Dec. 21, 1954 A. B. NASH ET AL 2,697,519

ORE SEPARATING MACHINE

Filed Nov. 5, 1951 5 Sheets-Sheet 1

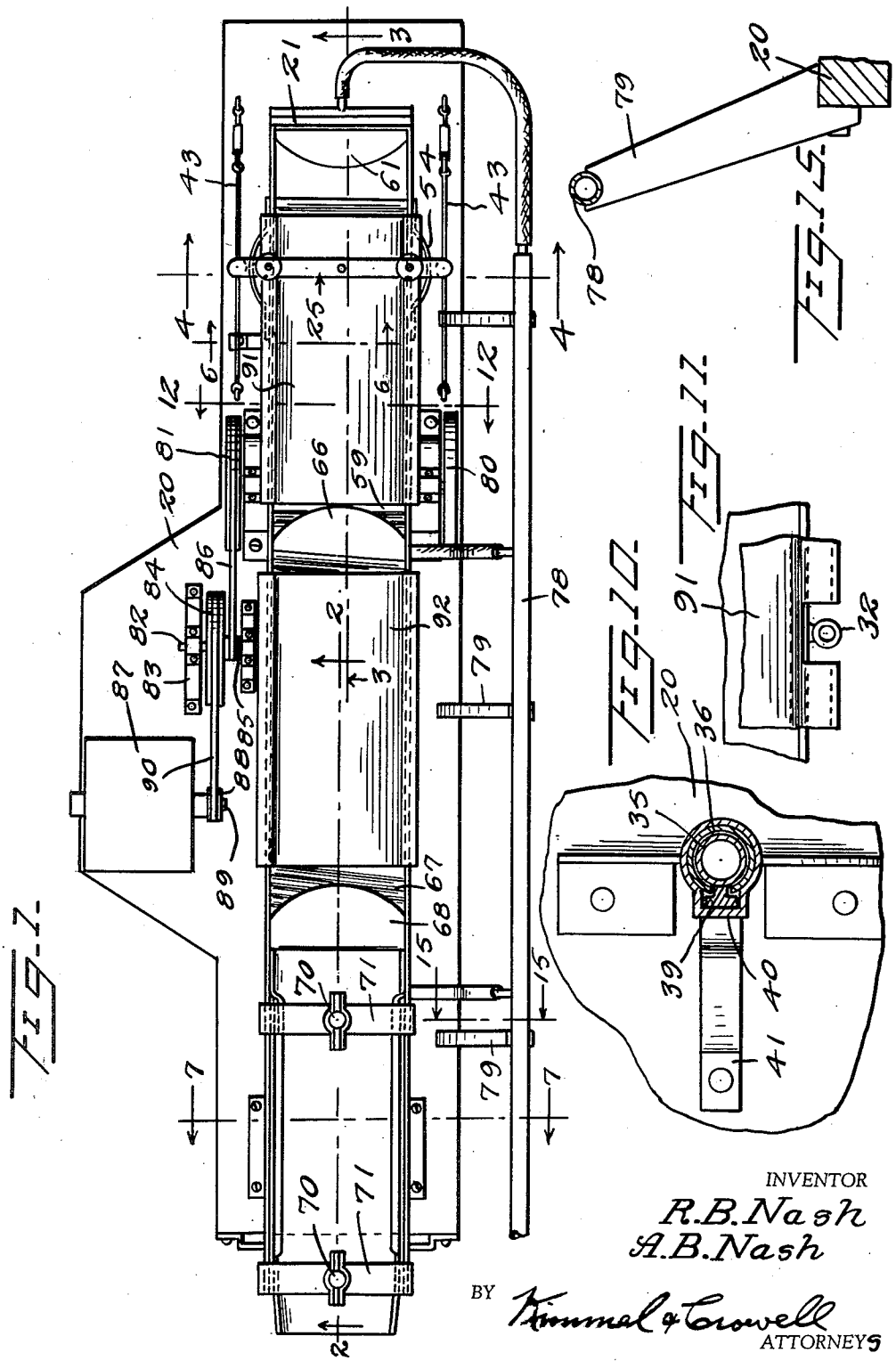


FIG. 1.

