

No. 680,678.

G. W. THORNBURGH.
CONCENTRATOR.

Patented Aug. 13, 1901.

(No Model.)

(Application filed Dec. 27, 1900.)

2 Sheets—Sheet 1.

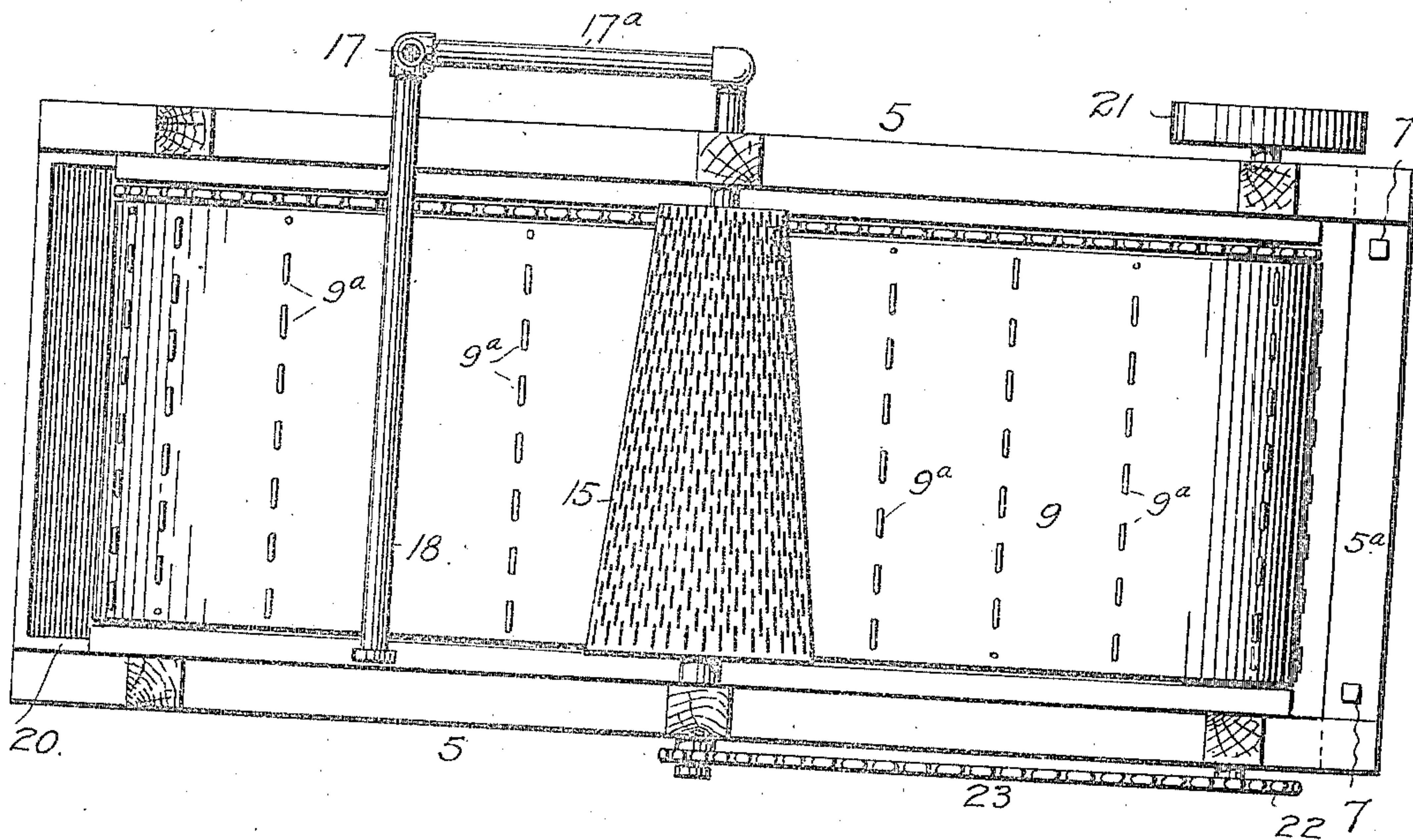


FIG. 1

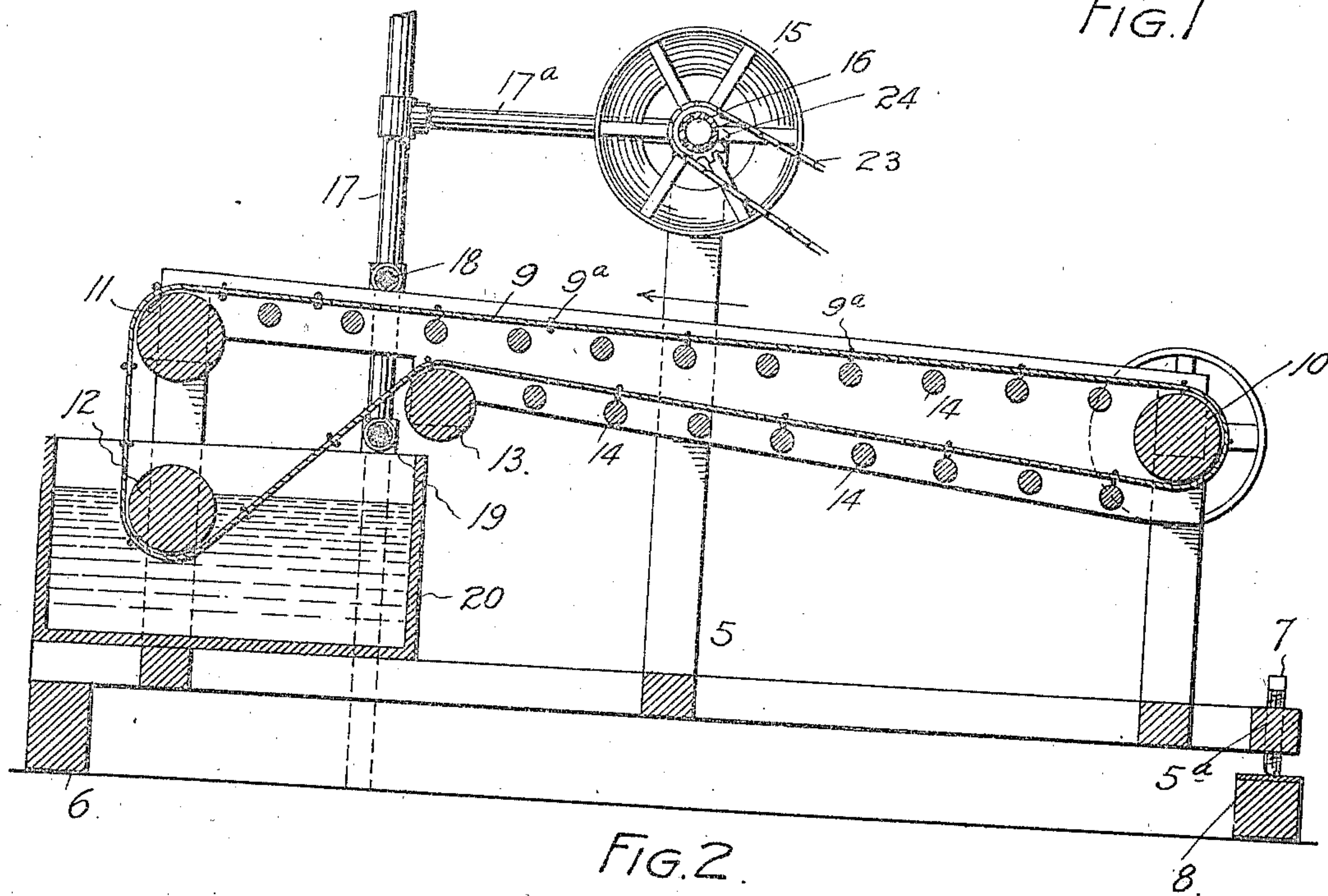


FIG. 2.

