

No. 686,369.

Patented Nov. 12, 1901.

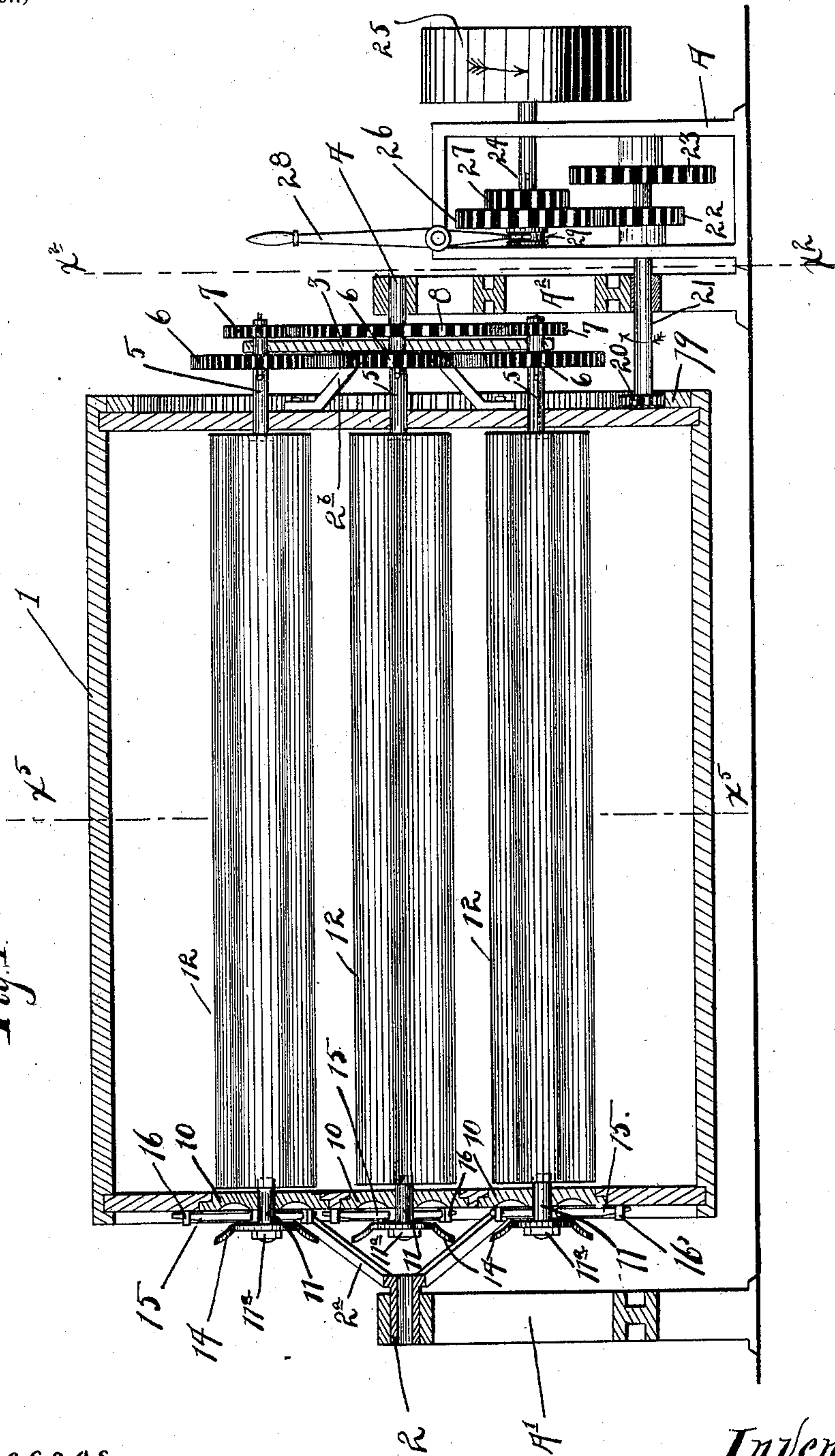
D. E. VIRTUE & G. A. HAGEDORN.
CREAM TEMPERING, CHURNING, AND BUTTER MAKING MACHINE.

