No. 626,874.

Patented June 13, 1899.

A. J. SLONECKER.

CHURN.

(Application filed Apr. 18, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

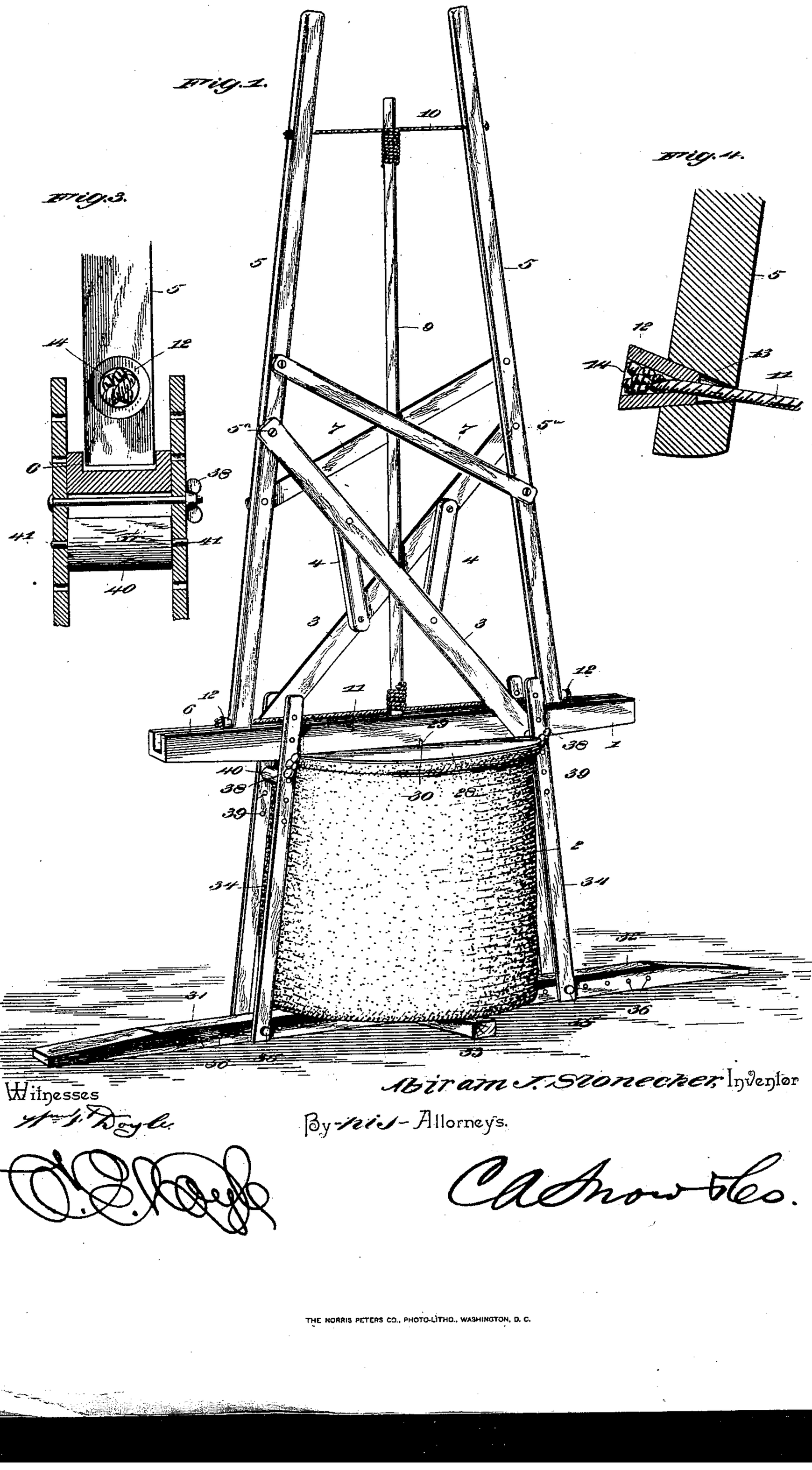

Fig. 3.

Fig. 4.

