March 31, 1936. J. F. NOEL 2,035,564

ORE CONCENTRATOR

Filed Sept. 6, 1933

Fig. 1.

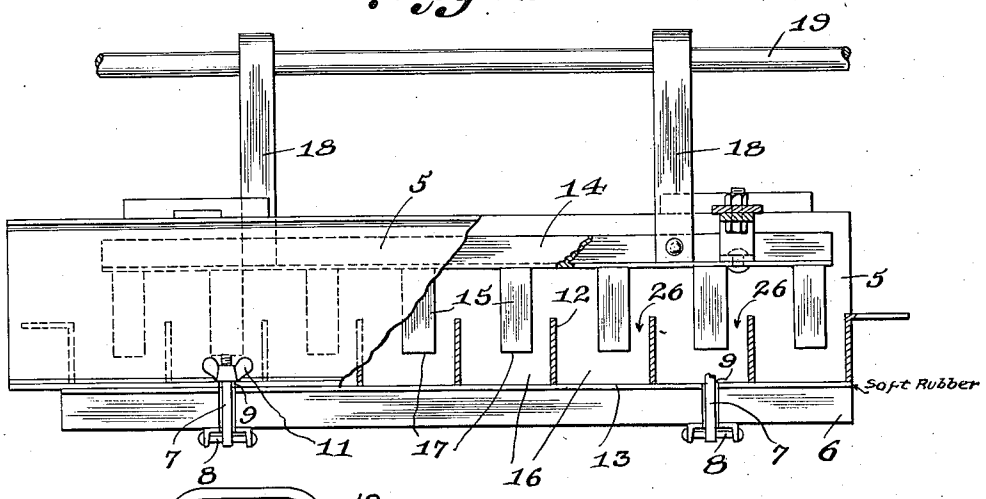


Fig. 2

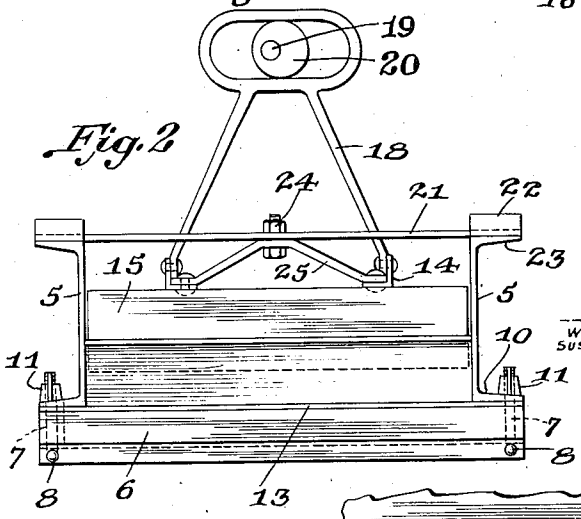


Fig. 3.

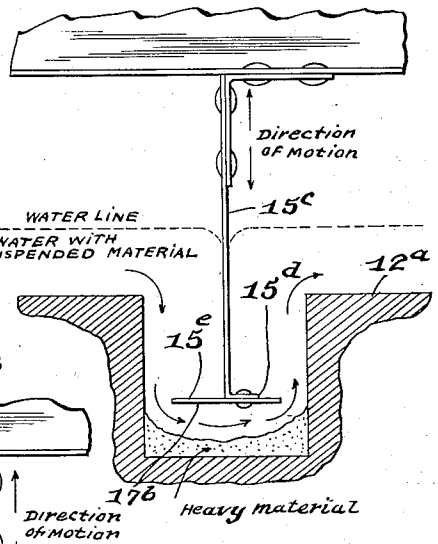
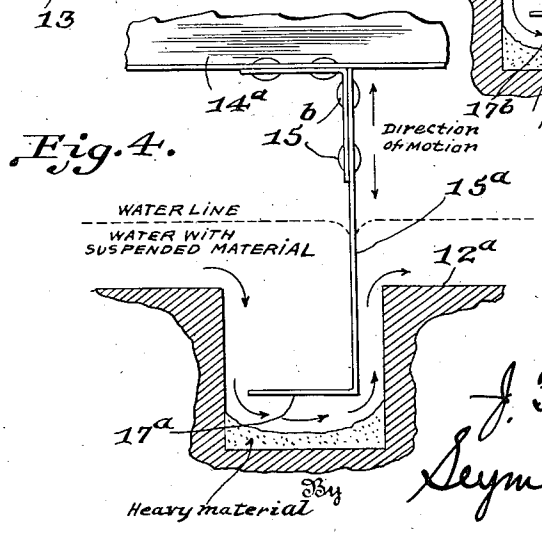


Fig. 4.