(Application filed Dec. 4, 1900.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



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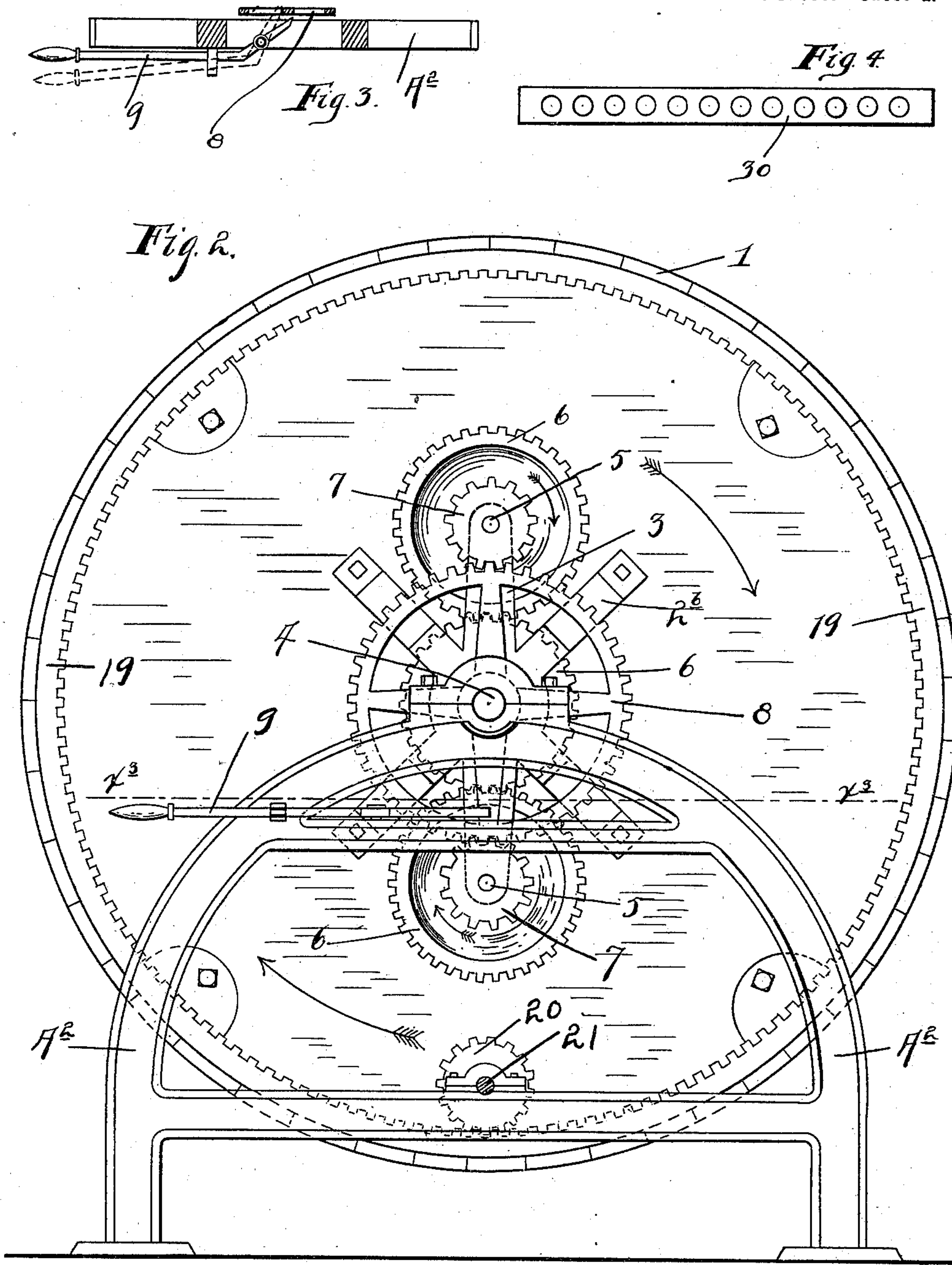
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4 Sheets—Sheet 2.



