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G. K. GARVIN.

MILLING MACHINE.

APPLICATION FILED NOV. 13, 1903.

NO MODEL.

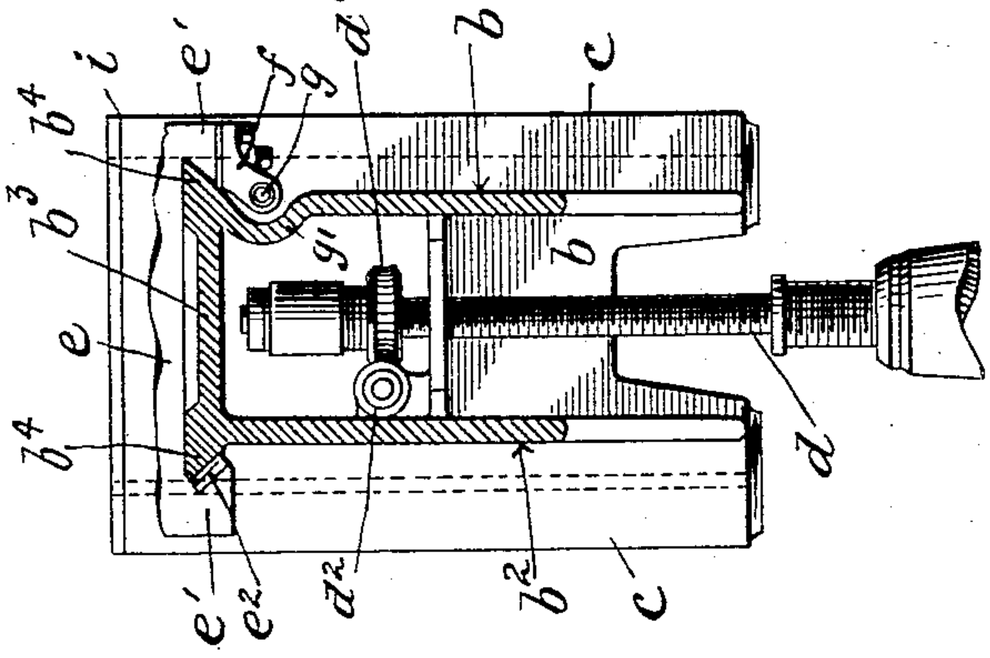
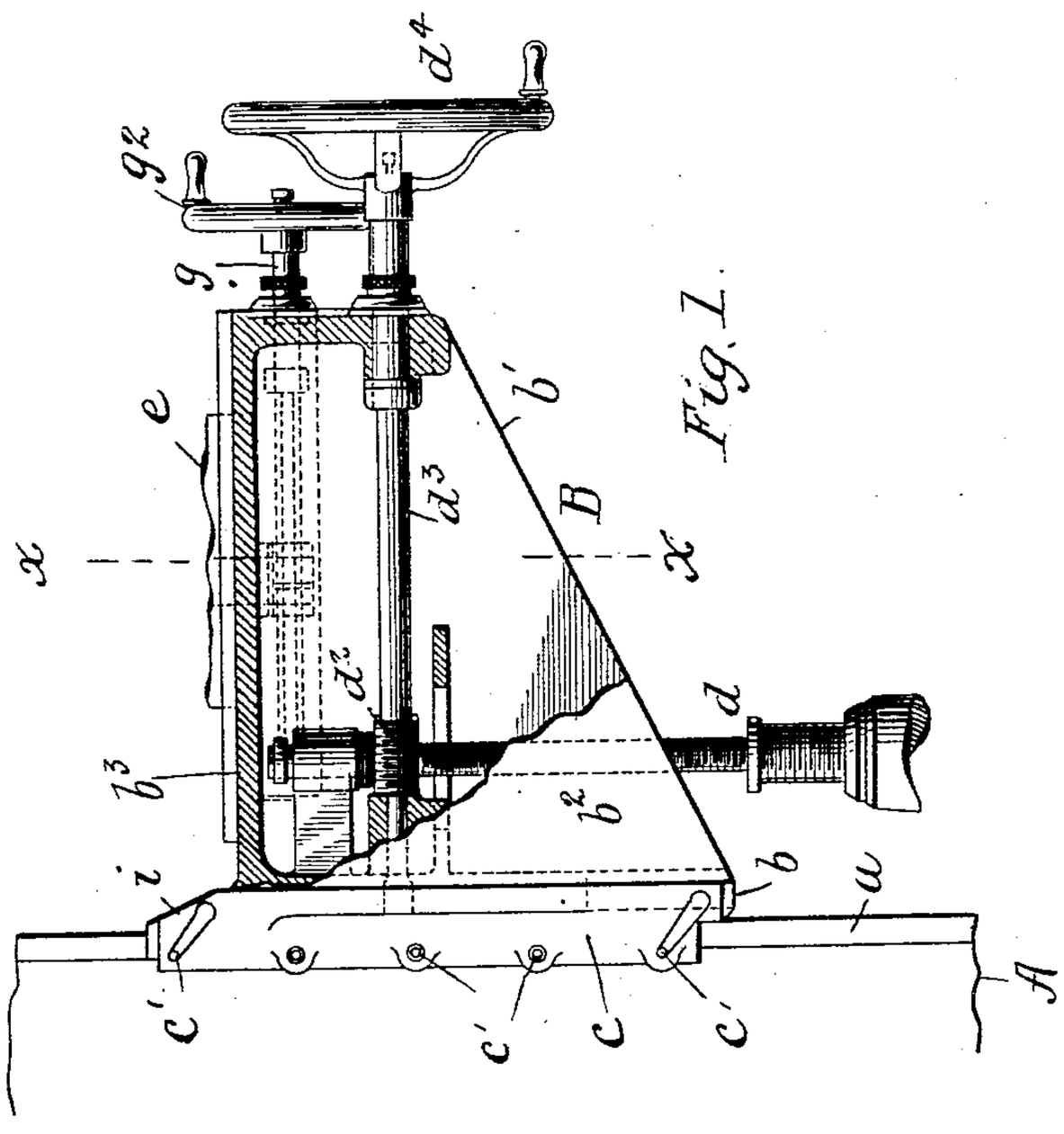


