

April 22, 1941.

K. JUNG

2,239,103

HEADSTOCK FOR MACHINE TOOLS, PARTICULARLY GRINDING MACHINES

Filed June 23, 1933

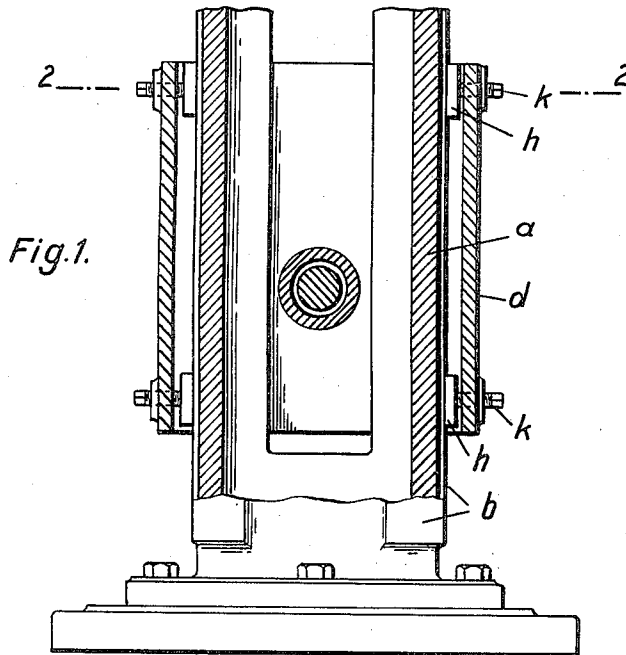


Fig. 1.

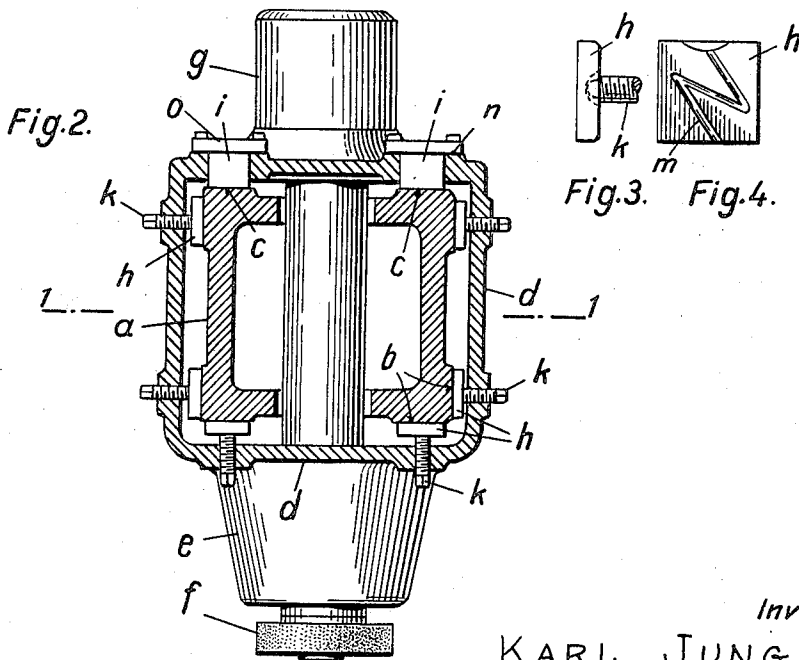


Fig. 2.

Fig. 3. Fig. 4.

Inventor:

KARL JUNG

By *Young, Emery & Thompson*
ATTYS.

UNITED STATES PATENT OFFICE

2,239,103

HEADSTOCK FOR MACHINE TOOLS, PARTICULARLY GRINDING MACHINES

Karl Jung, Berlin, Germany

Application June 28, 1938, Serial No. 216,379
In Germany November 15, 1937

5 Claims. (Cl. 51-166)

It is known in the case of machine tools and in particular surface grinding machines, to carry the spindle of the tool in a headstock which embraces in box form a guide column. In order to be able to adapt such a box-shaped headstock to the columns ready finished, it has been usual to make the headstock in two parts, i. e. of one part of U-shaped cross-section which embraced three sides of the column, and a cover which rested on the fourth rear surface and on which the driving motor was mounted. This construction necessitated a considerable amount of fitting and furthermore, the production of the headstock in two parts presented no sufficient rigidity, which is of particular importance with machines working very accurately.

Headstocks of this nature are already known which consist of one piece. These headstocks are made as hollow columns and they are fitted over the guide columns. To move the headstock with respect to the column, there have been used in these cases ball bearings the outer annular surfaces of which slid along on guide surfaces provided on the guide column. These ball bearings present no complete assurance of an exact guidance of the headstock, since the latter can take up an inclined adjusting position on account of inaccurate adjustment of the ball bearings or on account of the ball bearing rings yielding flexibly, so that there is no rigid and firm adjustment.

The present invention obviates this disadvantage and provides a guide which at all times and even if an adjustment has taken place, permits an exact movement in the desired plane. To this end, there are provided on one outer side of the headstock and if necessary also on a further side at right angles thereto relative surfaces located parallel to the movement of the headstock and which are exactly adjusted with respect to the spindle axis and on which rest guide elements projecting into the interior of the headstock and coming into engagement with corresponding guides on the guide column, so that the adjusting plane of the headstock is exactly and firmly fixed.

The accompanying drawing shows an example of carrying out the invention, in which

Figure 1 shows a section through the guide column with the headstock on the line 1-1 of Figure 2;

Figure 2 is a cross-section through Figure 1 on the line 2-2;

Figure 3 shows in detail on a larger scale a slide block in side view; and

Figure 4 shows a plan view of a slide block.

