

No. 666,002.

Patented Jan. 15, 1901.

W. G. DODD.
ORE CONCENTRATING TABLE.

(Application filed June 22, 1900.)

(No Model.)

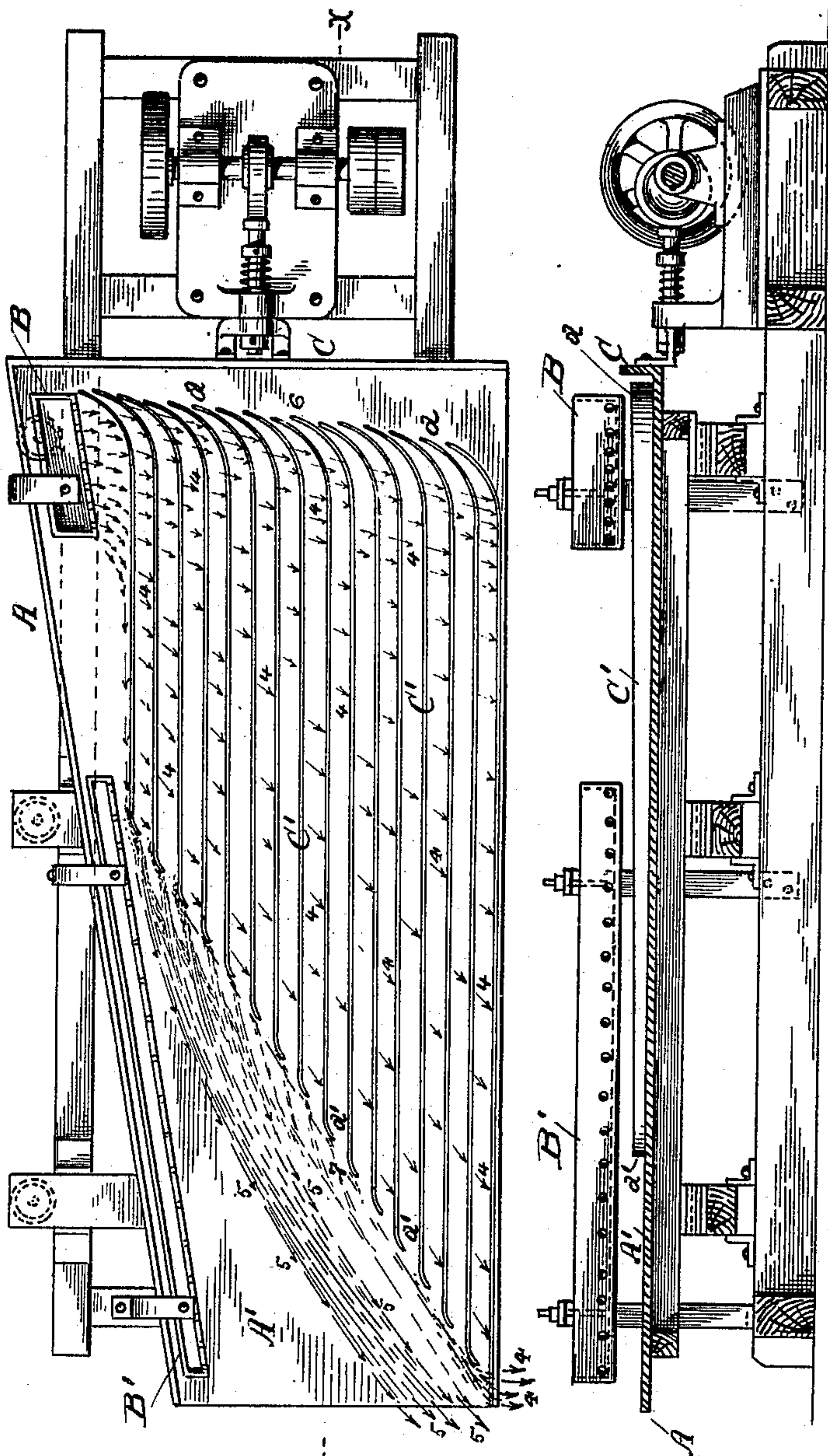


Fig. 1.

Fig. 2.

