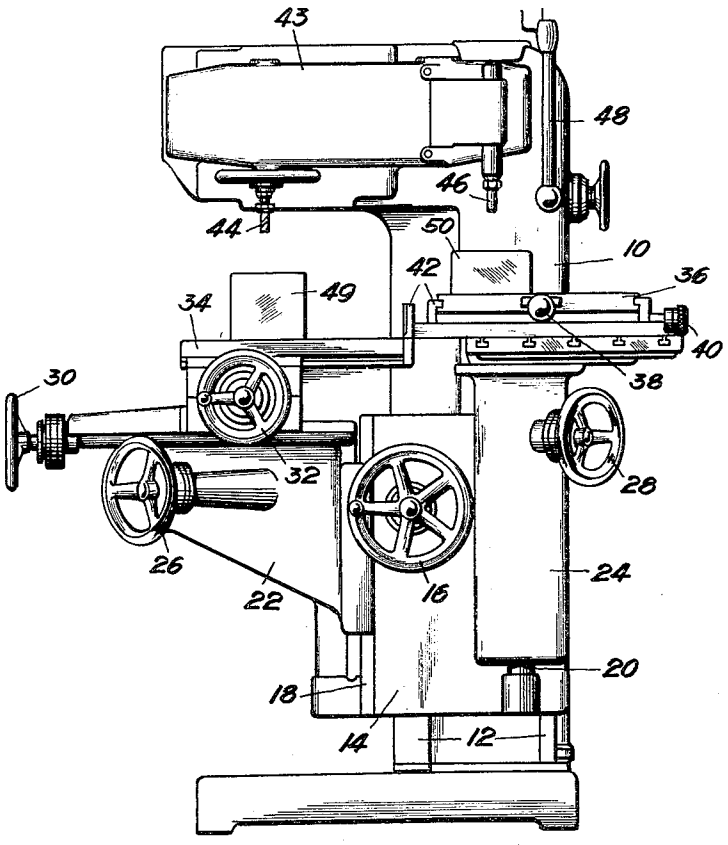
March 8, 1955 K. ZWICK 2,703,510

KNEE BRACKET ARRANGEMENT FOR MILLING-MACHINES, PARTICULARLY COPYING-MILLING-MACHINES

Filed Sept. 5, 1951 3 Sheets-Sheet 1

FIG. 1



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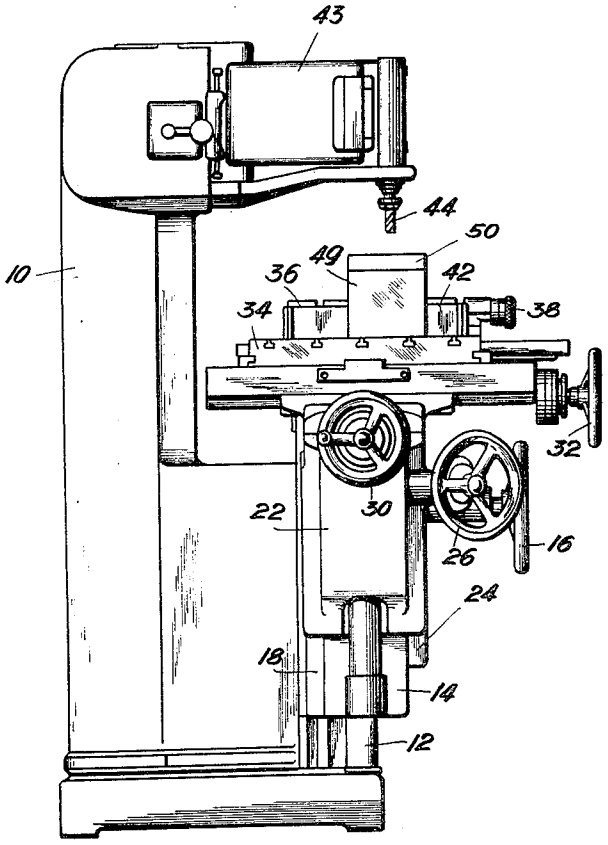
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FIG. 2



