

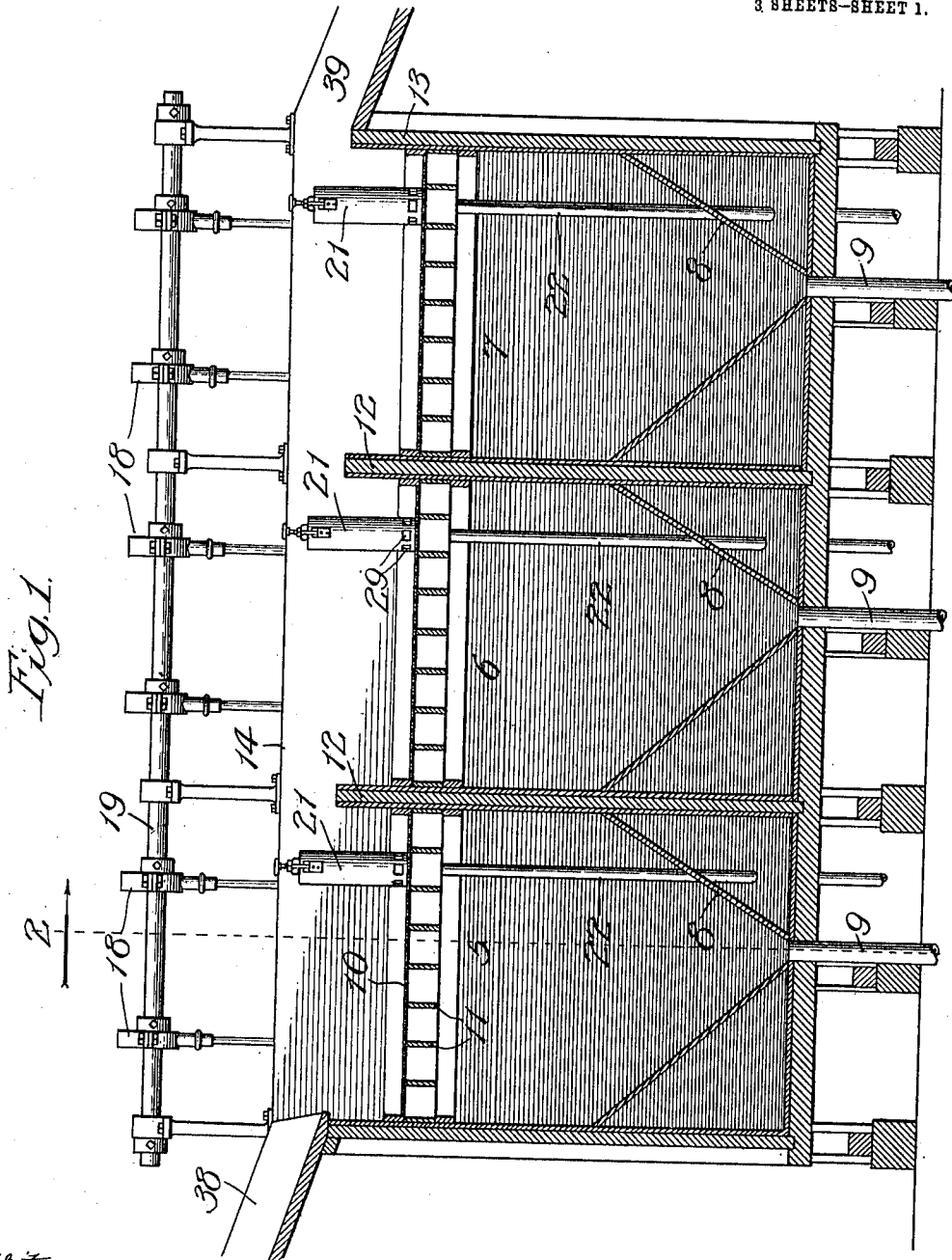
G. H. WILLIAMS.
ORE JIG.

APPLICATION FILED NOV. 26, 1909. RENEWED OCT. 12, 1910.

992,092.

Patented May 9, 1911.