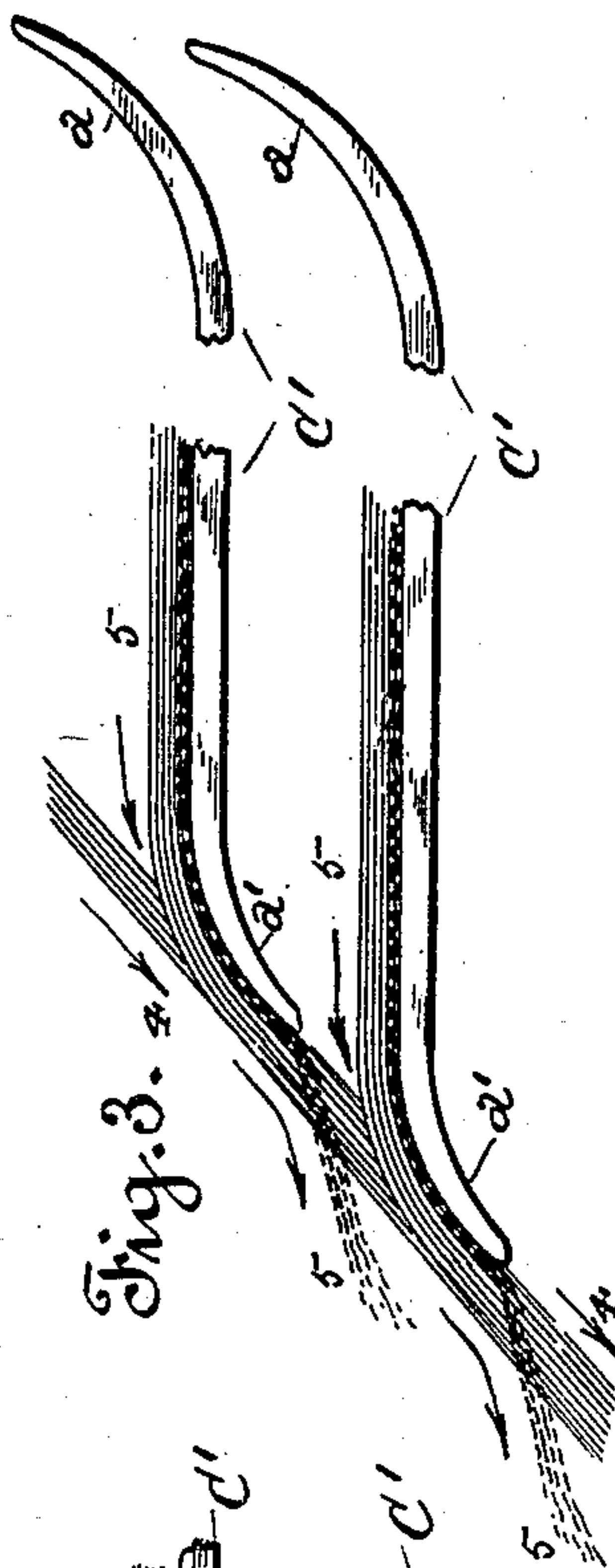


Fig. 3.

