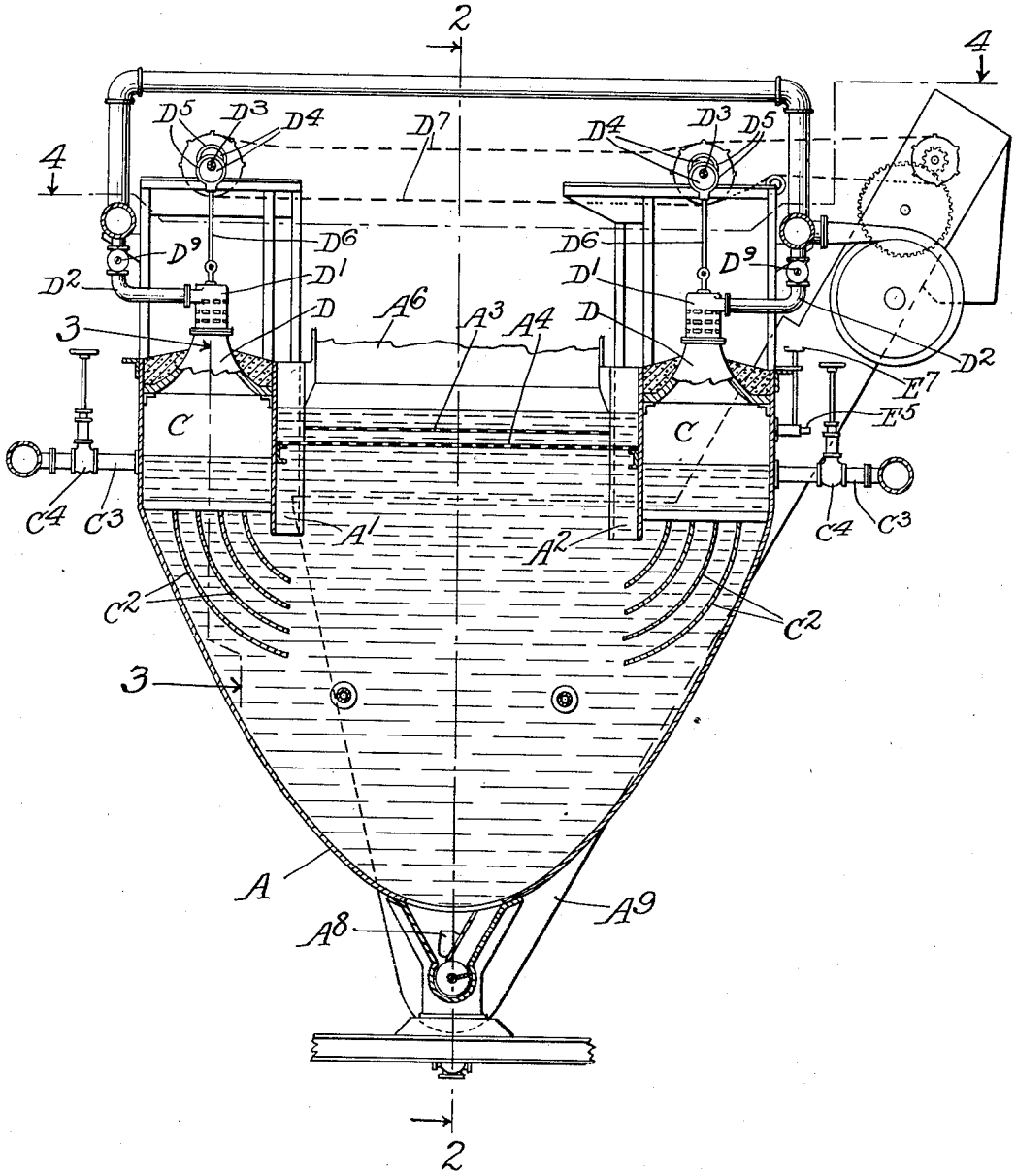
Sept. 12, 1933. J. D. S. DRINKWATER 1,926,375

WASH BOX

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Fig. 1.



