

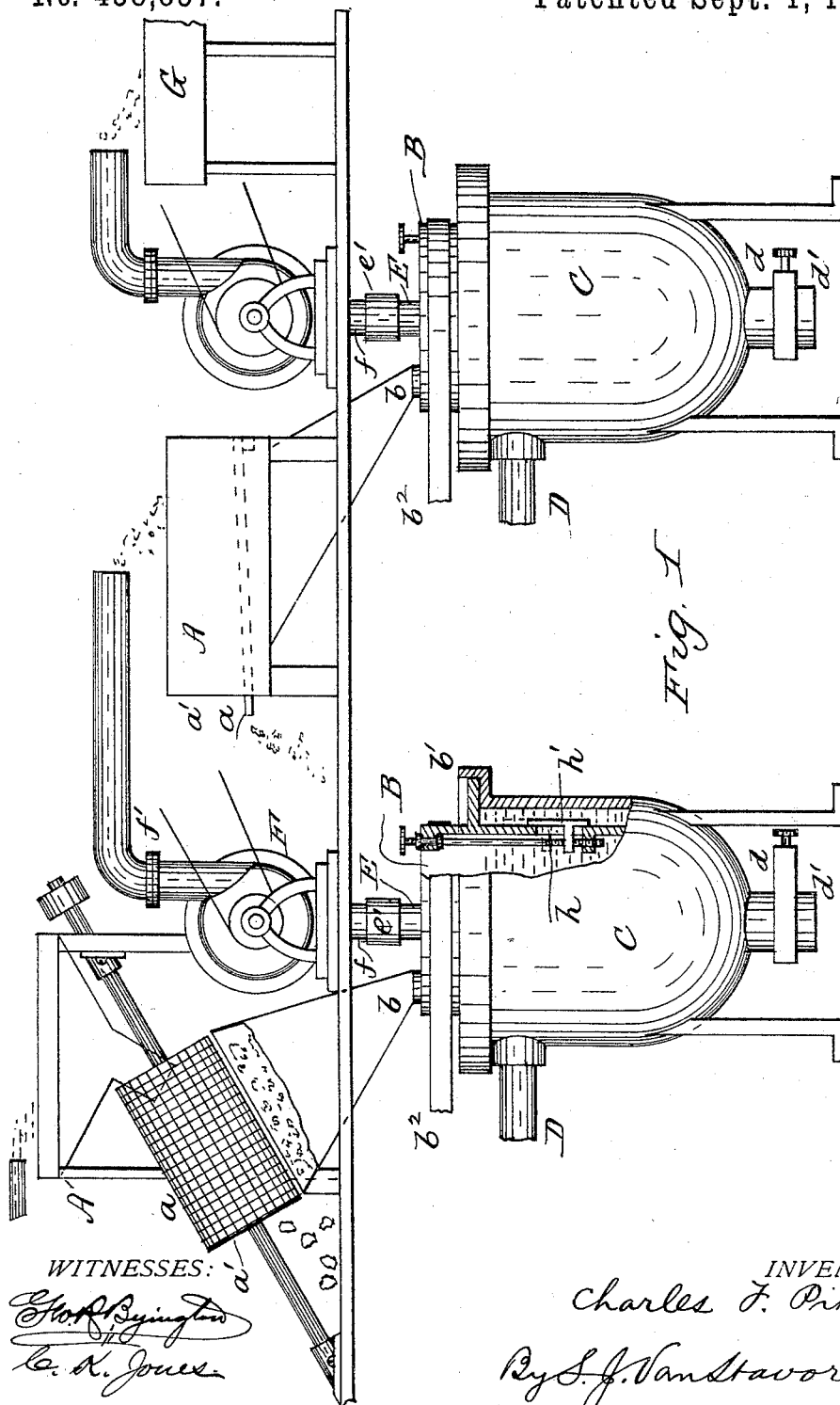
(No Model.)

2 Sheets—Sheet 1.

C. F. PIKE.
ORE WASHER AND CONCENTRATOR.

No. 458,837.

Patented Sept. 1, 1891.



