

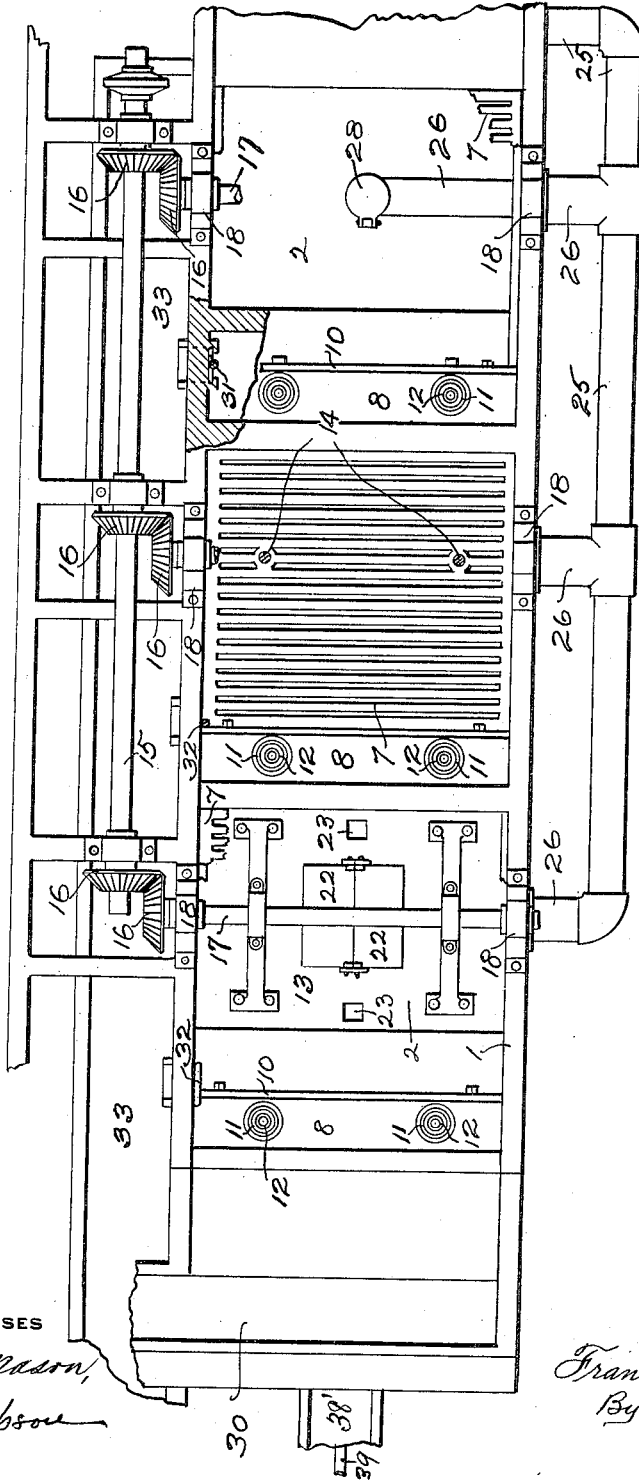
F. L. BOONE.  
 COAL WASHING JIG.  
 APPLICATION FILED DEC. 31, 1912.

1,091,797.

Patented Mar. 31, 1914.

