(No Model.)

3 Sheets—Sheet 1.

H. COOK.

AMALGAMATOR.

No. 458,823. Patented Sept. 1, 1891.

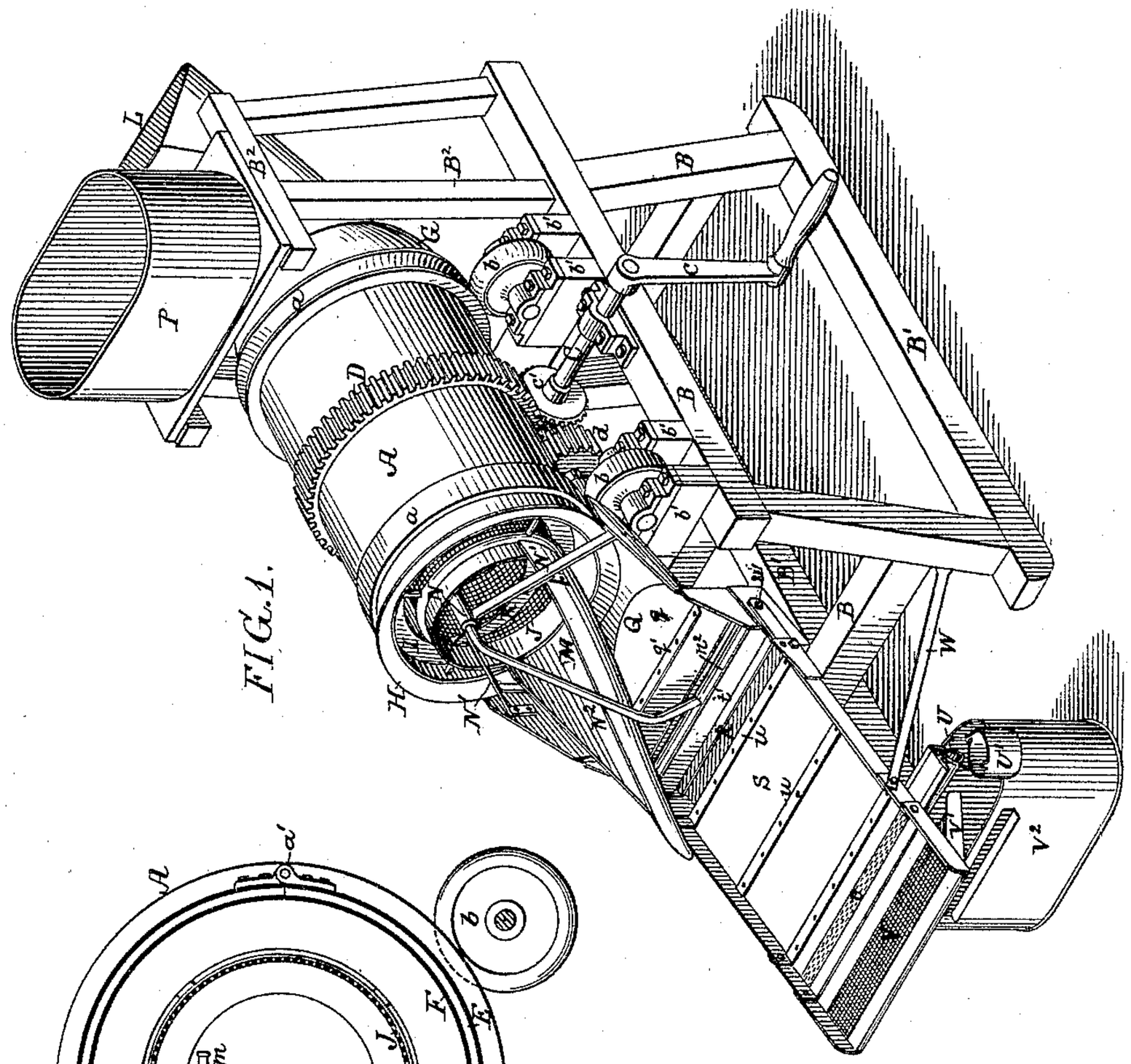

FIG. 1.

