

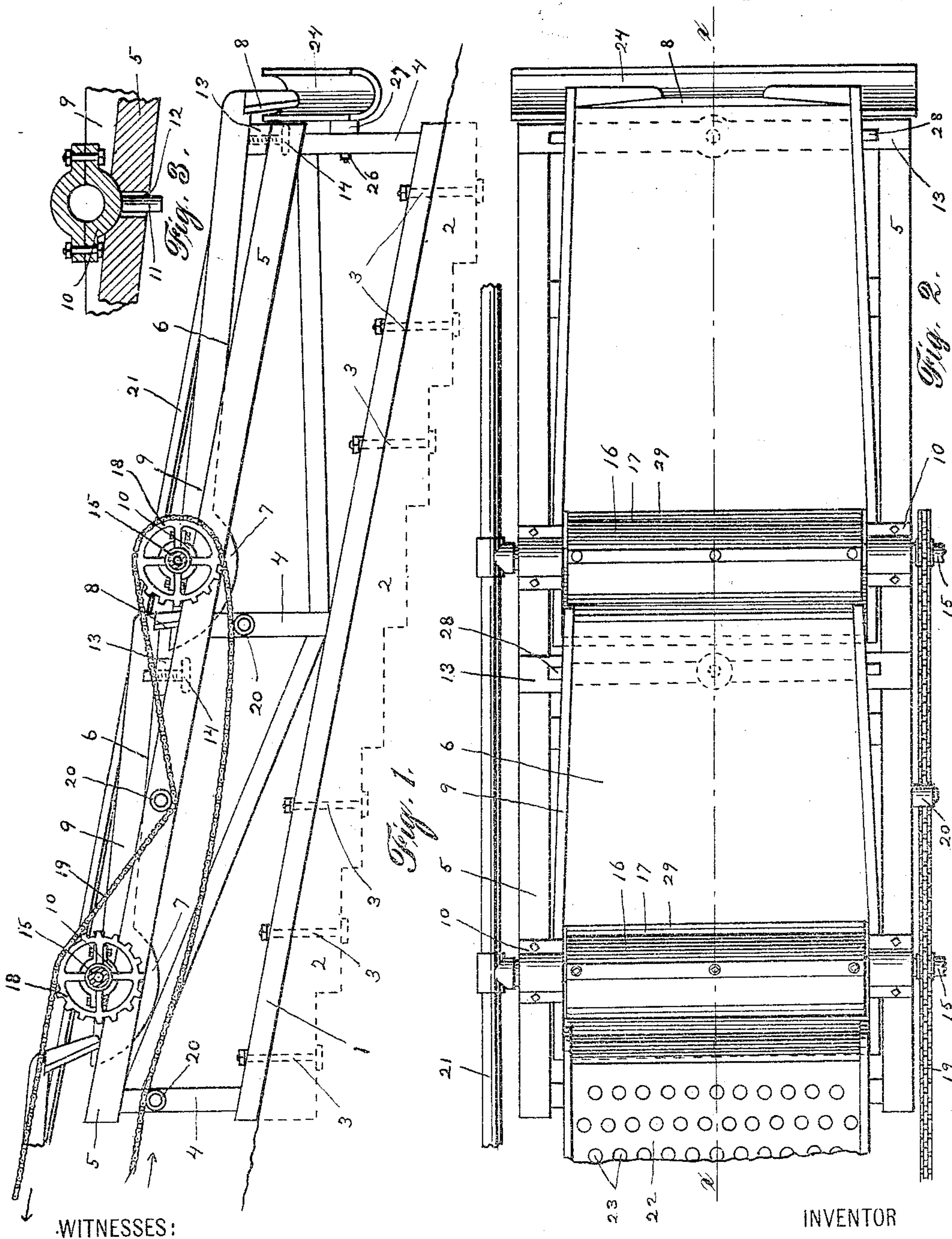
No. 898,050.

PATENTED SEPT. 8, 1908.

W. L. IMLAY.  
LIXIVIATOR.

APPLICATION FILED DEC. 5, 1907.

