

No. 717,195.

Patented Dec. 30, 1902.

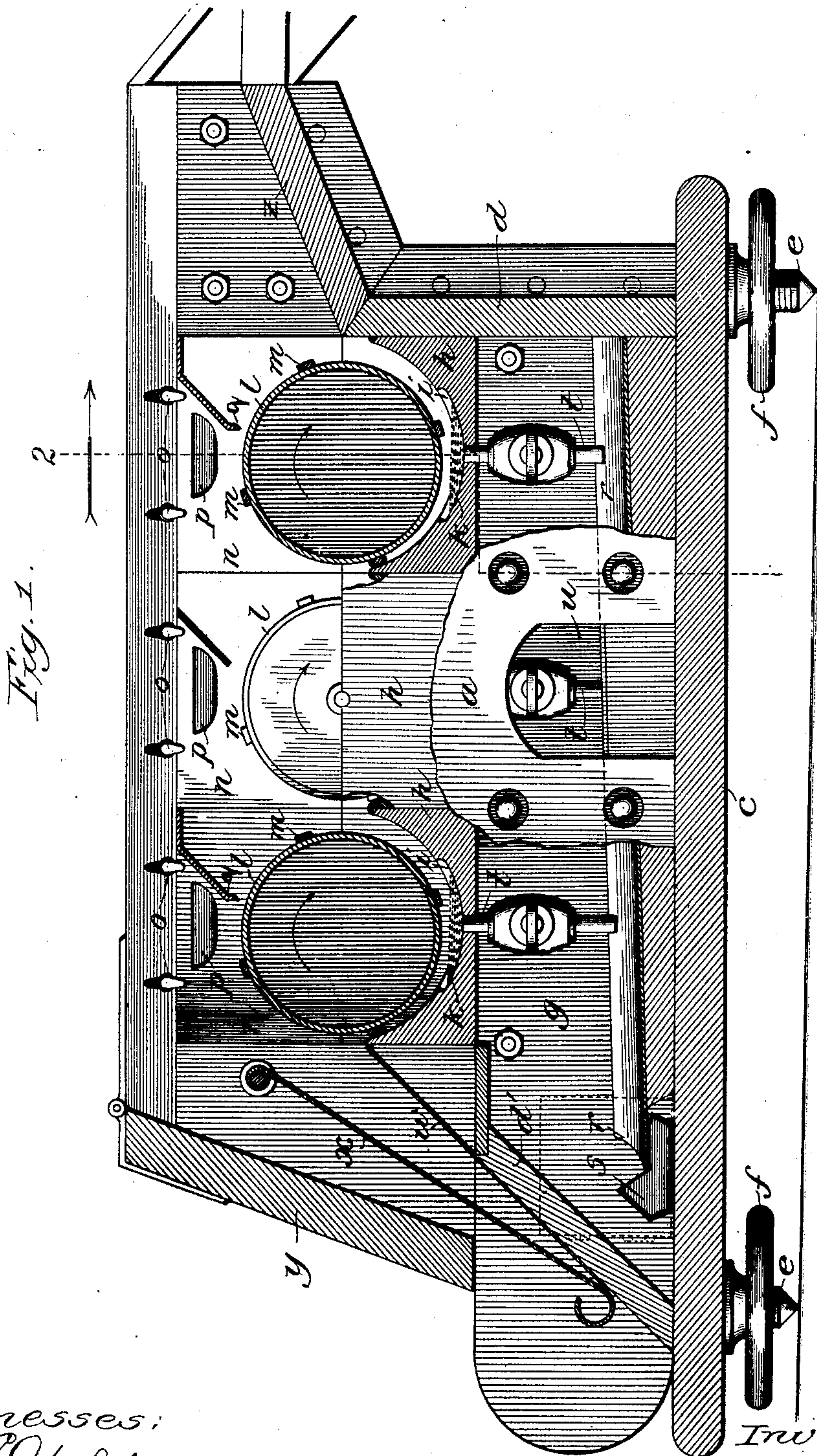
J. J. HILL.

AMALGAMATING APPARATUS.

