

J. M. BURCH.
 BLACK SAND SEPARATING MACHINE.
 APPLICATION FILED OCT. 6, 1909.

1,017,506.

Patented Feb. 13, 1912.

4 SHEETS—SHEET 1.

Fig. 1.

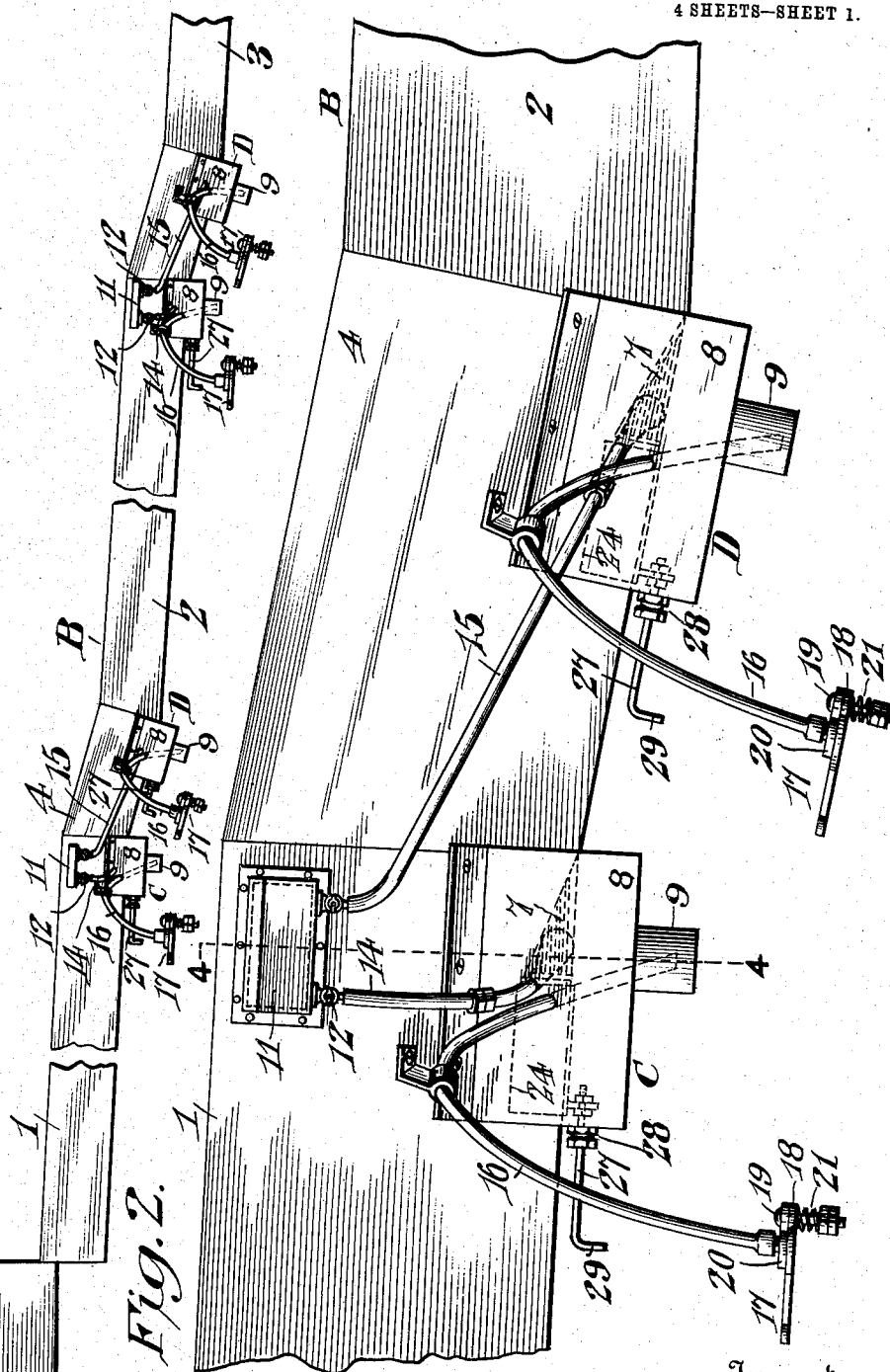


Fig. 2.

Witnesses
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 C. Bradway.

