R. S. TOWNE.

APPARATUS FOR AGITATING LIQUID MATERIAL.

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Fig. 1.

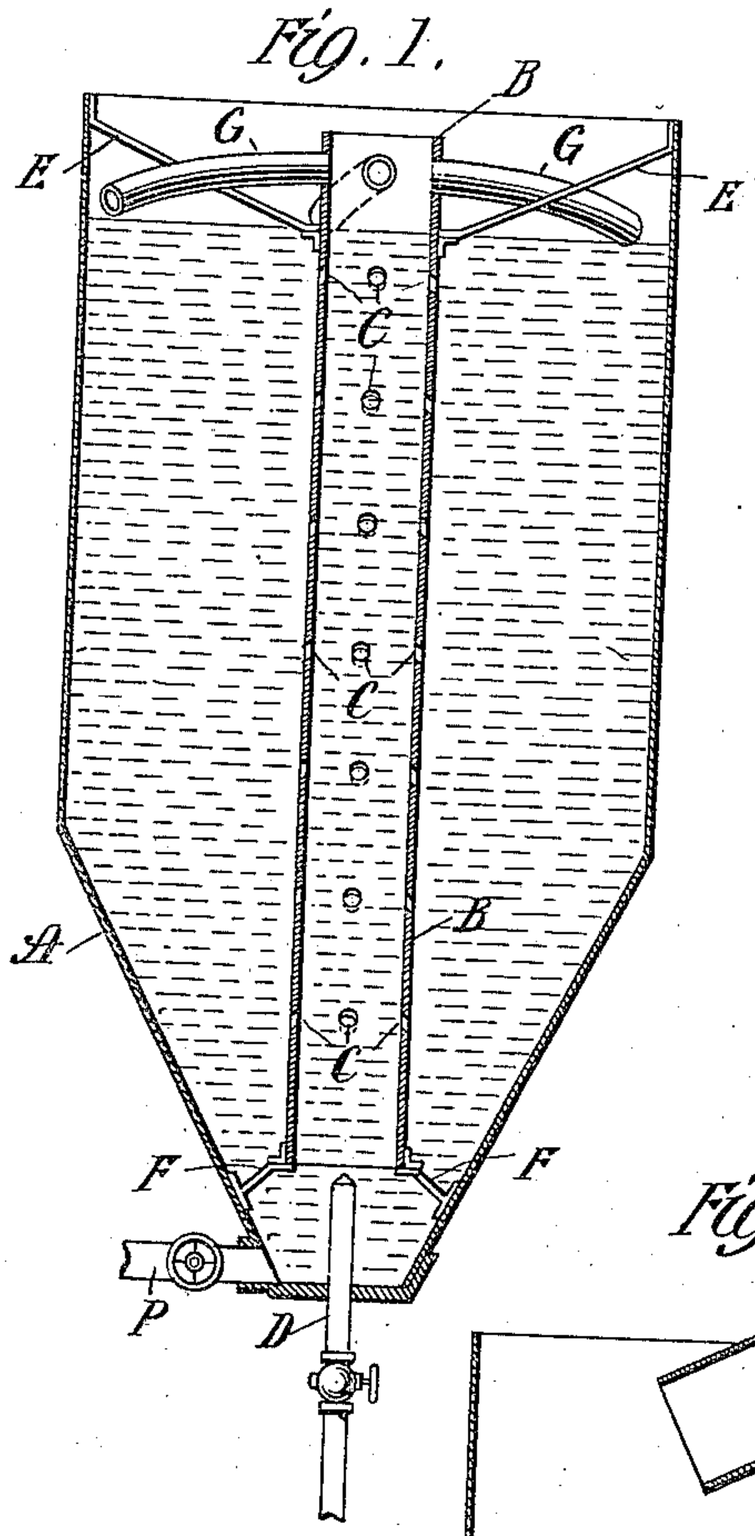

Fig. 2.