3 SHEETS—SHEET 1.

FIG. 1



WITNESSES

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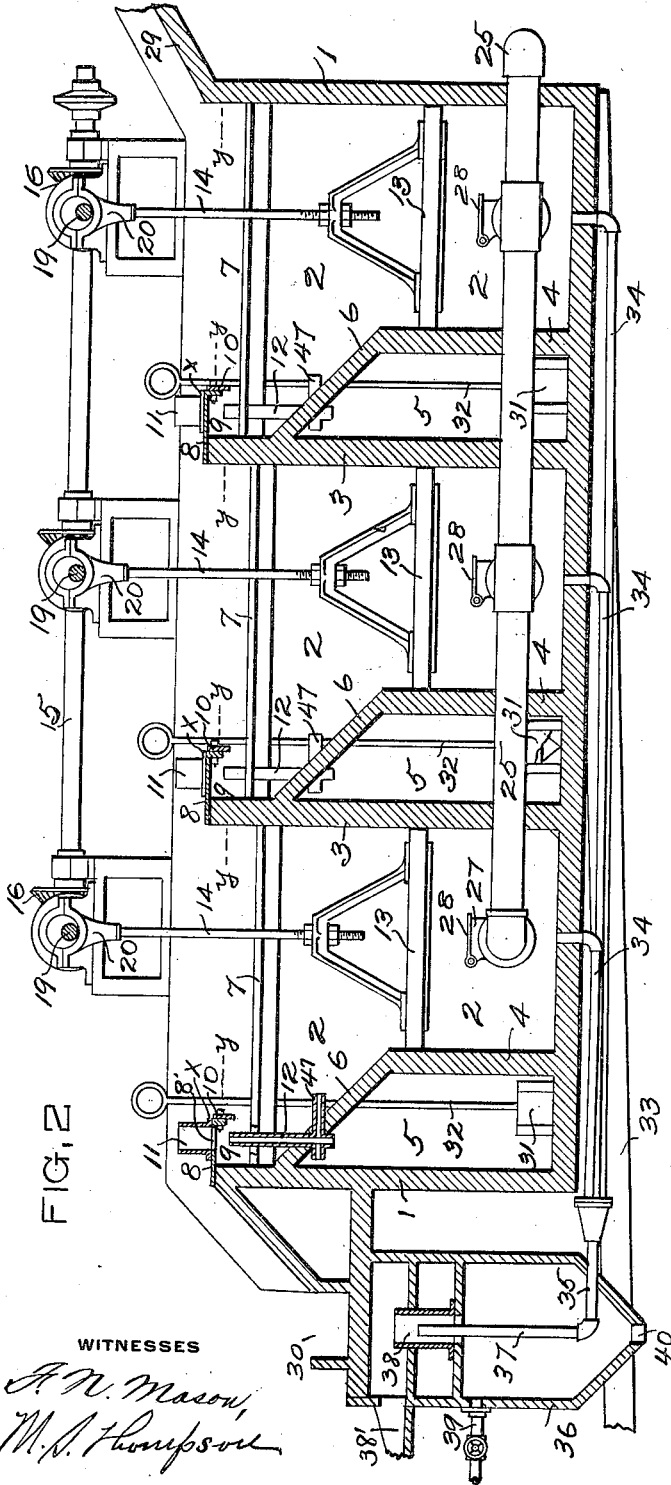
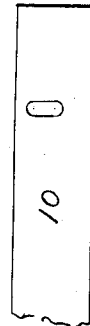


FIG. 2

FIG. 4



FIG. 3



WITNESSES

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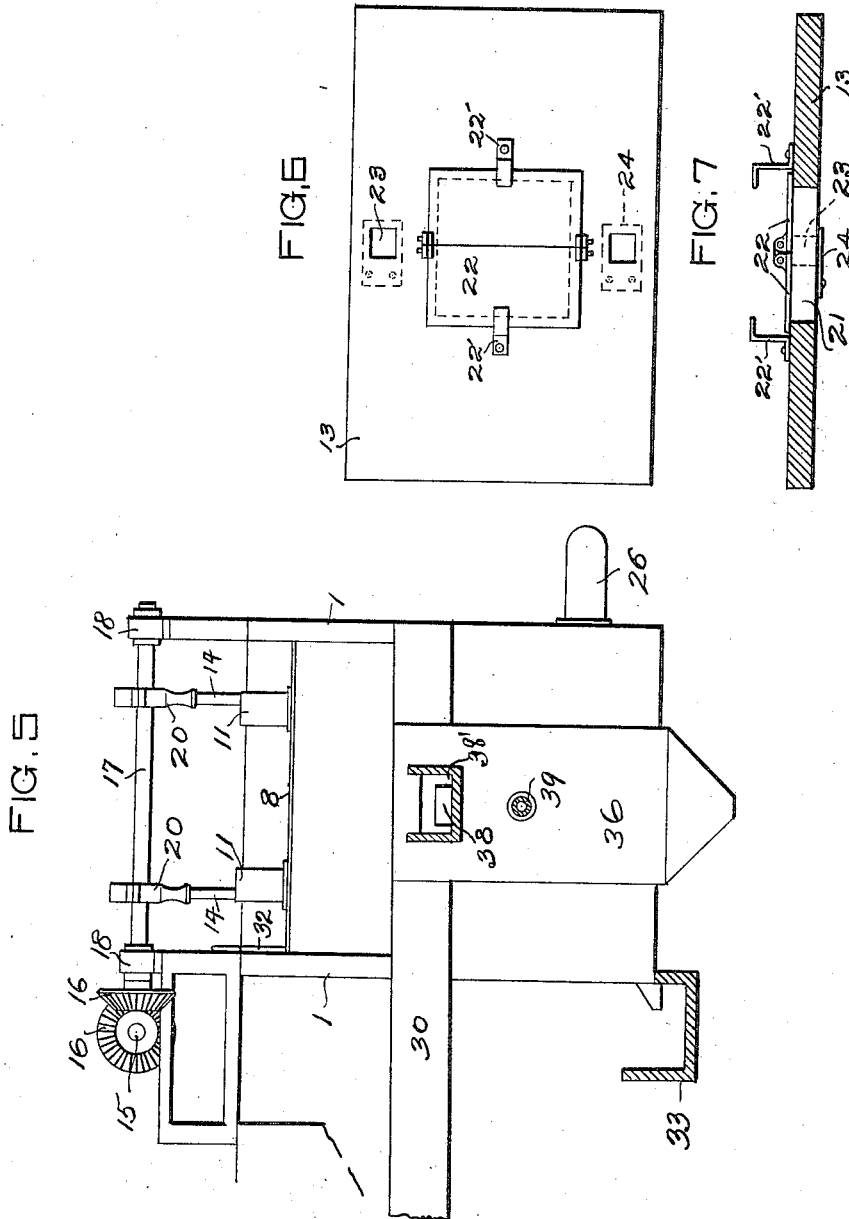
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3 SHEETS—SHEET 3.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

