(No Model.)

J. NORBOM.

CONCENTRATOR.

No. 528,442. Patented Oct. 30, 1894.

Fig. 3

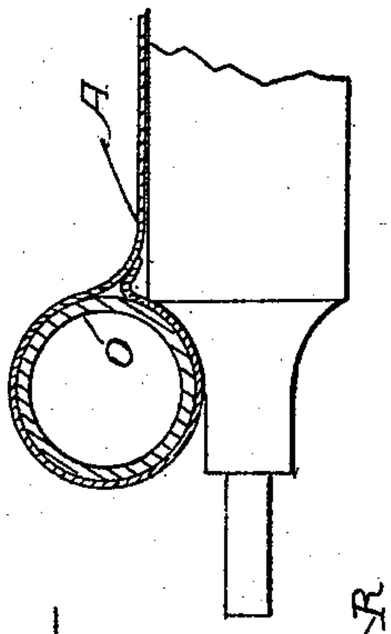


Fig. 1

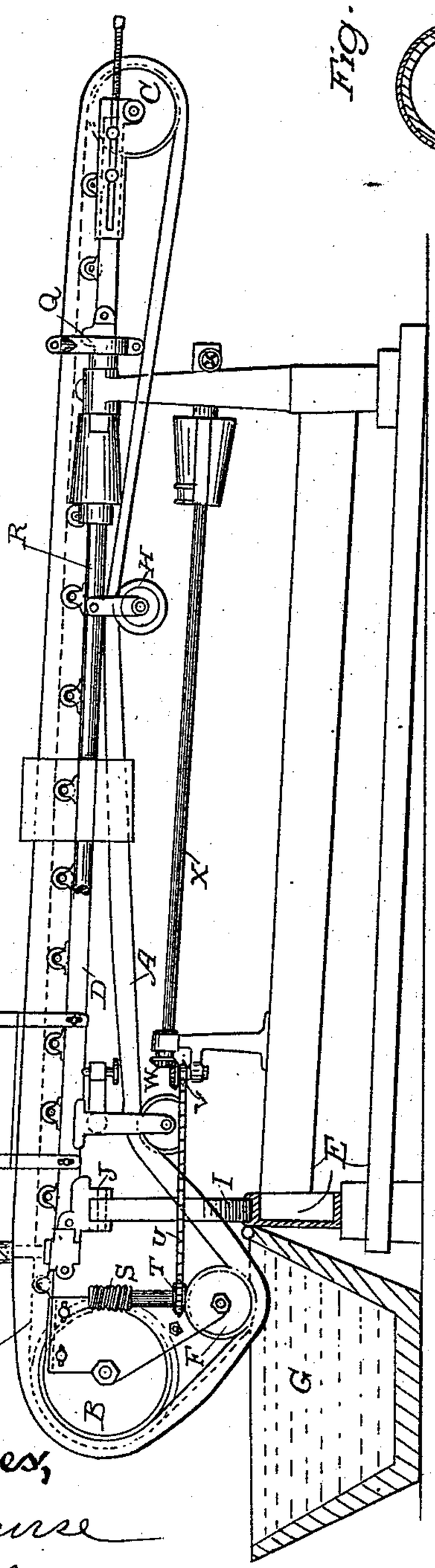
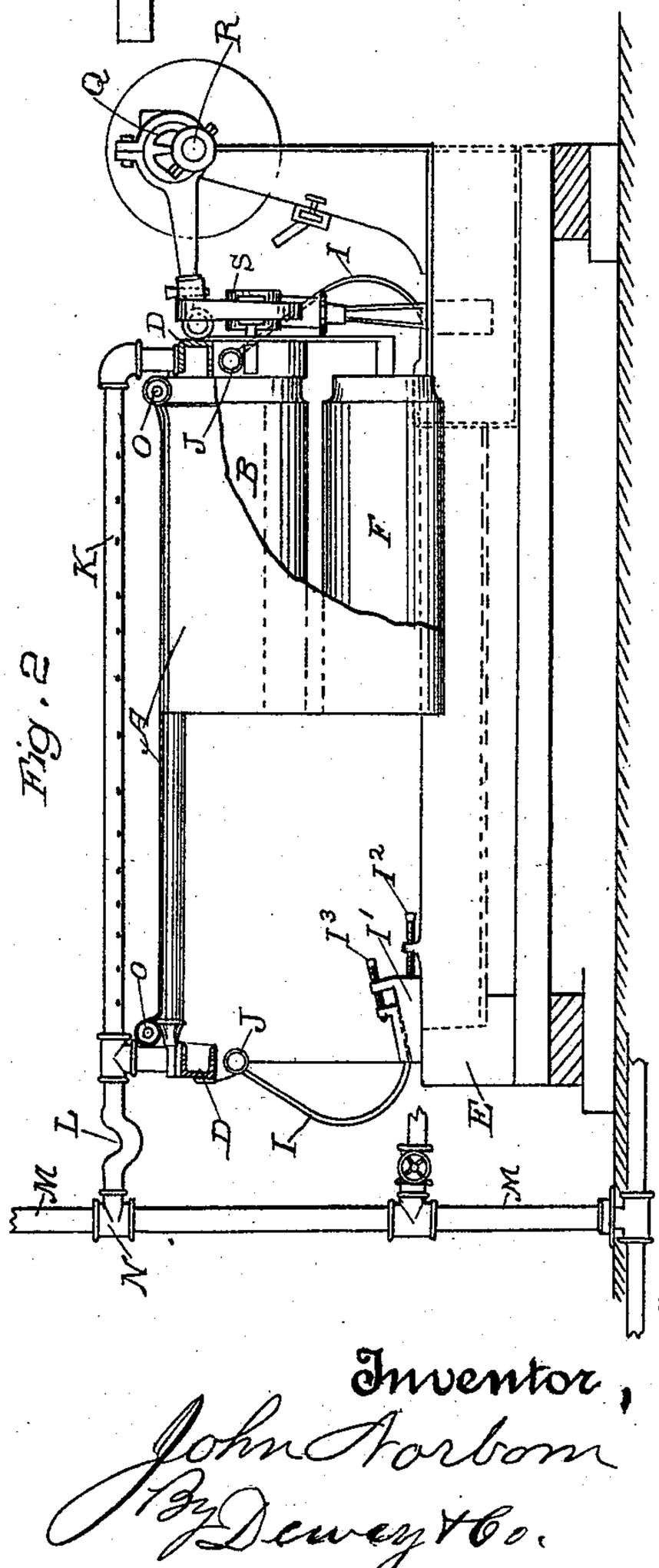


