R. H. RICHARDS.

PULSATOR RIFFLE JIG.

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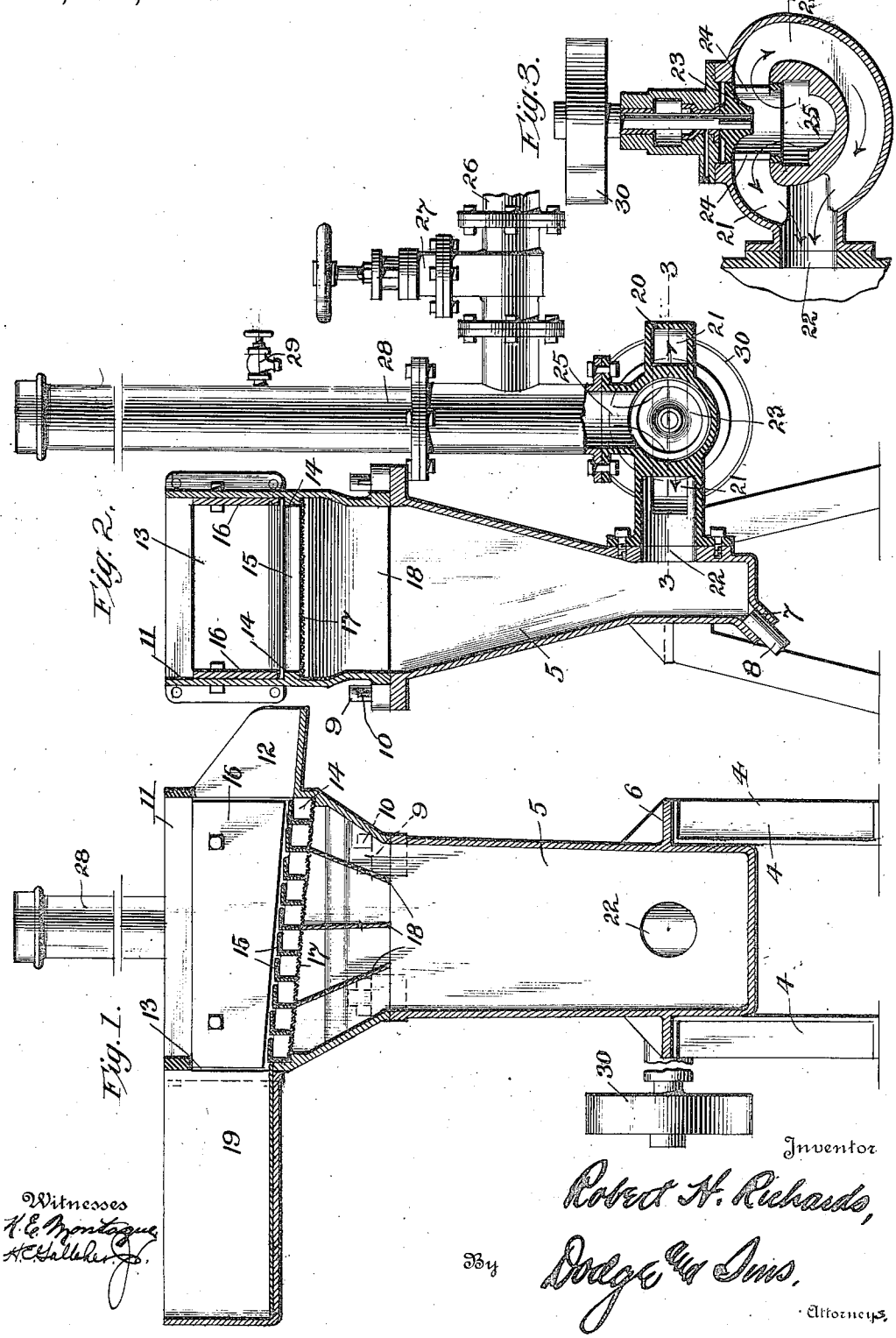

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PULSATOR RIFFLE-JIG.

