No. 724,019. PATENTED MAR. 31, 1903.

E. F. KNOTTS.

MULLER FOR GRINDING OR AMALGAMATING MILLS.

APPLICATION FILED JUNE 9, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

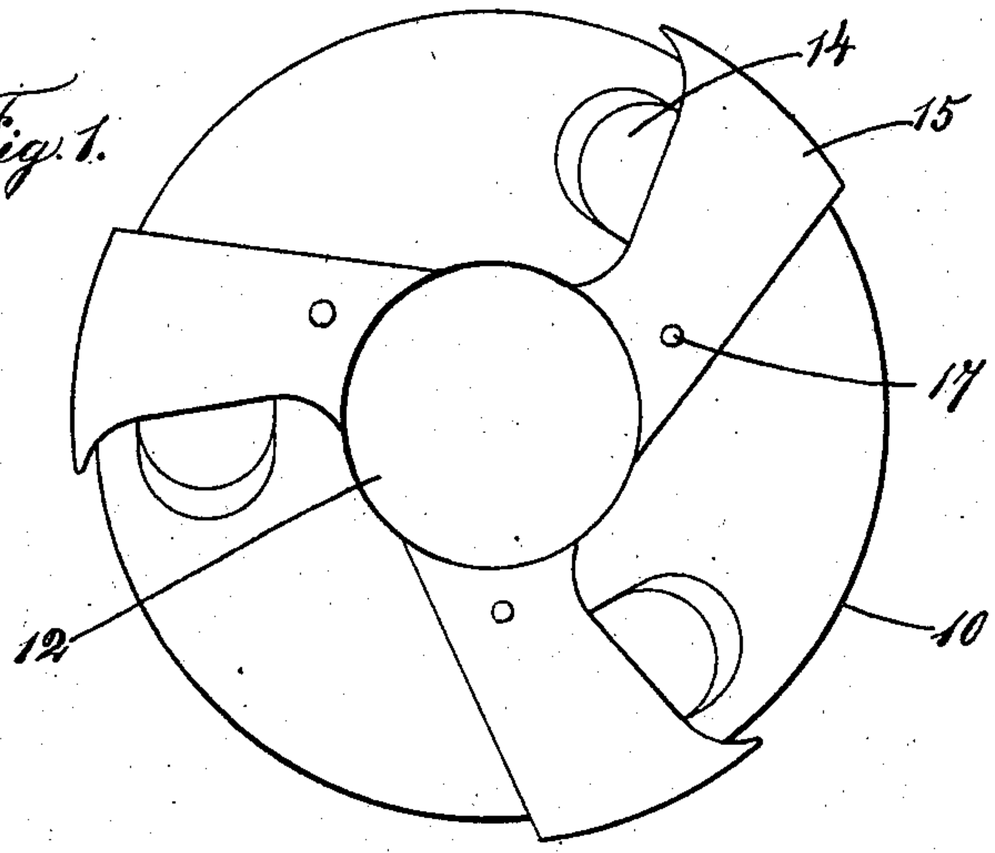


Fig. 3.

