

(No Model.)

2 Sheets—Sheet 1.

L. POULIN.
GRINDING MILL.

No. 443,295.

Patented Dec. 23, 1890.

FIG. 1.

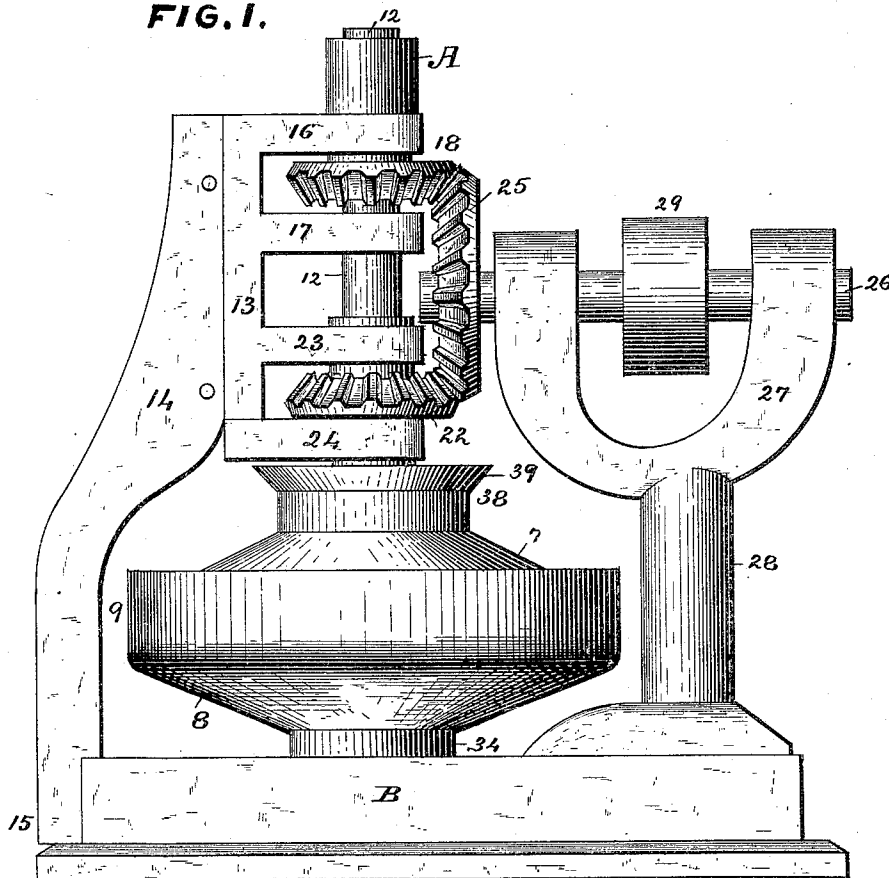


FIG. 6.

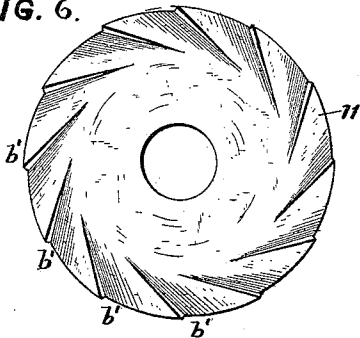
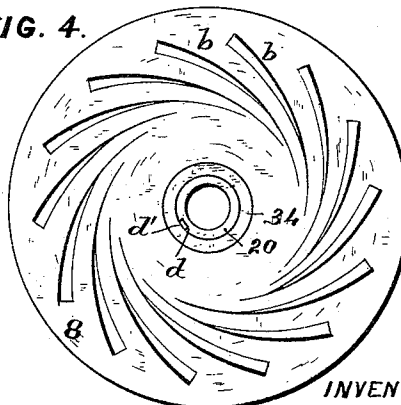


FIG. 4.



ATTEST.

J. Henry Kaiser.
Benj. Munroe

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Lucien Poulin.