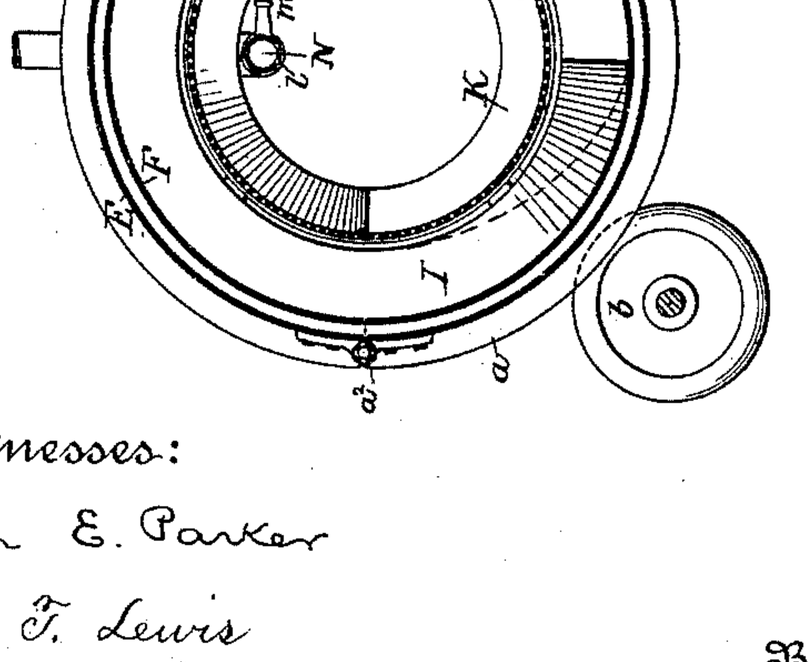

FIG. 4.

Witnesses:

John E. Parker

John F. Lewis

Inventor:

Henry Cook

By his Attorneys Howson & Sons

(No Model.) 3 Sheets—Sheet 2.

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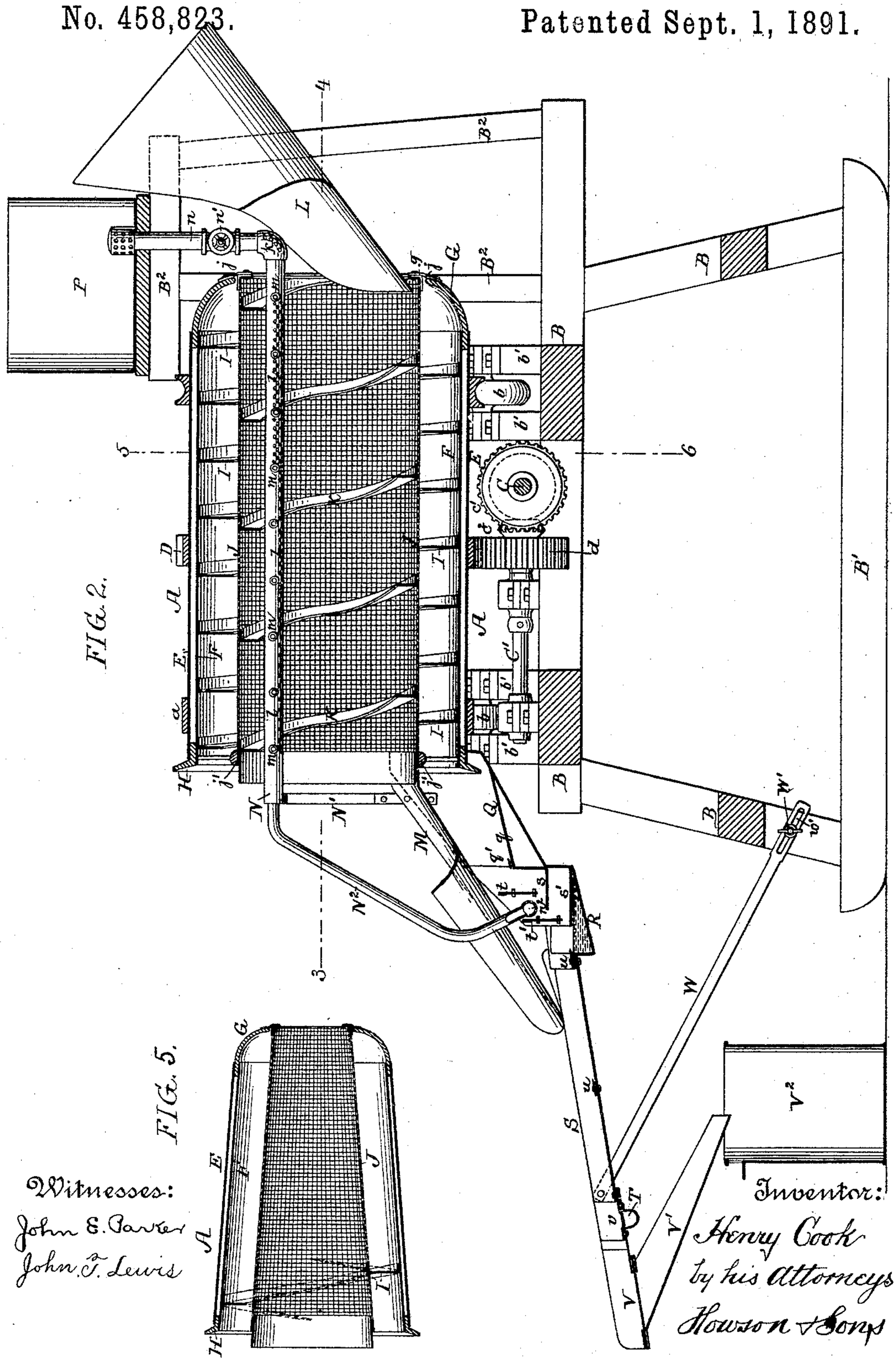