Fig. 2



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UNITED STATES PATENT OFFICE.

JOHN NORBOM, OF SAN FRANCISCO, CALIFORNIA.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 528,442, dated October 30, 1894.

Application filed June 28, 1894. Serial No. 515,982. (No model.)

To all whom it may concern:

Be it known that I, JOHN NORBOM, of the city and county of San Francisco, State of California, have invented an Improvement in Concentrators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in concentrators of that class in which an endless traveling and shaking belt is employed.

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

Figure 1 is a side elevation. Fig. 2 is an end elevation and partial section. Fig. 3 is an enlarged view and transverse section of the canvas belt and one of the side ribs.

A is a belt made of canvas or other material, which is adapted to retain small heavy particles of valuable material in the manner of this class of concentrators. This belt passes over drums B and C at opposite ends of a frame or table D which also has intermediate supporting rollers over which the upper portion of the belt passes.

The whole apparatus is supported from a base E as will be hereinafter described, and stands at a slight angle, the end of the belt passing over the drum B being the highest. After passing around this drum, the belt passes around another drum F which causes it to dip into a tank of water at G to wash off any gold, sulphurets, or other valuable material which adheres to the belt, and it is thence returned beneath the table over suitable direction drums H to the drum C. It is customary to give these belts a side shaking motion for the purpose of concentrating the heavier material upon the belt and allowing the lighter material to flow down toward the lower end, while the heavier material settling upon the belt and adhering to its surface, is carried upward and over the drum B as previously described.

Various devices are employed to support the table D and admit of the shaking motion desired. In my invention I have shown spring arms I, the lower ends of which are attached to the immovable frame E upon which the apparatus stands. From their point of attachment to the frame E, these arms curve either outwardly or inwardly, forming segments, the upper ends of which are connected, as shown at J, with the table D over which the belt passes. When a side motion is imparted to this table and belt, it will be seen that one of the points J will be depressed by reason of the curvature of the upper part of the elastic arm I, while the other point J, upon the opposite side, will be correspondingly elevated for the same reason. This produces a peculiar tilting motion as the belt frame reciprocates from side to side, one side of the belt being depressed and the other raised, and then the opposite action taking place when the tables moves in the opposite direction. In addition to this, the elasticity of the springs is such that a tremulous tossing motion of the belt and frame is also produced which is very effective in separating the light and heavy materials and concentrating the latter upon the belt. In order to adjust these elastic arms sidewise for tension, and also vertically to level the belt transversely, the lower ends are mounted upon transverse inclined or wedge-shaped blocks I′ which are moved and adjusted to regulate the tension of the springs by means of screws I^2. The raising or lowering is effected by moving the lower ends of the spring arms upon the inclined surfaces of the blocks I′ by means of screws I^3, or equivalent adjusting devices.

