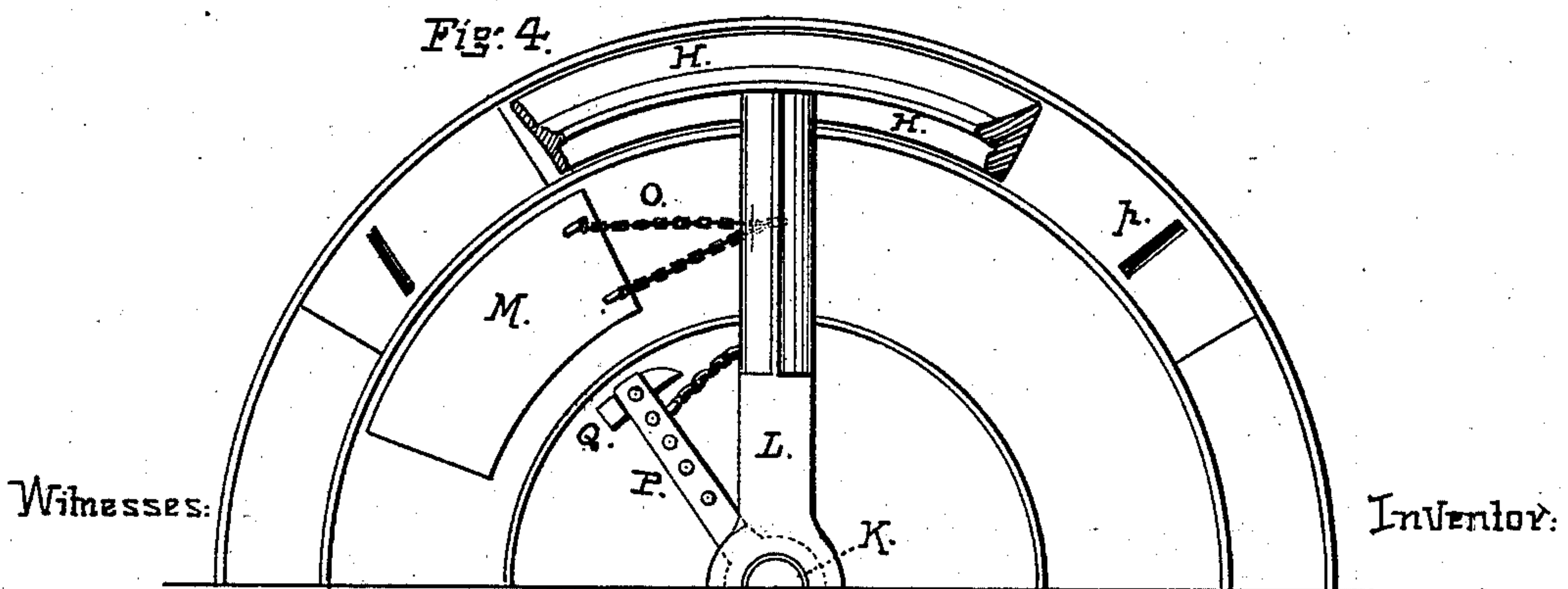
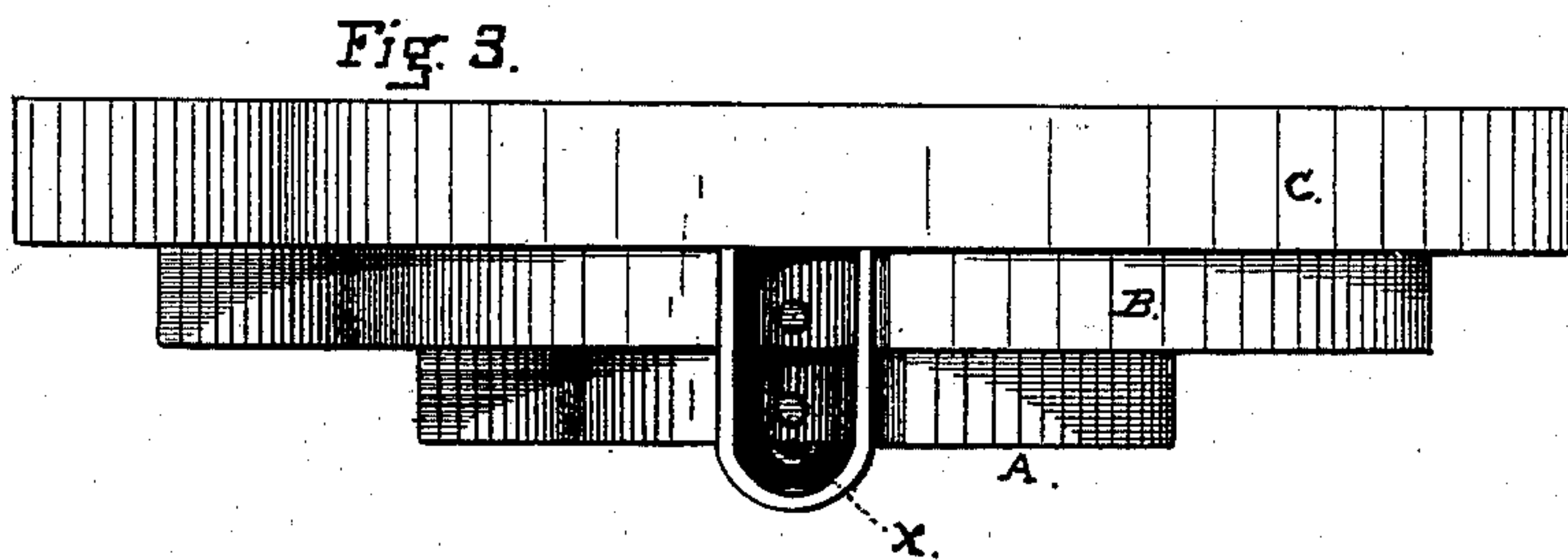
