H. GARDINER.

Churn.

No. 37,224. Patented Dec. 23, 1862.

Fig: 4.

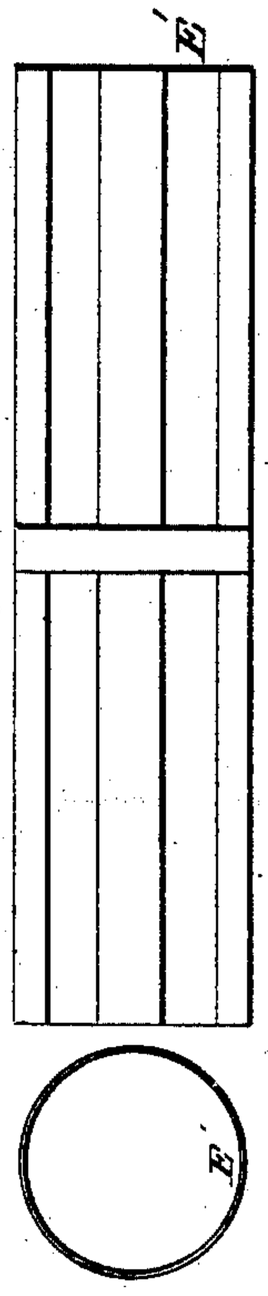


Fig: 3.

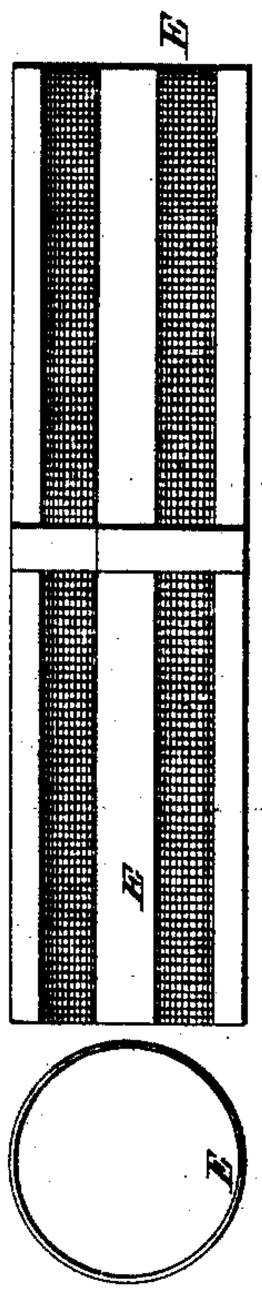


Fig: 2.

