

(No Model.)

J. A. BENTLEY.  
AMALGAMATING APPARATUS.

No. 562,882.

Patented June 30, 1896.

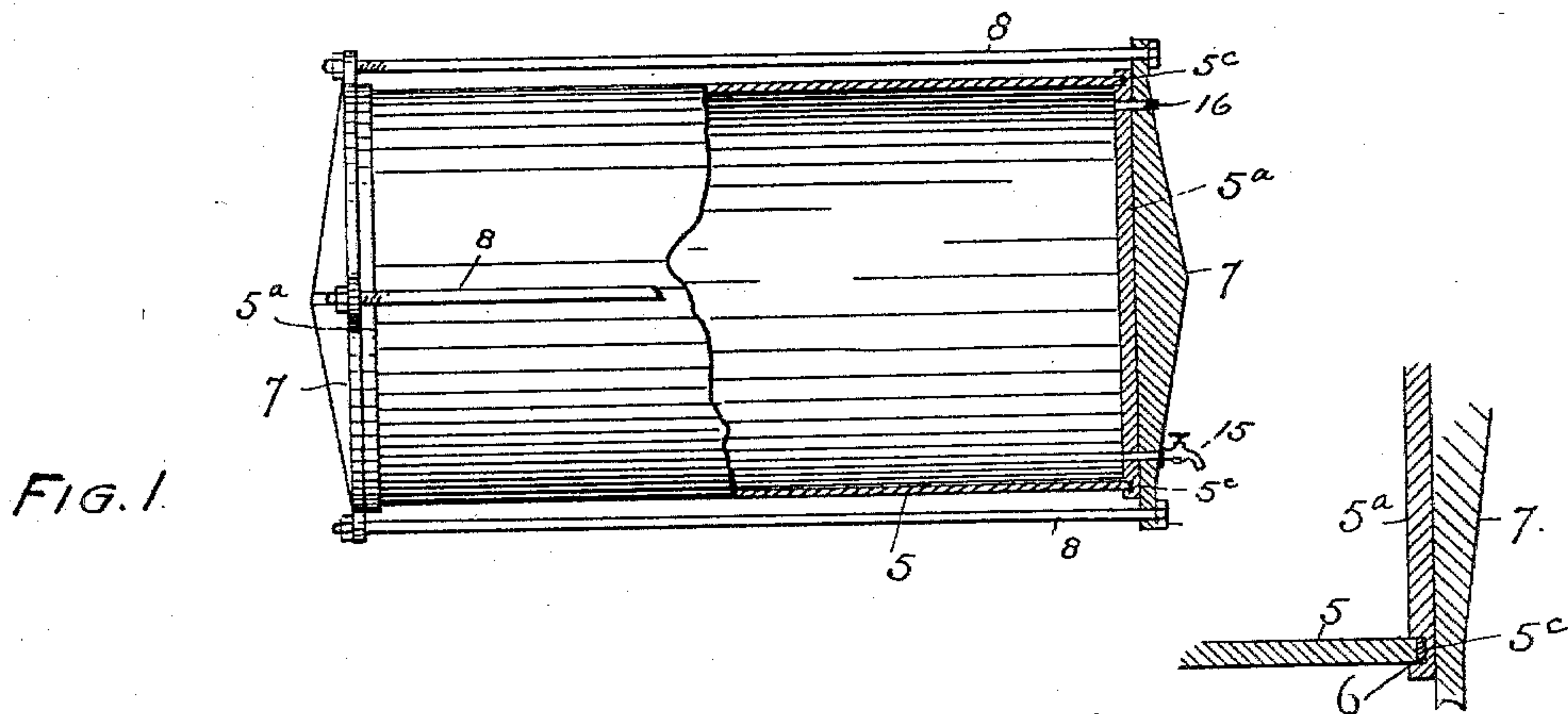


FIG. 1

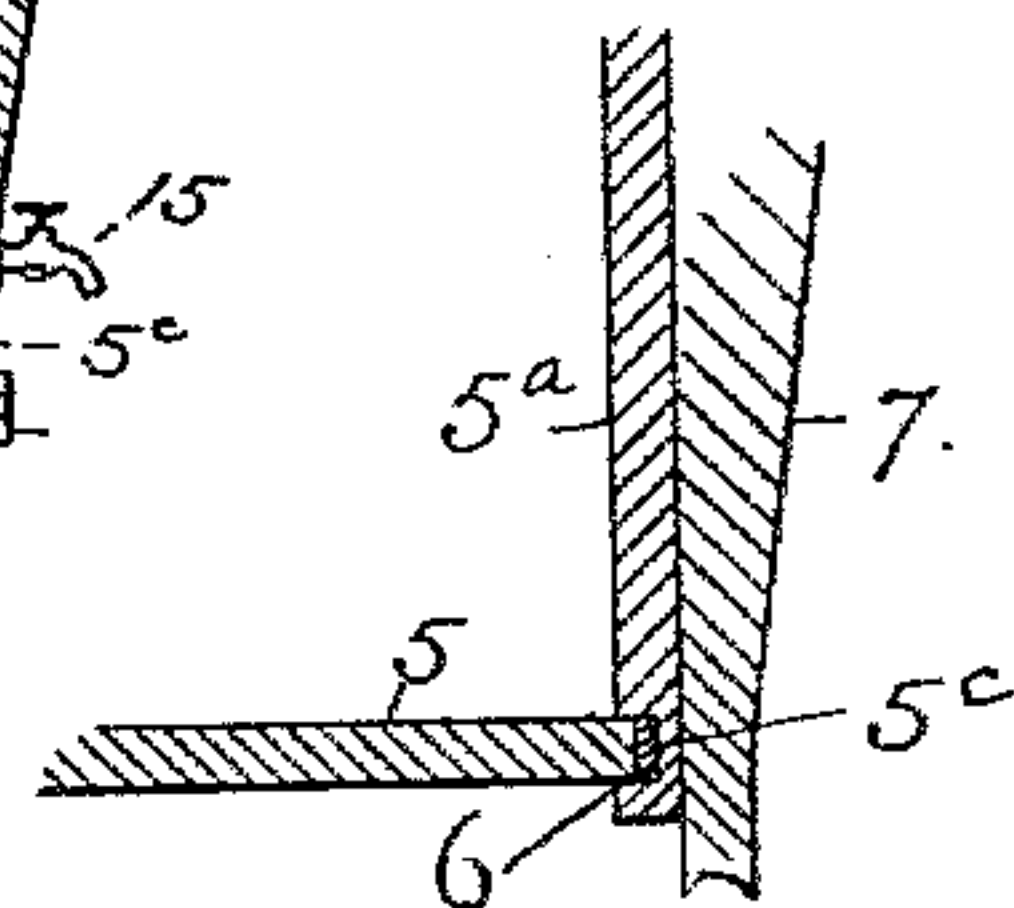


FIG. 5.