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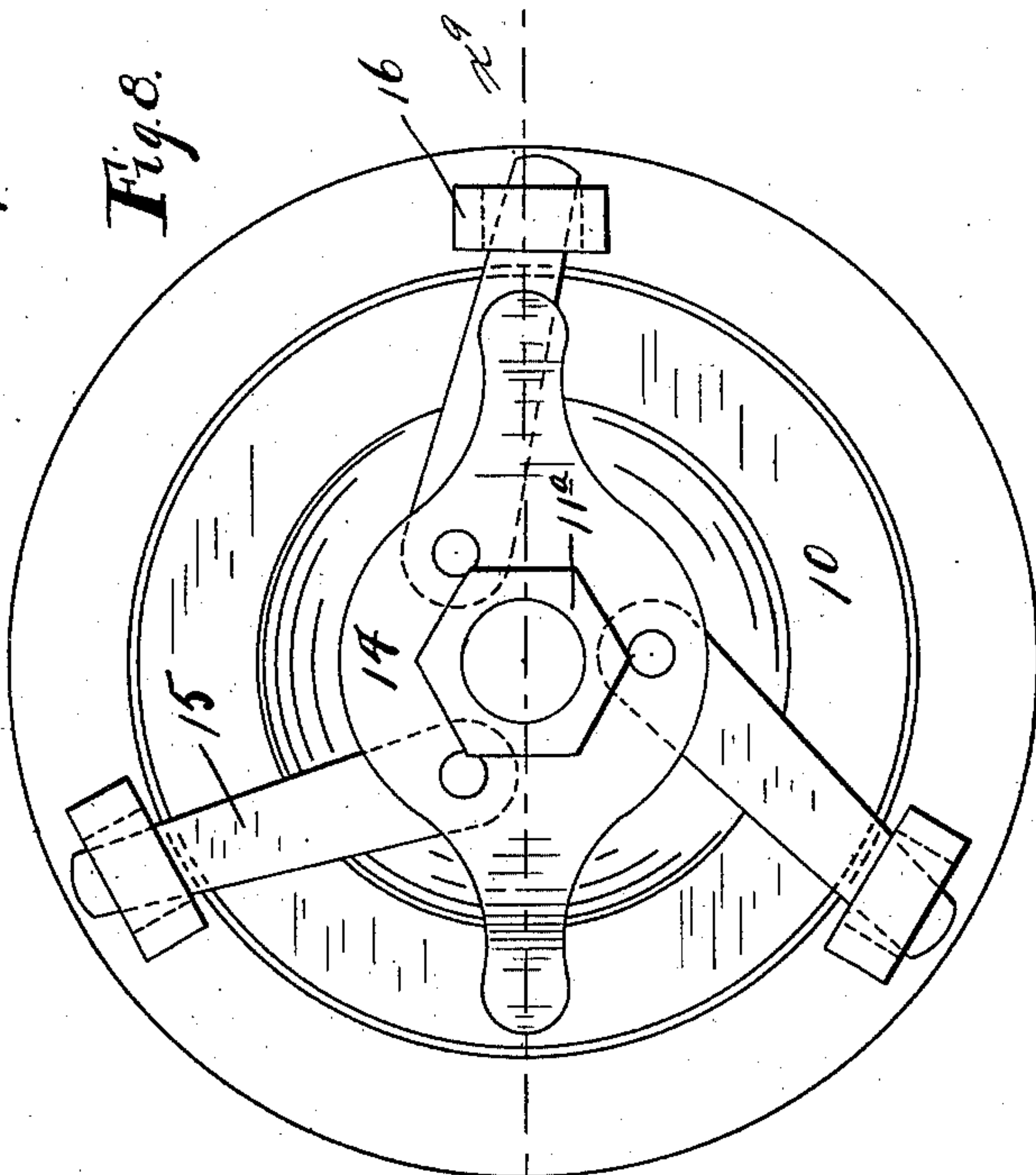
