

No. 882,527.

PATENTED MAR. 17, 1908.

F. MEARS & J. CRAIG.

PROCESS FOR BLEACHING AND AGING FLOUR AND OTHER GRAIN PRODUCTS.

APPLICATION FILED JULY 31, 1907.

Fig. 1.

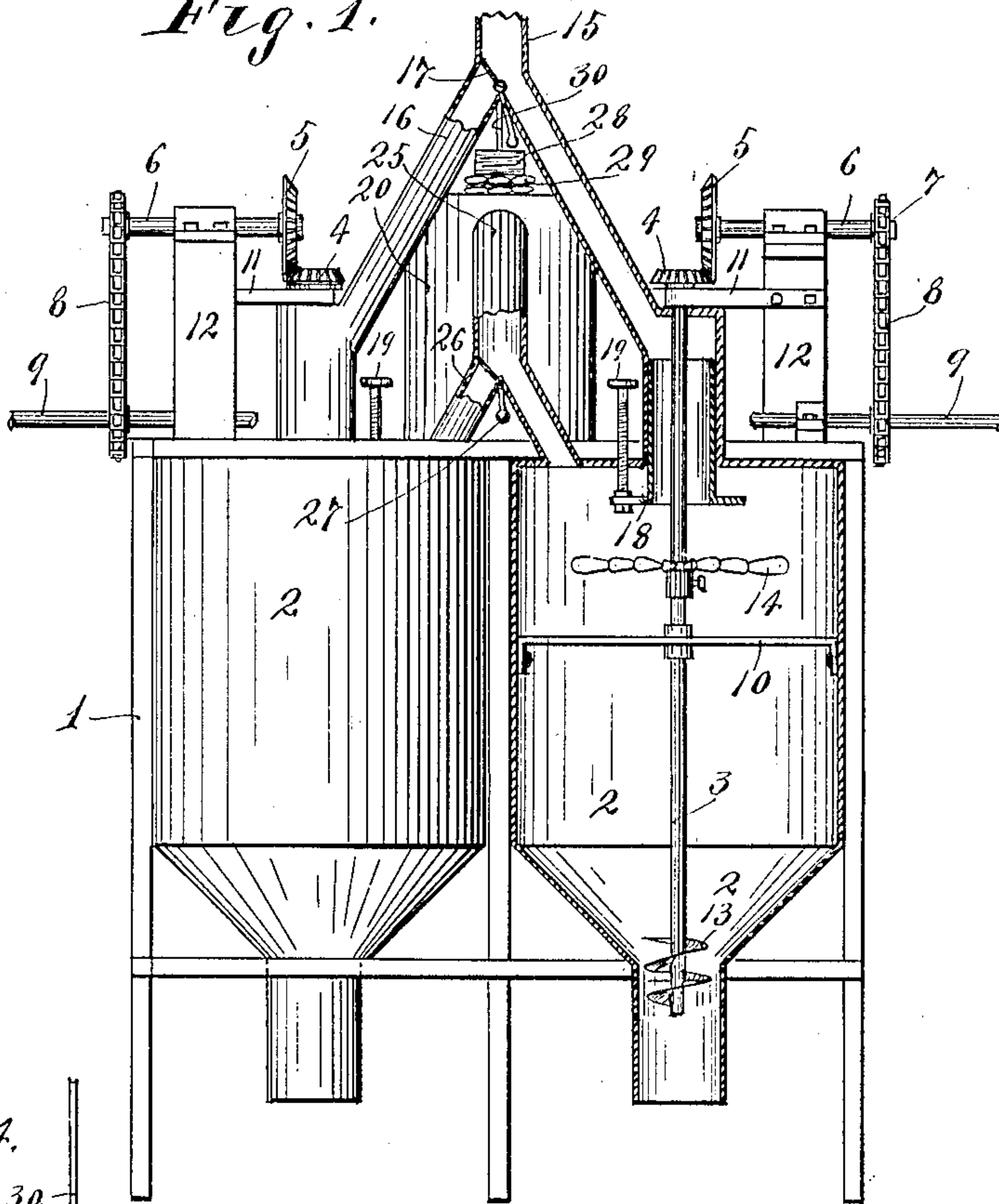


Fig. 4.