FIG. 1A.

FIG. 1B.

FIG. 1C.

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5 Sheets-Sheet 2

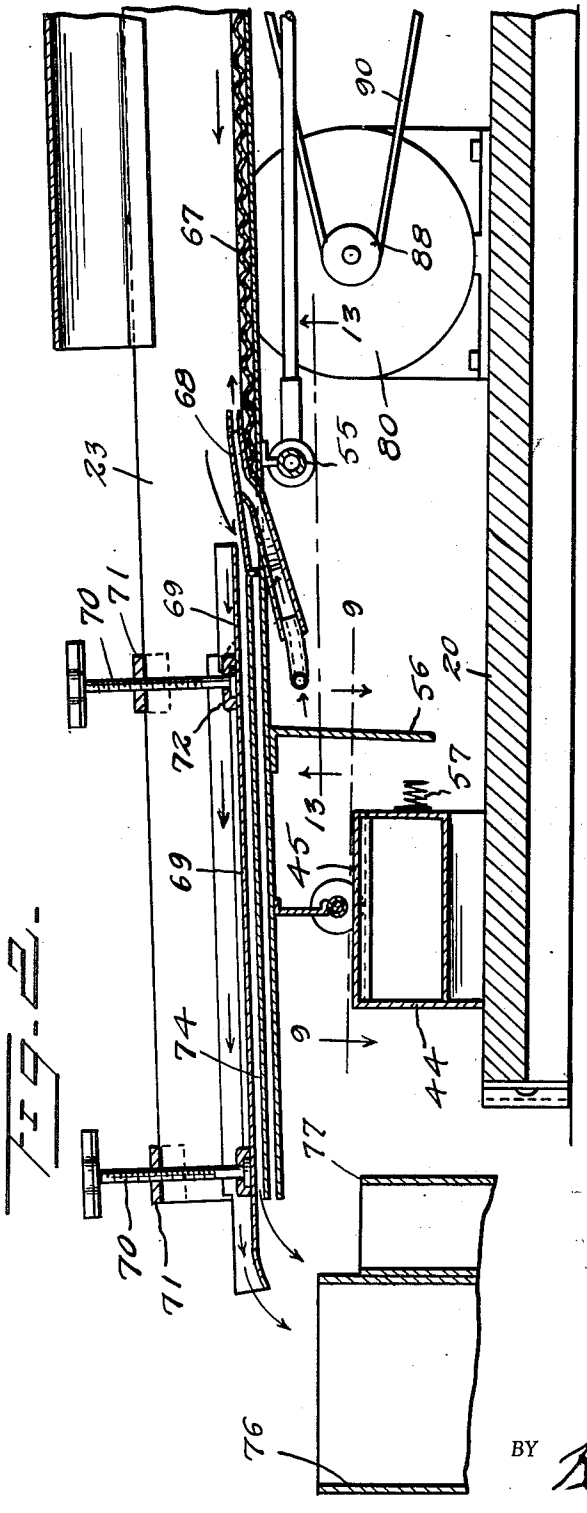


FIG. 2.

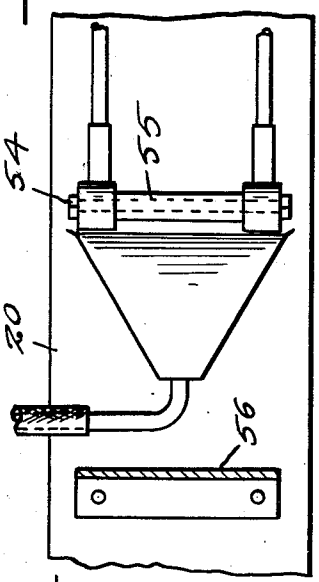


FIG. 3.

