

M. C. SEAGRAVE.
CONCENTRATING JIG.

APPLICATION FILED SEPT. 22, 1911.

Patented Nov. 25, 1913.

3 SHEETS—SHEET 1.

1,079,905.

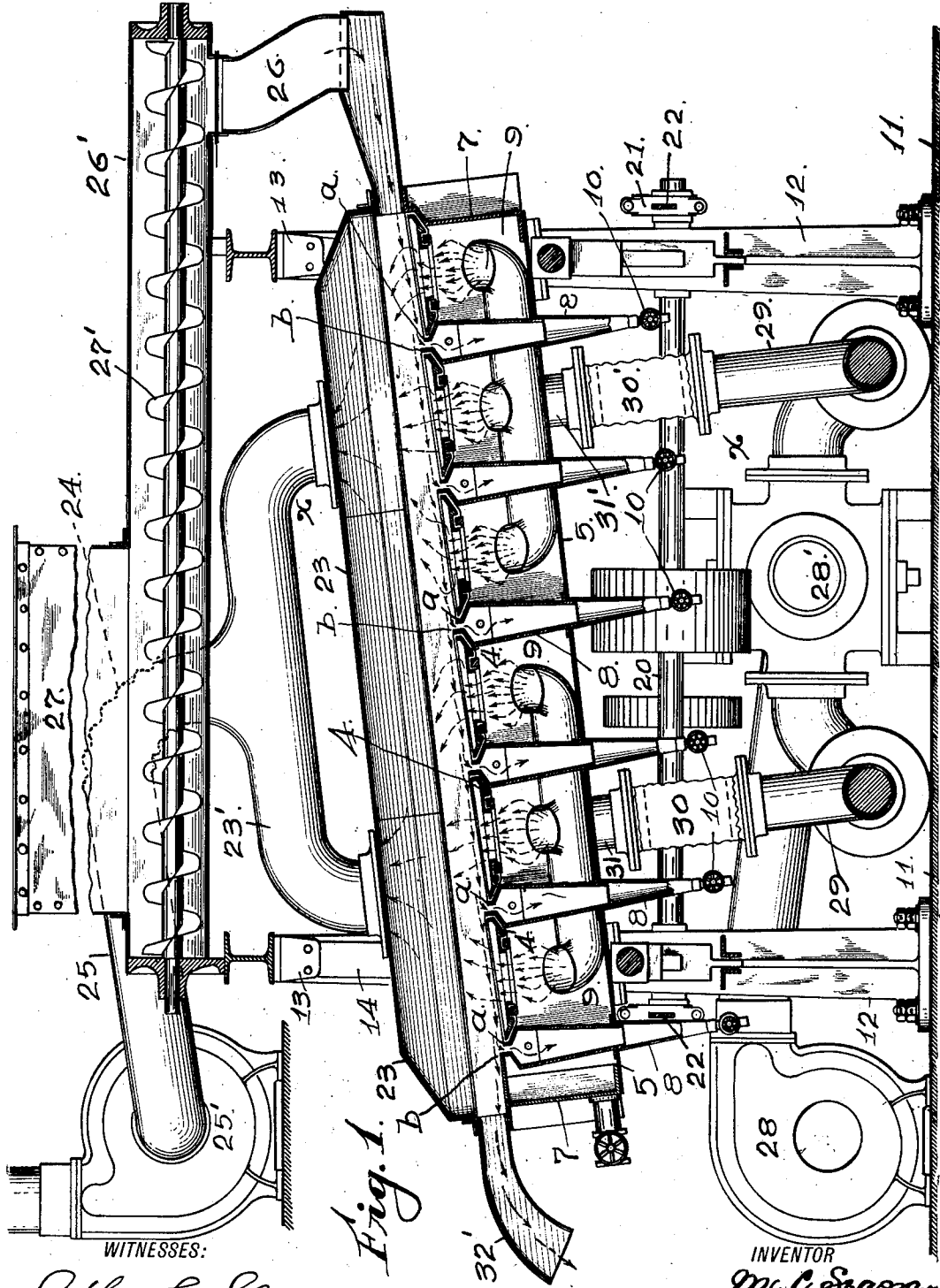


Fig. 1.