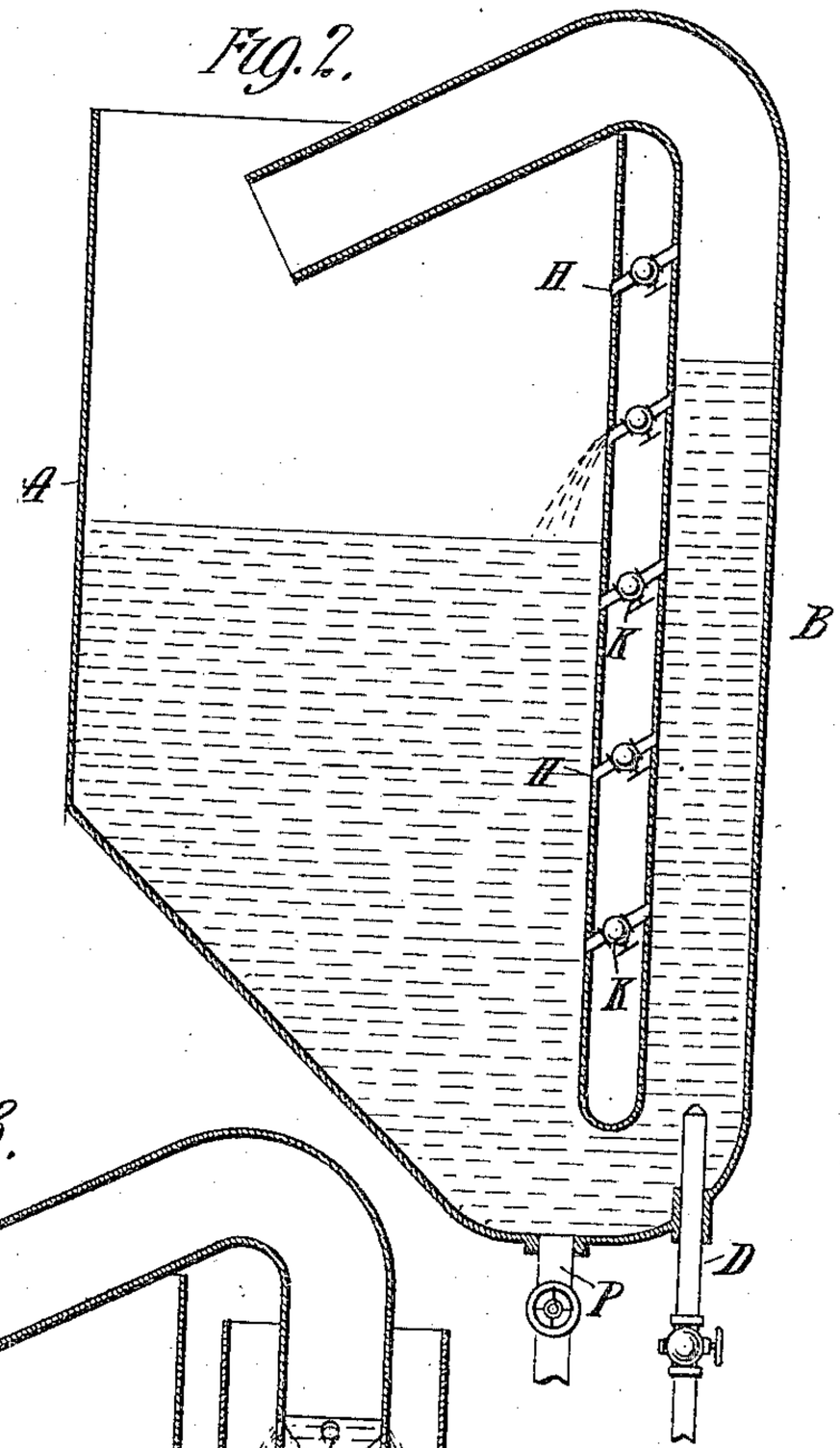

Fig. 3.

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APPARATUS FOR AGITATING LIQUID MATERIAL.

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To all whom it may concern:

Be it known that I, ROBERT SAFFORD TOWNE, a citizen of the United States, residing in the city, county, and State of New York, (whose post-office address is 82 Beaver street, in said city,) have invented certain new and useful Improvements in Apparatuses for Agitating Liquid Material, of which the following is a specification.

My invention relates to apparatuses for stirring or agitating by the use of compressed air or gas, sands, slimes, or concentrates in the cyanid or other similar metallurgical processes, or other materials which it may be desired to stir in a liquid or partially liquid state; and the principal object of my invention is to provide an apparatus in which the agitation can be carried on continuously during the operations of filling and discharging the tank.

In agitators employing a circulation shaft, the only discharge of the circulating liquid is at the top of said shaft. It can readily be seen, therefore, that when the tank is only partially filled, a very strong air current is required to force the liquid up through said shaft, and with material of high specific gravity, such as some iron ores, the circulation cannot be carried on under such conditions and the apparatus becomes clogged by the massing of the heavy material at the bottom of the tank. These objections are overcome by my invention as will be seen from the following specification, accompanied by drawings illustrating the same, in which—

Figure 1 is an elevation of my apparatus, and Figs. 2 and 3 elevations of modified forms thereof.