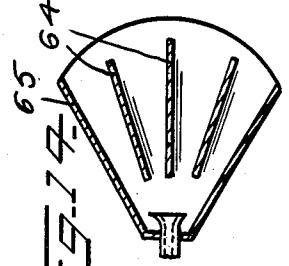


FIG. 4.

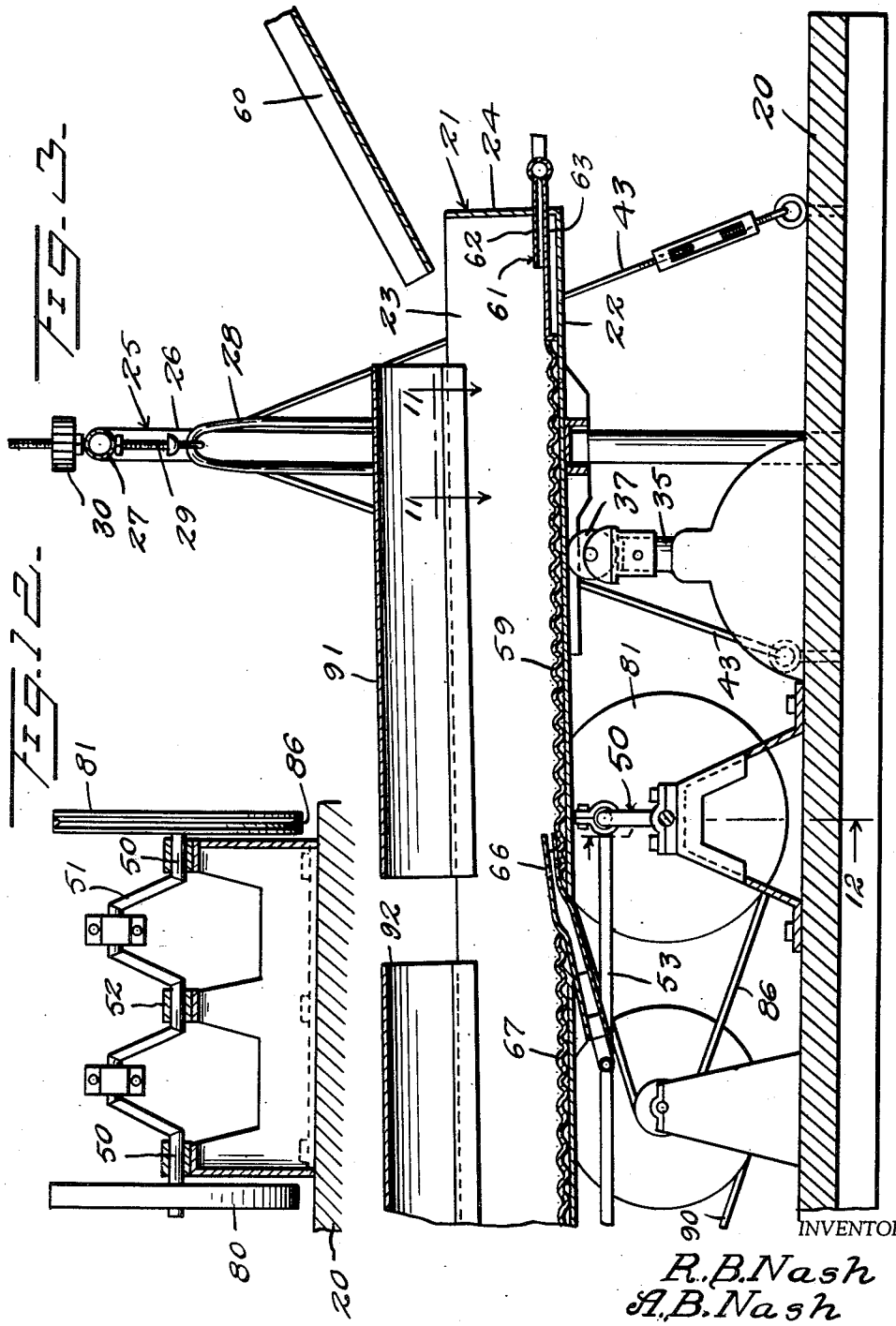
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ORE SEPARATING MACHINE

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ORE SEPARATING MACHINE

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Fig. 6.

