

W. BALL.
Ore Mill.

No. 8,835.

Patented Mar. 30, 1852.

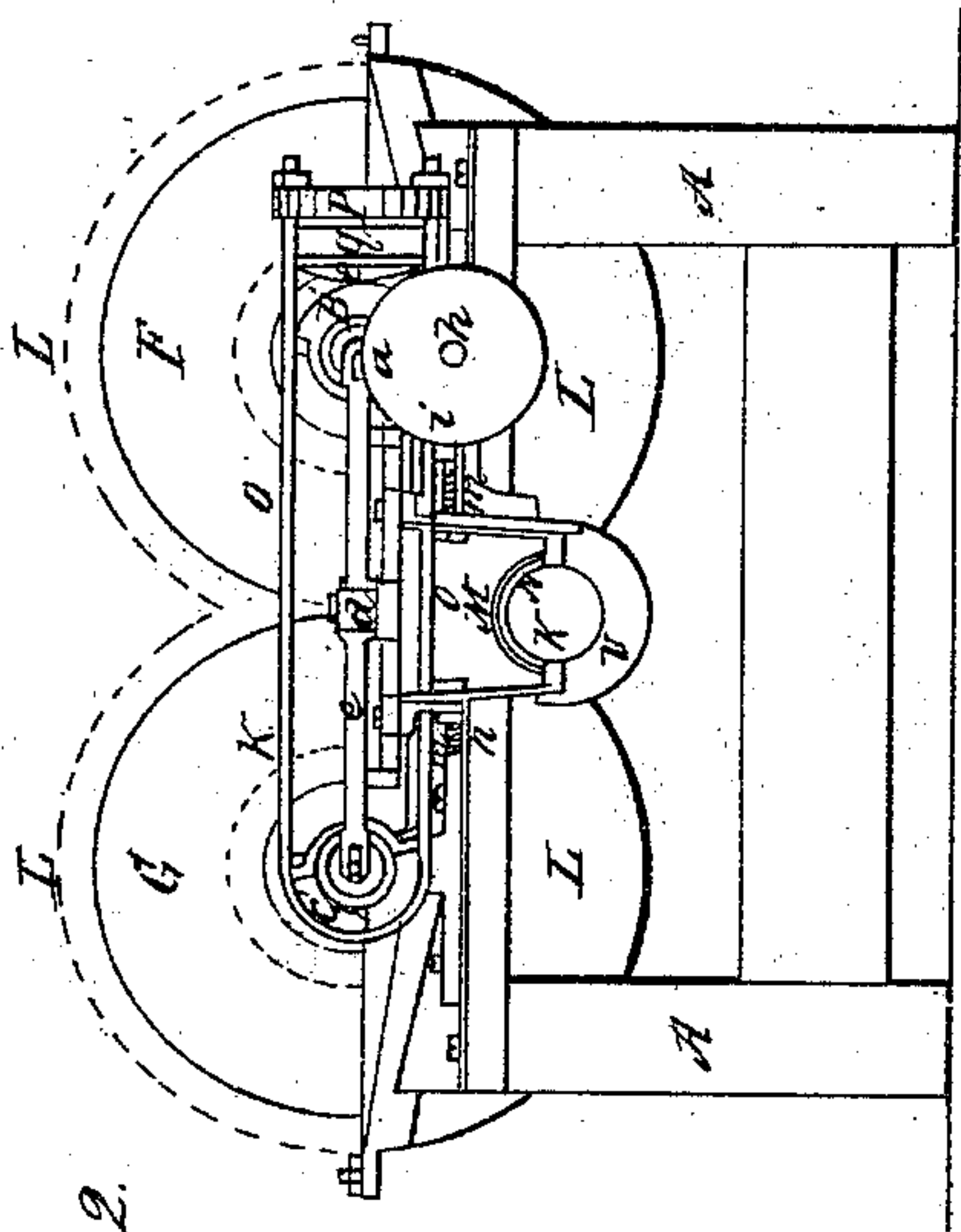


Fig. 2.