Witnesses

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By his Attorneys.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

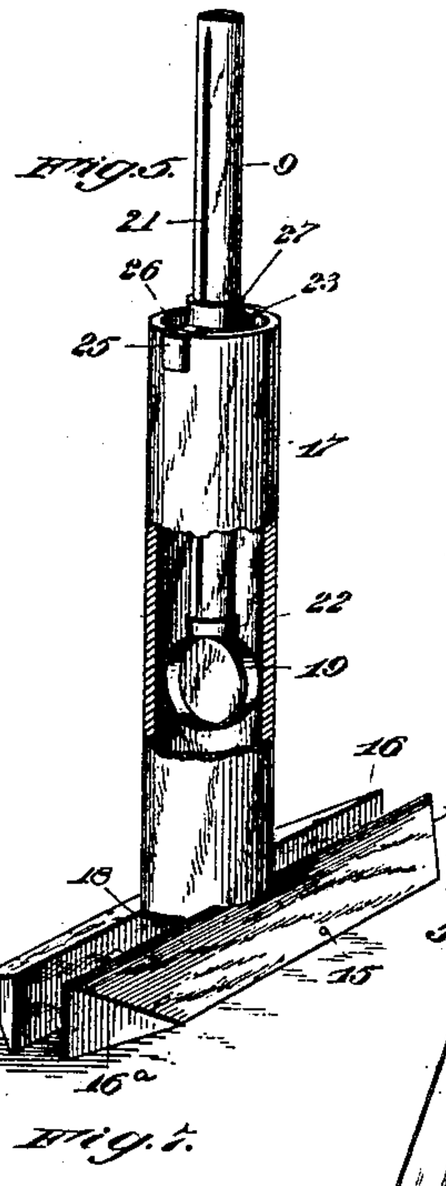


Fig. 7.

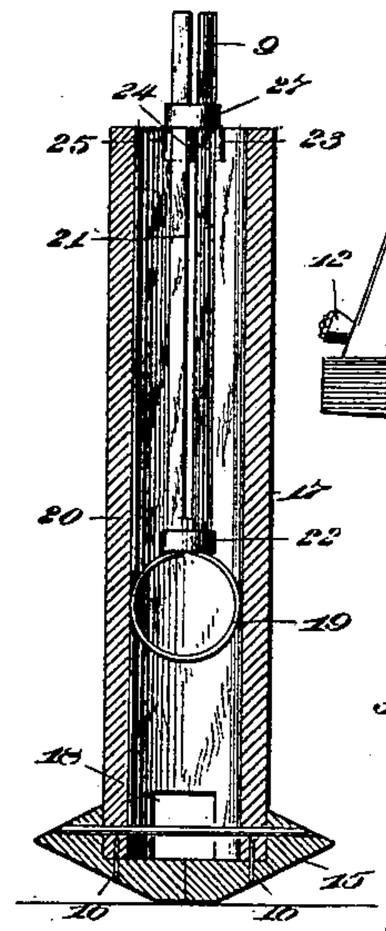


Fig. 2.

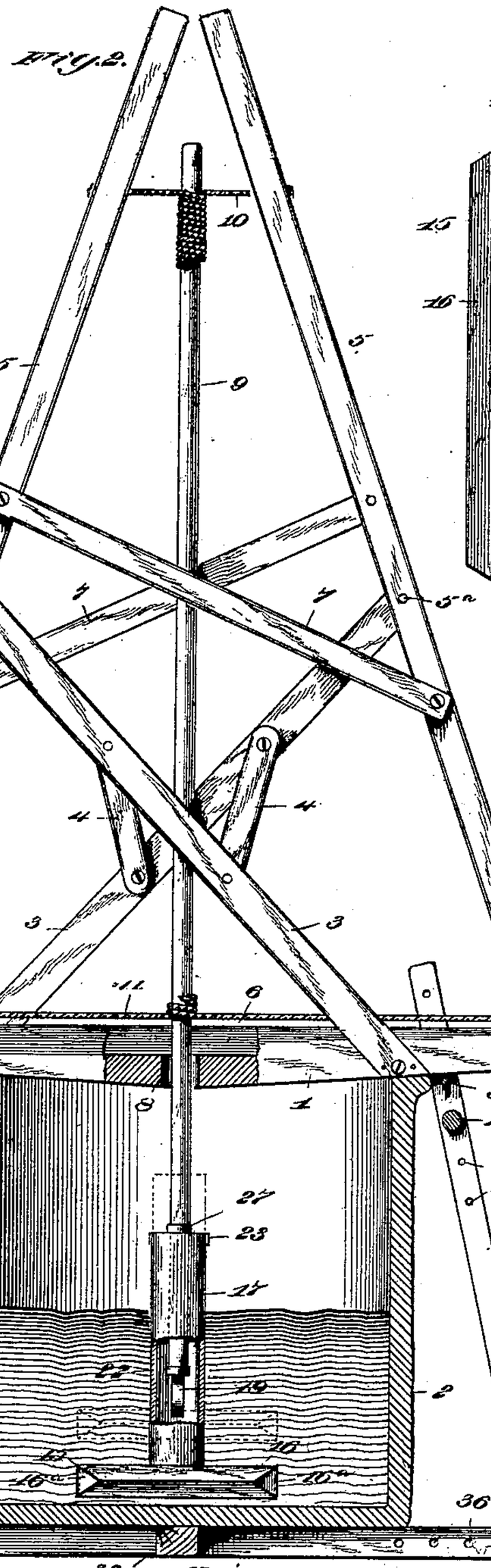


Fig. 6.