Fig. 2.



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No. 751,629. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

GEORGE K. GARVIN, OF NEW YORK, N. Y.

MILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 751,629, dated February 9, 1904.

Application filed November 13, 1903. Serial No. 181,001. (No model.)

To all whom it may concern:

Be it known that I, GEORGE K. GARVIN, a citizen of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Milling-Machines, of which the following is a full, clear, and exact description.

This invention relates to milling-machines, the object being to provide a construction which will afford the greatest possible rigidity in a knee of comparatively great length. It is evident that in milling-machines it is essential that the various parts shall be very rigid and stiff, because any springing or yielding of the parts while the machine is in operation or due to a clamping of the parts to sustain the work while being operated upon will result in inaccurate and imperfect work and the micrometer adjustments which are made on such machines could not otherwise be relied upon.

That portion of a milling-machine upon which the work is sustained is called the "knee," and a given standard or base in the assembling of the machine may carry a small or a large knee, depending upon the requirements of service. The larger the size of the knee the firmer must be its support and the more rigid its structure generally. The knee is in the form of a bracket having one vertical side in engagement with dovetailed guides on the standard and a horizontal top upon which the saddle and slide are carried. The top plate of the knee is ordinarily open to permit a nut carried by the saddle to pass through the top and engage with a screw to enable the saddle to be adjusted to any position along the top of the knee. This opening is an element of weakness in the knee, which becomes more pronounced as the length of the knee is increased, since lateral pressures which are brought to bear against the sides of the knee in clamping the saddle thereto cause the two sides to spring together, and thus throw the parts out of adjustment. One of the effects of this yielding or springing of the sides is to separate or swing outward the vertical flanges which sustain the knee upon the standard. Again, when the knee is lengthened the weight of the work which may be located on its extreme outer end being sometimes very great will strain the vertical flanges at the back and also throw the parts out of adjustment, this being especially noticeable when the flanges are thrown apart or outward by the clamping of the saddle. Hence in order to obtain the most rigid knee it is necessary to prevent the springing of the knee by the lateral pressures created by clamping the saddle and furnish a support at the rear of the knee which shall be ample to sustain any weight that may be placed upon it in the ordinary operation of the machine. To accomplish this, I propose to construct the knee with a solid top instead of with a slotted top and carry the back of the knee upward considerably beyond the top of the knee, providing the extended portions with continuations of the vertical supporting-flanges, which thus engage the knee with the standard at points where they will serve as a brace to sustain a weight placed at the outer end of the knee. The details of this construction will now be given with reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a milling-machine knee with parts in section and also showing a part of the standard of the machine, and Fig. 2 is a section on line $x\ x$ of Fig. 1.