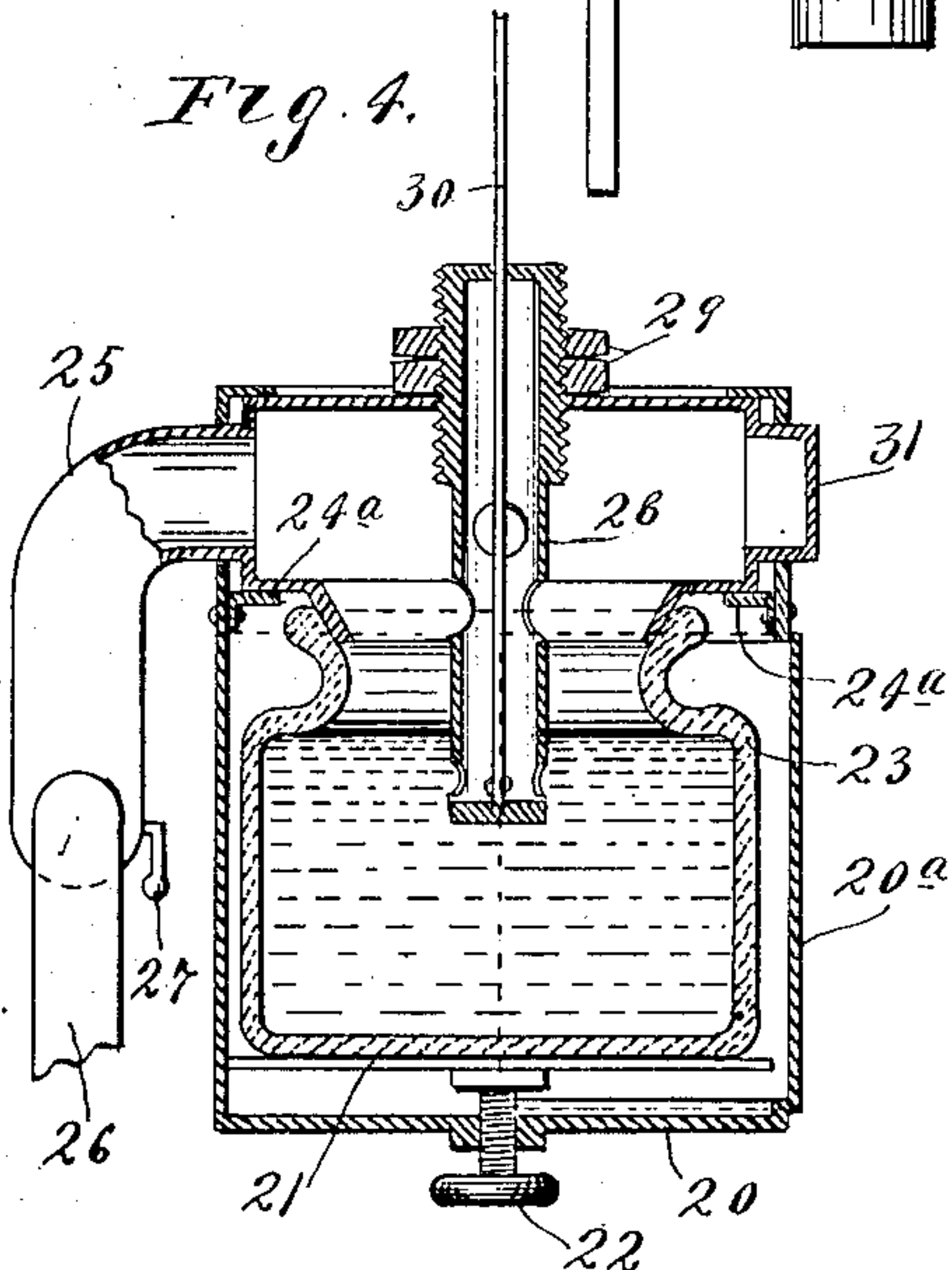


Fig. 2.