WITNESSES:

Arthur L. Slee.

Wm F. Booth

INVENTOR

M. C. Seagrave

BY

N. A. ...

ATTORNEY

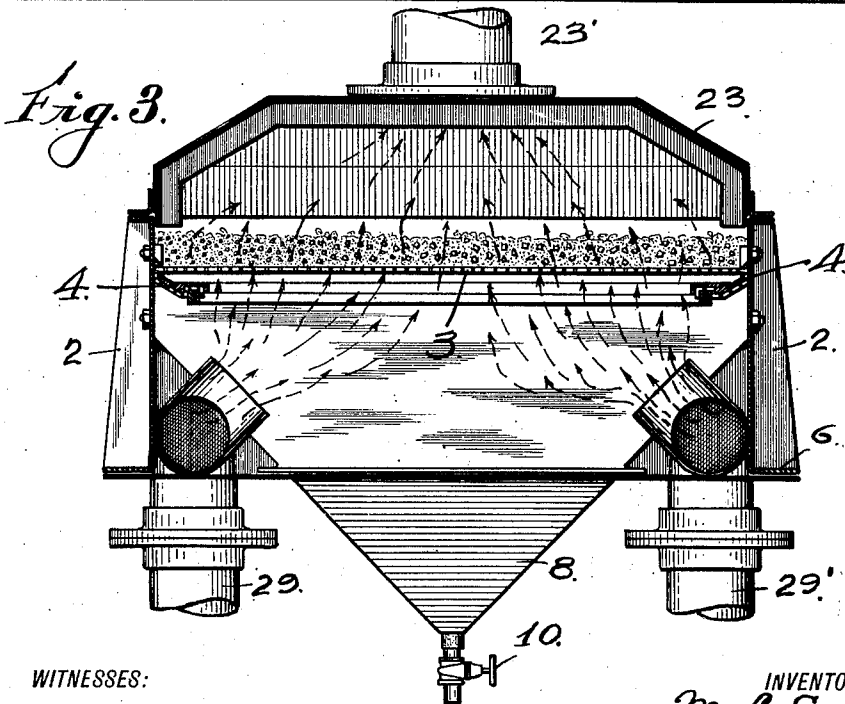
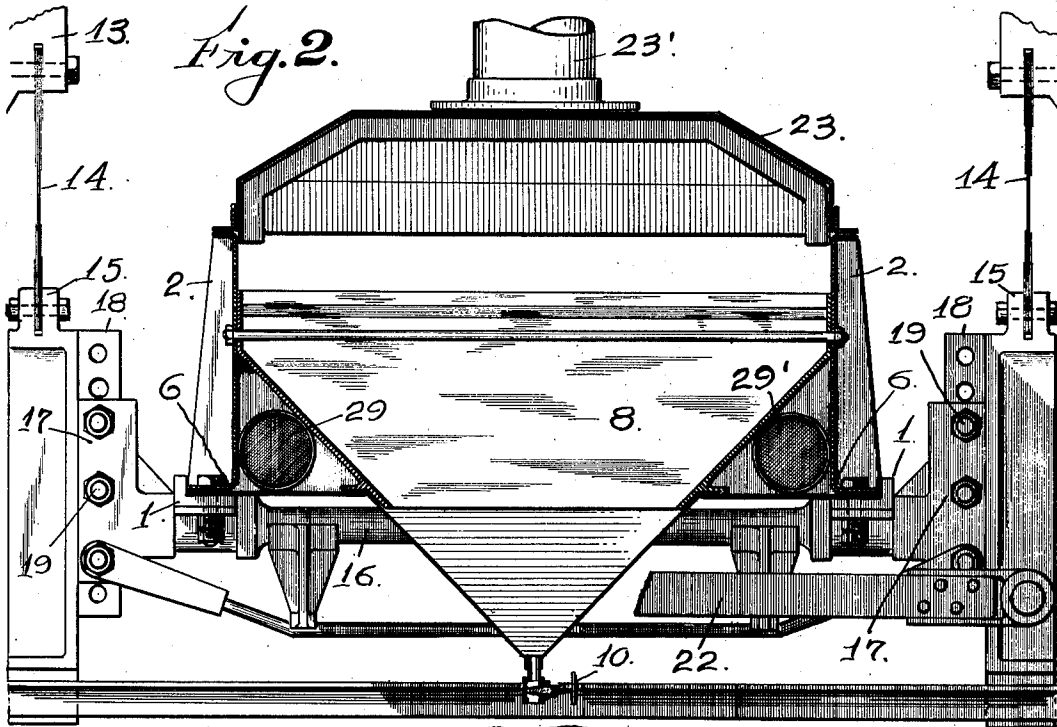
M. C. SEAGRAVE.
CONCENTRATING JIG.