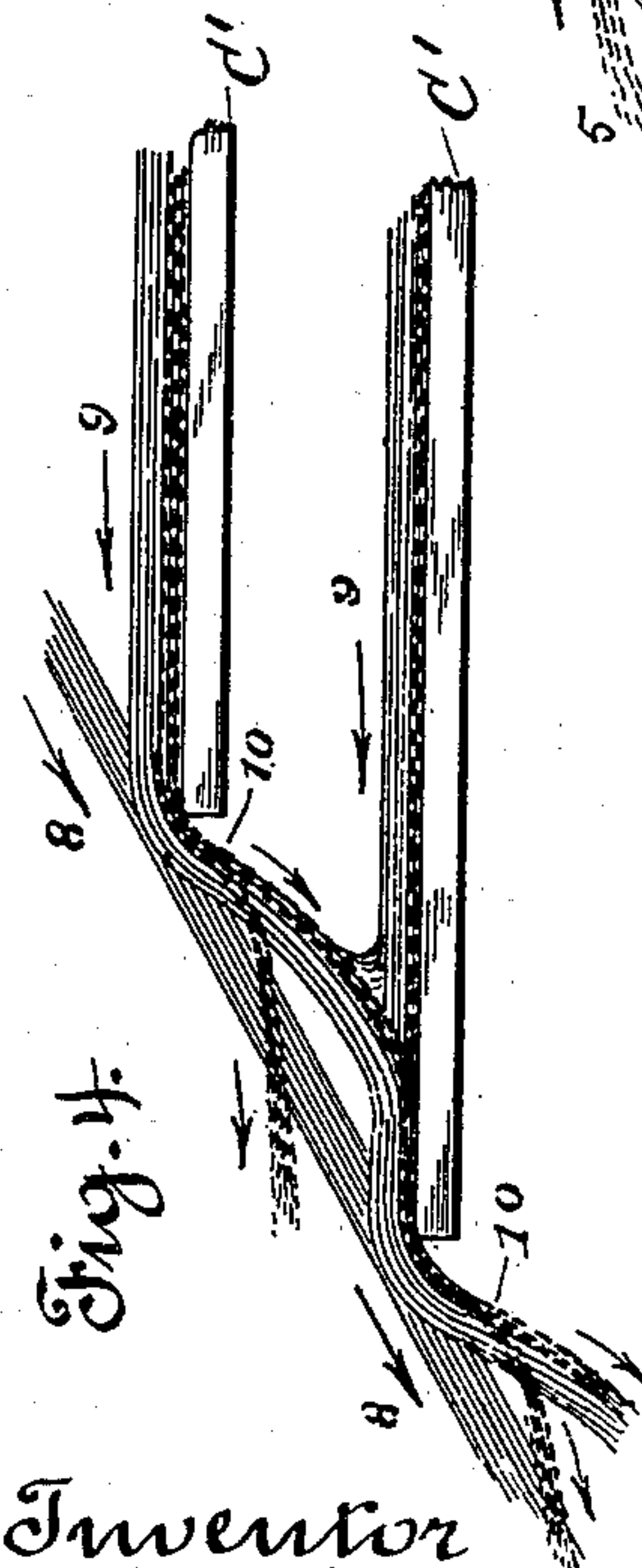


Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

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ORE-CONCENTRATING TABLE.

SPECIFICATION forming part of Letters Patent No. 666,002, dated January 15, 1901.

Application filed June 22, 1900. Serial No. 21,134. (No model.)

To all whom it may concern:

Be it known that I, WILLIS G. DODD, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Ore-Concentrating Tables; and I do hereby declare the following to be a full, clear, and exact description of the same.

The invention relates more especially to that class or type of concentrating-tables known as "transversely-inclined" concentrating-tables, and it resides more particularly in the arrangement of the riffles upon the working face of the said table. In this particular class of concentrating-tables—that is, the transversely-inclined ones—the separation of the valuable particles from the gangue takes place during the downward travel of the material over the working face of the table. The separation is due to the longitudinal action or reciprocating motion of the table and the downward flow of a body of water over the face thereof. The downward or transverse travel of the material to be or being treated is retarded by means of a series of riffles arranged longitudinally of the table, which riffles catch and confine the heavier or valuable particles separated from the gangue and divert the travel thereof from a path crosswise of the table to one longitudinal thereof. It is mainly due to the diverting of the crosswise travel of the material into a travel approximately longitudinally of the table that the separation of the valuable particles from the gangue is successfully accomplished. However, the recovery of the valuable particles is only partial where the table is provided upon its working face with a series of longitudinal riffles of equal or unequal length, for while the larger or heavier particles will be separated from the gangue and saved a considerable quantity of the lighter valuable particles or "float-gold" will be carried off with the flow of the gangue. It is the recovery of this grade of material which the present invention is designed to accomplish, while at the same time securing a better and more efficient separation of the valuable particles carried by the gangue upon the table.

The object of the present invention is to so construct the concentrating-surface of the table that the material fed thereon or deliv-

ered thereto may be "deflected," so to speak, from a transverse travel or path to a longitudinal travel or path with the least possible disturbance, thus allowing of the heavier particles separated from the gangue being conveyed longitudinally of the table with the least agitation and friction and in a compact form and upon such lines as the material would traverse the surface of the table of its own accord, resulting in an increased capacity of the machine, the making of a cleaner concentrate, and enhancing the value of the product obtained from the working of the table.

In order to comprehend the invention, reference should be had to the accompanying sheets of drawings, forming a portion of the present application, wherein—

Figure 1 is a plan view of the improved concentrating-table. Fig. 2 is a longitudinal section view of the table in side elevation. Fig. 3 is a detail enlarged plan view of a portion of the table, illustrating the discharge ends of the riffles and the paths taken by the gangue and valuable particles as they leave the riffles; and Fig. 4 is a similar view illustrating the paths of the gangue and valuable particles as discharged from the ends of the ordinary straight or longitudinal riffles.

In the drawings the letter A is used to indicate a transversely-inclined concentrating-table, and A' the unriffled or plain discharge end thereof. At the head-end corner of the table is arranged the feed-box B, from which the ore or pulp to be worked is delivered onto the table. It will be understood that the table is a longitudinally-reciprocating one, being driven by any suitable form of mechanism designed for this purpose, preferably that form of drive mechanism fully set forth and described in Letters Patent No. 650,673, granted me on the 29th day of May, 1900, for an improved ore-concentrator.