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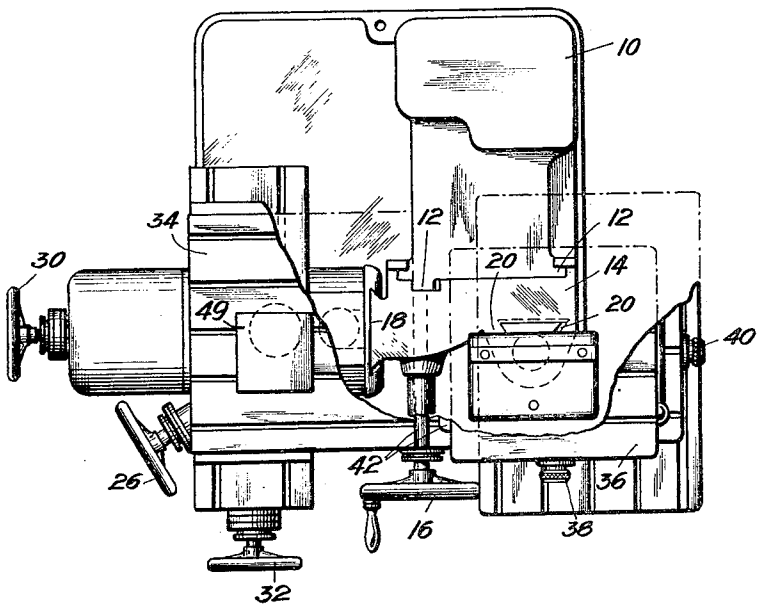
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FIG. 3



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2,703,510

KNEE BRACKET ARRANGEMENT FOR MILLING-MACHINES, PARTICULARLY COPYING-MILLING-MACHINES

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Application September 5, 1951, Serial No. 245,242

4 Claims. (Cl. 90—13.1)

In milling-machines, particularly copying-milling-machines, the movability of the knee brackets of the console serving to carry the worktable must be as great as possible, particularly in the vertical direction, in order to permit machine operations on the same machine of not only small and medium-sized workpieces but also of particularly large parts.

With previous copying-milling-machines the console is provided with ways directly in the machine pillar. In view of the fact that the outside dimensions of the machine dare not exceed certain standard values, the fulfillment of the above-stated conditions encounters great difficulties with such machines. These difficulties consist in the fact that a large working range can only be obtained at the expense of the height of the fastened-on workpiece, and if the working range is to be increased, this can only be done due to the shorter length of the ways of the console, and this results, due to the smaller reach, in a smaller working range in the plane.

It has heretofore been attempted with previous machines to obtain relief in such a way that, in order to get a greatest possible height of the fastened-on workpiece, the ways of the console are shortened in advance; and, for the working of flat workpieces special set-on tables have been employed, which are supposed to compensate the deficient movability of the console. Such arrangements, however, are complicated and time-consuming, and hence uneconomical.

The object of the present invention is to eliminate the disadvantages of the previous machines, and to create a machine which is, due to its great working range, universally employable, as well as simple and rapid in operation. This result is accomplished according to the invention in such a way that the knee brackets, serving to carry the preferably transversely-movable tables, that is the working or model table, are adjustably disposed in ways on an intermediate knee bracket, which latter is in its turn mounted for supplemental displacement on the machine, preferably on the machine pillar. With this arrangement according to the invention, therefore, the magnitude of the total movability of each of the consoles, is given by the magnitudes of the movabilities of the knee brackets and that of the intermediate knee bracket. In this way there can be obtained practically twice the movability of the table for the same dimensions of the machine. The machine of this invention permits the vertical adjustment of the knee brackets carrying the model and the workpiece within the limits of the top and to the bottom of the machine and also the relative or separate adjustment of said knee brackets. The range of adjustment of the knee brackets is increased over that heretofore possible. The increase of the height for operations on the fastened-on workpiece obtained by means of the intermediate knee bracket is one of the important advantages of my invention. If, for example, the workpiece is high and the model is flat, it is not necessary to resort to the use of special underlaid blocks in carrying out operations on the machine of my invention.

A preferred form of the invention is set forth in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 shows a copying-milling-machine in front elevation, embodying the invention;

Fig. 2 shows a side elevation of the machine shown in Fig. 1; and

Fig. 3 shows a top view of the machine of Figs. 1 and 2.

Referring to the drawings in detail the pillar **10** of the

copying-milling-machine is provided with vertical ways **12** on which there is displaceably mounted an intermediate knee bracket **14**. The movement of the intermediate knee bracket **14** along the ways **12** is controlled through rotation of a handwheel **16**. With the aid of conventional means, not necessary to illustrate here, the intermediate knee bracket **14** can be fixed in any position.