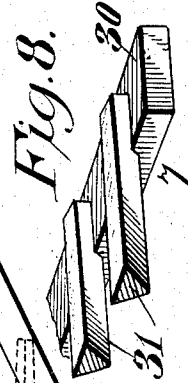
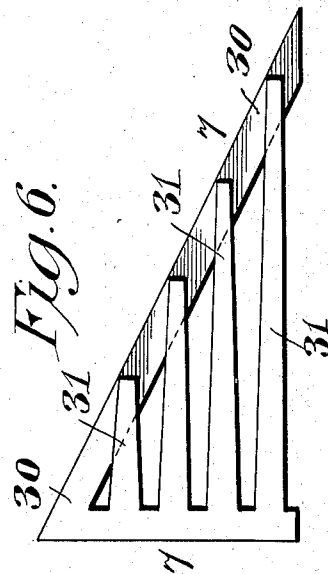
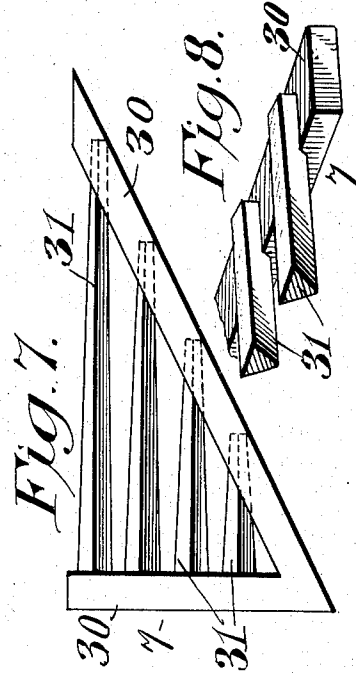
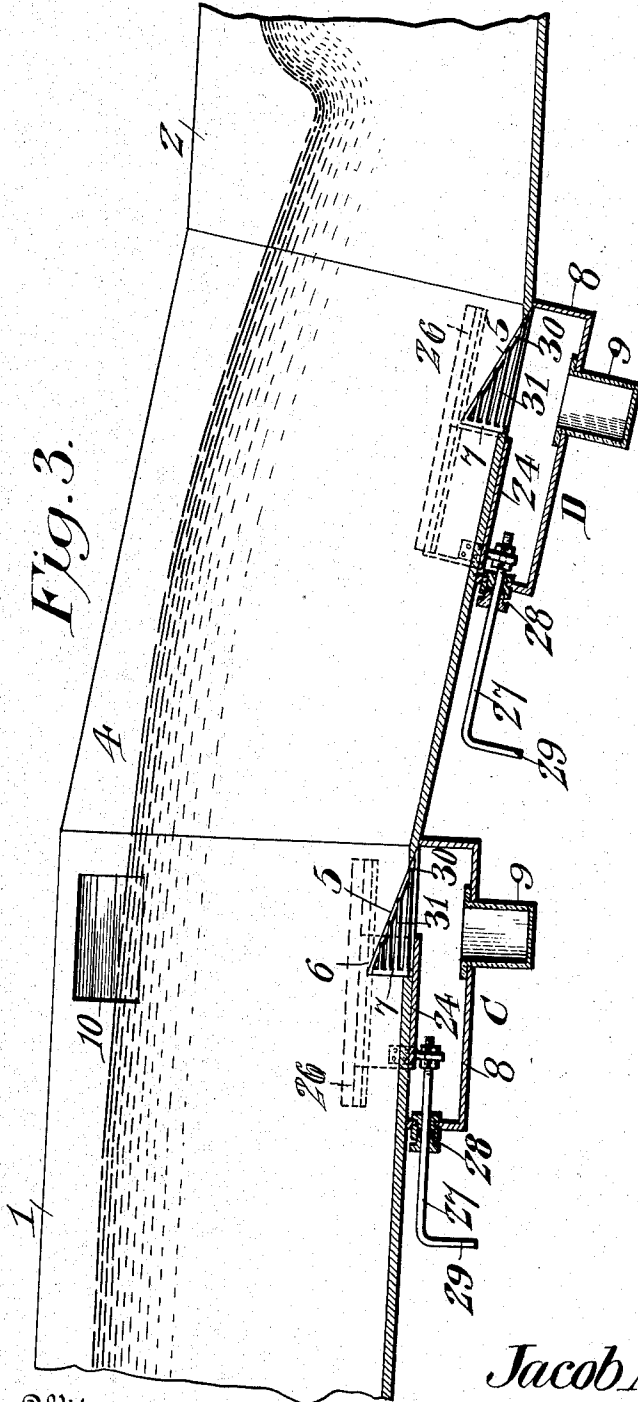
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4 SHEETS—SHEET 2.