(Application filed Apr. 28, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
E. L. Gaylord.
John Enders Jr.

Inventor:
John J. Hill.
By Dyrenforth, Dyrenforth & See,
Att'ys.

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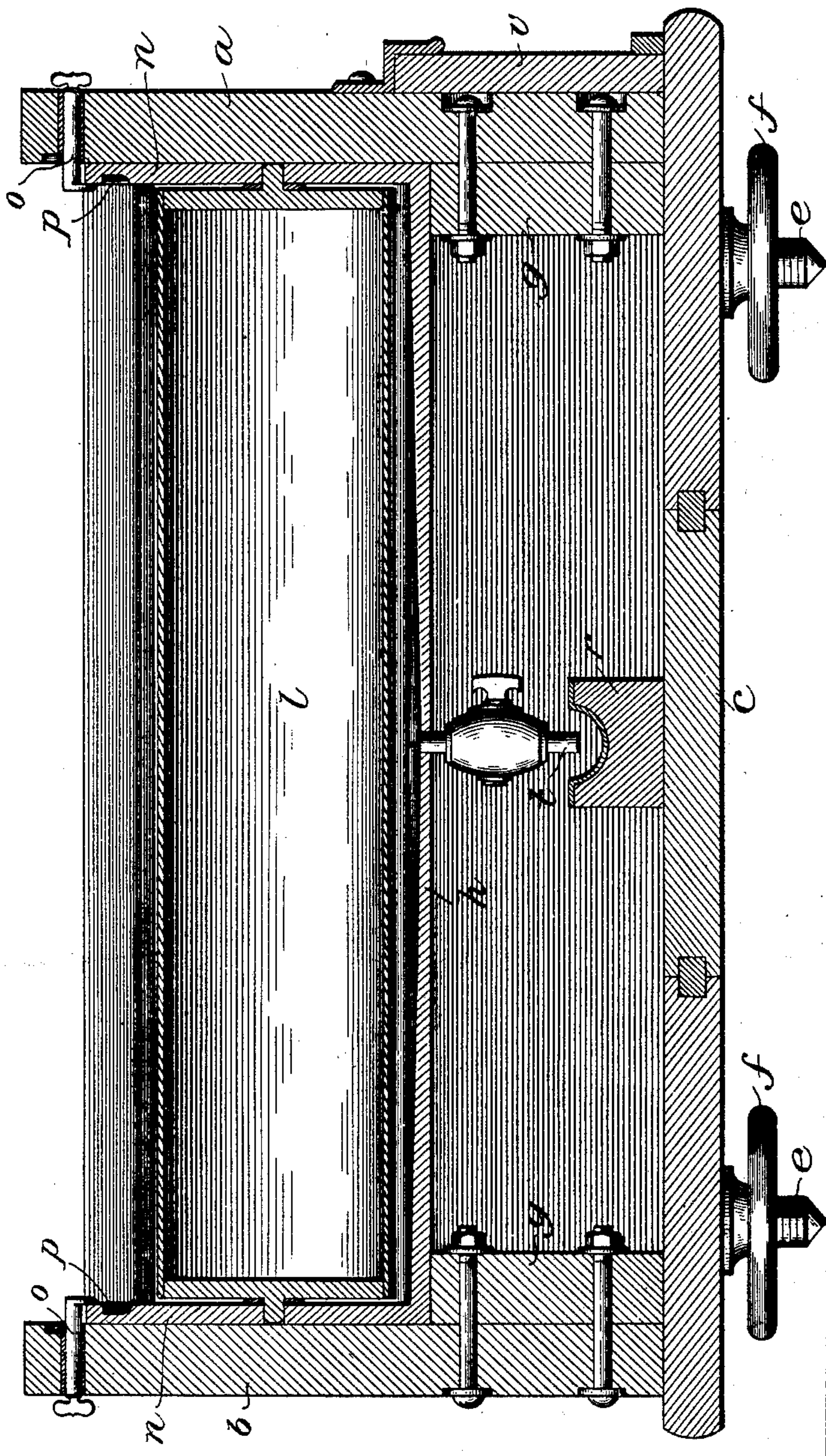
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Fig. 2.



