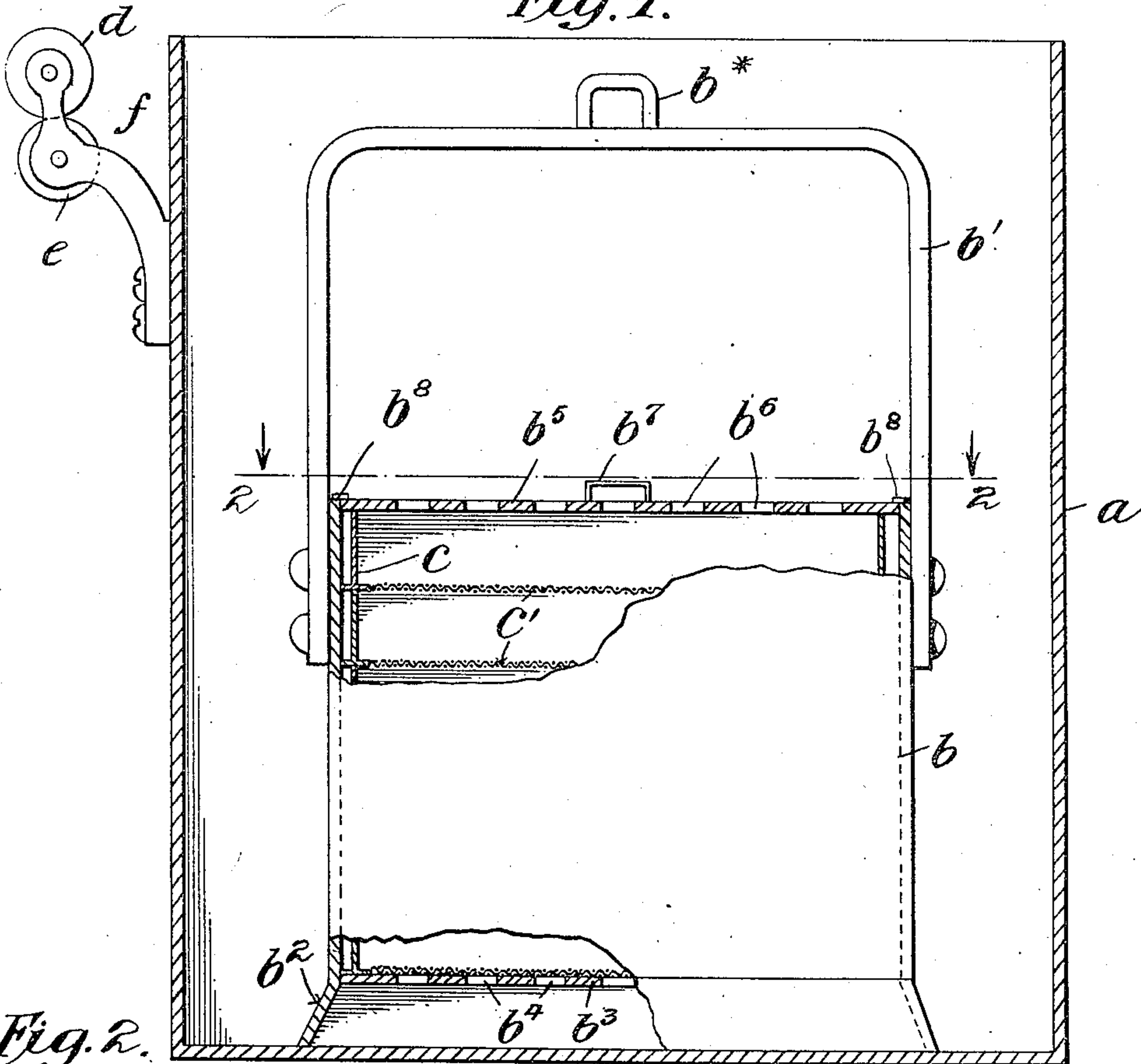


No. 855,751.