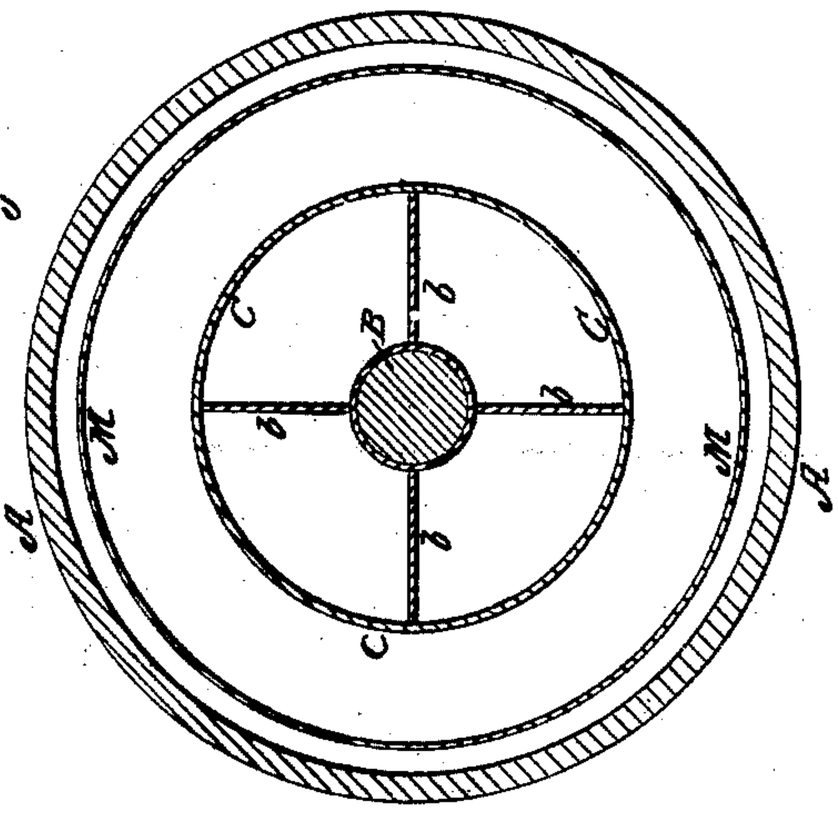


Fig: 1.

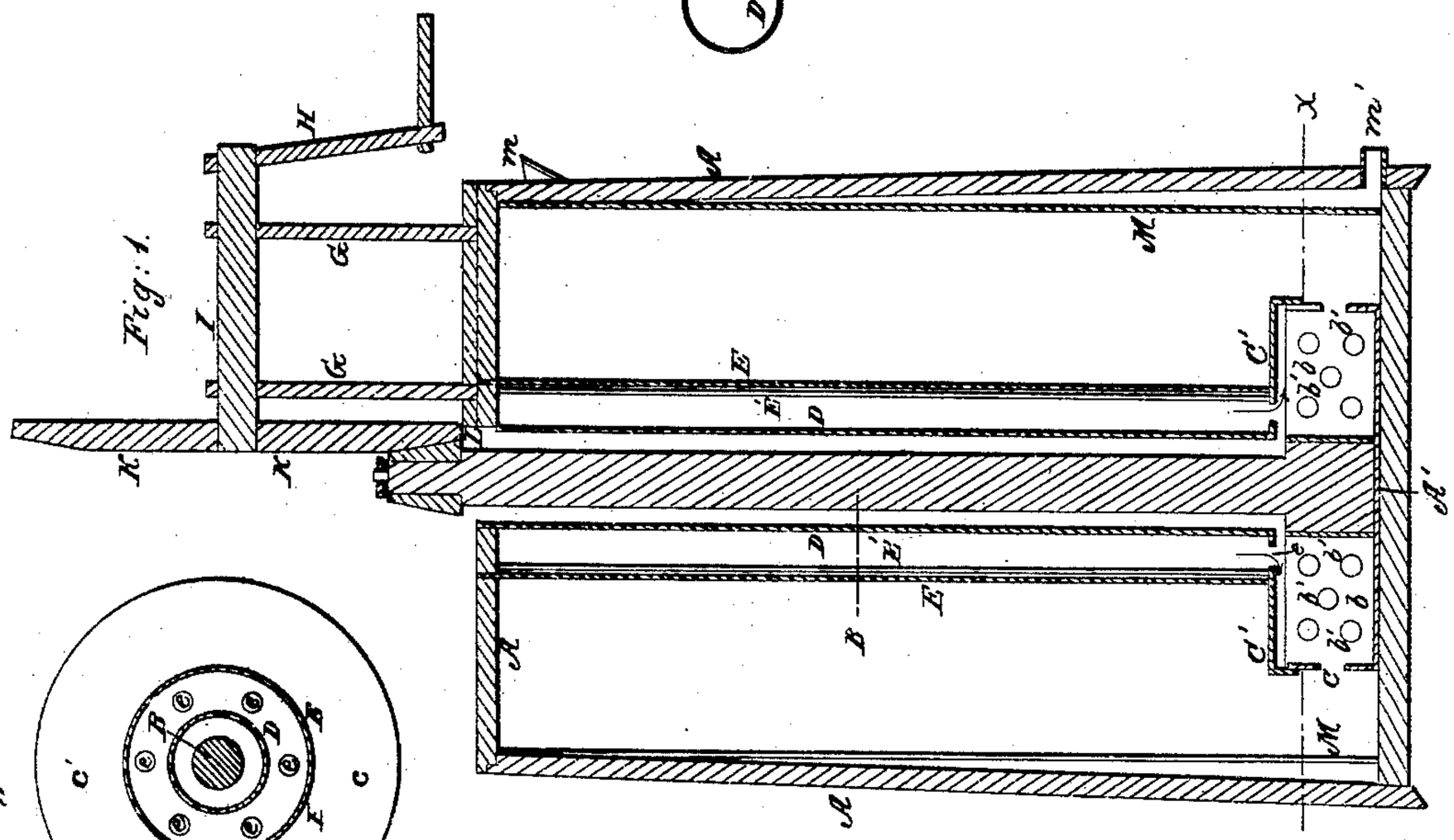
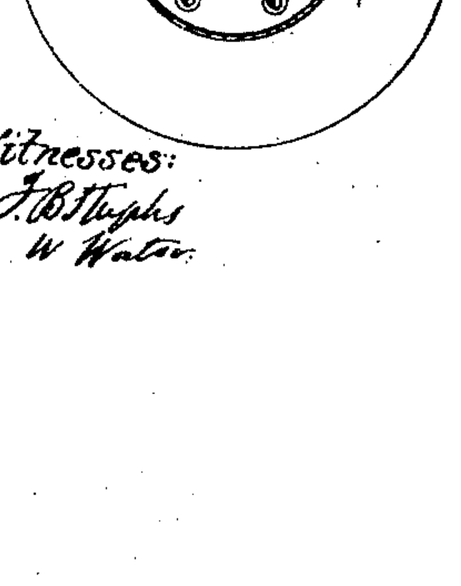