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By Dyrumforth, Dyrumforth & See,
Att'ys.

UNITED STATES PATENT OFFICE.

JOHN J. HILL, OF DENVER, COLORADO.

AMALGAMATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 717,195, dated December 30, 1902.

Application filed April 28, 1902. Serial No. 105,091. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. HILL, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improvement in Amalgamating Apparatus, of which the following is a specification.

My invention relates to an improvement in the class of apparatus for amalgamating with quicksilver the precious metals from the ore-pulp containing them, in which a rotary cylinder coated with quicksilver is supported in a trough containing a body of quicksilver, between which and the cylinder a passage is formed for the flow of the pulp to be treated between the surface of the bed of quicksilver and the coated surface of the cylinder which is revolved by the force of the pulp flow against blades projecting at intervals from the cylinder-surface.

The object of my invention is to provide a novel and improved construction in the matters of detail of an amalgamating apparatus in the class referred to whereby the efficiency of the apparatus as well as the facility of its use shall be greatly increased.

Referring to the accompanying drawings, Figure 1 is a view in longitudinal section, partly broken, of my improved apparatus; and Fig. 2 is a section taken at the line 2 on Fig. 1 and viewed in the direction of the arrow.

The frame of the apparatus comprises the two side walls *a* and *b*, the base *c*, and the end wall *d*, all of which may be formed of wood, which is the preferred material. From the base near the inlet end and also near the outlet end of the apparatus depend at opposite sides of the longitudinal center the threaded legs *e e*, at which the apparatus rests upon the ground or other support. Each leg carries for supporting the machine at its base a nut *f*, adapted to be screwed up and down on its leg to regulate the downward inclination of the apparatus from its inlet end.

At the inner sides of the walls *a* and *b* and bolted thereto are ledges *g g* for carrying the cylinder-supports *h*, each in the form of a rectangular oblong basin, trough-shaped internally with journal-bearings in the upper edges of its end walls and each provided with

a longitudinal pocket *i* in its base for containing a body of quicksilver *k*. In the bearings in the ends of each support *h* is journaled a hollow end-closed copper cylinder *l*, provided at intervals with ribs *m*, extending throughout the cylinder length and formed of wood or other material for which mercury has no affinity. Between the ribs each cylinder when in use is provided with a coating of quicksilver. The journaling ends of each cylinder-supporting basin *h* are supplemented by rectangular plates *n*, resting on the basin ends and having in their lower edges the upper halves of the cylinder-journaling openings. These plates are removably fastened in place by bolt-like latches *o*, passing through the side walls to engage with the upper edges of the plates, as shown in Fig. 2, the latches being rotatable and withdrawable in their bearings to free a plate when it is desired to lift it out by its hand-grips *p* for removing a cylinder fastened in place by the latches.

It will be observed that each cylinder is journaled in place eccentrically with relation to the longitudinal center of the cross-sectionally arc-shaped interior of its supporting-basin and with relation to the longitudinal center of the mercury-pocket in its base, whereby the passage across the cylinder between it and the bottom of the basin is widest at its inlet side and gradually tapers toward the opposite or overflow side, where it is so narrow that the ribs *m* barely pass it without touching. This construction constitutes a very important feature of my improvement, since the great efficiency of the apparatus is attributable to it, as hereinafter described.

Between each pair of plates *n* there inclines a splash-deflecting curtain *q* over the inlet side of the pulp-passage below the respective cylinder, the curtain being preferably formed of sheet-copper coated with quicksilver on its under side and shaped to adapt it to be slid in and out of retaining-grooves (shown in Fig. 1) provided to receive it in the inner sides of the plates near their upper edges on one side of the apparatus. Similar grooves are provided in the opposite plates to coincide with those illustrated.