1,176,403. Specification of Letters Patent. Patented Mar. 21, 1916.

Application filed August 13, 1914. Serial No. 856,589.

To all whom it may concern:

Be it known that I, ROBERT H. RICHARDS, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pulsator Riffle-Jigs, of which the following is a specification.

This invention relates to devices for concentrating metallic ores, and more particularly, though not exclusively, to devices for concentrating fine gold ores, or recovering fine gold from sands, etc.

Structurally considered the invention involves the application of a pulsator mechanism, preferably a pulsator valve mechanism of the general type shown in my Patents No. 901,474 and No. 901,475, October 20, 1908, to a sluice box having riffles placed above a screen and forming a novel type of concentrator which I call a pulsator riffle jig. In the preferred embodiment the riffles extend transversely of the sluice and are constructed of angle irons. I have discovered that by this arrangement I secure all the advantages of these riffles as heretofore applied to sluice boxes, plus greater capacity, sharper separation, continuous action, and a marked saving of floor space. I also eliminate the periodic clean-ups of the riffled portion of the sluice heretofore necessary, and laboriously accomplished by hand pans or rockers, etc.

A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:—

Figure 1 is a vertical axial section through the hutch and sluice, the plane of section being longitudinal with respect to the sluice; Fig. 2 is a vertical axial section through the hutch and sluice, the plane of section being transverse with respect to the sluice and passing through the pulsator valve mechanism; and Fig. 3 is a section on the line 3—3 of Fig. 2, showing the construction of the pulsator valve.

In the drawings 4 represents a supporting base or frame, and 5 the hutch which is carried on frame 4 by flanges 6. The concentrate discharge opening 7 is at the bottom of the hutch, and its size may be adjusted as desired by inserting interchangeable wooden spigots 8 having axial apertures of the different sizes. The discharge aperture is constantly open during the operation of the device, producing a continuous discharge of concentrates.

Rigidly mounted on the top of the hutch 5 by means of the lugs 9 and taper keys 10 is the launder casting 11 which forms a continuation of the hutch. The launder casting has a discharge spout 12, intake aperture 13, and inclined lugs 14 notched out to receive and support the angle-bar riffles 15. These riffles are of angle iron, as shown, and are mounted with one flange of the angle extending substantially vertically downward, and the other flange extending in the general direction of the flow in the sluice. They are retained by removable plates 16. Directly below and preferably in contact with the lower edges of the riffles, is a screen 17 of any suitable foraminous material which extends entirely across the launder casting, being partially sustained by the flaring webs 18 which are provided for the additional purpose of distributing the pulsing water flow over the entire screen. The screen and the line of riffle tops have an inclination in the direction of flow in the sluice and this inclination may be varied to suit particular conditions. The inclination of the sluice and the form, size and spacing of riffles, the mesh of screen, the character of screen material, and similar details are all dependent to some extent on the nature of the material treated.

Material to be treated in the riffle jig is fed to the launder casting from a box or receiver 19 bolted thereto and surrounding the intake aperture 13.

The pulsing flow is produced by a mechanically driven valve which alternately opens and closes to admit water to the hutch from a supply pipe. This pipe has an air chamber immediately adjacent said valve. In the present case the valve mechanism is of the balanced rotary type. It comprises a casing 20 having curved ports 21 leading to the hutch connection 22, and a rotary cylindrical valve 23 having opposite ports 24. This rotary valve is mounted in casing 20 and receives water from port 25 in casing 20, which port communicates directly with the supply pipe 26. This pipe 26 has a controlling gate valve 27, and immediately over and adjacent to the valve 23, an air chamber 28. The length of air column in this cham-

ber may be adjusted as desired by means of the pet cock 29. The rotary valve is driven by a belt running on pulley 30.