2 SHEETS—SHEET 1.



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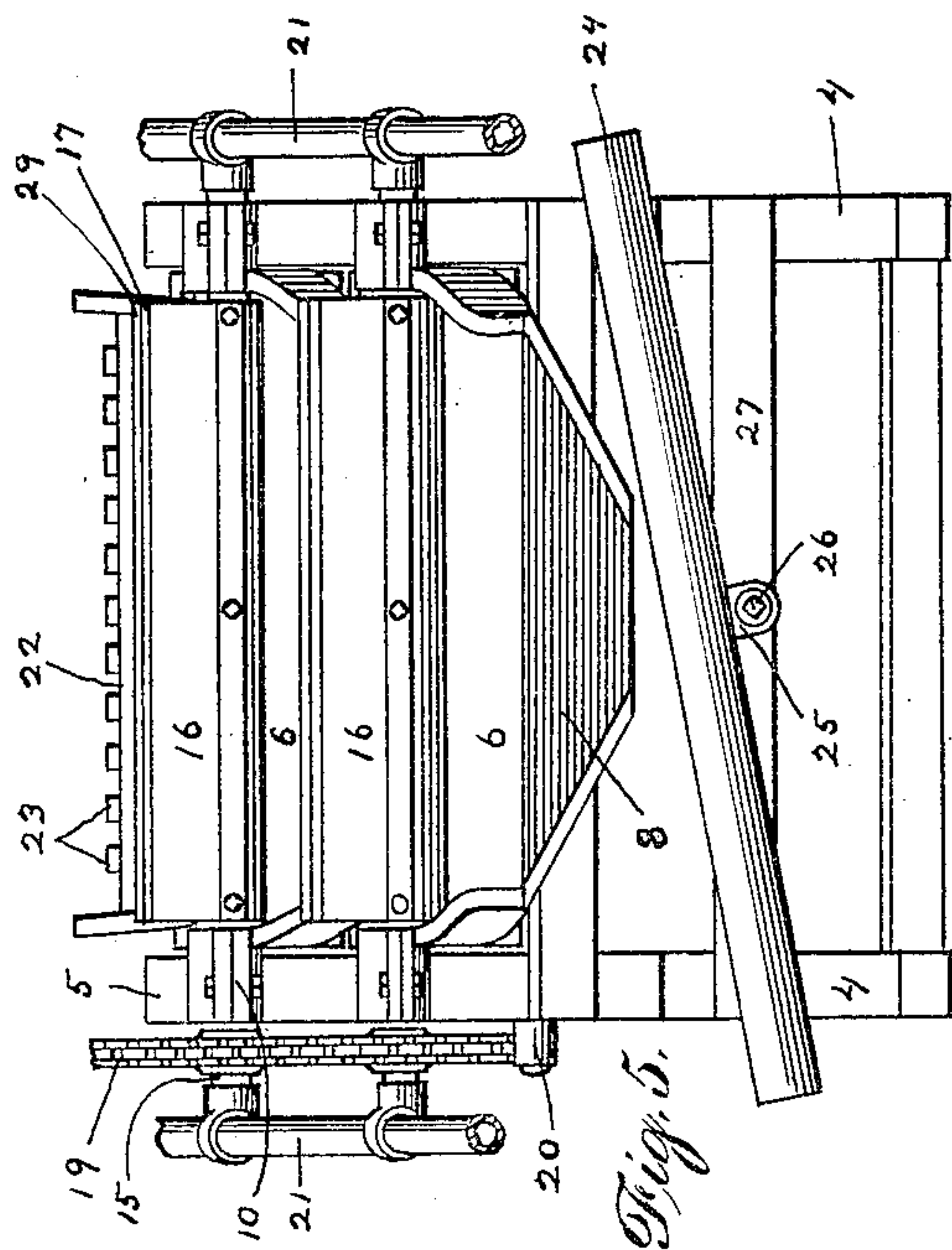
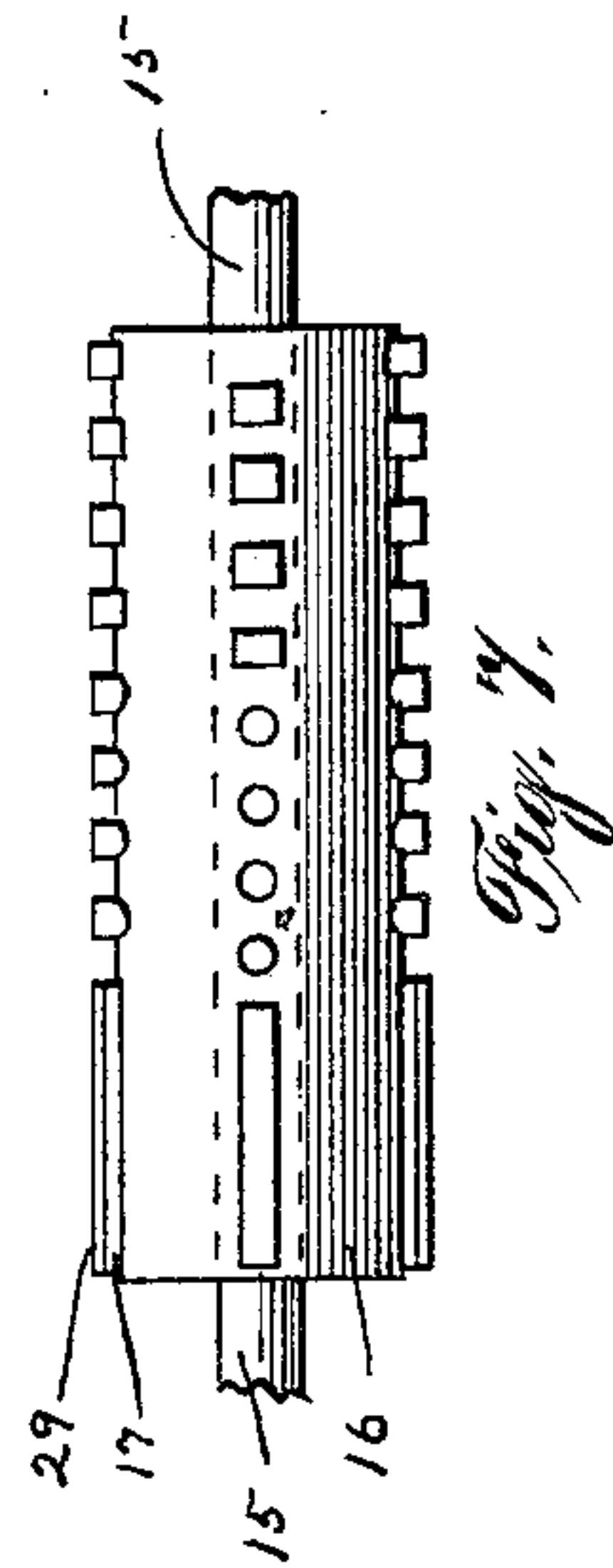