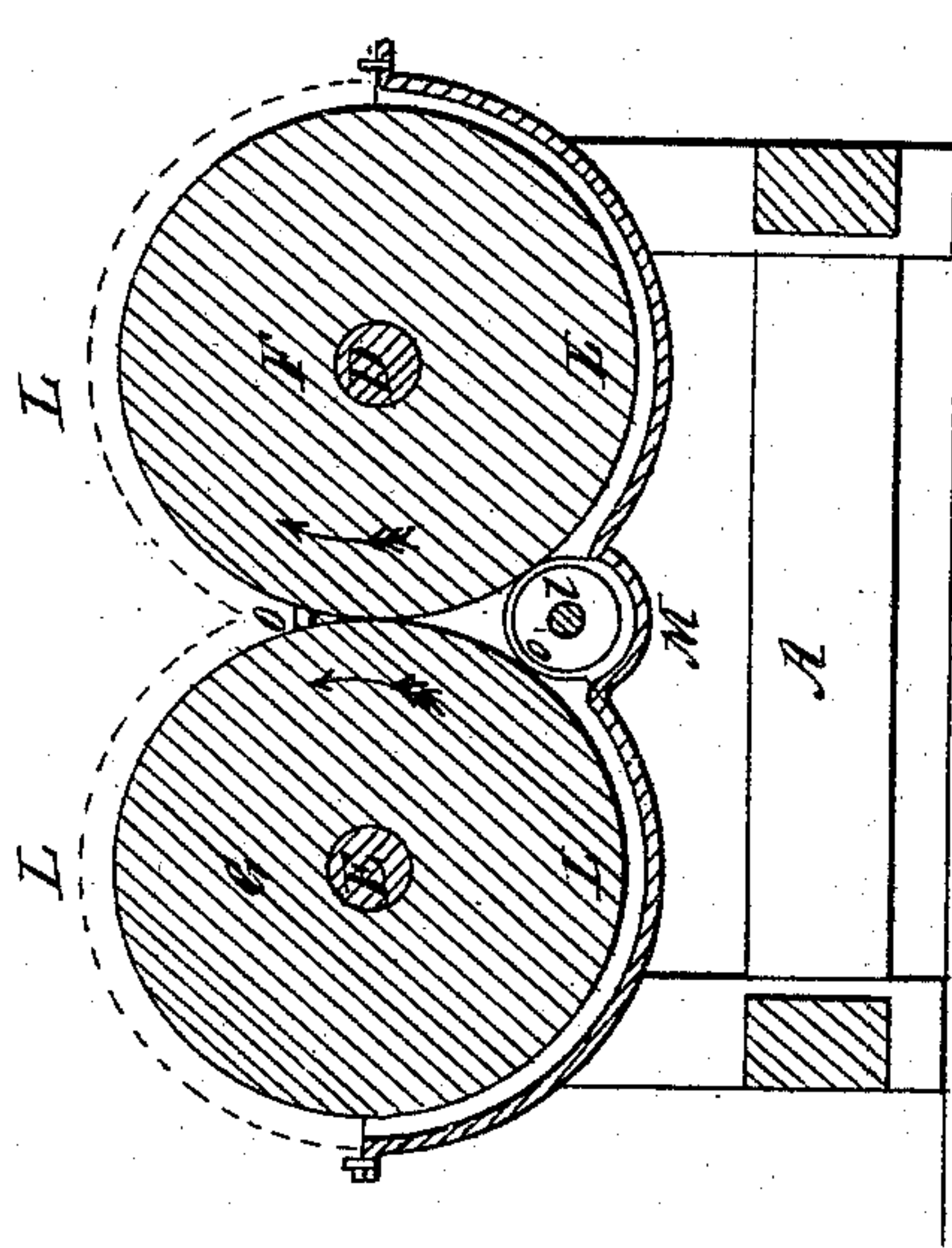


Fig. 3.

