July 31, 1934. F. S. WEST 1,968,362

UNIVERSALLY ADJUSTABLE HIGH SPEED TOOL MOUNTING

Filed Aug. 19, 1932 2 Sheets-Sheet 1

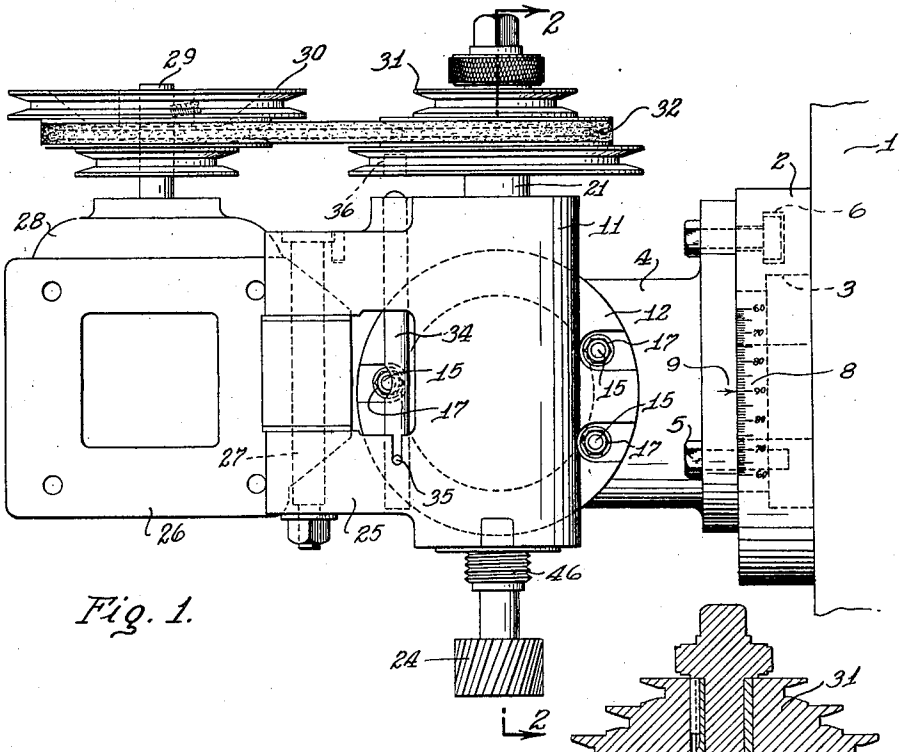


Fig. 1.

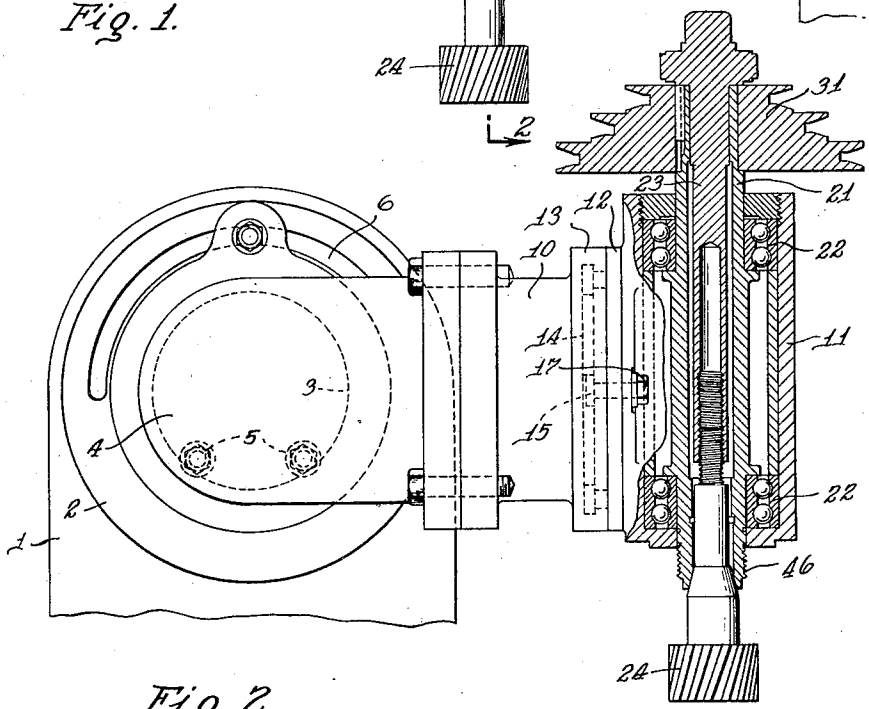


Fig. 2.