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COAL-WASHING JIG.

1,091,797.

Specification of Letters Patent. Patented Mar. 31, 1914.

Application filed December 31, 1912. Serial No. 739,483.

*To all whom it may concern:*

Be it known that I, FRANK L. BOONE, a citizen of the United States, residing at Greensboro, in the county of Greene and State of Pennsylvania, have invented a certain new and useful Improvement in Coal-Washing Jigs, of which the following is a specification.

The primary function of my invention is the washing and separation of the heavy, non-combustible or waste elements, such as slate, sulfur, pyrites, etc., from the light, combustible, or valuable properties of the coal, and the segregation of the same in separate bodies.

The device involves a plurality of screened over, fluid holding compartments, in which the separating process is carried out, and involving means for agitating the mass of coal entering the jig, likewise means for collecting the waste materials in a separate compartment, and for discharging the more valuable properties, which are to be saved, out of the machine.

A further feature and advantage consists in a hydraulic classifier or rewasher, which is designed to separate and segregate the valuable and waste elements that are not taken care of during the main washing process.

In the accompanying drawings, which show one embodiment of my invention, Figure 1 is a plan view of the assembled jig partly in section; Fig. 2 is a sectional side elevation of the same; Fig. 3 shows an enlarged detail of an adjustable bar member used in my device, and Fig. 4 is a fragmental section in elevation of the screen portion; Fig. 5 is an end elevation, Fig. 6 shows a plan view of a plunger element of the invention, and Fig. 7 is a sectional view of the said plunger.

Constructively my invention involves a suitable supporting frame work 1, which may be of wood or metal as desired, and of any required size or dimension, wherein is arranged a plurality of fluid holding compartments 2, separated from each other by lateral partitions 3. Each of said compartments is divided by a vertically disposed wall 4, which extends approximately one-half the height of the main chamber, forming a smaller compartment or well 5, and covered over with a sloping roof 6.

Suitably supported in the upper portion of each large compartment is a horizontally disposed screen or sieve 7, which is preferably made in the form shown, involving spaced apart bars, having alternating vertical and inclined side portions, as shown in detail Fig. 4, designed for a purpose to be more fully explained hereinafter. These said screens are placed at a somewhat lower level as they approach the discharge end of the machine, in order to obtain a fall for the coal and fluid being carried over from the preceding compartment.

