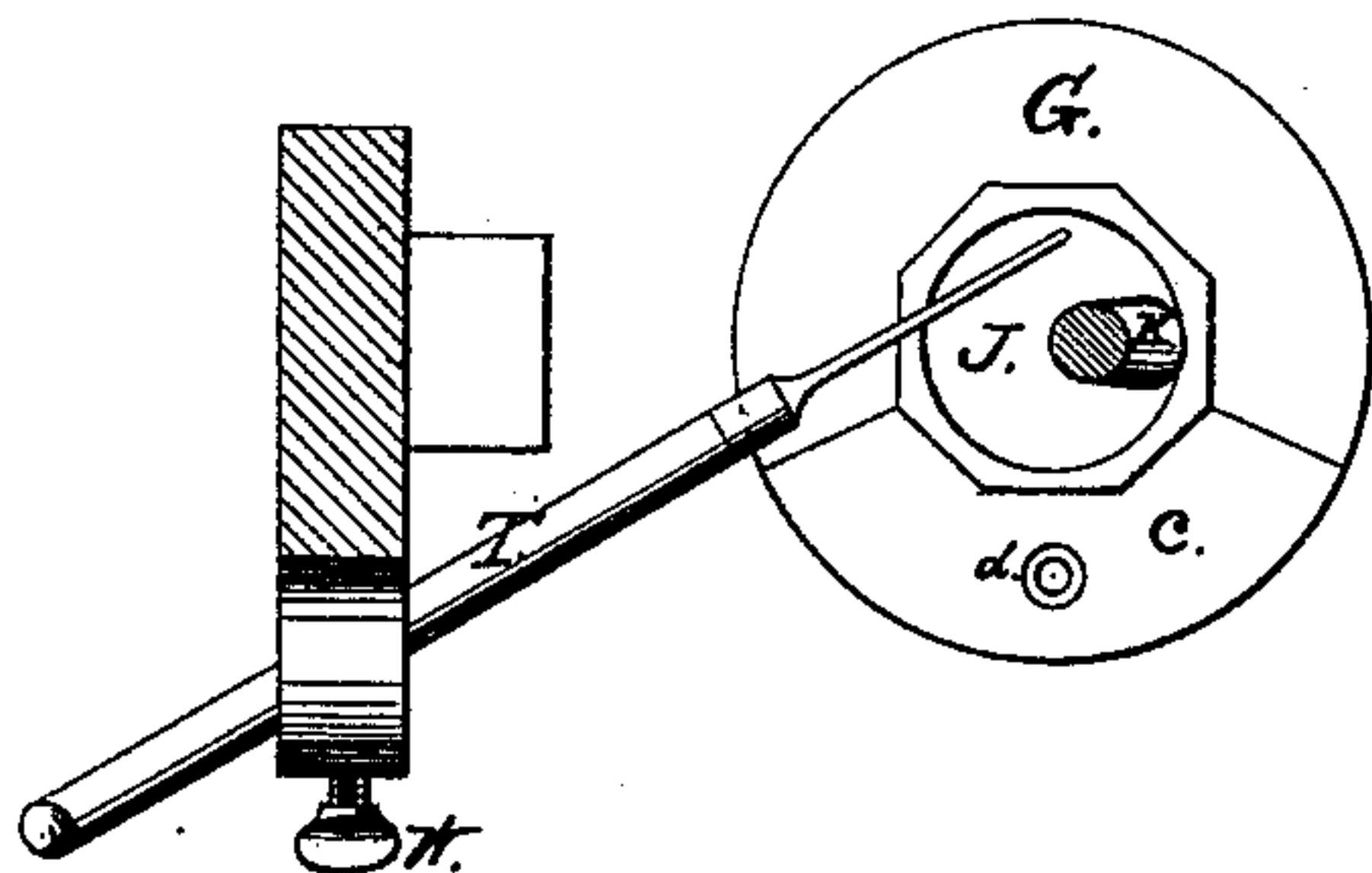


T. T. MORRELL.  
Grinding and Triturating Apparatus.

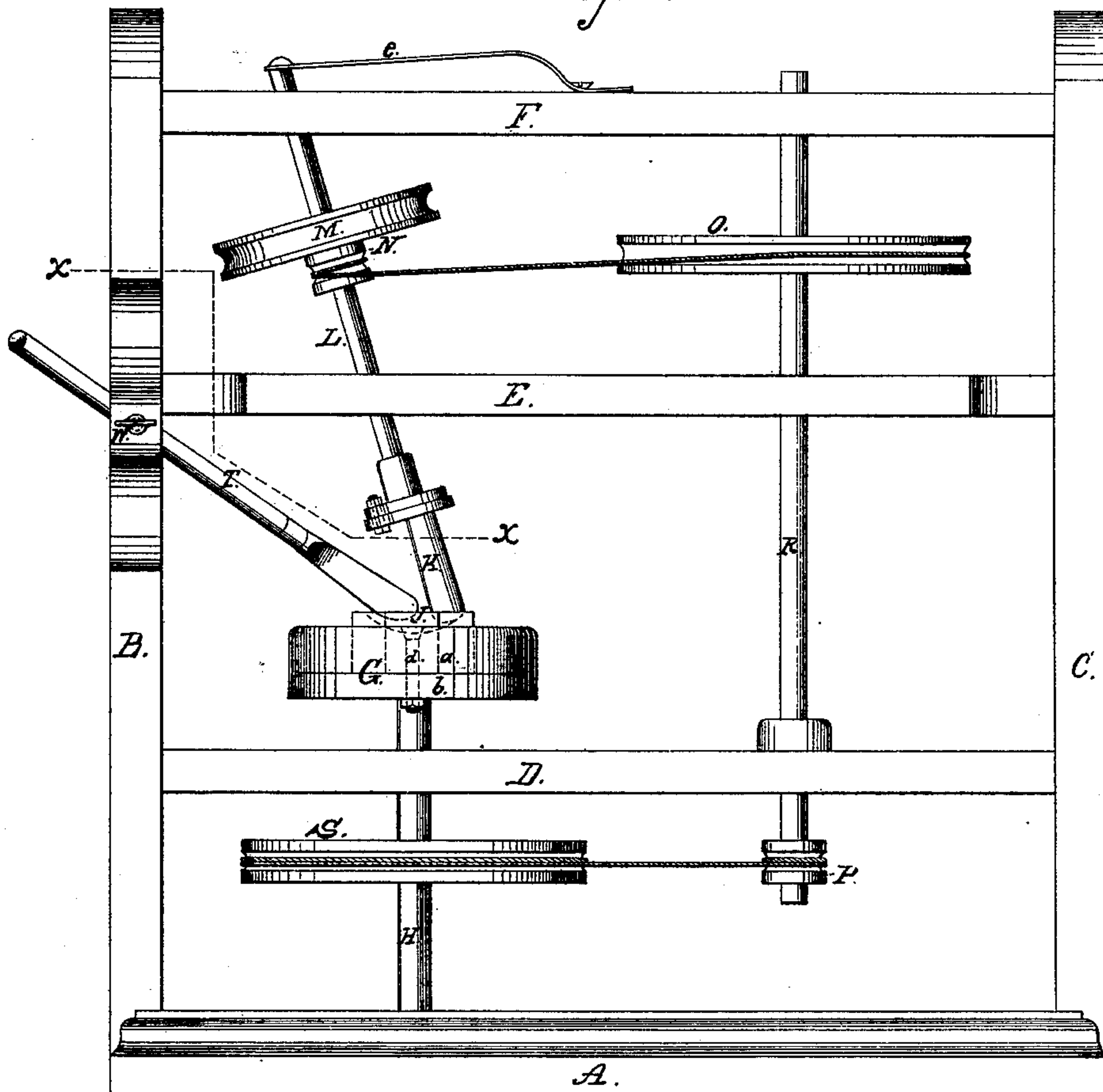
**No. 234,052.**

**Patented Nov. 2. 1880.**

*Fig 2.*



*Fig. 1.*



*Witnesses;*

Lynn Reed  
Harry C. Peabody

*Inventor:*

Thomas J. Morrell



# UNITED STATES PATENT OFFICE.

THOMAS T. MORRELL, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND CAMBRIA IRON COMPANY.

## GRINDING AND TRITURATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 234,052, dated November 2, 1880.

Application filed August 18, 1879.

*To all whom it may concern:*

Be it known that I, THOMAS T. MORRELL, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain  
5 Improvements in Grinding-Machines, of which the following is a specification.