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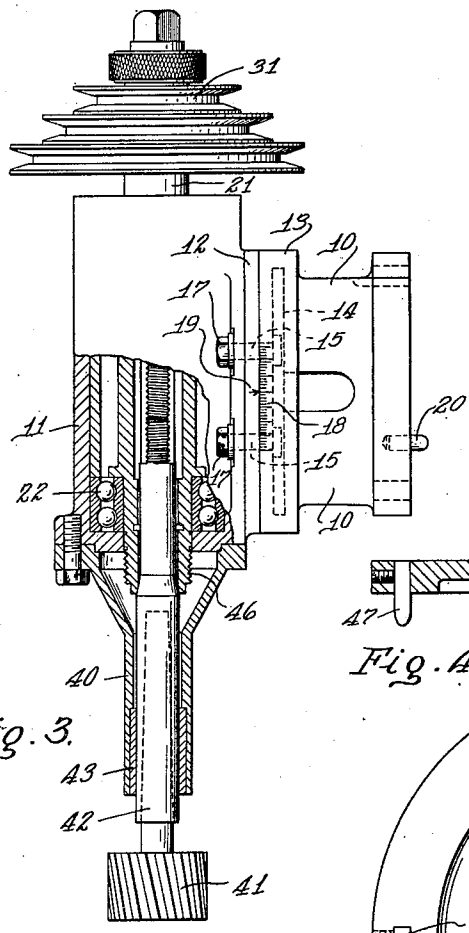


Fig. 3.

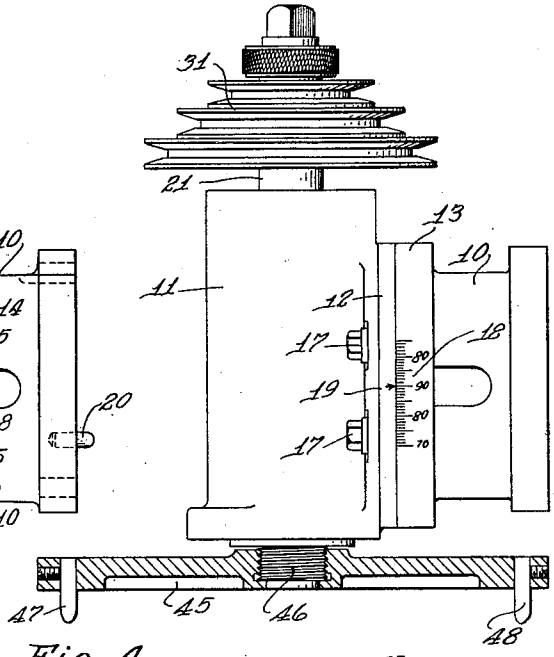


Fig. 4.

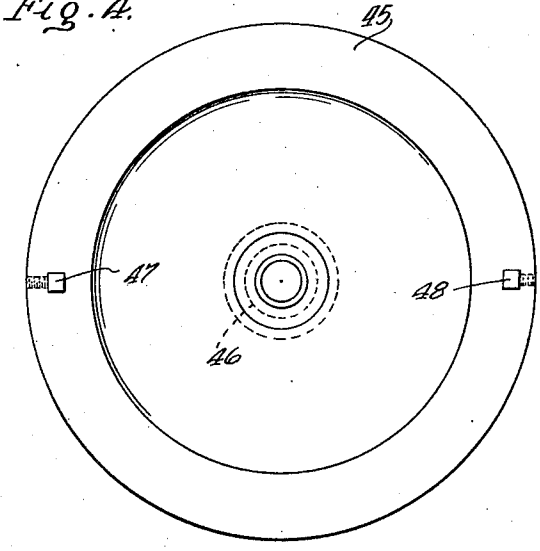


Fig. 5.