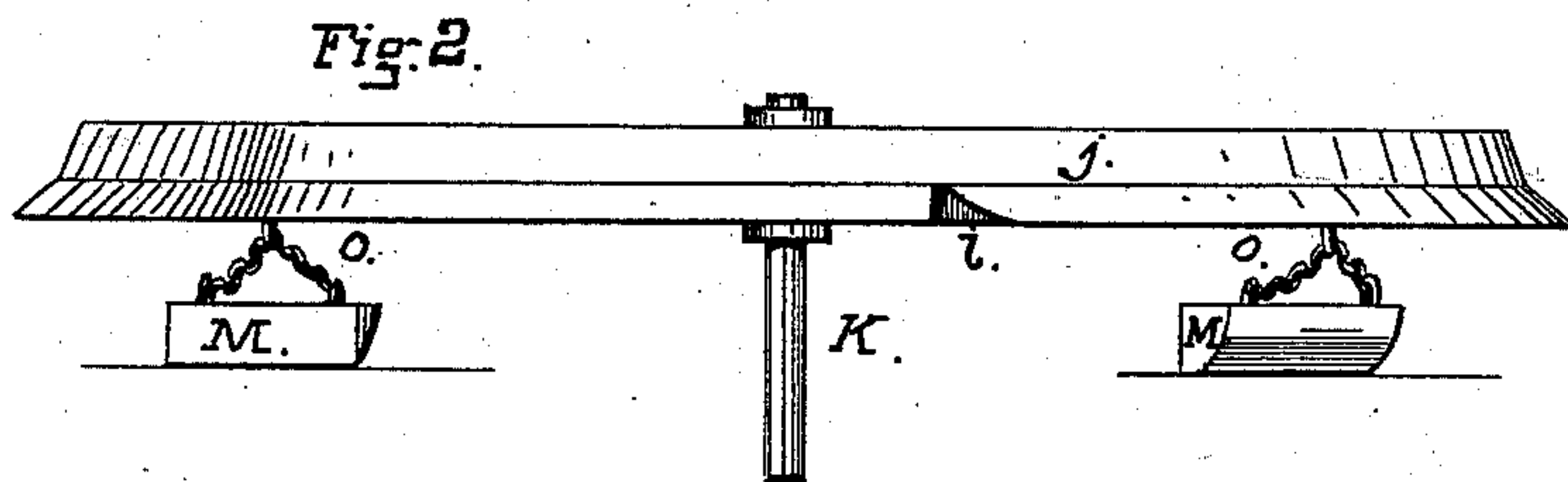
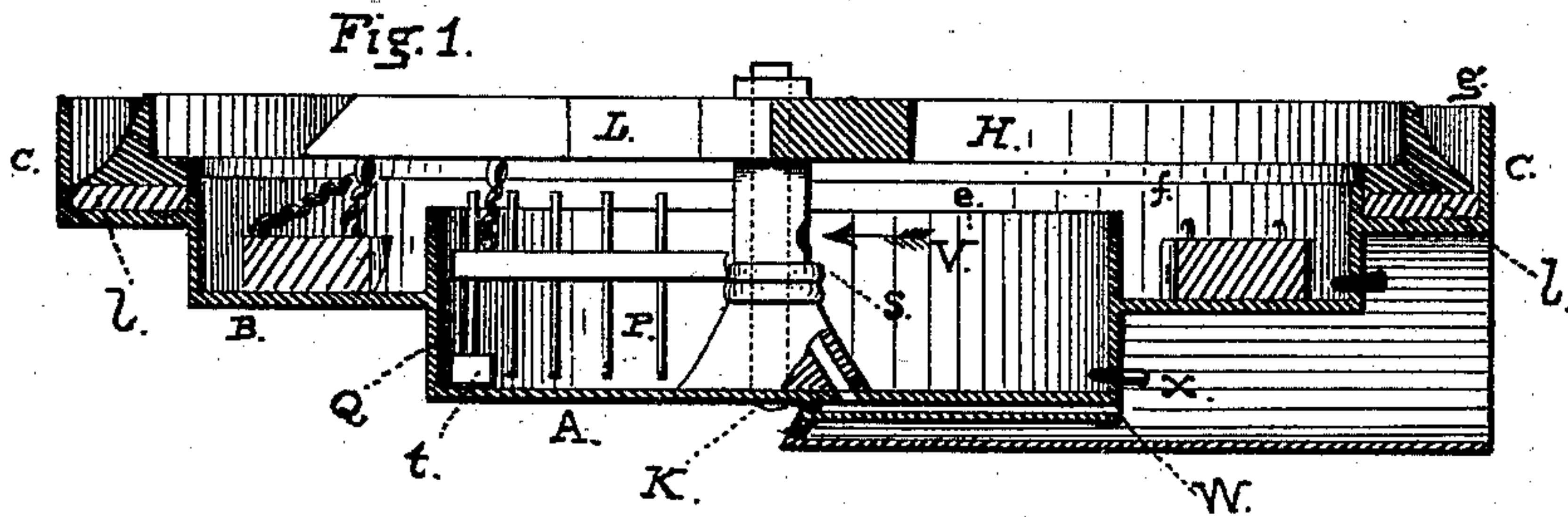