(No Model.)

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H. COOK.

AMALGAMATOR.

No. 458,823. Patented Sept. 1, 1891.

FIG. 3.

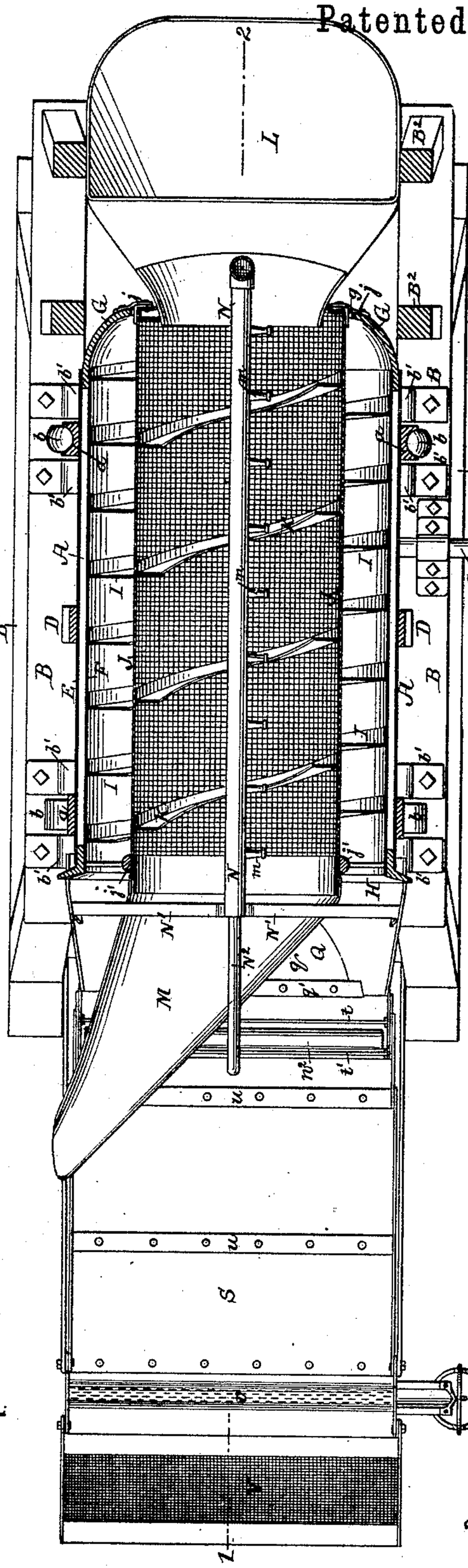


FIG. 7.