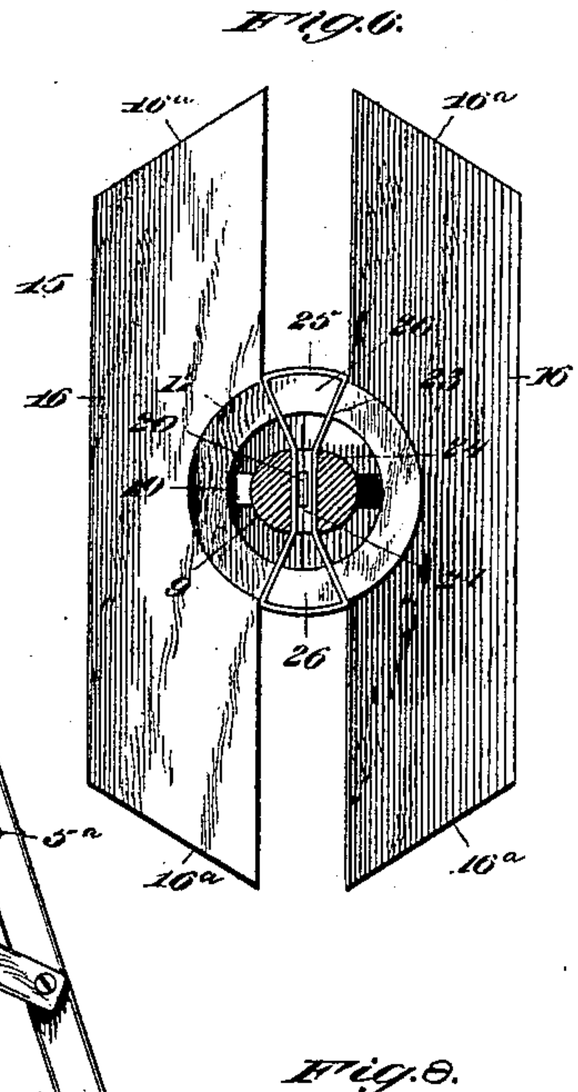
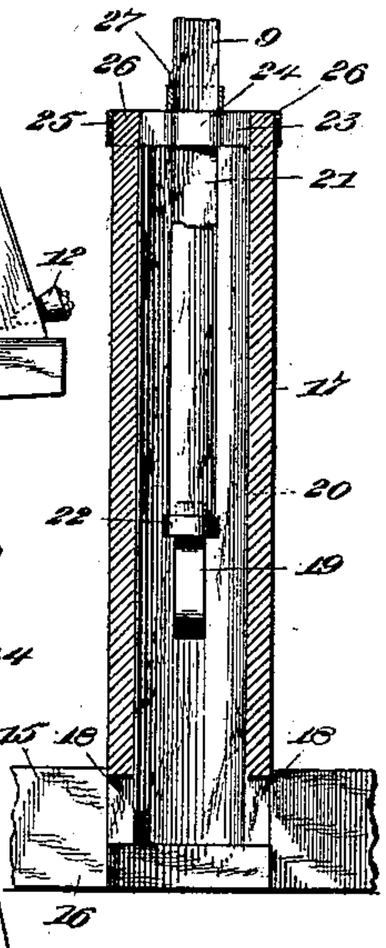


Fig. 8.



Witnesses
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UNITED STATES PATENT OFFICE.

ABIRAM J. SLONECKER, OF FARMERSVILLE, MISSOURI.

CHURN.

SPECIFICATION forming part of Letters Patent No. 626,874, dated June 13, 1899.

Application filed April 18, 1898. Serial No. 678,070. (No model.)

To all whom it may concern:

Be it known that I, ABIRAM J. SLONECKER, a citizen of the United States, residing near Farmersville, in the county of Grundy and State of Missouri, have invented a new and useful Churn, of which the following is a specification.