3 SHEETS-SHEET 1.



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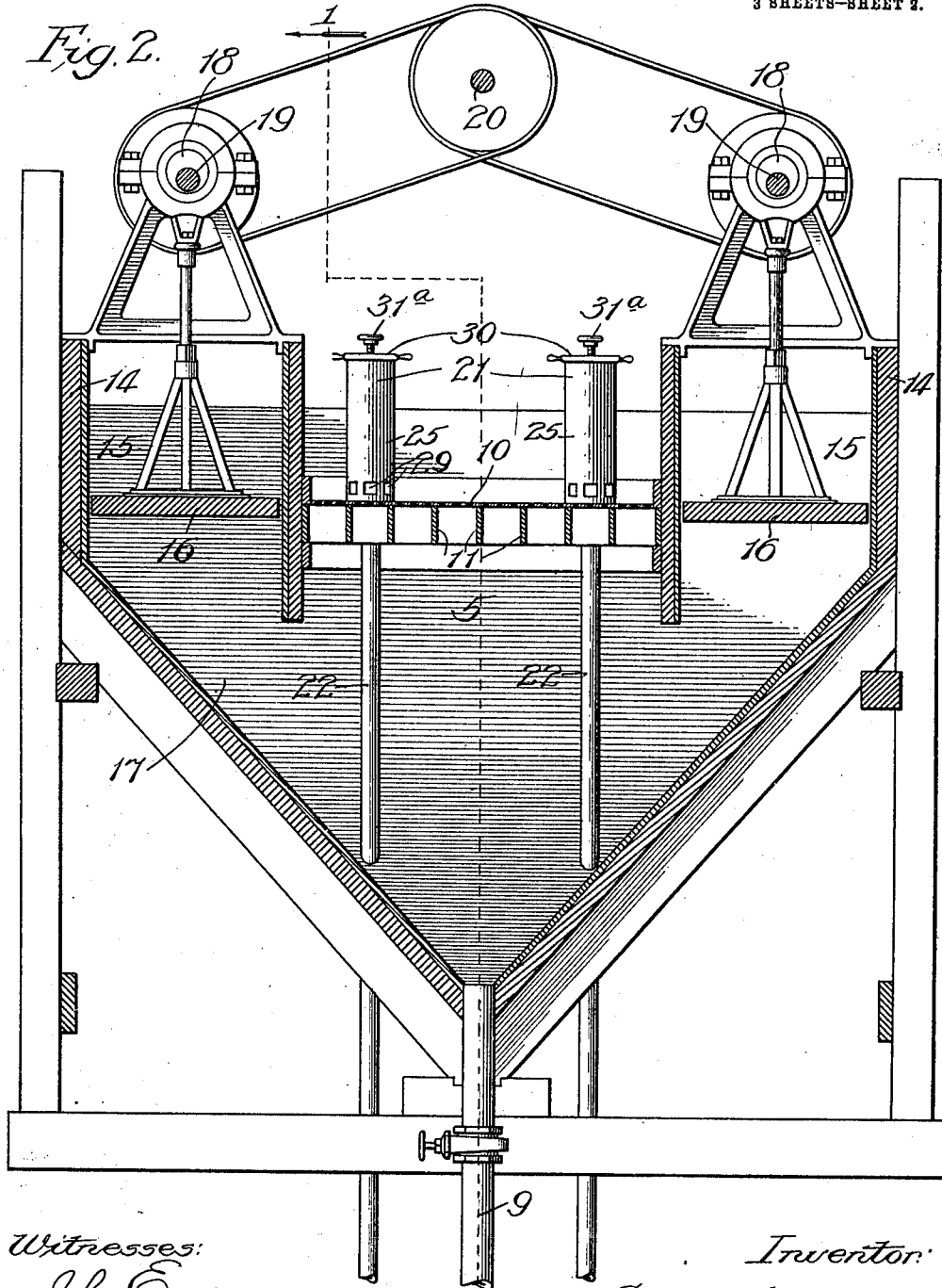
ORE JIG.

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3 SHEETS-SHEET 2.



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ORE JIG.

APPLICATION FILED NOV. 26, 1909. RENEWED OCT. 12, 1910.

