No. 778,847. PATENTED JAN. 3, 1905.

F. M. DILLON & W. G. WILSON.

CONCENTRATOR.

APPLICATION FILED DEC. 21, 1903.

2 SHEETS—SHEET 1.

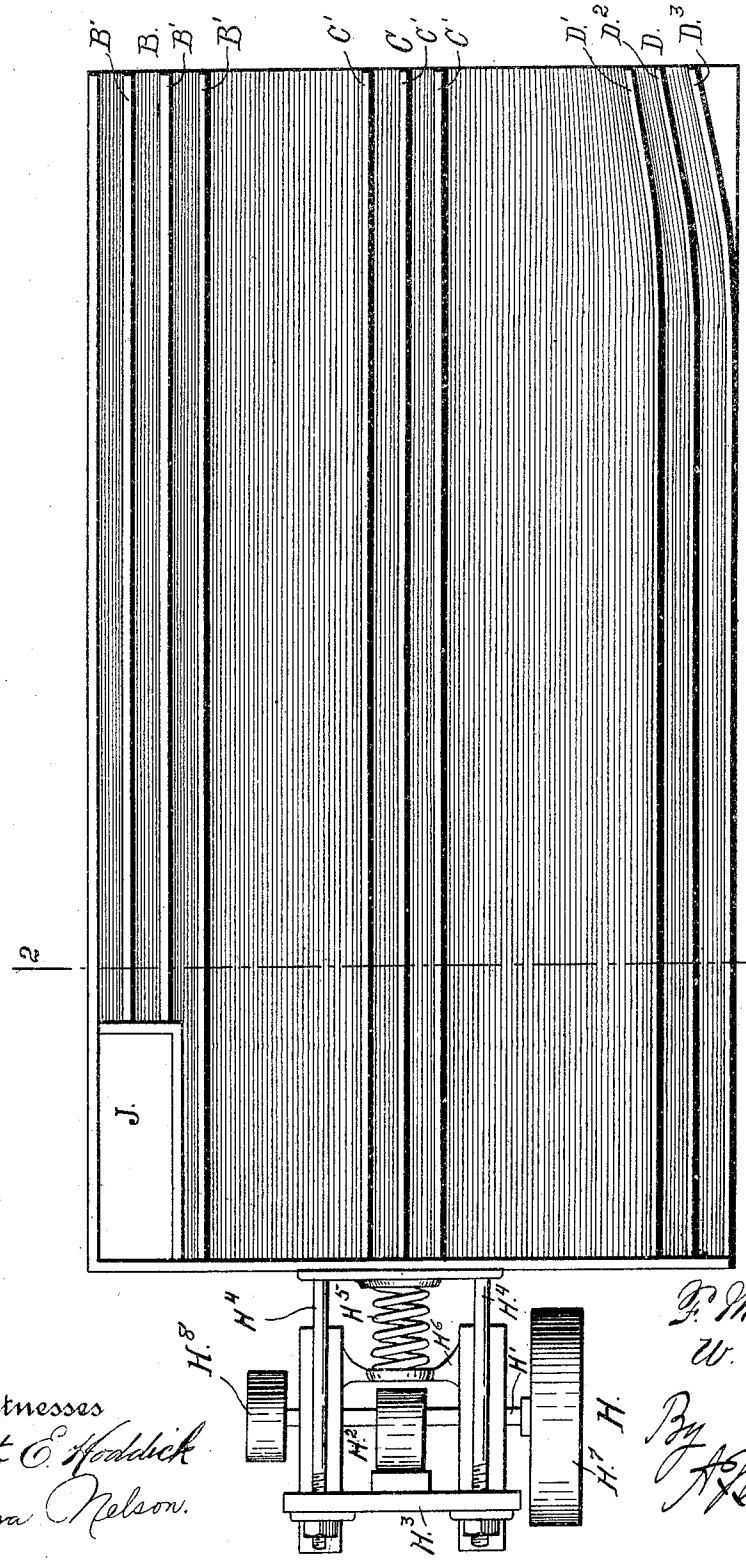

Fig. 1.