Supported on the base *c* and inclining along its longitudinal center is an amalgam-receiving trough *r*, the lining of which should be of

some metal having no affinity for quicksilver and which discharges into an amalgam-pan *s*. The contents of the pockets *i* are discharged from time to time into the trough *r* through valve-controlled draw-off spouts *t*, depending from the lowest point of the base or center of the mercury-pocket in each basin *h*. Access to the amalgam-pan *s* may be had through the hinged door, (shown by dotted lines in Fig. 1,) and the spouts *t* are accessible through an opening *u*, coincident with each in the wall *a*. Closure of all these openings is effected by covering them with a strip *v*, slid into confining-guides, (shown in Fig. 2 as provided to receive it on the outer side of said wall,) and the covering-strip may be locked against unauthorized withdrawal, as by means of a padlock. (Not shown.)

From the overflow end of the last of the series of pulp-passages under a cylinder *l* there extends downward upon and rigidly fastened to the inclined front apron *d'* of the apparatus a copper plate *w*, coated upon its upper surface with quicksilver, and forward of this plate is hinged at its upper end to swing a similar plate *x*, coated upon its under surface with quicksilver. The front or discharge end of the apparatus may be closed by a hinged door, (shown at *y*,) which may be locked in any suitable manner.

The operation is as follows, with the apparatus suitably inclined on its supports *e* to incline with relation to each other accordingly the series of pulp-passages below the cylinders from the inlet end to the discharge end of the machine: The pulp to be treated is introduced into the apparatus at the inclined inlet *z* and flows through the passage under the first cylinder, overflowing into and coursing through the passage under the next adjacent cylinder, and so on, to the final overflow, whence the tailings pass out of the apparatus between the plates *w* and *x*, the force of the flow lifting the latter on its hinge to permit the final escape. The manner shown of combining these plates tends to prolong the retention between them of the pulp-tailings, giving time for any heavier particles of the gold therein to precipitate upon and be taken up by the amalgamating-surface of the lower plate and enabling any remnant of the light flour-gold tending to float to the top of the downwardly-flowing tailings to be taken up by the under amalgamating-surface of the upper plate.

Only three of the cylinders *l* and their appurtenances are shown in the drawings; but the series may include any desired number thereof, which, however, need not exceed seven. The force of the flow of pulp is prevented from splashing it over the cylinders by the deflecting-curtains *q*, which may be removed from time to time for gathering the accumulated amalgam upon them. Furthermore, the force of the flow by its direction against the ribs on the cylinders rotates them on their journals, as indicated by arrows,

thereby bringing the entire area of the amalgamating-surface of each cylinder progressively into exposure to the float or flour gold, which seeks the upper surface of the pulp stream and which is thus saved, while the heavier particles of gold precipitate into the quiet, because unagitated, body of quicksilver in each pocket *i*, whence the amalgam may be drawn off from time to time through the spouts *t* into the trough *r* to run into the pan *s* and be saved. In coursing through each passage underneath a cylinder *l* the constriction of the passage toward its overflow side enables the ribs *m* without exerting any injurious agitating effect upon the body of mercury *k* to gather and carry before them from passage to passage the impurities contained in the pulp, such as iron, ruby-sand, and others, thereby preventing their release from the advancing progress to which they are subjected by the ribs, and thus avoiding the backward escape of the impurities upon the bed of quicksilver after they have been carried beyond the same.

The provision of a plurality of the cylinders *l* in series affords the practical advantage, in addition to that of the prolonged amalgamating course they provide with the bodies of mercury in the pockets *i*, of enabling the cylinders to be cleaned one at a time without for the purpose stopping the work of the apparatus. Thus when desired the initial cylinder of the series is removed upon unfastening and withdrawing its journaling-plates *n* and is immediately replaced by the similarly-released final cylinder in the series, the place of which may be taken either by a fresh cylinder or by the cylinder first removed after being cleaned of the amalgam on its surface. In this manner the cylinders may be successively transferred from the tail to the head of the series without interrupting the work of the apparatus, the construction of which renders the transfer an easy operation capable of quick performance.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an amalgamating apparatus, the combination with a supporting-frame, of a basin for holding a body of quicksilver, a copper cylinder having ribs at intervals on its surface and supported in said frame to rotate in said basin with its surface always above the surface-line of the body of quicksilver below it, and a pulp-passage formed between said basin and cylinder and constricted toward its overflow side, substantially as described.