Supported by the partition walls 3, which extend upward a predetermined distance above each screen, is a ledge or platform 8, which projects out over the said screen, forming a roofed over space 9, the outer extremity of said ledge carrying and supporting a vertically disposed and adjustable bar member 10. These said ledges 8 are provided with suitably sized apertures 8', and secured to said ledges, over the said openings, are the vertically disposed stand-pipes 11, open at both ends. A smaller pipe 12 is arranged in fixed position through the sloping roof 6 and screen 7, its upper end reaching to a point above the horizontal plane of said screen, directly underneath and central of the aforesaid pipe 11, and its lower extremity entering the smaller compartment 5.

Positioned in each of the larger compartments 2, and occupying the entire space between the vertical walls thereof, is a reciprocating piston or plunger 13, which is suspended by rods 14 from a power means involving a main driving shaft 15, bevel gears 16, and transmission shaft 17; the latter suitably supported on bearings 18 secured to the frame work. Reciprocating movement of said plungers is obtained by means of eccentrics 19 carried by the shaft 17, to each of which is connected a stirrup 20 housing one end of the rod 14. Each plunger is provided with centrally positioned apertures 21, covered by hinged doors or flaps 22, which perform the function of valves that open when the said plunger moves downward, and close as the plunger moves upward, this upward movement being limited by stop members 22', also with smaller apertures 23, near the outer edge, covered on the under side by flap valves 24,

which close as the said plunger moves downward and open on the upward movement.

Water is admitted to each of the larger compartments direct, preferably from below the plunger, by a common supply pipe 25, having laterals 26 entering each compartment, each terminating in an up-turned portion or stand pipe 27, in which is a check valve 28. Each compartment will fill with fluid to the over-flow point X, submerging the screen 7, and incidentally will fill the smaller wells 5 through the pipes 12 and 41, so that when the jig is ready for operation all compartments will be filled with fluid to the limit of their capacity.

The coal to be washed, which is previously crushed or broken into comparatively small particles, is introduced into the machine by way of the chute or trough 29, when it falls into the first compartment of the jig and spreads over the screen 7, the constituent particles arranging themselves according to specific gravity; the heavier elements at the bottom, and the lighter or purer coal on top. By causing a reciprocating movement of the plungers 13, at a predetermined speed, every upward stroke thereof will agitate the mass of coal deposited on the screen, and lift the lighter particles to the top of the fluid, together with a small percentage of the waste elements, when they will be floated and carried over the ledge 8 into the next compartment of the series, this identical agitating process taking place in each compartment until the valuable elements in the coal desired to be saved are finally discharged into the chute 30 leading to a settling tank or similar device, not shown.

While the agitating process is carried on simultaneously in all of the compartments, the reciprocating movement of the plunger 13 is reduced in each succeeding compartment of the series, for the reason that the percentage of waste material to be taken care of is considerably lessened toward the discharge end of the machine, therefore it does not require as much agitation, as is necessary in the first compartment, to lift the mass resting on the screen, and float the good coal over into the last compartment, or out of the jig.

Owing to the angled formation of the apertures formed in the screens, which incline toward the outlet or discharge from each compartment, the upward pressure or lift of the plunger will have a tendency to force the mass of heavy material always in the direction of the over-flow point X, when said mass will be gradually worked under the adjustable bar member 10 and into the space 9, where it will surround the pipes 12.

As heretofore stated every upward stroke of the piston will tend to agitate the mass deposited on the screen, which will bank

against the adjustable bar member 10 to a height approximately on the line  $y-y$ , and permit only a small percentage at a time detaching itself from the main body, passing under said bar, entering the space 9 underneath the ledge 8, and surrounding the upper open end of the pipes 12. When sufficient slate has accumulated at this point to a height above the said discharge pipe it will gradually pass down the same. The area of these said pipes 12 will be sufficient to receive the largest particle of slate, or other waste element, that is admitted to the jig; hence there will be no choking or obstruction at this point, and said pipes will continue to carry off the material entering beneath said bar to the well 5 as long as the agitating process is kept up.

A door or gate valve 31, controlled by a lifting rod 32, provides a means for emptying the wells 5, when they become sufficiently filled, the refuse being carried away by a trough 33, or other suitable means.

The screen 7 will normally be covered with the heavy waste material to a depth somewhat above the opening under the adjustable bar 10, which will greatly minimize the passing of any of the lighter and more valuable elements in the coal to the space underneath the ledge 8; it being desired to only admit the heavier or waste elements to this said space.