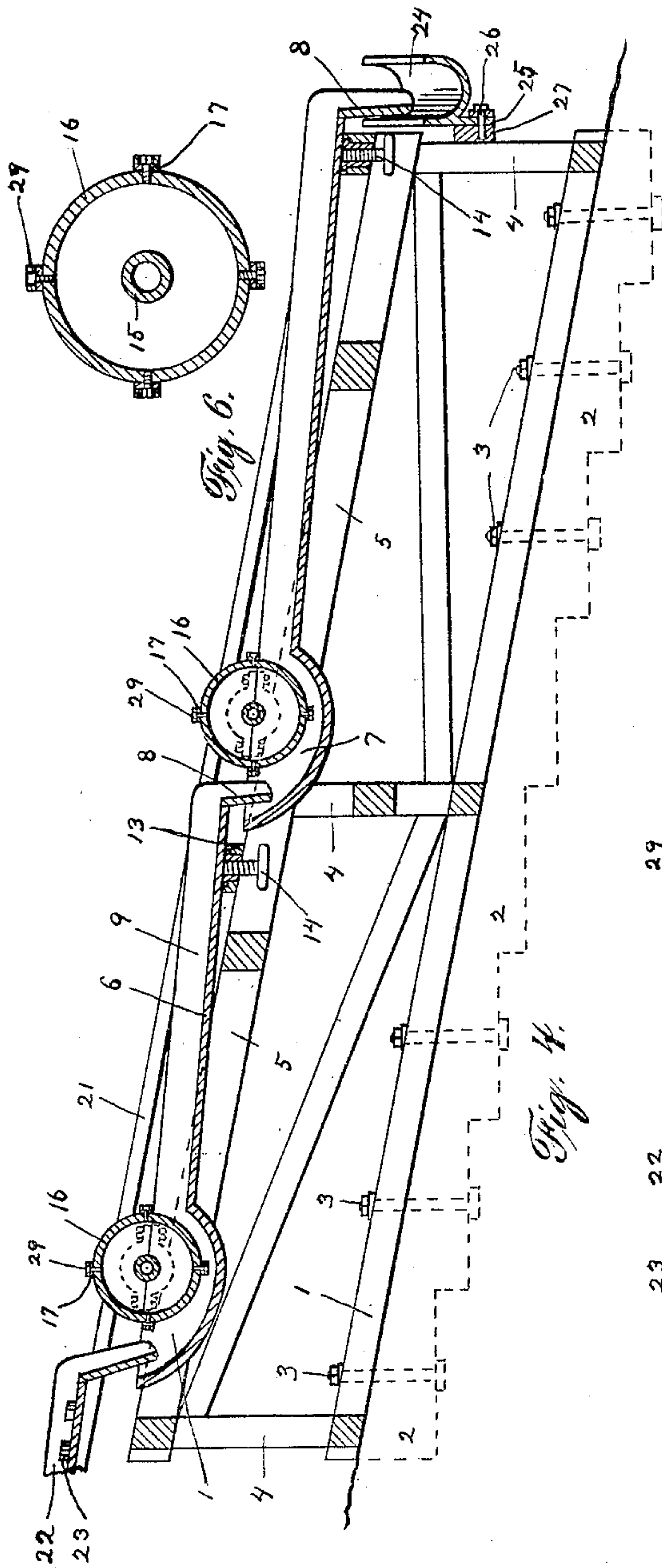
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2 SHEETS—SHEET 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