Witnesses

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4 SHEETS—SHEET 3.

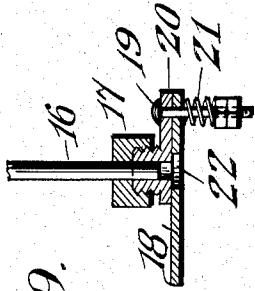


Fig. 9.

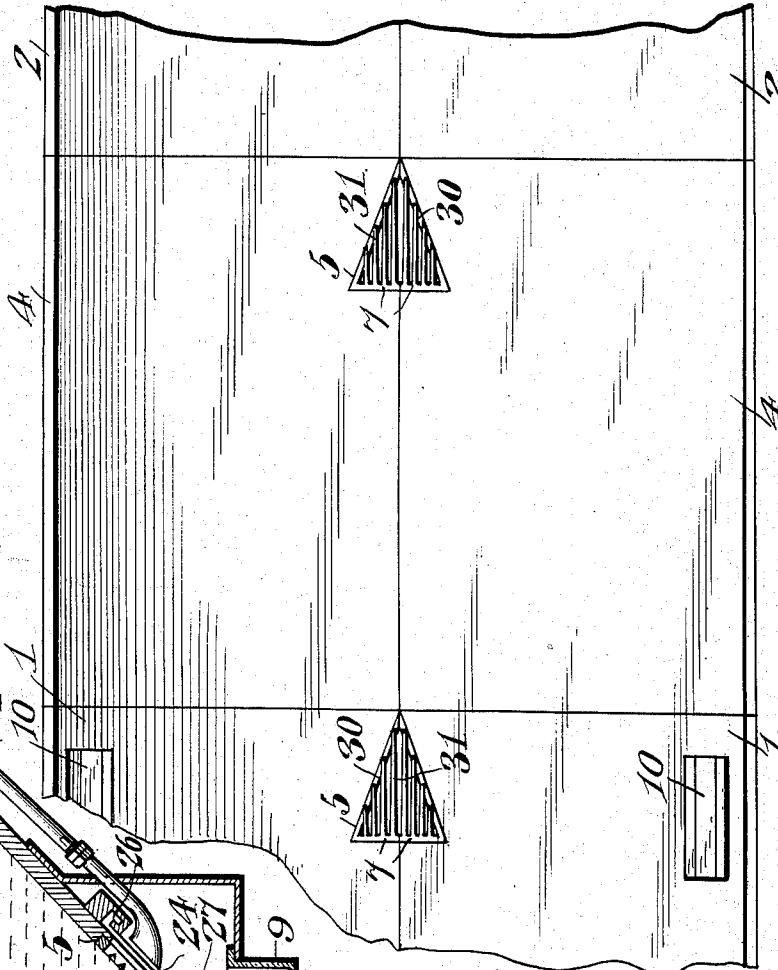


Fig. 5.

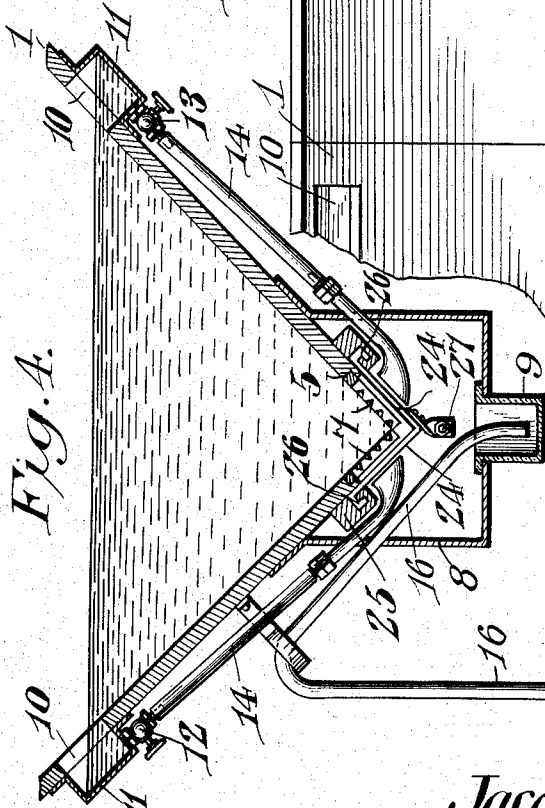


Fig. 4.

