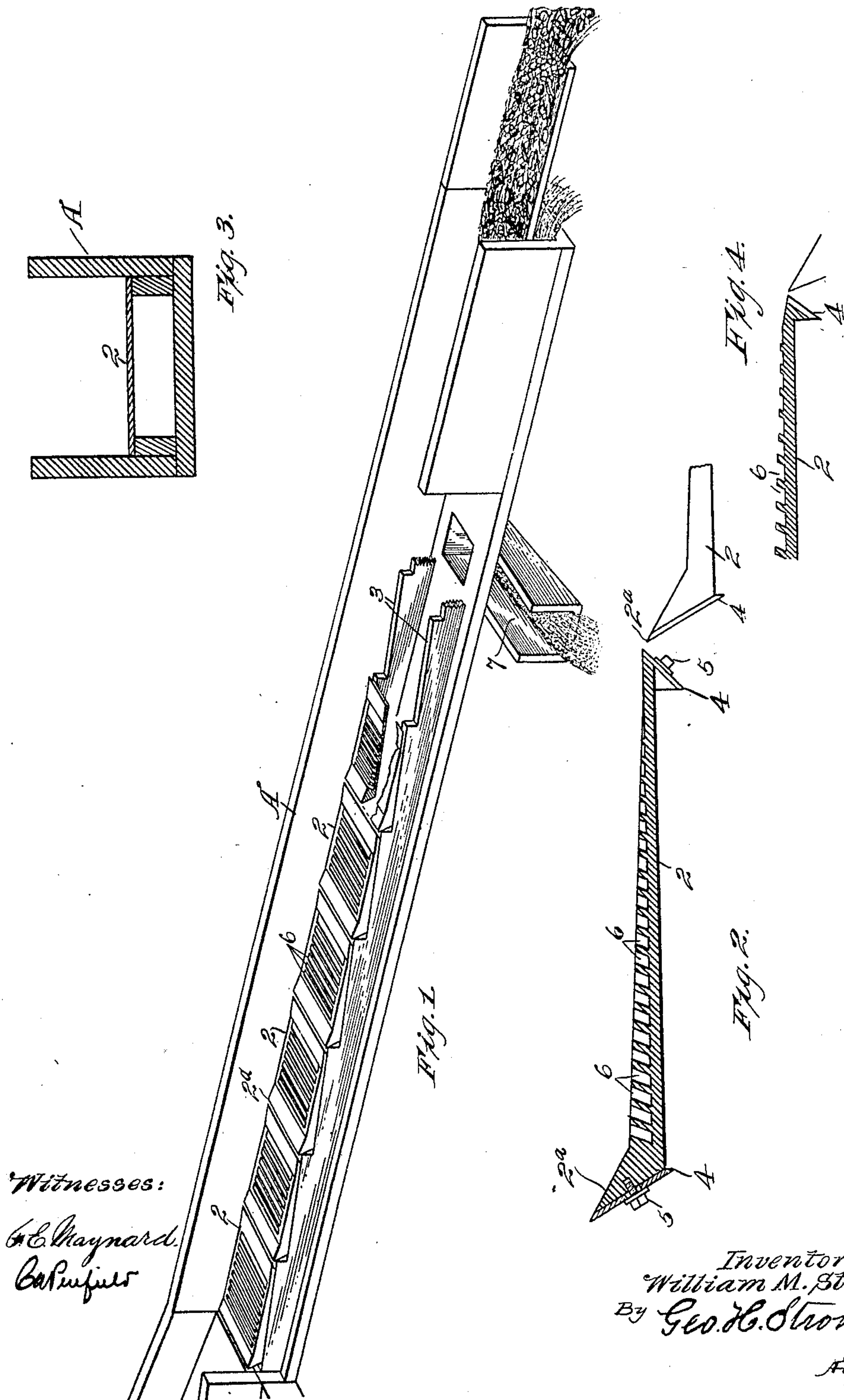


W. M. STOVER.
CONCENTRATOR.
APPLICATION FILED JULY 24, 1908.

926,031.

Patented June 22, 1909.