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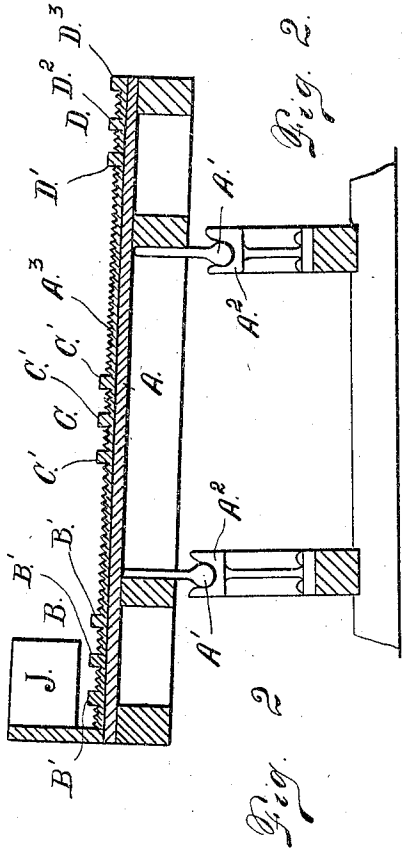

Fig. 2.

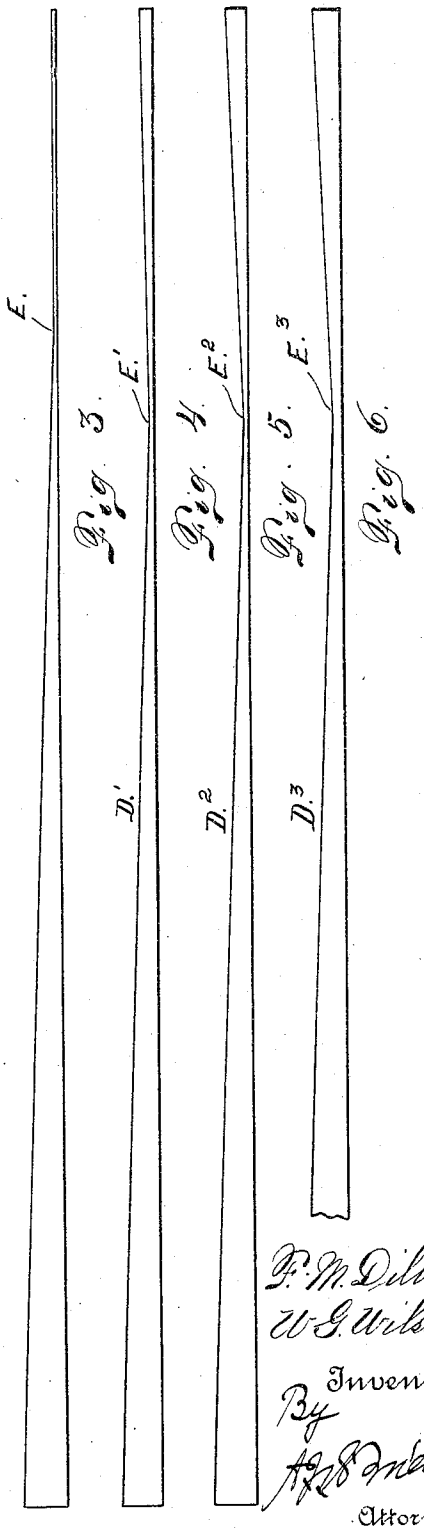

Fig. 3. Fig. 4. Fig. 5. Fig. 6.

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No. 778,847. Patented January 3, 1905.

UNITED STATES PATENT OFFICE.

FREDERICK M. DILLON AND WYLIE G. WILSON, OF DENVER, COLORADO.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 778,847, dated January 3, 1905.