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UNITED STATES PATENT OFFICE

2,035,564

ORE CONCENTRATOR

James F. Noel, Rawlins, Wyo.

Application September 6, 1933, Serial No. 688,373

5 Claims. (Cl. 209—461)

This invention relates to improvements in gravity concentrators and more particularly to a gold saving device for use in placer mining.

The primary object of the invention is to combine with a riffle sluice box a novel vibrating system that is free to vibrate vertically but opposes any tendency of the flow of water to close the spaces or vertical columns between the vibrating system and the riffles.

Another object is to combine with a riffle sluice box substantially flat surfaces forming part of a vibrating system and which are rapidly moved perpendicularly to said surfaces to prevent suspended material from packing in the sluice way and to allow the full carrying capacity of the water to be exerted and to permit the material too heavy to be raised by the given velocity of the water to settle back into the bottom of the cavities between the riffles.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawing and more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is a side elevation partly in vertical longitudinal section of a riffle sluice box shown combined with one form of my vibrating system.

Fig. 2 is an end view of the same.

Figs. 3 and 4 are side elevations respectively, partly in section, of modifications of details.

Referring to the drawing, 5 designates the side walls of the sluice box which may be formed of channel-irons. A removable bottom 6 to facilitate cleaning the box is detachably secured to the side walls by any suitable means such as bolts 7, each of which may be pivotally connected at 8 to the bottom and may enter a notch 9 in the lower wing 10 of the channel-iron. Thumb-nuts 11 which are threaded on the bolts may rest on the wings 10 for the purpose of clamping the bottom to the side walls of the sluice way.

Riffles 12 which are spaced from one another and extend across the bottom portion of the sluice way, may be secured either to the side walls 5 or to the bottom 6 and I prefer to place a mat 13 of soft rubber or the like on the upper surface of the bottom to prevent leakage between the parts 6 and 10.

While I prefer to use a sluice way of the above described character, it will be evident to those versed in this subject that my improved vibrating system may be employed with other and conventional types of riffle sluice ways.

The vibrating system consists of a supporting structure 14 from which depends transverse bars 15 which extend into the cavities 16 between the riffles. The bars are vertically guided by the side walls of the sluice box. The bars 15 have lower substantially flat surfaces 17 that are arranged substantially parallel to the bottom of the sluice way and are reciprocated in a path perpendicular to said surfaces by any suitable means. For example, the supporting structure 14 may be suspended from brackets 18 which are hung on a rotatable shaft 19 by eccentrics 20 which during the movement of the shaft act to vertically reciprocate the bars 15. In order that this movement may be a resilient one, leaf springs 21 extend across the sluice way and have their ends secured to brackets 22 that are fastened to the upper wings 23 of the sides of the sluice way. Each leaf spring has its medial portion connected by a fastening device, such as a bolt 24, to a bracket 25 that is fixed to the supporting structure 14.

In operation, as the water, suspended material and heavy material pass along the sluice way, the bars 15 rapidly reciprocate in the cavities 16 and this agitation functions to keep the lighter materials suspended in the water as the water travels through the sluice way, and while the materials are also agitated the action is such that such heavy materials become lodged in the cavities 16. Consequently the materials are prevented from clogging the columns 26 of the cavities on the downstream sides of the bars 15. In other words rapid motion of the surfaces 17 perpendicular to those surfaces, prevents the suspended material from packing and allows the full carrying capacity of the water to be exerted. At the same time in the columns 26, the material is sorted and that which is too heavy to be raised by the given velocity of the water settles back on to the bottom of the cavities 16.