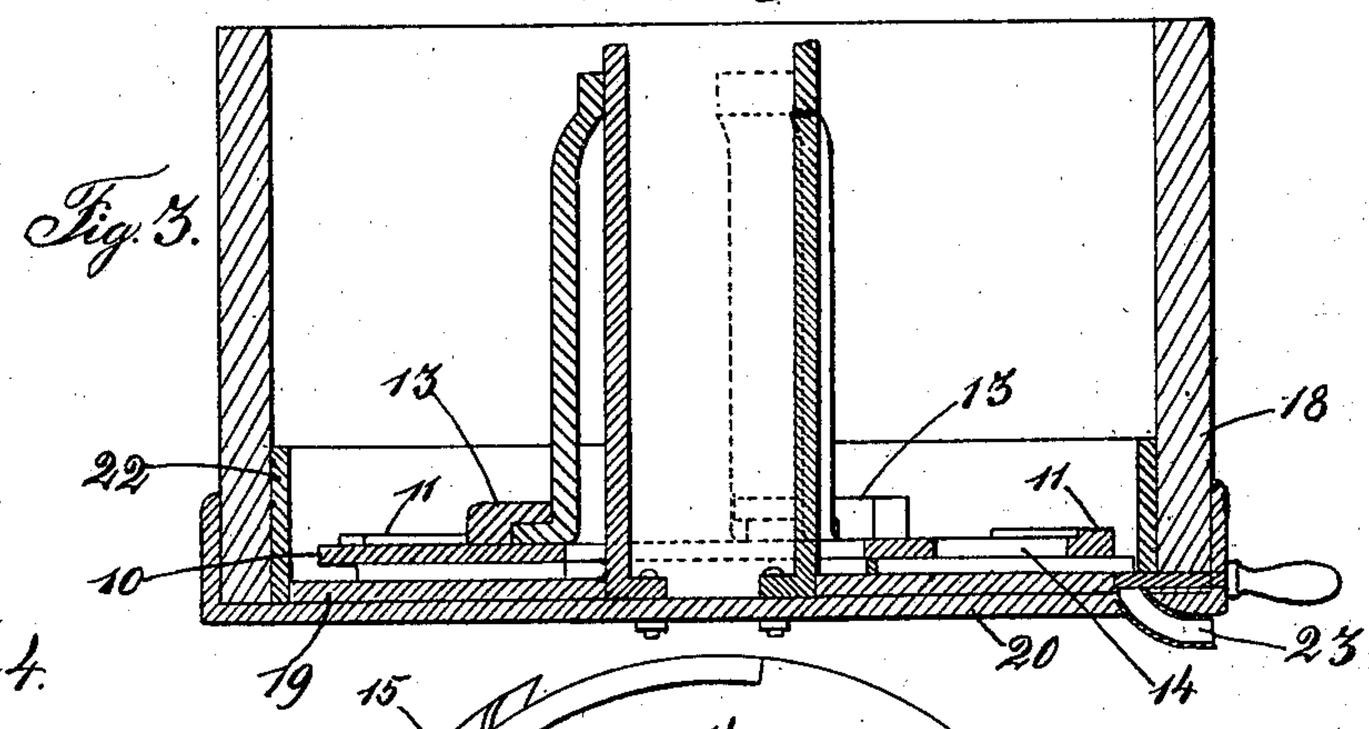


Fig. 4.

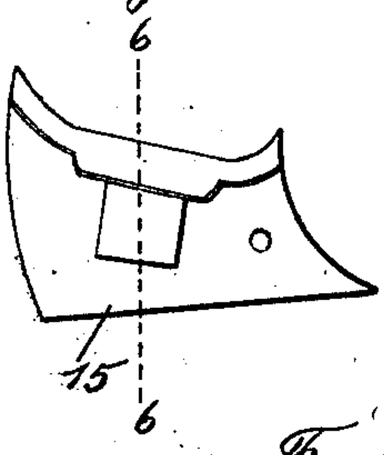
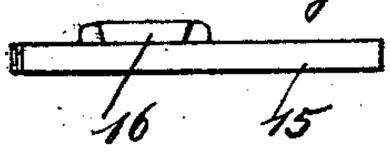


Fig. 5.



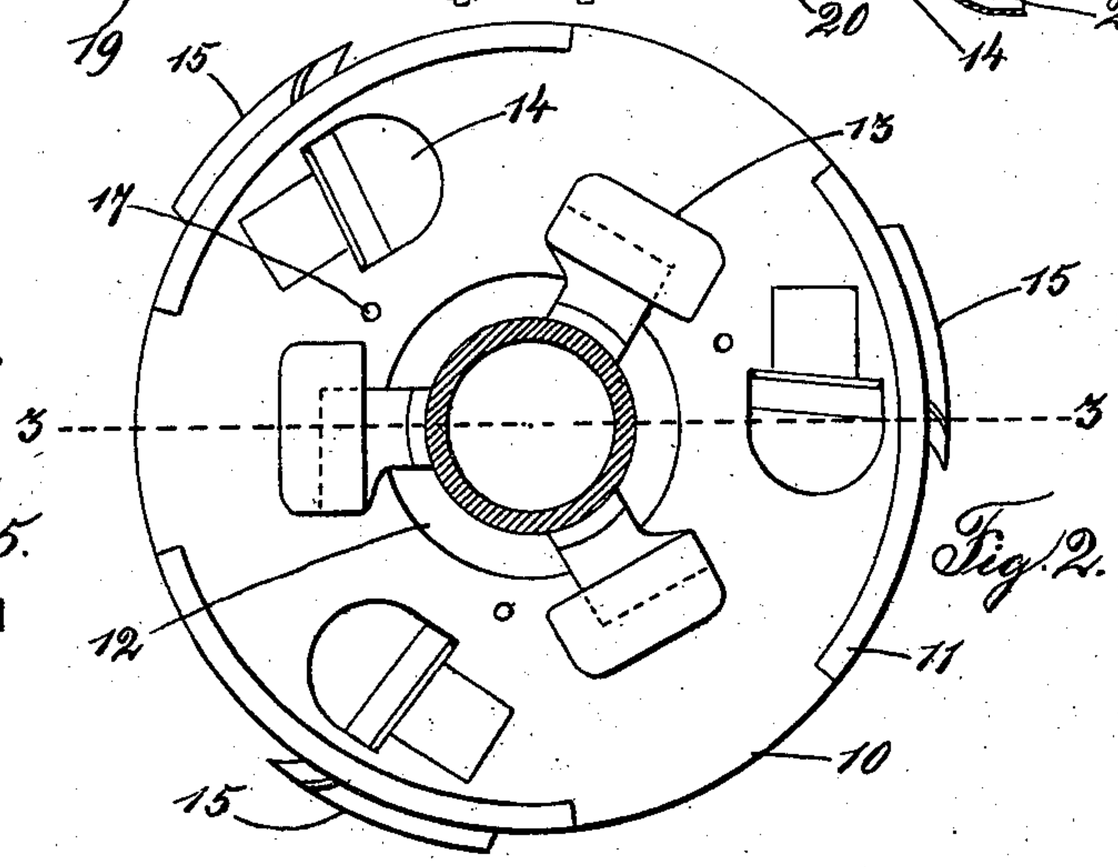
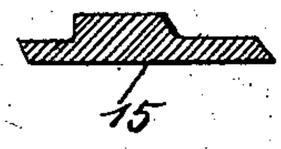


