Sept. 17, 1929. F. H. BLATCH 1,728,196

COAL JIG

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Fig. 1.

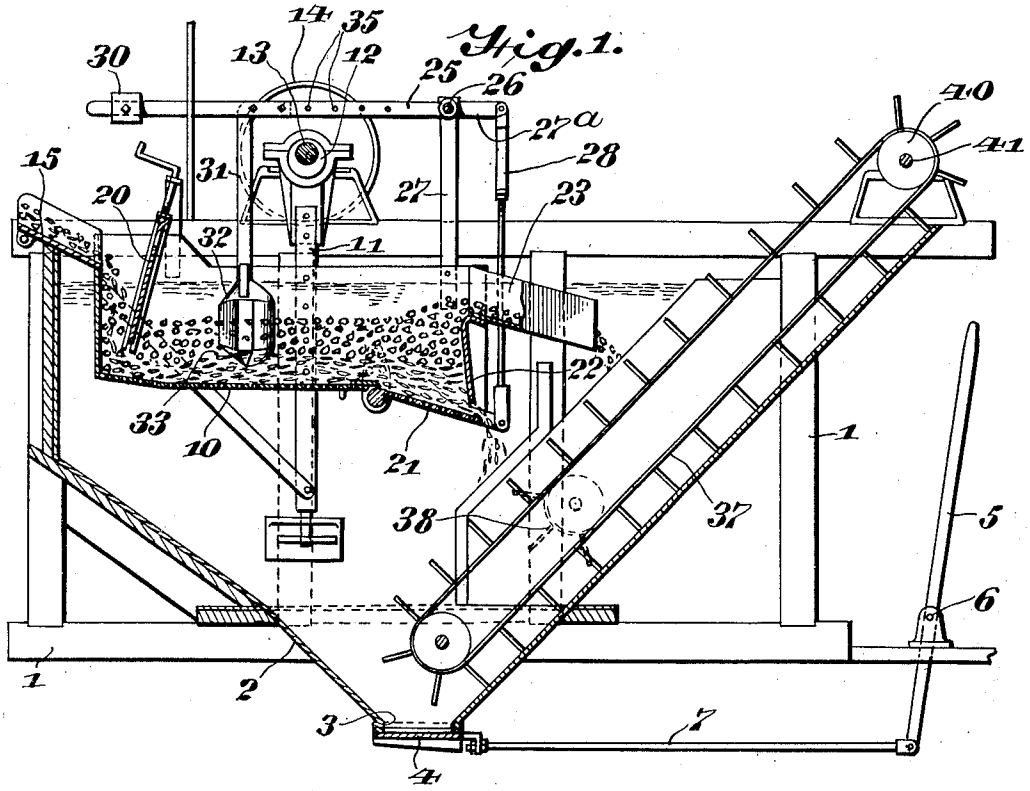
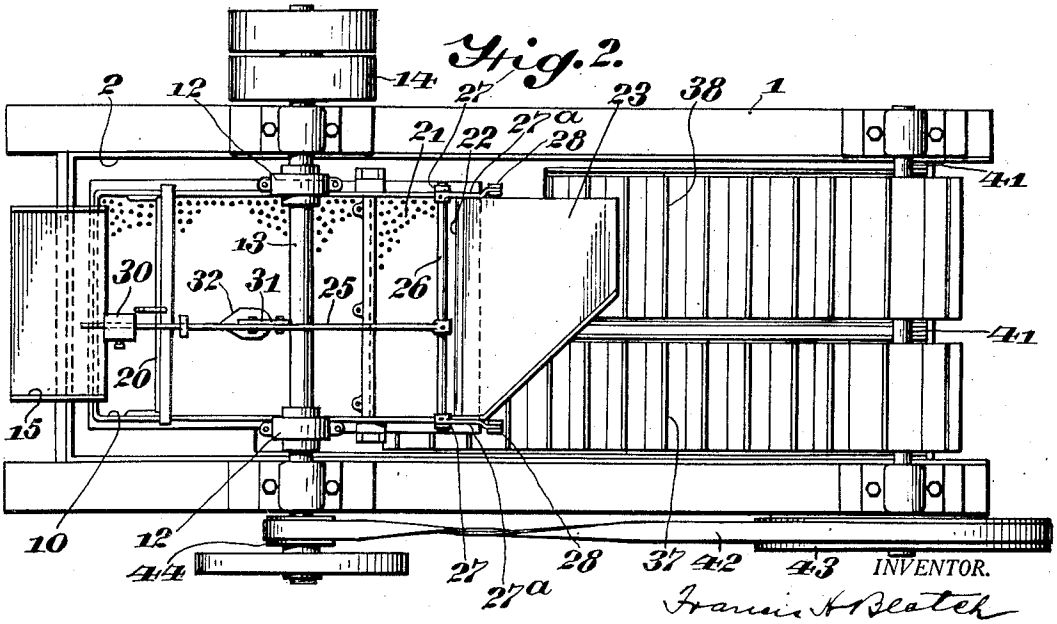