At the upper edge of the table, near its discharge end and above the plain or unriffled portion A', is arranged the perforated water-distributor B', by means of which clear water is delivered onto the plain or unriffled portion of the table in order to lubricate the same and wash from the valuable material such gangue as may adhere thereto as discharged from the riffles onto this portion of the table.

Intermediate the head end C of the table and the plain or unriffled portion A' thereof is arranged a series of parallel riffles C'. Each riffle is formed with an upwardly curved or inclined portion α near the head end of the table and a downwardly curved or inclined portion α' near the plain or unriffled portion of the table. The portion of the riffles intermediate the upwardly and downwardly curved or inclined ends α α' are approximately straight and longitudinal with the table or its working face. These riffles gradually decrease in height from their upwardly inclined or curved ends α toward their downwardly inclined or curved ends α' .

In Figs. 1 and 3 of the drawings the arrows 4 are used to indicate the travel or path of the gangue, its direction being transverse of the working face of the table, while arrows 5 indicate the travel or path of the heavier or valuable particles, which is longitudinally of the face of the table and at approximately a right angle to the travel of the gangue. The surface of the table between numerals 6 and 7 may be said to constitute the zone of the gangue.

The pulp or finely-crushed ore containing the mineral to be saved is delivered upon the table from the feed-box B, located at the head-end corner of the table, Fig. 1. The course or direction of travel of the material at this point is transverse of the table. As soon as the heavier particles come in contact with the upwardly curved or inclined portion or head end of the riffles this transverse travel of the valuable particles is gradually and gently changed into a longitudinal travel, due to the natural curve or inclination of the riffles at this point and the reciprocating motion given the table. The mineral or heavier particles are then moved longitudinally along the riffles toward the foot or unriffled portion of the table. During this travel of the mineral or valuable particles the gangue is gradually eliminated and washed over the riffles transverse of the table. When the mineral or valuable particles reach the end of the riffles, the velocity at which it has been moving is accelerated, due to the downward curvature or inclination of the riffles at this point, and it is guided into its natural trajectory, approximating a parabolic curve, at a velocity approximately coincident with the velocity of the gangue at the outward boundary 7 of the zone of flow, causing little or no disturbance of the particles of mineral collected. The gangue being much lighter than the mineral has an inclined trajectory. The final separation of the mineral from the gangue takes place as the mineral is discharged from the riffles onto the plain or unriffled portion of the table. Now as the trajectory of the gangue and the trajectory of the mineral intersect each other at the point of the mineral's discharge, Fig. 3 of the drawings, and the mineral crosses or passes through and out of the zone covered by the gangue

and enters upon the smooth or unriffled portion of the table it continues in its course or natural trajectory until it passes over the tail or foot of the machine into a receptacle located at such point for its reception. While making this passage over the unriffled portion of the table it is subjected to the action of a very slight spray of clear water delivered from the water-distributor B'. This spray is for the purpose of lubricating the smooth surface of the table and for washing out any small particles of gangue that may have become entangled with the mineral during its passage through the outward boundary of the gangue zone. The gangue passes downward over the riffles and across the table, being discharged over its lower edge and allowed to run to waste.

The improved riffles have two distinct features and perform two distinct functions in the operation of separating the mineral from the gangue. By reference to Fig. 1 of the drawings it will be seen that the upper or receiving end of the riffle has a gradual upward curve or inclination, while the lower or discharge end has a reverse or downward curve or inclination. The mineral when first delivered upon the table has a transverse direction, with a high velocity, which direction of the mineral's travel must be changed to a longitudinal direction with the least possible disturbance. This is accomplished by the inclination or curvature given to the riffles at this point. After the mineral or valuable particles have been collected within the riffles it is necessary that the mineral be carried forward longitudinally with as little agitation as possible and in a compact form, so as to enable it to cross and pass through the outward boundary of the gangue zone. The downward curvature or inclination of the discharge end of the riffles is such as to discharge the mineral on its natural trajectory in a compact form with a velocity sufficient to enable the compact body of mineral to cross and pass through the gangue without undue agitation or disturbance and without being carried downward by the flow of the gangue. The construction of the described riffles serves, first, to divert the transverse travel of the mineral into a travel longitudinally of the table, and, secondly, to enable the mineral to be discharged upon the plain or unriffled portion of the table on its natural trajectory. By thus imparting a natural discharge to the collected or separated mineral undue agitation or disturbance of the solid mass is obviated and a more perfect concentration obtained. Again, by confining the material between the riffles intermediate the inclined or curved ends thereof the material is subjected to the concentrating action of the table for a greater period than if the riffles were formed upon a common curvature throughout their length and the mineral thus permitted to settle or collect in a body. As the transfer of the transverse travel of the

material into a longitudinal travel of the table is a gradual one at the head end of the riffles, undue agitation or disturbance at this end of the riffles is overcome and to a certain extent the material is assisted in its longitudinal travel. The prevention of excessive agitation at this point prevents the finer or lighter particles of the valuable material being carried off with the gangue.