APPLICATION FILED SEPT. 22, 1911.

Patented Nov. 25, 1913.

3 SHEETS—SHEET 2.

1,079,905.



WITNESSES:

Arthur L. Slee.
Am. F. Booth

INVENTOR
M. C. Seagrave
BY *[Signature]*
ATTORNEY

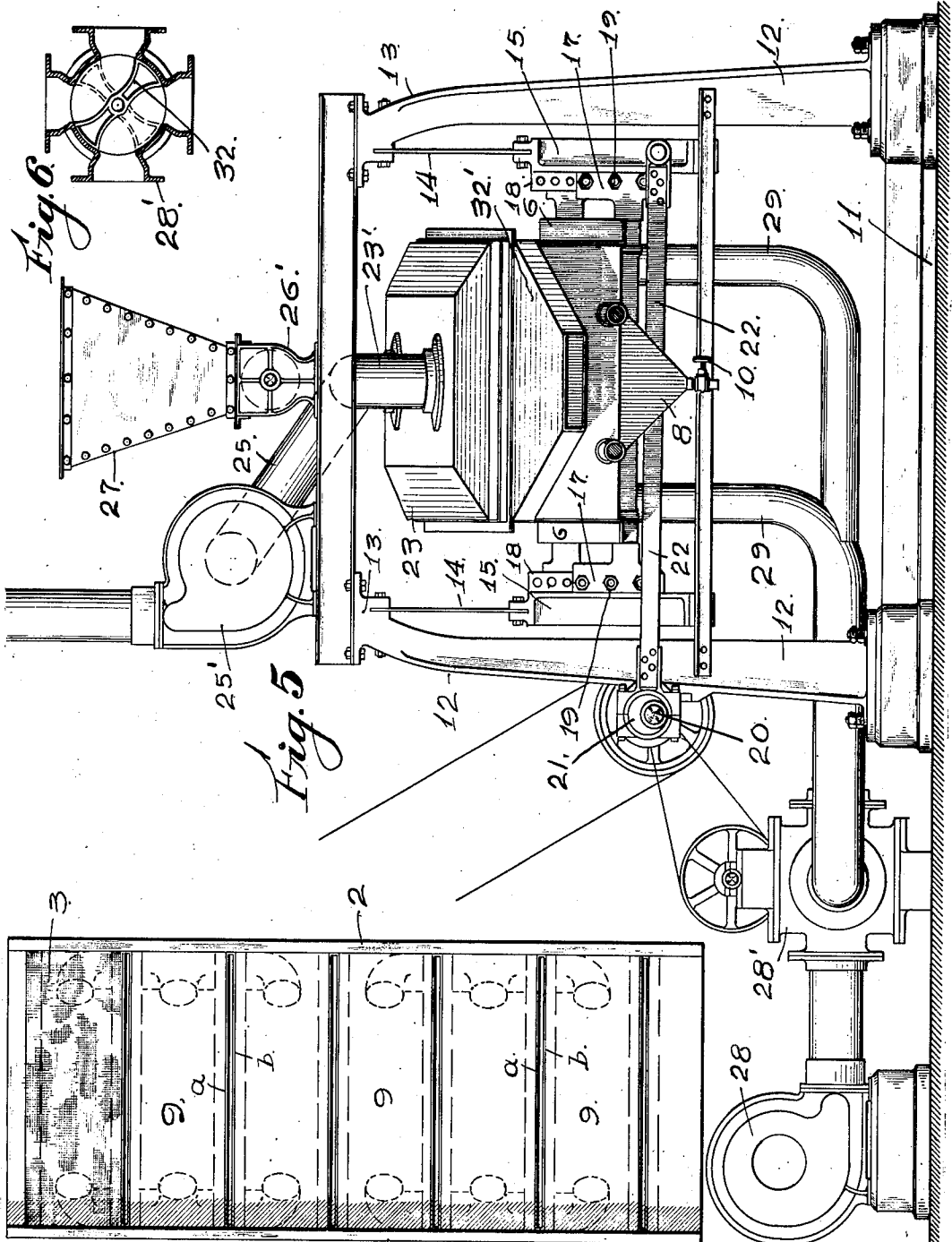
M. C. SEAGRAVE.
CONCENTRATING JIG.