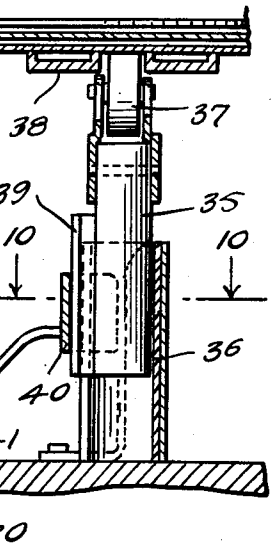


Fig. 4.

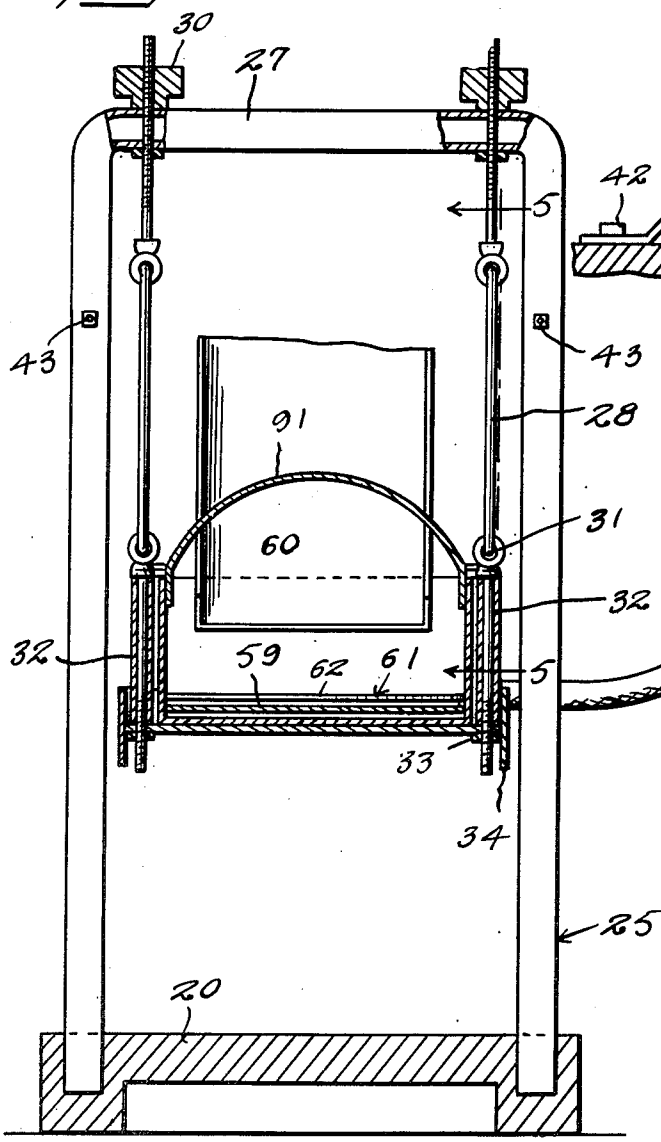
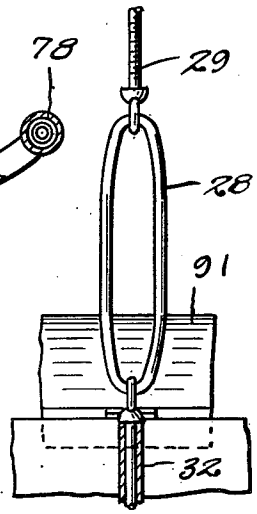


Fig. 5.