In order to secure the proper distribution of water upon the belt and an even flow at all times, I have shown the water distributing pipe K extending above the table D, and attached at opposite sides, this pipe having holes or perforations to allow the water to discharge evenly from it upon the surface of the belt. In order to connect this pipe, which shakes with the table, with the stationary source of supply, I employ an intermediate elastic hose L which forms a connection between the distributing pipe K and the stand pipe M. This latter pipe is stationary and receives its supply from any suitable main. It extends upward above the coupling N, through which water is supplied to the hose L and the distributer K, to such a height as may be desired, and the water is maintained

at a certain height in this stand pipe, so that a continuous even pressure is produced and the distribution of water over the surface of the table will always be constant, the flexible hose allowing the table to oscillate to any extent without in any way interfering with the stand pipe and supply.

Various methods have been employed for forming a ledge or rib upon each side of the belt to prevent the contents from running over the edges. When made of rubber, the belt and ribs are molded together in one piece. They must be made of considerable thickness, and such belts thus become very expensive. I make the belt and ribs or ledges independently and afterward secure them together.

In my device I employ for the ribs cylinders which may be of solid soft rubber, or in the form of rubber tube of sufficient stiffness to normally maintain its cylindrical form, but in either case, the tube or cylinder becomes flattened slightly as it passes around the drums at either end by reason of its being stretched in passing around the drum. I attach the edge of the belt to the rib O by curving the material of the belt upwardly at the edge, and passing it around the tubular or cylindrical rib and uniting it with itself again at the point where the edge forms a junction with it, or by other suitable means depending somewhat upon the material of the belt and that of the ribs or ledges. The cylindrical tube or rib is thus inclosed in the belt material, and the upper surface of the belt forms a continuous concave surface from the level of the table up the side of the rib, and as it is continuous at this point, with no joint of attachment, there is no danger of leakage by reason of the joint opening or giving way. This enables me to use a very thin, light, inexpensive rubber belt which is easily attached to the ledges and not costly to replace, or I may use canvas or other suitable material.

Various means are employed for imparting the shaking motion to the table. In the present case I have shown an eccentric Q mounted upon a horizontal shaft R parallel with the side of the table, and a connecting rod between the eccentric and the table. Power to drive the belt is communicated by means of a worm gear S, here shown as acting upon one end of the drum B at the head of the table. Power is communicated to the screw or worm of the worm gear by any suitable connection. In the present case I have shown it by means of a sprocket-wheel T and a chain U passing around this sprocket and a sprocket-wheel V upon another vertical shaft, having fixed to it a bevel-gear, which is driven by a similar bevel-gear W from a counter-shaft X receiving power from the main shaft R of the apparatus.

By thus constructing the device with the flexible connection U, it will be seen that the worm gear S may partake of the oscillating motion of the table, while the point V from which power is received, remains stationary, being the center about which the oscillation takes place.

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

1. In an endless traveling belt concentrator a frame-work having drums at opposite ends over which the belt passes, supports for said frame-work, consisting of the elastic arms curved in opposite directions having their lower ends secured to a stationary part and their upper ends connected with the sides of the belt supporting table as described.

2. In an endless traveling belt concentrator, a frame-work having drums at opposite ends over which the belt is guided, and movable elastic oppositely curved supporting arms, fixed at the lower ends and having the upper ends connected with the frame-work, and a mechanism whereby the frame-work and belt are oscillated transversely with relation to the supporting arms.

3. In an endless belt concentrator, the elastic oppositely curved arms fixed at the lower ends having the upper ends connected with and serving to support the frame or table which carries an endless traveling belt, and means for oscillating the belt and table transversely to the line of travel whereby said arms cause the opposite edges of the belt to be alternately depressed and elevated with relation to each other.

4. In an endless traveling belt concentrator, with drums at opposite ends of the table over which the belt passes, and mechanism by which an oscillating side shaking motion is imparted to the belt, oppositely curved elastic supporting arms having the upper ends connected with opposite sides of the table, and devices whereby the arms are adjusted horizontally and vertically.

5. The combination of an endless traveling belt having oppositely curved elastic arms whose ends are secured to the belt frame and a fixed part respectively whereby a transverse oscillating motion is imparted to said belt, a device for supplying water to the distributing pipe which is supported upon the belt frame and partakes of its oscillating motion, consisting of a stand pipe extending above the level of the distributer whereby a constant pressure is produced, and a flexible connecting pipe uniting the stand pipe with the distributer.

6. An endless traveling belt concentrator having elastic oppositely curved supporting arms, the ends of which are secured to the belt frame and stationary main frame respectively, a mechanism whereby a transverse oscillation of the belt and its frame is produced,

a means for transmitting power to give motion to the belt around its supporting drums, consisting of a worm gear movable with the belt and table, a rotary shaft turning in stationary journals at a distance from the worm gear shaft, and a chain belt passing around sprockets attached respectively to the stationary driving shaft and the shaft of the worm gear, and extending at right angles with the line of transverse oscillation of the belt.

In witness whereof I have hereunto set my hand.

JOHN NORBOM.

Witnesses:
S. H. NOURSE,
H. F. ASCHECK.