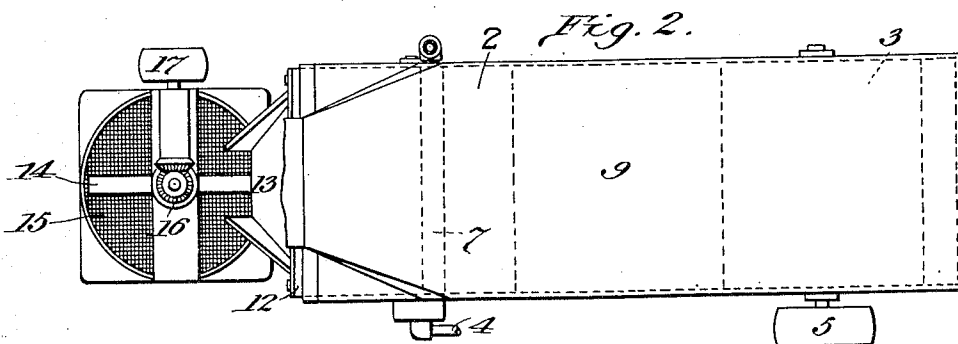


913,760.

Fig. 1.



Grace Cars -  
Spring Abundant

William S. Osborne  
by his Attorney -  
Arnum F. Dorsey

# UNITED STATES PATENT OFFICE.

WILLIAM S. OSBORNE, OF HYDE PARK, MASSACHUSETTS.

## APPARATUS FOR DESICCATING FLUID SUBSTANCES.

No. 913,760.

Specification of Letters Patent.

Patented March 2, 1909.

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*To all whom it may concern:*

Be it known that I, WILLIAM S. OSBORNE, a citizen of the United States, residing at Hyde Park, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Desiccating Fluid Substances, of which the following is a specification.

My invention relates to an apparatus for desiccating and pulverizing fluid substances such as milk, eggs, and the like, in such a manner as to produce a dry solid substance without substantial change in the chemical composition of the material.

The object of the invention is to produce apparatus of the character referred to by which the desiccating operation may be rapidly and economically performed in a reliable and uniform manner, and without the possibility of injuring the substance operated on by overheating, and to this end the invention consists in the apparatus hereinafter described, as defined in the appended claims.

In the accompanying drawings Figure 1 is a side elevation, partly in section, of an apparatus embodying the invention, and Fig. 2 is a partial plan view of the same.

The drawings are diagrammatic in character.

The method of operation of the apparatus consists in forming a film of the fluid substance on a suitable surface, drying the film thereon by the passage of a current of air over the surface, and removing the dried film from the surface. The film may then be reduced to powder. The drying air is preferably heated to a moderate degree to increase its drying effect, and the drying surface also may be heated, but in all cases the degree of heat used is substantially below that at which chemical change in the material can occur, as the drying operation is accomplished principally through the mechanical effect of the current of air over the drying surface.

To render the operation continuous, a moving surface is preferably used, and to insure the separation of the dried film from the surface a scraper or other suitable means may be provided.

In the apparatus illustrated in the drawings the drying surface is formed by an endless belt 1, of any material providing a smooth impervious surface, for which purpose sheet metal is preferred, and this belt

is mounted on two drums, 2 and 3. Drum 2 may be heated, if desired, by the admission of steam through steam pipes 4 entering through the journal of the drum, in order to heat the belt and hasten the drying operation.

The belt is moved longitudinally and constantly, in the operation of the machine, by drum 3, which is rotated by a pulley 5 connected with a suitable source of power. This movement is in the direction of arrow 6. The fluid substance is applied to the surface of the belt as it passes over drum 2 by means of a spraying pipe 7, which is perforated on its lower side and is connected with a tank 8 in which a supply of material is kept. The force necessary for spraying the material may be gained by elevating the tank or by the use of a suitable pump. The spray impinges upon the belt and forms a thin film which is carried away by the belt as fast as it forms.

To subject the film to a current of air, the belt is inclosed in a trunk 9, and the trunk is connected, at its upper end, with an exhauster 10, by which a current of air is induced in the trunk. This current flows in the direction opposite to the direction of movement of the belt, and passes over the drying surface both above and below the drums, so that its period of action upon the fluid is long enough to dry the latter without the use of a high temperature. The air is warmed, before its admission to the trunk, by means of steam coils 11.