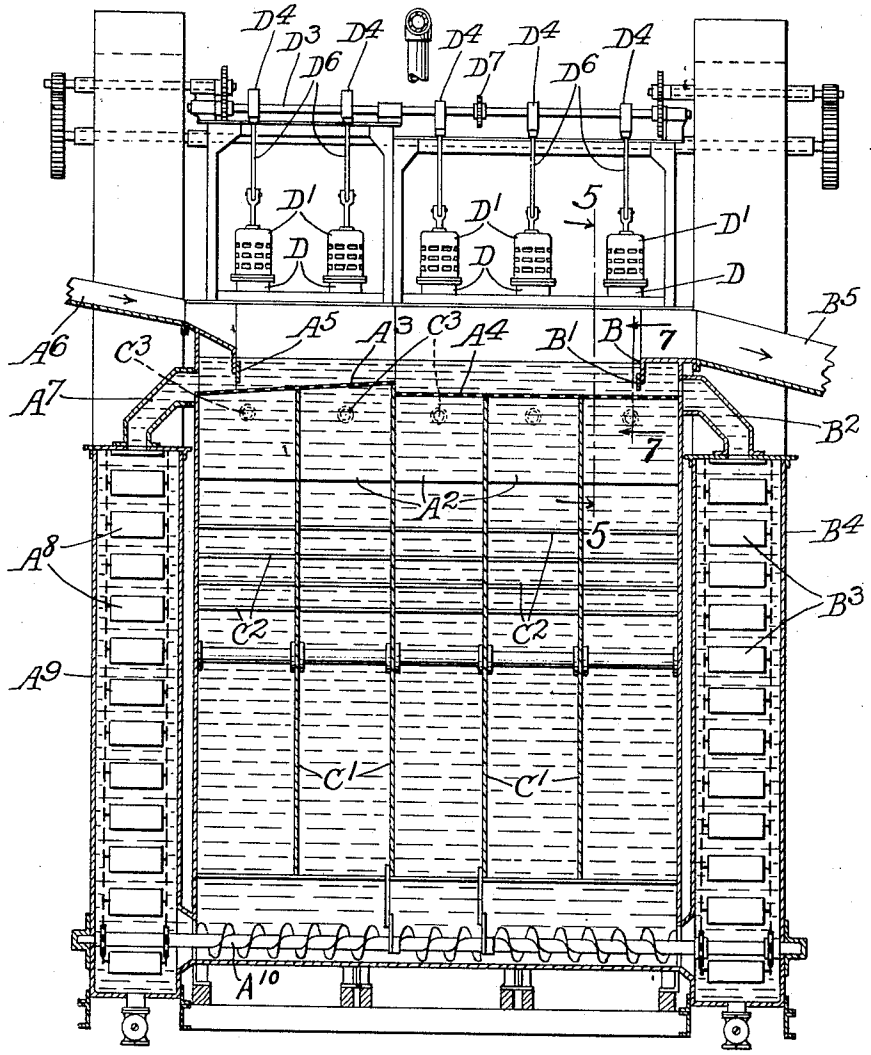
Inventor
James D. S. Drinkwater
by Parker & Carter.
Attorneys.

Sept. 12, 1933. J. D. S. DRINKWATER 1,926,375

WASH BOX

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Fig. 2.



Inventor
James D. S. Drinkwater
by Parker + Carter.
Attorneys.

Sept. 12, 1933. J. D. S. DRINKWATER 1,926,375

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Fig. 3.

