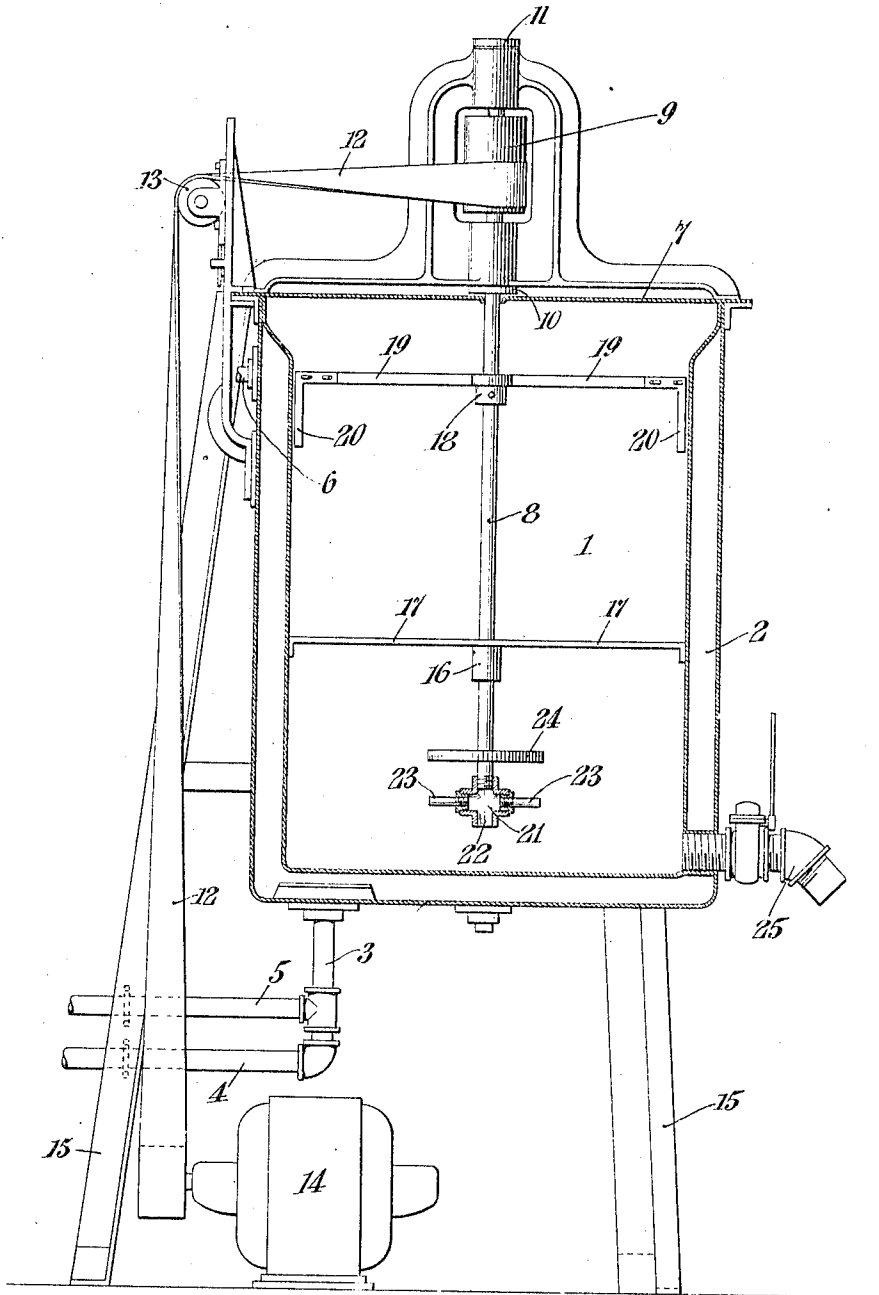


W. M. GROSVENOR.
MIXING APPARATUS.
APPLICATION FILED FEB. 29, 1916

1,293,087.

Patented Feb. 4, 1919



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MIXING APPARATUS.

1,293,087.

Specification of Letters Patent.

Patented Feb. 4, 1919.

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To all whom it may concern:

Be it known that I, WILLIAM M. GROSVENOR, a citizen of the United States, resident of Ridgewood, county of Bergen, State of New Jersey, have invented certain new and useful Improvements in Mixing Apparatus, of which the following is a specification.

My invention relates to improvements in mixing apparatus and is more particularly applicable to the mixing or emulsifying of more or less solid matter in fluids. My invention is particularly designed for the mixing or emulsification of waxy material in a mixture of or colloidal solution of starch and water, as more particularly explained in my co-pending application, Ser. No. 80353 filed Feb. 25, 1916. The main object of the invention is to provide an apparatus which is not only simple and efficient in construction and operation, but by means of which the materials may be most thoroughly and intimately mixed and in a short space of time. More specific objects, features and advantages will more clearly appear from the detailed description given below, taken in connection with the accompanying drawing, which shows an elevation of an apparatus embodying my invention in one form, the same being shown mostly in section.

