Nov. 26, 1935. W. H. McCORKINDALE 2,022,428

CHURN

Filed June 22, 1934

Fig. 1.

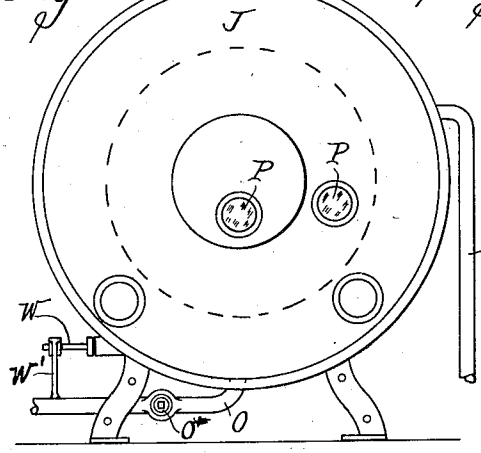


Fig. 2.

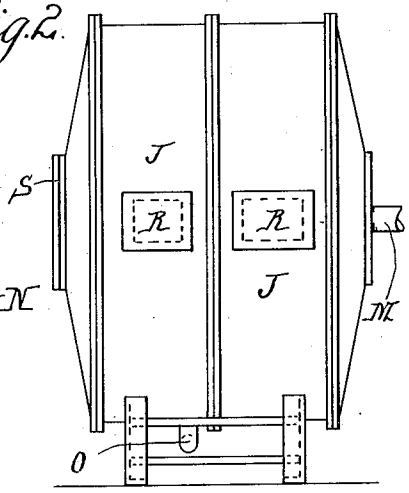


Fig. 3

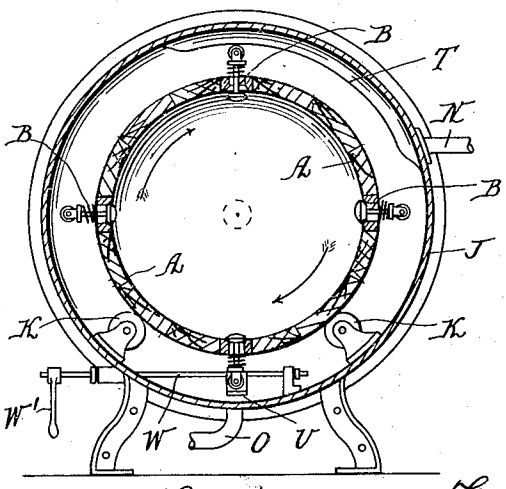


Fig. 4.

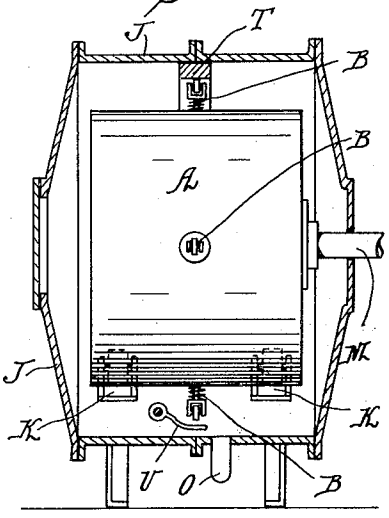


Fig. 5

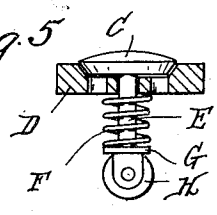
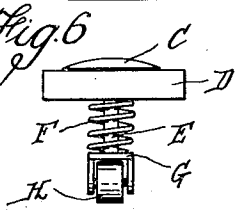


Fig. 6



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UNITED STATES PATENT OFFICE

2,022,428

CHURN

William Hamilton McCorkindale,
Auckland, New Zealand

Application June 22, 1934, Serial No. 731,954
In New Zealand July 27, 1933

2 Claims. (Cl. 259—50)

This invention has been devised with the object of providing means for combination with any of the ordinary types of churns having rotating bodies, whereby the operations of churning and working butter, margarine, and the like commodities may be carried out under vacuum conditions, in order thus to obtain the effects or benefits already well known in the art, attached to such method of operation.

The invention covers a construction of means which provide for the inside space of the rotating churn body or cylinder being connected with a chamber in which vacuum conditions are maintained, through the agency of automatically actuated valves fitted in such body and which valves are kept normally closed, but are caused to open as they move through the upper portion of their travel in the churn's rotation, in order thus to open up the churn body to the vacuum sphere and thereby cause any fumes and gases given off by the contents to be drawn out into the chamber and drawn away by the vacuum maintaining means employed.

The invention is suitably given effect to by enclosing the rotating churn body within an airtight casing formed to provide a clear space between it and the churn body and in fitting the valves in the periphery of the churn body. Each valve is made of spring controlled nature to keep normally closed but is designed to be opened, as it reaches a high point in the churn's rotation, by engaging a cam race fixed inside the casing and to be kept open for a proportion of its travel through the upper part of its travel and then allowed to close again. The casing is connected with any approved air pumping means whereby the space enclosed thereby is maintained in vacuum conditions.

The detail features of the invention's construction may be varied in a number of ways without departing from the main general features providing for the aforesaid effects being obtained.