Witnesses:
E. Maynard
C. R. Jones

Inventor:
William M. Stover;
By Geo. H. Strong
Att'y.

UNITED STATES PATENT OFFICE.

WILLIAM M. STOVER, OF OAKLAND, CALIFORNIA, ASSIGNOR TO STOVER-GLAZE MANUFACTURING COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

CONCENTRATOR.

No. 926,031.

Specification of Letters Patent.

Patented June 22, 1909.

Application filed July 24, 1908. Serial No. 445,183.

To all whom it may concern:

Be it known that I, WILLIAM M. STOVER, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Concentrators, of which the following is a specification.

My invention relates to an apparatus which is designed for the separation and concentration of heavy valuable material from lighter and worthless gangue by gravity.

It consists in a combination of devices, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a perspective view and partial section of my apparatus. Fig. 2 is a detail sectional view of a plate. Fig. 3 is a cross section of a sluice-box and plate. Fig. 4 is a section of a modification.

It is the object of my invention to provide a gravity separator and concentrator, in which I dispense with all power necessary to create what is termed a "jig" motion, which is the feature of all, or nearly all concentrators. To this end I employ a system of corrugated plates cast with sharp edges at either end, and so disposed with relation to each other as to shave off the lower portion of the flowing material at each passage from one plate to another.

While the pulp and gravel pass in suspension over the tops of the plates, and from one to another, the heavier and valuable portion which is drawn down between the plates by suction, flows through and into a subchannel to points of discharge.

As shown in the drawing, A represents a box or sluice of any description which may be made of wood, metal, or other suitable material, which is set at a suitable incline to insure the flow of material which is delivered into the upper end.

Within the sluice are fixed the plates 2. These plates may be supported upon any suitable frame-work, such as represented at 3 so that there is a space between the plates and the bottom of the sluice. These plates are made of any suitable length and width. I have found that plates may be very conveniently made one foot, eleven and a half inches in length by sixteen inches in width. These plates are made to slope from about

two and three-quarters inches thick, at the upper end, down to about one-half inch in thickness at the lower end of the plate. The upper end of each plate has a sharply upturned portion 2^a, and the rear face of this upturned portion stands at an angle of approximately 45 degrees. At the lower end, the plate has a similar angular face, and upon these faces are bolted the hardened steel plates 4. These plates may be secured in any suitable or desired manner, but I have here shown them conveniently attached by means of bolts as at 5.

The edges of the plates are drawn down to a sharp thin edge. Transversely across these plates are formed the forwardly inclined slots or channels 6. These channels commence at the base of the upper incline 2^a, and may be approximately seven-eighths of an inch deep, and the angle of inclination about 30 degrees toward the lower end of the plate. These channels or grooves decrease in depth gradually from the upper to the lower end; thus at the lower end having a depth of about one-eighth of an inch, and at each end there is a smooth surface amounting to about one inch at the upper end, and about six inches at the lower end. These plates in sets of any desired number are placed end to end, and supported, as previously stated, several inches above the bottom of the sluice, on suitable brackets.

An opening may be left between the sharp edges of these plates of one-half an inch more or less, depending upon the character of the material, and these plates are so arranged that the upper edge of each plate is approximately one-eighth of an inch beneath the lower edge or end of the preceding plate. As the pulp, gravel, or other material is carried down the incline by the current of water, it is forced to jump this opening, and as it falls upon the sloping upper end of the plate, that portion which passes over the opening, will receive a momentary increased impulse, by reason of the incline, which prevents any clogging which might occur if the material passed over a crack or crevice on a plane or level surface. By thus regulating the grade of the sluice, the following results are accomplished:

First,—As the pulp is in suspension while passing from one plate to another, the

values or heavier particles having settled to the bottom; these values are held to the edge of the shaving bit, and as the material passes from one plate to the other, the bottom of the flowing material is shaved off, and the material thus separated falls into the bottom of the sluice-box or flume. The refuse, pulp, or gravel continues on with the greater portion of the water over the tops of the plates which form a false bottom to the sluice, and is discharged after passing over all the plates, at the lower end of the sluice or flume, while the concentrates which have been shaved or separated at each of the slots or crevices between the plates, flow under, and may be automatically discharged through a sluice or passage as at 7, and may pass to a second apparatus of the same kind so that they may be re-concentrated as often as desired, until all the waste and pulp have been washed from the concentrates. An important result arising from this method is the suction action caused by the dropping of the lower stratum through the cracks or crevices between the plates; the weight of this material tending to form a vacuum and continually suck the passing material through the crack or crevice, so that in addition to gravitation, the operation is aided by this suction, and very light concentrates which would not fall by their own gravity, will be shaved off and sucked down through these channels.