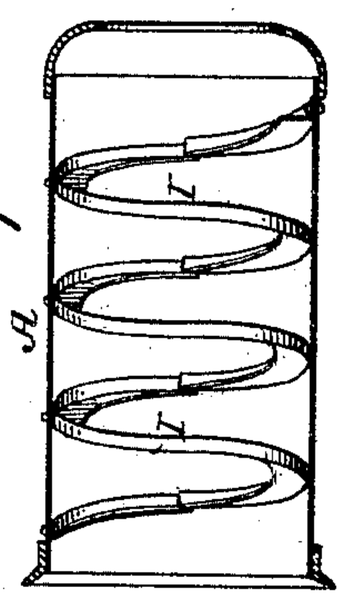
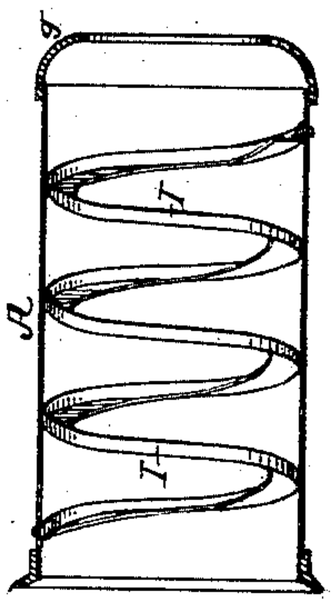


FIG. 6.



Witnesses:

John E. Parker

John T. Lewis

Inventor:

Henry Cook

by his Attorneys

Howson & Sons

UNITED STATES PATENT OFFICE.

HENRY COOK, OF PHILADELPHIA, PENNSYLVANIA.

AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 458,823, dated September 1, 1891.

Application filed May 20, 1887. Serial No. 238,815. (No model.)

To all whom it may concern:

Be it known that I, HENRY COOK, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Amalgamators, of which the following is a specification.

The object of my invention is to so construct an amalgamator that it will readily and thoroughly separate gold or like material from the earth.

In the accompanying drawings, Figure 1 is a perspective view of my improved amalgamator. Fig. 2 is a longitudinal section on the line 1 2, Fig. 3. Fig. 3 is a section on the line 3 4, Fig. 2. Fig. 4 is a transverse section on the line 5 6, Fig. 2. Fig. 5 is a view illustrating a modification of my invention, and Figs. 6 and 7 are views illustrating special features of the same.

Referring in the first instance to Figs. 1, 2, 3, and 4, A is a cylinder mounted, preferably, in a horizontal position and provided with two annular rails *a a*, which rest on suitable supporting-wheels *b b*, having their bearings in brackets *b'* on a frame B. This frame supports the whole structure and is mounted in the present instance on runners B', which allow the frame to be moved from one position to another, as required. The cylinder A is driven in the present instance by a shaft C, having a handled arm *c*, this shaft being geared with a longitudinal shaft C' by bevel-gears *c' c²*, and on the shaft C' is a spur-pinion *d*, meshing with an annular rack D, secured to the cylinder, as shown in Figs. 1 and 2; so that when the shaft C is turned the cylinder will be rotated, the friction-rollers *b b* sustaining the weight of the cylinder. It will be understood, however, that when it is desired to drive the amalgamator by power the arm *c* can be removed and a suitable driving-pulley attached to the shaft C, or both may be used if found necessary.

In the present instance I have provided the cylinder A with an outer casing E and an inner casing F, connected at the inlet end to a rounded head G and at the outlet end to a flanged ring H.

The cylinder is provided with an internal screw-flange I, which extends from the head G at the inlet-opening to the flange H at the outlet-opening, and is preferably made of the same depth throughout, except at the outer end, where it tapers off, as shown in Figs. 2 and 4, to allow a regular flow of water over the table S.

Situated centrally in the cylinder A is a screen-cylinder J, made in the present instance of wire-gauze. This cylinder is also provided with a screw-flange K, preferably of a pitch somewhat steeper than the pitch of the screw-flange I, this flange K by preference extending from end to end of the cylinder J and being of about the same diameter as the opening *g* in the head G. The cylinder J, as well as the cylinder A, is open at both ends, and extending into it is a trough L, through which the material to be acted upon is fed. At the outlet end of the cylinder J is a trough or spout M, which guides the material to one side of the machine, where it falls into any suitable receptacle.