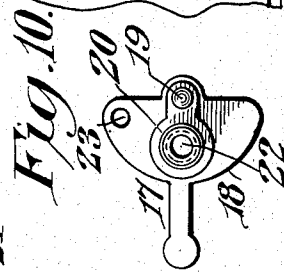


Fig. 10.

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4 SHEETS—SHEET 4.

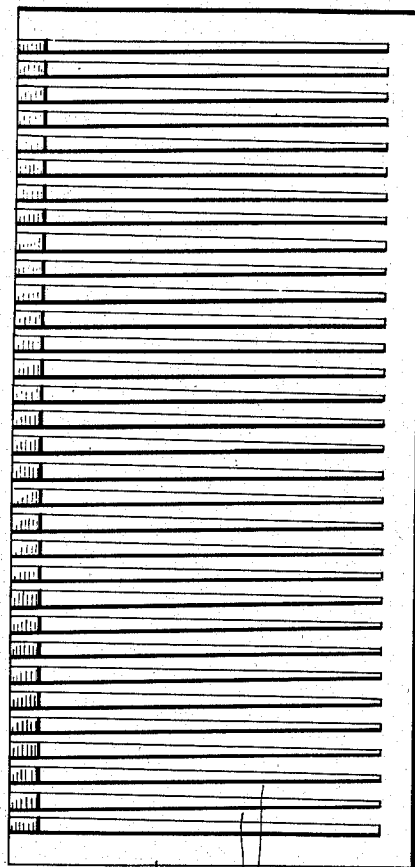


Fig. 12.

Fig. 13.

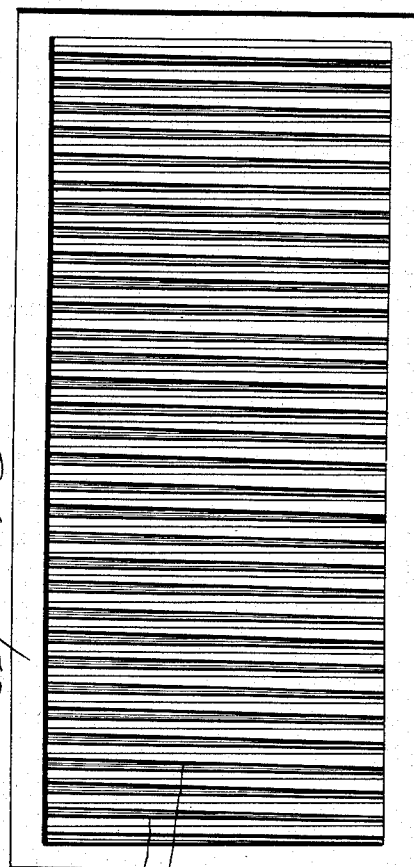


Fig. 15.

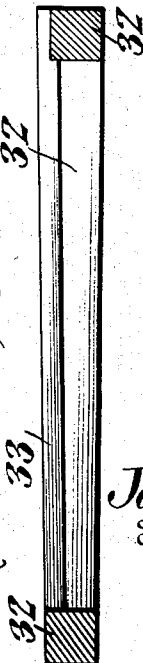


Fig. 11.

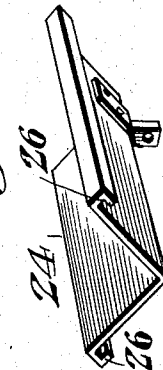


Fig. 14.



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UNITED STATES PATENT OFFICE.

JACOB M. BURCH, OF WALLACE, IDAHO, ASSIGNOR OF ONE-FOURTH TO JOHN LAFORS,
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BLACK-SAND-SEPARATING MACHINE.

1,017,506.

Specification of Letters Patent.

Patented Feb. 13, 1912.

Application filed October 6, 1909. Serial No. 521,417.

To all whom it may concern:

Be it known that I, JACOB M. BURCH, a citizen of the United States, residing at Wallace, in the county of Shoshone and State of Idaho, have invented a new and useful Black-Sand-Separating Machine, of which the following is a specification.