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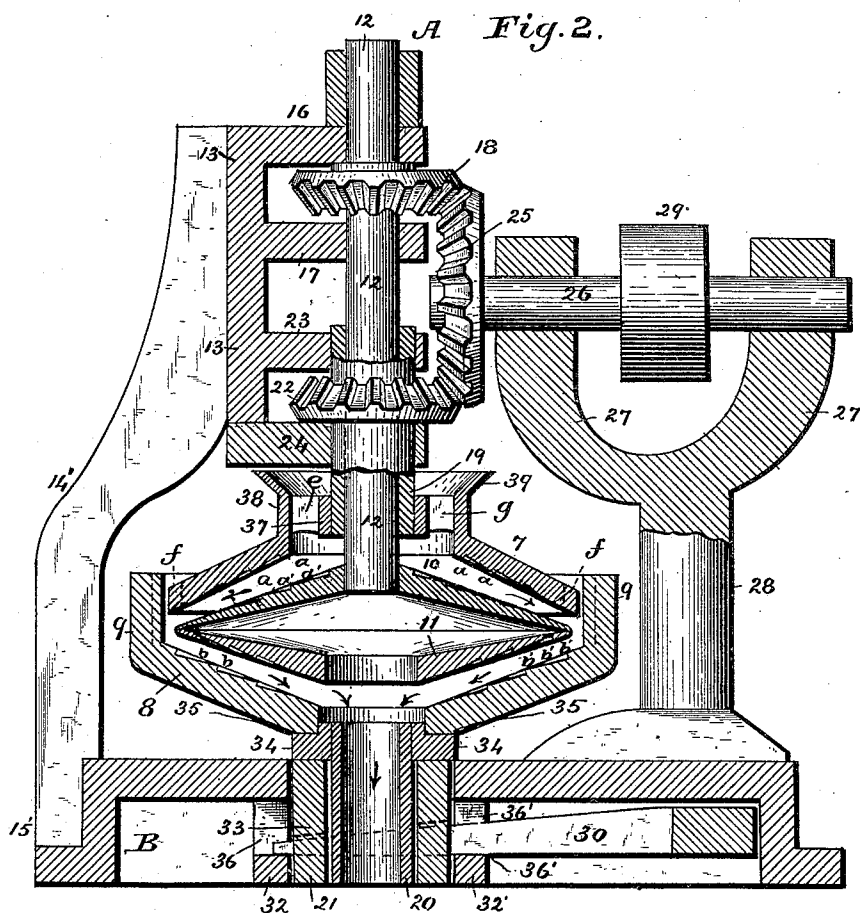


Fig. 5.

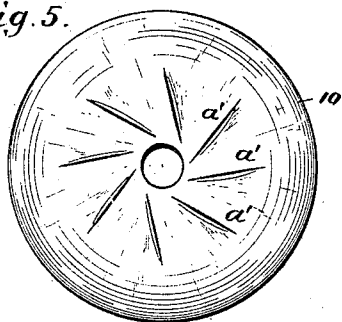
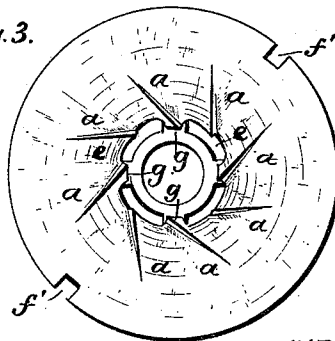


Fig. 3.



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UNITED STATES PATENT OFFICE.

LUCIEN POULIN, OF GUNDERSON, MONTANA.

GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 443,295, dated December 23, 1890.

Application filed October 1, 1890. Serial No. 366,731. (No model.)

To all whom it may concern:

Be it known that I, LUCIEN POULIN, a subject of the Queen of Great Britain, who have declared my intention to become a citizen of the United States of America, residing at Gunderson, in the county of Silver Bow and State of Montana, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

The object of my invention is the construction of a grinding-mill for the purpose of comminuting auriferous and argentiferous rock after the same has been partly reduced by other machinery, and I attain my object by the mechanism hereinafter described.

