(No Model.) 2 Sheets—Sheet 1.

R. CONRADER.

GRINDING MACHINE.

No. 404,686. Patented June 4, 1889.

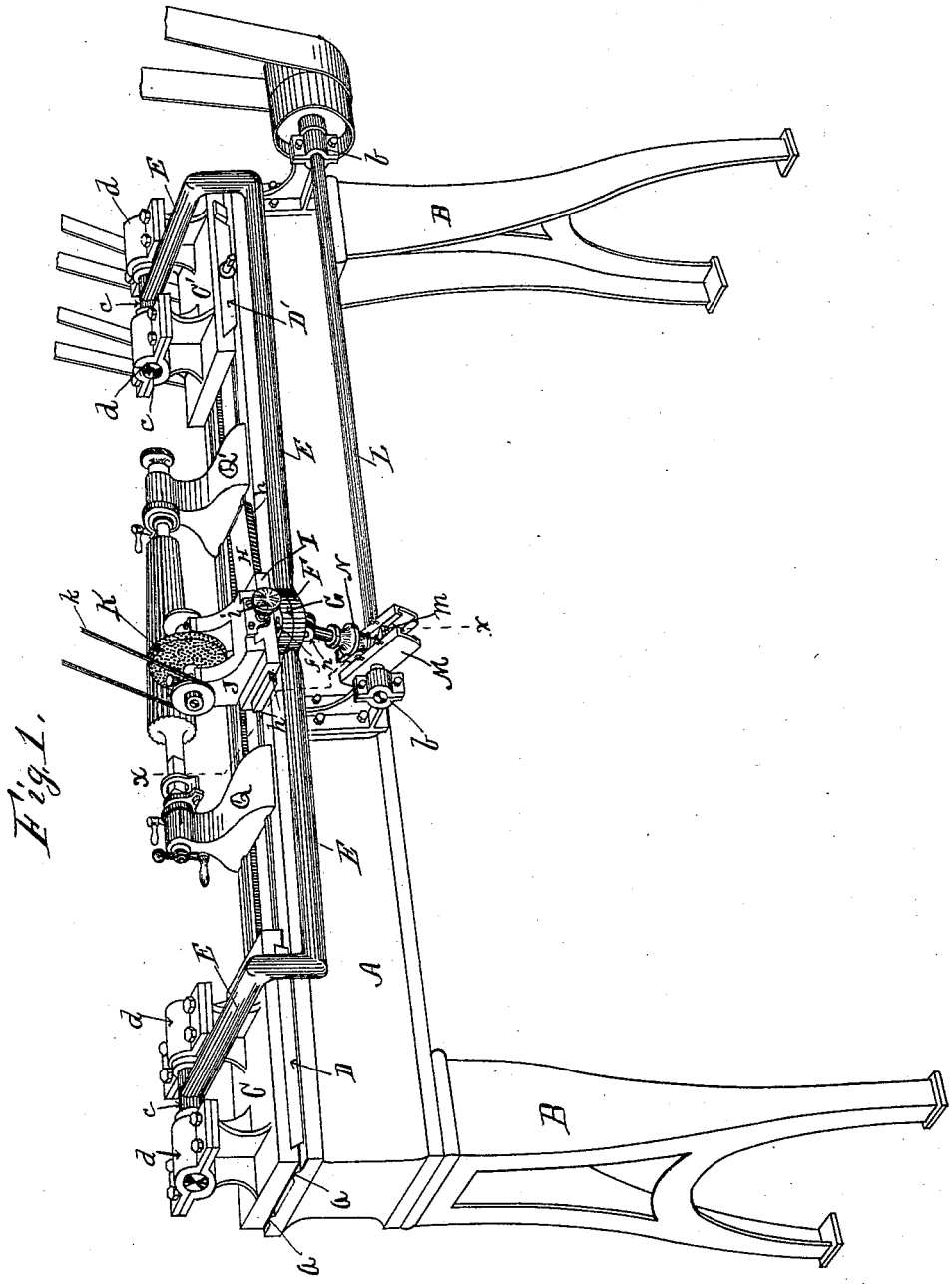

Fig. 1.

Witnesses.
G. J. Mead,
G. A. McDannell.