By making the flume of sufficient length, as for instance 36 feet, I may have as many as 18 of these plates set end to end with an opening between the contiguous ends of each two plates, and I am thus enabled to repeat the shaving or separating operation at least seventeen times during the passage of the material over the thirty-six feet.

Other lengths and numbers of plates may be employed as found best, and I can thus settle or filter the water, and get any and all values which there may be in the slimes, as the slimes, no matter how light or fine, will be sucked down and go with the water.

The riffles upon the surface of the plates may be partially filled with quicksilver. Thus, the first four or more riffles of the first set of six plates, may be half filled with quicksilver, and I am thus able to make a very perfect amalgamation of anything running over these riffles, as from their peculiar shape and position, the action of the flowing material will cause the quicksilver to continuously turn, and will keep it perfectly bright, so that I am enabled to dispense with silver or copper plates, such as are now in use.

By inclining the lower end of the riffles to a slightly greater angle, and continuing the riffles gradually decreasing in depth, the movement of the water and heavier concentrates nearest the plate will be further re-

tarded so as to insure their dropping through the channels, while the upper and lighter portions will pass across the open spaces as previously described.

The device also acts as a classifier of the concentrates.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In an apparatus of the character described, the combination with an inclined sluice, of a false bottom therefor formed of plates having knife edges at the upper and lower ends said ends having faces inclined at opposite directions, and said plates diminishing gradually in depth from the upper to the lower end, and having riffles intermediate of said ends.

2. In an apparatus of the character described, the combination with a sluice, of a false bottom therein composed of plates having knife edges fixed at divergent angles at the upper and lower ends, said plates diminishing gradually in depth from the upper to the lower ends and having similarly diminishing transverse riffles forming upon their surfaces, the lower end of one plate being slightly elevated above the upper end of the contiguous plate to form a narrow transverse channel between said plates.

3. In an apparatus of the character described, a sluice, a supplemental floor formed of plates having steel knife edges fixed at divergent angles at the upper and lower ends, said plates diminishing gradually in depth from the upper to the lower end, and having similarly diminishing transverse riffles formed upon their surfaces.

4. In an apparatus of the character described, a sluice, plates disposed therein to form a supplementary floor, said plates having upwardly divergent ends with sharpened knife edges, the upper ends of each plate having a sharper decline than the remainder, riffles disposed transversely on the surfaces of each plate, said riffles having a forward inclination, and decreasing from the upper to the lower end.

5. In an apparatus of the character described, a sluice, plates fixed in said sluice above the bottom, said plates having upwardly divergent knife edges at their upper and lower ends, and riffles gradually decreasing in depth, the upper ends of said plates having a steep declination from the receiving edges, said plates being disposed so that the lower edge of each plate is slightly above the upper edge of the succeeding plate and separated therefrom, whereby the lower surface of the flowing material is shaved off and deposited in the bottom of the sluice, and means connecting with the bottom of the sluice whereby said separated material is withdrawn therefrom.

6. In an apparatus of the character de-

scribed, the combination with a sluice, of a
false bottom therefor formed of separated
plates which diminish gradually in depth
from the upper to the lower end, said plates
5 having knife edges fixed at divergent angles
at the upper and lower ends adapted to
shave and separate the lower stratum of ma-
terial and produce a downward draft and
suction upon the passing material, the up-
10 per surface of the plates being provided

with riffles which diminish in height from
the upper to the lower end of the plate.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit-
nesses.

WILLIAM M. STOVER.

Witnesses:

GEO. H. STRONG,
CHARLES EDELMAN.