J. VAN N. DORR.

METHOD OF THE DISPOSAL OF TAILINGS.

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1,103,351. Patented July 14, 1914.

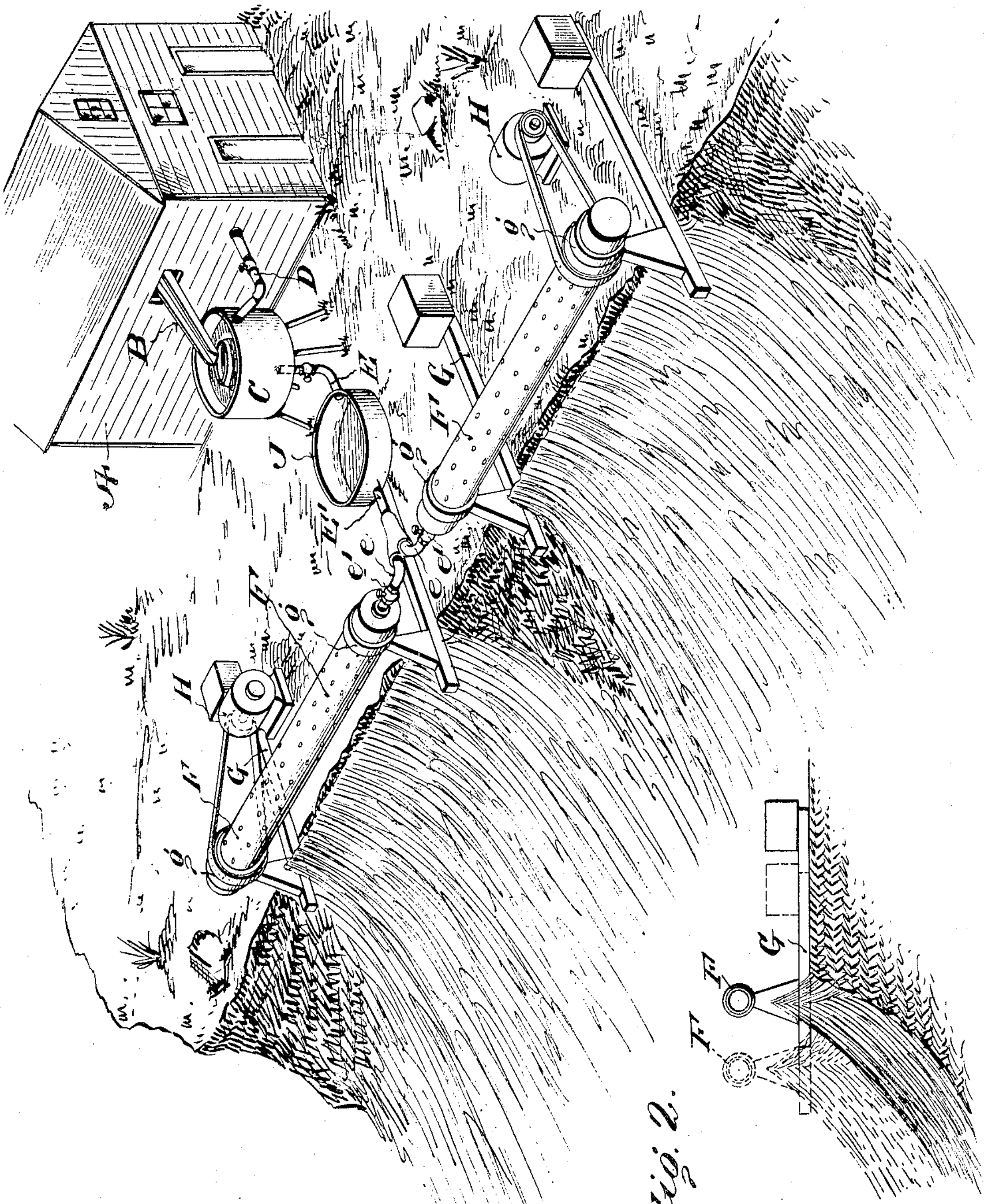


Fig. 2.

Fig. 1.

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METHOD OF THE DISPOSAL OF TAILINGS.

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To all whom it may concern:

Be it known that I, JOHN VAN NOSTRAND DORR, a citizen of the United States, residing in Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Methods of the Disposal of Tailings, of which the following is a specification.

Ordinarily the tailings or residues from ore reduction works in mining operations, consisting of pulverized rock and the like from which the values have been extracted, are discharged from the mill in a solid condition by trams or belt conveyers, or are carried out suspended in a stream of water. When dry or solid they are usually trammed from the plant and dumped, thus making a dump with a flat surface, or are carried up an incline by belt conveyers and deposited on a dump of increasing height.

When water is employed to convey the tailings from the mill, they are usually led to a river or running stream, when such is available and not prohibited; but where a running stream cannot for any reason be used and it is necessary to confine the dump on certain ground, it has been the practice to construct dams in various ways at the foot of slopes on the available ground and to sluice the tailings down the slopes into the dams, where they settle and the surplus water is drawn off. This method of procedure requires the employment of considerable labor. There is great waste of water, by evaporation and otherwise, which might advantageously be used in the mill and there is danger of damage by the breaking of the dams.