Fig: 6.



Witnesses:
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UNITED STATES PATENT OFFICE.

HEMAN GARDINER, OF NEW YORK, N. Y.

IMPROVEMENT IN CHURNS.

Specification forming part of Letters Patent No. **37,224**, dated December 23, 1862.

To all whom it may concern:

Be it known that I, HEMAN GARDINER, of the city, county, and State of New York, have invented new and useful Improvements in Churns; and I do hereby declare that the following is a full and exact description of my said invention and improvements, reference being had to the drawings accompanying and making part of this specification.

Figure I of the drawings represents a vertical cross-section through the center of the churn. Fig. II represents a horizontal cross-section of the churn at the part represented in Fig. I by the dotted line *x x*. Fig. III represents a perpendicular section of a wire strainer-tube. Fig. IV represents the sliding or rotary valve by which the spaces of gauze in Fig. III are closed. Fig. V represents the side of the cylindrical vessel or chamber, in section, at the bottom of the churn, showing simply a modification of the shape of the openings for the passage of the milk while the churn is operated. Fig. VI represents the chamber or closed cylindrical tub or box, in plan view, at the bottom of the churn, in which the agitation of the milk is produced.

In all the figures the same letters represent the same parts.

My improved churn is made of wood or metal suitable for the purpose, in the form of the wood tub or cylinder churns in common use, and the improvements in which my invention consists may be applied to such wooden churns as are ordinarily used by farmers and in dairies in the country.

In Fig. I the wooden churn-tub is shown—sides, bottom, and top—at A A, the cover being made removable at pleasure, but when in its place to be firmly fixed.

In the center of the churn, passing through an opening in the center of the cover, is the shaft or dasher B, extending down to the bottom of the churn. Upon the lower end of the dasher B are placed blades or arms *b b b b*, (usually four in number,) at right angles to each other. They are made of zinc, or any suitable metal that will not corrode, or of very hard tough wood, and they are perforated, as shown at *b′ b′ b′ b′*.

At the bottom of the churn and around the blades is placed the cylindrical box or chamber C, which is of a diameter considerably less than that of the churn, (say from about one-half to two-thirds,) and this chamber should so surround and inclose the blades as to just leave them space to rotate freely, the cover C′ of which should shut down closely and firmly upon the top of the chamber by means of a joint, but so as to be removable at pleasure. The sides of C are perforated with openings of a circular form or with vertical slots, as shown at *c c*, Fig. V.

The shaft or dasher B has its bearing at the top over the cover of the churn, and below upon the bottom of the chamber C, where there is a small gudgeon and socket to hold the shaft in place while being operated, as seen in Fig. I, at 1.