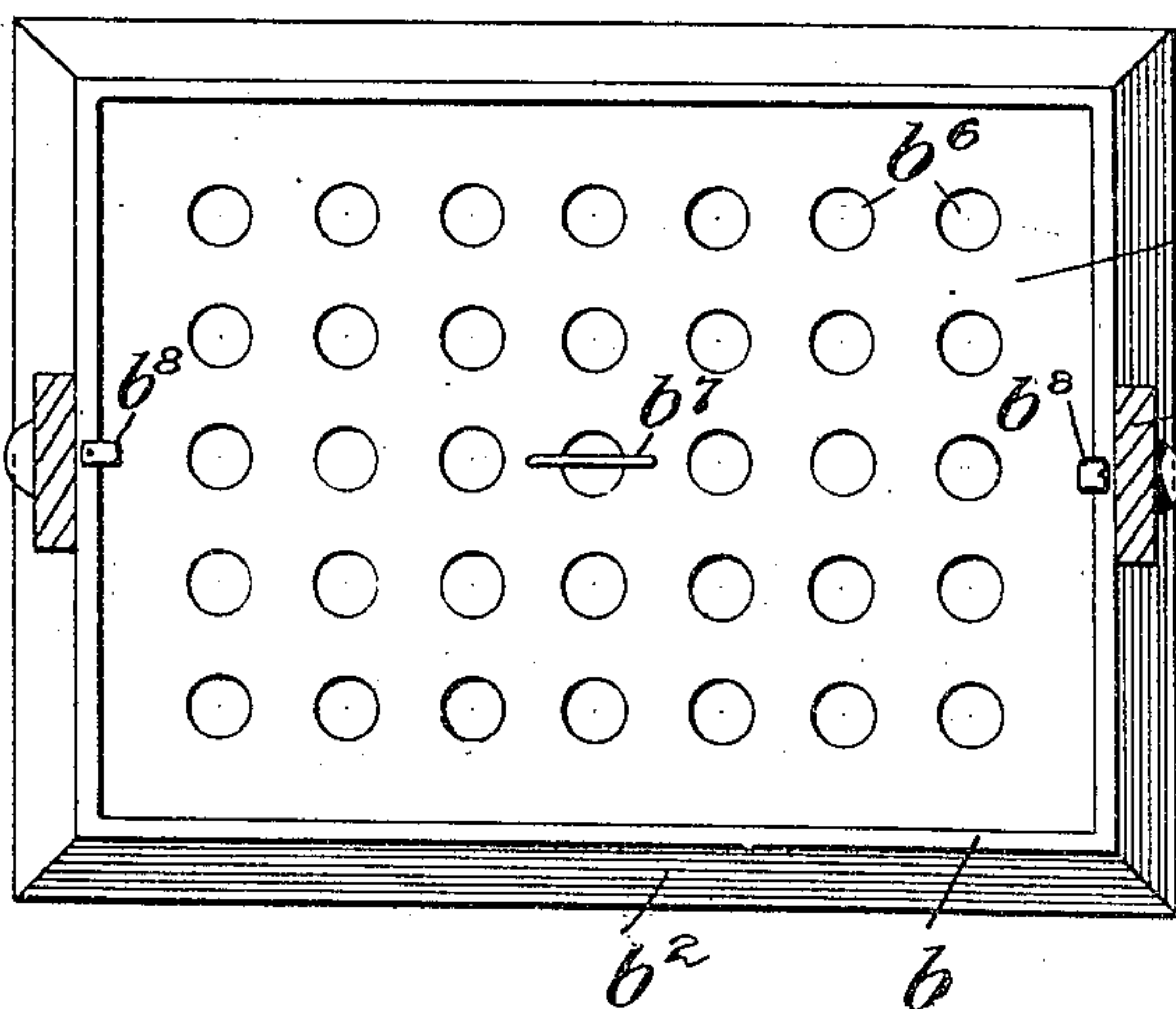
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H. R. BONNY.  
METHOD OF PREPARING VEGETABLE FIBERS.  
APPLICATION FILED JUNE 27, 1906.