My invention relates to churns, and has for its objects to provide a simple, compact, and efficient construction and arrangement of parts, including means for imparting a combined rotary and reciprocatory movement to a churn-dasher; to provide a light and portable supporting-frame for a churn-dasher spindle or stem, the means whereby said spindle or stem is mounted being such as to reduce to the minimum the friction due to its operation; to provide simple and efficient means for securing the dasher spindle or stem supporting frame in operative relation with a churn-receptacle; to provide simple and efficient means of adjustment for the parts, whereby they may be suited to churn-receptacles of different sizes and whereby lost motion in the communication of motion from the operating-levers to the dasher spindle or stem may be taken up; to provide an improved construction of dasher of that class wherein air is fed to the dasher-blades to supply the space in the contents of the churn-receptacle due to the rotary movement of the blades, and also to provide simple and efficient means whereby the dasher may be adjusted axially upon the dasher spindle or stem and may be secured operatively in its adjusted positions.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

Figure 1 is a perspective view of a churn mechanism constructed in accordance with my invention, the same being shown applied to a churn-receptacle. Fig. 2 is a side view, partly in section, of the lower portion of the apparatus, the churn-receptacle being shown in section. Fig. 3 is a detail view of the upper end of one of the base-frame braces. Fig. 4 is a detail sectional view of one of the operating-cord-adjusting devices. Fig. 5 is a detail view in perspective of the churn-dasher and the contiguous portion of the dasher spindle or stem. Fig. 6 is a detail cross-section of the dasher spindle or stem, showing the clamping-loop in plan, the split portion of the dasher-spindle being spread. Fig. 7 is a detail vertical section of the dasher-stem and contiguous parts, taken in a plane transverse to the dasher-blades. Fig. 8 is a similar view taken parallel with and between the planes of the dasher-blades.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

The apparatus embodying my invention includes a skeleton frame having a bearing-bar 1, designed to rest upon the upper edge of and transversely span a suitable receptacle 2 for containing liquid to be agitated. This bearing-bar should be made of a length sufficient to span vessels of various sizes, and, as shown in the drawings, it extends terminally for a considerable distance beyond the walls of the receptacle. Rising from the bearing-bar, at intermediate points and upon opposite sides of the plane of the longitudinal center thereof, are supporting-arms 3, which are disposed diagonally or in oppositely-inclined relations, whereby the planes thereof intersect in the vertical transverse plane of the center of the bearing-bar. The transverse spacing of the supporting-arms provides an interval between the same at their centers, and in order that the arms may be held against accidental displacement I employ braces 4, which are arranged between the longitudinal planes of the supporting-arms across the angles formed at the intersections of said arms, each brace being terminally secured, respectively, to the two arms.

Upon the outer extremities of the supporting-arms and in contact with the inner or facing surfaces thereof are mounted the operating-levers 5, which thus operate in the plane of the longitudinal center of the bearing-bar or between the longitudinal planes of the supporting-arms, and in order that the lower extremities of these levers may be positively guided and held from lateral deflection the upper side of the bearing-bar is channeled to form a guide 6. Also the operating-levers are connected for simultaneous operation, whereby they may receive motion by the application of power to either or both levers,

and in the construction illustrated the means of connection consist of connecting-rods or pitmen 7, one end of each of which is pivotally connected to one of the operating-levers below its fulcrum-point 5^a, and the other end of the same rod being pivotally connected with the other operating-lever at a point above its fulcrum-point. In this way the connecting-rods are crossed and the oscillatory motion of one operating-lever will communicate an oscillatory motion to the other lever, but in the opposite direction—namely, when one operating-lever is swung inwardly at its upper end a corresponding or inward swinging movement of the upper end of the other operating-lever results, whereby the upper ends of the two levers swing toward and from each other simultaneously.

Extending through a central opening 8 in the bearing-bar and of sufficiently smaller diameter than said opening to avoid contact with the walls thereof is a dasher spindle or stem 9, which is disposed between the longitudinal planes of the supporting-arms 3, and hence in the longitudinal plane of the operating-levers, and extending inwardly from the operating-levers 5 and coiled upon the spindle or stem are upper and lower operating cords or connections 10 and 11. The outer ends of the operating cords or connections are attached to the levers, and in practice I prefer to employ a single continuous cord or connection at each point, the ends of said connection being secured, respectively, to the levers, while the intermediate portion thereof is coiled upon the stem or spindle. Obviously these points of connection of the operating-cords are respectively above and below the fulcrums of the levers and, as shown, at equal distances therefrom, and it is obvious that by maintaining these cords or connections in a taut condition the dasher-spindle may be supported solely thereby. It is my object to so support the dasher spindle or stem in order to reduce to the minimum the friction due to the rotary movement thereof, and hence the cords or connections are coiled in opposite directions upon the spindle or stem. In other words, each cord or connection is attached at its center to the spindle or stem and from thence is coiled upon the stem or spindle in an outward direction or from the plane of the fulcrums of the levers. Obviously this relation between the parts may be reversed, as the coils may be formed inwardly or toward each other instead of outwardly or from each other, as shown in the drawings and as I prefer in practice. Both arms or portions of each connection or cord, however, are coiled upon the stem or spindle, whereby as the upper ends of the operating-levers are spread or separated the upper connection 10 is uncoiled or unreeled, thereby imparting rotary motion in one direction to the dasher spindle or stem, while the lower connection or cord 11 is coiled or reeled upon the spindle. On the other hand, when the upper ends of the operating-levers are moved toward each other the lower connection or cord 11 is uncoiled or unreeled, while the upper connection or cord is coiled. Thus by an opposite oscillatory movement of the operating-levers the dasher spindle or stem receives a rotary movement alternately in opposite directions, a plurality of complete revolutions of the dasher-spindle resulting from each vibration of the operating-levers.

