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Lukoshnikov

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[54] **HORIZONTAL COORDINATE BORING MACHINE**

[76] Inventor: **Valentin Mikhailovich Lukoshnikov,** ulitsa Antonova-Ovseenko, 97, kv. 63, Kuibyshev, U.S.S.R.

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[52] **U.S. Cl.** ..... **408/234,** 82/32, 90/11 R, 308/3 A, 308/6 R, 248/23

[51] **Int. Cl.** **B23b 47/00**

[58] **Field of Search** ..... 408/234; 90/11 R, 90/34, 15, DIG. 28; 82/21 R, 32; 248/23; 308/3 R, 3 A, 6 R

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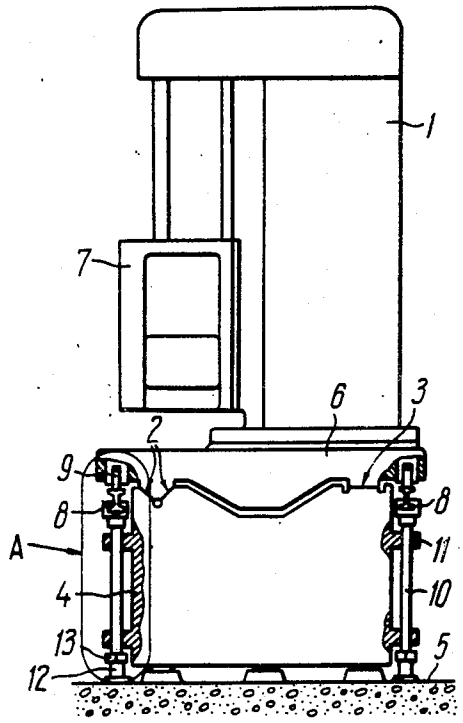
Primary Examiner—Gil Weidenfeld

Attorney—Waters, Roditi, Schwartz & Nissen

[57] **ABSTRACT**

A horizontal coordinate-boring machine with a longitudinally traversing column in which the horizontal guides of the bed rest on the foundation at three points and are relieved from the weight of the carriage with the column and the head stock mounted in these guides. The relief is provided by means of supports disposed along the guides on either side thereof, and taking up the relief forces as a result of elastic contact between the supports and rolling bodies built into the carriage. The supports are separated from the bed and are mounted directly on the foundation.

6 Claims, 3 Drawing Figures



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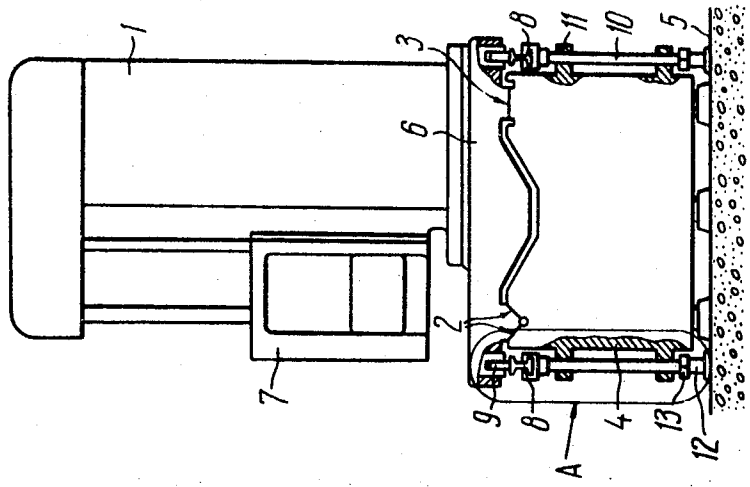