2. In an amalgamating apparatus, the combination with a supporting-frame, of a basin for holding a body of quicksilver, a copper cylinder having at intervals upon its surface ribs formed of material without affinity for quicksilver, said cylinder being supported in the frame to rotate in said basin with its surface always above that of the body of quicksilver below it, and a pulp-passage formed between said basin and cylinder and con-

stricted toward its overflow side, substantially as described.

3. In an amalgamating apparatus, the combination with a supporting-frame, of a basin having a quicksilver-pocket in its arc-shaped base, a copper cylinder having ribs at intervals on its surface, said cylinder being journaled eccentrically of the longitudinal center of said pocket to rotate in the basin with its surface always above that of a body of quicksilver in said pocket and to form a pulp-passage between the cylinder and basin gradually narrowing from its inlet to its overflow side, substantially as described.

4. In an amalgamating apparatus, the combination with a supporting-frame, of a series of basins having quicksilver-pockets in their bases provided with outlets, copper cylinders having ribs at intervals on their surfaces and supported in the frame to rotate in said basins with their surfaces always above the surface-lines of quicksilver in said pockets, and intercommunicating passages formed between said basins and cylinders and through which the pulp flows against said ribs to rotate the cylinders, each passage being constricted toward its discharge side at which it overflows into the next adjacent passage, substantially as described.

5. In an amalgamating apparatus, the combination with a supporting-frame, of an inclined series of basins having quicksilver-pockets in their bases provided with outlets, copper cylinders having ribs at intervals on their surfaces and supported in the frame to rotate in said basins with their surfaces always above the surface-lines of quicksilver in said pockets, intercommunicating passages formed between said basins and cylinders and through which the pulp flows against said ribs to rotate the cylinders, each passage being constricted toward its discharge side at which it overflows into the next adjacent passage, and an amalgam-receiving trough extending below said outlets, substantially as described.

6. In an amalgamating apparatus, the combination with a supporting-frame, of an inclined series of bases having quicksilver-pockets in their bases provided with valve-controlled outlets, copper cylinders having ribs at intervals on their surfaces, each cylinder being journaled eccentrically of the longitudinal center of the pocket below it to rotate in the basin always above the surface-

line of the quicksilver in said pocket, said cylinders forming intercommunicating pulp-passages between them and the basins, each gradually narrowing from its inlet to its overflow side, substantially as described.

7. In an amalgamating apparatus, the combination with supporting-frame, of a series of basins having quicksilver-pockets in their bases provided with valve-controlled outlets, copper cylinders having ribs at intervals on their surfaces and journaled in the basin ends to rotate in said basins with their surfaces always above the surface-lines of quicksilver in said pockets, removable plates on said basin ends confining the cylinder-journals and provided with fastening means, amalgamating-curtains removably supported in grooves in opposite plates, and intercommunicating passages formed between said basins and cylinders and through which the pulp flows against said ribs to rotate the cylinders, each passage being constricted at its discharge side at which it overflows into the next adjacent passage, substantially as described.

8. An amalgamating apparatus comprising, in combination, a frame on supports adjustable to regulate its inclination, a series of oblong basins supported on ledges at the inner sides of said frame, and having quicksilver-pockets in their bases provided with valve-controlled draw-off spouts, copper cylinders having ribs at intervals on their surfaces and journaled in the basin ends eccentrically of the longitudinal centers of said pockets below them to form intercommunicating passages each gradually narrowing from its inlet to its overflow side and through which the pulp flows against said ribs to rotate the cylinders, removable plates on said basin ends confining the cylinder-journals and provided with fastening means, amalgamating-curtains extending between opposite plates, a copper plate inclining from the overflow end of the final passage in the series, a copper plate hinged at its upper end to rest at its free end on said first-named plate, said plates presenting amalgamating-surfaces on their opposing sides, and an inclined amalgam-receiving trough extending below the series of said spouts, substantially as described.

JOHN J. HILL.

In presence of—

ALBERT D. BACCI,
WM. B. DAVIES.