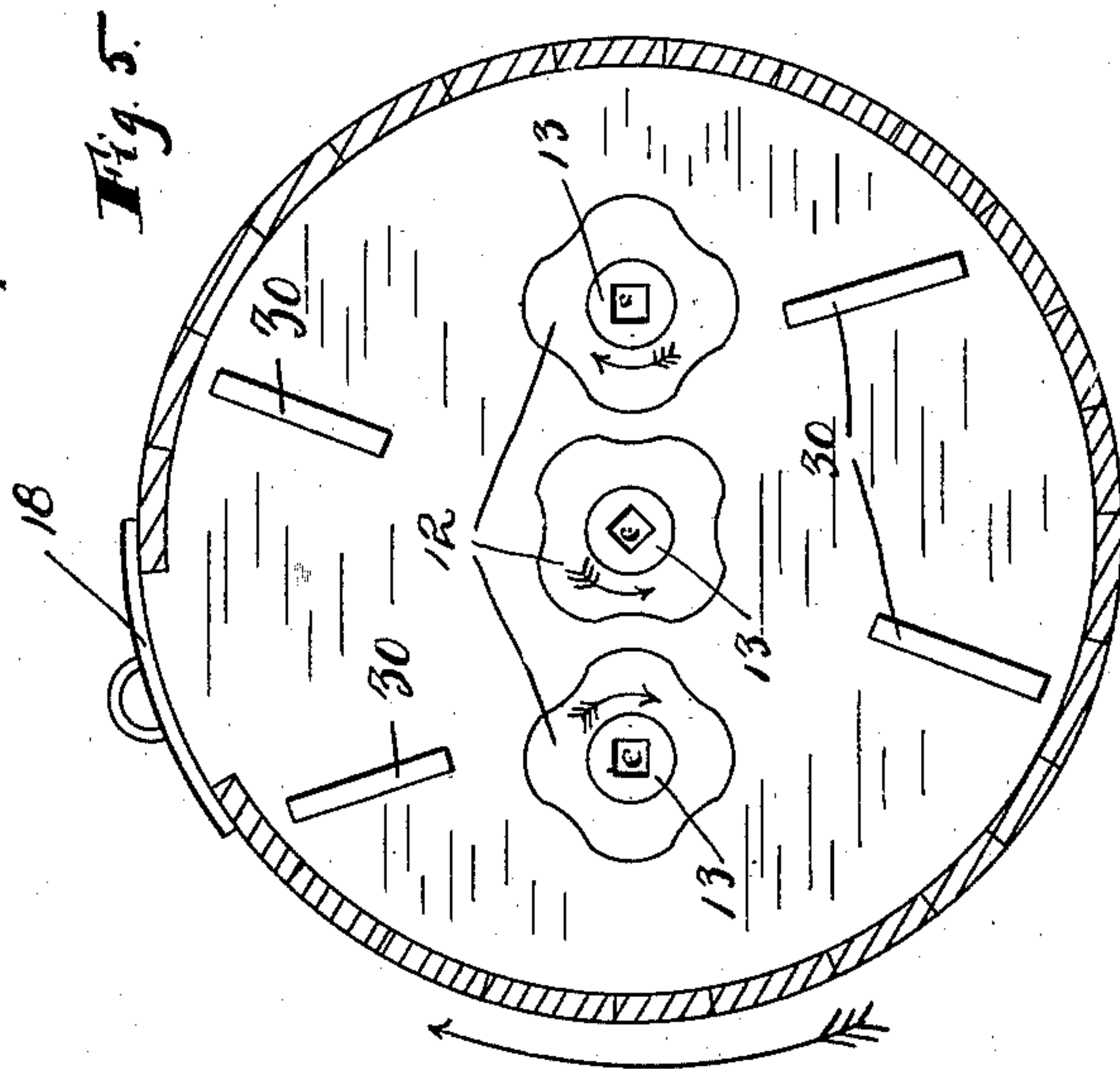
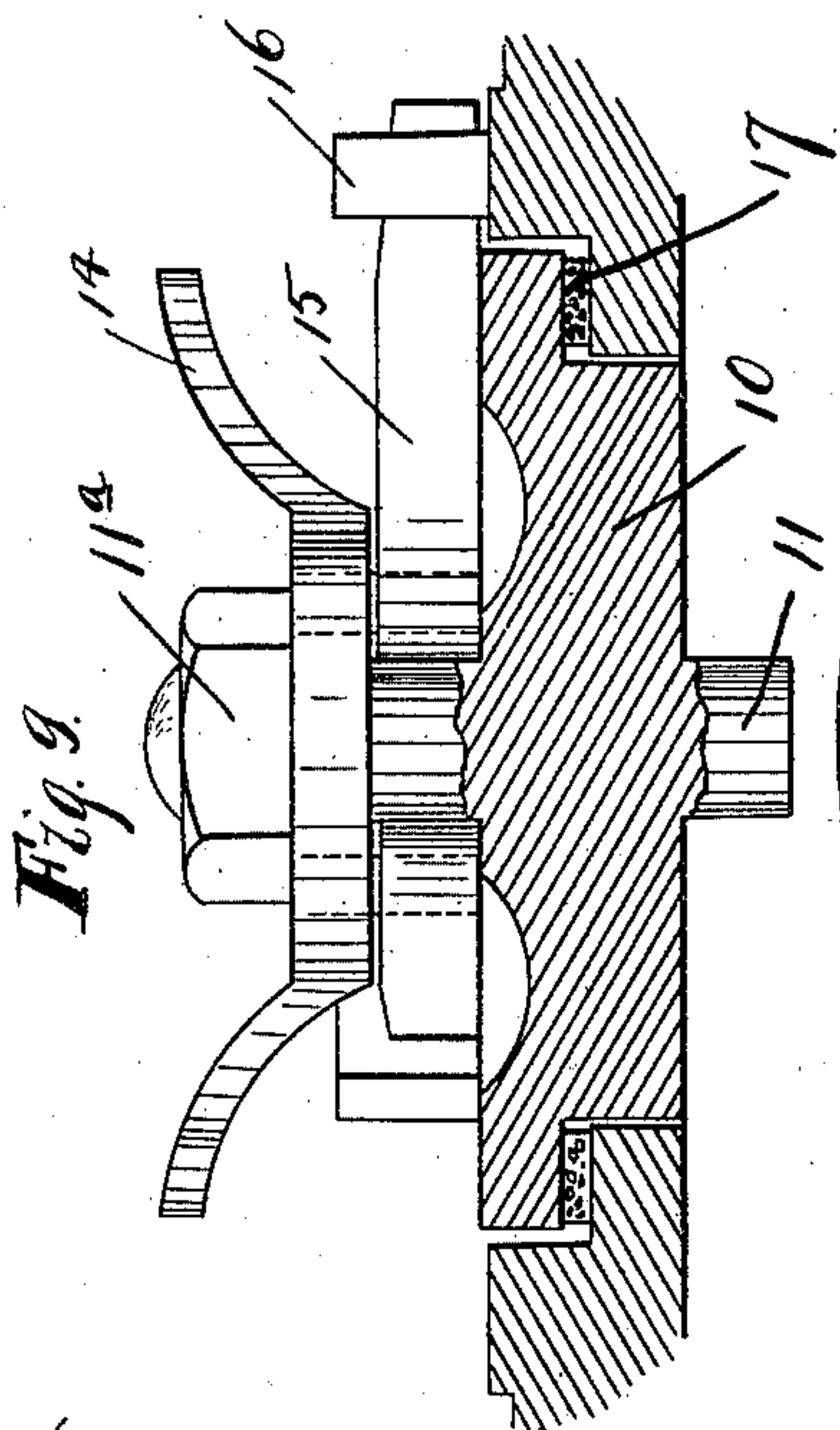