The accompanying drawing illustrates a suitable manner of giving effect to the invention, the drawing being to some extent in diagrammatic form.

In such drawing:—

Figure 1 is an end elevation of the complete machine.

Figure 2 is a side elevation thereof.

Figure 3 is a cross sectional elevation, and

Figure 4 a sectional side elevation of the casing showing the churn body therein.

Figures 5 and 6 are detail views of a suitable form of valve fitting for the churn body.

A is the churn body which is made in the manner commonly employed in the art and provided with the usual means for charging it and for the discharge of its contents.

In this invention, however, the churn body is fitted with a number of valves B arranged in its peripheral wall at intervals apart and in the same circumferential line. Each of such valves, in the form shown in the drawing, is made of mushroom form having a head C fitted upon a seat that is formed upon the inside of the opening through a disc plate D let into the churn wall, and a stem E that passes out through a guide in such opening and has a compression spring F surrounding its outer end which by compression between the plate D and a fixture G upon the stem end, causes the valve head to be normally drawn out on to its seat to close the opening. The said fixture G has a running wheel H journalled in it to turn on an axis parallel with that of the churn.

In this invention, also, according to the manner shown the churn body A is mounted to rotate within a cylindrical airtight casing J made large enough to receive it and to form a clear space all round. For this purpose the body may be supported upon carrying wheel supports K arranged in the lower portion of the casing to allow of the ready rotation of the body through appropriate driving means actuating its drive shaft M. The casing is designed to be exhausted of air through the pipe connection N leading away therefrom to any suitable pump and to have its vacuum conditions maintained at any desired degree by the operations of such pump. A drain pipe O, controlled by a cock *o*, leads away from the bottom of the casing.

This casing is made of any material suitable for its purpose and may be made with inspection windows P in its end, and with access openings covered by airtight covers R in its wall, and may also have one end open and covered by a cover S, in order that free access may be had to the churn body within for facility in the carrying out of the churn's usual operations.

Affixed to the inside of the casing J to extend circumferentially for a distance round its upper portion, is a cam race T which projects out from the casing surface. This is arranged in the line of rotation taken by the churn valves B and is so shaped that as each valve is carried in the churn's rotation up towards its highest point, its running wheel H will engage upon the cam race and run thereon, in such engagement causing the valve head C to be pushed inwardly against the spring F, to open the valve and keep it open until the

end of the race is reached, when it will free the valve and allow it to close again. During the period the valve is open therefore the inside of the churn body is placed in open communication with the casing enclosure to cause the vacuum conditions prevailing therein to exhaust air or gases from the churn body. Each valve in turn thus opens and closes, and by an arrangement of the cam race to overlap the spacings between the valves, provision may be made to ensure of a constant connection with the vacuum source.

As the valves open only during their travel through the highest portion of their rotation, which is well above the load level of the material in the churn, the possibility of drawing away the liquid or semi-liquid matter with which the churn is charged in its operations, is obviated.

The valves B may also be used in the draining away from the churn of liquid residues left in it after its operations. This may be provided for by fitting a lifting arm U upon a spindle W arranged to extend across within the casing bottom and to project outside it and arranging such arm so that its end will lie beneath the valve B for the time being at the bottom point of its travel in respect of the churn's rotation. The outer end of the spindle W has a handle lever W' fixed to it and by turning this the spindle may be turned to raise the arm U to engage and lift the valve and thereby open it to drain away any liquid in the churn, which will then collect in the casing, to be drained away therefrom through the drain pipe O provided for that purpose.

It will be apparent that the details of construction of the valves and of their combination in the churn, as well as the means for their operation, may be varied in a number of ways without departing from the spirit of the invention. Also the form of the vacuum chamber constituted by the casing J may be varied to suit any special circumstances and to ensure that during the period each valve B is opened, it will connect the inside of the churn with the vacuum chamber.

Provision may be made whereby the valves may be thrown out of action, as by providing for the cam race T being constructed in such a manner as to permit of it being moved away from the line of travel of the valves, or back into such line, at will. Such a provision would be of advantage in churning operations to allow for the first period of churning, when the cream is in a very liquid state, being carried on without connection with the vacuum and then the connection with vacuum established when the mass had firmed up to some extent.

I claim:—

1. A churn of the rotating body type comprising an air-tight casing, a churn body rotatably mounted in said casing and provided with an opening in the wall thereof, a valve associated with said opening, means urging said valve to a position to close said opening, stationary means in the upper part of said casing for opening said valve when the opening closed thereby is in its uppermost position, and shiftable means in the lower portion of said casing adapted to be moved into engagement with said valve for opening the same when the opening closed thereby is in the lowermost position to provide for draining the contents of said churn body.

2. A churn of the character described, comprising an air-tight casing, means for maintaining said casing under a subatmospheric pressure, a churn body rotatably mounted in said casing and provided with a plurality of openings in the wall thereof, a valve associated with each of said openings, means for urging said valves to a position to close said openings, a cam within the upper portion of the casing for opening the valves as they are moved to the upper part of the casing during rotation of the churn body, and means for opening a valve in the lower part of the churn body for draining the contents thereof.

WILLIAM HAMILTON McCORKINDALE.