In Fig. 4 of the drawings I have illustrated the disturbance and agitation which take place at the discharge end of the riffles when the table is provided with the ordinary straight riffles. In this view the arrow 8 indicates the flow of the gangue and 9 the flow of the mineral, which meet or intersect at the point 10. It will be noticed that in such case the "mineral," so to speak, is dropped from one riffle onto the next lowest riffle and the material broken and the finer particles liberated from the solid mass. Being thus liberated, the finer particles will be carried off with the gangue and lost unless the waste material be treated as middlings and be returned to the tables by means of an elevator or otherwise to again undergo the process of separation.

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

1. A reciprocating ore-concentrating table having a plain or unriffled tail or foot portion, an obstructing-riffle arranged upon the working face of said table intermediate its head end and its plain or unriffled foot or tail portion, said riffle having an upward inclination at its head end and a downward inclination at its discharge end, the portion of the riffle intermediate the upwardly and downwardly inclined ends being approximately longitudinal with the working face of the table.

2. A reciprocating ore-concentrating table having a plain or unriffled tail or foot portion, an obstructing-riffle arranged upon the working face of said table intermediate its head end and its plain or unriffled foot or tail portion, said riffle being upwardly inclined at its head end and downwardly inclined at its discharge end.

3. A reciprocating ore-concentrating table having a plain or unriffled tail or foot portion, a series of obstructing-riffles arranged upon the working face of said table intermediate its head end and its plain or unriffled foot portion, said riffles having an upward inclination at their head ends and a downward inclination at their foot or discharge ends, the portion of the riffles intermediate the upwardly and downwardly inclined ends being approximately longitudinal with the working face of the table.

4. A reciprocating ore-concentrating table having a plain or unriffled tail or foot portion, a series of obstructing-riffles arranged upon the working face of the table intermediate its head end and its plain or unriffled foot portion,

said riffles being upwardly inclined at their head ends and downwardly inclined at their discharge ends.

5. A reciprocating ore-concentrating table having a series of obstructing-riffles arranged upon its working face, said riffles having an upward inclination at their head ends and a downward inclination at their discharge ends, as and for the purpose set forth.

6. A reciprocating ore-concentrating table having a plain or unriffled foot or tail portion, an obstructing-riffle arranged upon the working face of said table intermediate its head end and its plain or unriffled foot or tail portion, the riffle being upwardly inclined at its head end and downwardly inclined at its discharge end and having that portion intermediate its upwardly and downwardly inclined ends approximately longitudinal with the working face of the table, said riffle gradually decreasing in height from its head end toward its foot or discharge end.

7. A reciprocating ore-concentrating table having a plain or unriffled tail or foot portion, a series of riffles arranged upon the working face of said table intermediate its head end and its plain or unriffled foot portion, said riffles being downwardly inclined at their discharge end, the portion of the riffles intermediate the head end of the table and its foot or tail end being approximately longitudinal with the working face of the table.

8. A concentrating-table having a plain or unriffled foot or tail portion and provided on its working face with an obstructing-riffle, the body portion of said riffle being approximately longitudinal with the face of the table and its head end upwardly inclined, whereby the material fed onto the table for separation has its path of travel diverted from a transverse direction into a travel longitudinal of the working face of the table.

9. A concentrating-table having a plain or unriffled foot or tail portion and provided on its working face with an obstructing-riffle, the body portion of said riffle being approximately longitudinal with the face of the table and its discharge end downwardly inclined.

10. A reciprocating ore-concentrating table having a plain or unriffled tail or foot portion, a series of obstructing-riffles arranged upon the working face of the table intermediate its head end and its foot portion, said riffles having an upward inclination at their head end and having their body portion approximately longitudinal with the working face of the table.

In testimony whereof I affix my signature, in the presence of witnesses, this 13th day of June, 1900.

WILLIS G. DODD.

In presence of—

N. A. ACKER,

D. B. RICHARDS.