My invention relates to grinding-machines adapted to the grinding of ores, minerals, clays, paints, and like materials; and its principal  
10 object is to supply simple and inexpensive apparatus which may be operated by hydraulic or other power for the grinding of materials used in shops and laboratories more perfectly than it can be done by the exhausting hand-  
15 labor generally employed for the purpose. It will be found especially useful to chemists for the reduction to powder of ores and minerals to be analyzed. For their use a machine of small dimensions and but little cost will be  
20 found to be very effective.

In the accompanying drawings, Figure 1 is a side elevation of my improved grinding-machine. Fig. 2 is a partial horizontal section through dotted line *xx*, Fig. 1, showing  
25 the arrangement of the mortar, pestle, scraper, and bolt for attaching and running the mortar.

In the drawings the same parts are designated by the same letters.

The frame of the machine consists of the  
30 bed-plate A, the uprights or housings B C, and the cross-pieces D E F, which sustain and carry the operating parts. G is a head having a socket keyed upon and revolving with the upright shaft H, which shaft has a bearing in  
35 the cross-piece D, and is supported by and turns in the bed-plate A. J is a mortar fitting into the top of the socketed head G, and this mortar is constructed preferably octagonal on the outside, which is also the shape of the  
40 socket. The head G is constructed of two disks, an upper, *a*, and lower, *b*, screwed together horizontally, the upper disk, *a*, holding the mortar and having its segment *c*, equal to three  
45 of the octagonal sides of the mortar, removable as a means of taking out and replacing the mortar when desired. This segment *c*, when the mortar is in position for use, is fastened to the lower disk of the socket by the  
50 bolt or screw *d*.

K is a pestle, bolted to the lower end of the

inclined shaft L by means of a face-plate, and it is eccentric to this shaft, the purpose of its eccentricity being to cause it to describe a circle when revolved by the shaft L. The shaft L is deflected from the perpendicular to give  
55 the pestle a direct bearing on its point in traveling from the center to the side of the mortar J. This shaft passes through bearings in the cross-pieces E F, and its end, after passing through cross-piece F, is taken by the spring  
60 *e* on the top of the cross-piece F, which spring gives to the pestle such pressure upon the materials in the mortar as is required, while allowing such vertical motion to the pestle as  
65 will accommodate it to the size of the pieces of material to be ground.

The motion of the pestle in passing from the center to the side of the mortar may be varied by making its attachment to its shaft more or  
70 less eccentric, this motion of the pestle from the center to the side of the mortar, or from near the center in the direction of its circumference, being especially effective as one of the principal objects which my devices are intended to accomplish.

M is the driving-pulley, which is hung on  
75 the main shaft L, moving the pestle, and from which shaft motion is communicated to the operating parts by means of the pulley N on main shaft and pulleys O and P on the vertical shaft R and pulley S on mortar-shaft H, by  
80 which arrangement of shafts and pulleys the mortar-shaft is driven; and the mortar can be made to revolve in the same direction as the pestle or in a direction contrary to it. Most  
85 generally it will be desirable to drive the mortar and pestle in the same direction, but in grinding oily and damp substances and similar materials it is best to drive them in opposite directions.

T is a scraper, attached to the upright B  
90 nearest to the mortar in such a way as to extend into and clean the inner edges of the mortar and draw the material in the mortar into a position to be caught by the pestle. This  
95 scraper may be a thin blade of iron, steel, or other material, attached to a handle which is fastened to the upright B by a thumb-screw, as shown at W, or by any similar device.

To operate the machine bands, belts, or cords 100

are properly arranged upon the pulleys, the mortar is partially filled with material broken to a convenient size, and power is applied to the driving-pulley M.

5 Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of pestle K, inclined shaft L, and a mortar, J, adapted to be rotated  
10 by suitable mechanism, the said pestle being secured eccentrically to the said shaft and

adapted to traverse the said mortar between its center and sides, as and for the purpose set forth.

2. The combination of inclined shaft L, pestle 15 K, mounted eccentrically thereon, spring e, mortar J, and shafts R H, as and for the purpose set forth.

THOMAS T. MORRELL.

Witnesses:

CYRUS ELDER,  
HARRY S. PEELOR.