The dried film is removed from the belt by a scraper 12, as it passes over drum 2, and the dried material falls into a chute 13, by which it is delivered to the pulverizer. The pulverizer comprises a brush 14 and a screen 15. The brush is rotated in contact with the screen by means of gears 16 and a pulley 17, and the material is thereby forced through the meshes of the screen and uniformly pulverized to reduce it to commercial form.

The inclined position of the belt shown in the drawings facilitates the uniform distribution of the fluid on the surface of the belt, and also renders the apparatus compact. By causing the air to move over the belt opposite to the direction of motion of the latter the drying effect of the air is increased, since the driest portion of the film is subjected to the action of the dry entering air. The speed of movement of the belt is regu-

lated to suit the character of the material and the proportion of moisture contained therein.

Various modifications may be made in the specific embodiment of the invention herein described and illustrated in the drawings without departure from the nature and scope of the invention, as it is defined in the following claims.

I claim:

1. Apparatus for desiccating fluid substances having, in combination, a metal belt, drums upon which the belt is mounted and by which it is driven, means for heating one of the drums internally, and means for applying a film of fluid to the surface of the belt at said drum.
2. Apparatus for desiccating fluid substances having, in combination, a metal belt, drums upon which the belt is mounted and by which it is driven, means for heating one of the drums internally, means for forming a film of fluid on the surface of the belt at said drum, and means for creating a current of heated air over said surface between the drums.
3. Apparatus for desiccating fluid substances having, in combination, a belt, two drums upon which the belt is mounted, one drum being higher than the other so that the belt is in an inclined position, means for rotating one of the drums to drive the belt, means for heating the upper drum internally, means for forming a film of fluid on the surface of the belt as it passes over the upper drum, and means for creating a current of heated air over the surface of the belt between the drums flowing contrary to the direction of motion of said surface.
4. Apparatus for desiccating fluid substances having, in combination, an endless belt, drums upon which the belt is mounted and by which it is driven, means for introducing heated fluid into one of the drums to heat the drum, means for spraying a fluid upon the surface of the belt at said drum, a trunk inclosing said surface between the drums, and means for inducing a current of air in the trunk.
5. Apparatus for desiccating fluid substances having, in combination, a belt, two drums upon which the belt is mounted and by which it is driven, one drum being higher than the other so that the belt is in an inclined position, means for introducing heat-

ed fluid into the upper drum to heat the drum, means for spraying a fluid upon the belt as it passes over the upper drum, a scraper engaging the belt in proximity to the upper drum, and means for creating a current of heated air over the surface of the belt as it passes to and around the lower drum.

6. Apparatus for desiccating fluid substances having, in combination, a belt, two drums upon which the belt is mounted, one drum being higher than the other so that the belt is in an inclined position, means for rotating one of the drums in a direction to cause the upper part of the belt to move downward, means for introducing heated fluid into the upper drum to heat the drum, means for forming a film of fluid on the upper side of the belt near the upper drum, a scraper engaging the belt as it passes over the upper drum, and means for creating a current of heated air over the surface of the belt between the drums.

7. Apparatus for desiccating fluid substances having, in combination, a belt, two drums upon which the belt is mounted and by which it is driven, one of the drums being heated and being higher than the other so that the belt is in an inclined position, means for spraying fluid upon the belt as it passes over the upper drum, a scraper engaging the belt in proximity to the upper drum, and means for creating a current of heated air over the surface of the belt as it passes from one drum to the other and around the lower drum.

8. Apparatus for desiccating fluid substances having in combination, a belt, two drums upon which the belt is mounted, one drum being heated and being higher than the other so that the belt is in an inclined position, means for rotating one of the drums in a direction to cause the upper part of the belt to move downward, means for forming a film of fluid on the upper side of the belt, a scraper engaging the belt as it passes over the upper drum, and means for creating a current of heated air over the surface of the belt between the drums.

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

WILLIAM S. OSBORNE.

Witnesses:

FARNUM F. DORSEY,  
MARGARET M. KILLEEN.