A. B. PAUL.
Ore Grinding Mill.

No. 232,364.

Patented Sept. 21, 1880.



Witnesses:

Inventor:

Wm. H. Clark
Jas. L. Boone

Almarion B. Paul

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Atty's.

UNITED STATES PATENT OFFICE.

ALMARIN B. PAUL, OF SAN FRANCISCO, CALIFORNIA.

ORE-GRINDING MILL.

SPECIFICATION forming part of Letters Patent No. 232,364, dated September 21, 1880.

Application filed December 23, 1879.

To all whom it may concern:

Be it known that I, ALMARIN B. PAUL, of the city and county of San Francisco, in the State of California, have invented an Improved Ore-Grinding Mill; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates to certain improvements in the construction and arrangement of the arrastra or ore-mill for which Letters Patent No. 213,527 were issued to me on the 5th day of March, 1879.

In the machine as originally constructed the ore was fed at the center of the pan, and the grinding operation was accomplished by drags which moved around in a track near the center, while the stirring and discharging of the pulp were carried on at the outer circumference of the pan. This machine operated very well; but I soon found that the stirrers were operated too fast, while the grinders operated too slow. I have therefore reversed the operation, so as to grind at the outer circumference and stir and discharge at the center. To do this I have altered the construction of the machine, as hereinafter described.

