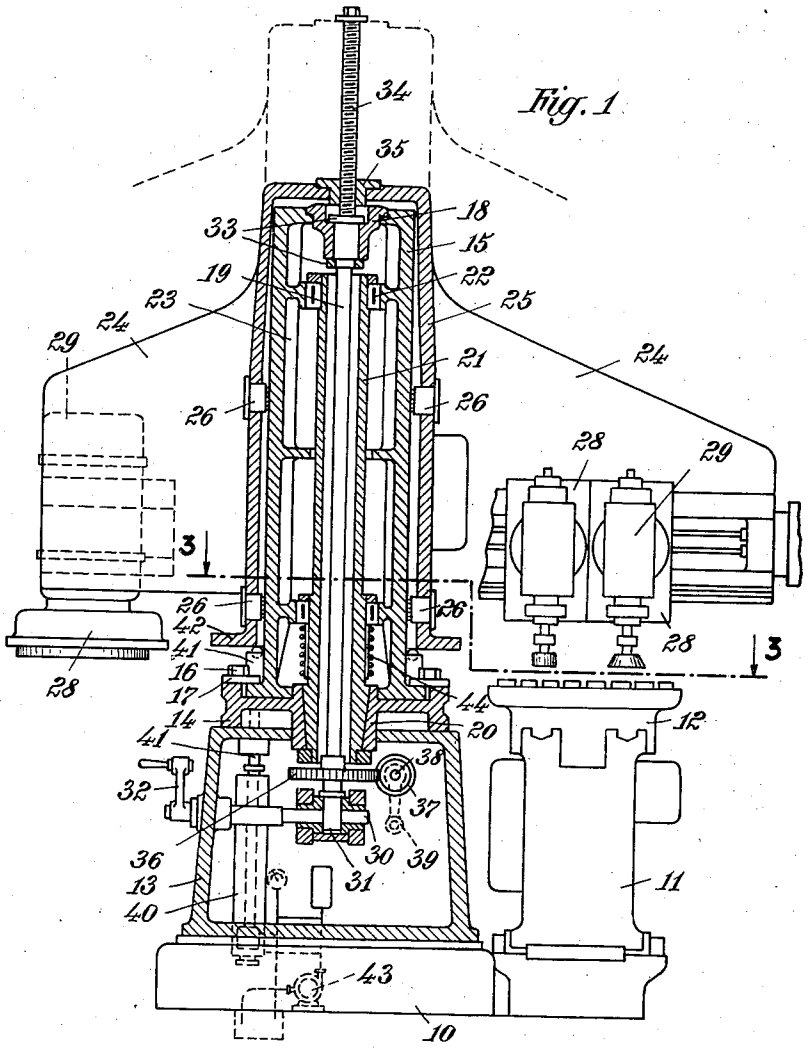
Oct. 21, 1941. M. AHNERT 2,259,870

MACHINE TOOL

Filed July 29, 1940 2 Sheets-Sheet 1

Fig. 1



Inventor

Max Ahnert,

Bailey & Harrison

Attorneys

Oct. 21, 1941. M. AHNERT 2,259,870

MACHINE TOOL

Filed July 29, 1940 2 Sheets-Sheet 2

Fig. 2

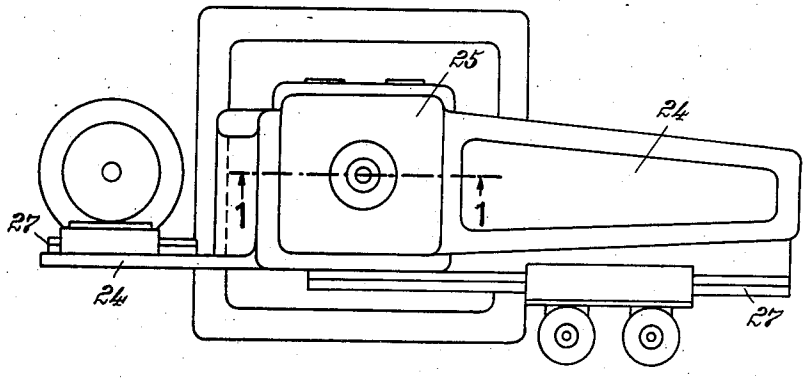
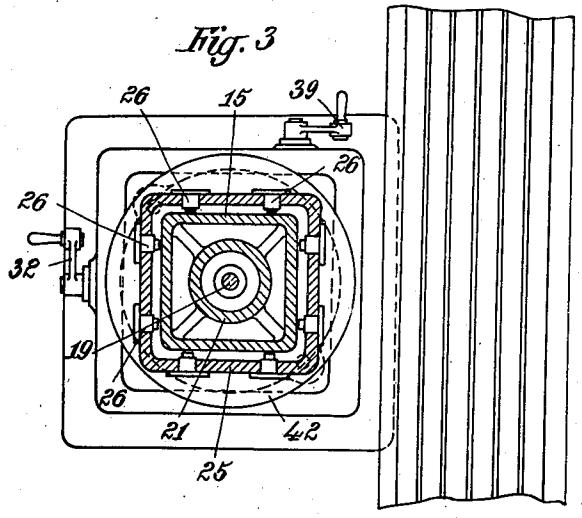


