(No Model.) 2 Sheets—Sheet 1.

C. H. PHILLIPS.

MILLING MACHINE.

No. 484,455. Patented Oct. 18, 1892.

Fig. 2.

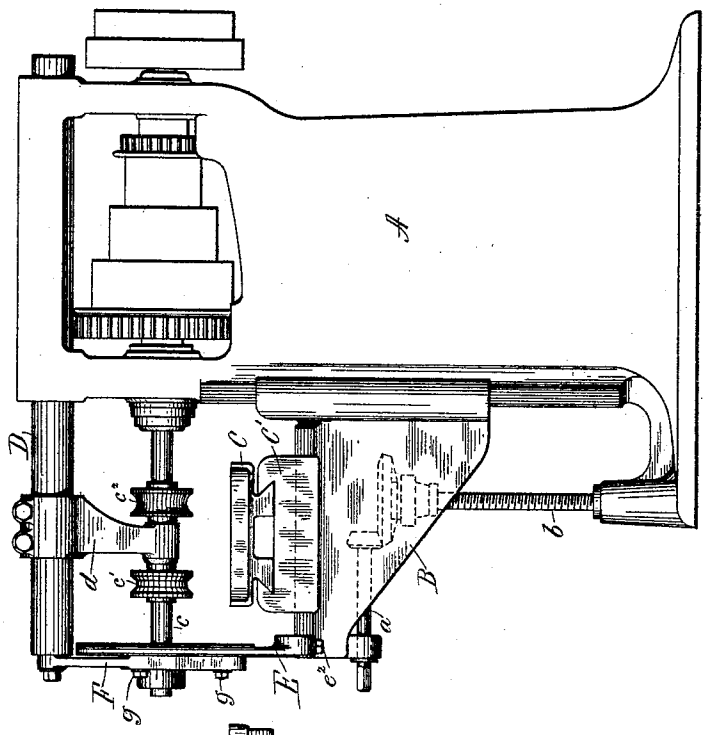
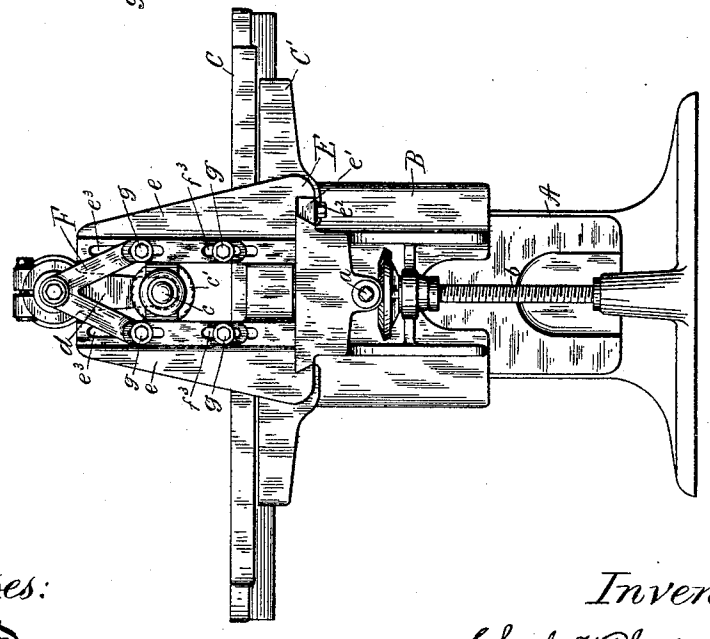


Fig. 1.



Witnesses:
W. E. Thurston
S. J. Murphy

Inventor:
Charles H. Phillips

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

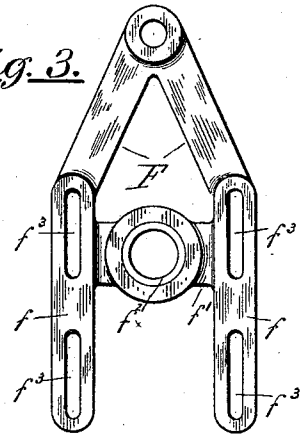


Fig. 4.

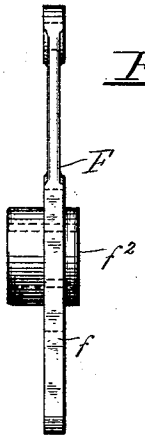


Fig. 5.

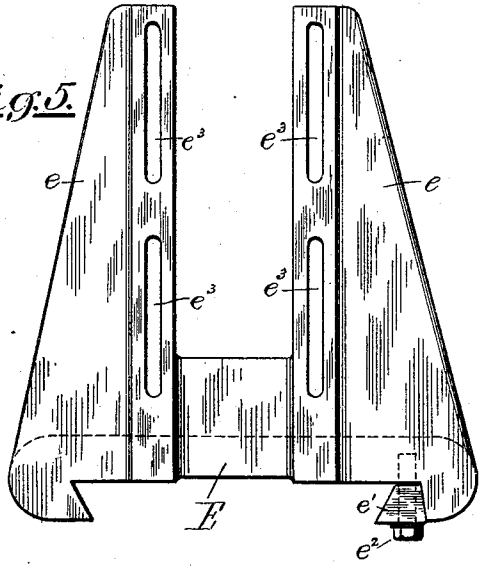
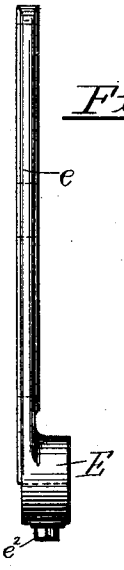


Fig. 6.