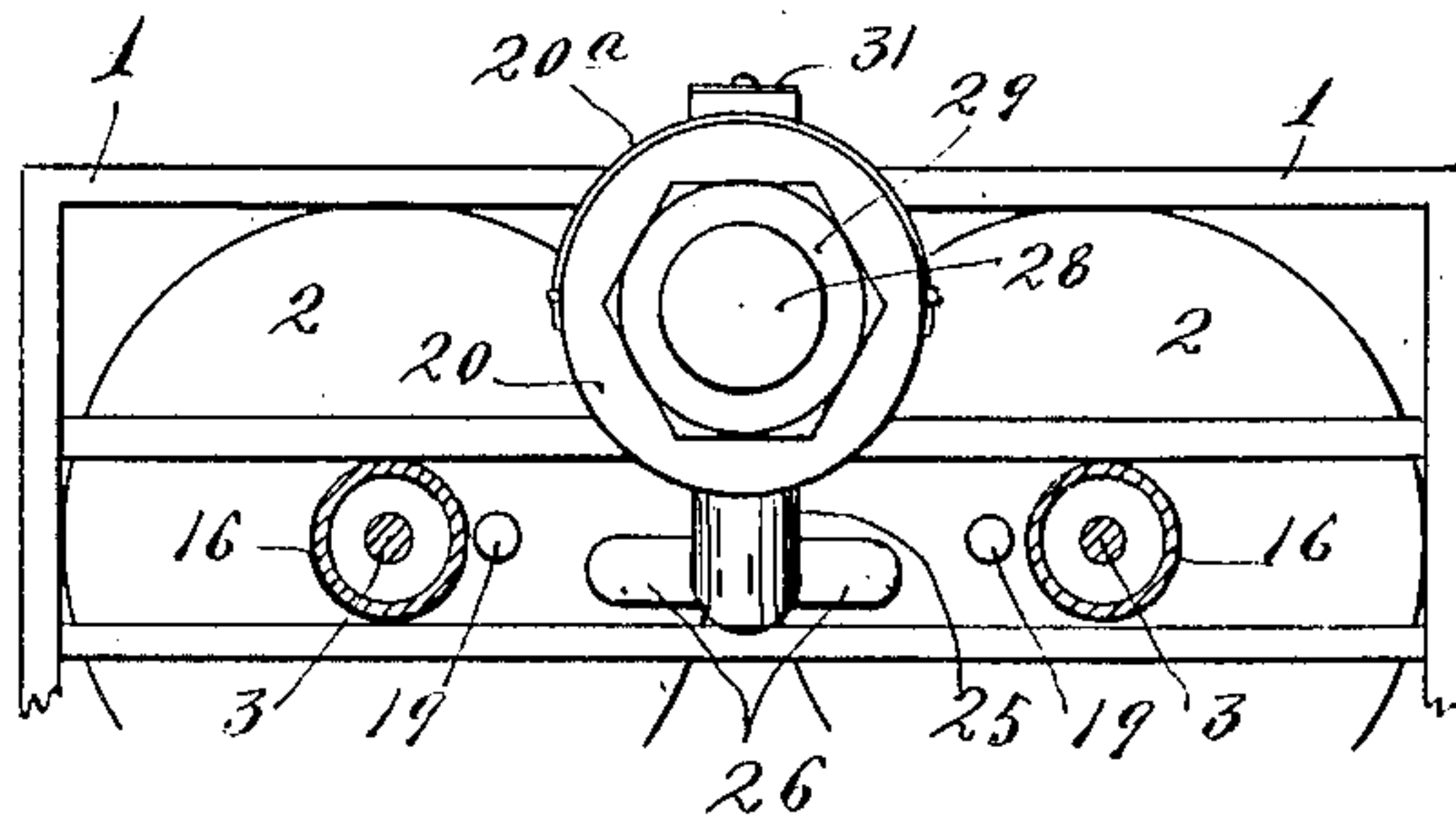
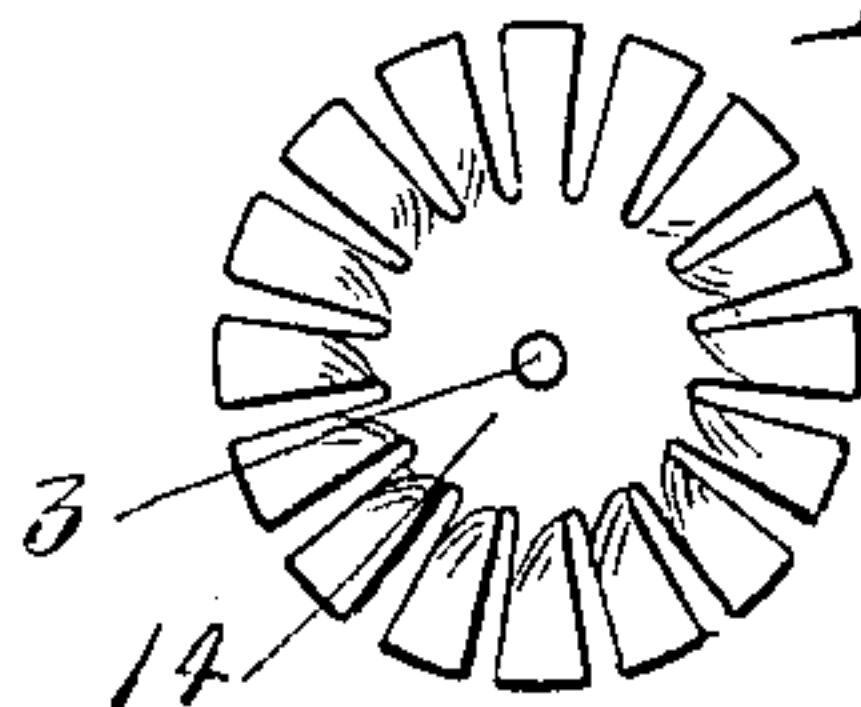


Fig. 3.