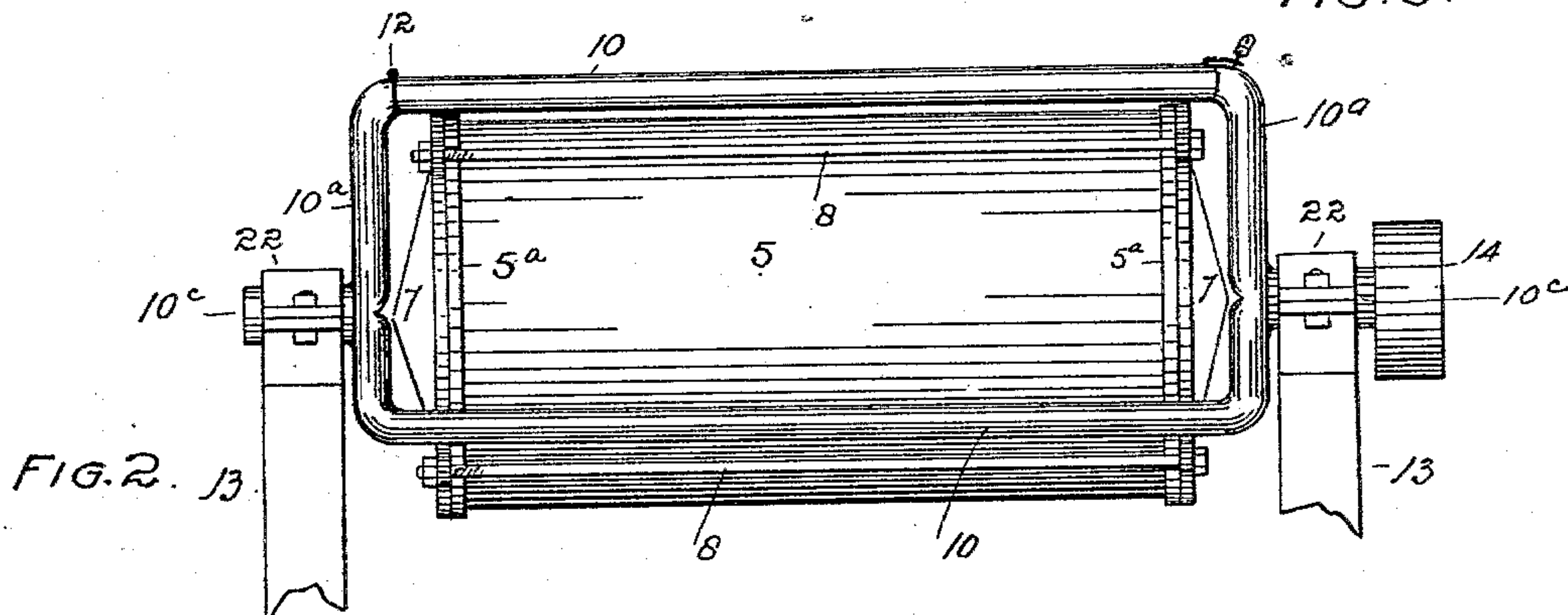


FIG. 2. 13