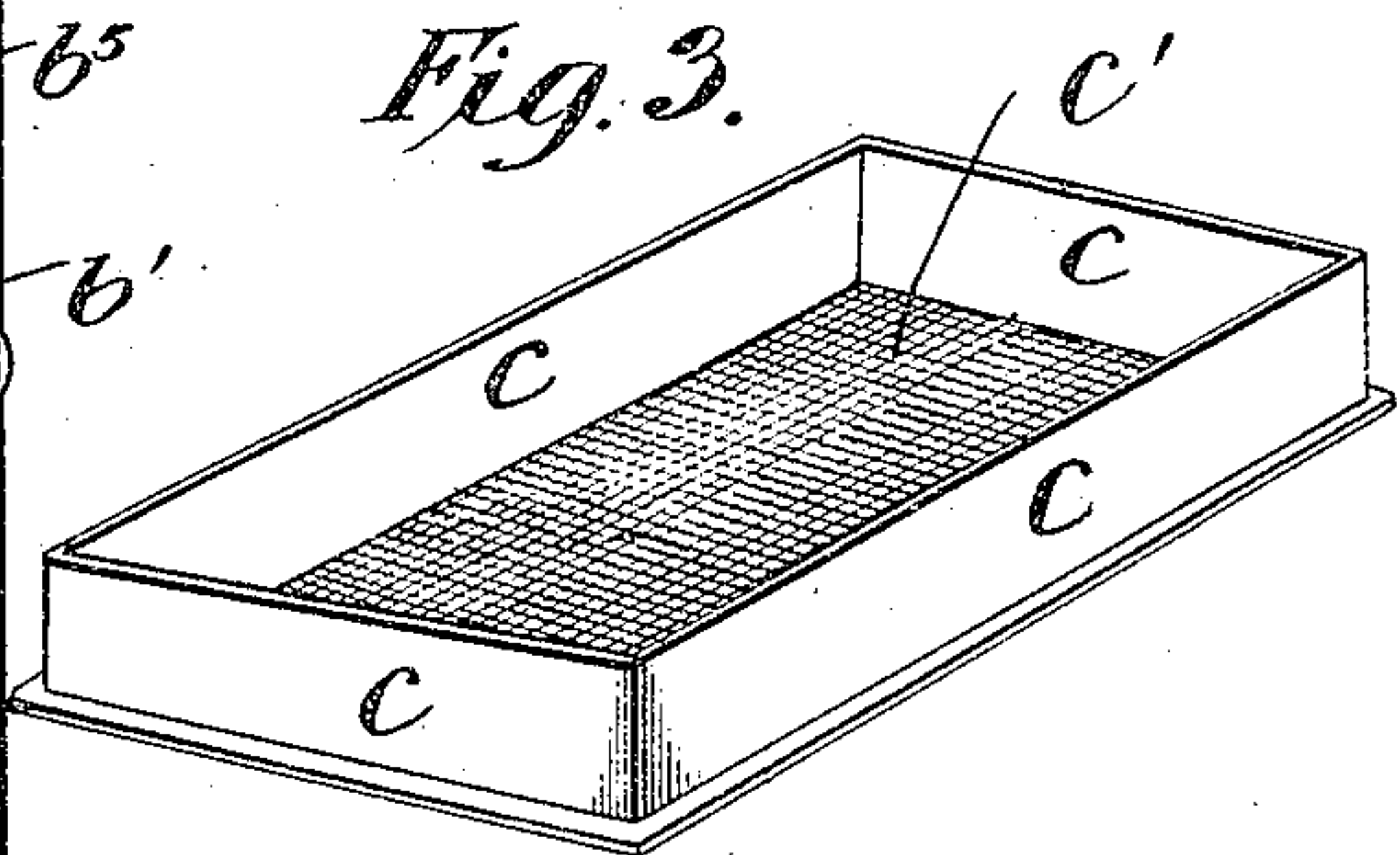
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## METHOD OF PREPARING VEGETABLE FIBERS.

No. 855,751.

Specification of Letters Patent.

Patented June 4, 1907.

Application filed June 27, 1906. Serial No. 323,719.

*To all whom it may concern:*

Be it known that I, HOWARD ROGERS BONNY, a citizen of the United States of America, and a resident of the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in the Methods of Preparing Vegetable Fibers, of which the following is a specification.

10 This invention relates to a process for the treatment of vegetable fibers, being intended more particularly for the degumming and decoloring of mechanically decorticated flax fibers; and for decoloring flax fibers that  
15 have been subjected to the usual retting process.

By mechanical decortication the shive or chive is broken up, and the fibers are separated from the shive and from each other in  
20 the outer bast. These fibers are, however, incrustated with gum or a gum resin, by which some of the fibers adhere to each other and remain matted with particles of the broken shive. This incrustation of gum is a hindrance in the spinning of the fibers and in the  
25 manufacture of linen fabrics. The removal of the gum from the fibers by the process of retting is the result of fermentation which takes place in the stalks when they are left  
30 to soak in water. This retting process is tedious, occupying from seven to fourteen days, after which the stalks are spread out on the field to be dried. The process of retting  
35 which it depends is influenced by the outward atmosphere and the temperature of the water. It is an uncleanly and foul-smelling process, and the fibers are deteriorated by the process of fermentation or rotting going  
40 on for several days all around them.