APPLICATION FILED SEPT. 22, 1911.

Patented Nov. 25, 1913.

3 SHEETS—SHEET 3.

1,079,905.



WITNESSES:
Arthur L. Slee.
Wm. F. Booth

Fig. 4

INVENTOR
M. C. Seagrave
BY [Signature]
ATTORNEY

UNITED STATES PATENT OFFICE.

MARSHAL C. SEAGRAVE, OF OAKLAND, CALIFORNIA.

CONCENTRATING-JIG.

1,079,905.

Specification of Letters Patent. Patented Nov. 25, 1913.

Application filed September 22, 1911. Serial No. 650,740.

To all whom it may concern:

Be it known that I, MARSHAL C. SEAGRAVE, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Concentrating-Jigs, of which the following is a specification.

The invention relates to that class of machines, adapted for the elimination of the worthless gangue in the mineral bearing mass, and particularly to such machines wherein the separation or elimination of the worthless material is accomplished without the use of water; intermittent air currents or jets being commonly employed in connection with an agitation of the suspended frame for the separation of the mineral bearing earths and ores, one of such constructed machines being disclosed by United States Letters Patent No. 994,406, granted J. B. Jardine, Jr., June 6, 1911.

On account of the general low value of the ores worked under the system of dry concentration or separation, the cost incident thereto must be low per ton to permit of the same being profitably worked to advantage, and for this purpose it is required to provide a machine having large capacity for the preliminary treatment or separation of such material in order to successfully and economically handle low grade deposits of mineral bearing material and to properly and cheaply prepare the same for true concentration.

The present invention resides mainly in the construction of means for rapidly and efficiently taking care of the concentrates or separated values, so that large quantities of material may be treated with a machine of ordinary size, the object being to provide for an increase in the tonnage treatment without in any manner restricting the separating surface of the concentrator or separator, and this without unduly enlarging the working area of the machine, which must be confined within certain limits.

To comprehend the invention reference should be had to the accompanying sheets of drawings, wherein—

Figure 1 is a side elevation, partly sectioned, of my jig, showing the application and positioning of the outlet bins or hoppers for the jigged material, and the means for regulating the discharge therefrom, said

view illustrating the means for supplying intermittent air currents or jets to the under surface of the screened units or sections of the concentrating bed and for removing the dust laden air, the feed device for supplying material to be treated onto the concentrating bed, and the discharge for the gangue eliminated from the metal bearing material. Fig. 2 is a cross sectional view, enlarged, of the table taken through one of the riffles thereof, illustrating the adjustable cradle and the shaking frame supporting the concentrating table, said view being taken on the line $x-x$ —Fig. 1 of the drawings. Fig. 3 is a cross sectional view, enlarged, of the table taken through one of the screened sections or units, disclosing the application of the air currents or jets to the under surface thereof. Fig. 4 is a plan view of the jig frame. Fig. 5 is an end elevation of the apparatus viewed from the discharge end thereof. Fig. 6 is a vertical sectional view of the pulsator.

The vibrating jig frame is composed of two spaced longitudinally disposed supporting side sills 1 and the upwardly extended side plates 2 bolted or fastened thereto in any suitable manner. The said jig frame is provided with a concentrating bed or top consisting of a series of independent transversely disposed separated screened sections or units 3, the frame 4 for each section or unit being fastened between and to the side plates 2, and the bottom of the jig is formed of an impervious plate 5 which lies and is secured between the base flanges 6 of the side plates 2 and the upper surface of the longitudinal side sills 1, the ends of said bottom plate 5 being united to the end plates 7 of the jig frame, so as to form a hollow chamber for the interior of the jig, which may or may not be divided.