The intermediate knee bracket **14** is provided with two vertical ways **18**, **20**, on which there are displaceably mounted the knee brackets **22** and **24**, respectively. The handwheels **26** and **28** are respectively arranged for controlling the displacement of knee brackets **22** and **24**; the knee brackets can be fixed in their prevailing position relatively to the intermediate knee bracket **14** with the aid of conventional means, not shown here. The knee bracket **22** carries a worktable **34**, transversely displaceable under control of handwheels **30**, **32**, while on the knee bracket **24** another table **36**, that is the model-table is mounted, likewise transversely displaceably through the intermediary of two turnbuttons **38**, **40**.

The tables **34**, **36** can, with the help of a coupling **42**, be rigidly coupled in a particular position relatively to each other in such a way that the movement of both of the tables **34**, **36** in the plane only occurs under control of the displacing means of the one table, for example, the handwheels **30**, **32** of the table **34**.

The pillar **10** also carries an articulation system **43** of a conventional type, in which there are mounted by means not shown the tool **44** and the copying peg **46**. With the aid of a handle **48** on the articulation system **43** this system, together with the tool **44** and the copying peg **46**, can be moved by the operator in all directions, in which the working of the workpiece **49** occurs according to a pattern **50**.

As already explained, the knee brackets **22**, **24** for the tables **34**, **36** are adjustably disposed on the intermediate knee bracket **14**, which latter is, in its turn, mounted for supplemental displacement on the machine ways **12**. Further, the paths of movement of the two knee brackets are in the same direction as the path of movement of the intermediate knee bracket. Through this arrangement a movement is brought about so that the tables can be displaced vertically in succession with the help of the knee brackets and the intermediate knee bracket. With flat workpieces, therefore, the knee brackets and the intermediate knee bracket are present in their uppermost position, and, conversely, with particularly high workpieces, in their lowermost position. With medium, and, of course, also with other workpieces, the individual movements of the knee brackets and the intermediate knee bracket can be combined as desired. In every case, however, the total vertical movement of the tables results from the vertical movements of the knee brackets themselves and of the intermediate knee bracket. In view of the fact that the adjustment of the two knee brackets is approximately equal to the length of the displacement path of the intermediate knee bracket, there is obtained practically twice the range of adjustment movability of the console, and therewith of the tables, for the same dimensions of the machine.

Another great advantage of the arrangement according to the invention results from the fact that the work- and the model-table are vertically displaceable on the intermediate knee bracket. Through this there is afforded the possibility of extensively equalizing the difference in height between the workpiece and the model without its being necessary to resort to the use of special underlaid blocks as is the case with previous machines. Further, the new arrangement affords the possibility, at 1:1 copying-milling, to raise and lower the work- and the model-table together.

Finally, it still remains to be noted that, in contrast to the arrangement herein described as the model, the expedients according to the invention could, of course, also be applied to machines with which the knee brackets carrying the tables are displaceable in another direction, for example, horizontally.

While a preferred form of the invention has been shown it is realized that modifications may be made and it is to be understood that no limitations upon the in-

vention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A copying machine having a machine column and including at least a first knee bracket supporting a workpiece and at least a second knee bracket supporting a model, an intermediate knee bracket, said knee brackets being adjustably mounted on said intermediate knee bracket means for independently adjusting said first and second knee brackets on said intermediate knee bracket, said intermediate knee bracket being adjustably mounted on said machine column, and means for selectively controlling the position of said intermediate knee bracket with respect to said machine column.

2. A copying milling machine having a machine column, an intermediate knee vertically adjustable on said column, a pair of knees mounted for vertical adjustment on said intermediate knee each of said pair of knees carrying a pair of horizontally adjustable tables, a cutter coacting with one of said pair of tables, a tracer coacting with the other of said pair of tables, and means individual to said intermediate knee and to each of the knees in said pair of knees for selectively adjusting said knees with respect to said machine column.

3. A copying machine having a machine column, two pairs of slides, two slides included in each of said pairs and movable in at least two directions, one slide being mounted on a support knee bracket and the second slide

being mounted on the first one and an intermediate knee bracket, each support knee bracket being vertically adjustably mounted on said intermediate knee bracket, said intermediate knee bracket being mounted for vertical adjustment on said machine column, and separate means for independently adjusting each of said knee brackets.

4. A copying machine including a machine column, a knee bracket, means for adjusting the position of said knee bracket on said column for vertical movement with respect to said machine column, a second knee bracket coupled with one end of said first-mentioned knee bracket and vertically adjustable thereon, a third knee bracket adjustably coupled with the other end of said first knee bracket and vertically adjustable with respect thereto and means on said second and third knee brackets for supporting a work piece and model, a cutting tool and copying tool supported with respect to said machine column in positions above said second and third knee brackets, respectively, and separate means for independently adjusting the position of second and third knee brackets with respect to said first knee bracket.

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