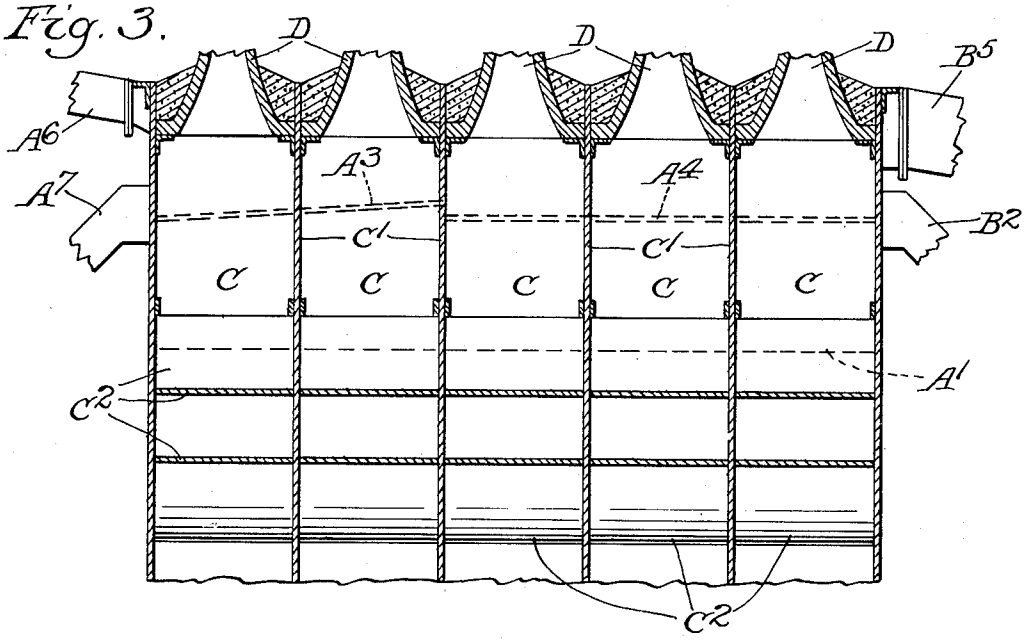


Fig. 6.

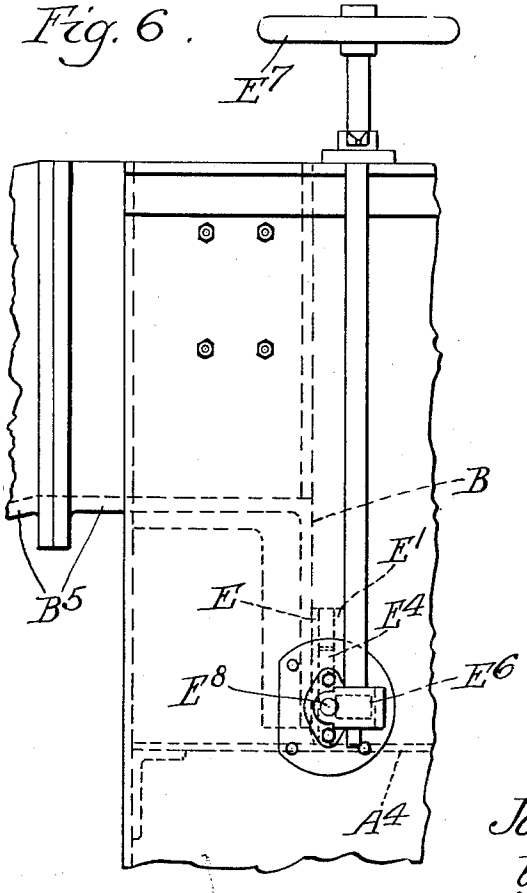
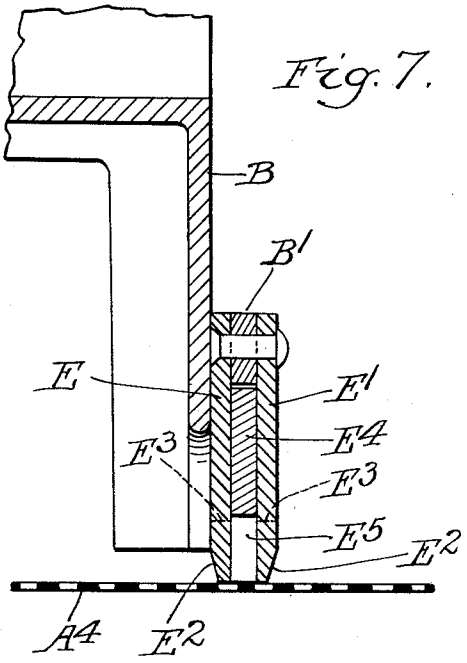


Fig. 7.