Fig. 2.

Fig. 6.



Witnesses:
Henry Manger.
F. R. Lowery.

Inventor: E. Franklin Knotts.
by Quigg & Lane Atty's.

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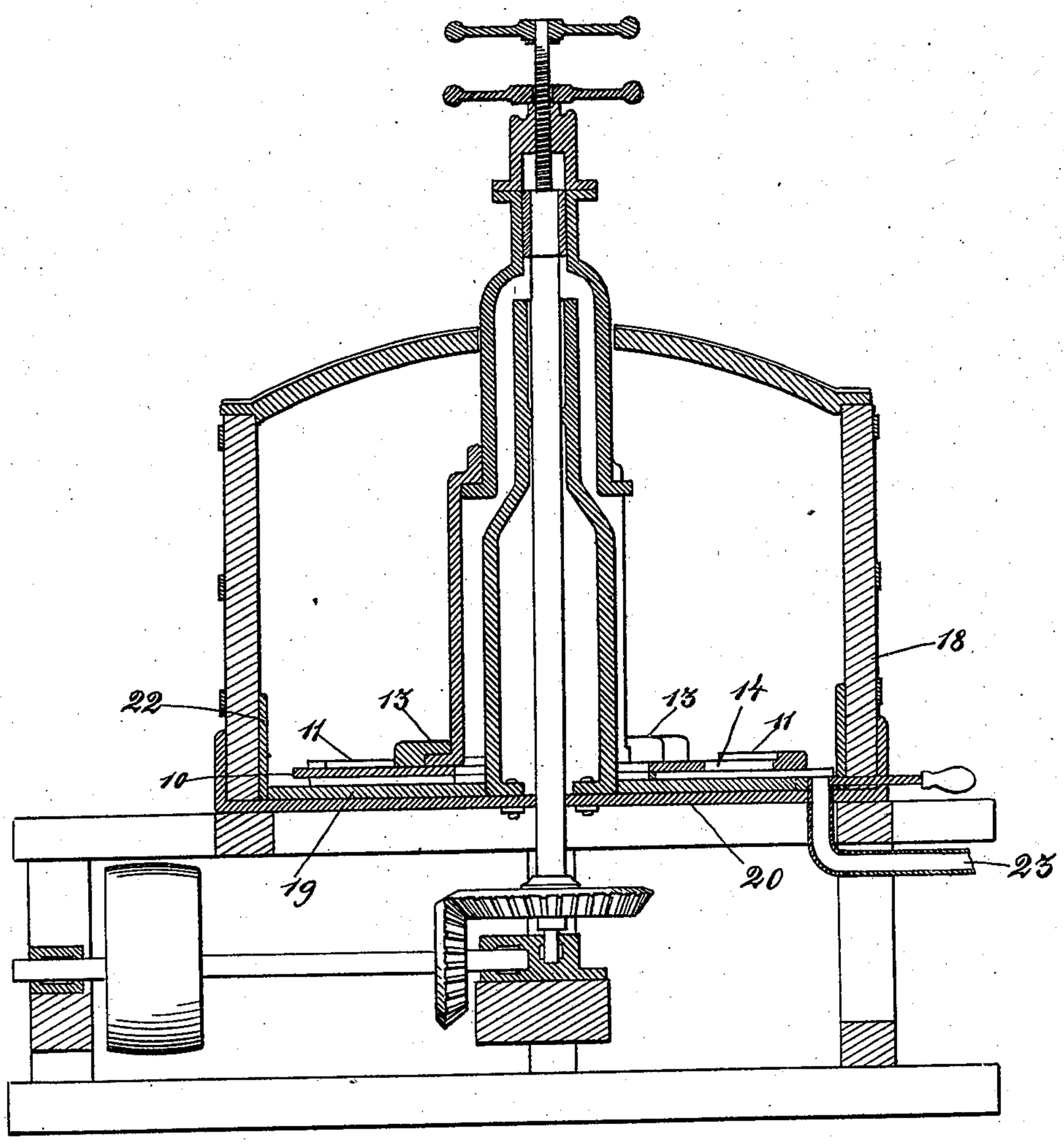
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 7