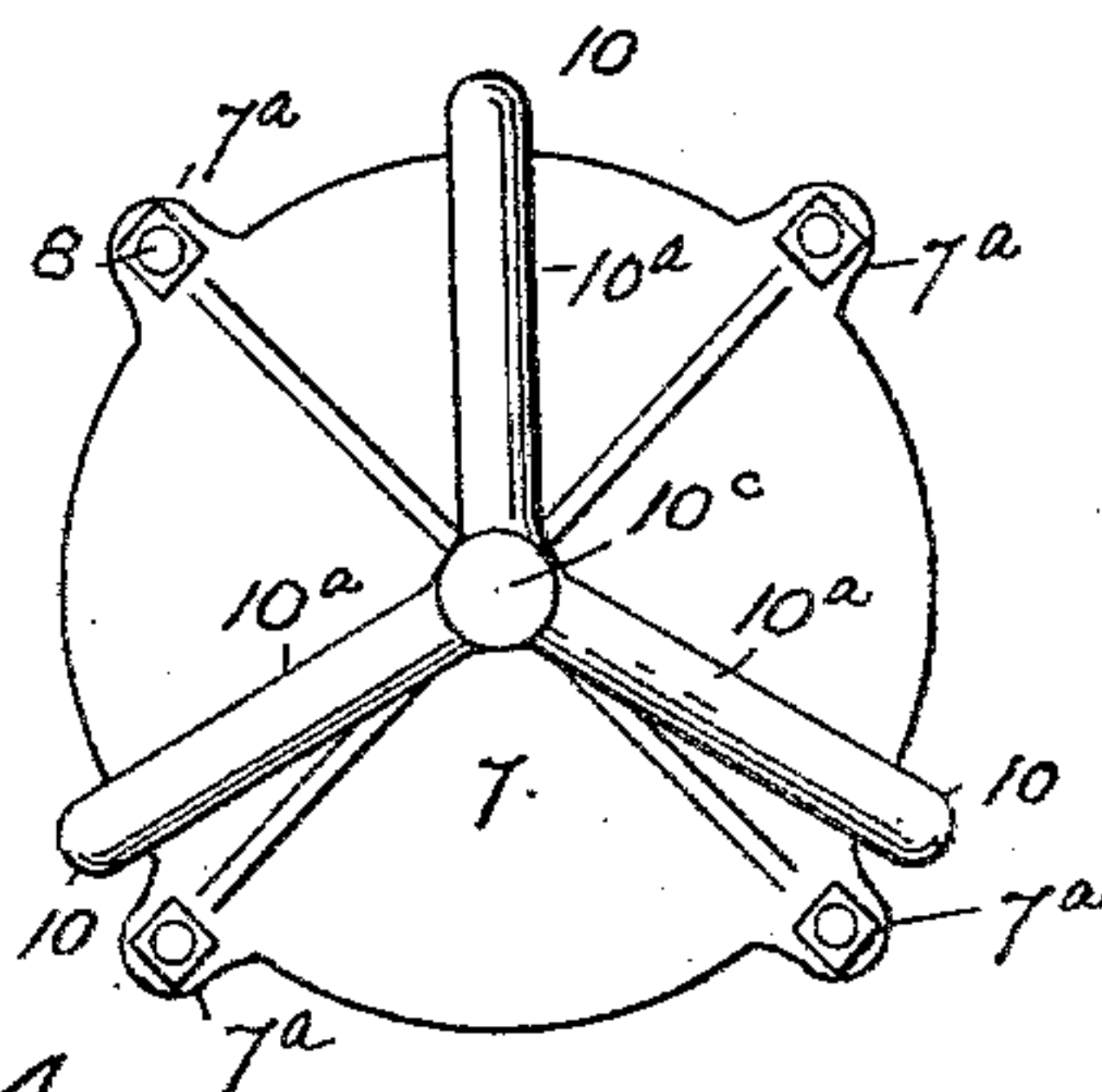
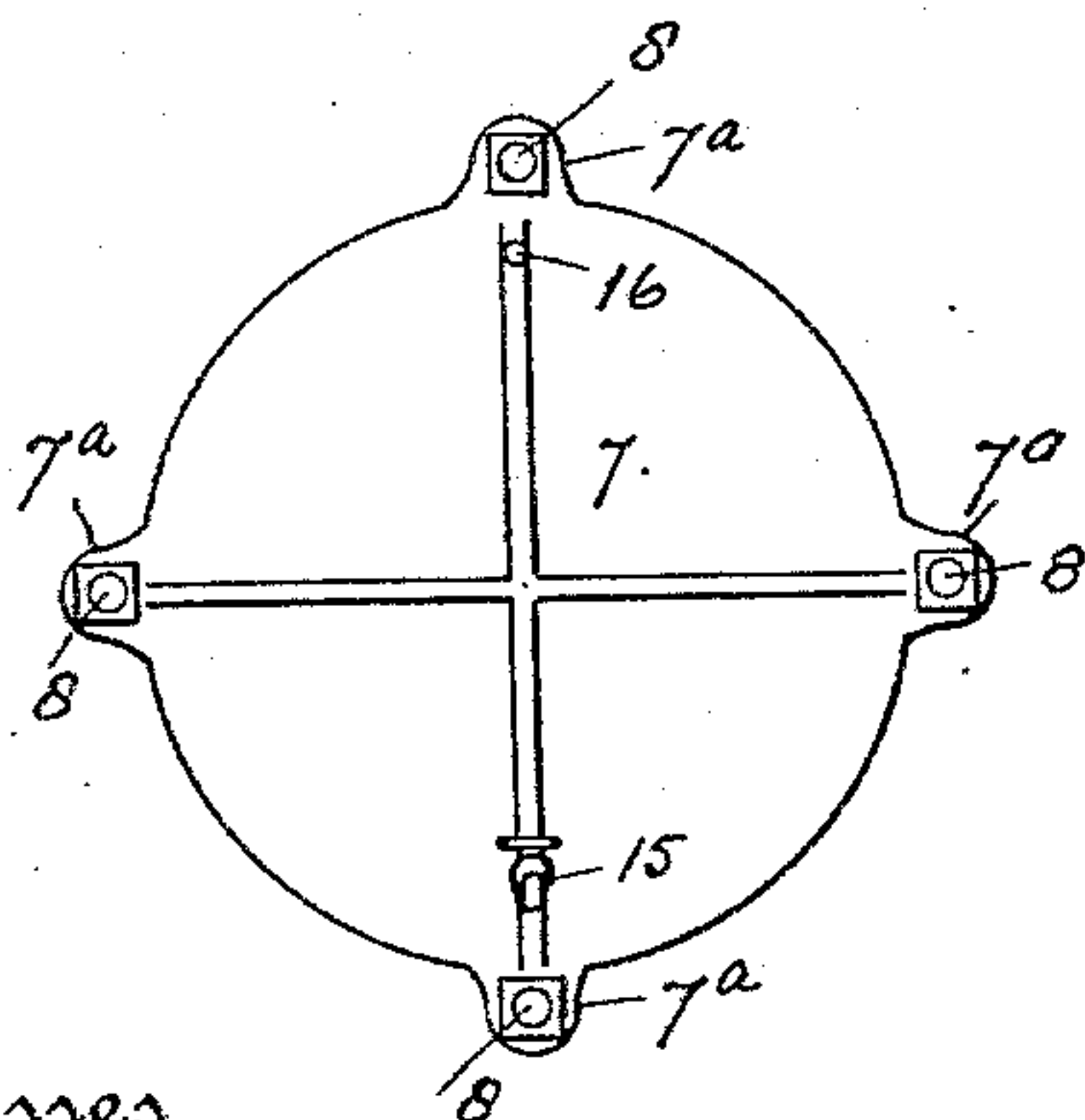