Application filed December 21, 1903. Serial No. 186,107.

To all whom it may concern:

Be it known that we, FREDERICK M. DILLON, a citizen of the United States of America, and WYLIE G. WILSON, a subject of the King of Great Britain, both residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Concentrators; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Our invention relates to improvements in concentrators or machines more especially intended for the treatment of pulverized ores for the purpose of saving their metallic values. The valuable product obtained through the instrumentality of machines of this class is known as "concentrates."

Our present invention belongs to that class of machines in which the table is laterally inclined, its lower longitudinal edge being the gangue-discharge edge or the edge over which the gangue or worthless portion of the material passes after having traveled across the table transversely, while the concentrates are discharged from the tail end of the table or the extremity remote from the feed end or what is termed the "head" of the table. The material to be treated is discharged into a feed-box at the upper left-hand corner of the table referring to Figure 1 of the drawings. Wash-water may be delivered at the upper edge of the table, as may be required; but as there is nothing new about this feature no means is shown in the drawings for supplying wash-water.

Furthermore, our improvement belongs to the class of concentrating-tables which are mounted to reciprocate or vibrate longitudinally or in the direction of the travel of the concentrates, the movement being imparted by suitable mechanism connected at one extremity of the table, being the head thereof, as shown in Fig. 1 of the accompanying drawings.

Having briefly outlined the general construction as well as the function of the class of machines to which our invention belongs, we will proceed to describe the same in detail and subsequently point out in the claims what we believe to be novel.

In the accompanying drawings, Fig. 1 is a top or plan view of our improved concentrator. Fig. 2 is a transverse section taken through the machine on the line 2 2, Fig. 1, looking in the direction of the arrow. Figs. 3, 4, 5, and 6 illustrate the different constructions of riffle employed in connection with our improved machine.

The same reference characters indicate the same parts in all the views.

Let A designate the body of the concentrating-table, which is provided with depending parts A′, which slidably engage supports A^2, permitting the table to reciprocate longitudinally or in the direction of its length. As shown in the drawings, the body A is covered on its upper surface by a layer A^3, of corrugated material, the corrugations extending lengthwise thereof. This part A^3 may be composed of rubber or any other suitable material. When composed of rubber, it is preferred to form the several groups of riffles employed integral with the said part A^3, whereby the table top or covering A^3 will consist of an integral device.

The top of our improved table is equipped with a number of groups of riffles longitudinally arranged, the individual riffles of the various groups being parallel with each other. The space between these groups of riffles is greater than the space between the individual riffles. These groups of riffles will be designated as B, C, and D. As shown in the drawings, the group B consists of three riffles, which are individually designated by the reference character B′. The individual riffles of the group C are respectively designated C′, while the riffles of the group D are designated D′, D^2, and D^3, respectively. All of these riffles project above the corrugated surface of the table's top. The groups of riffles B and C are exactly alike, one of these riffles being shown in Fig. 3 of the drawings. These rif-

fles B′ and C′ are highest at the head of the table or at their left-hand extremity, referring to Fig. 3 of the drawings, from which extremity they taper downwardly to a point E, which is a short distance from their rear extremities or from the tail end of the table when the riffles are in place. From this point E to the rear extremity of each of these riffles the riffle is of uniform height, but comparatively low, projecting only slightly above the corrugated face of the table. The group B of riffles is located on the upper part of the table, the term "upper" having relation to the table when transversely inclined. The group C of riffles is located in the central portion of the table, while the group D of riffles is located in the vicinity of its gangue-discharge edge or the lower edge of the table when transversely inclined. All of these riffles extend the entire length of the table.