Fig. 3



Inventor
Max Ahnert,

Bailey & Harrison
Attorneys

Patented Oct. 21, 1941

2,259,870

UNITED STATES PATENT OFFICE

2,259,870

MACHINE TOOL

Max Ahnert, Aschersleben, Germany, assignor to Billeter & Klunz, Werkzeugmaschinenfabrik & Eisengiesserei, Aschersleben, Germany

Application July 29, 1940, Serial No. 348,229
In Germany May 25, 1939

5 Claims. (Cl. 51—166)

My invention relates to a machine tool, more particularly, to a machine of the type in which a column mounted on the frame of the machine forms a guide for a vertically adjustable cantilever support on which one or more grinding tools are mounted for cooperation with the work piece carried by a reciprocatory table. Machines of this kind are particularly adapted to accurately finish the guiding faces of frames and tables of tool machines or other machines. A machine of this kind is disclosed, for instance, in the German Patent No. 355,707.

In normal operating condition of the machine the column is firmly clamped to its seat. If it is desired to adjust the column in order to swing the cantilever tool support to a different angular position, the clamping means are released and the column is then lifted from its seat.

It is the object of my invention to provide simple means serving the dual purpose of lifting the column for this purpose and of raising or lowering the cantilever tool support slidable on the column.

Further objects are to provide improved means for rotatably mounting the column on the frame which will result in a very rigid and compact structure affording great accuracy in operation; to provide means eliminating back-lash in the means for lifting and lowering the cantilever support and to so redesign and combine the various elements of the machine that they can be readily assembled and disassembled and can be manufactured at a low price.

A preferred embodiment of my invention is illustrated in the accompanying drawings in which

Fig. 1 is an elevation partly in section along line 1—1 of Fig. 2;

Fig. 2 is a plan view of the machine in which the reciprocatory table and the bed thereof is omitted; and

Fig. 3 is the section taken along the broken line 3—3 of Fig. 1.

The frame of the machine comprises a base plate 10, a bed 11 mounted thereon for a reciprocatory table 12 and a casing 13 mounted on the base plate 10 adjacent to the bed 11 and accommodating a plate 14 constituting a seat for a column 15. The plate 14 is rigidly attached to the casing 13 and thus forms part of the frame structure. It is provided with tapped bores accommodating screws 16 whereby clamping plates 17 may be pressed upon a flange of the column 15 to firmly clamp the same against the seating member 14.

The column 15 is formed by a hollow casting having a polygonal, preferably a square cross-section. In its top wall a bearing 18 is inserted and suitably fixed in position. In this bearing a shaft 19 is journalled which extends downwardly through the column into the frame casing 13.

The seat member 14 is formed with a conical sleeve 20 in which a tubular post 21 is seated extending upwardly into the column 15. On this post the column is rotatably supported by means of anti-friction bearings 22 mounted in openings of horizontal partition walls of the column 15. These partition walls are interconnected by vertical ribs 23 of the column reinforcing the same. In this manner, a very rigid structure is provided whereby any deflection of the column under the weight of the tools mounted thereon is minimized.

The column constitutes a vertical guide for a cantilever tool support 24. Preferably, this tool support is formed with a cap 25 which surrounds the column and is slidably and non-rotatably guided thereon by means of roller bearing elements 26. These elements are running upon the opposite parallel outer faces of the column. In the embodiment shown the cap 25 is integral with two cantilever arms 24. Each arm has a horizontal guide 27 on which one or more grinding tool carriers 28 are adjustably mounted, each grinding tool being driven by an electric motor 29 attached to the carrier 28.

By turning the column 15 and the cantilever tool support 24 mounted thereon about the post 21, the operator may bring one or the other set of tools into position above the table 12 for operation upon a work piece mounted thereon. For turning the column 15, the operator must loosen the clamping screws 16 and must then slightly lift the column 15 from the seating member 14 to reduce the friction thereon. For this purpose, the following means are provided: Within the casing 13 a horizontal shaft 30 is mounted which is formed with a cam 31 and has a hand crank 32 for manual operation. On rotation of the shaft 30 the cam 31 will engage the lower end of the shaft 19 and lift the same. As the shaft 19 is secured against axial displacement within the bearing 18 by suitable collars 33, the column 15 and the cantilever tool support mounted thereon is thus lifted. It may be then swung by hand to the desired position, whereupon the clamping screws 16 are tightened again.

I employ the same shaft 19 for lowering and lifting the cantilever tool support relative to the

column 15. For this purpose, the upper end of the shaft 19 constitutes a threaded spindle 34 which extends through the top wall of the cap 25 and engages a nut 35 firmly mounted therein. Thus, rotation of the shaft 19 will result in a vertical displacement of the cantilever tool support relative to the column 15.