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# UNITED STATES PATENT OFFICE.

FRED MEARS, OF MINNEAPOLIS, AND JOSEPH CRAIG, OF PRINCETON, MINNESOTA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO HYGIENIC REFINER COMPANY, OF PRINCETON, MINNESOTA, A CORPORATION OF MINNESOTA.

## PROCESS FOR BLEACHING AND AGING FLOUR AND OTHER GRAIN PRODUCTS.

No. 882,527.

Specification of Letters Patent.

Patented March 17, 1908.

Original application filed April 27, 1907, Serial No. 370,719. Divided and this application filed July 31, 1907.

Serial No. 386,500.

*To all whom it may concern:*

Be it known that we, FRED MEARS and JOSEPH CRAIG, citizens of the United States, residing at Minneapolis and Princeton, respectively, in the counties of Hennepin and Millelacs and State of Minnesota, have invented certain new and useful Improvements in Processes for Bleaching and Aging Flour and other Grain Products; and we do hereby 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.

Our invention has for its object to provide an efficient process for bleaching and aging flour, or other grain products; and to this end, our invention consists in subjecting the flour to nitric oxid gas (NO).

The present case is a division of our pending application S. N. 370,719, filed April 27, 1907, entitled "Process and apparatus for bleaching and aging flour and other grain products".

The accompanying drawings illustrate a suitable apparatus for the successful utilization of our said process, or invention, and this apparatus is substantially the same as the one disclosed and claimed in our above identified pending application, but differs therefrom in certain details.

In said drawings, wherein like notations refer to like parts throughout the several views:—Figure 1 is a view chiefly in side elevation, but partly in vertical section, with some portions broken away, illustrating our improved apparatus. Fig. 2 is a plan view of the parts shown in Fig. 1, with some portions removed and others shown in diagram lines only. Fig. 3 is a detail showing the flour distributing head detached, in plan view; and Fig. 4 is a detail showing the gas generator detached, chiefly in vertical section but with some parts in elevation.

Upon a suitable skeleton frame 1 is mounted a pair of cylindrical mixing vessels 2, closed at their upper ends and having hopper-like bottoms. In each of these vessels 2 is suitably supported a rotary shaft 3, having at its upper end a beveled pinion 4 engaging a bevel gear 5 on countershaft 6. Each countershaft 6 is shown as provided with a sprocket wheel 7 connected by a chain 8 with

a main shaft 9 receiving motion from any suitable source, not shown.

As shown, the shaft 3 is supported by a bearing bracket 10 fixed to the walls of the mixing vessel 2, and an upper bracket 11 projecting from a standard 12 rising from the main frame 1, and which also supports the bearings for the shaft 6. To the lower end of the shaft 3 is fixed a screw blade 13 co-operating with the shaft 3 to afford a screw conveyer working in the neck or outlet of the hopper-like bottom of the mixing vessel 2. To the shaft 3, within the vessel 2, at a suitable point below the head or upper end of the vessel 2, is located a flour distributing head 14 which, as shown, is of approximately disk-like form, its central portion being a solid web and its outer portion being made up of radial projections or fingers extending outward from the solid web, and bent upon themselves so as to assume somewhat the shape of propeller blades or paddle arms, as can be readily understood from an inspection of Figs. 1 and 3. The flour is supplied from an overhead source through the main trunk or chute 15, having a pair of diverging legs 16, the feet sections of which are vertical and of cylindrical form, and tap or are secured to the heads of the vessels 2. At the point where the legs 16 diverge from the trunk 15, is located a weighted valve 17 which may be shifted to throw the flour to either of the vessels 2 and shut the same off from the other, whenever so desired. In the vertical or feet sections of the legs 16 is mounted a flanged sleeve 18 in such a way that it will telescope or move freely up and down therein. The sleeve 18 is adjustably supported by a hand screw 19 tapped through the head of the vessel 2 and taking hold of the sleeve flange. The shaft 3 passes out through the sleeve 18 and the vertical section of the flour supply leg 16. By adjusting the sleeve 18 up or down, it may be brought nearer to or farther away from the distributing head 14, and thus be made to regulate the flour or feed supply to the mixing chamber 2.