Instead of using bars as shown at 15, each of these elements, as illustrated in Fig. 4, may take the form of an L-shaped leg 15a formed of any suitable metal. The upper end of each leg will be secured as shown at 15b to the supporting structure 14a and the lower end of the leg will provide a substantially flat surface 17a which is the equivalent of the surface 17.

Again, the bar may take the form shown in Fig. 3. In this figure the L-shaped leg 15c will have a relatively short foot 15d to which is secured a plate 15e having a substantially flat under-surface 17b.

It will be noted in both of the modifications

that the riffles 12*a* are thicker than shown in Fig. 1 so that they resemble more closely conventional riffles.

The form of the invention shown in Fig. 3 is not so efficacious as the ones in the other figures as materials tend to pack on the plate 15*d* at the downstream side of the leg 15*c*.

It is believed that the most important point of my invention is the movement of the undersurfaces of the bars perpendicularly to those surfaces, as this creates disturbances below said surfaces. Such disturbances prevent the suspended material from settling in proportion to the energy of the action. A strong action will keep heavier material suspended than will a weak one. The material suspended and well surrounded by water is now in a much more favorable position to be acted upon by a current across the faces of the surfaces 17, 17*a*, 17*b*, than the same material at rest on the bottom of the sluice box. Such current moves the suspended material into what may be termed the "sorting columns" 26 where the material light enough for the given velocity of the water is carried up and over the following riffle while the material too heavy to be thus carried, settles back.

The material mechanically prevented from settling, and, distributed evenly through the water under the surfaces 17, 17*a*, 17*b*, allows the use of the correct velocity of water to properly sort the material in the cavities 16, whereas if the material is allowed to settle, a very much greater velocity would be necessary to start it moving again and that increased velocity would be too great to properly sort the material in the cavities. Thus the action increases the efficiency of the water and by allowing a closer regulation of the velocity of the water, results in a more accurate division of the material.

While I have disclosed what I now consider to be preferred embodiments of the invention in such manner that the same may be readily understood by those skilled in the art, I am aware that changes may be made in the details disclosed without departing from the spirit of the invention as expressed in the claims.

What I claim and desire to secure by Letters Patent is:

1. The combination with a sluice box provided with transverse riffles which divide the bottom portion of the box into a series of transverse channels, of transverse bars depending into said channels and extending lengthwise of the channels substantially the entire width of the sluice box, said bars having lower surfaces, and means for vibrating said bars in paths arranged substantially perpendicularly to said surfaces, each of said surfaces being substantially flat throughout the length of each bar and arranged parallel to the bottom of the sluice box.

2. The combination with a sluice box provided with transverse riffles which divide the bottom portion of the box into a series of transverse channels, of transverse bars depending into said channels and having lower surfaces, and means for vibrating said bars in paths arranged substantially perpendicularly to said surfaces, the last mentioned means including resilient elements for imparting a springy action to the bars.

3. The combination with a sluice box provided with transverse riffles which divide the bottom portion of the box into a series of transverse channels, of transverse bars depending into said channels and having lower surfaces, and means for vibrating said bars in paths arranged substantially perpendicularly to said surfaces, the last mentioned means comprising a supporting structure for the bars, brackets carrying the supporting structure, a turnable shaft, eccentrics on the shaft and engaging the brackets, and leaf springs for yieldingly resisting movements of the supporting structure.

4. The combination with a sluice box provided with transverse riffles which divide the bottom portion of the box into a series of transverse channels, of transverse bars depending into said channels and extending lengthwise of the channels substantially the entire width of the sluice box, said bars having lower surfaces, and means for vibrating said bars in paths arranged substantially perpendicularly to said surfaces, each bar being in the form of a substantially L-shaped leg and having a plate secured to the foot thereof, said plate projecting on both sides of said leg, and extending substantially the entire width of the channel.

5. The combination with a sluice box provided with transverse riffles which divide the bottom portion of the box into a series of transverse channels, of transverse bars depending into said channels and extending lengthwise of the channels substantially the entire width of the sluice box, said bars having lower surfaces, and means for vibrating said bars in paths arranged wholly perpendicularly to said surfaces, each bar being in the form of an L-shaped leg, and substantially flat throughout its undersurface.

JAMES F. NOEL.