Extending through the upper portion of the cylinder J is a pipe N, which communicates with a reservoir P through a pipe *n*, provided with a regulating-valve *n'*, the reservoir being supported on suitable standards B² above the cylinder A, as shown in Fig. 2. The trough M and the outer end of the pipe N are supported by bracket-bars N', which are attached at their lower ends to a spout Q, secured to the frame of the machine.

The pipe N has a series of nozzles *m*, projecting transversely to the length of the machine, as shown in Figs. 3 and 4, the water which escapes from these nozzles passing through the meshes of the screen-cylinder J and impinging against the inner periphery of the cylinder A, so that the jets will not only readily clean and dislodge any foreign matter that may cling to the cylinder J, but will also cleanse the inner surface of the cylinder A. The pipe N is also provided with a series of openings *l* in its under side, in order that a constant spray of water may act upon and wash off any material or earthy matter that may be adhering to the stones and rocks passing through the cylinder J, as described hereinafter. The bend or elbow *k* of the pipe N is also provided with a series of perforations to permit jets of water to act upon the material in the trough L as it passes through into the amalgamator.

The cylinder J is secured to the cylinder A

at the inlet end by straps *j* and by a spider *j'* at the outlet end, so that both cylinders J and A will revolve at the same speed, the contents of the cylinder J, however, owing to the steeper pitch of the screw K, being fed along faster than the contents of the cylinder A.

Located some distance below the outlet end of the cylinder A is a spout Q, having a flat inclined plate *q*, provided at its outer end with a rib *q'*, and below the plate *q* are in the present instance two plates *s s'* in the form of steps, while below the plate *s'* is a receiving-pan R, containing mercury. The plate *s'* is in such position in respect to the overflow-line of the pan R that the mercury in the pan will be level or nearly level with the plate, so that the gold and mercury on the plate will pass off to the mercury in the pan. Above the plate *s* is a gate or dash-board *t*, which can be raised or lowered, as desired, a similar gate *t'* being located above the plate *s'*.

Extending from the receiving-pan R, preferably at an angle, is an amalgamating-table S, having ribs *u* at intervals.

Extending from the outer end of the tube N and bent downward, as shown in Fig. 2, is a pipe N^2, having a right-angled perforated tube n^2 at its lower end, this tube extending from one side of the spout Q to the other between the two gates or dash-boards *t t'*, in order to evenly spread and wash the material as it passes from the plate *s* to the plate *s'* and under the lower gate *t'*.

The table S is adjustably connected to the spout Q by bolts *w* at each side of the apparatus, and the outer end of this table is supported by brace-rods W, which are pivoted at one end to the flanges of the table and adjustably secured to the frame B by set-screws W', which pass through slots *w'* in the rods, so that the incline of the table may be regulated as desired.

The operation of the apparatus is as follows: The reservoir P is filled with water or other suitable liquid and the cylinders are revolved by hand or driven by belting or gearing from any adjacent source of power. The valve *n'* is turned so that a stream of water will pass through the tubes N and N^2 and issue from the openings in said tubes and their branches, the material—such as small stones and earth—carrying the gold or other metal to be separated being shoveled into the feed-trough L and directed thereby into the cylinder. The smaller particles will pass at once through the meshes of the cylinder J into the cylinder A, and as the cylinders are revolved the fine material will be washed from the surface of the stones or rocks that are too large to pass through the meshes of the screen J and will be carried through the same and into the cylinder A. The large stones are fed by means of conveyers K to the end of the cylinder J, from which they are delivered onto the trough M, which guides them to one side of the apparatus.

I make the inner casing F of the cylinder A of copper or other material, which has an affinity for mercury, and, where circumstances permit, I also make the conveying-screw I of copper or like material, so that when mercury is poured into the apparatus through the trough L the copper casing of the cylinder and its screw-flange will attract the mercury and will be completely coated thereby, so that if any particles of amalgamating metals—such as gold, silver, &c.—are in the earth treated they will amalgamate with this mercury and be taken up by it, the rest of the earth and lower grades of mineral matter passing on with the water and being delivered onto the plate *q* of the spout Q.