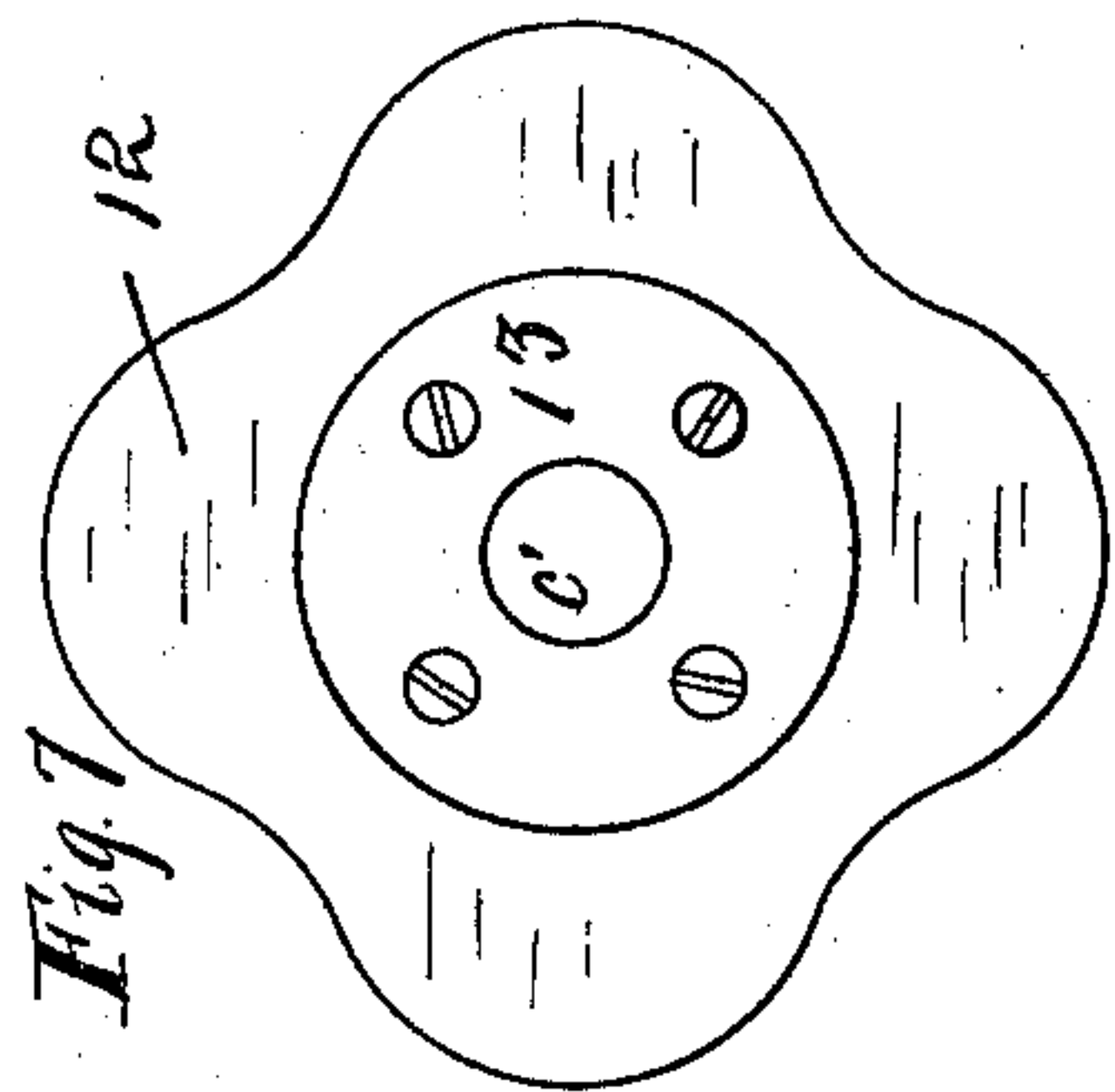
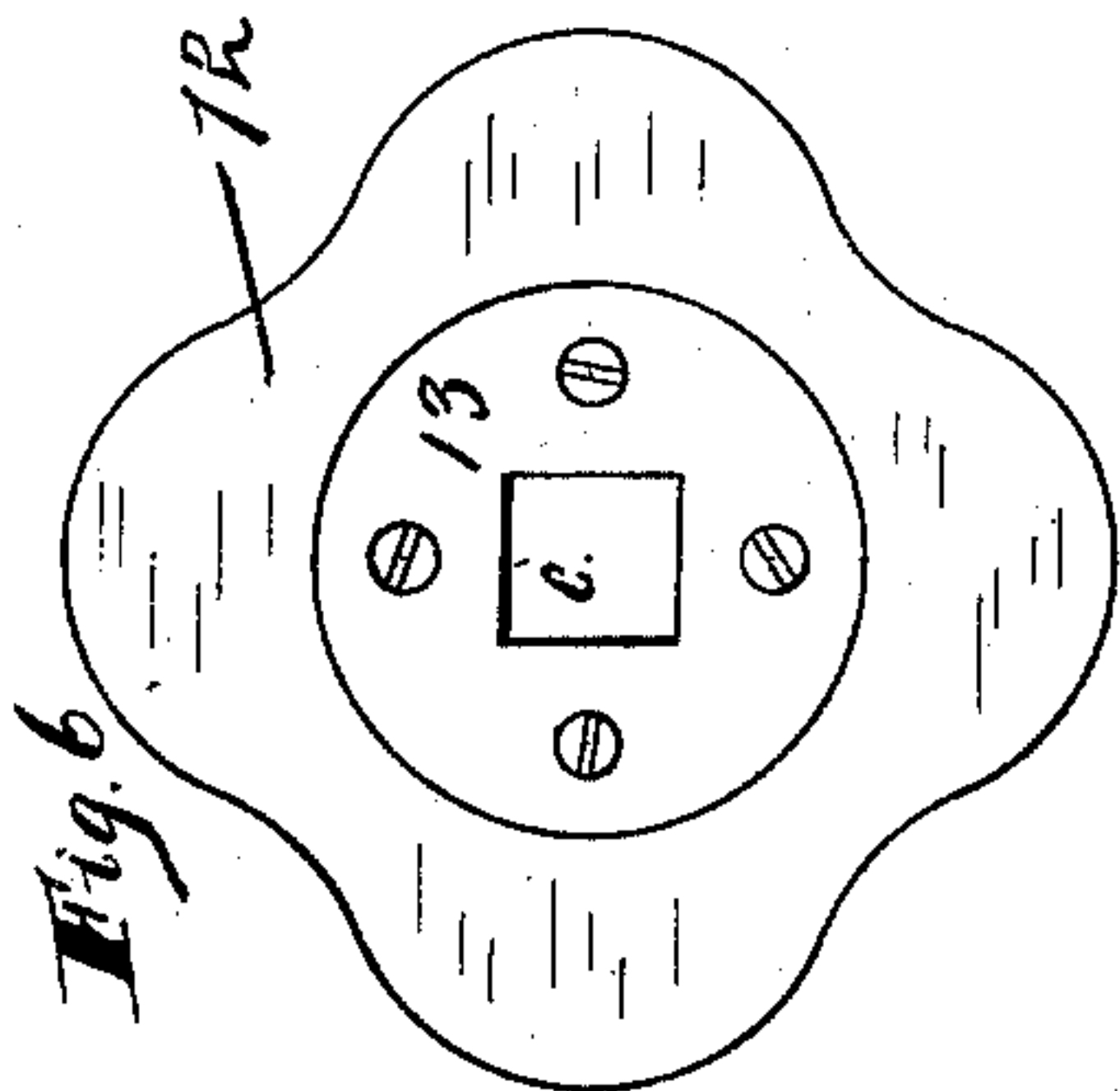
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4 Sheets—Sheet 3.