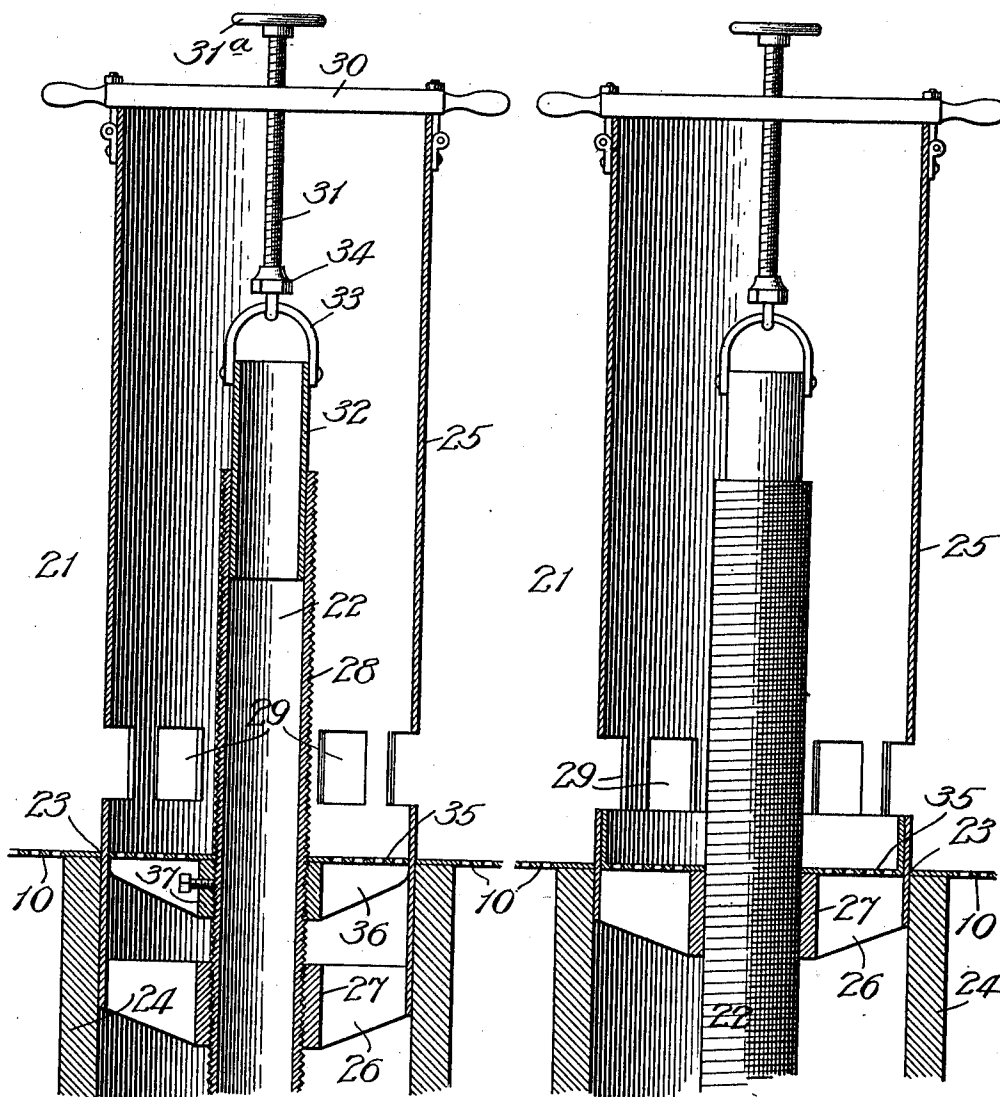
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3 SHEETS—SHEET 3.

Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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ORE-JIG.

992,092.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE H. WILLIAMS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Ore-Jigs, of which the following is a specification.

The primary object of my invention is to provide improvements in the construction of ore concentrating, or coal washing, jigs, which shall enhance their efficiency, particularly in the direction of effecting clean separation of the constituent elements of a heterogeneous mass.

I have devised my improvements for use, more especially, in connection with jigs of the type wherein the material to be treated is fed upon and advanced along a stationary screen, and subjected to agitation by water pulsations, directed against it from the underside through the screen, to wash out heavy fine particles and effect stratification of the remaining constituents, according to their specific gravities and, in a measure, according to size, whereby the strata may be separately drawn off; and my invention consists, more especially, in improved draw off means whereby different strata may be withdrawn from the jig in a more highly pure or concentrated condition than has hitherto been possible in devices of this class.

In the accompanying drawings—Figure 1 is a longitudinal section through a plural cell jig equipped with my improvements; Fig. 2, a section taken on line 2 in Fig. 1; Fig. 3, an enlarged broken section of my improved adjustable draw off; and Fig. 4, a broken sectional view corresponding with Fig. 3 and illustrating a modification.