Witnesses:
Henry Manger.
F. R. Lowery.

Inventor: E. Franklin Knotts.
by Owing & Lane Atty's.

UNITED STATES PATENT OFFICE.

ELIJAH FRANKLIN KNOTTS, OF DES MOINES, IOWA.

MULLER FOR GRINDING OR AMALGAMATING MILLS.

SPECIFICATION forming part of Letters Patent No. 724,019, dated March 31, 1903.

Application filed June 9, 1902. Serial No. 110,949. (No model.)

To all whom it may concern:

Be it known that I, ELIJAH FRANKLIN KNOTTS, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, (whose post-office address is Des Moines, Iowa,) have invented certain new and useful Improvements in Mullers for Grinding or Amalgamating Mills, of which the following is a specification.

The objects of my invention are to provide a muller for amalgamating mills of simple, durable, and inexpensive construction which can be attached readily and easily to the mechanism connected with the ordinary amalgamating-pan in which gold and silver bearing ores are treated by the amalgamation process.

A further object is to provide a shoe on the under surface of the body of the muller which will cause the quicksilver used in the amalgamation to be mixed thoroughly into the pulp, so that it will come in contact with all the pulverized ore with which the pans are charged, and thus make a quicker and more complete amalgamation.

A further object is to provide a muller which when put in motion will cause a strong steady current of pulp to circulate in the amalgamating-pan.

A further object is to provide shoes which can be easily and readily removed from the body portion of the muller and new ones substituted in their place, thus reducing the wear on the body portion of the muller to a minimum.

A further object is to provide a muller which will cause the current to be forced upwardly through openings in the muller by means of the peculiar construction of the shoes, which are attached to it, and thus keep the pulp and quicksilver thoroughly mixed up in order that the most perfect and speedy amalgamation may take place.

A further object is to provide shoes so shaped and detachably connected with the muller that the quicksilver, which naturally settles at the bottom, will be gathered and forced up through the openings in the muller when it is in motion.

A further object is to provide means for detachably connecting the muller with the shaft used for transmitting motion.

A further object is to provide means for raising and lowering the muller in the pan.

My invention consists in certain details in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows an inverted plan view of the bottom of my muller, showing the shoes comprising the lower portion thereof. Fig. 2 shows a plan view of the top portion of the same, showing the means for connecting the muller with the means for transmitting power. Fig. 3 shows a cross-section of the pan in which my muller is used and the section of the muller cut through line 3 3 of Fig. 2 and also shows a cross-section of a portion of the means whereby the muller is operated and means whereby the said muller is held in position in the amalgamating-pan. Fig. 4 is a plan view of the detachable shoe and shows the means for attaching the shoe to the body portion of the muller. Fig. 5 is a rear end elevation of the same. Fig. 6 is a cross-sectional view of the same, cut through line 6 6 of Fig. 4; and Fig. 7 shows a cross-sectional view of the muller and the means for attaching the muller to the means for transmitting power. Said view also shows a cross-section of the amalgamation-pan. This section of the muller is cut through line 3 3 of Fig. 2.

Referring to the accompanying drawings, I have used the reference-numeral 10 to indicate the body portion of the muller, which is of cast-iron or other metal, substantially circular in shape and has a series of strengthening-bgraces 11 on its upper surface and near the outer periphery thereof. There is a large circular opening 12 in the center of the body portion so arranged that the muller can be slipped over the mechanism used for transmitting the power and the mechanism for supporting the said means and fit inside of the pan used for amalgamation.