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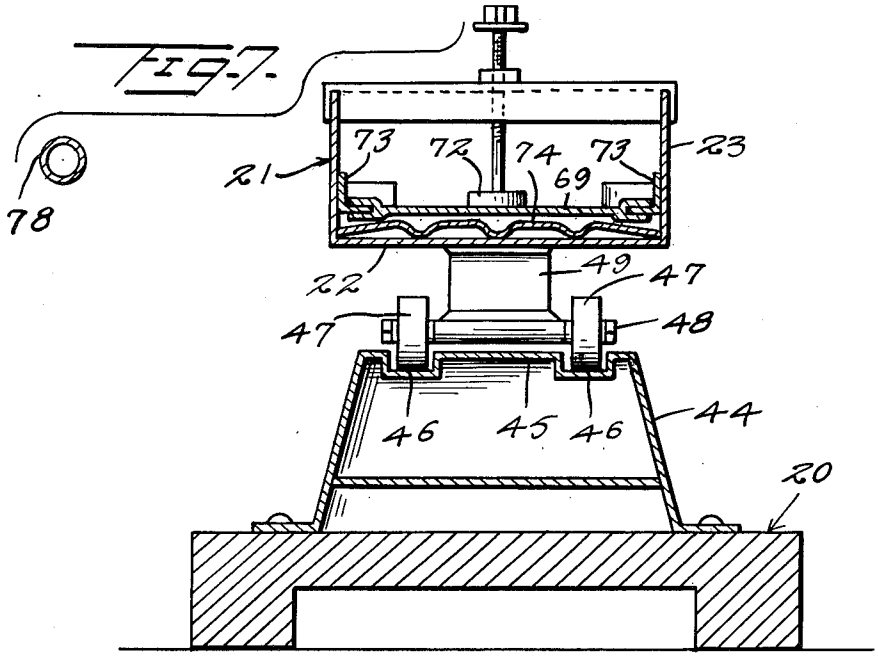
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ORE SEPARATING MACHINE

Filed Nov. 5, 1951 5 Sheets-Sheet 5

Fig. 7.



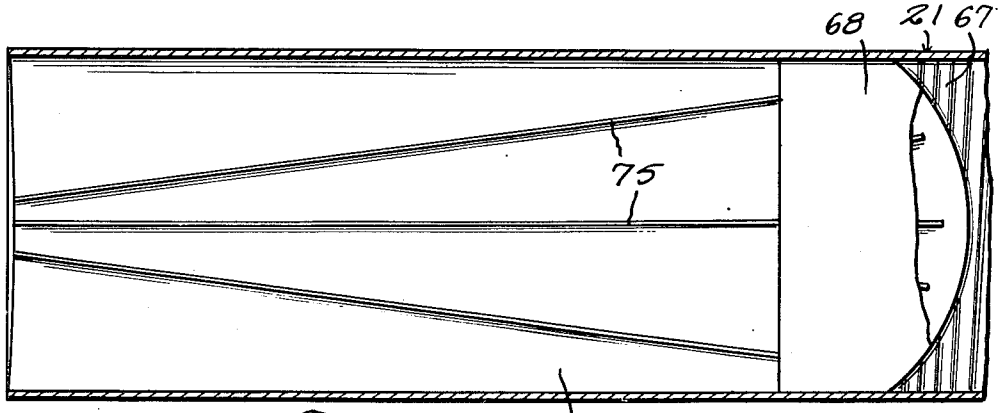


Fig. 8.

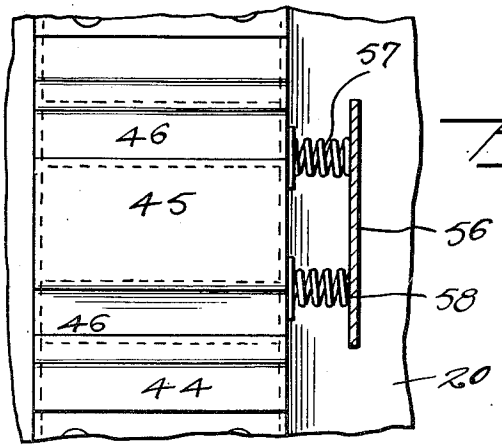


Fig. 9.