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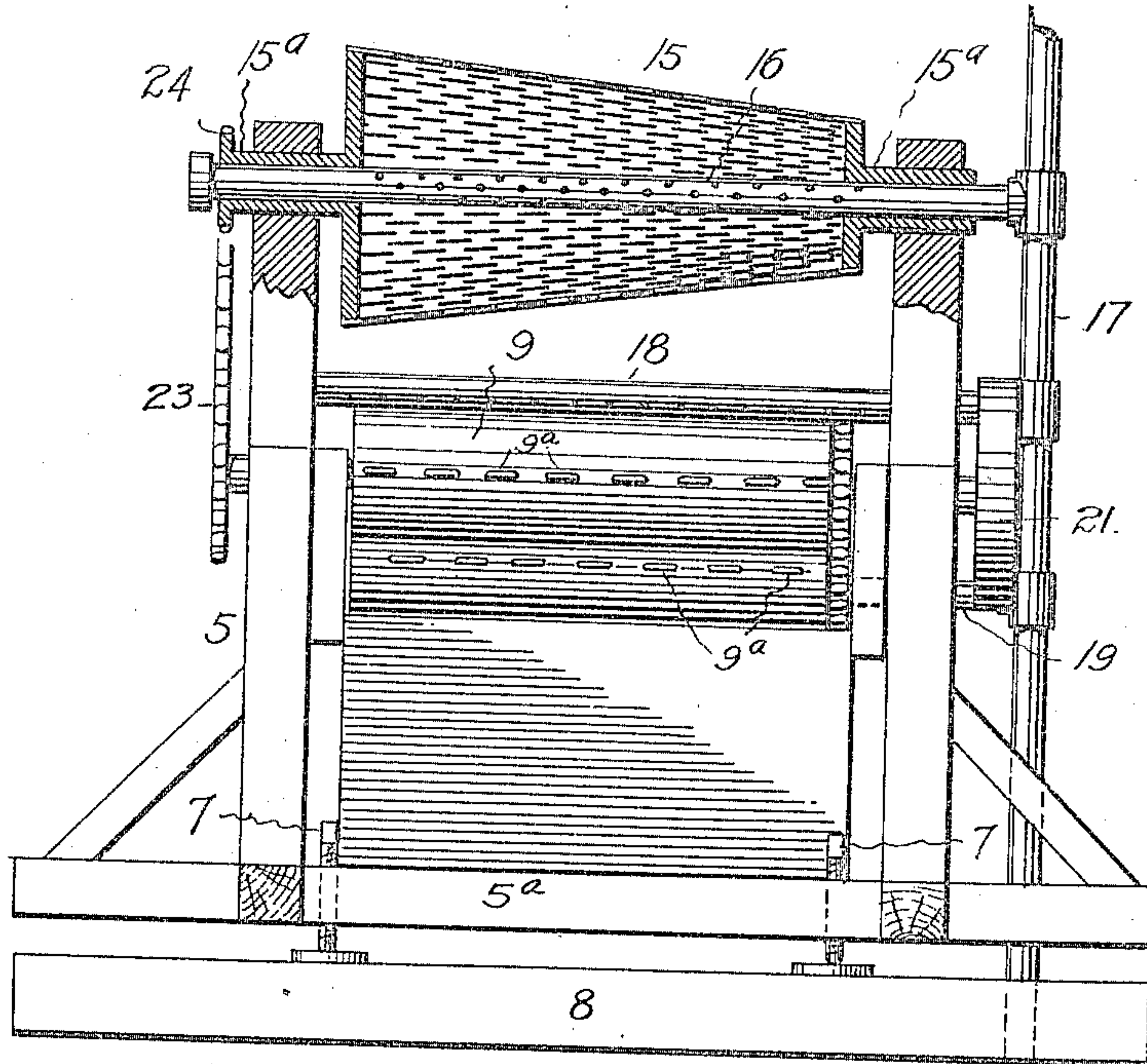