It will readily be seen that when the screw-flange I, as well as the inner casing F of the cylinder, is made of copper the rolling motion of the dirt as it passes down the cylinder will, owing to the rotation of the latter, tend to force any grains of gold, &c., against the mercury-coated surfaces.

To obtain as much of the gold as possible, I make the plate *q* of the spout Q, as well as the plates S S', of copper, the water and earth falling from the cylinder onto the plate *q*, thence falling over the ledge *q'* and onto the plate *s*, thence onto the plate *s'*, the impact at each fall naturally causing some of the gold that may have escaped from the cylinder to adhere to the plate onto which it falls. The ore that is taken up by the plate passes off into the receiver R, as the mercury in the receiver is on a level with the edges of the plates, as shown in Fig. 2.

The plates *t t'* regulate and equalize the passage of the material over the bath or receiver R and table S, and as said gates are made also of copper they will likewise attract the mercury and catch any small particles of gold that may touch them. There may be as many plates *s s'* as required, said plates forming a series of steps, over which the material is passed, so as to separate as much gold as possible. The water that issues from the tube n^2 rewashes the material in its passage.

Directly under the plate *s'* is the receiving-pan R, containing a bath of mercury, the lighter particles passing off over the same and over the rib *u*, while any mercury (whether clean or in the form of amalgam) that has not been taken up by the copper of the cylinder, trough, or plates is caught by the receiver or bath R. Any particles that may pass the receiver, owing to the density of the material covering the bath, pass over the rib *u* and onto the table S, which is also of copper or other suitable material, the flow down the table being obstructed by one or more ribs *u*. It will be seen that in its passage through the amalgamator the earth will be thoroughly turned over, so that all amalgamating material which it may contain will come in contact with the

mercury-coated surfaces, which are continually kept clean, the rolling and tumbling motion preventing the gold from floating.

I have found by actual test that I can save considerably more gold in my machine than by any apparatus now in common use.

In some cases the machine may be used without the plates *s s'*, receiver R, and table S, and in other cases only the cylinder and its trough, the plates, and receiver may be used; but I prefer, where practicable, to use the complete apparatus shown and described.

In some cases I prefer to make the cylinder A in sections, hinged together at *a'*, and bolted together in any suitable manner at a^2, so that by detaching the bolt the cylinder may be opened longitudinally, in order to permit the ready removal of the amalgam from the inner surface of the cylinder and its flange.

The cylinders A and J may each be tapered and the cylinder A may be provided with a short screw-flange I' at the delivery end, as shown in Fig. 5, so as to regulate the delivery from the cylinder, or the inner cylinder only may be tapered, and said inner cylinder may be driven at a different speed from the cylinder A or in a different direction, as circumstances may require. In some cases it may be advisable to make the screw-flanges detachable for cleansing purposes or for facilitating the manufacture and application of the same.

In Figs. 6 and 7 I have shown two ways of adopting this plan in connection with the flange I. In Fig. 6 the flange is made in one piece, connected to the cylinder at its opposite ends, the cylinder having a series of openings, to any of which the securing-bolts may be adapted, so that the flange may be compressed or expanded to vary its pitch, while in Fig. 7 I have shown a flange consisting of a number of independent sections.

I claim as my invention—

1. The combination of an amalgamating-cylinder, a screen contained therein, a screw-flange for feeding the material from the cylinder, with a series of steps and a mercury-pan, and a water-pipe extending through the cylinder and having a branch connected with a sprinkler-pipe situated directly above one of the steps, said water-pipe having a series of openings whereby jets of water are thrown through the meshes of the screen onto the cylinder, said water passing with the material over the series of steps, substantially as specified.

2. The combination, in an amalgamator, of the amalgamating-cylinder, of an even diameter throughout, a screen-cylinder inside the same, with an internal screw-flange in each of said cylinders, an inlet for the mercury, the spout, plates, and mercury-pan, and table over which the material flows, and an independent spout for guiding the screened material away from the machine, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY COOK.

Witnesses:
HENRY HOWSON,
HARRY SMITH.