Any of the lighter and valuable coal desired to be saved that may possibly filter down through the screen into the main plunger compartment will first lodge on the said plunger, but will be free to pass through the several valves 24 provided in the same, down into the lower portion of the compartment beneath the said plunger at each reciprocating stroke.

At each upward stroke of the plunger the main valves 22 will close and the smaller valves 24 will open, and on the downward stroke a reverse action of these several valves will take place. Fluid from the intake below the said plunger will therefore be admitted above the same upon each downward stroke, and on each upward stroke the smaller valves 24 will open to permit the discharge of any coal that has filtered through the screen, likewise on this same upward stroke the check valve 28 will open to admit fluid into the plunger compartment.

Leading from the bottom of each compartment 2 is a pipe 34, which extends to a single reducer pipe 35, that enters a hydraulic classifier or rewasher 36, situated adjacent the discharge end of the machine. Connected to the said pipe 35 by an elbow is a vertically disposed stand-pipe 37, centrally positioned, which projects out of the tank, and is surrounded by a larger stand-pipe or sorting column 38, the lower end communicat-

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ing with the interior of said tank by means of a suitable aperture and the upper end projecting through a trough 38', which leads to the main settling tank, not shown. A valve controlled supply pipe 39, entering said rewasher at a convenient level, furnishes additional fluid thereto as needed.

At each downward or pulsating stroke of the plungers 13 a portion of whatever amount of coal has passed into the lower section of the chamber 2 will be forced through these pipes 34, and into the classifier 36, the heavier portions, after leaving pipe 37, falling to the bottom through pipe 38, and the lighter or valuable portions rising to the top of said sorting column 38, and floating over with the fluid into a chute 38', which connects with the main chute 30, or direct with the settling tank, not shown. The waste material collected in said tank 36 is drawn off through a suitable aperture or gate valve 40 into the trough 33.

When it becomes necessary to empty the slate tank or well 5 a plug or stopper, not shown, is placed in the open upper end of the stand-pipe 12, which is easily accessible through the larger pipe 11, after which the valve or gate 31 is opened by means of the lifting rod 32. The plug will prevent any suction downward through said pipe 12 when the draw-off take place, which suction would have a tendency to cause a lowering of the slate line below the adjustable bar member 10, with a consequent drawing of the valuable coal down said pipe. This contingency, *i. e.*, the drawing off of the valuable coal along with the waste materials, I have overcome by means of the construction shown and described. There will be practically no good coal admitted into the gathering chamber or space 9 during the separating process, as heretofore set forth, so that only waste material will pass down the pipe 12 into the chamber 5. By inserting a plug into the open upper end of said pipe 12, when it is desired to empty said chamber 5, further drawing off from the space 9 will cease, and the normal level of the slate line remain undisturbed, so that no good coal can pass under the adjustable bar member 10.

What I claim as my invention is:

1. A coal washing jig involving a fluid holding compartment divided to form a walled-in chamber; a screen covering said main compartment; an overflow portion involving a ledge overhanging said screen; a vertically disposed and adjustable bar member supported by said ledge; a plunger adapted for reciprocation within the main compartment; a pipe connecting the space underneath said ledge with the walled-in chamber, its upper end projecting above the horizontal plane of said screen; and a second pipe connecting the said chamber with the main compartment.

2. A coal washing jig involving a fluid holding compartment divided to form a walled-in chamber; means for supplying fluid to said compartment; a screen covering said main compartment; an overflow portion involving an apertured ledge overhanging the said screen; an adjustable bar member depending from said ledge; a stand-pipe supported by said ledge over its apertured portion; a pipe connecting the space underneath said ledge with the walled-in chamber, its upper end projecting above the horizontal plane of said screen; a plunger adapted for reciprocal movement within the main compartment; a second pipe connecting the said walled-in chamber with the main compartment; and means for drawing off the waste materials collected in said walled-in chamber.

3. The combination with a coal washing jig involving a screened over compartment and reciprocally operated plunger within the compartment, of a hydraulic classifier involving a sorting column, and a tubular conduit connecting the bottom of the compartment with the said classifier and delivering upwardly into the sorting column, said conduit adapted to convey material under the pulsating force of the jig plunger.

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

FRANK L. BOONE.

Witnesses:

B. F. PROVANCE,  
F. W. FLUMIKEN.