Inventor.
Rudolph Conrader
By J. H. Shugrue
Atty.

(No Model.) 2 Sheets—Sheet 2.

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Fig 2

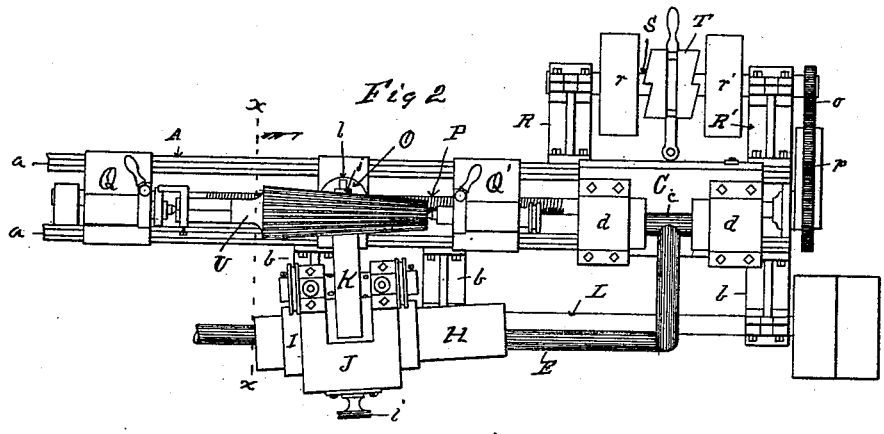
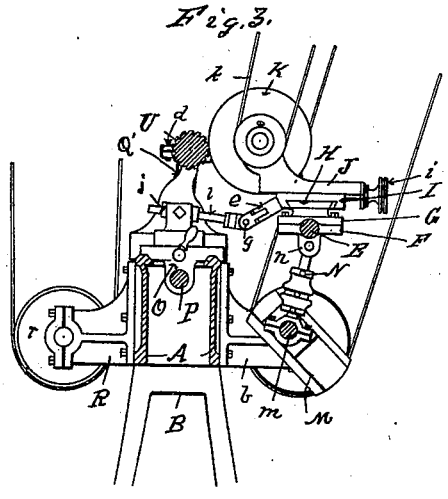


Fig. 3.



Witnesses.
G. J. Mead.
G. A. McDaniell.

Inventor
Rudolph Conrader
By H. Stringer
Att'y.

UNITED STATES PATENT OFFICE.

RUDOLPH CONRADER, OF ERIE, PENNSYLVANIA.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 404,686, dated June 4, 1889.

Application filed August 13, 1888. Serial No. 282,606. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH CONRADER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Grinding-Machines; 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 drawings, and to the letters of reference marked thereon, forming part of this specification.

My invention consists in the improvements in grinding-machines, hereinafter set forth and explained, and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of my machine, seen from the rear. Fig. 2 is a top or plan view of same. Fig. 3 is a cross-section of same on line *x x* in Figs. 1 and 2.

Like letters refer to like parts in all of the figures.

In the construction of my machine shown the frame consists of the bed A, supported upon legs B B, the frame A being provided with ways *a a*, similar to an ordinary lathe-frame. Upon each end of the frame A, I secure head-blocks C and C′, which are supported upon gibbed plates D D′, resting upon the ways *a a*, so that the head-blocks C and C′ may be moved crosswise upon the plates D D′, as and for the purpose hereinafter set forth. In bearings *d d* in the head-blocks C and C′, I mount the journals *c* of an oscillating bell-crank shaft E, which extends along the back of the bed A from one head-block C to the other C′.

Centrally upon the shaft E, I secure a circular horizontal plate F, and upon this plate a plate G, adapted to be rotated thereon and to be secured at any desired point by means of bolts passing through slots *f* in one of these plates, and to the upper plate G, I secure a rectangular plate H, the edges *h* of which form gibbed ways for the traverse of the bed-plate I of the grinding-carriage J, which rests thereon, the plate I being also gibbed crosswise, so that the grinding-carriage J may be adjusted in and out thereon by means of a set-screw *i* therein. In the carriage J is mounted an emery-wheel K, driven by a belt *k* from an overhead drum, (not shown,) in the usual manner.