Each riffle of the group D of riffles is highest at the head end of the table and tapers downwardly or decreases in height to points E′, E^2, and E^3, or about two-thirds the length of the riffles measured from the head of the table toward the foot or tail thereof, while from these points the said riffles increase in height toward their rear extremities. The point E′ of the riffle D′ is nearest the head of the table as compared with the corresponding points of the riffles D^2 and D^3. The point E^2 of the riffle D^2 is a very short distance farther from the head of the table than the point E′ of the riffle D′, while the point E^3 of the riffle D^3 is slightly farther from the head of the table than the point E^2 of the riffle D^2. The portions of the riffles D′, D^2, and D^3 at the right of the points E′, E^2, and E^3 vary somewhat in height, the said portion of the riffle D′ being lowest, the corresponding portion of the riffle D^2 somewhat lower, and the corresponding portion of the riffle D^3 lowest. The riffle D^3 is located at the gangue-discharge edge of the table. The riffle D^3 is next above, and the riffle D′ is the farthest of the group D from the gangue-discharge edge of the table. The rear extremities of the riffles of the group D are upwardly curved at the tail of the table in order to facilitate the saving of the concentrates.

When the apparatus is in use, the reciprocating movement or vibratory action of the table is imparted by suitable mechanism H, connected with the head of the table and composed of a shaft H′, a cam H^2, an abutment H^3, connected with the table by rods H^4, and a spring H^5, interposed between the table and a stationary part H^6. A fly-wheel H^7 is connected at one end of the cam-shaft and a pulley H^8 at the opposite extremity. The operating mechanism is not described in extreme detail, since nothing is claimed thereon specifically in this application. The material to be treated is discharged into the feed-box J, located at the upper head end of the table, and passes therefrom to the corrugated surface of the table provided with the groups of riffles, as heretofore explained. As the table is actuated or given the reciprocating or vibratory movement the material thus fed to the table in the form of pulp travels transversely downwardly and simultaneously rearwardly toward the tail of the table, with the result that the gangue or valueless portion of the ore, which is lighter than the concentrates or metallic values, is carried transversely downwardly and discharged over the lower edge of the table, while the concentrates are caused to travel rearwardly and discharged at the tail end of the table. The peculiar construction and arrangement of the riffle groups, as heretofore explained, result in a high percentage of saving of the values contained in the ores, as has been demonstrated in actual practice.

By arranging the riffles in groups and leaving a greater space between the groups than between the individual riffles of a group we obtain areas over which the wash-water flows with less disturbance than in those places where the surface is obstructed by riffles. These comparatively undisturbed spaces intermediate the riffle groups give the finer mineral particles an opportunity to stratify on the corrugated concentrating-face of the table, whereby these fine mineral particles take their place underneath the gangue, which position protects them from being carried off by the wash-water. Riffles are placed on the table in order to check the travel of the heavy gangue, which travel when unobstructed would carry a large portion of the values with it over the gangue-discharge side of the table. The group of riffles at the gangue-discharge side of the table is made comparatively high for the whole length of the table in order to stop such portion of the mineral as has come that distance with the wash-water from being carried off with the gangue. This group of riffles is made higher at the discharge end of the table and inclined or bent upwardly toward the feed edge of the table on which the wash-water is poured for the following reasons: The light gangue is carried off by the wash-water near the feed end of the table. The heavy gangue and some of the lighter mineral values travel in a diagonal direction along the table and strike the last or lowest group of riffles at about the point at which we begin to make this group higher and incline or bend them transversely upwardly toward the feed or wash-water edge of the table. If this group of riffles were straight and tapered like the other groups, the fine mineral would be carried into the gangue discharge by the heavy gangue, or the heavy gangue, with the fine mineral, would be carried over the end or tail of the table with the

concentrates or values and into the trough therefor, both of which results are undesirable. By making the riffles higher at this point this heavy gangue is prevented from traveling over the side of the table at the tail end thereof and carrying the fine mineral with it, and this heavy gangue is washed back from the tail end of the table by the action of the original wash-water engaging the high inwardly or upwardly inclined part of the riffles in this group. Wash-water is used in connection with all tables of this class. This wash-water stops the travel of the heavy gangue toward the tail of the table, of which gangue there is at this point a considerable thickness, so that the wash-water has comparatively little effect on the fine mineral below the gangue. The result is that the gangue is checked in its travel toward the end of the table and is made to travel first back and then over the gangue-discharge edge of the table at some distance forward of the tail thereof, while the fine mineral values continue their travel along the riffle whose upward inclination carries the fine mineral away from the gangue-discharge side of the table and deposits it safely in the values-trough at the end of the table.