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2,697,519

ORE SEPARATING MACHINE

Austin B. Nash and Robert B. Nash, Denver, Colo.

Application November 5, 1951, Serial No. 254,930

2 Claims. (Cl. 209—437)

This invention relates to an ore separating machine.

An object of this invention is to provide an ore separator embodying an agitating sluice box having a transversely corrugated inner bottom which is inclined downwardly toward the tailing end so that the material will gravitatingly flow through the box. At spaced intervals the box is provided with means for additionally agitating the material so that the heavy ore will more thoroughly separate at the rear end of the tailing section.

Another object of this invention is to provide an ore separator of this kind, including means for reciprocating the sluice box and means at one end of the stroke of the box for producing a lateral motion to the box so as to assist in keeping the material in spread condition within the box.

A further object of this invention is to provide a series of material spreading nozzles which are so arranged within the sluice box as to keep the material in a relatively even spread condition in addition to agitating and dispersing the material in the water so that the heavier metals may settle out at the intake end of the tailing section.

A further object of this invention is to provide an improved means for swingably supporting the rear or receiving end of the sluice box so that the latter may be inclined to the desired degree to provide for movement of the material through the box.

A further object of this invention is to provide a reciprocal sluice box and means at one end of the stroke of the box for producing an impact or jar which will effect forward movement of any metals which may settle out before reaching the tailing and separating section of the box.

With the above and other objects in view, our invention consists in the arrangement, combination and details of construction disclosed in the drawings and specification, and then more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a plan view of an ore separator constructed according to an embodiment of this invention,

Figure 2 is a fragmentary sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 1,

Figure 4 is a sectional view taken on the line 4—4 of Figure 1,

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 4,

Figure 6 is a fragmentary sectional view taken on the line 6—6 of Figure 1,

Figure 7 is a sectional view taken on the line 7—7 of Figure 1,

Figure 8 is a fragmentary horizontal section taken in the tailing portion of the device,

Figure 9 is a fragmentary sectional view taken substantially on the line 9—9 of Figure 2,

Figure 10 is a fragmentary sectional view taken on the line 10—10 of Figure 6,

Figure 11 is a fragmentary sectional view taken on the line 11—11 of Figure 3,

Figure 12 is a fragmentary sectional view taken on the line 12—12 of Figures 1 or 3,

Figure 13 is a fragmentary sectional view taken on the line 13—13 of Figure 2,

Figure 14 is a fragmentary horizontal section taken through one of the water spreading nozzles,

Figure 15 is a fragmentary sectional view taken on the line 15—15 of Figure 1.

Referring to the drawings, the numeral 20 designates generally an elongated base above which is swingably mounted an elongated sluice box 21. The sluice box 21 comprises a bottom wall 22, opposite side walls 23, and a rear end wall 24. The box 21 is swingably supported adjacent the rear thereof from an inverted U-shaped supporting member 25. The supporting member 25 is formed of a pair of upright members 26, and a horizontal connecting member 27.

A pair of elongated links 28 are adjustably suspended from the horizontal member 27 by means of I bolts 29 on which an upper adjusting nut 30 is threaded. The lower ends of the links 28 are mounted in I bolts 31 which engage through vertically disposed sleeves 32 secured to the side wall 23, and a lower nut 33 is threaded on each bolt 31.

A pair of outwardly offset guards or shields 34 are secured to the outer sides of the side walls 23 and engage loosely about the sleeves 32. The rear portion of the sluice box 21 is also movably supported on a spring-pressed plunger 35 engaging in a vertically disposed cylindrical guide 36. The upper end of the plunger 35 has a roller 37 rotatably secured thereto and the roller 37 engages between a pair of track forming members 38 which are secured in spaced apart parallel relation to the bottom wall 22.