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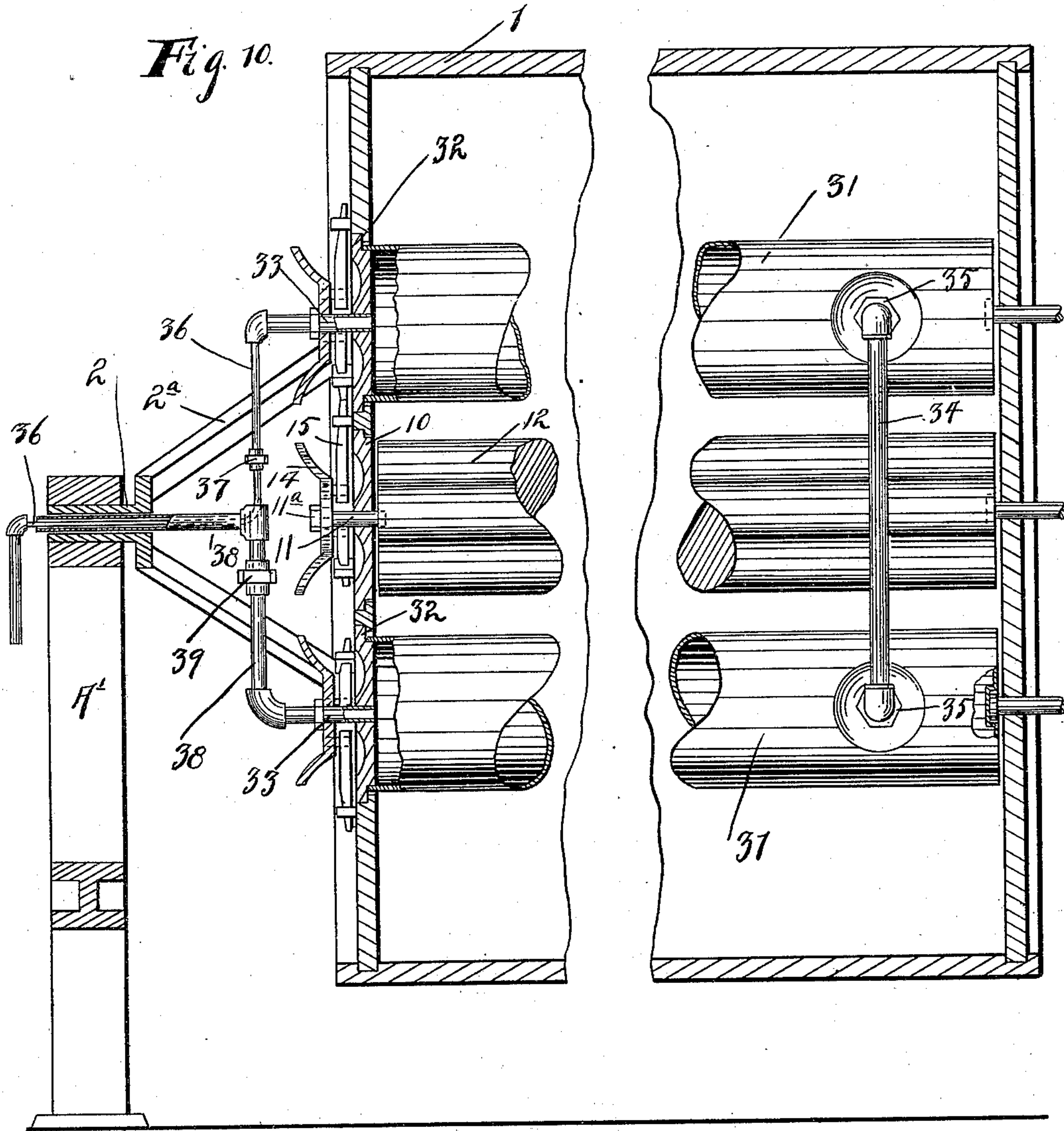
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UNITED STATES PATENT OFFICE.