In order that the necessary tension of the operating cords or connections may be preserved to communicate motion efficiently to the dasher-spindle and at the same time support said spindle, I employ tension-adjusting devices preferably for the lower cord or connection, although in practice tension devices may be applied to each of the cords. In the construction illustrated, where the inner ends of the connection or cord members or arms are permanently secured to the dasher-spindle, the desired tension of the parts may be preserved by applying adjusting devices to the outer extremities of the lower cord or connection, and, as illustrated, the same consist of conical cups 12, revolubly fitted in conical seats 13, formed in the operating-levers, said cups being introduced into the seats from the outer sides of the levers and having tapered bores for the reception of knotted or enlarged outer extremities 14 of the cords or connections. In practice the cords or connections consist of twisted strands, whereby the length of the cords may be diminished by tightening the twisting thereof and obviously increased by the loosening or untwisting thereof. Owing to the conical construction of the exterior surfaces of the cups and the seats in which they are fitted, the tension upon the cord members is sufficient to hold the cups at the desired rotary adjustment, and hence by manually turning the cups in a direction to twist the cord or connection both connections may be tightened. Also the adjustment of one cup more than the other will serve to properly center the spindle or stem 9 in the opening 8 of the bearing-bar, as it is desirable in practice to have the spindle extend through this opening without contact with the walls thereof in order that all friction at this point may be avoided.

The avoidance of friction or of fixed bearings for the dasher-spindle is particularly desirable in view of the fact that by reason of the opposite coiling of the upper and lower cords or connections upon the spindle the alternate coiling and uncoiling thereof causes a vertical reciprocatory movement of the dasher-spindle. For instance, with the cords coiled upon the spindle as illustrated in the drawings—namely, the upper cord coiled upwardly from its point of fixed attachment and the lower cord coiled downwardly from its point of attachment—the movement of the upper ends of the operating-levers outwardly or from each other will cause an upward movement of the dasher-spindle, whereas the in-

ward movement or movement toward each other of the upper ends of the operating-levers will cause the depression of the dasher-spindle. Hence during the operation of the levers the dasher-spindle not only receives a rotary movement, which is reversed at intervals, or, in other words, an oscillatory movement, of which each vibration consists of a plurality of complete revolutions, but an axial reciprocatory movement, equal in extent to the length of the coils formed upon the spindle by the cords or connections when the latter are completely wound thereon or when those arms of the levers to which the cords are attached are at the limits of their inward movement. For instance, if the length of the coil formed by the upper cord 10 is one inch when the upper ends of the operating-levers are at the limits of their inward movement the extent of axial reciprocation of the spindle will be one inch.

That portion of the dasher spindle or stem which projects below the plane of the bearing-bar carries a dasher 15, which in the construction illustrated consists of a plurality of parallel dasher blades or bars 16, secured at their centers to the lower extremity of a tubular shank 17 and having beveled outer or remote sides and abrupt inner or adjacent sides, said inner abrupt sides being spaced apart to form an interval which is in communication through side outlets 18 with the interior or bore of the shank. The object of this construction is to cause the separation or deflection of the liquid contents of the receptacle by the outer sides of the dasher blades or bars during the rotation of the dasher to produce in the interval between the blades a partial vacuum, which is supplied by air admitted through the bore of the shank 17 from a point above the surface of the contents of the receptacle, it being understood that said shank is of sufficient length to extend above the surface of the contents of the receptacle and the adjustment of the dasher upon the spindle or stem being such as to preserve this relation. The effect of the introduction of atmospheric air into the contents of a churn-receptacle during the churning operation, whereby the air mingles with the contents and rises therefrom to the surface, is to vastly hasten the separation of the butter without breaking the globules thereof or without injuring the "grain" of the butter, and by the peculiar construction above described this introduction of air is facilitated without so severely agitating the contents of the receptacle as to cause the splashing thereof. The reduced outer sides of the dasher blades or bars cut through the milk and deflect it upwardly and downwardly and also radially, owing to the beveled terminal faces 16^a, whereby an approximately complete vacuum is formed between the abrupt inner faces of the bars. This produces sufficient suction to induce a rapid inflow of air through the tubular shank.