WILLIAM L. IMLAY, OF CONESTOGA, PENNSYLVANIA, ASSIGNOR TO WILLIAM L. IMLAY  
RAPID CYANIDE PROCESS COMPANY, A CORPORATION OF SOUTH DAKOTA.

## LIXIVIATOR.

No. 898,050.

Specification of Letters Patent.

Patented Sept. 8, 1908.

Application filed December 5, 1907. Serial No. 405,244.

*To all whom it may concern:*

Be it known that I, WILLIAM L. IMLAY, a citizen of the United States, residing at Conestoga, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in Lixiviators, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to an improved lixiviator, and is designed to provide an apparatus particularly applicable for the rapid extraction of precious metals from the complex sulfid and silicious ores which cannot be perfectly and quickly treated by the apparatus now in use, and which apparatus is particularly adapted to the treatment of low grade ores by the cyanid process, with a high percentage of recovery of values and commercial profit.

Another object is to provide an apparatus which shall be adapted for use in connection with a continuously operated plant, and which by reason of its construction and operation will greatly shorten the time required for the treatment of the ores by the cyanid process, and secures all the values without waste.

The apparatus is designed for the treatment of the ore and the rapid dissolving of the values by the solution as it is received from the stamp mills after having been crushed to a sixty or eighty mesh pulp and at the same time mixed with a solution of cyanid. It can also be used for the treatment of many so called refractory ores, especially those in which the precious metals occur in such a finely divided form that even amalgamation in pans fails to recover the values of ores in which the gold is coated with a film of metallic oxid or sulfid rendering it non-amalgamated.