FIG. 4.

Inventor

Witnesses  
J. E. Hall and  
Chas. Lawton

By his Attorney *John A Bentley*  
*[Signature]*



# UNITED STATES PATENT OFFICE.

JOHN A. BENTLEY, OF DENVER, COLORADO.

## AMALGAMATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 562,882, dated June 30, 1896.

Application filed October 10, 1895. Serial No. 565,306. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. BENTLEY, 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 Amalgamating Apparatus; 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 amalgamating apparatus; and it consists of the features 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 side elevation of the amalgamating-cylinder, partly in section. Fig. 2 is a side elevation of the complete apparatus, comprising the cylinder, the cage, and the supporting structure. Fig. 3 is an end elevation of the cylinder. Fig. 4 is a similar view of the cylinder and skeleton cage. Fig. 5 is a fragmentary view of the apparatus, the parts being shown on a larger scale.

Similar reference-characters indicating corresponding parts in the views, let the numeral 5 designate a cylindrical metal tank. The ends 5<sup>a</sup> of this tank are detachable. These ends are grooved to receive the circular end edges of the tank-body, as shown at 5<sup>c</sup>. Located within the grooves 5<sup>c</sup> is a packing 6 of rubber, or other suitable material, whose function is to render the tank perfectly tight when the ends are suitably compressed. Applied to the detachable ends of the tank are the compression-heads 7, having apertured lugs 7<sup>a</sup> formed on their peripheral edges. These heads are connected and subjected to any desired degree of compression by means of tie-rods 8, whose extremities engage the lugs 7<sup>a</sup>. To the threaded extremities of these tie-rods are applied fastening-nuts whereby the heads may be compressed as tightly as necessary against the detachable ends of the tank. The tank is preferably composed of copper; and, in any event, its entire inner

surface, including the ends, is amalgamated or coated with quicksilver or mercury.

The cylindrical tank is supported in a skeleton cage composed of horizontal parallel bars 10, engaging the body of the tank, and radial end bars 10<sup>a</sup>, connected with central trunnions 10<sup>c</sup>. As shown in the drawings, there are three bars 10, equidistant from each other. One of these bars 10 is hinged, as shown at 12, to the corresponding radial end bar 10<sup>a</sup>. The opposite extremity of the hinged bar is detachably secured to its corresponding end bar, as by a hasp engaging a staple, to which is attached a padlock, to the end that the tank may be locked against removal from the cage, except by the person holding the key. The outwardly-projecting trunnions 10<sup>c</sup> engage journal-boxes 22, attached to a suitable supporting-frame 13. One of the trunnions projects outwardly far enough from its journal-box for the attachment of a pulley 14, which may be connected with any suitable motor for the purpose of imparting a rotary movement to the tank and cage.

One end of the tank, together with the corresponding compression-head, is apertured to receive a cock or faucet 15. The end of the tank and its head are also provided with registering vent-ports adapted to receive a plug 16, which may be removed to facilitate the charging of the tank with pulp, and the drawing off of the gangue.