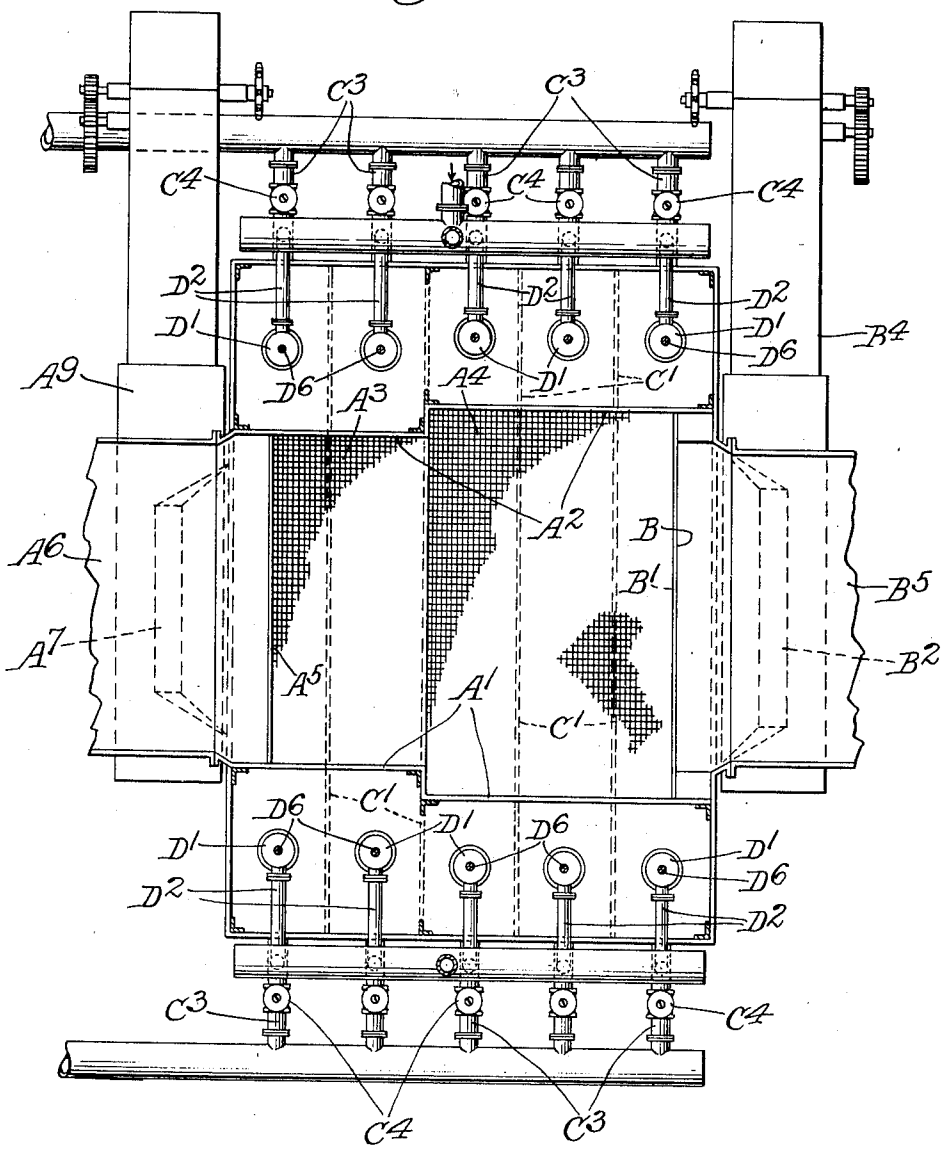
Inventor
James D. S. Drinkwater
by Parker & Carter.
Attorneys.

Sept. 12, 1933. J. D. S. DRINKWATER 1,926,375

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Fig. 4.



Inventor
James D. S. Drinkwater
by Parker & Carter.
Attorneys.