In the drawings, Figure 1 is a side elevation of my mill. Fig. 2 is a vertical section of the same. Fig. 3 is a detail of the upper grinding-surface of the shell. Fig. 4 is a detail of the lower grinding-surface of the shell. Fig. 5 is a detail of the upper grinding-surface of the core, and Fig. 6 is a detail of the under grinding-surface of the core.

Like letters and figures refer to the same parts throughout the several views.

The grinding-surfaces consist of the inner surfaces of a double cone-shaped shell formed by the parts 7 and 8 and the outer approximating surfaces of a hollow double cone-shaped core formed by the parts 10 and 11, susceptible of being revolved in opposite directions. The lower portion of the shell is seated upon the annular shoulder 34 at seat 35, and is supplied with a rim 9, which may be cast integrally therewith, projecting above the upper portion of the shell and forming a zone inclosing the point of junction of the upper and lower portions of the shell. The annular shoulder 34, being subject to wear, should be cast separately and attached by any suitable means, so that it may be removed when worn out. The upper portion of the shell 7 fits within the rim 9 as a lid or cover, forming a joint sufficiently tight to prevent the escape of the material which is being ground, and holds to and revolves the lower portion of the shell 8 by means of the flanges upon the inner side of rim 9, which enter slots *f'*, Fig. 3, in the upper portion of the shell for that purpose. The upper and lower

portions of the core are rigidly attached at their edges. They are cast separately for convenience, and the core is hollow, so as to render it of light weight. Of course it may be cast in one piece and solid. The upper portion of the shell is provided on its inner concave side, radiating from its top, with grinding-furrows *a a a a*, extending outwardly and downward, being deeper at the top and gradually disappearing, so as to leave the lower and outer portion of this concave surface smooth. The opposing and approximating upper portion of the core 10 is supplied with similar grinding-furrows *a' a' a' a'* on its convex surface, similarly located to those on the upper portion of the shell and gradually disappearing toward the outer edge. The lower portion of the shell 8 and of the opposing and approximating lower portion of cone 11 are similarly supplied with grinding-furrows *b b b b* and *b' b' b' b'*, except that these grinding-furrows are most prominent at the outer edge on both shell and core and gradually disappear downwardly and inwardly, leaving smooth surfaces as the center or top is approached. Thus the opposing approximating surfaces of shell and core conjoin to grind the material passing between them. By this arrangement of the grinding-ridges the material is subjected to the action twice, once immediately on entering between the upper grinding-surfaces and again on commencing the passage between the lower grinding-surfaces. The core is attached by its upper portion at the apex thereof to the core-shaft 12, and is suspended thereby within the shell. The core-shaft has its bearings upon head A, which sustains the shaft vertically and in the supporting-fingers 16 and 17 of the block 13, extending inwardly over the center of the frame-bed B. The block 13 is attached to and held between the standards 14 and 14', fixed to the side of the frame-bed at 15 and 15'. The gear-wheel 18 is rigidly attached to this shaft between its bearings 16 and 17. The shell is attached by its upper portion at the apex thereof to the sleeve 19 by a band 37, which the sleeve enters. The band 37 is rigidly held in place by bars *g*, connecting the band and terminating rim 38 of the upper portion of the shell 7, thus forming an annular opening *e* between the terminating rim 38 and