On the drawing *a* is the vertical guide column for the headstock of a surface grinding machine. On this guide column are provided guide surfaces machined on the four corners and extending in strip form from the top to the bottom, which guide surfaces are indicated by the reference letter *b*, with the exception of the two surfaces at the back of the column which are indicated by the reference letter *c*. These latter surfaces are exactly perpendicular to the grinding spindle axis and exactly parallel to the direction of movement of the work table. The actual headstock which consists of a closed hollow four-cornered body *d* is fitted round the column. This body has on the front the bearing *e* for the grinding spindle *f* and on the back the driving motor *g* for the grinding spindle. Slide blocks *h* and *i* serve for guiding the headstock. The slide blocks *h* are provided on the front and on the two side surfaces, their shape is shown on an enlarged scale in Figure 3. They are simple guide plates which are held against the guide surfaces *b* by means of screws *k*, which are screwed through the headstock.

For the arrangement of the slide block *i*, the headstock is provided on the outside with exact control surfaces *n* preferably located in the same plane; and from which the whole machining of the headstock takes place, and which after the mounting of the headstock in the machine lie exactly parallel to the surfaces *c*, that is, exactly perpendicularly to the grinding spindle axis and parallel to the direction of movement of the headstock. The slide blocks *i* are provided with a widened head *o* and are inserted from the outside through holes in the headstock. The inner surfaces of the head here bear against the control surfaces *n* whilst the end surfaces projecting inwardly of the blocks bear against the sliding surfaces *c*. The fixing of the blocks *i* on the headstock can take place in any desired manner, e. g., by screws or the like.

The sliding blocks *h* and *i* are provided in at least two rows over each other in order to ensure correct guiding.

The blocks *h* are freely movable on the screws *k* and the slide blocks of the upper group have a Z-shaped lubricating groove *m*, which is open at the top and bottom. Owing to the shape of these grooves, the oil intended for the upper slide blocks is kept therein and only the superfluous oil flows down to the lower slide blocks.

The slide blocks *i* are not tightened but form the permanent support of the headstock on the

slide surfaces *c*, so that as these slide surfaces and the thickness of the slide blocks are exactly produced from the outset, the guiding of the headstock always remains unaltered even when in consequence of wear or the like an adjustment of the other slide blocks *h* takes place by means of the screws *k*.

In the example of construction, the guide column is shown four-cornered, but naturally any other desired cross-sectional form may be chosen, e. g., a round, elliptical or polygonal one, and in the same way the sliding blocks if desired can be arranged superposed in more than two rows.

It is important for the invention that on the one guide surface determining the exact position of the spindle, there is ensured an exact and immovable guide. In the embodiment shown, this takes place owing to the slide blocks *i*, but naturally the guide surfaces may be provided conversely on this side on the headstock, and the slide blocks on the column or headstock and guide column be provided with exact guide parts sliding on each other, which consists with the headstock or the guide column in one piece, or instead of the slide blocks *i* there may be arranged other immovable guide means ensuring an exact position. On the other side, naturally instead of the slide blocks *h* there may be used other suitable adjustable guides.

In certain cases, it may also be advisable to provide not only on one side of the headstock but also on two side surfaces perpendicular to each other of the headstock, control surfaces and to use fixed slide blocks *i*.

I claim:

1. In a machine tool, particularly a grinding machine, in combination, a headstock comprising a homogeneous hollow body, a spindle journaled in said headstock, a guide column embraced by said headstock, control surfaces provided on an outer side of the headstock located parallel to the movement of the headstock and arranged exactly with respect to the spindle axis, and guide elements bearing against said surfaces, said guide elements projecting into the interior of the headstock and engage said guide column.

2. In a machine tool, particularly a grinding machine, in combination, a headstock comprising a homogeneous hollow body, a spindle journaled

in said headstock, a guide column embraced by said headstock, control surfaces provided on an outer side of the headstock located parallel to the movement of the headstock and arranged exactly with respect to the spindle axis, guiding surfaces provided on said guide column and guide elements bearing against said control surfaces, said guide elements projecting into the interior of the headstock and engaging said guiding surfaces.

3. In a machine tool, particularly a grinding machine, in combination, a headstock comprising a homogeneous hollow body, a spindle journaled in said headstock, a guide column embraced by said headstock, control surfaces provided on an outer side of the headstock located parallel to the movement of the headstock and arranged exactly with respect to the spindle axis, guiding surfaces provided on said guide column, and slide blocks provided with a head, said slide blocks bearing with their end surfaces on the said guiding surfaces of the column and with the inner surfaces of their head against the control surfaces, and the slide blocks being inserted through openings in the headstock.

4. In a machine tool, particularly a grinding machine, in combination, a headstock comprising a homogeneous hollow body, a spindle journaled in said headstock, a guide column embraced by said headstock, control surfaces provided on an outer side of the headstock located parallel to the movement of the headstock and arranged exactly with respect to the spindle axis, and slide blocks provided in the headstock and projecting entirely through a side wall of the headstock from the outside into the interior thereof, each block bearing against a control surface and also engages the guide column.

5. In a machine tool, particularly a grinding machine, in combination, a headstock, a guide column embraced by said headstock, said headstock having control surfaces provided on an outer side of the headstock, and guide elements provided in said headstock from the outside into the interior thereof and bearing against said control surfaces, said guide elements also engaging said guide column.

KARL JUNG.