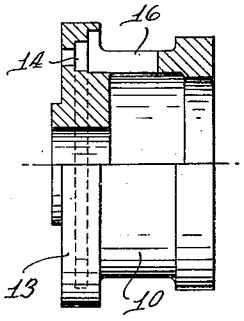


Fig. 6.

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UNITED STATES PATENT OFFICE

1,968,362

UNIVERSALLY ADJUSTABLE HIGH SPEED TOOL MOUNTING

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Application August 19, 1932, Serial No. 629,434

3 Claims. (Cl. 90—17)

The present invention pertains to a novel mounting or attachment for milling machines, drill presses and the like, whereby the tool may be universally adjusted, in two planes, and driven at a high speed.

It is well known to mount the tool in a casing or head which is adjustable in a single plane. In this case, the drive is effected through a train of gearing passing through the plane of adjustment. If this scheme is extended to enable adjustment in another, perpendicular plane and the gearing extended through the second plane of adjustment, it is impossible to obtain high speed of the tool because of noise and wear in the train of gearing.

The object of the present invention, therefore, is to enable high speed drive notwithstanding the universal adjustability in two perpendicular planes. With this object in view, an electric motor is mounted on the second adjustable part which carries the tool, and the motor is connected directly to the spindle of the tool. This type of drive, acting directly on the tool spindle and not requiring angular rotated shafts with gearing therebetween, is well adapted for high speed operation of the tool. The invention also includes for loosening and tightening a belt connection between the motor and the tool spindle, in shifting or replacing the belt.

Other objects of the invention are to provide novel tools that may be associated with the attachment for special operations.

The invention is fully disclosed by way of example in the following description and in the accompanying drawings, in which—

Figure 1 is a side elevation of the device;

Fig. 2 is a section on the line 2—2 of Figure 1;

Fig. 3 is an elevation, partly in section, of the sub-head, showing also the extension spindle;

Fig. 4 is a similar elevation of the sub-head, showing the fly cutter in section;

Fig. 5 is a bottom plan view of the fly cutter; and

Fig. 6 is an elevation, partly in section, of the sub-head adapter.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

In Figure 1 the numeral 1 indicates generally the body of a machine having built thereon or suitably attached thereto a guide bracket 2. Within the guide bracket is rotatably mounted a disk 3 to which a head 4 is secured by a pair of bolts 5. The member 2 has an arcuate guide slot 6 outside the disk 3, and a headed bolt 7 extends from the head 4 into the slot. Thus, the disk 3 and head 4 are rotatable together relatively to the bracket 2 and may be locked in any position of adjustment by means of the bolt 7. For the purpose of making accurate and definite adjustments, the bracket 2 carries graduations 8 cooperating with an index arrow 9 on the head 4.

To the head 4 is secured a sub-head or adapter 10 having its longitudinal axis perpendicular to that of the head 4. At the free end of the sub-head 10 is supported a tool casing 11 having a disk 12 lying against a somewhat similar disk 13 on the end of the sub-head. The disk or flange 13 is formed with an internal shouldered slot 14, as shown more clearly in Figure 6. Headed bolts 15 are inserted in the slot 14 through an opening 16 cut in the adapter 10 and are passed through the disk 12, as shown in Figures 1 and 3, to which they are tightened by means of nuts 17. The bolts support the tool casing 11 rotatably with reference to the sub-head 10, and the adjustment is secured by tightening the nuts 17. In order to enable definite and accurate adjustment, the flange 13 carries graduations 18 cooperating with an index arrow 19, on the flange 12. The other end of the adapter 10 carries one or more locating pins 20 for use in mounting the sub-head.

Through the tool casing 11 is passed a hollow spindle 21 mounted in ball bearings 22. In the spindle, in turn, is mounted a collet 23 having a milling or other cutting tool 24 screwed into its lower end.