Referring to the accompanying drawings, Figure 1 is a vertical section through *xx*, Fig. 3. Fig. 2 is an elevation and detail of the grinding-ring and drags. Fig. 3 is a front elevation. Fig. 4 is a one-half plan view, part of the grinding-ring broken away.

The pan I construct with three compartments, A B C, the floors of which are on different levels. The center or lowest compartment, A, is a complete pan in itself. The compartment B is similar in form and surrounds the pan A, and its floor is higher than the floor of the compartment A. The rim *e* of pan A projects above the floor of compartment B, forming the inside rim of the annular channel. The outer compartment, C, is also annular in form, and its floor is still higher than the floor of compartment B. The outer rim, *f*, of compartment B extends above the floor of compartment C, so as to form its inner rim, and it has an outer rim, *g*, which is higher still than the inner rim, *f*. The outer annular compartment or channel, C, is the grinding-compartment. The intermediate compartment or chan-

nel is the arrastra, while the center pan or compartment is the settling-compartment, from which the pulp is discharged.

On the bottom of the outer compartment, C, I place a die which extends entirely around the channel, and upon this die rests the grinding-ring H, which also extends entirely around the channel, resting upon the die, which is provided with transverse cuts *i* at intervals on its under side to admit the ore under the grinding-ring. This ring has a vertical rim, *j*, projecting upward from it, so as to form a channel between this rim and the outer rim, *g*, of the compartment into which the substance to be ground is fed.

In the annular die *l*, I make one or more cavities or recesses, *p*, at intervals, in which a body of mercury is contained.

A vertical spindle, K, which is driven by appropriate mechanism underneath the pan, passes up through the center of the central compartment, A, and its upper end is secured in a cross-beam, L, which extends across the pan, and has its ends attached to the grinding-ring on opposite sides. Now, when this spindle is driven the grinding-ring will be caused to move around in a circle, so as to grind the substance which passes under it, while the quicksilver-cavities arrest and retain any particles of free gold that may be liberated and caught by them. The drags M, which move in the intermediate compartment, B, are connected with the cross-beam L by chains O, so that they follow the ring.

A rake, P, has one end connected to a ring or band, *s*, which surrounds the spindle K, while its opposite or outer end is supported on the outer edge of the floor of the central compartment by a vertical rod, Q, on the lower end of which is a shoe, *t*. The outer end of the rake is connected with the cross-beam L by a chain, so that it also follows the rotation of the ring.

It will be noticed that by this arrangement the grinding is done at the outer circumference of the pan, where the greatest speed is attained, while the settling is at the center, where the slowest speed is found.

The material to be treated is fed into the annular channel outside of the grinding-ring and gradually finds its way underneath the

ring, where it is subjected to the grinding action. It then flows over the rim *f* into the compartment B, where it is subjected to the grinding action of the drags. From this channel it flows over into the central compartment, A, where it is subjected to the stirring action of the rake, by which the metallic substances are settled and the lighter portion is discharged through an opening, V, in the central cone, in the ordinary way, whence it passes into the trough W, which conducts it away. An opening, *x*, is also made in the bottom or side of the central compartment, A, through which the entire contents of the compartment can be drawn off, if desired. This opening is arranged to discharge into the spout or trough W.

By this arrangement I provide an extremely simple and effective arrastra or ore-mill, which is a great improvement upon my former mill. Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an ore-grinding mill, the pan having the central stirring and settling and discharging compartment, A, an outer grinding-compartment, C, and an intermediate arrastra or drag compartment, B, with their floors on different levels, substantially as specified. 25

2. In an ore-grinding mill, the combination, with the outer grinding-chamber, C, of the grinding-ring H, connected to the beam L, driven by a central spindle, K, substantially as and for the purpose set forth. 30

3. The circular grinding-ring H, having a vertical rim, *j*, and connected to a driving-spindle, in combination with a circular grinding-chamber, substantially as set forth. 35

In witness whereof I have hereunto set my hand and seal.

ALMARIN BROOKS PAUL. [L. S.]

Witnesses:

E. CHAQUETTE,
JOHN RAFFERTY.