This invention relates to a machine designed for use in connection with placer mining operations and dredge work for separating the black sand and all its values in precious minerals from the earth and waste materials usually discharged therewith from the sluice box and lost.

The invention has for one of its objects to provide an improved sluice box having novel means arranged at different points for effectively removing the black sand by means of gratings or grizzlies and collecting chambers located thereunder from which chambers the separated precious metals and minerals can be drawn off in the most advantageous condition for treatment in a concentrator or other suitable machine.

Another object of the invention is to provide a sluice trough made up of sections located successively at lower levels and connected together by fall sections which are disposed at a greater inclination to the horizontal than the others, each section being provided with an opening located close to its tail end and covered by a grizzly, downwardly through which the black sand passes to the collecting chamber thereunder. By thus dividing the trough into sections disposed at different inclinations, the flow along the very bottom where one section discharges into another, is slower than at other points, and hence the black sand has a better chance to pass through the grizzlies than it would if the water rushed swiftly over the grizzlies, carrying the sand with it, as would be the case in a straight trough.

A further object is to provide means for keeping the grizzlies clean and at the same time maintaining the black sand in such form that it can be readily drawn off, as for instance, by means of a siphon or other suction device.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of

parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a side view of the improved apparatus with intermediate portions of the sluice trough broken away. Fig. 2 is an enlarged side elevation showing the adjacent ends of two sections of the sluice trough connected by a fall section, together with the black sand separating and discharging means. Fig. 3 is a central longitudinal section taken through a portion of the sluice trough. Fig. 4 is a transverse section on line 4-4, Fig. 2. Fig. 5 is a plan view of a portion of the sluice trough at the juncture of a fall section and the two adjacent sections. Figs. 6 and 7 are top and bottom plan views, respectively, of one portion of the grizzly. Fig. 8 is a detail view of a portion of the grizzly. Fig. 9 is a detail sectional view of the regulating valve of the siphon. Fig. 10 is a plan view of the valve. Fig. 11 is a perspective view of the valve for the grizzly opening. Figs. 12 and 13 are top and bottom plan views, respectively, of a modified form of grizzly. Figs. 14 and 15 are sections of the grizzly, the sections being taken at right angles to each other.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawings, and more particularly to Fig. 1, A designates the ordinary sluice box which overflows into the sluice trough designated generally by B, in which the separation of the black sand from the earth and waste material takes place, the said trough being composed of any number of sections 1, 2 and 3, arranged almost horizontally and successively at lower levels and connected together to form a continuous channel for the water, the adjacent sections being connected together by a fall section 4 which is, in practice, arranged so as to provide approximately a ten-degree fall.

At the tail end of each main section of the trough is arranged a black sand separating and collecting devices designated generally by C, and also at the tail end of each fall section is arranged a black sand separating and collecting device designated

generally by D, said devices being substantially the same so that a description of one will suffice for both.

In the bottom of the trough, which latter is V-shaped in cross section, is arranged an opening 5 formed by cutting a right triangular recess in the bottom edge of each side 6 of the trough, and the recess of one side is disposed opposite that of the other, so that both recesses cooperate to form an approximately equilateral triangular opening, as shown in Fig. 5. In this is fitted a grate or grizzly 7 through which the black sand is adapted to pass. The widest part of the grizzly is disposed toward the head of the trough and the vertex extends downwardly toward the tail end.

Under each grizzly or grate 7 and located outside the trough is a collecting box 8 of any suitable construction to form a watertight receptacle, and in the bottom thereof is fitted a glass or other well 9 into which the black sand containing the precious metals and minerals settles. In order to further prevent any danger of the grizzly becoming clogged, means is provided for spraying water upon the under surface of the grizzly to thereby keep the spaces between the bars of the grizzly clear, and this water also serves to prevent the black sand from becoming too thick to be effectively drawn off from the collecting well. For this purpose, each main section of the trough has openings or ports 10 at opposite sides and at a normal level of the water in the trough, so that water can overflow through these openings and be conducted to the grizzly. At the openings are arranged valve boxes 11, each of which is provided at its lower end with a pair of valves 12 and 13 that are connected, respectively, by pipes 14 and 15 with the collecting chambers or boxes 8 of each main section and adjacent fall section of the trough, so that one water feeding means will serve for each pair of black sand separating and collecting devices C and D. The discharge ends of the pipes 14 and 15 lead into the boxes 8 from the sides thereof and discharge against the grizzly, as clearly shown in Fig. 4. The valves 12 and 13 can be so regulated that the separated black sand will be sufficiently thinned by the water to be readily removed from the collecting wells 10.