The means which I have adopted for securing the desired adjustment of the dasher upon the spindle or stem without interfering with the influx of air through the tubular shank include a spacing-ring 19, consisting of a band of which the parallel extremities 20 are fitted in the lower end of a longitudinal slot 21 in the dasher spindle or stem, said slot being formed by splitting the spindle from a point contiguous to the under side of the bearing-bar to its lower extremity. The proper clamping of the tongue or extension 20 between the faces of the slot 21 is accomplished by means of a band 22, tightly fitted exteriorly upon the spindle adjacent to its lower end.

Obviously the longitudinal slotting or splitting of the spindle or stem produces an expansible and contractible structure, and the slot 21 is utilized as a guide for a clamping-loop 23, having a reduced central portion 24 fitting in the slot and enlarged or spread looped ends 25, which project beyond the side surfaces of the spindle and are adapted to engage projections 26, formed at the upper end of the tubular shank 17 at diametrically opposite points. The terminal enlargement or spreading of the clamping-loop 23 prevents the transverse displacement thereof, while permitting axial movement to cause the engagement of the extremities 25 with the projections 26 in any adjusted position of the dasher. The clamping-loop being of endless construction or with the centers of its sides extending through the slot 21 provides for the contraction of the loop to cause the tight clamping of its looped extremities 25 upon the projections of the dasher-shank, and this contraction of the clamping-loop is attained by the contraction of the dasher spindle or stem, a clamping-ring 27, which is fitted to slide exteriorly upon the spindle or stem, being the means which I have adopted for accomplishing this object. Therefore after the adjustment of the dasher to the desired depth to secure the relation between the parts, as above indicated, the clamping-loop is moved axially to engage its terminal enlargements with the projections 26 of the dasher-shank, after which the clamping-ring is slid to a point contiguous to the plane of the clamping-loop to contract the dasher-spindle, and thus lock the clamping-loop at the desired adjustment in the slot 21 and also tighten the terminal enlargements 25 thereof upon the projections 26. In practice I have found this means of locking the dasher to be not only efficient, but simple and capable of being kept in a clean and hygienic condition without difficulty. The spacing-ring 19 serves to properly center the lower end of the dasher spindle or stem in the dasher-shank without interfering with the communication of air through the shank, and also in practice I prefer to construct the projections 26 by longitudinally sawing or slitting the upper edge of the dasher-shank at opposite points, as shown in the drawings.

As thus far described the apparatus em-

bodying my invention is adapted particularly for use in churning in connection with small receptacles, or where the operator desires to grasp the operating-handles, respectively, in both hands and operate the same by alternate movements toward and from each other. In this case the bearing-bar is adapted to maintain its operative position upon the churn-receptacle without any means of fastening, as there is no special strain upon the supporting-frame. In other words, the pressure upon the operating-levers is applied equally in opposite directions, and hence the operator is able not only to actuate the levers, but to maintain the proper position of the bearing-bar upon the receptacle without special effort. I prefer, however, to employ a receptacle-lid in connection with the bearing-bar, said lid consisting of separate semidisk sections 28, having straight approximately diametrical inner edges for centact with the opposite side surfaces of the bearing-bar and semicircular outer edges to correspond with the exterior contour of the receptacle. These lid-sections are held in operative relation with the bearing-bar by means of hooks or retaining-pins 29, carried by the bearing-bar for engagement with openings 30, formed in the lid-sections contiguous to the centers of their straight inner edges. This causes the lid-sections to follow the movements of the bearing-bar in case of a slight displacement thereof, and yet effectually cover the receptacle to exclude dust and vermin during the churning operation.

When it is desired, on the other hand, to communicate motion to the churn-dasher by power applied only to one operating-lever, I have found it desirable to employ a base-frame consisting of a base 31, having a longitudinal bar 32 and a central short cross-bar 33 to support the receptacle, and base-frame braces 34, each consisting of parallel spaced strips pivotally and adjustably secured at their lower ends to opposite side surfaces of the longitudinal base-bar 32 and bearing near their upper ends against opposite side surfaces of the bearing-bar 1. In order to attain the necessary adjustment of the lower ends of the braces 34 to suit the diameter of the receptacle which is in use, I preferably connect the lower ends of the strips forming said braces by transverse bolts 35, each of which is adapted to engage either of a plurality of transverse openings 36, formed in the bar 32, and in order to secure the braces in efficient frictional contact with opposite side surfaces of the bearing-bar 1 I employ transverse bolts 37, connecting the strips forming the braces and fitted with thumb-nuts 38, said bolts being adapted for engagement with either of a plurality of transversely-registering openings 39 in the strips to suit the height of the receptacle. Also interposed between the strips forming the braces I employ spacing-blocks 40, having terminal projections or pins 41, also adapted for engagement with the above-named perforations 39. These spacing-blocks are designed to prevent the drawing of the strips forming the braces toward each other, except in the planes of the adjusting-bolts 37, and obviously said spacing-blocks may be engaged with the desired registering perforations 39 contiguous to the plane of the adjusting-bolts, and hence in order to suit the adjustment of said bearing-bolts with relation to the braces.

