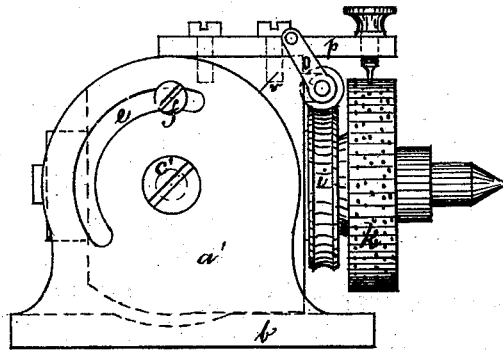
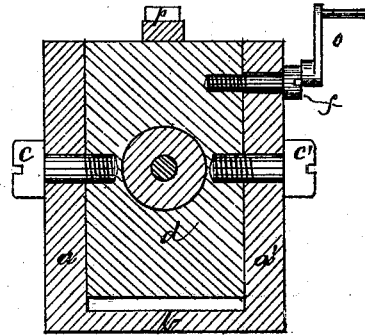


A. H. Brainard,
Milling Machine
No. 111,311. Patented Jan. 31, 1871.

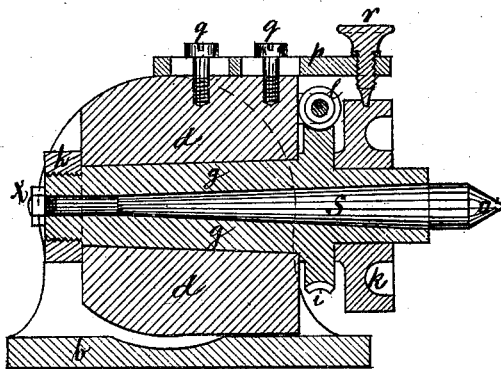
— *Fig. 1.* —



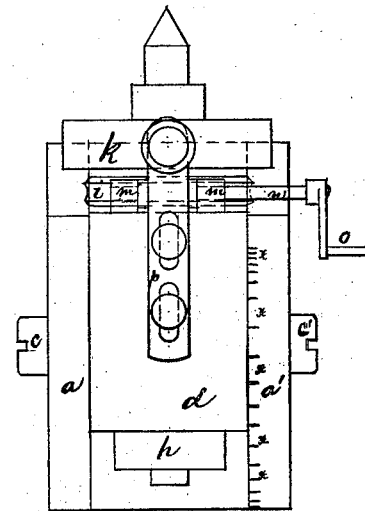
— *Fig. 2.* —



— *Fig. 3.* —



— *Fig. 4.* —



— *Witnesses:* —

Thos. Park

oscar D. Perrigg

— *Inventor:* —

A. H. Brainard

by his attorney Allan Andrews

United States Patent Office.

AMOS H. BRAINARD, OF HYDE PARK, MASSACHUSETTS.

Letters Patent No. 111,311, dated January 31, 1871.

IMPROVEMENT IN HEAD-STOCKS FOR MILLING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

I, AMOS H. BRAINARD, of Hyde Park, in the county of Norfolk and State of Massachusetts, have invented a new and Improved Head-Stock for Milling and other Machines, of which the following is a specification.

Nature and Objects of the Invention.

The object of my invention is to provide a head-stock for milling and other machines for cutting straight and conical mills, bevel and spur-gears, and for milling at various angles, &c., for which purpose I construct it as follows:

On the drawing—

Figure 1 is a side elevation;

Figure 2 is a transverse section;

Figure 3 is a longitudinal section; and

Figure 4, a plan of my invention.

Similar letters indicate similar parts in all the figures.

a a', are two upright standards rising from the base.

Between these standards is hung the block *d*, pivoted on the screws or bolts *c c'*, on which it turns to the extent of one hundred and twenty degrees, and is held in any required position by the screws *f* which move in the circular slot *e* in the standard *a'*.

Within the block *d* is fitted the spindle *g*, which is made slightly tapering to compensate for wear, and is held in its position by the check-nut *h*.

Within the spindle *g* is fitted a tapering center, *s*, on the front end of which is supported one end of an arbor or other work to be held.

On the block *d* is a line *v* which coincides with the lines *x x x* on the standard *a'*, fig. 4, which plainly indicates the number of degrees of elevation or depression of the block *d*, and consequently the correct position of the spindle *g* to a horizontal line.

On the front end of the spindle *g* is fitted an index-plate having its holes in its periphery.

Into these holes enters the point *r*, which holds the spindle in any required position.

The spindle is also provided with a worm-wheel, *i*;

working in this is the worm *l*, which is supported by the bearings *m m* on the block *d*, and is turned by a crank, *o*.

By this means the index *k* is turned to any required position.

In the index *k* are several lines of holes and the point *r* is made to enter either line by the bar *p*, which carries the point *r*, being movable and held in any position by the screws *q q*.

Head-stocks now in use have the supporting-pins, screws, or bolts *c c*, of the block *d*, near the left-hand edge of the standards *a a'*, and consequently give very small bearing surface on the block *d* when the spindle *g* is brought to nearly an upright or vertical position.

This difficulty is entirely avoided in my invention by making the block *d* to hang by its center, thereby giving the same amount of bearing surface in any position.

For milling circular or irregular work on cams, &c., the head-stock is to be set with the spindle *g* on the same line with the arbor of the mill used, and the pin *r* raised entirely out of the index *k*. The crank *l* is then used to turn the spindle *g* and with it the arbor on which the cam or other work is placed.

For cutting bevel-gears the block *d* may be placed in any position required.

Straight and conical mills may be cut by elevating or depressing the block *d* and using the index *k* and point *r* to give the number of teeth.

Having thus described the nature, construction, and uses of my invention, which I wish to secure by Letters Patent, and claim—

1. The location of the pivot-pins *c c'* for supporting the block *d* in the center of the standards *a a'*, as and for the purpose described.

2. The combination of the conical spindle *g*, the worm-wheel *i*, index-plate *k*, with the worm *l*, adjustable index-arm *p*, and point *r*, substantially as described.

AMOS H. BRAINARD.

Witnesses:

ALBAN ANDREW,
FRANCIS GARDNER.