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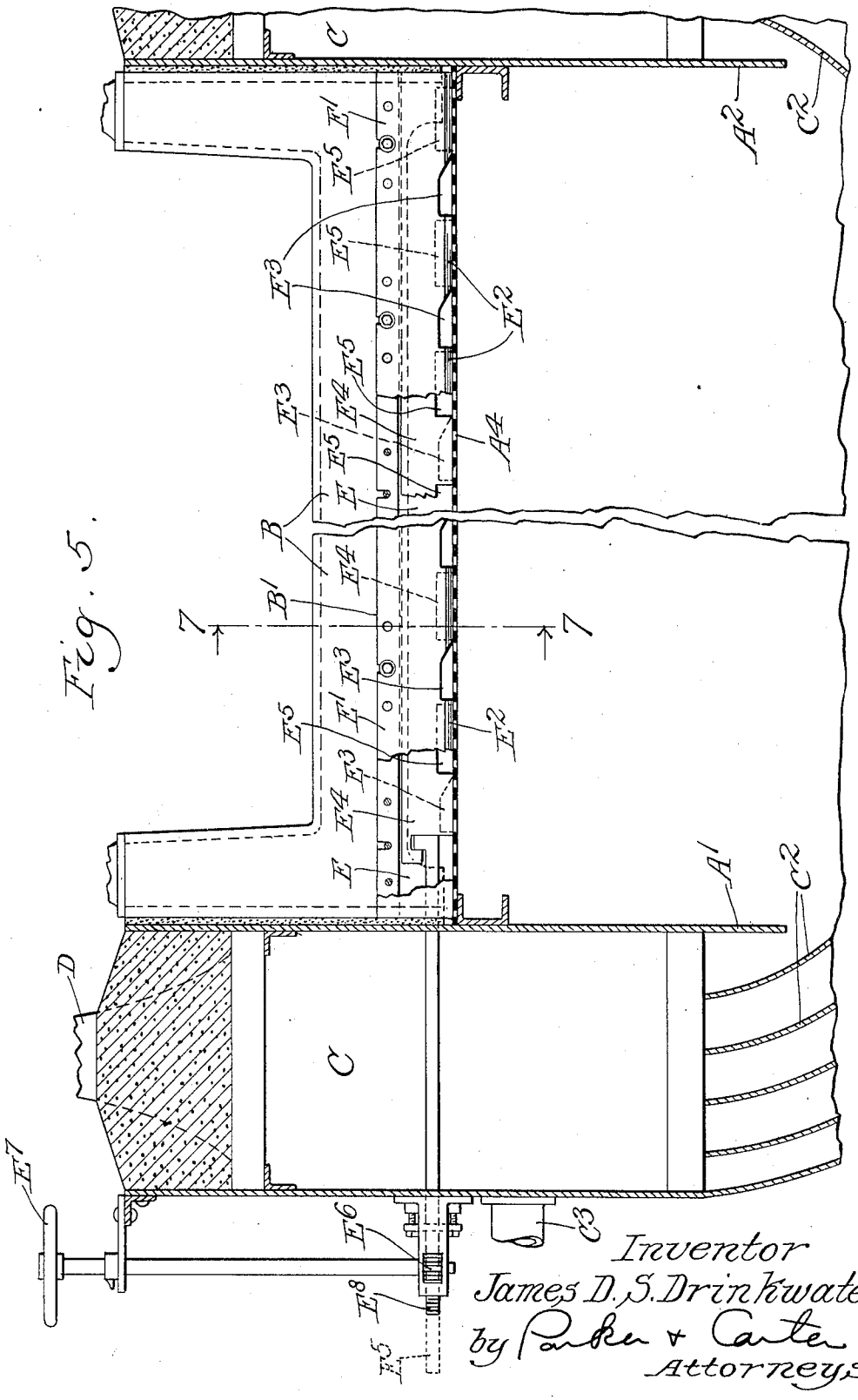


Fig. 5.