As above indicated, the base-frame is specially designed for use when it is desired to operate the churn by means of only one of the operating-levers, in which case the bearing-bar is held in its proper position or is clamped tightly upon the churn-receptacle by means of said base-frame, and as the operating-levers are connected for simultaneous movement in opposite directions the application of power to one of them will be communicated to the other, and hence the operation of the dasher-spindle will be as hereinbefore described. Furthermore, it will be understood that by reason of the peculiar construction and arrangement of the dasher I am enabled during the churning operation to induct a sufficient quantity of atmospheric air into the contents of the receptacle to insure the rapid separation of the butter without destroying the grain thereof, the circulation of the air through the liquid performing the function of gathering the butter-globules upon the surface of the liquid. Also the construction of the dasher is such that it may be adjusted vertically to suit the depth of the contents of the receptacle, and it may be used in receptacles of different sizes without change of the operating means to adapt the mechanism for performing the churning operation in connection with either large or small quantities of milk.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. The combination with a supporting-frame and a spindle, of oppositely-located intermediately-fulcrumed operating-levers mounted upon the frame and adapted for simultaneous swinging movement in opposite directions, whereby corresponding arms of the levers simultaneously approach or recede from the spindle, and flexible connections between both arms of each lever and the spindle, and coiled at their inner ends upon the latter, the connections extending from corresponding arms of the levers being coiled in a common direction, and the connections attached to different arms being coiled in opposite directions, substantially as specified.

2. The combination with a supporting-frame and a spindle, adapted for rotary and axial reciprocatory movement, of oppositely-located intermediately-fulcrumed operating-

levers mounted upon the frame, and cord connections between the levers and the spindle and coiled in opposite directions upon the latter, for imparting said rotary and reciprocatory movement to the spindle, substantially as specified.

3. The combination with a supporting-frame and a spindle, of oppositely-located intermediately-fulcrumed operating-levers mounted upon the frame, connections between the levers for causing simultaneous swinging movement in opposite directions thereof, and flexible connections between both arms of each lever and the spindle, the flexible connections extending from corresponding arms of the levers being coiled in a common direction, and those extending from different arms of a lever being coiled in opposite directions upon the spindle, substantially as specified.

4. The combination of a frame having a bearing-bar and inclined supporting-arms arranged in intersecting transverse and spaced longitudinal planes, a spindle arranged in a longitudinal plane between said supporting-arms, operating-levers fulcrumed at intermediate points upon the supporting-arms in the longitudinal plane of the spindle, connecting-links between the levers for communicating oscillatory movement in opposite directions from one to the other, and flexible connections or cords between the opposite arms of the levers and the spindle and coiled upon the latter, substantially as specified.

5. The combination of a frame having a bearing-bar channeled longitudinally to form a guide, supporting-arms rising from the bearing-bar in transversely intersecting and spaced longitudinal planes, respectively upon opposite sides of the plane of said guide, braces connecting said supporting-arms at opposite sides of the centers thereof, a spindle arranged between the longitudinal planes of said supporting-arms, and between the braces thereof, operating-levers fulcrumed at intermediate points upon the extremities of the supporting-arms and in the longitudinal plane of said spindle, and flexible connections or cords between the arms of the levers and the spindle, the lower extremities of the operating-levers being fitted in said guide of the bearing-bar, substantially as specified.

6. The combination with a supporting-frame and a spindle, of oppositely-located intermediately-fulcrumed operating-levers mounted upon the frame, operating cords or connections between the arms of the operating-levers and the spindle, and coiled upon the latter, and tension devices for said operating cords or connections, and capable of rotary adjustment to torsionally adjust said connections, substantially as specified.

7. The combination with a supporting-frame and a spindle, of oppositely-located intermediately-fulcrumed operating-levers mounted upon the frame, twisted cords connecting the arms of said levers with and coiled upon the spindle, the tension of said cords or connections being affected by the torsional adjustment thereof, and revoluble cups carried by the levers and having the extremities of the cords attached thereto, substantially as specified.