Any suitable means may be employed for drawing off the sand containing water from the well, as for instance a siphon 16 may be employed for each collecting well, the suction end of the siphon being extended through one side of the box 8 and depending into the well thereof, while the outer end or discharge arm of the siphon extends below the bottom of the well and is equipped with a valve 17 for controlling the feed. This valve consists of a swinging

plate 18 pivoted at 19 on a bracket 20 carried by the siphon, and on the pivot is a spring 21 which holds the valve plate against the bracket. The valve plate has ports 22 and 23 of different size, so that when either is brought into register with the outlet end of the siphon, the feed will be varied. The valve can also be used for cutting off the supply entirely when occasion requires by bringing the unported part of the valve plate over the end of the siphon.

In each well box 8, is a valve for controlling the effective area of discharge of the grizzly opening, according to the amount of black sand passing down the sluice trough. This valve 24 is of V-shaped cross section to fit under the trough and it slides back and forth longitudinally of the latter to cover and uncover the grizzly opening. On the trough are guides 25 in which the flanges or ribs 26 of the valve engage, and connected with the valve is an operating rod 27 that extends out of the box 8 through a stuffing box 28 and terminates in a handle 29. By pushing the rod 27 inwardly, the valve closes the grizzly opening, and by pulling it outwardly the valve is moved open.

Each grizzly is composed of two sections fitted together, and one of such sections is shown in Figs. 6 and 7. This section comprises a triangular frame 30 open at one side and having spaced bars 31 which are flat on their top faces and have their upper or head ends disposed flush with the inner surfaces of the trough, as shown in Fig. 3, so that material can freely pass upon the grizzly. The grizzly bars taper downwardly in cross section so that the spaces between adjacent bars flare to thus prevent lodging of material between the bars, and, furthermore, the bars become narrower toward the tail ends so as to provide diverging spaces in which stones cannot wedge as the current of water passing over the grizzly will assist in dislodging any material that might otherwise become wedged between the bars. The tail ends of the bars are raised above the frame 30 to prevent stones from striking the frame and lodging in the slots between the bars of the grizzly.

In flat bottom sluice troughs, the rectangular form of grizzly shown in Figs. 12 to 14, inclusive, may be employed. This comprises a rectangular frame 32 having bars 33 similar to the bars 31 of Figs. 6 and 7, integrally connected therewith.

In practice, the material containing the minerals and precious metals to be separated is washed out of the sluice box A into the sluice trough and the heavier black sand containing the gold, silver, platinum and the like, settles to the bottom as it is heavier than the other waste materials and is conducted down the trough along the very bot-

tom, and when the grizzlies are reached, the black sand passes to a large degree through the grizzlies into the well boxes from which it is drawn off by the siphons.

5 By reason of the abrupt change in pitch between the tail end of each fall section of the trough and adjacent main section, the flow of water along the bottom of the trough will be comparatively slow at the tail end
10 of the section so that the passage of the sand through the grizzlies is facilitated, as there is less tendency to sweep the black sand by. The number of grizzlies and separating devices may be varied as conditions
15 dictate, so that by the time the discharge end of the sluice trough is reached, the black sand will be to a great extent removed from the earth and waste materials.

Such a machine as herein described can
20 be applied to any sluice box with only a small outlay, and after once installed, it requires very little repair or attention. The siphons which draw off the black sand, discharge into an appropriate means for con-
25 ducting the sand to concentrators.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily
30 apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood
35 that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

40 Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In combination, a continuous series of sluice sections all declining in the same di-
45 rection, sections of moderate declination alternating directly with sharply declining sections to constitute a series of alternating retarding and accelerating sections, said series being free from uprising portions in the
50 path of the current, the declination and length of the accelerating sections being such as not to disturb the stratification, and collecting means for the heavier material located in proximity to points of deflection
55 between the sections.