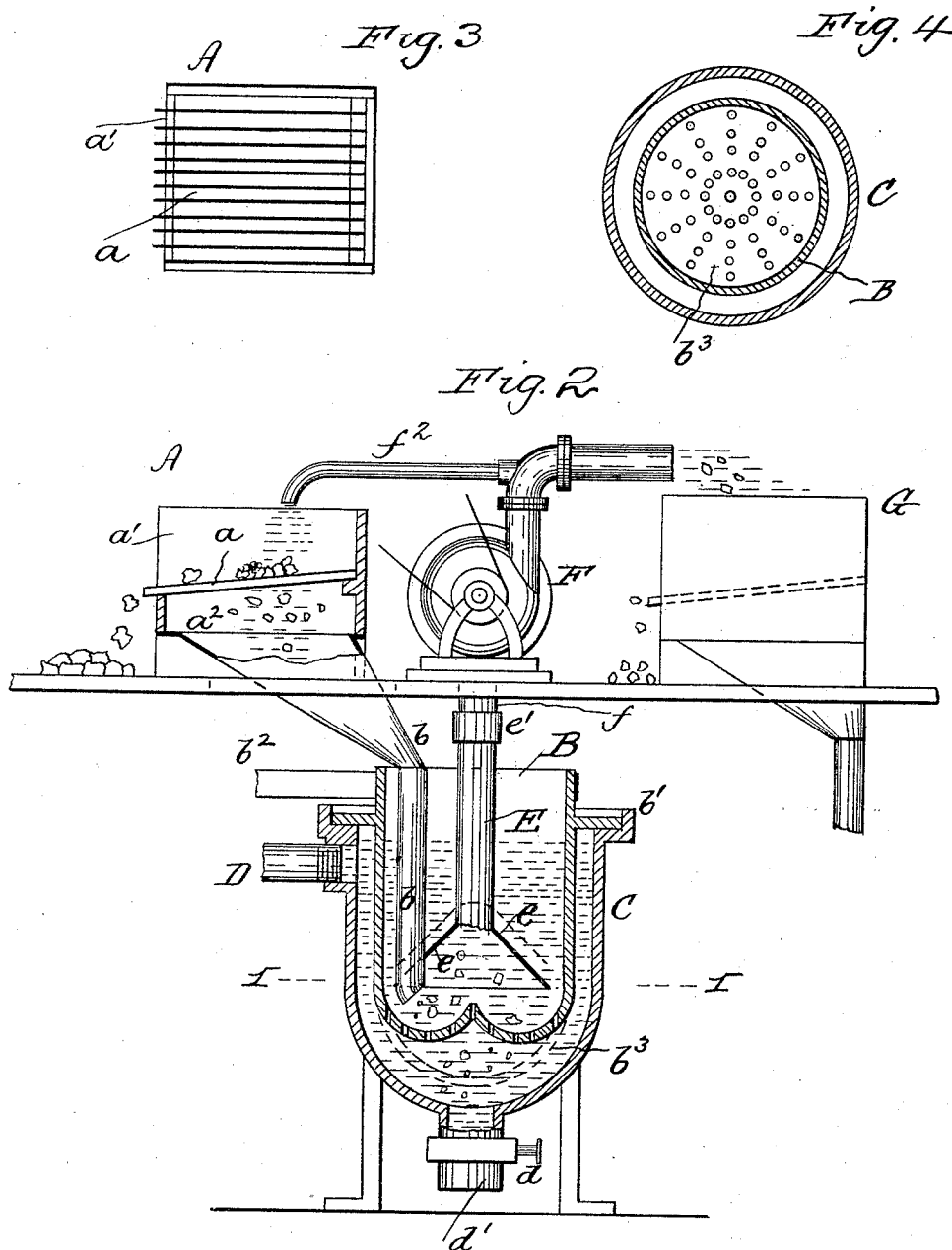
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UNITED STATES PATENT OFFICE.

CHARLES F. PIKE, OF PHILADELPHIA, PENNSYLVANIA.

ORE WASHER AND CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 458,837, dated September 1, 1891.

Application filed December 20, 1890. Serial No. 375,312. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. PIKE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Ore Washers and Concentrators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has relation to ore washers or concentrators of the form wherein the gangue is subjected to the agitating influence of an upward flow or current of water; and it has for its object simplicity of construction and efficiency of operation of the washer or concentrator, whereby it is capable of rapidly and economically separating ore from large quantities or bulk of gangue to make it especially available for use for the concentration of low-grade ores.

My invention accordingly consists of the combinations, constructions, and arrangements of parts, as hereinafter described in the specification and pointed out in the claims.