Along the rear of the bed A, below the shaft E, I mount a shaft L in bearings *b* on the bed A, and I secure to the shaft L, directly below the plate F on the shaft E, a crank-disk M, having an adjustable wrist-pin *m* therein, whereby the length of the stroke of the crank can be varied at pleasure, and from the wrist-pin *m*, I extend an adjustable connecting-rod N to a bearing *n* on the under side of the plate F, so that the crank M operates to oscillate the shaft E and the grinding mechanism hereinafter described, mounted thereon and supported thereby, the shaft L being driven by a belt, in the usual manner.

To the inner edge of the grinder-carriage bed-plate I, I secure an arm *e*, at the outer end of which is a flexible joint *g*, from which a rod *l* extends to and through a bearing *j* in the feed-nut O, which is operated by an ordinary feed-screw P, so that the motion of the feed-nut O is communicated to the grinding-carriage J through the rod *l* and arm *e*, the carriage J being thereby moved longitudinally on the plate H to enable the grinding-wheel K to traverse the length of the work required.

On the bed A, between the heads C and C′, I secure adjustable tail-stocks Q Q′, between which the work to be ground is centered and secured. To the front side of the bed A, opposite the head C′, I secure brackets R R′, in which is mounted a shaft S, provided with a reversing-clutch T and pulleys *r r′*, which shaft is geared to the feed-screw P by gearing *o p*, in the usual manner, so that the feed-screw P may be run forward or backward, as desired. In operating this machine a taper reamer U (or other piece of work) to be ground is placed between the center of the tail-stocks Q Q′. The head-blocks C C′ are then adjusted across the bed A on their bed-plates D D′, so as to give the grinding-wheel K the proper radial movement, and the plate H is adjusted by means of its circular bearings G on the plate F, so that the angle of the traverse of the grinder-carriage J thereon will correspond with the taper of the reamer U. The machine is then started, the shaft L and its crank mechanism operating to oscillate the shaft E

and grinder-carriage J thereon, so as to preserve the radial contour of the work being ground, while the feed-screw operates the nut O, and thereby the grinder-carriage J, and causes it to travel back and forth along the work until completed.

I have thus described convenient mechanism for utilizing my invention so as to enable others to construct and operate the same; but it is obvious that many modifications may be made therein without departing from the spirit of my invention. Therefore,

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

1. The combination, in a grinding-machine, of a grinding-carriage supported by and traveling on an oscillating supporting-bed, with a traveling feed-nut, a feed-screw operating said nut, and a flexible connection between said grinder-carriage and said feed-nut, substantially as and for the purpose set forth.

2. The combination, in a grinding-machine, of adjustable head-blocks on the machine-frame, an oscillating bell-crank shaft mounted in said head-blocks, and an adjustable traveling grinder-carriage mounted on said shaft and supported thereby, with a shaft and crank mechanism connecting with and operating said oscillating shaft, substantially as and for the purpose set forth.

3. The combination, in a grinding-machine, of adjustable tail-blocks mounted on ways on the machine-frame and adapted to support work to be ground, with a grinder-frame mounted upon an oscillating bell-crank shaft adapted to be moved in and out to and from the work to be ground, said grinder-frame being adapted to travel laterally along said work on an adjustable bed secured to said oscillating bell-crank shaft, substantially as and for the purpose set forth.

4. The combination, in a grinding-machine, of a grinder-carriage traveling on an adjustable bed mounted upon a laterally-adjustable oscillating bell-crank shaft, with a flexible arm connecting said carriage with a feed-nut, and a reversible feed-screw operating said feed-nut, substantially as and for the purpose set forth.

5. The combination, in a grinding-machine, of the heads C C′, adapted to be adjusted across the bed A, and the oscillating bell-crank shaft E, mounted thereon, with the adjustable bed H, mounted on the shaft E, the grinder-carriage J, a rotary grinder K on said carriage J and traveling on said bed H, the crank M, connected to and operating to oscillate the shaft E and the grinder mechanism mounted thereon, and the reversible feed-screw P, nut O, and jointed arm *l e*, connecting said nut with the grinder-carriage J, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

RUDOLPH CONRADER.

Witnesses:

WILLIAM WALLACE,

H. J. CURTZE.