Fig. 2.



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COAL JIG

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Fig. 3.

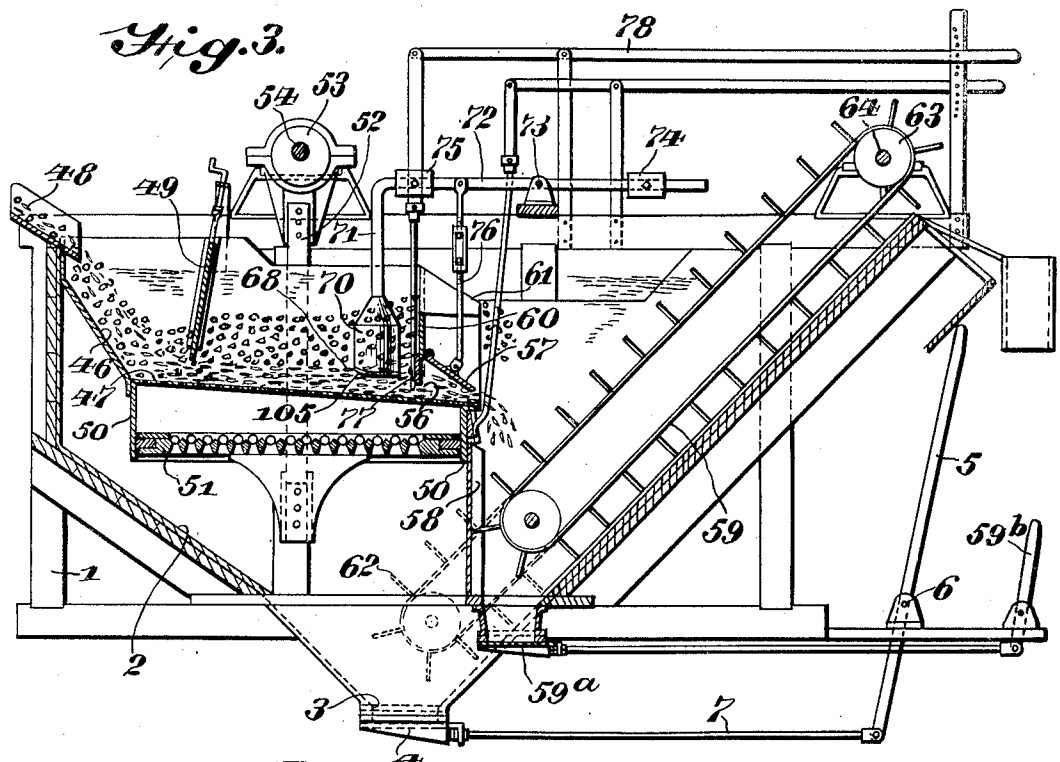
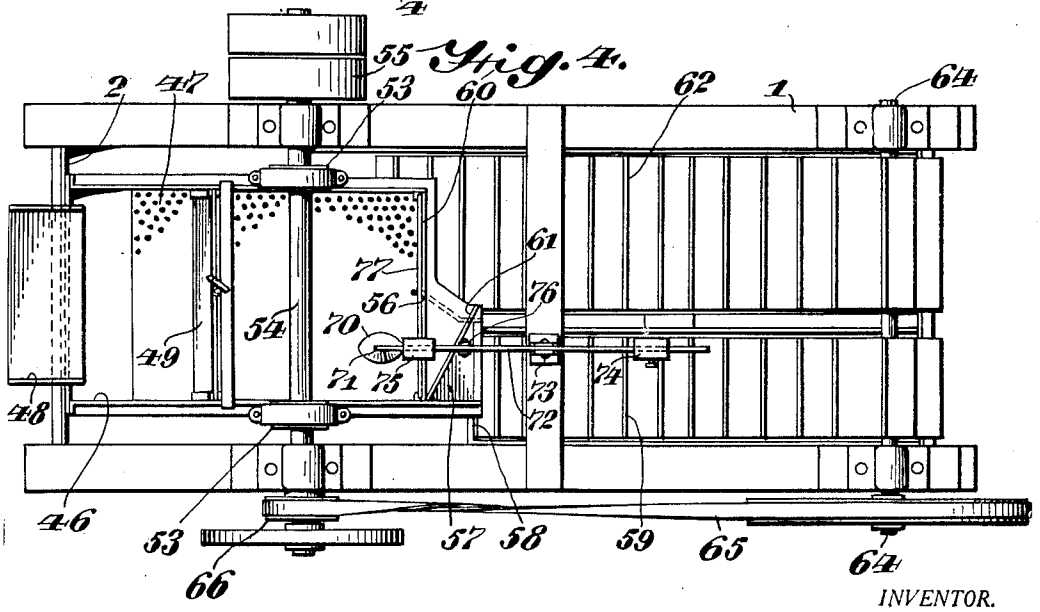