My invention relates to the disposal of tailings, conveyed in suspension in water from the mill, and it consists in first extracting as much water as possible, to be returned to the mill for reuse if desired, and then distributing the thickened tailings in such manner as to form a dump, with its upper surface being extended out over the slope essentially horizontally, and the descending pulp building up the sloping surface similar to a dry dump. In this way the water will separate from the solid material, soaking into the dump or evaporating, and a pile or dump may be formed without an excessive flow of water, requiring the construction of dams.

The apparatus which I preferably employ comprises a decanter or thickener, which extracts some of the water from the tailings, and a distributer, which is connected with the thickener and delivers the thickened tailings to the dump. The thickener may be of any approved pattern, many apparatus of this kind being well known to those skilled in the art of treating ore pulp for a similar purpose. The distributer is so constructed that it will deliver the thickened but still fluid tailings in small streams or jets, continuously or intermittently as desired, over an extended surface from the edge of the dump, so that as it flows down the water will separate from the solids by infiltration and evaporation. I have also found that the introduction of a storage vat for the thickened pulp, after the thickener, allows an accumulation of thick pulp for a given period, which may be rapidly discharged into the distributer at intervals, and thus enable the more rapid flow of thick material to run down the slope. The distributer is so mounted and supported that it may be moved from time to time as the dump is extended, and preferably it is made in sections, so that if necessary one section may remain idle to allow the surface of the dump to settle and dry while another is in operation. While perforated launders or perforated stationary pipes can be used for distributing the pulp, they require a heavy inclination with thick pulp, and I have found that when the distributer comprises an almost horizontally arranged perforated pipe, which is rotated during discharge, better results are obtained as the perforations are in this way kept free and the discharge is more uniform. The pipe connections are provided with suitable valves and the density of the discharge may be regulated to carry the thickened tailings to a greater or less distance down the incline of the dump, as may be desired.

In the accompanying drawings I have shown suitable apparatus for carrying out my invention.

Figure 1 is a perspective view of an ore milling plant, showing the combined thickener, storage tank and distributer, the latter being supported at the top of a slope where the dump is to be formed. Fig. 2 is a detail view illustrating how the layers of the dump are successively produced.

A mill is indicated at A and this delivers the tailings in water by a conveyer B to a thickener C, where water is extracted and

returned by a conductor D to the mill for reuse. The thickened pulp passes from the thickener or dewaterer by a pipe E to storage tank J, and thence by pipe E′ to the distributing apparatus. This is suitably constructed to deliver the tailings in relatively small streams or jets to the dump. Preferably the distributer is constructed as follows: It is divided into two or more sections in order that one section may be discharging while another is idle, and each section preferably consists of an approximately horizontally arranged perforated pipe F supported on weighted skids G. It will be noted that the even distribution of the pulp can be further regulated by plugging up a portion of the perforations in the pipe from time to time, thus changing the flow over any given portion of the dump. Each pipe section is arranged to rotate about a horizontal axis in bearings *g* on said skids. Each pipe F is connected to a branch *e* from the pipe E′, and each branch is provided with a valve *e′*. A motor H of any suitable kind, as an electric motor, is belted to each pipe section for the purpose of rotating it.

When the distributer is supported at the top of a slope in the manner shown in Fig. 1, the tailings are first conveyed from the mill to the thickener, the extracted water being returned to the mill for reuse, while the thickened pulp is conveyed by the pipe E to storage tank J and then by pipe E′ and branches *e* to the pipes F through the perforations of which they pass and are delivered to the dump. During the operation the pipes are rotated by the motors in order to keep the perforations clear and to promote the flow of pulp from the receiving ends to the opposite ends thereof and from time to time the skids and motors are moved forward to cause the deposit of successive layers on the dump in the manner illustrated in Fig. 2. In this way much of the water from the mill is recovered and can be returned for reuse and the tailings freed from excess of water are deposited at any desired distance from the mill without the construction of dams or the contamination of streams.

I claim as my invention:

1. The method of disposing of finely divided waste material suspended in liquid, which consists in thickening the material by separating it from part of the liquid in which it is suspended, conveying the thus thickened finely divided material to a dump, carrying the liquid to another receptacle, distributing the thickened material approximately horizontally along the edges of the dump to form an extended layer of uniform consistency on the slope thereof, and then forming repeatedly successive layers in like manner.

2. The method of disposing of finely divided waste material suspended in liquid, which consists in thickening the material by separating it from part of the liquid in which it is suspended, regulating the amount of liquid thus separated to thus regulate the consistency of the thickened material, conveying the thus thickened finely divided material to a dump, distributing such material approximately horizontally along the edge of the dump to form an extended layer of uniform consistency on the slope thereof and then forming repeatedly successive layers in like manner.

In testimony whereof I have hereunto subscribed my name.

JOHN VAN NOSTRAND DORR.

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