Referring to Fig. 1—A represents a tank in which the material is to be agitated, and B, a circulation shaft located centrally in the tank, and D an air jet. This shaft is so constructed and positioned that the uppermost discharge is below the top of the tank and the bottom communicates with the tank so as to permit free access of the material to the same and is provided with apertures (C) in its sides. The number, arrangement and size of these apertures may be varied to the character of the material to be treated, but I prefer to incline them downwardly from the inside for the purpose hereinafter set forth.

The uppermost discharge may be through the open top of the shaft, but for the purpose of increasing the agitation, I prefer to provide the shaft B near its top with discharge pipes (G), which are bent or otherwise constructed so as to discharge the material obliquely against the sides of the tank A; thus imparting a rotary motion to the material in the tank, in addition to the vertical circulation. In this construction the shaft is carried a suitable distance above the pipes (G) to prevent discharge from the top. The shaft in the construction of Fig. 1, by preference is supported by feet (F) and stays (E). The tank is emptied through the discharge pipe (P), located at some suitable point in or near the bottom of the tank but sufficiently removed from the nozzle of the air jet so as to prevent air entering the discharge pipe with the discharging liquid.

The operation of my apparatus is as follows: Material being fed into the tank by means of a pipe at the top or any convenient method, a current of air is introduced to the circulation shaft by means of air jet (D), carrying with it material from beneath the circulation shaft which is discharged back into the tank through apertures (C). As the liquid rises in the tank the circulation takes place through a higher level of apertures until finally when the tank is sufficiently filled the extreme or maximum circulation is reached, the liquid being discharged through pipes G or over the top according to the style of construction. In emptying the tank the action is reversed as will readily appear. When agitating a full charge it is desirable for a more complete agitation that the material be discharged from the topmost outlets of the shaft. I find that if the apertures are made horizontal, some material is discharged through the submerged apertures, but that if the apertures are inclined downwardly from the inside, the discharge through the submerged apertures is lessened.

The apparatus may also be provided with valves for closing the same when the tank is full so that the circulation will be carried on through the extreme points of the communication between the shaft and tank.

In Figs. 2 and 3 the circulation shaft is shown outside of the tank. In Fig. 2, the circulation, when the tank is only partly filled, is effected through pipes H connecting the apertured shaft with the tank, and controlled by valves (K). By closing these

valves, the entire circulation may be restricted to the top outlet, and when agitating a full charge this may become desirable. Fig. 3 shows an outside shaft surmounted by a tank (R) to receive the material discharged through the apertures (C). This is not a desirable construction owing to the difficulty of handling the material discharged through the apertures (C) into tank (R), but it serves to illustrate the variety of construction to which my invention may be adapted. In this form of apparatus, the material discharged into tank R could be pumped to the filter or back into tank A for further agitation as desired. It is apparent from the above that my invention in connection with the advantages above pointed out obviates the necessity of employing mechanical strirrers or other auxiliary means at the bottom of the tank in order to prevent clogging of the apparatus during the process of filling and discharging, and also provides an apparatus which can be used with great advantage in connection with a continuous filter.

I claim:

1. In an agitating apparatus comprising a material tank, a circulation shaft communicating therewith at a point intermediate the extremes of circulation through said shaft.

2. In an agitating apparatus comprising a material tank, a circulation shaft communicating therewith at a plurality of points intermediate the extremes of circulation through said shaft.

3. In an agitating apparatus comprising a material tank, a circulation shaft communicating therewith at its bottom and points intermediate its top and bottom.

4. In an agitating apparatus comprising a material tank, a circulation shaft communicating therewith at its top, bottom and points intermediate thereof.

5. In an agitating apparatus, a circulation shaft provided with a plurality of series of apertures in its sides.

6. In an agitating apparatus, a circulation shaft provided with apertures in its sides inclined downwardly from the inside.

7. In an agitating apparatus comprising a material tank, a circulation shaft provided with discharge pipes near its top constructed so as to discharge the material into the said tank in such manner as to impart a rotary motion thereto.

8. In an agitating apparatus comprising a material tank, a centrally located circulation shaft communicating with said tank through its bottom and apertures in its sides, and provided with supporting feet at its lower end.

9. An agitating apparatus comprising a material tank, a circulation shaft having apertures in its sides, said shaft communicating with said tank through said apertures and at the bottom, and means for causing material to flow upwardly into said shaft.

10. An apparatus comprising a material tank having a tapering bottom, a circulation shaft having apertures in its sides, centrally located in said tank and communicating therewith at its lower end, and means for causing the material to flow upwardly into said shaft and out through said apertures.

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