Fig. 4.



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COAL JIG

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Fig. 5.

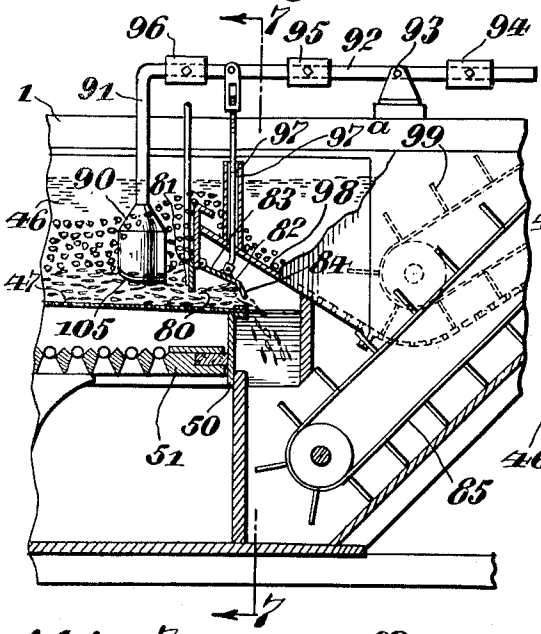


Fig. 6.

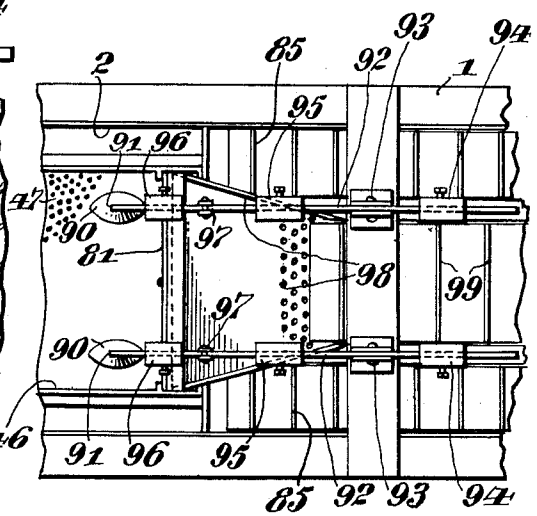


Fig. 9.

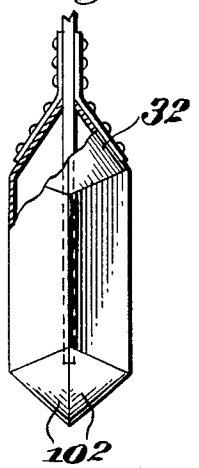


Fig. 8.