FIG. 2

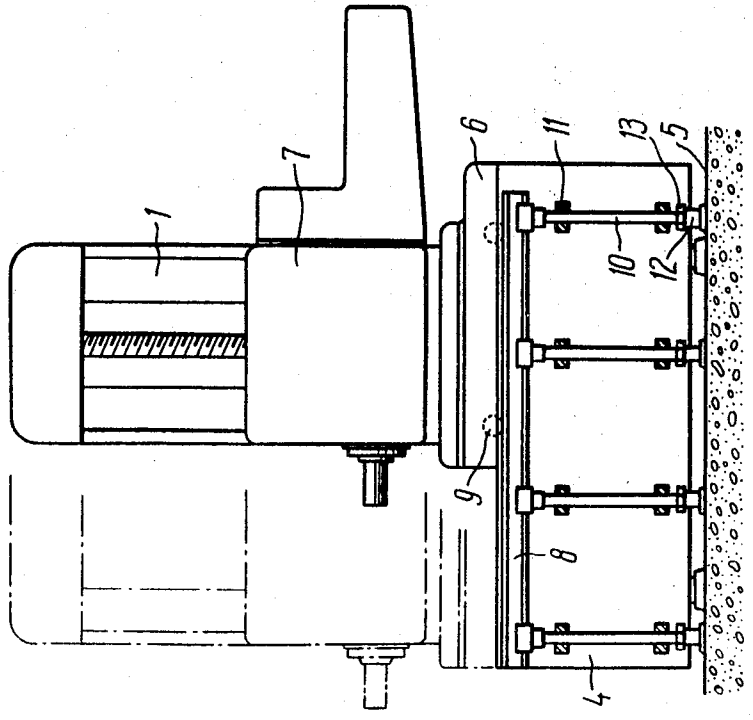


FIG. 1

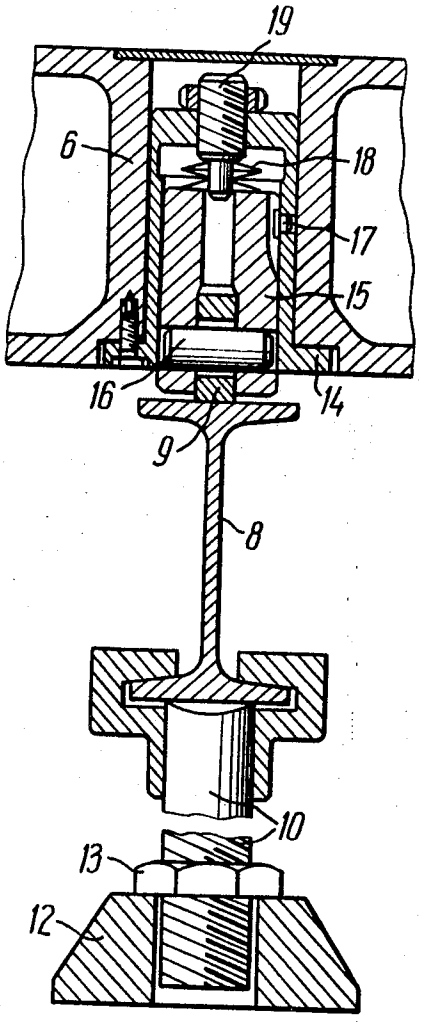


FIG. 3

HORIZONTAL COORDINATE BORING MACHINE

The invention relates to metal cutting machines, and more specifically to horizontal coordinate-boring machines with a longitudinally traversing column.

The present invention can also be used in coordinate measuring machines based on horizontal coordinate-boring machines.

Widely known in the art are horizontal coordinate-boring machines, wherein the horizontal guides of the bed resting on the foundation at three points are relieved from the weight of the carriage with the column and the mandrel stock mounted in these guides, by means of supports disposed along the guides on either side thereof, and taking up the relief force as a result of elastic contact between the supports and rolling bodies built into said carriage.

In these conventional machines the supports taking up the relief forces are located directly on the bed. In the course of movement of the carriage with the column and the mandrel stock in the horizontal guides of the bed, there occurs elastic contact of the rolling bodies secured in the carriage, with the supports. This realizes the relief of the guides, the value of which equals the force of elastic contact between the rolling bodies and the supports. As a consequence, the specific pressure in the bed guides is reduced at the places of their contact with the carriage, and sliding friction in the guides is partially replaced by rolling friction on the supports. The relief forces taken up by the supports located on the bed, deform the latter in a vertical plane, and hence, deform the horizontal guides, which distorts their linearity. The value of this deformation is a variable depending on the position of said carriage in the guides with respect to the points of support of the bed on the foundation.

These circumstances have a most adverse effect on the job accuracy, the error of machining being in direct relationship with the deformation value of the bed guides.

An object of the present invention is to eliminate the indicated disadvantage.

Another object of the present invention is to provide a horizontal coordinate-boring machine with a longitudinally traversing column, and with such a disposition of the supports relieving the horizontal guides, that provide a higher degree of linearity of these guides in the vertical plane, in the course of movement of the carriage, as compared to the conventional machines of similar type.

In accordance with the above and other objects, in a machine, wherein the horizontal guides of the bed resting on the foundation at three points are relieved from the weight of the carriage with the column and the mandrel stock mounted in these guides, by means of supports disposed along the guides on either side thereof, and taking up the relief forces as a result of elastic contact between the supports and rolling bodies built into this carriage, according to the invention, said supports are separated from the bed, and mounted on the foundation.