The improved process of removing the gum from the fibers is accomplished in the short period of a few hours. It is cleanly, the fibers are not subjected to the injurious  
45 effects of fermentation in their midst, and they retain their inherent strength.

In carrying out said new process of degumming fibers which have been mechanically decorticated, but which are coated with gum,  
50 a mass of the fibers is subjected to movement in, or the movement of, water of moderate temperature that has been made alkaline and its solvency increased by the addition of a borate salt of a metal of the alkali-

lies. The alkaline water in conjunction with the slight pressure from the movement aforesaid, dissolves the gummy or glutinous matter incrusting the fibers and removes it from the fibers, leaving them clean and free.

In practice, a mass of fibers that have been mechanically separated as aforesaid, but in which the gum or glutinous matter is still present, is subjected in a thin layer to side-wise movement in, or the movement of, water of moderate temperature that has been rendered alkaline, as stated, such solution permeating said thin layer of fibers and in conjunction with the slight pressure created by movement, dissolving the gummy or glutinous matter, thereby speedily removing  
60 such matter from the fibers. To prevent matting of these fibers while undergoing the degumming process, a mass thereof is placed in a foraminous cage or cage composed of open wire netting, the fibers lying horizontally in said cage, and mechanical means are provided for moving said cage to and fro vertically within the bath aforesaid. The same effect can be obtained by pressure of the alkaline water forced against the sides and  
70 through the mass of the fibers.

It has been found in practice that a solution of a borate of potash of about the strength of one to two grains to the ounce of water, speedily and efficaciously dissolves the gum about the fibers, the operation being expedited through the pressure created by the movement referred to, and occupying not more than several hours.

The water of the bath should not contain iron or lime, so that when they are present the water should be boiled, and when the flax is placed in said bath, the water should be warm and bland. This process has been successfully employed with the water containing the borate at a temperature of about 70° F. While the warm or moderate temperature of the water assists in the removal of the gum, I have found it unwise to materially increase the degree of heat for the reason that should the water be, for example, at boiling heat, the result would be to render the product harsh and less flexible and yielding.

A range of temperature of from 70° F. to 100° F. has no deleterious influence upon the character of the fibers.

In treating a quantity of flax, a cage con-



taining a series of closed shallow trays has been employed, each tray capable of containing a layer of fibers, the tops and bottoms of the cage and trays being foraminous or of open work as in the path of the movement or pressure applied, and closed at the sides for the purpose of insuring the passage of the solution through the fibers, and of preventing diversion of fluid pressure. In other words, when such cage containing the several layers of fibers is moved vertically in the bath, the fluid must pass through said layers without being diverted or allowed to escape at the sides of said cage.

In illustration of a form of mechanical device which may be employed in carrying out my process, I have annexed hereto a sheet of drawings, wherein

Figure 1 is a vertical sectional view of a bath containing a cage having trays for the fibers, the cage being shown partially broken away. Fig. 2 is a top plan view taken on the line 2—2 of Fig. 1, and Fig. 3 is a perspective view of one of the trays.

In said figures the letter *a* indicates a tank of any suitable form, and *b* indicates a cage having a handle *b'* with attaching eyelet *b\**, and supporting base flange *b<sup>2</sup>*. The cage *b* comprises a rectangular receptacle whose base *b<sup>3</sup>* is provided with a series of openings *b<sup>4</sup>* and whose top *b<sup>5</sup>* is provided with a series of openings *b<sup>6</sup>*. One of the sides or the top of the cage may be removable, and I have shown the top as provided with a handle *b<sup>7</sup>* by which it may be removed to insert and withdraw the trays, swinging lugs as *b<sup>8</sup>* retaining this cover in place when the device is in use. The trays to contain the fibers have surrounding walls *c* and a foraminous base *c'*. These trays are placed, one on top of another within the cage *b*, and the cage cover *b<sup>5</sup>* being fitted and secured thereover, the device is then in readiness for use.

A sufficient quantity of the fibers is placed within the trays to fill the latter so that the top of the layer of fibers in each tray comes against the under surface of the bottom of the next upper tray, or in the case of the top tray the fibers therein come against the cage top. By this means the fibers are prevented from such individual movement as might cause them to become tangled or matted. In other words, the individual fibers of a layer thereof contained in a tray are maintained in parallelism, this being an important feature as it prevents waste in heckling and permits the heckling to be carried out in a satisfactory manner.