FIG. 3

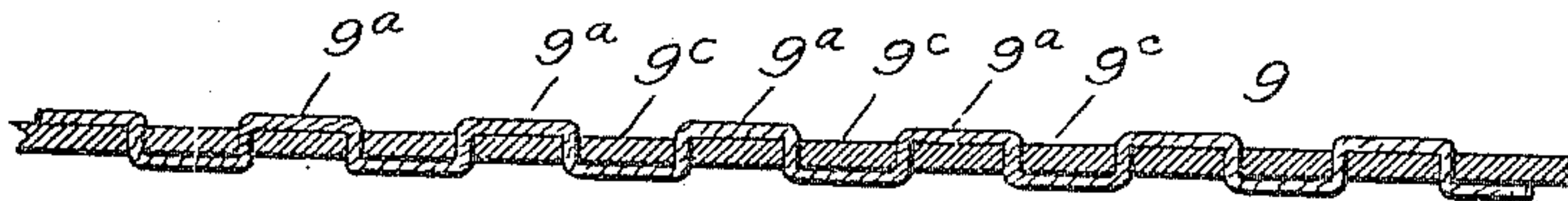


FIG. 4

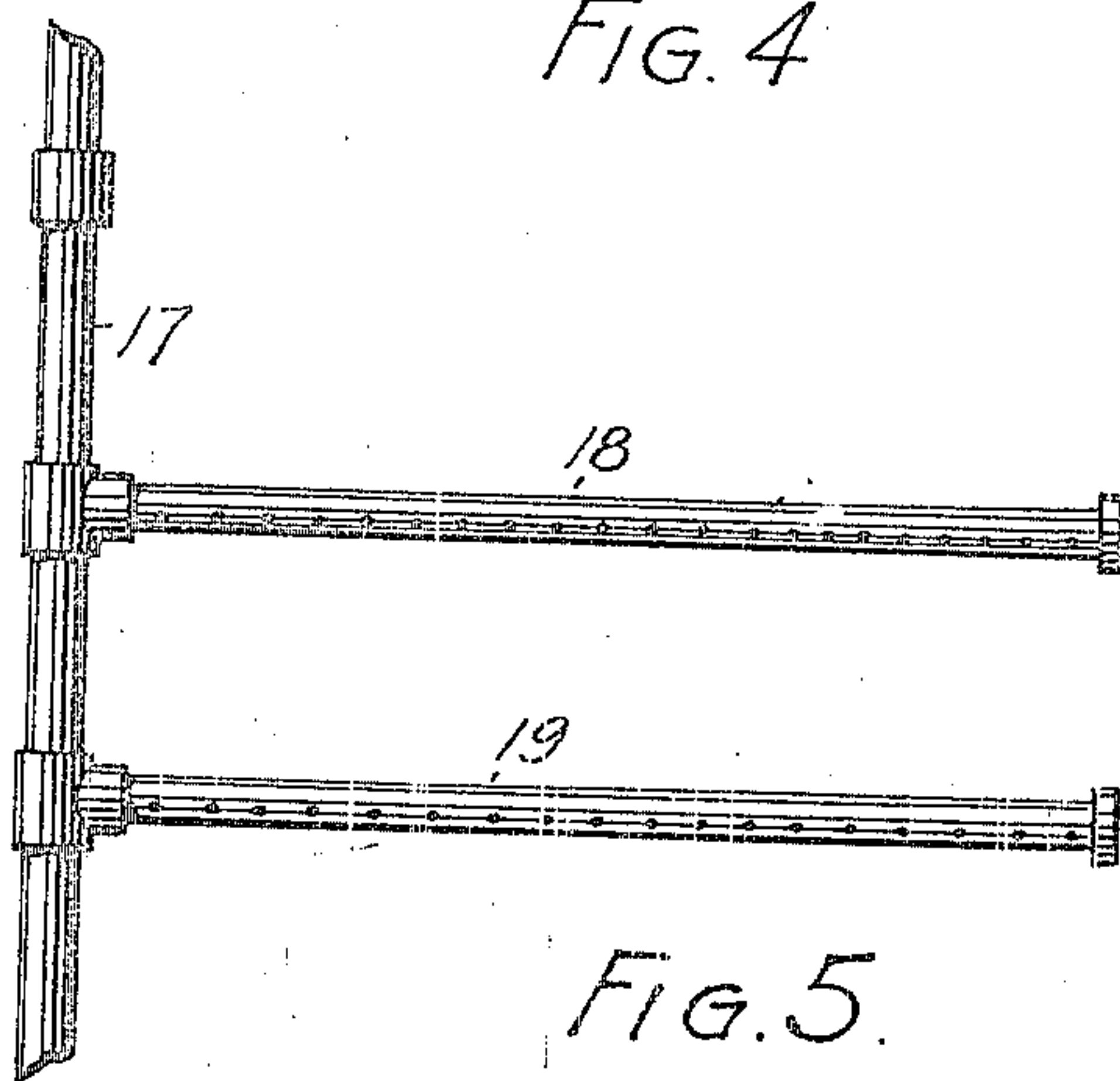


FIG. 5.

WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE W. THORNBURGH, OF DENVER, COLORADO.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 680,678, dated August 13, 1901.

Application filed December 27, 1900. Serial No. 41,257. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. THORNBURGH, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Concentrators; and I 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 figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in concentrators adapted for use either in treating placer material or pulverized rock, as may be desired.

The invention consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a top or plan view of my improved machine equipped for treating placer material. Fig. 2 is a section taken through the same. Fig. 3 is a rear end elevation, the rotary separator being shown in longitudinal section. Fig. 4 is a transverse section of the concentrating belt or apron shown on a larger scale. Fig. 5 is a detail view of the water-supply pipe and its perforated branches, which extend respectively above and below the endless traveling apron.

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

Let the numeral 5 designate a framework resting on a stationary support or base 6. The end bar 5^a at the right-hand extremity of the frame is provided with adjusting-screws 7, which engage threaded openings in the bar, their lower extremities resting on metal plates 8, applied to the base 6 underneath. By turning these screws the right-hand extremity of the frame 5 (see Figs. 1 and 2) may be raised and lowered at pleasure to give any necessary or desired inclination to the endless apron 9, which passes around the large end rollers or drums 10, 11, and 12, journaled in the framework 5. The drum 10 is located at one end of the frame and the drums 11 and 12 at the opposite end

of the frame, the one being directly above the other. Underneath the lower portion of the belt is located a drum or roller 13. Between the drums 10 and 11 and between the drums 10 and 13 the apron is supported by small rollers 14, journaled in the framework.