The objects of the invention are to simplify the process, reduce the cost, labor and time, by taking advantage of the use of gravity and agitation for moving the pulp, and the use of heating, cooling, agitation and friction for the rapid dissolving of the precious metals.

While I have here illustrated my invention in the form of troughs mounted upon an inclined frame at different levels, with the lip of each trough directing its contents into the basin of the next trough upon a lower level, the number of troughs depends upon the na-

ture of the ore to be treated, I do not confine myself to the exact construction as shown, as slight changes may be made in the construction to suit different conditions of locality, ore, etc. without departing from the spirit of the invention.

In the drawings: Figure 1, is a side elevation of the two end sections of my device, but in practice it will consist of a series of sections depending on the class of ore treated. Fig. 2, is a plan view of the same, showing driving mechanism and heating connection with one of the heating pipes removed. Fig. 3, is an enlarged sectional view of a drum bearing, illustrating the manner of attaching it to the frame. Fig. 4, is a sectional view of Fig. 2, on the line *x x*. Fig. 5, is an end elevation of Fig. 1, as viewed from the discharging end. Fig. 6, is a transverse section of the drum showing the method of attaching the web strips. Fig. 7, is a plan of a drum illustrating the different forms of agitating devices.

Corresponding figures indicate corresponding parts in all the figures of the drawing.

1, indicates bed-plates of suitable material secured to an inclined foundation 2, (preferably erected upon a natural decline) by the anchor bolts 3, in a rigid manner. From the bed-plates 1, extend upward the supporting posts 4, upon which are secured the bearing plates 5, of any suitable material, and which are placed parallel to the bed-plates 1, and suitably secured and braced thereto. Supported upon said bearing plates 5, are a series of metal troughs or plates 6, of a rectangular form, slightly converging inwardly toward the lower end and containing at the upper end a depression or basin 7, with a curved bottom, and at the other end a lip 8, extending downwards, and they are further provided with sides 9, to the outer sides of which, at the basin portion, are secured and integral therewith the bearing boxes 10, which are formed with a circular bottom from the center of which depends the stud 11. Said box rests within a depression upon the top of the bearing plates 1, with the stud 11, extending through the hole 12, in the center of said depression in said plates, which is of greater diameter than said stud, thus allowing the boxes and troughs a great deal of play without danger of becoming detached.

Near the lower ends and under the troughs are secured to the bearing plates 5, the trans-



verse tie braces 13, through the center of which is screw-threaded the adjusting pin 14, which bears upon the under side of the trough and serves to raise and lower it to the proper incline, guided by the stops 28, on said tie braces 13.

Rotatably mounted in the bearings 10, are the hollow shafts 15, upon which are cast or otherwise secured the hollow metallic drums 16, upon the outer surface of which are cast webs or pins 17, to which are detachably secured the strips 29, which may be removed for renewal when worn out. To the projecting ends of the shafts 15, upon one side of the frame are keyed the sprocket wheels 18, which are connected by the endless belt 19, which is guided by the idlers 20, and driven by any suitable power, and which rotates all of the drums in the direction indicated. The shafts 15, extend through and beyond the boxes and are connected by the usual form of universal pipe joints to the steam or hot water pipe 21, which supplies heat to the drum, and allowing them to freely rotate without leakage.

The curve of the basin bottoms is such that it conforms to the arc of the drum except at the rear of said drum where it is enlarged to form a mouth to receive the lip of the next trough in the series, while into the first or top basin of the series is entered the lip of the launder table 22, the upper surface of which is studded with the pins 23, designed to break up and evenly deliver the pulp to the first basin. The sides of the lip of the last basin of the series are contracted to guide and deliver the solution to the center of a launder 24, which is open at both ends and is pivoted at its center by the lug 25, and bolt 26, to the end brace 27, of the frame, and thus may be tipped in either direction, leading to sumps or wells upon either side.