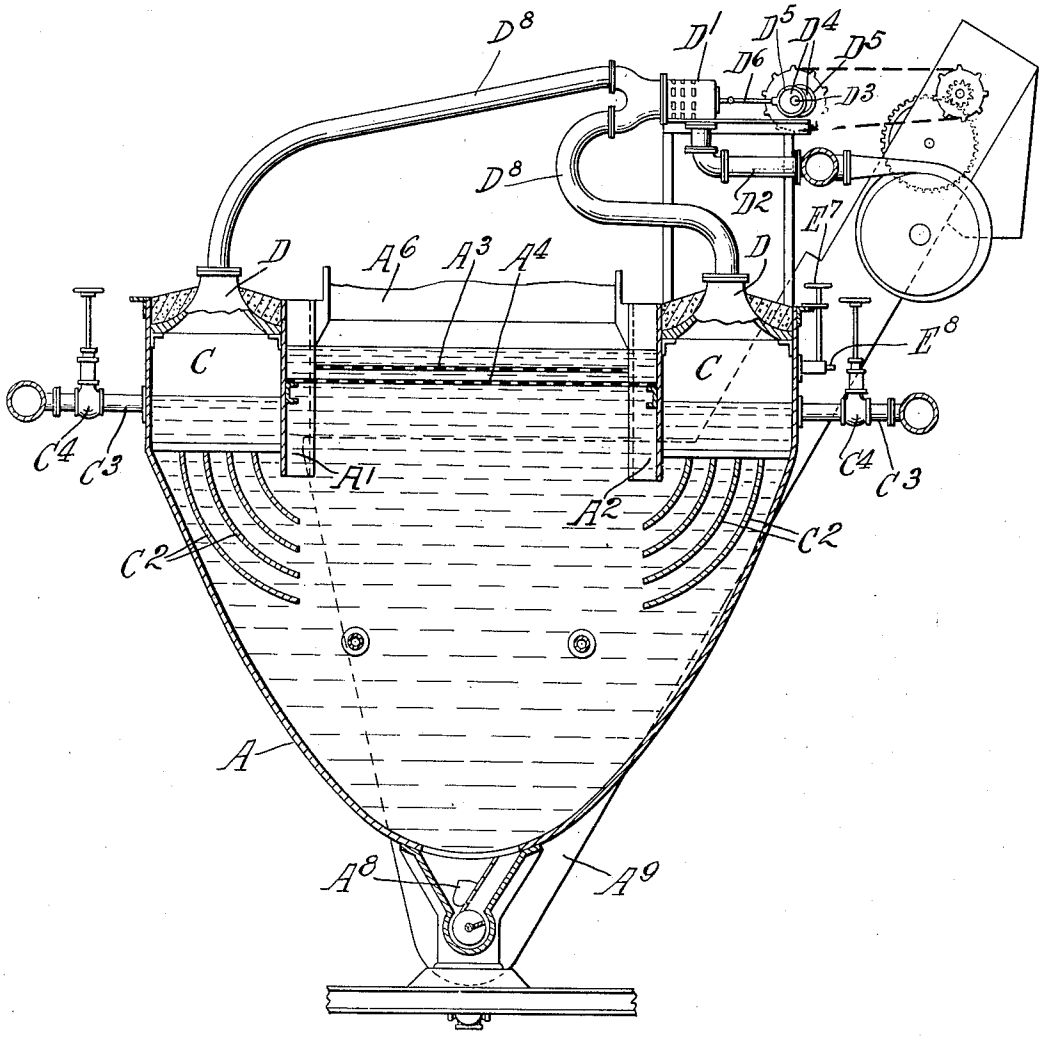
Inventor
James D. S. Drinkwater
by Parker & Carter
Attorneys.

Sept. 12, 1933. J. D. S. DRINKWATER 1,926,375

WASH BOX

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Fig. 8



Inventor
James D.S. Drinkwater
by Parker & Carter.
Attorneys.

Patented Sept. 12, 1933

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UNITED STATES PATENT OFFICE

1,926,375

WASH BOX

James D. S. Drinkwater, Chicago, Ill., assignor to Link-Belt Company, Chicago, Ill., a corporation of Illinois

Application December 4, 1929. Serial No. 411,627

2 Claims. (Cl. 209—500)

My invention relates to improvements in wash boxes for coal, ore and the like, and has for one object to provide a new and improved type of wash box which will have great capacity, be subject to close regulation, and will separate the coal or other material treated by it within narrow ranges according to the specific gravity of the different parts of the material. Other objects will appear from time to time throughout the specification and claims.