Due to such disposition of the supports taking up the relief forces, a high degree of linearity of the horizontal guides in the vertical plane is secured in the proposed machine in the course of the carriage traverse.

The present invention will be better understood from the following explanation given with reference to the appended drawings, wherein:

FIG. 1 is a front elevation view of a horizontal coordinate-boring machine with a longitudinally traversing column according to the invention;

FIG. 2 is a side view, partially in section, of the machine; and

FIG. 3 is an enlarged sectional view of joint A of FIG. 2.

Disclosed herein is a horizontal coordinate-boring machine with a longitudinally traversing column **1** (FIGS. **1** and **2**) carrying a headstock **7**. Horizontal guides **2** and **3** (FIG. **2**) of a bed **4** rest on a base or foundation **5** at three points, and the guides and bed are relieved from the weight of a slide or carriage **6** carrying column **1** and headstock **7** mounted in these guides. The relief is provided by means of supports **8** disposed along said guides on either side thereof, and resisting up the relief forces due to elastic contact between the supports **8** and rolling bodies **9** secured in carriage **6**.

According to the invention, supports **8** are separated from bed **4** and are mounted directly on foundation **5**. With such a disposition of supports **8**, the forces relieved thereby are transmitted to foundation **5** bypassing the bed. Thus bed **4** is not subject to vertical deformation by the relief forces, and hence, a high degree of linearity of the horizontal guides **2** and **3** is secured. This, in turn, ensures high accuracy of job working.

In the present exemplary embodiment of the invention supports **8** consist of rails placed on vertical bars **10**, which freely pass through ears **11** of bed **4**, and rest on foundation **5** through shoes **12** (FIGS. **1**, **2**, **3**). These bars are adjusted for height by means of nuts **13**.

Rolling bodies **9** (FIG. **3**) are made in the form of rollers, and are built into carriage **6** as follows.

Secured in carriage **6** are cups **14**, each of which houses a plunger **15** spring-loaded at one end, and carrying at its other end a pin **16** on which is freely seated the rolling body **9**. The plunger **15** is prevented from turning by a key **17**, so that pin **16** will be disposed perpendicular to the direction of movement of carriage **6**.

The spring-loading of plunger **15** is reailized by means of a pack of disk springs **18** subjected to an adjustable compression by a screw **19**. This regulation is necessary to provide the specified force of elastic contact of each roller with the support, the value of this force equaling the relief force of the horizontal guides.

Thus, by means of screws **19** acting on the packs of disk springs **18**, a definite relief force of the guides is set for each type-and-size of machine.

Elastic contact between the rollers and supports can be alternatively provided by employing pneumatic or hydraulic cylinders.

Since the operation of the proposed machine is known to those familiarized with the art, its description is herein omitted.

Owing to the above-described disposition of supports **8** in the proposed machine, in the course of the traverse of carriage **6** with column **1** and the mandrel stock **7** along guides **2** and **3** the relief force provided by the elastic contact of the rollers with supports **8** is transmitted to the foundation bypassing the bed.

What I claim is:

1. A horizontal boring machine comprising a bed provided with horizontal guides and resting upon a base at three points, a slide mounted on said bed for sliding movement in said guides a column and a headstock attached to said slide for movement therewith, means for relieving said guides and said bed of at least a part of

the combined weight of said slide, column and headstock, said means comprising supporting means located on said base along said guides and separate from said bed; roller means carried by said slide and in bearing engagement with said supporting means for rolling movement therealong; and resilient means located between said slide and said roller means for urging said roller means against said supporting means.

2. A horizontal boring machine as claimed in claim 1 wherein said resilient means comprises a cup mounted on said slide; a stack of disk springs housed within said cup; and means supporting said roller means and subjected to the action of said stack of disk springs.

3. A horizontal boring machine as claimed in claim 2 wherein said resilient means further comprises an adjusting screw threaded into said cup and bearing against said stack of disk springs, said screw being rotatably adjustable in said cup to adjust the force of said stack of springs.

4. A horizontal boring machine as claimed in claim 3 wherein said means supporting the roller means comprises a plunger disposed within said cup and supporting said roller means, said stack of disk springs bearing against said plunger.

5. A horizontal boring machine as claimed in claim 1 wherein said supporting means comprises rails, vertically adjustable bars supporting said rails, and shoes placed on said base and supporting said bars.

6. A horizontal boring machine as claimed in claim 1 wherein said roller means comprises a freely rotatable axle carried by said slide, and a rolling body freely mounted on said axle and in contact with the supporting means.

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