*d* *e* represent a pair of rollers pivoted in a bracket *f*, which may be attached to the tank *a*, said rollers being intended for the passage therebetween of the treated fibers, to squeeze out therefrom extraneous matter.

The purpose of the cage and trays being to support the fibers in thin layers and submit

them to sidewise reciprocating movement in or movement of the bath, thus provides moving contact between the individual fibers and the bath, and the foregoing description of an apparatus and its direction of movement is merely indicative of a practical example in the performance of the process. If the fibers were bunched and moved sidewise in the bath the fluid would not so readily pass between the fibers, as is obvious; while, if moved longitudinally, the same objection would obtain, and the gummy matter be forced into the interior of the bundle.

After undergoing the aforesaid degumming process the fibers are found to still retain their coloring matter, the removal whereof, without resorting to the usual tedious operation of bleaching, comprises another step in the present process. In accomplishing this object the cage containing the degummed fibers is placed in a bath containing saponified water, which may be at a temperature of about 95° F., and the fibers subjected to sidewise movement in or the movement of said bath; whereby, within a short period of time the coloring matter is removed from the fibers. Less than an hour has served in the performance of this step.

The proportionate quantity of soap to be dissolved in the bath for the purpose of decoloring the fibers varies according to the particular quality of the flax undergoing treatment, but can be easily ascertained, it being only necessary to render the bath saponaceous to a suitable degree.

The above noted step of effecting decolorization of the fibers is not limited to employment with mechanically decorticated fibers, but may also be used efficiently in the case of fibers that have been retted, (but not decolored) in the usual manner.

In some instances, where it is desired to expedite the operations aforesaid, the separate steps of degumming and decoloring decorticated fibers may be performed in a single bath. To this end the bath, rendered alkaline by the addition of a borate salt of a metal of the alkalies, and at a temperature of 95° F., or thereabout, has a quota of soap dissolved therein; and the decorticated fibers, in the manner previously described, are subjected to movement in or the movement of said bath for a sufficient length of time. Less than half an hour has served.

The gummy and coloring matter being dissolved as described, the fibers are removed from the bath and from their container, then being passed through plain rollers, as *d* *e*, to squeeze out the dissolved gummy and coloring matter; thereafter, the fibers, which may be again contained in layers in a foraminous cage, are placed in a bath of clear water, and subjected to movement in or the movement of said bath to cleanse them from all adherent extraneous matter. The fibers will



then be found to be finely separated, free from gum and resinous matter, and to present a white or grayish white appearance.

I claim:

5 1. The method of degumming decorticated vegetable fibers which consists in placing a layer of loose fibers in a warm bath made alkaline by a weak solution of a borate salt and creating pressure between said bath and  
10 fibers.

2. The method of degumming decorticated vegetable fibers which consists in placing a layer of loose fibers in a warm bath made alkaline by a weak solution of a borate salt  
15 and creating pressure against the side of said fibers by moving them in said bath.

3. The method of degumming and decoloring decorticated vegetable fibers which consists in (1st) placing a layer of loose fibers in  
20 a warm bath made alkaline by a weak solution of a borate salt, (2nd) creating pressure between said bath and fibers, (3rd) placing the degummed fibers in a saponaceous bath, and (4th) creating pressure between said  
25 bath and fibers.

4. The method of decoloring separated vegetable fibers which consists in (1st) re-

moving the gum therefrom, (2nd), in placing separated parallel layers of loose degummed fibers in a warm saponified bath, and (3rd) 30 creating pressure between said bath and fibers.

5. The method of degumming and decoloring decorticated vegetable fibers which consists in placing a layer of loose fibers in a warm bath made alkaline by a weak solution  
35 of a borate salt and saponified; and creating pressure between said bath and fibers.

6. The method of degumming and decoloring decorticated vegetable fibers which consists in placing a layer of loose fibers in a warm bath made alkaline by a weak solution  
40 of a borate salt, and saponified; creating pressure between said bath and fibers; then squeezing the dissolved matter from said  
45 fibers, and finally washing and drying said fibers.

Signed at New York, this 22nd day of June, 1906.

HOWARD ROGERS BONNY.

Witnesses:

FREDERICK C. BONNY,  
F. W. BARKER.