In the use of the apparatus, the cylindrical tank is first nearly filled with the material to be treated, which is pulverized sufficiently fine to release the metals to be amalgamated. This pulverized ore is mixed with water to form a pulp of the proper consistency. To facilitate amalgamation, a quantity of free quicksilver may be placed in the tank prior to the introduction of the pulp. The cylindrical tank having been charged with pulp, and the faucet and vent-port closed, so as to make the tank perfectly tight, the tank and cage are rotated by connecting the pulley 14 with any suitable motor. This rotation of the tank brings every particle of the pulp in direct contact with the amalgamated surface of the cylindrical tank, and the rotation of the tank is continued until the pulp has been impoverished of all the amalgamable metals.

The necessary time for the treatment of any



charge, in order to accomplish the end sought, must be left to the judgment of the person in charge of the mill, and can be readily ascertained by experiment.

5 When amalgamation is completed, the gangue, or the pulp impoverished of its amalgamable metals, may be withdrawn via the faucet or cock 15, after which the tank is recharged and again rotated. When it becomes  
10 necessary to clean up, the tank is removed from the cage, the free amalgam drawn off, and the heads removed to give access to the inner surface of the tank, which is then scraped to remove the amalgam from the  
15 amalgamated surfaces. The revolving motion of the tank causes a constant movement and intermixture of the charge of pulp contained therein, this movement being most active in close proximity to the amalgamated  
20 surfaces. By means of such intermixture the metals to be amalgamated are brought rapidly into contact with such amalgamated surfaces, and the mass of quicksilver introduced, as aforesaid, thereby rendering amal-  
25 gamation more rapid and complete, and requiring less frequent clean-ups than are necessary with the amalgamated plates as arranged in apparatuses now in use. The as-  
30 cending motion of the cylinder on one side, and the corresponding movement of the pulp adjacent thereto, together with the downward movement on the descending side, bring the slimes, which rise to the surface, in direct contact with the amalgamated surfaces. The  
35 amalgamable metals carried by the floating slimes are thus saved.

The skeleton cage comprising the parallel horizontal bars, the radial end bars, and the trunnions, one of said horizontal bars being  
40 detachably connected with the corresponding end bars, which cage is shown, but not broadly claimed in this application, is claimed in my subsequent application, Serial No. 584,564, filed March 23, 1896.

45 Having thus described my invention, what I claim is—

1. In an amalgamating apparatus, the combination of the cylindrical tank having detachable ends, the inner surface of the tank  
50 being amalgamated, the compression-heads, the rods connecting the heads, the skeleton cage attached to the tank and provided with trunnions, a suitable supporting-framework in which the trunnions are journaled, and

means attached to one of the trunnions for 55 imparting a rotary movement to the tank, as and for the purpose set forth.

2. In an amalgamating apparatus, the combination of the cylindrical amalgamating-tank having detachable ends, the compression-head attached to the tank, the skeleton cage also attached to the tank and provided with trunnions, and suitable means for supporting the apparatus whereby it may be rotated on the trunnions, as and for the purpose set forth. 65

3. In an amalgamating apparatus, the combination of the cylindrical amalgamating-tank having detachable ends containing grooves to receive the circular edges of the body of the tank, suitable packing-rings located in said grooves, compression-heads engaging the ends of the tank, said heads being provided with apertured lugs, tie-rods engaging said lugs, a skeleton cage attached to the tank and provided with trunnions, and suitable means for supporting the apparatus in such a manner that it may be rotated, as and for the purpose set forth. 70

4. In an amalgamating apparatus, the combination of the cylindrical amalgamating-tank having detachable heads, the skeleton cage attached to the tank, and comprising parallel horizontal bars, radial end bars and trunnions, one of the horizontal bars being hinged at one end and detachably connected with its corresponding end bar at the opposite extremity, and suitable means for supporting the tank in such a manner that it may be rotated on the trunnions, as and for the purpose set forth. 80

5. In an amalgamating apparatus, the combination of the cylindrical amalgamating-tank having detachable ends, said tank having its entire inner surface amalgamated and containing a quantity of quicksilver, compression-heads engaging the ends of the tank and suitably connected, a skeleton cage embracing the tank and having trunnions, and suitable means for supporting the tank in such a manner as to be rotated on the cage-trunnions, as and for the purpose set forth. 85

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

JOHN A. BENTLEY.

Witnesses:

CHAS. E. DAWSON,  
ALFRED J. O'BRIEN.