Witnesses:
H. C. Thurston
D. J. Murphy.

Inventor:
Charles H. Phillips

UNITED STATES PATENT OFFICE.

CHARLES H. PHILLIPS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE BROWN & SHARPE MANUFACTURING COMPANY, OF SAME PLACE.

MILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 484,455, dated October 18, 1892.

Application filed March 15, 1892. Serial No. 424,964. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. PHILLIPS, of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Milling-Machines; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

My invention has for its object to provide a firm and steady support for the outer end of the cutter-arbor of a milling-machine; and to that end it consists in the combination and arrangement of parts hereinafter described.

Referring to the drawings, Figure 1 is an end elevation, and Fig. 2 a side elevation, of a milling-machine embodying my invention. Figs. 3 to 6, inclusive, are detailed views, upon an enlarged scale, of certain of the parts.

A represents the frame of a milling-machine with a driving-spindle, pulleys, and gearing mounted thereon, as usual.

B represents the vertically-adjustable knee, arranged to slide on ways upon the frame, the adjustment of which is effected by the shaft *a*, operating the screw *b* in the usual manner.

C represents the platen or work-carriage, arranged to slide in suitable ways upon the saddle C′.

c is the cutter-arbor, secured at one end to the driving-spindle and carrying the cutters c' c^2.

D is a bar mounted in the frame and longitudinally adjustable therein.

It has been customary heretofore to employ an arm or bracket, as *d*, adjustably mounted on the bar D for supporting the outer end of the cutter-arbor. Such arm or bracket, however, has been found not to furnish a sufficiently firm and steady support for the cutter-arbor, especially in a lateral direction, under all conditions.

In order to secure the necessary firm and steady support for the cutter-arbor in all directions, I employ a bracket E, adjustably secured to the knee B, and a second bracket F, secured to the adjustable bar D. The bracket E, which is provided with two arms *e e*, is secured in any adjusted position on the knee B by means of a gib e' and clamp-screw e^2. The bracket F is likewise provided with two arms *f f*, and in a cross-bar f' of said bracket F is formed a bearing f^2 for the outer end of the cutter-arbor. By bolting firmly together the arms of the brackets E and F the cutter-arbor *c*, with its end supported in the bearing f^2, will be given a firm and steady support in all directions, laterally as well as from both above and below. As the bar D is longitudinally adjustable in its bearings, and as the bracket E is likewise adjustable upon the knee B, the bearing f^2 may be adjusted to accommodate arbors of different lengths.

To provide for the vertical adjustment of the knee B, the brackets E and F are constructed to permit of such adjustment. For this purpose the arms *e e* of the bracket E are provided with slots e^3, as shown in Fig. 5, and the arms *f f* of the bracket F are likewise provided with corresponding slots f^3, through which slots pass the clamp-bolts *g*, which clamp the two brackets together. With this arrangement when the knee B is to be raised or lowered by unclamping the bolts *g* the bracket E may be likewise raised or lowered with the knee and with relation to the bracket F without affecting the position of the bearing f^2, which is in the bracket F, secured to the bar D. Thus the cutter-arbor will be at all times firmly supported in all directions, but without interfering in any way with the adjustment of the knee. With the combination and arrangement above described two cutters may be employed simultaneously, as shown in Fig. 2, in which case the arm *d* may be arranged between the two cutters, the bearing f^2 serving to furnish a firm and steady support for the outer end of the arbor.

In some forms of milling-machines the bar D is not adjustable in the frame.

It is plain that the invention hereinbefore set forth may be likewise applied to a machine of that character, in which case the bracket E will not require to be adjustable upon the knee of the machine. If desired, the slots f^3 in the bracket F may be omitted, said bracket being instead provided simply with holes for the reception of the clamp-bolts, and the slots e^3 in the bracket E made continuous, which arrangement will likewise serve to permit of the vertical adjustment of the knee without

affecting the location of the bearing for the cutter-arbor.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the knee of a milling-machine, of a bracket secured to said knee, a bar secured to the frame of the machine, and a bracket secured to said bar, said last-named bracket being provided with a bearing for the outer end of the cutter-arbor and said two brackets being clamped together, whereby said cutter-arbor will be firmly supported in all directions, substantially as described.

2. The combination, with the knee of a milling-machine, of a bracket adjustably secured to said knee, a bar adjustably mounted in bearings in the frame of the machine, and a bracket secured to said bar, said last-named bracket being provided with a bearing for the outer end of the cutter-arbor and said two brackets being clamped together, whereby said cutter-arbor will be firmly supported in all directions, substantially as described.

3. The combination, with the knee of a milling-machine, said knee being vertically adjustable, of a bracket secured to said knee, a bar mounted in bearings in the frame of said machine, and a bracket secured to said bar, said last-named bracket being provided with a bearing for the outer end of the cutter-arbor and one or both of said brackets being provided with slots for the clamp-bolts, whereby said knee with the bracket secured thereto may be adjusted vertically with relation to the other bracket and the bearing therein, substantially as described.

CHARLES H. PHILLIPS.

Witnesses:
W. H. THURSTON,
S. J. MURPHY.