2. In combination, a continuous series of sluice sections all declining in the same di-
60 rection, sections of moderate declination alternating directly with sharply declining sections to constitute a series of alternating retarding and accelerating sections, said series being free from uprising portions in the path of the current, the declination and length of the accelerating sections being such as not to
65 disturb the stratification, and collecting

means for the heavier material located in proximity to points of deflection between the sections, the sluice sections being of substantially V-shape throughout with the angle lowermost and the collecting means each
70 comprising a receptacle beneath the angle bottom of the section communicating with said section through an opening therein, and a grizzly for each receptacle covering the opening through which the bottom of
75 the sluice section communicates with said receptacle.

3. In combination, a continuous series of sluice sections all declining in the same di-
80 rection, sections of moderate declination alternating directly with sharply declining sections to constitute a series of alternating retarding and accelerating sections, said series being free from uprising portions in the path of the current, the declination and
85 length of the accelerating sections being such as not to disturb the stratification and all of the sections contracting in width toward the bottom, and collecting means for the heavier material located in the con-
90 tracted bottom portion of the sections in proximity to points of deflection between the sections.

4. In combination, a continuous series of sluice sections all declining in the same di-
95 rection, sections of moderate declination alternating directly with sharply declining sections to constitute a series of alternating retarding and accelerating sections, said series being free from uprising portions in the
100 path of the current, the declination and length of the accelerating sections being such as not to disturb the stratification, grizzlies in proximity to points of deflection between the sections, and receptacles for material passing through the grizzlies under-
105 riding such grizzlies.

5. A sluice trough having separated declining sections with connecting declining sections of greater pitch, all the sections be-
110 ing free from uprising portions in the path of the current, grizzlies at the ends of the several trough sections, and means for conducting water from the tail ends of the separated sections of the trough to and discharg-
115 ing the same beneath the grizzlies at the tail end of each main section and of the next adjacent intermediate section in order.

6. A sluice trough adapted to stratify a stream carrying materials of different spe-
120 cific gravities, said trough having an overflow opening spaced from the bottom and adapted to receive water from the upper stratum of the stream, means receiving directly from the stratifying portion and in-
125 cluding one or more grizzlies for separating out the heaviest material, and means for delivering the water from the overflow opening up through the grizzlies.

7. A sluice trough adapted to stratify a 130

stream carrying materials of different specific gravities, said trough having an overflow opening spaced from the bottom and adapted to receive water from the upper stratum of the stream, a grizzly communicating directly with the stratifying portion of the stream for separating out the heaviest material, water conducting means connected with the said overflow opening and discharging against the under side of the grizzly, and means secured to the trough and extending under the grizzly for receiving the cleaning water and collecting the material passing through the grizzly.

8. A sluice trough adapted to stratify a stream carrying materials of different specific gravities, said trough having an overflow opening spaced from the bottom and adapted to receive water from the upper stratum of the stream, a valve box extending over said opening, a plurality of means for receiving directly from the stratifying portion of the stream and including grizzlies for separating out the heaviest materials, and means for conducting water from the valve box and delivering the water up through the grizzlies.

9. A sluice trough adapted to gravitally separate heavier particles from lighter particles and having an opening in its bottom, a grizzly mounted in the opening, a box secured to the outside of the trough and extending under the grizzly, a collecting well mounted in the bottom of said box and closed against direct gravital discharge of concentrates collected therein, and siphonic means for drawing off the material from the said well, said siphonic means having its highest point lower than the water level when water is flowing through the trough.

10. A sluice trough adapted to gravitally separate heavier particles from lighter particles and having an opening in its bottom, a grizzly set in said opening, a box secured to the under side of the trough and extending under the grizzly, a collecting well depending from the bottom of said box and closed against the direct gravital discharge of concentrates collected therein, and means for withdrawing the contents of the well through the top of the same, said means being located below the level of and responsive to water flowing through the trough.

11. A sluice trough adapted to gravitally separate heavier particles from lighter particles and having openings in its bottom, material-separating means in the said openings, means for collecting materials passing through the first-mentioned means, said collecting means being closed against the direct gravital discharge of concentrates deposited thereon, and a siphon for drawing off the material from the last-mentioned means, said siphon being provided with means for regu-

lating the flow of the materials and having its highest point below the level of water flowing through the trough.

12. A sluice trough adapted to gravitally separate heavier particles from lighter particles and having an opening in its bottom, a collecting chamber under said opening and closed against the direct gravital discharge of concentrates collected therein, means for the removal of the concentrates from the collecting chamber, and a valve beneath the opening and mounted to move in the direction of the length of the sluice trough to cover or uncover the opening, said valve being housed in the collecting chamber.