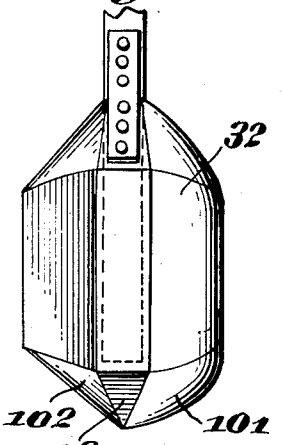


Fig. 7.

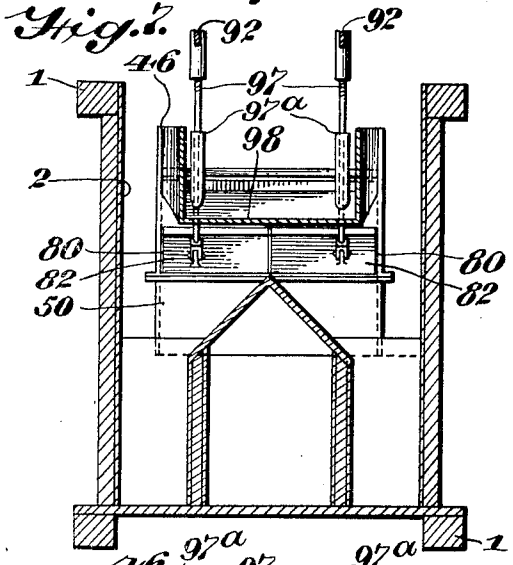


Fig. 10.

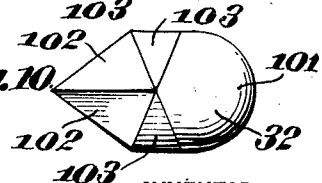
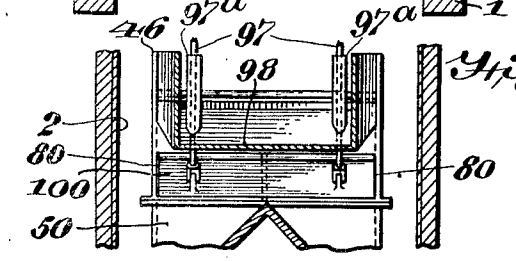


Fig. 11.



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UNITED STATES PATENT OFFICE

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COAL JIG

Application filed February 7, 1925. Serial No. 7,463.

My invention relates to apparatus for treating mixtures, including materials of different specific gravities such as coal, ore and the like, for the purpose of separating such mixtures into their constituent parts. More particularly the apparatus is designed and intended for use for the washing of coal for the purpose of separating the coal from mixtures of slate, stone and the like. In the washing of the coal or ore according to the process contemplated, it is subjected to the action of water which is agitated and caused to flow through the mass and by reason of the different specific gravities of the constituents of the mixture the said constituents are caused to travel in different paths or directions from the apparatus.

In the operation of apparatus for the separation of coal from impurities, consisting of slate, stone and the like, the latter forms a bed upon the bottom of the washing pan, from which bed it is discharged at a predetermined rate, while the coal, being lighter, is lifted up by the upwardly flowing stream of water and thereby separated from the heavier impure material and discharged through separate discharge passageways or paths.

In the washing of the coal it is necessary, in order that the best result may be obtained, to provide and maintain upon the bottom of the washing or jig pan a bed of slate, stone or the like of certain thickness through which the water must travel upwardly through the jig pan. The thickness of this bed should vary with the character of the mixture which is being treated.

The general object of the invention is to provide means whereby by proper adjustment the thickness of the bed of slate or other material of greater specific gravity than the coal upon the bottom of the jig pan may be automatically controlled and regulated.

It is also an object of the invention to provide means whereby the area of the opening through which the slate or other relatively heavy material is to be discharged may be varied automatically so as to permit discharge of the said slate or other relatively heavy material at a rate to maintain the desired thickness of the bed of slate or other material upon the bottom of the jig pan.

The further objects and advantages of the invention will be pointed out in the detail description thereof which follows, or will be apparent from such description.

In order that the invention may be readily understood and its practical advantages fully appreciated, reference may be had to the accompanying drawings, in which I have illustrated certain convenient forms of embodiment of the same. However, it will be understood that the invention is susceptible of embodiment in other forms of construction than those shown and that changes in the details of construction may be made within the scope of the invention without departing therefrom.