Reference is had to the accompanying drawings, wherein Figure 1 is an elevation, with parts broken away, of two ore washers or concentrators embodying my invention. Fig. 2 is a sectional elevation of a single washer or concentrator, showing detail modifications. Fig. 3 is a detail plan of grating for the washer or concentrator; and Fig. 4 is a section on the line 1 1, Fig. 2.

A A' represent two forms of feeding boxes or receptacles, each preferably having an inclined grating or analogous surface *a* leading to a discharge end *a'*, said box having an open bottom *a²* below the grating *a*. From the bottom *a²* leads a chute-pipe *b*, which enters and depends into near the bottom of a preferably open-top cylindrical receiver B, which is supported in any suitable manner, as indicated at *b'*, Fig. 2, upon an outside jacket or chamber C, so as to admit of it being rotated by a band, chain, or belt *b²*, suitably applied and driven, the actuating or power-transmitting devices for said belt *b²* not being shown in the drawings, as they are obvious.

At or near the top of the chamber C is a water-supply pipe D and at the bottom of said

chamber is a valve *d* of any suitable or desired construction, to admit of drawing off from time to time any accumulations of ore in chamber C through outlet-pipe *d'*.

The bottom of the receiver B may be constructed as desired. Thus, for instance, it may be semispherical, as indicated by dotted lines *b³*, to correspond with the configuration of the bottom of chamber C, or it may be in the form of an annular rounding with central conical surface, as indicated by full lines, Fig. 2. Said bottom may be integral with the receiver B, or otherwise, as desired.

Depending into the receiver B is a pipe E, which preferably has an outwardly-flaring or inverted-funnel-shaped lower end *e* for embracing the bottom *b³* of the receiver B. This pipe E preferably connects by a slip-joint *e'* with the inlet-pipe *f* of a suction or sand pump F of the kind which admits of the passage through it of a large bulk or volume of material, the same being a valveless or centrifugal pump, and is commercially termed a "coal-pump." When only one washer or concentrator is used, as indicated in Fig. 2, the outlet end *f'* of pump F discharges onto a waste grating or sluice G. If successive washers or concentrators are employed, as illustrated in Fig. 1, the outlet ends *f'* of each successive pump F discharges into the grating-box A for the successive washers or concentrators. The grating *a* may be a flat open one, as shown in Fig. 2, or a revolving cylindrical one, as indicated in Fig. 1.

The operation is as follows: The gangue, with its bowlders, stones, or other bulky matter as contradistinguished from prepared or pulverized gangue, is dumped or supplied to the grating *a* which separates from the gangue the bowlders or other large waste material. Preferably a stream of water is supplied to the grating *a* in any suitable manner, as shown in the drawings. I have shown said stream obtained from a branch pipe *f²* from the discharge end *f'* of the pump, which provides for an economical use of water for the apparatus. The screenings from the grating *a* are conveyed by the chute-pipe *b* into the bottom of the receiver B, where they are subjected to the upward flow or current of water from supply-pipe D, through chamber C, and up through the perforations in the bottom *b³* of the re-

ceiver B, such upward flow or current serving to agitate said screenings as they enter the receiver B and facilitate the separation of the ore from the gangue, which ore falls through the perforations in said bottom to the bottom of the jacket or chamber C, from which they may from time to time be drawn off by opening the valve *d* in the outlet-pipe *d'* of the receiver. The agitation of the gangue in the receiver B is further facilitated by revolving the receiver B, so that by the short interval of time that elapses between the discharge of the gangue into the receiver and its subjection to the action of the pump F such gangue is agitated to admit of the falling through it of the ore to the bottom of the receiver. The waste or gangue in receiver B is raised or lifted through pipe E by the pump F, and discharged therefrom as the condition or form of the ore in the gangue requires. Thus, for instance, if the ore is "shot ore" only one washer or concentrator need be used, in which case the pump F will discharge into a waste-slucie. If the gangue contains "scale-ore," a second washer or concentrator is preferably used, as indicated in Fig. 1, in which case the first pump F discharges into a second grating *a*, and the pump for the second washer or concentrator is run at a speed less than that of the pump for the first one; or, in other words, the discharge from the former is less than from the latter, this difference of discharge admitting of more thoroughly separating the ore from the gangue without waste of ore. Instead of varying the discharge of the pump or pumps by variation in running speed, the same may be accomplished by adjusting the funnel ends *e* of pipes E to and from the bottom *b*³ of receiver B, and to this end the pipes E are provided with the slip or adjustable joints *e'*, or the side of the receiver B may be provided with an opening *h*, closed by any suitably-formed valve *h'*, which, when closed, causes all the water entering receiver B from the jacket C to pass through the perforations in the receiver-bottom *b*³ to produce the maximum agitation of the gangue in said receiver; but by opening said valve part of such water flows into the receiver B through the opening *h*, and this reduces the velocity of the upward flow through the perforations in the receiver-bottom *b*³ to vary the degree of agitation for the gangue in the receiver B, and in turn the extent of the discharge from the pump F. If the gangue contains "float gold or ore," the discharge from the washer or washers, as above described, is conveyed to further washing or concentrating apparatus, and, further, if desired, to amalgamating appliances, preferable forms of which I have shown and claimed in two other pending applications filed of an even date herewith, Serial Nos. 375,313 and 375,314, respectively.