For turning the shaft 19 the following means are provided: The lower end of the shaft 19 carries a worm gear 36 within the casing 13. This worm gear engages a worm 37 attached to a horizontal shaft 38 which is journalled in the casing 13 and provided with a hand crank 39. In this manner, the same shaft or spindle 19 may be optionally used to raise or lower the cantilever tool support 24 or to lift the column 15 from its seat 14 on the frame.

Since the back-lash between the nut 35 and the spindle 34 affords a certain freedom of vertical movement to the cantilever support, the same could yield under excessive pressure acting upon its tools. It is, therefore, desirable to provide suitable means for taking up such back-lash.

For this purpose, I have provided the following means: A plurality of vertical cylinders 40 are mounted within the casing 13 being circumferentially distributed therein. Plungers 41 guided in these cylinders extend therefrom upwardly through suitable openings in the casing 13 and the seating member 14 and carry rollers bearing against a lower flange 42 of the cap 25. The bottom of each cylinder 40 is connected with a suitable source of pressure fluid, for instance, with a pump 43. The pressure of this fluid tends to lift the plungers 41 and will thus exert an upward pressure upon the cantilever support. This pressure exceeds the weight of the latter and will thus take up any back-lash between the nut 35 and the spindle 34. Suitable means are provided to keep the fluid pressure constant independently of the vertical adjustment of the cantilever support.

For supplying electric current to the motors 29, suitable means are provided including slip rings mounted on the post 21 cooperating with brushes diagrammatically indicated at 44. As such means are well known in the art, a detailed explanation thereof appears dispensable.

The location of the shaft 19 coincidental with the axis of the column 15 has the advantage that the means for manually operating the spindle 34 raising or lowering the tools may be mounted within the frame. This would not be possible if the spindle 34 were mounted on the outside of the column 15 as it is customary in machines of this kind. Moreover, it will be apparent that the coaxial nested relationship of the elements 25, 15 and 21 results in a very rigid structure ensuring a high accuracy in operation.

While I have described my invention with reference to a specific embodiment thereof, I wish it to be clearly understood that the invention is not limited to the details thereof but is capable of numerous modifications within the scope of the appended claims.

What I claim is:

1. A machine tool comprising a frame provided with a seat, a column constituting a vertical guide, means for rotatably mounting said column on said seat for angular adjustment thereon, a member slidable on said guide, threaded spindle journalled in said column and secured against axial displacement therein, a nut engaging said spindle and attached to said member, means for rotating said spindle and means carried by said frame for lifting said spindle, whereby the same spindle is adapted to raise or lower said member on said guide or to lift said column from said frame for angular adjustment thereon.

2. A machine tool comprising a frame provided with a seat, a column constituting a vertical guide, means for rotatably mounting said column on said seat for angular adjustment thereon, a cantilever tool support slidable on said guide, a threaded spindle journalled in said column and secured against axial displacement therein, a nut engaging said spindle and attached to said cantilever support, means for rotating said spindle, and means carried by said frame for lifting said spindle, whereby the same spindle is adapted to raise or lower said cantilever support on said guide or to lift said column from said frame for angular adjustment thereon.

3. A machine tool comprising a frame provided with a seat, a polygonal hollow column rotatably mounted on said seat, a tool support formed with a cap surrounding said column and being slidably and non-rotatably guided thereon, a bearing mounted in the top of said column, a shaft journalled in said bearing and projecting therefrom upwardly and downwardly into said frame, the upwardly projecting end of said shaft constituting a threaded spindle extending through said cap and engaging a threaded bore thereof, a gearing within said frame and adapted to rotate said shaft, and means carried by said frame for lifting said shaft, whereby the same shaft is adapted to raise or lower said tool support on said column or to lift said column from said frame for angular adjustment thereon.

4. A machine tool comprising a frame provided with a seat, a tubular post attached to said frame in the center of said seat, a column rotatably mounted on said post and said seat for angular adjustment thereon, said column constituting a vertical guide, a cantilever tool support slidable on said guide, a threaded spindle journalled in said column and secured against axial displacement therein, a nut engaging said spindle and attached to said cantilever support, means for rotating said spindle and means carried by said frame for lifting said spindle, whereby the same spindle is adapted to raise or lower said cantilever support on said guide or to lift said column from said seat for angular adjustment on said post.

5. A machine tool comprising a frame provided with a seat, a column constituting a vertical guide, means for rotatably mounting said column on said seat for angular adjustment thereon, a member slidable on said guide, a threaded spindle journalled in said column and secured against axial displacement therein, a nut engaging said spindle and attached to said member, means for rotating said spindle, means carried by said frame for lifting said spindle, whereby the same spindle is adapted to raise or lower said member on said guide or to lift said column from said frame for angular adjustment thereon, vertical cylinders attached to said frame, plungers slidable therein and operable by fluid pressure, and rollers mounted on said plungers and adapted to engage the bottom face of said member to take up the back-lash of the engagement of said spindle with said nut.

MAX AHNERT.