The tool casing 11 has a lateral wing 25 to which is attached a motor bracket 26 by means of a hinge pin 27. A high speed electric motor 28 is carried by the bracket and has a portion of its shaft 29 exposed and extending upwardly as clearly shown in Figure 1. The spindle 21 and shaft 29 respectively carry step pulleys 30 and 31 inverted with respect to each other. The pulleys are connected by a drive belt 32, and adjustments of the speed ratio are available by shifting the belt in the well known manner. Loosening and tightening of the belt incident to shifting is facilitated by the hinged mounting of the motor bracket 26 on the wing 25, so that the distance between the shaft 29 and spindle 21 may be decreased and increased as desired. The motor bracket is locked in its final position by a nut 33 on the hinge pin 27.

In the operation of the device, an adjustment of the tool in one plane is made at the bracket 2 and head 4, and in a perpendicular plane at the disks 12 and 13. Thus, a universal adjustment of the tool is possible. The invention is

made especially useful for high speed operation, however, by the direct mounting of the motor 28 on the tool casing 15 and the belt drive between the motor and the tool. High speed tool operation requires a direct drive of this type, and a gear drive through the two planes of adjustment would be too slow. Thus, the invention incorporates the advantages of high speed drive and universal adjustability of the tool.

In changing the tool, it is necessary to hold the pulley 31 stationary. For this purpose, a locking pin 34 slidably mounted in the wing 25 and has a lateral finger 35 by means of which it may be actuated. The locking pin enters a notch 36 in the pulley 31.

In milling into deep cavities requiring an unusually long tool, an extension housing 40 is first secured to the lower end of the tool casing 11 as shown in Figure 3. A tool 41 mounted within an auxiliary extension draw bar 42 of at least the same length as the extension housing is passed through the extension and is secured to the collet in the usual manner. The lower end of the extension has a bushing 43 which serves as an additional bearing for the long shank 42.

A novel form of fly cutter, illustrated in Figures 4 and 5, is also suitable for use as a tool in this machine. The cutter comprises a flywheel or disk 45 adapted to be screwed directly on the threaded lower end 46 of the spindle 21. In the disk are inserted two diametrically opposite cutter members 47 and 48 located at different distances from the center. It will be seen that the cutter 47 is at a greater distance from the center of the disk 45 than the cutter 46 and is not as deep. In the operation of this device, the cutter 47 makes a rough cut and is tracked by the cutter 48 which makes the finishing cut, the difference in radii being compensated by the movement of the work beneath the tool in the usual manner. If desired, there may be more than two cutters 47, 48 which may also be at equal distances from the center and of equal cutting depth. In such case, the work is fed to the tool accordingly, in order that one cutter may track the other.

Although specific embodiments of the invention have been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention, as indicated by the appended claims.

What I claim is:—

1. In a machine of the character described, a fixed body, a head rotatably adjustable relatively thereto, a tool casing rotatably and adjustably mounted on said head in a plane perpendicular to the plane of adjustment of said head, a tool spindle journalled in said casing, an electric motor carried by said casing, a belt drive from said motor to said spindle, an extension spindle secured to one end of said casing, and an elongated tool inserted in said extension spindle, said tool having one end secured within the first named spindle, and a working end disposed externally of said extension spindle.

2. In a machine of the character described, a fixed body, a head rotatably adjustable relatively thereto, a tool casing rotatably and adjustably mounted on said head in a plane perpendicular to the plane of adjustment of said head, a tool spindle journalled in said casing, an electric motor carried by said casing, a belt drive from said motor to said spindle, an extension spindle secured to one end of said casing, an elongated tool inserted in said extension spindle, said tool having one end secured within the first named spindle, a working end disposed externally of said extension spindle, and a bearing within said extension spindle and engaging said tool.

3. In a machine of the character described, a tool casing rotatably and adjustably mounted on said head in a plane perpendicular to the plane of adjustment of said head, a tool spindle journalled in said casing, an electric motor carried by said casing, a belt drive from said motor to said spindle, an extension spindle secured to one end of said casing, an elongated tool inserted in said extension spindle, said tool having one end secured within the first named spindle, a working end disposed externally of said extension spindle, and means for driving said spindle.

FREDERICK S. WEST.