In use the gravel or other ore to be treated is fed to the feed box 19 and from there is sluiced across the riffled surface. At the same time water is supplied through the pipe 26 and rotating valve 23 producing an upward pulsing flow in the hutch, and up through the screen 17 and riffles 15. As the gravel is sluiced across the riffles a portion of it falls between the same, forming a sort of bed which is constantly agitated by the pulsing current and thus forms a very ready path for descending gold particles. These pass through the gravel bed and screen into the hutch and finally are discharged through spigot 8. An incidental advantage is that particles of rusty gold are so brightened in their descent through the jig bed as readily to amalgamate when discharged from the hutch.

As stated the form and dimensions of the device are subject to considerable variation. Good results can be secured with angle riffles from $1\frac{1}{4}'' \times 1\frac{1}{4}''$ to $2\frac{1}{2}'' \times 2\frac{1}{2}''$ spaced from $3\frac{3}{16}''$ to $3\frac{3}{8}''$ apart. A suitable slope is about 1 inch to 1 foot and the water may be supplied to the valve under a head of about 16 feet at the rate of about 40 gallons per minute for each square foot of riffled surface. None of the above dimensions is however to be taken as limiting.

The advantages of this device are that while retaining all the desirable characteristics of the old type of sluice box having riffles of the general type shown, it operates continuously and avoids the necessity of periodic clean-ups; it provides a loose bed, like quick sand between the riffles so as to entrap a large percentage of fine gold values; it increases the capacity of a given area of riffled surface thus saving space and weight; it makes a closer separation than possible heretofore and turns out a concentrate which may if desired be fed direct to amalgamators.

The device is particularly adapted for use on dredges.

Peculiarly desirable results are secured by the use of the pulsator valve mechanism in combination with the riffled screen. In the pulsator valve mechanism the air chamber is placed close to the rotating valve and this secures not only the cushioning of water hammer in the supply pipe, but reduces the mass of water which will be set in motion through the valve by the pressure of the confined air as the valve opens. Thus a quick start of the flow is secured and rapid pulsations are possible and as these are sharply defined and absolutely unidirectional they produce ideal jigging conditions in the confined spaces between adjacent riffles. Thus while other devices for a unidirectional pulsating flow may be used with some degree of success, and such use is contemplated by me, I prefer the pulsator mechanism of the type mentioned because of its peculiar efficiency in this particular combination. Similarly while I find the particular type of riffle illustrated in the drawing to give most desirable results, good results are secured with other types and I do not restrict myself to the type shown except as specified in the claims. Fundamentally the device includes the sluice, screen, pulsator and some type of retarding riffle arranged in any suitable way in the sluice above the screen. Improved results are as a rule secured by using transverse riffles wider at the top than at the bottom so that the pockets or spaces between adjacent riffles have narrow entrance slots or apertures. The L-shaped riffles, probably because they direct the pulsing flow in the general direction of flow in the sluice, give the best results so far secured.

Having thus described my invention, what I claim is:—

1. The combination with a jig including a screen and means for producing a unidirectional pulsing upward flow of water therethrough, of a plurality of transversely extending riffles, having an inverted L-shape in cross section mounted directly above the screen.

2. The combination of a sluice having an opening in its bottom; a screen mounted in said opening; a hutch beneath said screen; a plurality of closely spaced inverted L-shaped riffles extending transversely of said sluice mounted immediately above said screen with the upper flanges extending substantially horizontally in the direction of gravital flow in the sluice; and means connected with said hutch for producing a pulsing flow of water through said screen and riffles.

3. The combination of a sluice having an opening in its bottom; a screen mounted in said opening; a hutch beneath said screen; a plurality of riffles extending transversely of said sluice immediately above said screen, said riffles being wider at the top than at the bottom to produce restricted entrance apertures to the spaces between adjacent riffles; and means connected with said hutch for producing a unidirectional pulsing flow of water through said screen and riffles.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT H. RICHARDS.

Witnesses:
C. H. Doolittle,
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