A represents the standard or base of a milling-machine, provided on its front corners with vertical dovetailed flanges a, serving as guides and supports for the knee.

B is the knee of the milling-machine, which consists, essentially, of a triangular box-like structure made up of the back plate b, two triangular side plates b' and b^2, and a horizontal top plate b^3. The back plate is extended on each side and formed into jaws c, which embrace the vertical guides a on the standard, key-plates being interposed and clamped between the engaging surfaces to obtain an accurate fit of the knee upon the guide. These key-plates are clamped by the bolts c' in the usual manner. The knee is adjustable upon the standard by any well-known means, such as the vertical telescoping screw d, carrying the worm-wheel d', engaged by the worm d^2

on horizontal shaft d^3. By rotating shaft d^3 by means of the hand-wheel d^4 the telescoping screw opens or closes and raises or lowers the knee.

The top plate b^3 of the knee is provided along each edge with similar dovetailed guiding-flanges b^4 for a saddle e, (only a part of which is shown.) The saddle is provided with suitable jaws e' on each side to engage with said flanges and also has key-plates e^2 for tightening it upon the knee. The purpose of this saddle is to support what is known as the "slide," upon which the work is carried; but this device is not shown. The saddle must be provided with means for accurately adjusting it back and forth along the top of the knee to properly position the work with respect to the tool. This is usually accomplished by means of a nut passing downward from the saddle through a slot extending from end to end of the top plate to engage with a screw-shaft immediately under the middle line of the top plate; but instead of doing this I propose to attach the nut (indicated at f) to one of the flanges e' of the saddle and place the screw-shaft (indicated by g) on the outside of one of the side plates b' of the knee, thus leaving the top plate intact and solid, as shown. To better accommodate the screw-shaft g, I preferably form the side plate with a deflected portion g', extending the length thereof, the shaft occupying this cavity and extending forward and fitted with the usual hand-wheel g^2, by rotating which the saddle is caused to move backward or forward. It will be seen that any pressure in a lateral direction which may be put upon the sides of the knee, either in clamping or locating the work in position or during the action of the tool upon the work, will be resisted by the solid top of the knee and compression of the middle part of the knee will be prevented. If such compression is allowed to occur, it is plain to be seen that there will be a tendency to throw the jaws c c apart or outward and alter the fit of the jaws against the guiding-flanges a. The stiffened solid top, however, prevents this. With the stiffened top it is obvious that the knee can be made considerably longer to accommodate larger work; but in lengthening the knee additional strength must be provided to support the weight of the work applied at the greater leverage. I furnish this additional support by providing a reach or extension i to the back plate b, which projects some distance above the top plate, the jaws c being likewise integrally extended, as shown. The knee being thus given a point of attachment to the standard A above the top plate b^3 obtains a purchase sufficient to sustain the additional strains caused by lengthening the knee. The solid top plate and the reach or extension i thus combine to make a lengthened knee practicable.

Having described my invention, I claim—

In a milling-machine, the combination with a standard, of a knee having a solid closed top plate and a back plate extending above the top plate and adapted to engage with the standard at points above said top plate, a saddle supported upon said top plate and means external to the top plate for adjusting the position of the saddle along the top plate.

In witness whereof I subscribe my signature in presence of two witnesses.

GEO. K. GARVIN.

Witnesses:
J. T. WILLIAMS,
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