The frame 5 is so regulated that the upper portion of the apron upon which the material is treated is downwardly inclined from the left toward the right, referring to Figs. 1 and 2. The apron travels in the direction indicated by the arrow in Fig. 2. When treating placer material, the latter is discharged into the smaller extremity of a cone-shaped rotary screen 15, whose walls are perforated to allow the finer material to pass there-through, while the rocks and coarse gangue are discharged at the larger extremity of the screen. This screen is mounted above the apron and extends transversely thereof, about midway between the extremities of its supporting-frame 5. The perforated water-pipe 16 extends through the longitudinal center of the rotary screen, whose extremities are provided with spider-arms connected with sleeves 15^a, which turn on the pipe 16, the latter forming bearings for the sleeves of the rotary screen. The pipe 16 communicates at one extremity with a stand-pipe 17. During the operation of the machine water is continuously discharged into the rotary screen from the pipe 16, whose extremity remote from the stand-pipe is closed, thereby compelling the water delivered to the pipe to pass exclusively through its perforated portion into the rotary screen. A branch pipe 17^a (see Figs. 1 and 2) leads from the stand-pipe 17 to the perforated pipe 16. Two branch horizontal perforated pipes 18 and 19 lead from the stand-pipe 17 and occupy positions respectively above and below the traveling apron. The pipe 18 supplies the necessary water for separating the mineral values from the gangue on the concentrating-surface of the apron, while the pipe 19 discharges upon the under portion of the apron above the water-tank 20, through which the apron passes and in which the concentrates or mineral values caught by the apron are deposited. The discharge from the perforated pipe 19 will remove from the apron any concentrates that may not have been washed off or removed from the apron while passing through the water in the tank 20.

When the apron is used for the treatment of pulverized ore, as distinguished from placer material, the rotary screen is not used, but the ore is fed to the apron in the form of pulp or otherwise, as may be described.