From the foregoing it will be noted that the mined or natural gangue is supplied to

the grating *a*, that the same as it enters the receiver B is agitated by an upward current or flow of water, the velocity of which may be varied as desired to conform to the conditions of the ore under treatment; that such agitated gangue is, together with any contained solid or bulky matter, forcibly and quickly discharged from the receiver by the pump F, and that the operation is continuous. The washer therefore is not only available for use for rich ores, but particularly so for low-grade ores, as large quantities of the gangue containing the latter can be rapidly and economically treated. Furthermore, such washer is especially available for use in placer-mining, where the supply of water is restricted, and also for washing dredged or raised river-bottom material containing ore.

As the construction and arrangement of the receiver B, the devices for producing the upward flow or current of water through the receiver, and the suction-pipe communicating therewith may be greatly changed without departing from the spirit of my invention, I do not confine myself to the construction and arrangements of the same as shown and described.

What I claim as my invention is—

1. In an ore washing or concentrating apparatus, the combination of a grating, a vessel or jacket having an upward flow or current of water and a valved outlet-pipe, an inner receiver provided with a perforated bottom through which said upward flow or current passes into the receiver, a discharge-pipe between said grating and the receiver, and a suction-pump having a pipe depending into said receiver, substantially as set forth.

2. In an ore concentrator and washer, the combination of a receiving-chamber having a perforated bottom or partition, a pipe connected with said receiver and supplying water to the space between said receiver and partition, which water passes upward through the latter, and a pump having a suction-pipe projecting into said chamber to a point immediately above the perforated bottom.

3. In an ore concentrator and washer, the combination of a receiving-chamber having an outlet-pipe and a perforated partition above the outlet-pipe, a pipe connected with said receiver and supplying water to the space between said receiver and partition, which water passes upward through the latter, and a pump having a suction-pipe projecting into said chamber to a point immediately above the perforated bottom.

4. In an ore washing or concentrating apparatus, the combination of a receiver having an upward flow or current of water and a valved outlet-pipe, a supply-pipe for said receiver, a suction-pump in communication with said receiver, and means for varying the velocity of said upward flow or current and the amount or volume of discharge from said pump, substantially as set forth.

5. In an ore washing or concentrating ap-

paratus, the combination of a grating-box A, the receiver B, having an upward flow or current, a supply-pipe from said grating-box to the receiver, an outlet-pipe for the latter, and
5 a suction-pump F, communicating with said receiver, substantially as and for the purpose set forth.

6. In an ore washing or concentrating apparatus, the combination of a grating-box A, the rotating receiver B, having an upward
10 flow or current, a supply-pipe from said grating-box to the receiver, an outlet-pipe for the latter, and a suction-pump F, communicating with said receiver, substantially as and for
15 the purpose set forth.

7. In an ore washing or concentrating apparatus, the combination of successive receivers, each having an upward flow or current of water and a suction-pump for dis-
20 charging the gangue, and the pump for the suc-

cessive receivers, arranged or operated to have different discharging capacities, substantially as set forth.

8. In an ore washing or concentrating apparatus, the system of subjecting the mined
25 or natural gangue to, first, a separating device for removing the bowlders or analogous bulky material from the gangue, then subjecting the latter to an upward flow or current of water, and then to a simultaneous suction force to
30 agitate said gangue to permit the ore to separate therefrom and the gangue to be discharged from the apparatus, substantially as set forth.

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

CHARLES F. PIKE.

Witnesses:

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