machine frame in the horizontal direction so that the vibrations of the spindle rails, as far as they have not been vertical, have been transmitted to the machine frame. Furthermore, isolation of the machine frame from the floor to which it has been fastened by the use of vibration-dampening means has been known. In this latter arrangement, while the transmission of vibrations to the floor has been reduced, the machine itself still has vibrated and has emitted these vibrations as noise in the audible spectrum.

Also, it has been known to dampen the connection between the spindles and the spindle rails to achieve a reduction of the intensity of the vibrations transmitted to the spindle rail; however, insufficiently dampened vibrations have still been transmitted to the spindle rails and from there to the machine frame which presents large noise emission surfaces.

Accordingly, it is an object of the invention to reduce machine vibrations in order to avoid mechanical damage.

It is another object of the invention to reduce noise emission by twisting machines.

It is another object of the invention to reduce the number of noise emitting vibrating surfaces in the twisting machines.

It is another object of the invention to isolate the neighborhood of a spindle rail from vibration noise.

It is another object of the invention to suppress rocking or torsion movements around the length axis of a spindle rail caused by the forces exerted by the spindles without using rigid connections.

Briefly, the invention provides a twisting machine having a machine frame with longitudinally extending stationary spindle rails to each side of the frame, each of which supports a plurality of spindles. In addition, the spindle rails are connected together with a plurality of rigid connecting cross members to form a rigid frame and the resulting rigid frame is connected to the machine frame by means of omnidirectionally acting dampening members. These dampening members, such as resilient blocks, are preferably mounted between the spindle rail frame and the machine frame at the greatest distance possible from the central axis of the machine frame.

In other embodiments, the spindle rails are surrounded by a noise abating cover in order to further reduce the noise generated by the machine. For example, in one embodiment, the noise-abating cover is connected by means of a rigid connecting piece to the machine frame and encloses at least a part of the drive elements for the spindles which may also vibrate with the spindles. In another embodiment, the noise-abating cover is connected by means of a dampening member to the machine frame. In still another embodiment, the noise-abating cover is connected directly to the spindle rails by means of a dampening member.

These and other objects and advantages of the invention will become more apparent from the following detailed description and appended claims taken in conjunction with the accompanying drawings in which:

FIG. 1 illustrates a cross-sectional view of a twisting machine according to the invention;

FIG. 2 illustrates a view taken on line II—II of FIG. 1;

FIG. 3 illustrates a view taken on line III—III of FIG. 1 of a crossmember;

FIG. 4 illustrates a side view of a modified twisting machine according to the invention;

FIG. 5 illustrates a view taken on line V—V of FIG. 4; and

FIG. 6 illustrates a cross-sectional view of a modified noise-abating cover about a spindle rail according to the invention.

Referring to FIG. 1, the twisting machine has a rigid frame **6** which is secured as by bolts to a floor and which is constructed of a plurality of spaced upstanding supports **4** connected together by longitudinally extending elements **5**. In addition, a spindle rail **2**, **3** is disposed on each side of the machine frame **6** and supports a plurality of longitudinally disposed spindles **1** thereon, as is known, for example, by a rigid or flexible mounting. The spindles **1** in turn carry rotatable bobbins **7** thereon for winding and unwinding of thread thereon as is known. The spindle rails **2**, **3** are further rigidly connected together at uniform intervals by rigid crossmembers **8** to form a rigid ladderlike frame in order to suppress the forces generated by the rotating bobbins **7** which forces cause strong vibrations including longitudinal and torsional vibrations.

In order to rotate the spindles **1**, a spindle drive of known construction is mounted on the frame **6** and includes a tape **9** which passes around the spindles **1** to impart a rotating force thereto. The momentum which acts on the spindle rails **2**, **3** due to the forces generated by the tape **9** are also taken up by the ladderlike frame of spindle rails **2**, **3** and crossmembers **8**.

Referring to FIGS. 1 and 2, the ladderlike frame of spindle rails **2**, **3** and crossmembers **8** is mounted on the machine frame **6** by omnidirectionally acting dampening members **11**, for example, resilient blocks made up of layers of rubber pads **10**. Each dampening member **11** includes an upper metal plate **12** and a lower metal plate **13** which are vulcanized to the rubber pads **10** sandwiched therebetween and which serve to secure the members **11** to the spindle rails and machine frame supports **4**. As shown, the upper metal plate **12** is secured as by screws to a spindle rail **2** while the lower metal plate **13** is secured as by screws to a support **4**.

Referring to FIG. 2, if sufficiently rigid, the upper metal plate **12** can be used as a connecting piece to connect two adjacent sections **14**, **15** of a spindle rail together at a junction point **16** with suitable screws. In this case, the dampening member **11** is positioned so that the junction point **16** is disposed in the middle plane of the dampening member **11** (as indicated in dash-dot lines).

Referring to FIG. 1, the spindles **2**, **3** are positioned so that the distance between the spindle rails **2**, **3** corresponds to about the width of the machine frame **6** with the result that a desirably large distance is achieved between opposite supporting points of the ladderlike frame on the resilient blocks **11** about the vertical plane defined by the central longitudinal axis of the machine frame. Consequently, notwithstanding the elasticity of the silent blocks **11**, the horizontal position of the ladderlike frame is sufficiently maintained even under the influence of the momentums originating from the spindles **4**.