Referring to the drawing, 1 represents a suitable container provided with a heating or cooling jacket 2, into which extends a pipe 3 connected with an inlet water pipe 4 and an inlet steam pipe 5, so that any suitable heating fluid may be introduced into the jacket 2. 6 represents an exit pipe for the heating or cooling fluid. 7 represents a suitable covering for the container, which may be made in sections or provided with a suitable opening through which the materials to be mixed may be inserted. 8 represents a suitable drive shaft extending into the container, the shaft having a pulley 9 thereon and being provided with ball bearings at 10 and 11. The pulley 9 and shaft 8 are driven by a belt 12 passing over idlers and the driving pulley of an electric motor 14. The motor is adapted to drive the shaft 8 at high speed. The container 1 and parts supported thereby are carried by supporting legs 15. The shaft 8 is also provided with a bearing 16 in the container, which bearing is carried by a spider 17, secured to the inside of the container. Secured to the shaft 8 near

the top of the container, is a collar 18 and loosely carried upon the collar 18, and free to rotate about the shaft 8 is a spider 19, carrying depending scraper fingers 20, adjacent the inner wall of the container. Connected at the lower end of the shaft 8 and carried thereby, is means consisting of a suitable head or pipe-union 21, something in the shape of a cross-T, provided with a pipe opening or duct 22 at its lower end and extending parallel with the shaft 8 and substantially at its axis. Secured laterally within the union 21 are two similar pipes 23, which extend radially so as to form radially arranged outlet ducts, which are of smaller diameter than the duct 22. Arranged above the pipes 23 is a disk 24, but situated sufficiently low on the shaft 8, so that it is well within the material being mixed.

In operation, when the shaft 8 is driven at high speed, the material is sucked up through the vertically arranged duct 22 and thrown laterally by centrifugal force through the outlet ducts 23, and at the same time the ducts or pipes 23 are tearing through the material, so that a most thorough breaking up and mixing of the materials in the container is accomplished. After the mixing is finished, the material may be withdrawn through a suitable valved exit pipe 25.

The disk 24 not only provides additional agitation in a well-known manner and performs a balancing action, but likewise has a tendency to prevent air being drawn in at the vortex of the material by the great suction at the opening 22, and tends to increase the width of the vortex so that the material is thrown higher up on the sides of the container, thereby producing a more thorough agitation.

By rotating the shaft 8 at about 1200 R. P. M., and operating on mixtures such as described in my co-pending application above mentioned, the materials are quickly emulsified. For batches of such materials of about thirty gallons, the diameter of the opening 22 may be about $\frac{3}{4}$ inch and the internal diameter of the sections 23 about $\frac{3}{8}$ inch, the sections 23 extending about 1 inch outwardly from the cross-T 21. The mixture being swirled about by the agitator 21, 22, 23, the upper portions of the mixture will engage the scraper fingers 20 and cause them to be rotated, the spider 19 being loosely mounted on the shaft 8, the rotation

of the scraper fingers 20 requires practically no power from the motor.

While I have described my improvements in great detail and with respect to one form thereof, I do not desire to be limited to such details, as many changes and modifications may well be made without departing from the spirit and scope of the invention, especially in its broader aspects. Hence I desire to cover all arrangements and modifications coming within the language of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A mixing apparatus having in combination a container, a stirrer therein having a vertically arranged inlet duct at its bottom and opposite radially arranged outlet ducts above the bottom, a disk situated above said outlet ducts but within the material to be mixed, each of said lateral outlet ducts being smaller than said inlet duct, and means driving said stirrer at high speed.

2. A mixing apparatus having in combination a container and agitating means therein comprising a vertical shaft and a pipe union screwed to the bottom of said shaft by means of its top pipe connection and having a bottom opening to provide a bottom inlet opening, and pipes screwed laterally into the pipe union, each of said pipes being of smaller cross section than said bottom opening and having their outer ends open to provide outlets for the material drawn upwardly through the bottom opening, and means for driving said shaft at high speed.

3. A mixing apparatus having in combination a suitable container, a stirrer therein

having a vertically arranged inlet duct and radially arranged outlet ducts, a disk situated above said outlet ducts but within the material being mixed, and means for driving said stirrer at high speed.

4. A mixing apparatus having in combination a container, and an outlet pipe in the bottom for withdrawal of the mixed material, a stirrer therein having a vertically arranged inlet duct at its bottom, and opposite radially arranged outlet ducts above the bottom, a disk situated above said outlet ducts but within the material to be mixed, each of said lateral outlet ducts being smaller than said inlet duct, and means driving said stirrer at high speed.

5. A mixing apparatus having in combination a suitable container and an agitator comprising a driving shaft with means having an inlet duct and a lateral outlet duct, whereby the material in the container is drawn in through the inlet duct and thrown rapidly from the outlet duct, and a scraper loosely carried by the shaft to rotate relatively thereto and adapted to be driven by the material being mixed.

6. A mixing apparatus having in combination a container and agitating means therein comprising a driving shaft with means having an inlet duct and a lateral outlet duct, whereby the material in the container is drawn in through the inlet duct and thrown rapidly from the outlet duct and a scraper carried by the shaft and operating above said lateral duct.

In testimony whereof, I have signed my name to this specification.

WILLIAM M. GROSVENOR.