The plunger 35 has a T-shaped key 39 secured thereto which slidably engages through the cylinder 36, and a substantially semi-cylindrical guide 40 confronts the key 39 and is carried by a resilient upwardly and inwardly inclined support 41 which is secured to the base 20 by fastening means 42. The supporting member 25 is braced relative to the base 20 by means of pairs of upwardly convergent stays 43, as shown in Figure 3.

The forward end of the sluice box 21 is movably supported on an upstanding supporting member 44 secured to the base 20, and the upper wall 45 of the supporting member 44 is formed with a pair of longitudinally extending channels 46, as shown in Figure 7. A pair of rollers 47 movably engage within the channels 46 and are rotatably carried by a shaft 48 which is secured to a depending supporting member 49 fixed to the bottom wall 22 of the sluice box 21. The sluice box 21 is horizontally reciprocated by means of a crankshaft 50 having a pair of cranks 51 secured thereto, and the crankshaft 50 is journalled in bearings 52 carried by the base 20.

A pair of crank rods 53 are pivotally connected at their rear ends to the crank members 51 and are pivotally connected at their forward ends to a shaft or bolt 54 extending through a bushing 55 which is fixed to the bottom wall 22 of the sluice box 21.

In order to provide a means whereby the sluice box 21 will be jarred at the time the box reaches substantially the limit of its forward movement, we have provided a depending plate 56 which is fixed to the bottom wall 22 of the sluice box and is disposed in a position to strike a pair of springs 57 and 58 which are fixed to the supporting member 44 at the rear side of the latter. As shown in Figure 9, spring 58 is slightly shorter in length than spring 57 so that when the plate 56 strikes longer spring 57, sluice box 21 will be given a sidewise or lateral movement at the rear thereof in order to laterally agitate the material which is moved forwardly and downwardly within the sluice box.

A rear riffle member 59 is disposed within the box 21 and in the present instance the riffle member 59 is formed of a transversely corrugated metal sheet which extends between the side walls 23. The material which is to be worked upon is discharged into the box 21 from a discharge chute 60 as shown in Figure 3, which empties into the box 21 at the rear thereof. The material enters the box 21, is spread out and moved forwardly by means of water which is discharged from a horizontally disposed nozzle member 61. The nozzle member 61 is identical with the nozzle structure shown in Figure 14 and includes upper and lower walls 62 and 63 with forwardly divergent dividers 64 secured between the upper and lower walls 62 and 63.

The nozzle member **61** also includes opposite forwardly divergent side walls **65**. An intermediate nozzle **66** similar to nozzle **61**, is disposed at the forward end of the riffle member **59** and is directed rearwardly so as to agitate or stir up the water and material which is gravitatingly flowing downwardly over riffle member **59**.

A forward or second riffle member **67** formed of a corrugated sheet is disposed in the box **21** forwardly of the nozzle **66** and, as shown in Figure 1, the corrugations of the riffle member **67** are disposed on an oblique angle to the length of the riffle member **67**. A forward nozzle **68**, similar to nozzle **61**, is disposed at the forward end of the riffle member **67** and is directed rearwardly in the same manner as nozzle **66**.

A tailing chute **69** is disposed between the side walls **23** of the box **21** forwardly of nozzle **68**, and tailing chute **69** is vertically adjusted within the box by means of a pair of adjusting bolts **70** which are threaded through transverse supporting bars **71** fixed to the side walls **23** of the box. The lower ends of the bolts **70** are swivably mounted in flanged bushings **72** which are secured to the upper side of a chute or trough **69**. The chute or trough **69** is disposed in substantially water tight position between the side walls **23** of the box by means of oppositely disposed rubber sealing strips **73** which are secured to the trough or chute **69** and extend upwardly on the inner sides of the side walls **23**, as shown in Figure 7.