8. The combination with a supporting-frame and a spindle, of operating-levers mounted upon the frame and provided with conical seats, twisted operating-cords coiled upon the spindle to connect the same with the levers, and exteriorly conical tension-adjusting cups revolubly fitted in said conical seats in the levers, for revoluble adjustment, and having the extremities of the cords attached thereto, whereby the cords may be twisted to increase their tension by turning said cups in the seats, and are held at the desired tension by the frictional contact of said cups with the seats, substantially as specified.

9. The combination with a supporting-frame having a bearing-bar adapted to span the top of a churn-receptacle, and dasher-operating mechanism mounted upon said frame, of a base-frame having a base-bar parallel with said bearing-bar, divided braces attached at their lower ends to the base-bar and having their members arranged in frictional contact with the opposite side surfaces of the bearing-bar, at spaced points, and means for adjusting the members of the braces to produce the desired frictional contact with the bearing-bar, substantially as specified.

10. The combination with a supporting-frame having a bearing-bar adapted to span the top of a churn-receptacle, and dasher-operating mechanism mounted upon said frame, of a base-frame having a longitudinal base-bar, braces attached at their lower ends to the base-bar, and each consisting of spaced strips arranged in frictional contact with opposite side surfaces of the bearing-bar, and provided with series of transversely-registering openings, and adjusting-bolts engaging registering openings and fitted with adjusting-nuts, substantially as specified.

11. The combination with a supporting-frame having a bearing-bar adapted to span the top of a churn-receptacle, and dasher-operating mechanism mounted upon said frame, of a base-frame having a base-bar parallel with the bearing-bar, braces attached at their lower ends to the base-bar, and each consisting of spaced strips arranged in frictional contact with opposite side surfaces of the bearing-bar, said strips being provided with transversely-registering openings, spacing-blocks provided with terminal projections to fit in registering perforations of the strip contiguous to the plane of the bearing-bar, and adjusting-bolts also engaging registering openings in the strips for contracting the interval therebetween to frictionally engage the bearing-bar, substantially as specified.

12. The combination with a supporting-frame having a bearing-bar adapted to span the top of a churn-receptacle, and dasher-op-

erating mechanism mounted upon said frame, of a base having a longitudinal base-bar and a central transverse bar, said longitudinal bar having series of transverse openings, braces each consisting of spaced strips connected at their lower ends by a transverse bolt engaged with one of said transverse openings of the longitudinal base-bar, said strips being provided near their upper ends with transversely-registering series of perforations, spacing-blocks having terminal projections for engagement with registering perforations of the strips adjacent to the plane of said bearing-bar, and adjusting-bolts also engaging registering perforations contiguous to the spacing-blocks and between the same and the bearing-bar, substantially as specified.

13. The combination with a dasher-spindle, of a dasher having a tubular shank adapted for arrangement at its upper end above the surface of the contents of the churn-receptacle, and parallel transverse dasher blades or bars carried by said shank, and having oppositely-beveled outer faces, and abrupt spaced inner faces forming an interval in communication with the interior of said tubular shank, and means for communicating motion from the spindle to the dasher, substantially as specified.

14. The combination of a longitudinally-slotted dasher-spindle, a dasher having a tubular shank inclosing and loosely fitting the lower end of said dasher-spindle, a clamping-loop fitted to slide in said slot of the dasher-spindle for engagement with projections at the upper end of the dasher-shank, and meaus for locking said clamping-loop at the desired adjustment upon the dasher-spindle, substantially as specified.

15. The combination of a longitudinally-slotted transversely-contractible dasher-spindle, a dasher having a tubular shank inclosing the lower end of said spindle, a clamping-loop fitted at its center in said slot and provided with projecting portions for engagement with projections on the dasher-shank, and a contracting ring fitted upon the spindle for locking the clamping-loop at the desired adjustment, substantially as specified.

16. The combination of a longitudinally-slotted transversely-contractible dasher-spindle, a dasher having a tubular shank inclosing the lower end of said spindle, a clamping-loop having a reduced center fitted in said slot of the dasher-spindle and having looped terminal enlargements to engage projections at the upper end of the dasher-shank, and a contracting ring fitted to slide upon the dasher-spindle to contract the same and lock the clamping-loop at the desired adjustment, substantially as specified.

17. The combination of a longitudinally-slotted transversely-contractible dasher-spindle, a dasher having a tubular shank inclosing the lower end of the dasher-spindle, a spacing-ring affixed to the lower end of said spindle and arranged in the dasher-shank to center the lower end of the spindle in the shank, an endless clamping-loop having a contracted center fitted in said slot of the spindle, and terminal enlargements to engage projections at the upper end of the dasher-shank, and adjustable means for contracting the dasher-spindle to secure the clamping-loop at the desired adjustment, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ABIRAM J. SLONECKER.

Witnesses:
WILL. M. HOUF,
GEORGE S. BENSON.