In the drawings,—

Fig. 1 is a central, vertical and longitudinal sectional view of a jig structure provided with means embodying my invention;

Fig. 2 is a top plan view of the structure shown in Fig. 1;

Fig. 3 is a view similar to that shown in Fig. 1, showing the invention applied to and embodied in a jig of different construction from that shown in Figs. 1 and 2;

Fig. 4 is a top plan view of the structure shown in Fig. 3;

Fig. 5 is a central, vertical and longitudinal sectional view of a portion of another modified construction of jig structure provided with means embodying the invention;

Fig. 6 is a top plain view of the same;

Fig. 7 is a transverse sectional view taken on the line 7—7 of Fig. 5;

Fig. 8 is a view in side elevation of a float of desired construction which is adapted to be employed in the construction of devices embodying the invention;

Fig. 9 is a view in rear elevation of the float shown in Fig. 8;

Fig. 10 is a bottom plan view of the float shown in Figs. 8 and 9; and

Fig. 11 is a view similar to that shown in Fig. 7, showing a slightly modified construction of discharge gate for controlling the discharge of slate and other relatively heavy material from the jig pan.

Referring to the drawings, 1 designates

as a whole the frames of the several constructions disclosed by means of which the tank 2 and other parts of the structure are supported. In the several forms of construction the water may be supplied to the tank in any preferred manner and its discharge from the tank for the purpose of cleansing and flushing out the latter may be effected through an opening 3, controlled by a valve 4, actuated by a lever 5, pivoted intermediate its ends at 6 and connected at its lower end by the connecting rod 7 to the valve 4. It will be apparent that by causing pivotal movement of the lever 5 on the pivot 6 the valve 4 may be opened and closed.

Referring now to Figs. 1 and 2 of the drawings, 10 designates a jig pan having a perforated bottom, in accordance with the usual construction. This jig pan is connected to and is supported by the depending arms 11, the upper ends of which are supported upon eccentrics 12 mounted upon the rotatable shaft 13, driven by a wheel 14 to which power is applied from a source not shown. The material to be washed is introduced into the jig pan 10 through a chute or trough 15 between the rear end of the jig pan and an adjustable baffle plate 20. The perforated bottom of the jig pan is provided with a pivotally supported perforated extension 21 which constitutes a gate, which gate is adapted to co-operate with the lower edge of a front wall 22 of the jig pan. A discharge trough or chute 23 is supported upon the upper edge of the front wall 22. The coal which is separated from the stone and other relatively heavy material is discharged through this trough or chute in usual manner.

For the purpose of controlling the gate 21 I have provided a lever 25 which is rigidly connected at its forward end to a shaft 26 which is pivotally supported in the upper ends of posts 27, the lower ends of which are connected with the opposite sides of the jig pan 10. Forwardly extending arms 27ª are rigidly connected to the opposite ends of the shaft 26. Connecting rods 28 connect the forward ends of these arms to opposite ends of the forward edge of the slate discharge gate 21. The portion of the lever 25 to the rear of the shaft 26 is provided with an adjustable weight 30, by the adjustment of which the force applied to the connecting rods 28 to lift the gate 21 may be varied. A bar 31 is connected at its upper end to the portion of the lever 25 in rear of the shaft 26 and depends into the jig pan 10. This bar is provided at its lower end with a float 32 which rests upon the top of the slate bed 33 within the said pan. It is obvious that the position of the float 32 with respect to the bottom of the jig pan is controlled by the thickness of the bed of slate or other relatively heavy material upon said bottom. It is apparent that the upper end of the bar 31 may, by reason of the presence of the holes 35 in the lever 25, be adjusted to different positions upon the latter. If it is desired that a slight vertical movement of the float shall effect relatively great movement of the front ends of the arms 27ª and a consequent relatively great movement of the slate discharge gate 21, the upper end of the bar 31 should be connected to the lever 25 at a point near the shaft 26. By adjusting the point of connection of the bar 31 to the lever 25 the extent of the opening movements of the slate discharge gate 21, due to variations of the depth of the bed of slate and other relatively heavy material upon the bottom 10 of the jig pan, may be controlled. The position of the weight 30 may likewise be varied so as to vary the downward pressure of the float 32 upon the top of the bed of slate in the jig pan.