The apron is propelled by connecting a pulley 21, fast on the shaft of the end drum 10, with any suitable power. The opposite end of the drum-shaft is provided with a sprocket-wheel 22, from which a chain 23 leads to a smaller sprocket-wheel 24, fast on one of the end sleeves 15 of the rotary screen 15. The apron 9 which I employ is of special construction. The body of the apron may be composed of heavy canvas or any other suitable material. Broken riffles 9^a are formed transversely of the apron by sewing there-through back and forth with heavy cord, wire, or other suitable material, the riffle parts 9^a and the blank spaces 9^c between them alternating across the apron, as shown in Fig. 4. The parts 9^a of any two adjacent riffles are staggered—that is to say, the parts 9^a of one riffle are arranged opposite the blank spaces 9^c of the other riffles. These riffles may be arranged any desired distance apart.

In the operation of the machine the material, which is in the form of placer-dirt or pulverized ore, is fed upon the apron in the form of pulp, preferably about midway thereof, and while the apron is traveling up the incline. (Shown in Fig. 2.) The finer portion of the placer material (if such is under treatment) fed to the rotary screen, as heretofore explained, is mingled with the water from the perforated pipe 16, forming pulp, which passes directly to the apron. The mineral values, which are heaviest, settle upon the surface of the apron and are caught by the riffles, while the gangue, which is of less specific gravity, is washed downwardly in a direction opposite the travel of the apron and discharged at the tail of the machine or the extremity where the drum 10 is located. The mineral values, however, being caught by the apron-riffles resist the action of the water, which carries the gangue downwardly, as just explained, and are first carried upwardly by the apron and thence downwardly over the head of the machine into the tank 20, where the concentrates are washed off the apron and saved in the tank. If the passage of the apron through the water does not remove all the concentrates therefrom, the water from the spray-pipe 19 will complete the removal of the values, which will drop back into the tank, as heretofore explained.

It will be understood that the treatment of the material is substantially the same whether it is placer-dirt or pulverized ore, except that the placer-dirt is first discharged into the rotary screen in order to remove the coarser portion of the gangue, which it would not be practicable to discharge upon the apron. The downward inclination of the apron from the head toward the tail of the machine, as well

as the rapidity of the apron's travel, may be regulated at pleasure and as circumstances may require.

Having thus described my invention, what I claim is—

1. The combination with a suitable frame, of an endless concentrating belt or apron mounted to travel thereon, and provided with broken, transverse riffles, formed by passing a device substantially of the construction described, back and forth through the apron.

2. The combination with a suitable frame, of an endless concentrating belt or apron mounted upon the frame and provided with broken transverse riffles formed by passing a device substantially of the construction described, back and forth through the apron, the sections or parts of any two adjacent riffles being staggered.

3. The combination with a suitable frame, of an endless concentrating belt or apron mounted to travel thereon, and provided with broken transverse riffles formed by passing a cord of suitable size back and forth through the apron.

4. The combination with a suitable frame, of an endless concentrating belt or apron suitably mounted to travel thereon and provided with broken transverse riffles formed by passing a device substantially of the construction described, of any suitable size back and forth through the apron, the parts or sections of the riffles being staggered whereby the parts of one riffle are opposite the spaces between the parts of an adjacent riffle.

5. The combination with a suitable frame, and rollers journaled thereon, of an endless traveling apron mounted on the rollers and provided with broken riffles formed by passing a device, substantially of the construction described, back and forth through the apron, its concentrating-surface being longitudinally inclined, means for adjusting the frame to regulate the inclination of the apron, a water-tank underneath the apron, through which the latter passes, and in which the concentrates are deposited, a stand-pipe for supplying water to the machine, and two perforated branch pipes leading therefrom and extending respectively above and below the apron, as and for the purpose set forth.

6. The combination with an endless traveling concentrating belt or apron provided with broken riffles formed by passing a device substantially of the construction described, back and forth through the apron, and means for supplying wash-water thereto, of a conical, rotary screen located above the apron, extending transversely thereof, and a perforated water-pipe passing axially through the screen which is journaled on said pipe.

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

GEORGE W. THORNBURGH.

Witnesses:

A. J. O'BRIEN,
DORA C. SHICK.