An inner wall **74** is disposed between the chute or pan **69** engaging on the bottom wall **22**, and plate **74** is formed with a plurality of forwardly convergent grooves or channels **75**. The trough or pan **69** extends beyond the forward end of the box **21**, as shown in Figure 2, whereas the plate **74** terminates substantially at the forward end of the box.

The tailing material passing through the pan or trough **69** is adapted to discharge in a tailing receiver **76**, and an ore collector **77** is disposed rearwardly of the receiver **76** in a position to receive the metal or ore which is discharged from the forward end of the plate **74**. The nozzles **61**, **66** and **68** are connected to a water manifold **78** supported at one side of the box by means of upwardly and outwardly extending supporting members **79**, as shown in Figure 15.

It will be understood that where desired valve members of the conventional construction may be interposed between the manifold **78** and nozzles **61**, **66** and **68** so as to provide for the desired discharge of water into the box **21**. Crankshaft **50** has a flywheel **80** secured to one end thereof, and a grooved pulley **81** secured to the opposite end thereof. A shaft **82** is rotatably carried by bearings **83** fixed to the base **20**, and a large pulley **84** is secured to shaft **82**. A second smaller pulley **85** is also secured to shaft **82**, and a belt **86** engages about the pulleys **81** and **85**.

A power member **87** is secured to the base **20** and a pulley **88** is secured to drive shaft **89** of the power member **87**. A belt **90** engages about the pulleys **84** and **88**. The pulley arrangement hereinbefore described provides for a reduced speed between the power member **87** and the crankshaft **50**.

A pair of transversely arcuate or dome-shaped covers **91** and **92** are secured to or mounted on the upper edges of the side walls **23** of the box **21** in a position substantially overlying the riffle members **59** and **67** respectively.

In the use and operation of this separator the material

bearing the ore is discharged into the sluice box **21** from the chute **60**. The sluice box **21** is reciprocated back and forth by rotation of the crankshaft **50**, and at the same time the sluice box **21** is given a lateral movement at the time the box **21** reaches substantially the forward end of its travel. The rear nozzle **61** will discharge water into the bottom of the box **21** in a forwardly spreading stream so as to even out the material as the latter enters the rear of the sluice box **21**.

The sluice box **21** is elevated at its rear end to a point where the water and material will readily gravitatingly move downwardly as the box is reciprocated. The intermediate and forward nozzles **66** and **68** which discharge water in a rearward direction will tend to agitate and stir up the material as the latter moves forwardly so that the heavier metals will be able to gravitatingly drop from the dispersed material after the material passes the forward nozzle **68**. The plate **56** upon striking the springs **57** and **58** will cause a jarring action to the sluice box **21** at the forward end of its travel so as to assist in moving the material forwardly which may slide along the riffle members **59** and **67**.

We do not mean to confine ourselves to the exact details of construction herein disclosed, but claim all variations falling within the purview of the appended claims.

What we claim is:

1. An ore separating machine comprising a base, a sluice box above said base, means movably supporting said box relative to said base, means for reciprocating said box, a transversely corrugated riffle member in said box adjacent the rear thereof, a second corrugated riffle member extending forwardly of said first riffle member, the corrugations of said second riffle member being disposed on an oblique angle relative to the length of said box, a tailing pan extending from the forward end of said second riffle member, means adjustably supporting said tailing pan, and cooperative resilient means carried by said base acting on said box for effecting a longitudinal jarring force and a simultaneous transverse disalignment on said box at the end of the forward movement thereof, said last-mentioned means including transversely spaced apart resilient means carried by the end of said base, and a plate carried by said box engageable successively with first one and the other of said resilient means at the end of the forward movement of said box.

2. The structure of claim 1 wherein said resilient means comprising a pair of spaced apart coil springs of different lengths, whereby said plate strikes one spring first, laterally to disalign said box.

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