The object of the peculiar arrangement of the group of riffles at the gangue-discharge edge of the table, particularly the arrangement and construction at the tail end of the gangue-discharge edge, as heretofore intimated, is to separate the heavy gangue from the fine mineral values, which in all concentrating-tables collect at this point. This is where the greatest loss takes place in concentrators. The construction and arrangement of riffles herein shown greatly lessens this loss, as has been demonstrated by actual practice.

Having thus described our invention, what we claim is—

1. A concentrating-table provided with riffles running the whole length of the table, the table having a motion to cause the concentrates to travel in the direction of the riffles and being open to permit the discharge of the concentrates at the rear extremities of the riffles, the said riffles being arranged in groups, the spaces between the groups of riffles being greater than the space between the riffles in any group.

2. A concentrating-table having a corrugated surface provided with groups of riffles running the whole length of the table, the spaces between the groups of riffles being considerably greater than the space between the riffles in any group.

3. A concentrating-table provided with a corrugated surface with groups of riffles running the whole length of the table, one of the said groups being located at the gangue-discharge side or edge of the table, the said last-named group being high at the feed end of the table, tapering downwardly for about two-thirds of their length, and then gradually rising again at the concentrates-discharge end or tail of the table.

4. A concentrating-table having a corrugated surface provided with groups of riffles running the whole length of the table, one of the riffle groups being located adjacent the gangue-discharge edge or surface of the table, the individual riffles of the last-named group, being relatively high at the feed end of the table, from which point they taper downwardly for about two-thirds of their length, and then gradually rise until the concentrates-discharge end or tail of the table is reached, the riffles of the other groups being high at the feed end of the table, tapering for the greater part of their length toward the concentrates-discharge end of the table, from which point they are parallel to the concentrates-discharge end of the table.

5. A transversely-inclined concentrating-table having a corrugated surface provided with three groups of riffles extending the whole length of the table, one group being located adjacent the upper edge of the table, another group adjacent the lower edge of the table, and a third group intermediately located, the space between the three groups being considerably greater than the space between the individual riffles of any group.

6. A transversely-inclined, longitudinally-reciprocating concentrating-table provided with a corrugated surface and having three groups of riffles longitudinally disposed thereon, one group of riffles being located adjacent the upper edge of the table, another group adjacent the lower edge of the table, and a third group intermediately located, the individual riffles of the upper group and the middle group, being highest at the head of the table and tapering downwardly the greater portion of their length where the taper ceases and from which point they continue parallel to the tail or rear extremity of the table; while the individual riffles of the third group of riffles, are highest at the head of the table and taper downwardly to a point about two-thirds of their length from the head of the table, from which point each riffle gradually increases in height to the tail or rear extremity of the table and are slightly curved or bent upwardly, the riffle of this group nearest the gangue-discharge edge of the table being highest at its tail extremity and the corresponding portion of the other riffles of this group decreasing in height as they recede from the gangue-discharge edge of the table.

7. A transversely-inclined, longitudinally-reciprocating concentrating-table provided with longitudinally-disposed riffles extending

the entire length thereof, a number of the riffles adjacent the lower or gangue-discharge edge of the table being turned upwardly at the tail or concentrates-discharge end of the table the said upwardly-bent riffles, increasing in height from the point where the upward bend begins, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

FREDERICK M. DILLON.
WYLIE G. WILSON.

Witnesses:
DENA NELSON,
A. J. O'BRIEN.