The dampening members **11** are sized to be, for example, 5 cm. by 8 cm. with a 4 cm. thickness or height, and have a Shore hardness of, for example, 45 degrees. The spindle rails **2**, **3** are of rectangular cross section so as to present an ideal spindle rail design in which a mass as large as possible presents an emitting surface as small as possible, and in which a sufficiently high momentum of resistance is reached so that the amplitudes of the vibrations caused by the spindle forces can be kept as small as possible. The cross section of the crossmembers **8** can also be chosen in a similar manner. For example, as shown in FIG. 3, a crossmember can be formed with a circular cross section in the zone between the spindle rails.

This is advantageous insofar as a circular cross section of the crossmember results in a minimum noise emission.

Referring to FIGS. 4 and 5, instead of supporting the spindle rails 24 directly by means of resilient block dampening member 19, 20 as shown in FIG. 1, the crossmembers 18 of the ladderlike frame are mounted as by screws via the silent blocks 19, 20 directly onto longitudinal members 21, 22 which form part of a machine frame 23. The dimensions to be chosen of the silent blocks 19, 20 arranged between spindle rails 24 and machine frame 23 largely depend on the conditions between the diaphragms 25 of the draw-twisting machine shown as an example.

Referring to FIG. 4, with six spindles 26 mounted on each section of spindle rail 24, the weight of the elements supported (i.e. the ladderlike frame including the weight of spindles 26 and bobbins) amounts to 80 kg. per dampening member 19. Further, for a dampening member 19 of dimensions of 5 cm. by 8 cm. by 4 cm. and a Shore hardness of 45 degrees, as above, measurements which have been carried out have shown that the vibration forces acting on the machine frame at a spindle speed of approximately 10,000 r.p.m. are reduced to about 2 percent of the forces which would act if the spindle rails were otherwise rigidly connected to the machine frame.

Further, where the spindles are driven by a tangential belt 29 pressed against the spindle whorls 27 by tension rolls 28, the drive elements either vibrate due to direct influence of the spindles 26 or of the vibrating spindle rails 24, or cause vibrations themselves and thus emit noise. In order to isolate this noise source from the surrounding room a noise-abating cover 30 is connected by means of a support member 32 which can be designed as a rigid member or as a dampening member (FIG. 5) with the machine frame 23, which practically no longer vibrates, and is arranged around a spindle rail 24 and along at least the length of the belt 29. The inside of the cover 30 can be provided with a noise-abating or antivibration lining 31 in order to damp out the noise therein.

Referring finally to FIG. 6, noise emission by a spindle rail 35 can be further reduced by attaching a cover 33 formed of two parts which are screwed together directly to the spindle rail 35 via a dampening element 34. The dampening element 34 which can be a dampening substance, such as polyurethane foam, is cast into the cover 33 to fill the space between the spindle rails 35 and cover 33 in order to avoid the formation of an echo chamber within the cover 33. Experiments have shown a reduction of about 6 decibels of the noise emission level with the use of this cover 33 and dampening element 34.

It is noted that the invention relates to any twisting machine for textile threads and includes all machines on which a thread is taken up by, or taken off from, a bobbin placed on a spindle and twist is imparted. In particular, the twisting machines included are ring-twisting, draw-twisting, ring-spinning, as well as uptwisting machines and twisters arranged in tiers, all containing spindles arranged on a spindle rail mounted along the machine.

What is claimed is:

1. In combination with a twisting machine having a machine frame, a rigid frame including longitudinally extending stationary spindle rails to each side of said machine frame for supporting a plurality of spindles and a plurality of crossmembers rigidly connected to and across said spindle rails, and a plurality of omnidirectionally acting dampening members supporting said rigid frame on said machine frame.

2. The combination as set forth in claim 1 wherein said dampening members are each mounted on said machine frame at the greatest distance possible from the central longitudinal axis of said machine frame.

3. The combination as set forth in claim 1 wherein said dampening members are mounted directly below said spindle rails.

4. The combination as set forth in claim 1 wherein said dampening members are disposed between said crossmembers and said machine frame.

5. The combination as set forth in claim 1 wherein said dampening members are disposed between said spindle rails and said machine frame.

6. The combination as set forth in claim 1 wherein each said crossmember has a circular cross section over a substantial length thereof.

7. The combination as set forth in claim 1 wherein said dampening members are resilient blocks.

8. The combination as set forth in claim 1 which further includes at least one noise-abating cover about each said spindle rail.

9. The combination as set forth in claim 8 which further includes a rigid connecting piece rigidly securing said cover to said machine frame.

10. The combination as set forth in claim 8 which further includes a dampening element securing said cover to said spindle rail.

11. The combination as set forth in claim 10 wherein said dampening element fills the space between said cover and said spindle rail.

12. The combination as set forth in claim 10 wherein said dampening element is a noise-abating substance cast between said cover and said spindle rail.

13. The combination as set forth in claim 8 which further includes a dampening member connecting said cover to said machine frame.

14. The combination as set forth in claim 8 which further includes a drive having drive elements including a tangential belt pressed against said spindles for driving the spindles on said spindle rails, wherein said cover encloses at least part of said tangential belt.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,604,191 Dated September 14, 1971

Inventor(s) Rudolf Jaeggli

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, lines 6 and 9, change "silient" to

--resilient--

Signed and sealed this 11th day of April 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents