

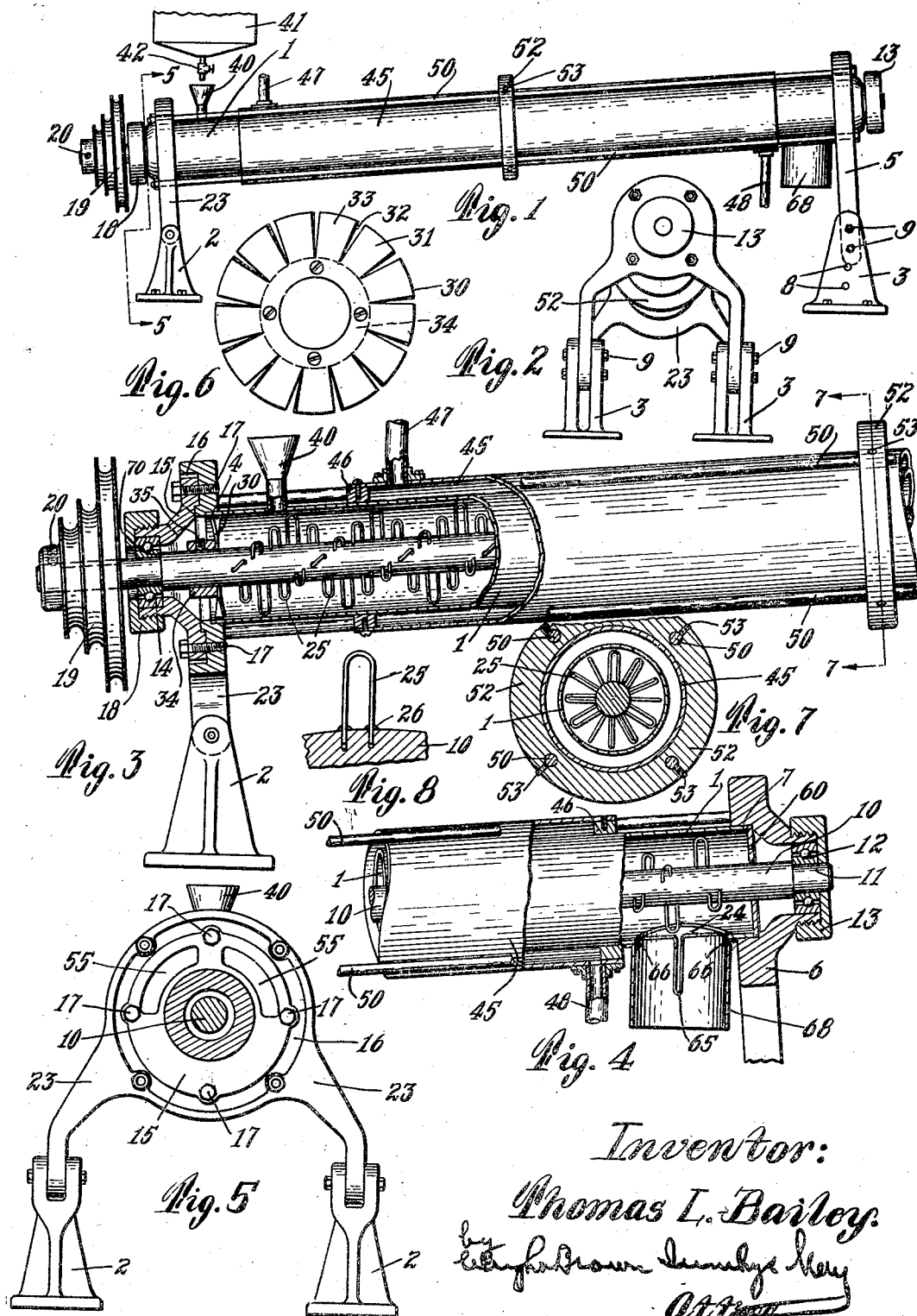
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T. L. BAILEY

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BEATER AND AERATOR

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Inventor:

Thomas L. Bailey.

by *Wm. H. Brown* *James H. Key*
Attys.

UNITED STATES PATENT OFFICE

THOMAS L. BAILEY, OF MELROSE, MASSACHUSETTS

BEATER AND AERATOR

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This invention relates to machines for beating eggs, whipping cream and for similar uses in connection with the manufacture of candy, pastry, and the like, and provides a construction wherein the beating takes place in a continuous process, the material to be beaten being continuously supplied at one part of the machine and continuously removed in beaten and aerated condition at another.

In general the machine comprises a tube arranged at an inclination to the horizontal and having therein an agitating member so formed as to tend to feed the material being beaten upwardly lengthwise of the tube. Provision is also made for introducing the material to be beaten at the lower end of the tube and for permitting the beaten material to pass out adjacent to the opposite end, and means is also provided whereby a current of air is introduced at the lower end of the tube, this current of air acting to aid in the beating operation, and passing in the direction of transportation of the material as it is being beaten to the upper end of the tube where it escapes. This tube is preferably jacketed so as to permit heating or cooling of the material being beaten as may be desirable in any particular case.

For a more complete understanding of this invention, reference may be had to the accompanying drawings in which

Figure 1 is a side elevation of the machine.

Figure 2 is an end elevation thereof looking from the higher end.

Figure 3 is a fragmentary elevation of the lower end portion of the machine to a larger scale than Figures 1 and 2 and partly broken away and in section.

Figure 4 is a similar view of the opposite or upper end portion.

Figure 5 is a section on line 5—5 of Figure 1.

Figure 6 is an elevation of the fan.

Figure 7 is a section on line 7—7 of Figure 3.

Figure 8 is a detail of a beater element.

The machine in general comprises a tube 1 which is supported at its opposite end from pairs of standards 2 and 3 which may be

fixed to a table top or other suitable surface. The standards 2 have hinged to their upper ends a member 23 having an opening 4 at its upper end to receive one end of the tube 1. The brackets 3 carry with capability of vertical adjustment, a member 5 which is formed at its upper end with a cap portion 6 shaped at 7 to take over the opposite end of the tube 1. Adjustment of the member 5 relative to the standards 3 may be provided by any suitable construction, but as herein shown there are a plurality of spaced perforations 8 in the standards through any selected one or more of which may be passed securing bolts 9 engaging in suitable holes in the member 5.

Positioned axially within the tube 1 is a beater member comprising a central shaft 10, its upper end as shown being reduced as at 11 and journaled in a bearing 12 positioned within the outer end portion of the cap portion 6. This bearing as shown is enclosed by a thimble 13 having threaded engagement with the outer end portion of the cap. Near its opposite end the shaft 10 is journaled in a similar bearing 14 in the end of a cap 15, the larger end of which is seated in an annular recess 16 in the member 23 and which is shown as fixed in position therein by means of the screws 17. A thimble 18 is also provided for enclosing the bearing 14. At this end of the shaft also is positioned a belt pulley 19 fixed to the shaft by any suitable means such as the set screw 20. This shaft 10 carries beater elements 25 arranged in spiral series from adjacent to the lower end of the tube toward its opposite end and beyond an opening 24 in its lower face through which the beaten material escapes as will later appear.

These beater elements may be variously constructed, but as shown best in Figure 8 they are formed as loops of wire, the ends thereof being fixed as by soldering as at 26 in perforations in the shaft. Between the lower ends of the series of beater elements and the cap 15 is positioned a blowing element or fan 30, this being shown detached in Figure 6. This may be formed of sheet metal having blower vanes 31 formed by slit-

ting inwardly from the circumference of a disk as at 32 and twisting the portions 33 between the slits to form the vanes. This disk may be fixed to a hub element 34 which in turn may be fixed to the shaft 10 as by means of a set screw 35.

At 40 is shown a funnel extending through the upper wall of the tube 1 adjacent to its lower end, this funnel being for the purpose of receiving the material to be beaten which may conveniently be supplied thereto from a storage tank 41 positioned above the funnel and provided with a valved outlet 42 at its lower end by which its rate of supply may be regulated.

It is also desirable that provision be made for controlling the temperature of the material being beaten and for this purpose the tube 1 is shown as provided with a jacket extending throughout the greater portion of its length, this jacket as shown being formed by means of an outer tube 45 arranged concentrically with the tube 1 and surrounding this tube and spaced therefrom adjacent to its ends by means of the ring members 46. At 47 and 48 are shown pipe connections with the space between the tubes 1 and 45 through which a cooling or heating fluid may be passed, for example, cold water or steam.

In order to stiffen the mechanism, tie rods, as shown at 50, may be passed through the members 3 and 5 externally of the tubes 1 and 45 and these may also be extended through perforations through one or more rings 52 surrounding the tube 45 between its ends. As shown in Figure 7 these tie rods 50 may be fixed to the rings 52 as by means of the set screws 53.

In operation the material to be beaten is supplied through the funnel 40 and the shaft carrying the beater element 25 is rotated in such a direction as to tend to convey the material as it is beaten upwardly through the tube toward the exit opening 24. At the same time the fan 30 draws air through openings 55 in the upper portion of the cap 15, the air passing through the tube in the same direction as the feeding action of the spirally positioned beating elements. This combined action of the beater elements and fan causes the material as it becomes beaten and stiffened to be separated from the unbeaten or partially liquid material in the lower end portion of the tube 1 and while continuing its beating and aerating transports this material to the upper end of the tube where it is discharged through the opening 24. While the degree of inclination of the tube may be varied to suit the particular material being beaten, in general it is found that the greater the inclination the stiffer the material is beaten up by the time it is discharged from its upper end. This inclination of the beater also insures that only the beaten up material will be ejected from the upper end so that there is no

danger of unbeaten or insufficiently beaten material passing out at this point.

In order to prevent the beaten material from passing upwardly into the cap 6, a plate 60 may be used to close off the upper end of the tube, this plate having a perforation for the passage of the shaft 10, and in some cases it is found desirable to extend from the opening 24 a guiding member about which the beaten material will flow as it is being ejected. A convenient construction of such a member is shown in Figure 4, comprising a wire bent centrally to form a depending portion 65 within the area of the discharge opening and having at its upper end oppositely extending portions 66 which may be engaged in any suitable manner with the tube 1. In some cases also it may be desirable to form a tubular extension 68 through which the material is passed from the opening 24.

It is found that this mechanism is capable of handling materials which is difficult to handle with beaters as heretofore commonly made and since the process is a continuous one, the beaten material may be used as it issues from the opening 24 at once without requiring the transporting of a volume of the beaten material from one container to another as is necessary where batch processes are employed. This delay occasioned by beating the material in batches often permits the beaten material to revert to its unbeaten condition, thus impairing the quality of the product to be made therefrom and it often results in un- or incompletely beaten material being removed with the beaten material. Where the beating is continuous and the material is continuously fed out from the machine, as is done by the present machine, there is no tendency for the material to revert since it can be used immediately after issuing and is not required to be specially handled before being used and no un- or incompletely beaten material passes out with the beaten material. One of the materials which it has been found possible to beat up very satisfactory in this manner and which it has been found difficult to properly handle with batch beaters is what is known as dried beef serum which comprises primarily the white corpuscles of beef blood. The use of this material for confectionery and bakery purposes is becoming of increasing importance. When this material is beaten up it is usually desirable to pass cold water through the jacket of the machine.

When it is desired to clean the machine it is only necessary to remove the screws 17 which hold the cap 15 in position, whereupon the beating elements and fan with the shaft on which they are fixed may be removed bodily from the tube, the reduced end 11 at the upper end of the shaft permitting this end to be detached from its bearing by endwise movement. An annular shoulder 70 on the shaft

bearing against the inner face of the bearing 14 in the cap 15 acts to hold the shaft in proper endwise position when the cap 15 is fixed to the member 3.

5 Having thus described an embodiment of this invention, it should be evident to those skilled in the art that various changes and modifications might be made therein without departing from its spirit or scope as defined 10 by the appended claims.

I claim:

1. A device of the class described comprising a tube inclined to the horizontal, a shaft arranged axially within said tube, caps 15 closing the ends of said tube and in which said shaft is journaled, heating elements carried by said shaft within said tube, the lower one of said caps being perforated, and a fan fixed to said shaft adjacent to said perforated 20 cap and acting as said shaft is rotated to draw air through the perforations and blow it into said tube, said tube having an opening inwardly of said fan for the introduction of material to be beaten, and an opening adja- 25 cent to the opposite end of the escape of beaten material.

2. A device of the class described comprising a tube arranged at an inclination to the horizontal, a shaft arranged axially within 30 said tube, looped beating elements arranged in spiral series therealong, caps for closing the ends of said tube and in which said shaft is journaled, the cap at the lower end there- 35 of being perforated through its upper portion, and a fan fixed to said shaft within said tube adjacent to said perforated cap, said tube having an opening for the introduction of material to be beaten inwardly of said fan at its lower end and an opening for the dis- 40 charge of beaten material adjacent to its upper end.

3. A device of the class described comprising a pair of spaced standards, a tube supported adjacent to its ends on said standards 45 with capability of adjustment of its inclination relative to the horizontal, a cap normally partly closing the lower end of said tube, a shaft arranged axially in said tube and journaled in said cap and removable from 50 said tube therewith, beater elements fixed to said shaft within said tube, and a pulley fixed to said shaft outwardly of said cap, said tube having openings adjacent to its opposite ends for the introduction of material to be beaten 55 and the escape of beaten material.

4. A device of the class described comprising a pair of spaced standards, a tube supported adjacent to its ends on said standards 60 with capability of adjustment of its inclination relative to the horizontal, a cap normally partly closing the lower end of said tube, a shaft arranged axially in said tube and journaled in said cap and removable from 65 said tube therewith, beater elements fixed to said shaft within said tube, a fan fixed to

said shaft between said cap and beater elements, and a pulley fixed to said shaft outwardly of said cap, said tube having openings adjacent to its opposite ends for the introduction of material to be beaten and the 70 escape of beaten material.

5. A device of the class described comprising a cylindrical tube, means for supporting said tube inclined to the horizontal a shaft 75 journaled axially in said tube, a series of beater elements fixed to said shaft within said tube, a fan fixed to said shaft at one end of said series of beater elements and at the lower end of said tube, caps at the ends of said tube in which said shaft is journaled, 80 the cap nearest to said fan having a perforation through which air is drawn into said tube by said fan, and means for delivering liquid to be beaten into said tube inwardly of said fan, said tube having a discharge 85 opening for material adjacent to the opposite end of said tube.

In testimony whereof I have affixed my signature.

THOMAS L. BAILEY. 90

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