The slate is discharged into the tank 2 and is removed therefrom by the endless conveyer 37, while the coal is discharged from the chute 23 on to an endless discharge carrier 38 and is conveyed upwardly thereby from the tank and from the apparatus. The upper ends of the conveyers are mounted upon drums 40, which in turn are mounted upon a shaft 41 driven by a belt 42 which extends over a wheel 43 from a driving pulley 44 upon the shaft 13.

In the construction as shown in Figs. 4, 5, 6, 7 and 11, the jig pan 46 is stationary and is provided with a stationary perforated bottom 47. The coal is discharged from a chute 48 into the jig pan between the rear wall thereof and an adjustable baffle plate 49. Depending from the bottom portion of the jig pan 46, underneath the perforated bottom 47, are walls 50 which form in effect a chamber underneath the bottom 47. Operating within the said chamber, with its opposite edges in sliding contact with the walls 50, is a valve structure 51. The said valve structure is supported upon the lower ends of supporting connecting bars 52 which depend from eccentrics 53 upon a shaft 54, the rotation of which is effected by power applied to the pulley wheel 55 fast to the said shaft 54. Power is applied to the said pulley wheel 55 by a driving band (not shown). Reciprocating movements of the valve structure 51 causes agitation of the water within and an upward flow of a stream thereof through the bottom of the jig pan 47. Such upward flow and agitation operates to separate the coal, of less specific gravity, from the slate, stone and the like, of greater specific gravity. The latter forms a bed upon the bottom 47 of the jig or washing pan.

Referring now to Figs. 3 and 4, it will be noted that the slate is discharged from a single opening 56 controlled by a flat gate 57 which is adapted to close the said opening. The slate which is discharged enters the lower end of a compartment 58 and is conveyed

therefrom by an endless conveyer 59. The compartment 58 is provided with an opening in its lower end which is adapted to be controlled by a valve 59ª, which valve may be opened and closed in an obvious manner by actuating the lever 59ᵇ. The coal is discharged over the upper edge of a front wall 60 into a compartment at the opposite side of the appartus from that on which the slate is discharged and is deflected and guided to such side by an angular upwardly extending vertical wall 61 and is conveyed from said compartment by an endless conveyer 62. The upper ends of the conveyers 59 and 62 are supported upon drums 63 upon a shaft 64 driven by a belt 65, which is in turn driven by a driving pulley 66 mounted upon one end of the shaft 54.

For the purpose of controlling the gate 57 and regulating the extent of its opening movements by the depth or height of the bed of slate 68 upon the bottom 47 of the washing or jig pan 46, I have provided the float 70, the lower end of which rests upon the top of the bed of slate 68. The float 70 is supported upon the lower end of a downwardly extending portion 71 of a lever 72 pivoted intermediate its ends at 73. The forward end of said lever is provided with an adjustable weight 74. The rear end likewise is provided with a weight 75. Both of these weights are adapted to be adjusted toward and from the pivot 73 to vary the downward pressure exerted by the float 70 upon the bed of slate 68. An adjustable connecting rod 76 is connected at its upper end to the lever 72 at a point between the float 70 and the pivot 73 and at its lower end to the gate 57.

It will be apparent that as the top level of the slate 68 rises and falls the float 70 will likewise rise and fall to vary the position of the gate 57, the lower forward edge of which is adapted to contact with the forward edge of the bottom 47 to close the slate discharge opening 56. It will be understood also that by adjusting the vertical slidable gate 77 by means of the lever 78 the area of the opening 56 may be varied.

In Figs. 5, 6 and 7 of the drawings, two slate discharge openings 80 are provided, the areas of which may be controlled by adjusting the vertically movable plates 81. These discharge openings are adapted to be opened and closed by gates 82. These gates, instead of being flat as is the gate 57, are of the shape shown in cross section in Fig. 5. The rear portions 83 are less inclined than are the portions 84, as a result of which the component of the force of the forwardly pressing slate upon the bottom 47 of the washing pan which tends to open the said gates, is greater than is the case with the flat plate such as is shown in Fig. 3. By providing plates of the construction shown in Fig. 5 the sensitiveness of the device as to variations in the height or depth of the bed of slate upon the bottom 47 of the washing and separating pan is increased.