The jig illustrated in the figures is particularly well adapted for washing raw coal containing more or less large percentages of iron pyrites, slate and impure or "bone" coal which it is desired to eliminate. The present structure has the three cells 5, 6, 7, respectively, formed with hopper bottoms 8 provided with outlet pipes 9. In the upper part of each cell is a more or less horizontal screen 10 firmly supported upon cross-beams 11. The screen employed in each instance is a matter of selection as to mesh depending upon the character of the material to be treated. The partition walls 12, 12 between the cells and the end wall 13 of the third cell extend to a plane somewhat lower than

that of the side walls 14. The screen 10 in each instance extends the full length of the cell and is flanked on opposite sides by compartments or cylinders 15, 15 containing plungers 16. The compartments 15 are open at the top and at their lower sides are in open communication with the hopper bottom receptacles or cell portions 17 beneath the same. The plungers 16 are hung from eccentrics 18 on shafts 19 extending along the jig above the compartments 15, the shafts being simultaneously driven from a power shaft 20 to move the plungers coincidentally up and down. Toward the rear end of each screen 10 is a pair of draw offs or discharge devices 21, each communicating with a separate discharge pipe 22. As the draw offs are all constructed alike, a description of one will answer for all. The pipe 22 extends to some distance above the screen 10 through an opening 23 in the latter, the opening being provided at its under-side with a vertical guide 24 for a vertically adjustable selector-sleeve 25. The sleeve 25 is mounted at its base upon a spider 26 having a central threaded hub 27 at which it is adjustably mounted upon the threaded end-portion 28 of the pipe 22. Near its lower end the sleeve is provided with an annular series of openings 29. Extending across and resting upon the top of the sleeve 25 is a bar 30 having a central threaded opening for an adjusting screw 31 with a handle 31^a. Fitting slidably into the top of the pipe 22 is a pipe extension or adjustable draw-off 32 provided at its top with a bail 33 having a swivel-connection 34 with the lower end of the screw 31.

In the construction shown in Fig. 3, the opening 23 through the screen, within the selector-sleeve 25, is closed by a screen 35 mounted upon a spider 36 and having a hub 37 internally threaded to fit the threaded portion 28 of the pipe 22. It will be understood from the illustration and foregoing description that the screen 35, forming the bottom of the selector-sleeve chamber, may be adjusted to different elevations upon the pipe 22, that the selector-sleeve may also be raised and lowered to change the elevation of the openings 29 with reference to the stationary screen 10; and that the draw-off or pipe-extension 32 may be raised and lowered, by turning the adjusting screw 31 at the handle 31^a, to change the elevation of its mouth with reference to the screen 10.

In operation, the material to be treated is fed with reasonable regularity into a sluice or chute 38 and deposited upon the initial end-portion of the screen 10 of the first cell 5. The plungers, as is common in jigs of this type, work up and down simultaneously to force water contained in the chamber 17 upward through the screen 10 and, consequently, through the material deposited upon the screen, and the quantity of incoming water used to sluice the material to be treated into the jig should, of course, be regulated within reasonable limits with reference to the action of the plungers to maintain the desired pulsations and outflow. Presuming, for example, that the material to be treated is mined coal containing iron pyrites, slate and bone coal, besides the higher grade coal, the material is first 20 crushed to desired mesh, and as it is sluiced or otherwise deposited on to the first screen 10 it is subjected to the pulsations of water. The incoming material has a tendency to move the previously fed material along the 25 screen, and as it moves and is agitated by the water pulsations it tends to stratify in accordance with the specific gravities of the elements, the finer particles of iron pyrites passing through the screen, and the larger particles thereof spreading over the screen to form a jig bed. The slate contents of the mass will tend to spread into a layer overlying that formed by the iron pyrites, the bone coal will tend to spread into a layer 35 above the layer of slate, while the lighter or commercial coal will form into a top layer of the mass. This stratification will become approximately complete, so far at least as the iron pyrites or iron pyrites and slate 40 are concerned, by the time the material reaches the first pair of selector-sleeves 25. These sleeves are adjusted to position their openings 29 so that their lower imperforate wall-ports will project a distance above 45 the screen 10 approximating the depth of iron pyrites which it is desired to maintain upon the screen as a jig bed. As the iron pyrites accumulates it overflows from the bed through the openings 29 into the chambers formed by the selector-sleeves 25. In 50 each upward plunge of the water the material in each selector-sleeve is raised, the pulsations operating in practice to draw iron pyrites into the sleeve and raise it until it overflows into the upper end of the draw-off 55 32. In the rise of the mass effected by the rise of water against it through the screen, the material forming the strata overlying the iron pyrites is swept intermittingly over the partition wall 12 on to the screen 10 of the second cell 6. Here, as the material moves along toward the opposite end of the screen, it is stratified, the smaller particles of the heavier slate passing through the 65 screen 10 into the hutch or hopper-chamber

beneath the screen, while the larger particles of slate are spread out to form a layer underlying the bone coal. The selector-sleeves of the second cell are adjusted as before described to maintain the desired depth of slate jig-bed upon the screen 10 and permit the surplus slate to pass into the selector-sleeve chambers to be discharged through the draw-offs therein. The bone coal and commercial coal are washed over the partition 12 75 on to the screen 10 of the third cell, 7, wherein the bone coal forms the jig-bed and is drawn off through the selector-sleeves, permitting approximately only the commercial coal to be discharged from the third cell 80 into the chute or sluice 39.