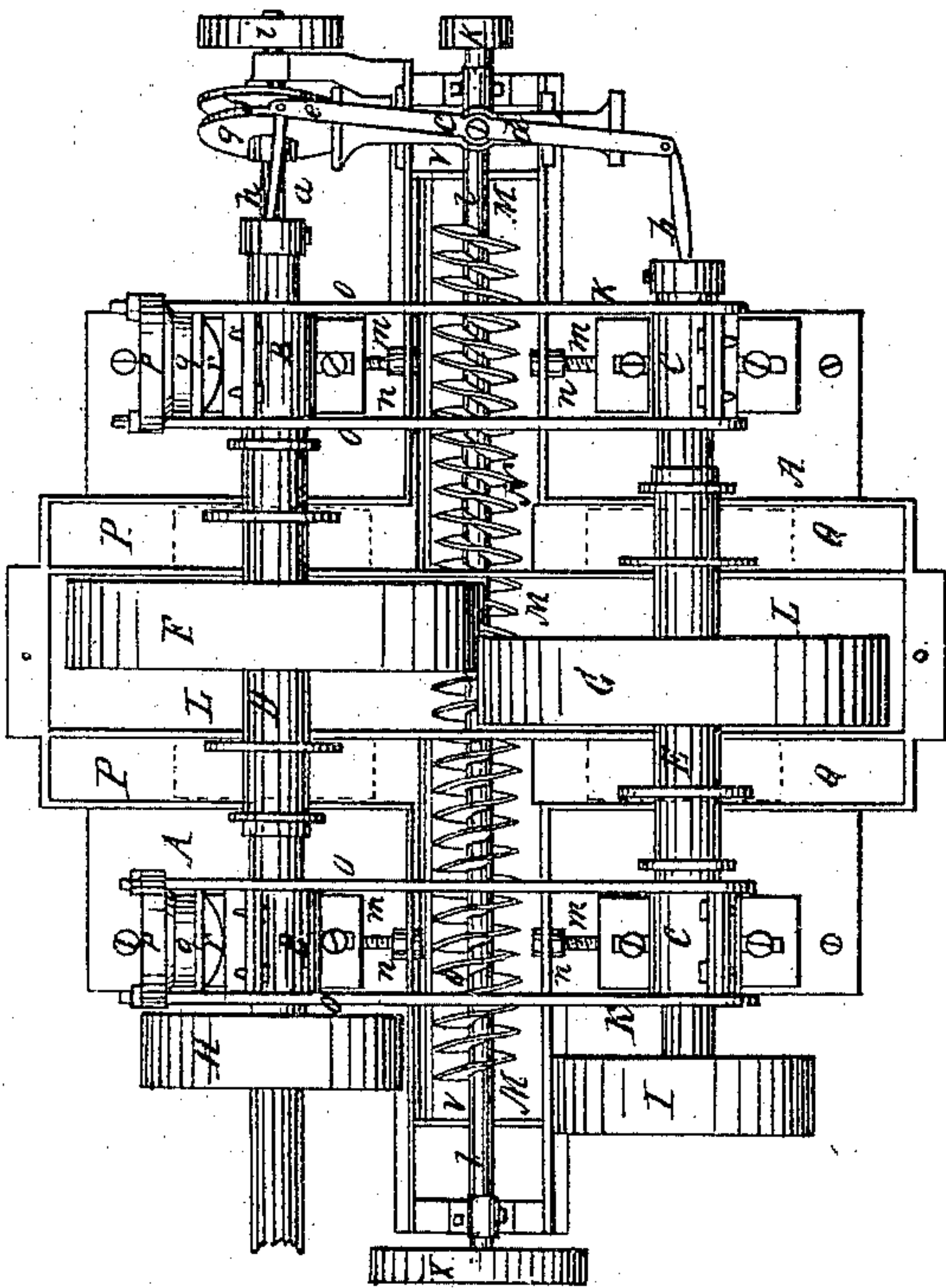


Fig. 1.