In general, my invention relates to wash boxes or jigs of the so-called Baumé's type wherein a flowing mass of material is passed across the screen beneath the surface of a body of water, which water is caused to pulsate through the screen and through the bed of material to cause stratification of the material by gravity, the heavy material being at the bottom and the lighter material above, and wherein this pulsation is caused not by a reciprocating plunger working directly on the water, but by controlled intermittently admitted and released volume of air under pressure in the air sections of the wash box so that the water itself serves as a piston in relation with the air.

In the past it has been customary to have the upper portions of the wash box made up in general of two sections, one section containing the screen across which the material to be treated flows, the other section containing the chamber in which air under pressure is admitted and released to pulsate the water. The water in this case pulsating or traveling around a longitudinal partition at its normal level is lowered in the air chamber by pulsating water at the bottom of the bank and forcing it up through the bed of material. Experience has taught that with this arrangement the width of the stream of material is limited because when it exceeds a certain well defined maximum of approximately six feet we find that the flow of the water forced from the air chamber of the jig short circuits through the portion of the screen and material bed closest to the longitudinal partition between the air and water sections. This uneven flow of water up through the screen and material causes too violent action in some parts of, and insufficient action or pulsations in other parts of the bed, thus making it impossible to properly agitate the material with a sufficient uniform operation over the entire area of the bed to secure satisfactory results with beds wider than specified above.

I propose to overcome the limitation as regards width of the bed of material as well as the size and characteristics of the material to be treated by providing a jig having a flowing bed of material of much greater width, but having an air chamber on each side so that the flow of water and the water pulsations will come to the mass of water beneath the bed of material from the two air chambers in opposition.

Experience shows that when opposed air chambers are used, especially if guide vanes are provided in the body of the water, a much wider bed may be used and that the upward flow of water is more uniformly directed through the screen, and the impinging streams of water and impinging wave or pulsating effect make it possible for the bed to be more than twice as wide as the bed which will work with a single chamber.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a cross section;

Figure 2 is a section along the line 2—2 of Figure 1;

Figure 3 is a section along the line 3—3 of Figure 1;

Figure 4 is a sectional plan, the section being taken on the line 4—4 of Figure 1;

Figure 5 is a cross section through an outlet box and gate;

Figure 6 is a detailed end view of outlet box and gate;

Figure 7 is a detailed section along the line 7—7 of Figures 2 and 5;

Figure 8 is a section similar to Figure 1 showing a modified form.

Like parts are indicated by like characters throughout the specification and drawings.

The jig box comprises a longitudinal reservoir having a generally curved bottom portion A, and at its top being divided longitudinally by walls A^1 A^2, which walls extend beneath the level of water in the jig. A^3 A^4 are the jig screens. It will be noted that the screen A^3 is higher than the screen A^4 and one is wider than the other. They might be the same width or they might be at the same level; there might be more variation in height or in width. However that may be, each screen, on the upstream or feed end of the box, has associated with it an adjustable refuse gate A^5, coal coming into the apparatus through the sluice A^6 above such gate, some refuse being permitted to move out to the left and be discharged through the refuse casting A^7 to the refuse elevator A^8 in the boot A^9, refuse from the bottom of

the tank being discharged into the boot A^9 by the spiral conveyor A^{10}.

At the discharge end of the apparatus is a banking wall B, having an adjustable discharge gate B^1 through which the remainder of the refuse not drawn off through gate A^5 discharges through the refuse casting B^2 to refuse elevator B^3 in the boot B^4, coal passing over the wall and being discharged through a chute B^5 into any suitable receptacle or conveyor. The details of the refuse gate will hereinafter be more fully discussed.