Ideal results are obtained in a jig of this character when the different materials are separately withdrawn in a clean state. The iron pyrites has sufficient value in the arts to render its saving in a clean, or approximately clean, state desirable, while the slate may be a waste product; the bone coal has some value, while naturally the finally discharged material or commercial coal should be as free as possible from the other materials. My improvements make it possible to secure the desired results in a manner more nearly perfect than any other construction of jig of which I am aware. By watching the output of different materials with reasonable care, adjustment of the selector-sleeves and draw-offs 32 may be made from time to time as may be required to effect clean or nearly clean separations. The maintenance of jig-beds is necessary to cause, for example, only, or nearly only, discharge of iron pyrites through the first screen and through the first draw-offs. The second cell should cause only the discharge of slate, and the third cell only that of bone coal, and the proper selections may be made with peculiar accuracy by adjusting the selector-sleeves, or the draw-offs, or both. 105

I have found it desirable in practice, in dealing with certain materials, to adjust the screens, or porous bottoms, 35, of the selector-sleeves, with reference to the screen 10 to regulate the height or weight of the column of material which may accumulate in a selector-sleeve; it being understood that the adjustment of the draw-off is made largely with reference to the height of the mass and water overlying the screen 10 during pulsations. 110

In the construction shown in Fig. 3, the screen 35 may be adjusted independently of the selector-sleeve, but in the modified construction, shown in Fig. 4, the screen 35 is carried by the selector-sleeve and adjusted therewith. Both constructions are useful, and it is only in specific cases that one gives more desirable results than the other. 125

In constructing the jig the number of cells necessary for the best results would depend 130

largely upon the character of the ore or other material to be treated, and the value of my invention rests more particularly upon the fact that as the material to be treated rarely runs uniformly for more than a short period of time, adjustments tending to the production of clean separation may be quickly made without stopping operations.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a jig of the character described, the combination of a cell, a screen in the upper part of the cell upon which the mass to be treated is fed and along which it is advanced, means for causing water to pulsate through the screen from its underside to stratify different materials of the mass and cause the lower stratum to form a jig bed, and means for discharging material of a lower stratum from the jig, comprising a selector sleeve provided with an inlet opening in its side, means for raising and lowering said sleeve to adjust the level of its inlet opening with reference to said screen, and a draw off pipe in the sleeve terminating above the level of said inlet-opening.

2. In a jig of the character described, the combination of a cell, a screen in the upper part of the cell upon which the mass to be treated is fed and along which it is advanced, means for causing water to pulsate through the screen from its under side to stratify different materials of the mass and cause the lower stratum to form a jig-bed, and means for discharging material of a lower stratum from the jig, comprising a selector sleeve-device having a lower jig-bed-retaining wall-portion and an inlet-opening above said wall-portion and draw-off means

within the sleeve above the level of said inlet-opening.

3. In a jig of the character described, the combination of a cell, a screen in the upper part of the cell upon which the mass to be treated is fed and along which it is advanced, means for causing water to pulsate through the screen from its underside to stratify different materials of the mass and cause the lower stratum to form a jig bed, and means for discharging material of a lower stratum from the jig, comprising a selector sleeve provided with an inlet opening above the screen, means for raising and lowering said sleeve to adjust the level of its inlet opening with reference to said screen, a draw off pipe in the sleeve, and means for raising and lowering said pipe at its mouth with reference to said screen.

4. In a jig of the character described, the combination of a cell, a screen in the upper part of the cell upon which the mass to be treated is fed and along which it is advanced, means for causing water to pulsate through the screen from its underside to stratify different materials of the mass and cause the lower stratum to form a jig bed, and means for discharging material of a lower stratum from the jig, comprising a selector sleeve device provided with an inlet opening in its side, a draw off pipe in the sleeve terminating above said opening, and a porous bottom in the sleeve with means for raising and lowering it bodily with reference to said screen.

GEORGE H. WILLIAMS.

In presence of—

R. A. RAYMOND,
R. A. SCHAEFER.