On the top of the frame 1 is mounted a suitable casing 20 adapted to support the working parts of the gas generator. As shown, the casing 20 is provided with a door 20<sup>a</sup>.



and a false bottom 21 mounted on hand screw 22 and adapted to be raised or lowered thereby within the casing 20. On the false bottom 21 is removably mounted the retort or generating vessel 23 composed of refractory material, such as glass or porcelain. Above the generating vessel 23 is a collector 24, shown as removably supported on shelves 24<sup>a</sup>. The collector 24 has a hopper-like bottom adapted to fit within the neck of the generating receptacle 23 and form a tight joint therewith; when the latter is raised to its highest position by the hand screw 22. The collector 24 is preferably made of aluminium, but may be made of other suitable material which will not be attacked by the generated gas. From one end of the collector 24 extends a main delivery pipe 25 which splits into two branches 26 tapping the respective mixing vessels 2 through the top walls of the same, as clearly shown in Fig. 1 of the drawings. At the junction of the branches 26 with the main pipe 25 is located a weighted valve 27 for directing the gas into either of the vessels 2 and cutting the same off from the other, whenever so desired.

An aluminium tube 28 is adjustably suspended within the generator. As shown, the tube 28 is suspended from the top wall of the collector 24 by means of nuts 29 having screw threaded engagement with the upper or screw threaded portion of the tube 28. The tube 28 is closed at its opposite ends but is perforated in the part thereof which works within the generating vessel 23 and collector 24. The tube 28 is adapted to support a generating rod 30 of galvanized iron, in such a way that the rod will automatically feed down, by gravity, as the lower end of the rod is consumed in the gas generating action. In the receptacle 23 is placed a solution composed of two-third parts nitric acid and one-third part water. Into this solution is placed sulfate of copper to the amount of about three per cent. of the liquid solution. Then, when the rod 30 of galvanized iron is submerged in this solution, at its lower end, the generating action will take place; and the gas will accumulate in the collector 24 and will pass out therefrom through the pipes 25 and 26 into the mixing chambers 2, or one thereof, according to the way in which the valve 27 is set. The compounds of nitrogen and oxygen produced from the materials indicated, are heavier than the air, and hence, the gas will feed by gravity from the pipes 25 and 26 into the mixing chambers 2 and pass down through the latter. The gas supply pipe 26, to the respective mixing chambers 2, tap the heads of these chambers; at a point above the flour distributing head 14. Under the rotary motion of the distributor 14, the

flour falling thereon, through the sleeve 18, will be thrown off from the distributor in the form of a shower, or in a finely divided condition, well adapting the gas, entering through the pipe 26, to get directly at all the different particles of the flour. The gas generated from the ingredients above noted is nitric oxid (NO); and, in view of the way in which the generator gets its delivery to the mixing vessels 2, the gas can be delivered into the said mixing chambers in its substantially generated form, i. e. nitric oxid. The flour supply chute sections 15 and 16 are always loaded full of flour, and the outlet from the hopper bottom, under the action of the screw propeller 13, will be loaded full of flour, the feed being adjusted properly to secure this result. It follows that the flour will enter the mixing chambers 2 and pass therethrough with very little (if any) air entering therewith. Hence, it will further follow that the gas will remain and be applied to the flour in the form of nitric oxid or as it was generated at the generator. Tests and analyses, made by an expert chemist, have demonstrated that the nitric oxid is a most efficient form of bleaching agent.

So far as we know, we are the first to have treated flour, or other grain products, with nitric oxid. All bleaching and aging apparatus disclosed in the prior art, so far as known to us, delivers to the flour peroxid of nitrogen, or peroxid of nitrogen commingled with more or less peroxid of hydrogen, or ozone with peroxid of hydrogen. Our commercial usage has demonstrated that, with the use of nitric oxid alone, a bleaching takes place in much less time; or, put it another way, with much less gas per unit of flour as compared with any of the processes hitherto proposed in the prior art.

While especially designed for bleaching and aging flour, it must be understood that the invention is applicable to bleach and age other grain products, when in a finely divided or comminuted condition; and, in the claims, the word "flour" is used in its broad or generic sense to cover any and all kinds of grain products in a finely divided condition.

What we claim is:—

The process of bleaching flour or other grain products, which consists in subjecting the flour to nitric oxid gas (NO), substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

FRED MEARS.  
JOSEPH CRAIG.

Witnesses:

JAS. F. WILLIAMSON  
HARRY D. KILGORE.