Fitted to the jig top in the intervals between the screened sections or units 3 and serving as a seat for the frames thereof are the transversely disposed downwardly extended bins or hoppers 8. A number of such bins or hoppers are provided throughout the length of the jig, and they are open at the top to the full width of the jig and the mouth of each bin or hopper at its upper edge a is on a level with the upper surface of the screened section or unit 3 the frame of which is seated therein, while the lower edge b of the same is projected for a slight

distance above the surface of the screened section to form a drag or transversely disposed riffle for the lower zone of material passing downwardly over the slotted bed or top of the jig frame. Under this construction the downwardly traveling material is suddenly arrested at the mouth of each bin or hopper 8, but as the same works or climbs over the barrier or riffle the same does not drop suddenly to a lower surface but continues its line of travel over an unbroken surface, with the result that the partial separation of the material is not broken up or destroyed. In the present case the bins or hoppers 8 extend through the hollow chamber of the jig and sub-divide the same into a series of individual compartments 9, and each bin or hopper is projected a distance below the bottom plate 5. The outlet for the said bins or hoppers is a contracted one, and the flow of material therefrom is preferably controlled by a regulating valve 10, which is provided for each of the said bins or hoppers.

The jig frame is supported or suspended above a suitable bed or foundation 11, from which rise the stanchions 12. From the overhang 13 of each stanchion a flat spring 14 projects downwardly, one being attached to each corner piece 15 of an adjustable cradle 16 with an inclination downwardly, on which cradle rests or is supported the jig frame. The cradle 16 is adjustably united to the corner pieces 15 by means of the slotted heads 17 which slide on the guide web or flange 18 projecting inwardly from the corner pieces 15 and are connected thereto by the bolts or pins 19 inserted through the holes or openings in the heads when in registry with any one of the vertical series of holes or openings in the web or flange 18 of the corner pieces 15. The inclination of the cradle may thus be varied as desired to change the inclination of the jig supported thereby in accordance with the material under treatment.

In order to impart a side shake or vibratory motion to the cradle and jig supported thereby, there is a drive shaft 20 situated and working in bearings at one side of the machine, and connected through eccentrics 21 to the cradle by means of the cross-heads 22, Figs. 1 and 5 of the drawings. The rotary motion of the crank shaft is thus transmitted for imparting a lateral shaking or vibrating motion to the jig supported by the suspended cradle.

The separating bed or jig is inclosed by a hood 23 the outlet flue 23' of which is connected by a flexible joint 24 to a pipe 25 leading to a suction fan 25' for drawing off the dust laden air, and the material to be treated is delivered at the head end of the said bed by a conduit 26 leading from a trough 26' which receives the material from

a feed hopper 27, the material being forced from the trough 26' into the conduit 26 by a worm conveyer 27'.

Intermittent air jets are supplied to the under surface of each screened section or unit 3 from a blower 28, which delivers air into a pulsator 28', the said pulsator in turn delivering intermittent blasts alternately into the branch air supply pipes 29 and 29', which are connected by flexible joints 30 and 30' to the delivery pipes 31 and 31' which distribute the air into the air receiving chambers of the jig. As usual with this form of air supply, the flow of air through the pulsator into the delivery pipes is controlled by a rotary valve 32, driven in any suitable manner, so that while air is being admitted into one chamber of the pulsator, it is being released from the companion chamber, and the intermittent air currents thus supplied to the interior of the jig chamber act to slightly vibrate the screened coverings of the screened sections or units composing the top of the jig, thereby maintaining the material traveling there- over in agitation.