To the top of the muller and attached near the opening in the central portion thereof are the metal clutches 13, designed to engage one end of the spider used in transmitting the power, said clutches having a shoulder on

their inner edge, so that by raising or lowering the means for transmitting the power the muller will be raised or lowered, and when the ends of these spiders are in connection with the said clutches and the power is applied the muller will be rotated in a horizontal plane parallel with the bottom of the amalgamating-pan

Extended through the body portion of the muller and substantially half-way between the exterior edge thereof and the exterior edge of the opening at the central portion of said muller is the series of semicircular openings 14, the edges of the body portion of the muller formed by said semicircular openings being beveled away from the top portion of the muller, so that when the muller rotates the pulp and quicksilver used in pan amalgamation can be easily forced through said semicircular openings.

Integral with or detachably connected with the muller, on the under surface thereof and at the rear edge of each semicircular opening 14, is the metal shoe 15, having the front edge thereof beveled in a direction parallel with the beveled edge at the front of the opening 14 near it. The front portion of said metal shoe 15 is substantially semicircular in shape and has a projection 16 in the upper surface thereof, said projection being beveled at its side portions, so as to be held firmly in engagement with the sides of a perforation at the rear of each opening 14, which perforation is designed to receive said metal projection, and this perforation is beveled from the top portion inwardly as it extends to the under surface of the body portion of the muller. The edges of the projection 16 on the top portion of the shoe are beveled from the top portion of the shoe outwardly toward the top of the projection, so that the beveled edges in the projection 16 will engage the beveled edges in the perforation designed to receive it. The shoe 15 is held firmly in position on the under surface of the body portion of the muller by means of the pins 17. The outer edge of the shoe 15 extends a slight distance beyond the edge of the body portion of the muller, so that the muller can rotate freely in the amalgamating-pan and yet the quicksilver or any substance which drops between the interior side of the amalgamating-pan and the outside edge of the body portion of the muller will be readily drawn inwardly and forced up through the openings 14 when the muller is rotated.

I have indicated the pan, which may be of any construction used in amalgamation, by the reference-numeral 18. The pan used in the illustration has a false bottom 19, which is placed on top of the bottom 20 and can be easily removed from the pan and replaced when worn. The pan also has a thin protecting-plate 22 on the interior of the sides of the pan, said plate 22 extending a slight distance upwardly from the bottom of the pan. My muller is attached to the means for transmitting power in the ordinary way, and the same means for raising and lowering the muller in the pan are used as are connected with the ordinary muller. There is an outlet 23 at the bottom of the pan, having a stopper for controlling the flow through said opening.

In practical use and assuming that the muller has been placed in the bottom of the pan and attached to the means for transmitting power by having the lower end of the spider of said means engaging the clutches on the upper surface of the muller and that the pan is charged with quicksilver and pulp of gold or silver bearing ore and that the muller is rotating in a horizontal plane parallel to the bottom of the pan, the shoes attached to the under surface of the body portion of the muller by means of their substantially semicircular form with forward and outward points will collect all the quicksilver as it settles to the bottom of the pan and cause it, together with the pulp from the bottom, to be forced up through the semicircular openings of the body portion of the muller and will cause a current, which is completed by the pulp returning to the bottom in the space between the outer rim of the body of the muller and the inner surface of the pan and through the opening 12 in the center of the body of the muller, to be produced, which will give a much better circulation of the quicksilver through the pulp and will therefore produce a quicker and more complete amalgamation than any device now in use. If the shoe forming a portion of the muller has become worn, the muller can be taken from the pan and the old shoes removed and new ones put in their places. The muller can then be replaced in the pan and will be in condition for further use.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a muller, the combination of a circular body portion having a circular opening in the central portion thereof and a series of semicircular openings midway between said circular opening and the exterior of the body portion, the body portion also having a square-shaped perforation at the rear of each of said semicircular openings, sides to said perforations beveled from a minimum distance between them at their lower edges to a maximum at their upper edges, shoes for the muller, a projection on the upper surface of each of said shoes extending upwardly from the shoe to which it is attached, beveled sides for said projections to hold the shoes in place relative to the body portion when placed in said perforations, pins for detachably connecting said shoe with said body portion, substantially as and for the purposes stated.

2. A muller, comprising in combination a circular body portion, one or more clutches on the upper surface of said body portion, shoes having a beveled edge on the front portion of them, said front portion being sub-

stantially semicircular, projections on the upper surface of said shoes, beveled edges on said projections, said body portion having a series of semicircular openings in it, beveled edges for the semicircular portion of said semicircular openings, said body portion having square perforations adjacent to said semicircular openings, beveled edges for said square perforations designed to coact with the beveled edges of said projections in detachably holding the shoe in position relative to the body portion, pins extending through said body portion and through said shoes, substantially as and for the purposes stated.

Des Moines, Iowa, March 28, 1902.

ELIJAH FRANKLIN KNOTTS.

Witnesses:
J. W. AUSTIN,
L. G. KNOTTS.