band 37 for the admission of the material to be ground. A small hopper 39 surmounts the terminating rim of the upper portion of the shell 7. The lower portion of the shell has at its base the hollow gudgeon 20, fixed in the annular shoulder 34 and revolving in the vertically-adjustable box 21, located in the base of the frame-bed, upon which the annular shoulder 34 has its bearing. The annular shoulder 34 carries the boss *d'*, Fig. 4, which engages in slot *d* in gudgeon 20, for the purpose of strengthening the fastening of the gudgeon to the annular shoulder. The sleeve 19 carries the gear-wheel 22 between the fingers 23 and 24 of the block 13. The bearings of sleeve 19 are in fingers 23 and 24 of block 13 and the gear-wheel 22 resting and revolving upon finger 24. The horizontal gear-wheels 18 and 22 mesh with a vertical gear-wheel 25 upon horizontal driving-shaft 26, having its bearings upon either horn of the U-shaped supports 27, resting on the single standard 28, which has its support and base upon the frame-bed B. Between the horns 27 upon driving-shaft 26 is the driving-pulley 29. The U-shaped support for bearings of horizontal driving-shaft 26 is placed on its single supporting-standard a little off its center to bring the inner bearing as near as possible to vertical gear-wheel 25, which is the point at which power is to be applied.

The box 21 is located in the frame-bed between cross-braces 32 and 32' (shown in section in Fig. 2) and the legs of a bifurcated wedge-shaped key 30, one leg of which is shown in Fig. 2, which rests upon cross-braces 32 and 32' at right angles with the cross-braces in mortises 36 and 36' prepared for its reception. There are projections 33 on either side of box 21, which conform to and rest upon the upper and beveled side of the wedge-shaped key 30, so that driving the key inwardly raises the box and with it the shell, and withdrawing it permits the box and shell to be lowered by gravity. The object of having this box 21 vertically adjustable is the adjustment of the lower portion of the shell 8 with reference to the lower portion of core 11, so that the grinding-surfaces thereon may be regulated in their separating distance according to the wish of the operator.

Power being applied to the driving-pulley 29, it is communicated by the gearing heretofore described to the core-shaft and sleeve, respectively, carrying the core and shell, revolving them in opposite directions. The partially-crushed rock to be operated upon, intermingled with water, enters between the grinding-surfaces through the annular opening *e* and, following the direction of the arrows in Fig. 2, passes downward between the grinding-surfaces and is discharged through the hollow gudgeon 20, comminuted to the extent desired.

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

1. In a grinding mill, a double cone-shaped shell having on the inner side of its upper portion grinding-furrows extending from its top outwardly and downwardly, deeper at the top and gradually disappearing so as to leave the lower and outer portion of the concave surface smooth, and on the inner concave side of the lower portion of the shell similar grinding-furrows, deeper at the outer edge thereof and gradually disappearing downwardly and inwardly, in combination with a double cone-shaped core located within the shell, having grinding-furrows on the convex surfaces of its upper and lower portions similar to those upon the shell, forming opposing and approximating grinding-surfaces of shell and core operating in conjunction to grind material passing between them, the shell and core being susceptible of revolution in opposite directions, as and for the purposes specified.

2. In a grinding-mill, the herein-described double cone-shaped shell and core, having on the upper portions of the grinding-surfaces thereof opposing and approximating grinding-furrows extending from their top outwardly and downwardly, deeper at the top and gradually disappearing so as to leave the lower and outer parts of both grinding-surfaces smooth, and similar grinding-furrows on the lower portions thereof, deeper at their outer edge and gradually disappearing downwardly and inwardly, in combination with the shaft 12, head A, block 13, supporting-standards 14 14', gear-wheel 18, sleeve 19, gear-wheel 22, vertical gear-wheel 25, driving-shaft 26, and driving-pulley 29, having the U-shaped supports 27 resting on the standard 28, as and for the purposes specified.

3. In a grinding-mill, the herein-described double cone-shaped shell and core, having on the upper portions of the grinding-surfaces thereof opposing and approximating grinding-furrows extending from their top outwardly and downwardly, deeper at the top and gradually disappearing so as to leave the lower and outer part of both grinding-surfaces smooth, and similar grinding-furrows on the lower portions thereof, deeper at their outer edge and gradually disappearing downwardly and inwardly, in combination with the annular shoulder 34, forming a seat for the lower portion of the shell, the vertically-adjustable box 21, and wedge 36, operating as and for the purpose specified.

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

LUCIEN POULIN.

Witnesses:

R. C. JOHNSTON,
H. HENDERSON.