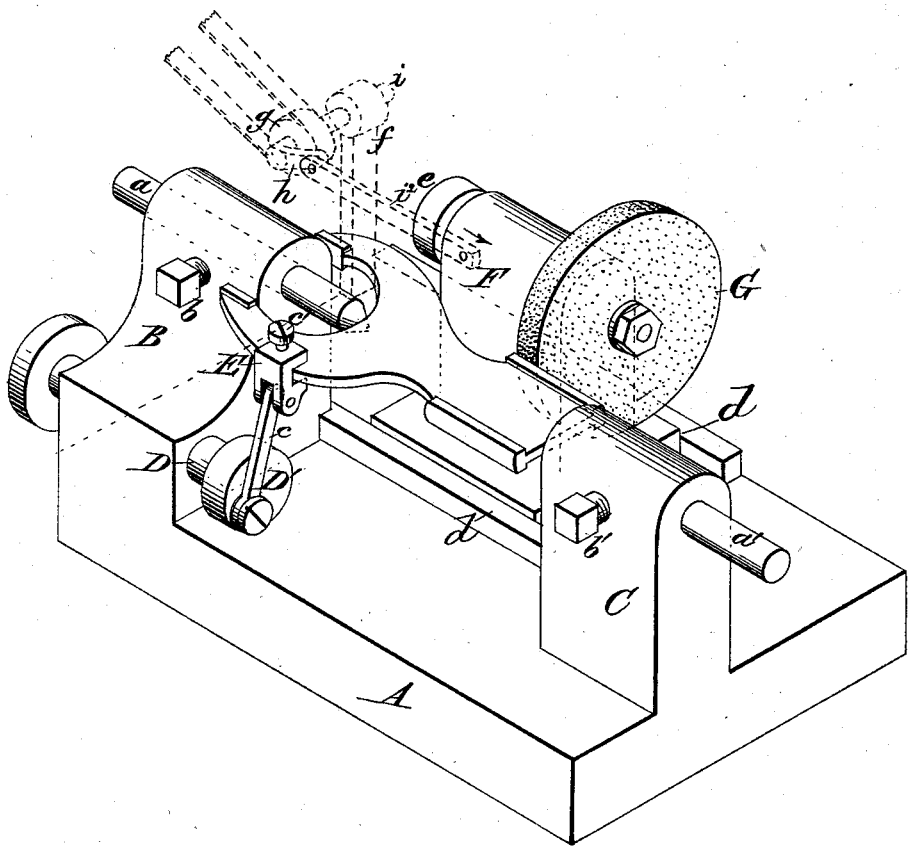
G. RICHARDS.

Machines for Grinding the Sector of Circles.

No. 222,736. Patented Dec. 16, 1879.



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UNITED STATES PATENT OFFICE.

GEORGE RICHARDS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE BETTS MACHINE COMPANY, OF WILMINGTON, DELAWARE.

IMPROVEMENT IN MACHINES FOR GRINDING THE SECTORS OF CIRCLES.

Specification forming part of Letters Patent No. **222,736**, dated December 16, 1879; application filed August 5, 1879.

To all whom it may concern:

Be it known that I, GEO. RICHARDS, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Grinding the Sectors of Circles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide a ready method and means for grinding and giving to the edges of flat bars and other forms of metal used in the arts the contour of a circular arc, and it will be found to be of great service in the manufacture of the various styles of gages used by machinists for determining the diameters of the circular apertures and cylindrical parts of their work.

My invention consists in the employment of a frame carrying the blank to be ground, to which blank a rocking or vibratory motion is imparted, in combination with an abrading-wheel operating on the blank, to which wheel a reciprocating and rotary motion is imparted by suitable mechanism, as hereinafter more fully set forth.

The drawing represents a perspective view of the machine and a tool or gage called a "fixed caliper." The heel, or that portion of the caliper which is used for determining the diameter of a circular aperture, is shown as being ground.

A represents the bed of the machine, from one end of which rises the head-stock B, while at the opposite end is placed the tail-stock C, which may, if desired, be made movable toward or from the head-stock in a manner similar to that of the tail-stock of the common lathe.

Two movable centers, *a* and *a'*, pass through the head and tail blocks, being secured at any desired point therein by the set-screws *b* and *b'*, or other suitable devices. Between these centers is held the article to be ground, the edge to be operated upon being placed parallel to the axis of the centers.

A shaft, D, provided at one end with a pulley or other suitable means for imparting rotation, and at the other with the crank D', is connected by the pitman *c* with the removable jaw E, which is secured to one edge of the article to be operated upon by the set-screw *c'*.

It will thus be apparent that rotation of the shaft D will produce a semi-rotative or vibratory motion in the article placed between the centers.

Moving in guides *d d* on the bed A is the standard F, which carries upon a suitable shaft the abrading-wheel G, to which a quick rotary motion is imparted by a belt from any suitable motor running upon the pulley *e*.

A reciprocating motion is imparted to the standard F, carrying the abrading-wheel G, and sliding in the grooves or ways *d d*, in the following manner: *f* is a post securely attached at its lower end to the bed-plate A, and having at its upper end a bearing for the shaft *i*, carrying at its inner end the crank *h*, pivoted to the pitman i^2, the opposite end of the latter being pivoted to the standard F, carrying the abrading-wheel G.

g is a pulley on the crank-shaft *i*, around which passes an endless belt, which also passes around another pulley on a shaft driven by any motor, by means of which a rotary motion is imparted to the crank-shaft *i*, which, through the pitman i^2, will impart a reciprocating motion to the standard F in the ways *d d*, and also to the abrading-wheel G.

By this arrangement the abrading-wheel has a rotary and reciprocating motion imparted to it as it operates upon the blank, while the vibratory or rocking movement of the blank renders the grinding operation more expeditious, and insures a smooth dressing of the latter in diagonal lines across its face.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent of the United States, the following:

1. The frame A, having the head-stock B,

tail-stock C, guides *d d*, and centers *a a'*, carrying the blank to be ground, in combination with the removable jaw E, pitman *c*, crank D', and abrading-wheel G, having a reciprocating and rotary motion, substantially as described, and for the purpose set forth.

2. The removable jaw E, pitman *c*, and crank, in combination with the head-stock B, for the purpose of imparting motion to an article operated on, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 17th day of July, 1879.

GEO. RICHARDS.

Witnesses:
EDWARD BETTS,
ALFRED BETTS.