It will be noted that this screen is centrally disposed of the jig. On either side are chambers or areas cut off from the screen by the walls A^1 A^2. These chambers or areas are divided into a series of air boxes C by transverse partitions C^1, which also extend down below the surface of the water. These transverse partitions have associated with them curved guide vanes C^2 which form water ducts adapted to guide the water as it flows from the air box downwardly into the body of the jig along lines impinging or meeting beneath the screen, so that when air pressure is applied to the surface of the water in the air boxes and the water is forced out of the boxes it will be forced up through the screen in uniformly distributed pulsating, continuous streams. In order that there may be a minimum return flow of water downwardly through the screen, the pipes C^3 are provided, discharging into the air boxes. The valves C^4 may be manipulated to control these pipes and the water is fed through them under a constant head to the air boxes, the head being such that water will not be forced out of the pipe when air is applied to the box and such that water will run into the box from the pipe when the air pressure is released, thus replacing the water which has been forced upwardly through the screen, and thus making it possible to have a continuous, pulsating stream of water through the screen and through the bed of material on the screen without any backward suction which would tend to compact or to carry good material through the bed into the chamber below the screen.

As indicated, each air box is closed by a head D which terminates in a quick acting air valve D^1 supplied with air under pressure through pipe D^2 controlled by a valve D^9 from any suitable source of supply. The valve, when in one position, permits air under pressure to rush into the air box, when in another position permits air to escape from the air box and shuts off the compressed air. This valve is caused to reciprocate by means of the eccentric shaft D^3, there being one shaft for each side of the jig with an eccentric D^4 for each air valve, the connection being through an eccentric strap D^5 and eccentric rod D^6. A chain or gear connection D^7 extends across the jig, so as to coordinate and synchronize the eccentric shafts, and thus insure that the timing of the air impulse, which is given to the several air chambers, will be correct, as it is of the utmost importance that the air pulsations synchronize in the air boxes on directly opposed sides of the screen as otherwise the water would not be uniformly forced up through the screen areas between partitions C^1.

Referring now to the box outlet or refuse gate this comprises two parallel plates E E^1, beveled at E^2 and coming down close to, if not in actual contact with the screen, these gate plates having a plurality of notches or ports through them adjacent to the screen, as indicated at E^3. These ports are straight sided at top and bottom except that toward one end each port diminishes gradually in height. Associated with them is an adjustable slide plate E^4, having ports E^5. This slide plate is attached to a rod which extends out through the body of the jig, and terminates in a rack E^8 associated with a gear E^6 manipulated by a hand wheel E^7, so that the effective gate opening may be adjusted by bringing the notched portions of the fixed and sliding members more or less into or out of register, and because of the diagonal boundary on one side of the fixed gate notches a very nice adjustment is permitted.

In the modified form shown in Figure 8, the only difference is that instead of having a separate valve for each air box, I provide a single valve for the two air boxes with two pipes D^8 leading air from it, one to each air box, preferably the length of these pipes is the same so that there will be no differential pressure or differential timing of the pressure effect in the two boxes but even with pipes of different lengths any inaccuracy of timing is so slight as not to be fatal.

Thus instead of having separate drives over each section of air boxes, and separate valves for each box, a single drive is used and a single valve for each pair of air boxes.

I claim:

1. A wash box comprising air and water reservoirs, a screen located beneath the surface of the water contained therein and extending longitudinally thereof, a plurality of air chambers spaced along both lateral sides of the screen closed at their bottoms by the water in the reservoir, means for intermittently supplying air under pressure to all of said chambers to cause a pulsating flow of water from them through the screen, and a unitary valve control means for all said air supply means whereby the pulsations applied to the water by the air in each pair of opposed chambers are simultaneous.

2. A wash box comprising air and water reservoirs, a screen located beneath the surface of the water contained therein and extending longitudinally thereof, a plurality of air chambers spaced along both lateral sides of the screen closed at their bottoms by the water in the reservoir, means for intermittently supplying air under pressure to all of said chambers to cause a pulsating flow of water from them through the screen, and a unitary valve control means for all said air supply means whereby the pulsations applied to the water by the air in each said pair of opposed chambers are simultaneous, and guide vanes located beneath the surface of the water in the reservoir for guiding water expelled by the air from each pair of opposed air chambers without eddying currents into the water area immediately beneath the screen.

JAMES D. S. DRINKWATER.