As already indicated, there are two gates 82 for controlling the discharge of the slate from the opposite sides of the washing pan. The slate which is discharged from these gates is conveyed from the tank by means of endless conveyers 85 located at the opposite sides of the apparatus. Control of the gates is effected by floats 90 secured to the lower ends of depending portions 91 of levers 92, which are pivoted at 93. The said levers project beyond the pivots 93 and are provided with adjustable weights 94. The opposite portions of the said levers rearwardly of the pivots 93 are provided with a couple of adjustable weights 95 and 96. Adjustable connecting rods 97 are connected at their upper ends to the portions of the levers 92 rearwardly of the pivots 93 and at the lower ends to the gates 82. It will be apparent that as the top level of the bed of coal upon the bottom 47 varies the positions of the floats 90 will likewise be varied so as to vary the position of the gates 82. The coal is discharged through a central chute or discharge trough 98 and is conveyed from the tank by an endless conveyer 99.

In Fig. 11 of the drawings I have substituted for the two gates 82 a single gate 100. Otherwise the construction shown in Figs. 5, 6, 7 and 11 are the same.

In the several forms of construction shown it will be obvious that any variation of the top levels of the bed of slate or other relatively heavy material upon the bottoms of the washing pans will be reflected in the movements of the floats. Movement of the floats will operate to control the positions of the slate discharge gates. It will be apparent, therefore, that if the weighted lever mechanism by which the floats are connected with the gates is properly adjusted, the gates may be so controlled as to maintain beds of slate or other relatively heavy material of desired depth upon the bottoms of tanks.

In Figs. 1, 2 and 8 to 10, inclusive, I have shown floats of a preferred design or construction. These floats consist of hollow sheet metal and the front portion of the lower end thereof is rounded, as indicated at 101. The rear portion of the lower end is provided with forwardly and downwardly tapered faces or surfaces, as indicated at 102, while the opposite sides thereof are likewise provided with inwardly and downwardly tapered faces or surfaces 103. The upper end portion of the float is tapered upwardly, as shown in the drawings, to prevent slate from resting thereon. A float of this sharafter is preferred because it appears to adjust itself and to permit the bed of coal to flow thereunder more readily than if the bottom thereof were flat or substantially flat.

In Figs. 3 to 6, inclusive, I have shown a float

of different design, in which the body portion thereof may consist of wood or other suitable material, the lower end of which is faced with a facing or lining of sheet metal 105. The rear portions of the bottoms of the floats shown in Figs. 3 to 6, inclusive, are inclined upwardly in order that the passage of the slate thereunder may be facilitated and whereby also the action of the float with respect to the slate may be rendered more sensitive.

It is preferred that the float employed shall be oblong in cross section.

It will be understood that my invention is not limited to a float of any particular construction or of any particular material. I have merely indicated floats of preferred forms of construction and design.

It will be apparent that by my invention I am enabled to provide an apparatus for washing and separating coal from its impurities, in which a bed of relatively heavy material, such as slate, may be maintained upon the bottom of the washing pan of a depth desired which may have been found to give the best results in the washing of any product. In other words, if the material which is being operated upon is found to possess certain characteristics requiring for the best results a bed of slate upon the bottom of the washing tank of a particular depth, the apparatus may be adjusted so as to automatically maintain the said bed at that particular depth.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a coal jig, a gate for controlling the discharge of slate therefrom the said slate forming a bed in the said jig, a float adapted to rest on the bed of slate, the lower rear portions of which are tapered downwardly, and means interposed between the float and the said gate whereby movements of the said float cause corresponding movements of the said gate.

2. In a coal jig, a gate for controlling the discharge of slate therefrom, the said slate forming a bed in the said coal jig, a float adapted to rest upon the bed of slate, the lower rear and side portions of the said float being tapered downwardly, and means for connecting the said float to the said gate.

3. In a coal jig, a gate for controlling the discharge of slate therefrom, the said slate forming a bed in the said jig, a float adapted to rest upon the said bed of slate, the lower rear portions of the said float being tapered downwardly, and the upper end portion of the said float being tapered upwardly, and means for connecting the said float to the said gate.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 4th day of February, A. D. 1925.

FRANCIS H. BLATCH.