Around the shaft B is constructed the hollow tube D, open at top and bottom, and communicating with the interior of chamber C, resting at the bottom upon the cover C′, to which it is affixed firmly, but still so as to be readily removed. The tube D extends at the top to the cover of the churn. Its size is such as to permit the shaft B to rotate freely, and also a free passage of air through it into chamber C, and it should be made and fitted as to prevent the milk from getting into the space between it and the shaft, excepting at the bottom. Concentric with tube D are placed the strainers E, composed of alternate strips of gauze and sheet metal sufficiently large in diameter to give space for the milk to circulate freely.

The strainers are best made of wire, but may be made of netting of cloth. Under the circular chamber thus made between D and E are openings *e e* in the cover C′, through which the milk passes down into C by the operation of the dasher B and blades *b*, as indicated by the arrows. Inside of E is constructed a sliding cylinder, E′, having open and closed spaces alternately to correspond with the wire gauze or netting, so that by turning the open spaces to correspond with the wire-gauze the passage of the milk through the gauze will be unobstructed, and by bringing the closed spaces opposite the gauze the flow will be stopped, and so by a partial closing the flow may be greater or less, and graduated as desired.

Upon the cover of the churn, supported by suitable bearings, G G, and connected with a crank and shaft, H I, is placed the beveled wheel K, geared into the corresponding pinion, L, fastened upon the head of shaft B, and so

adjusted that very great speed may be given to the rotation of the shaft B by a comparatively slow motion of the crank H.

For the purpose of giving the required temperature to the milk in cool weather while being churned and keeping the temperature constant as long as possible without changing the hot water, I construct within the wooden frame of the churn A a metallic interior vessel, which shall form, with the wooden tube or cylinder, an air and steam tight chamber all around the milk. This interior cylinder should be made of zinc or tin, and is shown in Figs. I and II at M, *m* being a spout for pouring in the hot water, and *m'* being an opening or pipe for letting it run off. The churn, where its sides are constructed of metal, is made in a similar manner.

Having thus described my improvements and the construction thereof, I will now describe the operation thereof.

The milk being placed in the churn, a rapid motion is given to the dasher and blades, by which the milk is rapidly drawn through the gauze-wire, and thence into and then driven out of the chamber C. The agitation and passage of the milk through the gauze is very great and rapid, the revolution of the blades or wings *b b*, by their centrifugal force, forcing the air and milk out of the chamber C through the apertures in the sides or periphery of the chamber, causing a vacuum in C, to fill which the air passes freely down through the tube D into the chamber C, and the milk rushes with much force and rapidity through the gauze down through E in the direction of the arrows, also carrying with it air, which is thereby mingled with the milk constantly during the operation. The milk is kept in a continual flow, and is subjected to the application of the air constantly, and is thus permeated by it, and the apertures in the blades and in the sides of chamber C and in the gauze or wire netting constantly separate and agitate the particles of milk, by which the globules which constitute the butter are disengaged and float upon the surface, where the butter is formed without breaking the globules themselves.

The rotation may be made in either direction, and may be changed from one direction to another alternately and from time to time, as desired, and the flow be rendered greater or less by the opening or closing of the spaces in the gauze or wire cylinder E by turning the interior cylinder E′, as described.

When it is desired to open the churn or to separate the parts, the cover is lifted and the dasher raised, which also raises the cover C′ and the other parts, D, E, and E′, attached, and these parts are then easily separated for cleaning and replaced, which may be done as well when the milk is in the churn as when the churn is empty.

The chamber C at the bottom of the churn may also be easily removed and replaced, being made adjustable by any suitable fastenings or by being inserted into a groove in the bottom of the churn so as to fit neatly.

Having thus described my improvements and the manner of constructing and operating the same, what I claim as my invention, and for which I desire Letters Patent, is—

1. The secondary chamber C at the bottom of the churn, closed as described, having the apertures for the ingress and egress of the milk, in which chamber the agitating and permeating process is produced separate from the milk in the body of the churn.

2. The combination and arrangement of chamber C, the cylinders or tubes D E E′ around the dasher, operating so as to maintain, when the dasher is in motion, a circulation and agitation of the milk and air, as described.

3. The use and application of the combined gauze cylinder E and sliding cylinder E′, for regulating the circulation of the milk while the process of churning is going on.

4. The combination and arrangement of the inner tube, D, and outer tubes, E E′, so as to form the hollow space or chamber, through which space the milk is drawn downward to the bottom of the churn into chamber C.

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