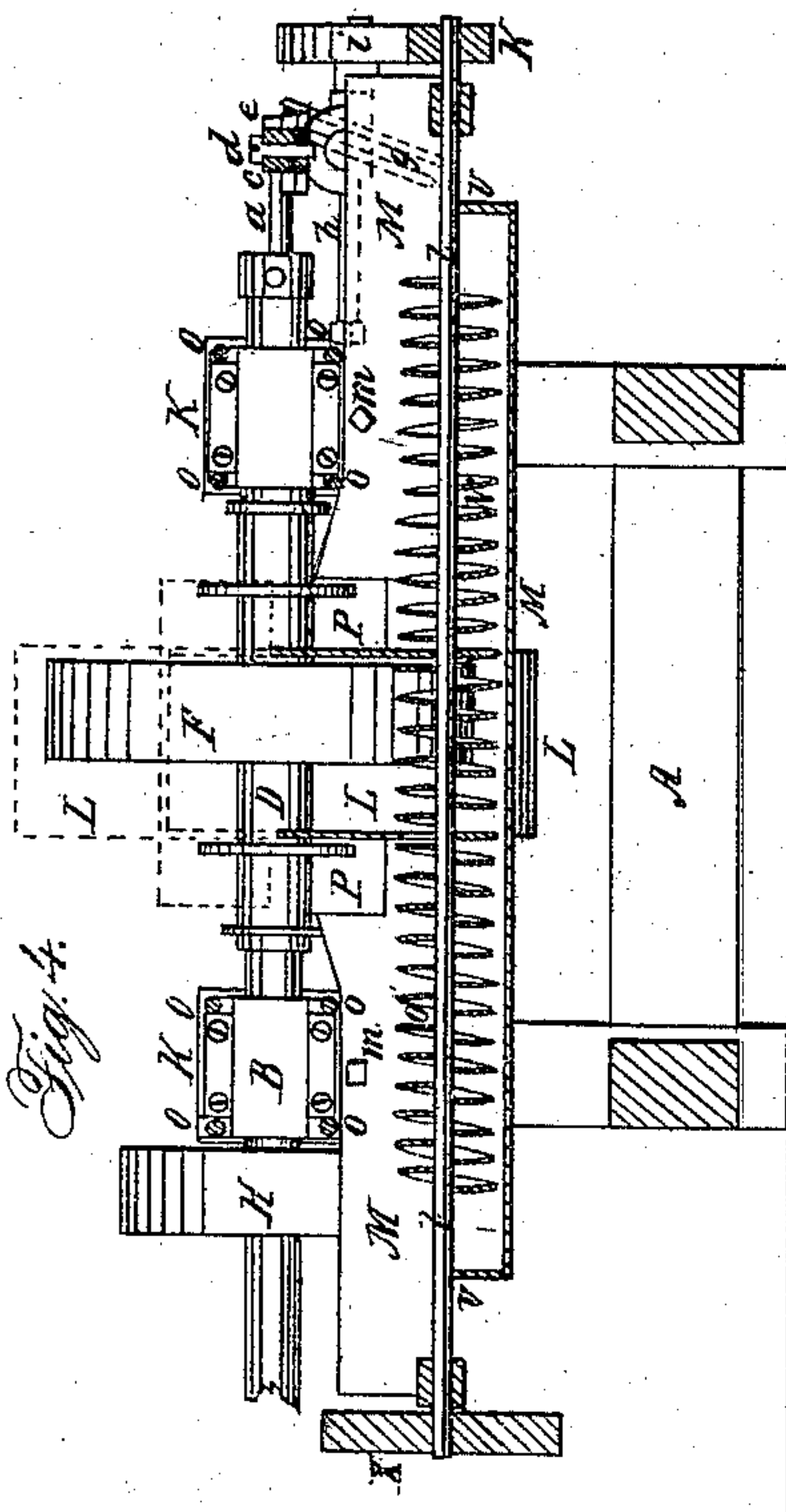


Fig. 4.

UNITED STATES PATENT OFFICE.

WILLIAM BALL, OF CHICOPEE, MASSACHUSETTS.

IMPROVEMENT IN MILLS FOR GRINDING ORES.

Specification forming part of Letters Patent No. 8,835, dated March 30, 1852.

To all whom it may concern:

Be it known that I, WILLIAM BALL, of Chicopee, in the county of Hampden and State of Massachusetts, have invented a new and useful or improved machine for pulverizing or grinding auriferous or other ore after it has been crushed or reduced by stamps or a stamping-machine; and I do hereby declare that the same is fully described and represented in the following specification and accompanying drawings, letters, figures, and references thereof.

Of the said drawings, Figure 1 denotes a top view of my said machine; Fig. 2, an end elevation of it; Fig. 3, a vertical and central section taken through the grinding-wheels. Fig. 4 is a vertical and central section taken between the grinding-rollers and in line of the axis of the endless screw or screws on each side of and beneath them.