13. The combination of a sluice trough adapted to gravitally separate heavier particles from lighter particles and having an opening in its bottom, a grizzly set within the opening, a collecting chamber carried by the trough in underriding relation to the grizzly and closed against direct gravital discharge of concentrates collected therein, means for the removal of the concentrates from the said collecting chamber, a slide valve mounted on the under side of the trough in close underriding relation to the grizzly for controlling the flow through the opening into the collecting chamber, said slide valve being housed within said collecting chamber, means for mounting the valve on the trough, and means supported by the chamber for actuating the valve.

14. The combination of a sluice trough adapted to gravitally separate heavier particles from lighter particles and having an opening in its bottom, a grizzly set in the opening, a collecting chamber carried by the trough in underriding relation to the opening and the grizzly therein and closed against the direct gravital discharge of concentrates collected therein, means for the removal of the concentrates from the said collecting chamber, a slide valve mounted on the under side of the trough and completely housed in and movable longitudinally of the chamber for controlling the flow through the grizzly, and a device connected with the valve and extending through the chamber to the exterior thereof for operating said valve.

15. The combination of a sluice trough adapted to gravitally separate heavier particles from lighter particles and having its sides inclined and meeting at their lower edges and provided with registering openings at said meeting edges, a grizzly conforming to and disposed in said openings, a collecting chamber in underriding relation to the grizzly and closed against direct gravital discharge of concentrates reaching said chamber through the grizzly, means for the removal of such concentrates, a valve conforming to the shape of the trough and grizzly and mounted on the sides of the

trough, said valve being movable longitudinally of the trough to vary the flow through the grizzly, and means for actuating the valve.

5 16. The combination of a sluice trough adapted to gravitally separate heavier particles from lighter particles and having its sides meeting at its lower edges and having an opening formed partly in both sides at
10 said lower edges, a grizzly disposed in the opening, longitudinal guides on the sides of the trough above the opening provided with inturned ribs at their lower edges, a valve mounted on the trough and movable
15 longitudinally thereof to vary the flow through the grizzly, said valve being provided at its upper edges with overhanging ribs engaging the ribs on the guides, a collecting chamber mounted on the trough under the opening thereof and inclosing the valve, and means connected with the valve and extending out of the chamber for actuating the valve.

17. The combination of a sluice trough
25 adapted to gravitally separate heavier particles from lighter particles and having its walls inclined and meeting at the bottom, each wall having at the lower edges an opening matching a similar opening in the
30 other wall, the openings being wide at the up stream end and tapering toward the down stream end, and a grizzly having a frame conforming to the combined shape of the mating openings in the walls of the
35 sluice trough and having bars extending in the direction of the length of the sluice trough from the wide end of the marginal frame to the narrow end thereof, said grizzly terminating at a substantial distance below
40 the normal water level of the sluice trough to discharge from a lower stratum only.

18. The combination of a sluice trough adapted to gravitally separate heavier par-

ticles from lighter particles and having its walls inclined and meeting at the bottom, 45 each wall having at the lower edge an opening matching a similar opening in the other wall, the openings being wide at the up stream end and tapering toward the down stream end, and a grizzly having a frame 50 conforming to the combined shape of the mating openings in the walls of the sluice trough and having bars extending in the direction of the length of the sluice trough from the wide end of the marginal frame to 55 the narrow end thereof, said bars being equally spaced apart with their head ends flush with and their tail ends raised above the top surface of the frame, said grizzly terminating a substantial distance below 60 the normal water level of the sluice trough to discharge from a lower stratum only.

19. The combination of a sluice trough adapted to gravitally separate heavier particles from lighter particles and having a 65 main section and a fall section forming a continuous bottom therewith, the said fall section being disposed at a greater angle to the horizontal than the main section, grizzlies in the bottoms of both sections at the 70 lower ends thereof, collecting chambers secured to the under side of the trough and extending under the grizzlies, overflow boxes on the sides of the main sections of the trough, and conduits leading from said 75 overflow boxes into both collecting chambers and having upturned discharge ends adjacent the grizzlies.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses. 80

JACOB M. BURCH.

Witnesses:

H. LIEB,

FRANK SCHULTZ.