The operation of the device as a whole is as follows: The crushed ore and cyanid solution being delivered directly from the mill upon the launder table 22, which is placed at an incline leading into the basin of the upper trough of the series, the pulp and solution slide down said table and are broken up by the pins 23, thus evenly delivered into the basin. Upon entering the basin the pulp and solution are heated by the warmth of the slowly revolving drum 16, which is kept heated to the desired temperature by the steam or hot water entering it by the hollow shaft and connecting pipe. The solution and pulp are constantly rubbed, agitated and delivered evenly upon the surface of the trough by the webs upon the drum which are slowly revolved in the direction indicated. Upon being delivered upon the trough, the solution flows evenly and slowly down the same, owing to the incline and the jarring or vibrating motion imparted to the trough by

the action of the sprockets and chain belts upon the boxes mounted loosely in the bearing plates, and is here brought into contact with the air which greatly aids in the dissolving of the values by the action of the air and its cooling effect, while upon entering the next basin of the series the solution is again heated and agitated, then thrown out upon the next trough where it is cooled and exposed to the action of the air while being thinly and evenly spread upon the surface of said trough, and so on down the series of troughs until it is delivered into the pivoted launder, and thence into a sump.

By the construction of the basin any coarse values in the pulp or ore will lie in the bottom until dissolved, as the webs of the drum do not quite come into contact with the surface of said basin bottom, but by their action they keep the pulp constantly agitated and rubbed, thus rubbing off any oxidation upon the particles of ore and giving the solution a fresh surface to act upon. The number of troughs required in the series will be determined by the character of the ore.

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

1. In a lixiviator, a series of troughs adjustably mounted, each upon a lower level than the preceding one, and each provided with a receiving basin and a delivering lip, means for supporting said troughs in an adjustable manner, means for delivering the contents of said basin upon said trough, means for warming the contents of said basin, and for imparting a vibrating motion to said troughs, for the purpose set forth.

2. In a lixiviator, bearing plates rigidly supported upon a frame work, troughs formed with upwardly extending sides, bearing boxes integral with said sides, a bearing stud extending downward from said bearing boxes, orifices extending vertically through said bearing plates for the reception of said boxes and studs, a supporting bar having its ends secured to said bearing plates, an adjusting pin screw-threaded through said supporting bar near its center, guide studs formed upon said supporting bar, a basin formed in the upper end of said trough and a lip extension formed upon the lower end of said trough, for the purpose set forth.

3. In a lixiviator, a series of troughs, adjustably mounted upon inclined bearing plates, bearing boxes integral with said troughs, a hollow drum mounted in said bearings, and revolving within said trough basin, hollow shafts concentric and integral with said drum rotatably mounted in said bearings, webs cast upon the outer surface of said drum, strips detachably connected upon the face of said webs, and means for rotating said drum, for the purpose set forth.



4. In a lixiviator, a series of troughs  
mounted upon an incline, each overlapping  
the other and formed at the upper end with  
basins, having circular bottoms, and at the  
5 lower end with extending lips, hollow shafts  
rotatably mounted in bearing blocks formed  
upon the sides of said troughs, sprocket  
wheels secured upon the extending ends of  
said shafts, an endless belt connecting and  
10 operating said sprockets, idlers mounted  
upon the supporting frame and retaining  
said chain belt in a taut position, for the pur-  
pose set forth.

5. In a lixiviator, a series of troughs each  
15 overlapping and delivering into the basin of  
the next in succession, a launder table formed  
with a series of pins in its upper surface and a  
downwardly extending lip delivering into the  
basin of the first trough of said series, a lip

formed upon the lower end of the last trough 20  
of said series, having inwardly converging  
sides, a launder open at both ends and formed  
with a central lug pivotally mounted to the  
end transverse brace of said frame, under  
said projecting lip, for the purpose set forth. 25

6. In a lixiviator, a series of troughs  
formed with basins, hollow drums rotatably  
mounted within said basins, a longitudinal  
steam or water pipe connected to each of said  
hollow shafts and drums for the circulation 30  
of heat through said drums, for the purpose  
set forth.

In testimony whereof I affix my signature  
in presence of two witnesses.

WILLIAM L. IMLAY.

Witnesses:

CHAS. F. BOWMAN,  
MABEL L. LEFEVRE.