In the said drawings, A represents the framework which sustains the operative parts, to be hereinafter described, such frame being constructed in any suitable manner. Over the frame and sustained by boxes B B' C C' two horizontal and parallel shafts, D E, are arranged, each of the said shafts being made to support and carry on its middle part a metallic grinding-wheel, F or G. The boxes B B' C C' are so made and the shafts so constructed that the latter may not only freely turn or revolve within the former, but freely slide in longitudinal directions through them. Each of the said shafts has a driving drum or pulley, H or I, fixed on or near one end of it, the other end of each shaft being jointed to one of two connecting-rods, a b, by a ball-and-socket joint, or such a one as will not only allow the shaft to freely revolve, but allow the connecting-rod to have any horizontal motion such as would be imparted to it during the endwise movement of its shaft and that of a horizontal lever, c, that turns on a stationary fulcrum, d, in its middle, and is jointed at its two ends to the two connecting-rods, all as seen the drawings. The joint-pin e of the end of the said lever is made to enter the groove f of a cam, g, that is arranged under it and fixed on a horizontal shaft, h, which shaft is put in motion by an endless belt made to run around a pulley, i, fixed on it, and another pulley, k, fixed on the endless screw-shaft l, so that when

the said screw-shaft is put in revolution the grooved cam g will be rotated in such manner as to produce a reciprocating vibratory movement of the lever c, and thereby produce a simultaneous reciprocating longitudinal movement of the two shafts D E and their grinding-wheels F G.

Each of the boxes B B' C C' is to be so confined down upon the frame-work as to be capable of being slid or moved horizontally in directions at right angles to the shafts, and each of the boxes is made to abut against the end of one of four screws, m m m m, arranged and screwed, respectively, through small stationary standards n n n n, as seen in the drawings.

A stirrup-frame, K, formed of two stirrup-rods, o o, (bent as seen in the drawings,) and a flat square plate, p, to which such rods are connected by screws and nuts, is applied to the two boxes B C or B' C', that are situated on either side of the grinding-wheels. The rods o o are made to clasp or be bent around the boxes C C', while between each of the other two boxes, B B', and the adjacent plate p an india-rubber or other suitable elastic spring, q, is interposed, one end of it being made to rest against a bearing-plate affixed to the plate p, while the other end of it rests against a bearer, r, affixed to the box. Such contrivances applied to the boxes not only serve to regulate the distance of the peripheries of the grinding-wheels asunder, but they allow the two wheels to spring apart from one another should any ore or matter get between them which they could not readily crush. It will readily be seen that by means of the screws m m m m the distance apart of the two wheels is regulated, while the stiffness or elastic power of the springs keeps them close together.

The grinding-wheels may or may not be made to revolve at the same speed. I prefer that the speed of revolution of one should be a little quicker than that of the other, in order that they may not wear unevenly. Their endwise movements also prevent them from wearing unevenly during the process of grinding or crushing the material submitted to them.

Each grinding-wheel is partially submerged in a case, box, or trough, L, arranged as seen in the drawings, and made to cover the lower half or the whole of it, which trough connects at its middle with a long horizontal trough, M,

that is semicircular in its bottom and stands at right angles to the trough L.

The endless screw-shaft *l*, hereinbefore mentioned, revolves within the trough M and carries upon it two endless screws, N O, one being a right and the other a left threaded screw. These screws at their junction are brought close up within the angle between the peripheries of the two wheels, and the screws are so made and operated or rotated by a belt made to pass over a pulley, *x*, as to cause pulverized matters lying in their respective troughs to be moved toward the grinding-wheels. Lateral troughs for conveyance of water charged with ore into the trough M are arranged as seen at P P Q Q in Fig. 1. They drop the water into the trough close to the grinding-wheels in order that the charged water may flow in a current from the middle of the trough M toward and over each end *v* of it.

Water charged with ore from the stamp-mill is suffered to flow into and down the troughs P P Q Q and into the trough M, where it will deposit such earthy or metallic particles or substances as are not light enough to be carried by the current that flows through the trough M. Such deposited matters will be moved by each of the endless screws toward

the grinding-wheels, and as these wheels are made to revolve toward one another and upward (as denoted by the arrows in Fig. 3) they will draw up with the current of water which they raise such earthy matters and crush or grind them between them, and will continue to operate on such until they are sufficiently reduced or pulverized to be borne out of the machine by the current or currents of water setting through the trough M.

What I claim as my invention is—

The combination and arrangement of the two grinding or pulverizing wheels, one or two endless screws, and the troughs which such wheels and screw or screws revolve in, all made and applied so as to operate together in such manner as to raise the ore up and crush it between the two wheels, and not only return or move the heavier or too weighty particles toward or back to the wheels, but allow the lighter ones or sufficiently reduced particles to flow out of the machine, as described.

In testimony whereof I have hereto set my signature this 6th day of February, A. D. 1852.

WM. BALL.

Witnesses:

CHAS. R. LADD,
ISAAC BUTTON.