In operation, as the material to be treated is fed onto the head end of the jig the same at once is spread out uniformly over the screened surface of the first screened section or unit and, combined with the flow of the material down the inclination of the jig, together with the side shake of the table and the air pulsations and the air releases, the said material by reason of the natural differences in specific gravity arranges itself with the heavier particles nearest the screened surface. The heaviest material during the course of downward movement will flow into the open mouth of the depending jig bins or hoppers, the arrested movement by reason of the barriers offered by the transverse projecting riffles giving ample time for such material to settle within the mouth of the jig bins. Inasmuch as these jig bins or hoppers are attached to the jig frame and move with the lateral shake thereof, the material discharging therein constantly assumes a level surface, and thus overcome the natural vortices in the center usually caused by the emptying of bins. The destruction, or rather the preventing of the formation of vortices in the bins permits of a discharge of separated material in proportion to the inflow thereof, inasmuch as a clogging of the bins is provided against.

By the employment of a plurality of downwardly projected jig bins or hoppers arranged throughout the length of the jig, each provided with a contracted outlet, the over-crowding of the concentrating surface is substantially impossible, as the outflow of the separated material is equal to the inflow thereof, thus permitting a larger tonnage of material to be treated on a table of given

5 dimensions than possible by the employment of tables provided with transversely disposed troughs having a lateral discharge, for the capacity of such tables is limited to the capability of the discharging means to handle or take care of the received material. Again, with tables constructed as described in mentioned United States Letters Patent No. 994,406 of June 6, 1911, the width of the table is materially limited, for if the transversely arranged discharge worms are carried beyond a given length they will sag within the receiving trough and thus clog the outflowing material, and if supporting bearings be employed within the troughs they will prevent the free discharge of material. On the contrary a shaking table constructed with downwardly projected discharging jig bins or hoppers may be constructed of any desired width, inasmuch as they form a portion of the jig frame and a support for the screened sections or units thereof, and the length thereof may be increased or decreased in proportion to the working tonnage of material required by merely adjusting the height of the supporting cradle for the jig frame. By thus providing for the working of large tonnage per machine, provision is made for the working of material running so low in values per ton as otherwise could not be worked successfully or profitably.

The tailing or gangue flows from the machine through the discharge outlet 32', extended from the discharge end of the jig.

The feature believed to be new and which it is desired to be understood as claiming broadly resides in the employment of a plurality of transversely disposed downwardly extended jig bins or hoppers projected from a vibratory jig, having a working surface or bed composed of separated transversely disposed independent screened sections or units, the jig bins or hoppers having a contracted outlet for the discharge of the material received therein.

Having thus described the invention what is claimed as new and desired to be protected by Letters Patent is—

50 1. In an apparatus for the described purpose, the combination of a jig-frame inclined in the direction of its length, means for imparting a vibrating motion thereto, a series of transversely disposed spaced

screened sections secured within and arranged throughout the length of the said frame, and a series of transversely disposed open top and bottom discharge bins let into the frame throughout the length thereof intermediate the screened sections and serving as downward discharges for the material separated on the screened surface of the vibratory frame, each of said bins being provided with a contracted outlet and projected below the surface of the said frame.

2. In an apparatus for the concentration of material, the combination with a jig frame, of means for imparting vibratory motion thereto, a screened concentrating surface for the said frame, devices for delivering thereon material to be worked, means for supplying intermittent blasts of air under pressure to the screened surface of the frame, and a transversely disposed downwardly extended open top and bottom discharge bin let into the under face of the frame adjacent the lower end of the screened surface thereof for receiving the separated material flowing therefrom and serving as a discharge therefor, the said bin being provided with a contracted discharge outlet.

3. In an apparatus for the described purpose, the combination with the jig frame having a separating bed composed of a series of transversely disposed spaced screened sections arranged throughout the length of the frame, of devices for supplying material to be separated onto said bed, means for imparting a vibratory motion to the jig frame, an open top discharge bin having a contracted outlet let into the frame intermediate the screened sections thereof and projected a distance below the frame, each bin extended the entire width of the screened sections of the separating bed, and each bin having a section extended above the lower edge of the screened sections to form a series of transverse riffles for the separating bed of the jig frame, and means for supplying intermittent blasts of air under pressure to the screened sections of the separating bed.

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

MARSHAL C. SEAGRAVE.

Witnesses:

N. A. ACKER,
D. B. RICHARDS.