DENNIS E. VIRTUE AND GEORGE A. HAGEDORN, OF OWATONNA,
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CREAM-TEMPERING, CHURNING, AND BUTTER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 686,369, dated November 12, 1901.

Application filed December 4, 1900. Serial No. 38,621. (No model.)

To all whom it may concern:

Be it known that we, DENNIS E. VIRTUE and GEORGE A. HAGEDORN, citizens of the United States, residing at Owatonna, in the county of Steele and State of Minnesota, have invented certain new and useful Improvements in Cream-Tempering, Churning, and Butter-Working Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention has for its object to provide a machine adapted to be interchangeably used for tempering cream and for churning and working the butter and to permit the necessary changes for this purpose to be made without drawing off the cream.

To this end our invention consists of the novel devices and combinations of devices which will be hereinafter described, and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like notations refer to like parts throughout the several views.

In said drawings, Figure 1 is a longitudinal vertical central section through the entire machine with the parts applied thereto for use in churning and working the butter. Fig. 2 is a view in section on the line $x^2 x^2$ of Fig. 1, but showing most of the parts of the machine in right end elevation with respect to Fig. 1. Fig. 3 is a detail in section on the line $x^3 x^3$ of Fig. 2 with most of the parts of the machine removed. Fig. 4 is a detail showing one of the paddles detached in plan. Fig. 5 is a vertical central cross-section on the line $x^5 x^5$ of Fig. 1. Figs. 6 and 7 are details in end elevation, showing opposite ends of one of the working rollers detached. Fig. 8 is a view in end elevation, on an enlarged scale, showing one of the closures for the roller passages or openings in one of the drumheads. Fig. 9 is a cross-section on the line $x^9 x^9$ of Fig. 8; and Fig. 10 is a view in central longitudinal vertical section with some parts removed and others broken away, showing the drum and the parts on the inside of the same as they appear when the water-circulating devices are applied thereto for tempering the cream.

A suitable rotary shell 1, shown as of drum-like form, is mounted to turn on a horizontal axis and receives rotary motion by means which will later be noted. The drum 1 is provided at one end with a spider 2^a, provided with a hollow trunnion 2, mounted in suitable bearings formed in a supporting pillow-block or fixed frame-section A'. At its opposite end the drum 1 is provided with a spider 2^b, which has fixed thereto a cross-bar 3, which in turn has fixed thereto a trunnion 4, mounted in suitable bearings formed in a pillow-block or frame-section A². One of the drum-heads—to wit, the right-hand head—as shown, has mounted therein three stub-shafts 5, which have fixed thereto three corresponding gears 6 of the same size. The central member of the stub-shafts 5 has its axis coincident with the axis of the drum, and the gear carried thereby is engaged by the other two members of said three gears 6. It follows that the shafts 5 are geared outside the drum by the gear-wheels 6 to turn together whenever one or more of the members 6 receive rotary motion. The side members of the three shafts 5 are radially equidistant from the axis of the drum and have fixed to their outer ends pinions 7, which are engaged by a relatively large gear-wheel 8, that is loosely mounted on the trunnion 4 of the drum. For distinction the loose wheel 8 may be called the "controlling-gear." A hand-lever 9 is pivoted to the frame member or pillow-block A² and is of such shape that its inner end may be thrown into the path of one of the spokes of the wheel 8 for preventing the rotary motion of said wheel. The relation of the hand-lever 9 to the controlling-wheel 8 is best shown in Figs. 2 and 3. With this construction it is obvious that when the controlling-wheel 8 is locked to the frame, so as to be held stationary, rotation of the drum will cause all of the shafts 5 to rotate on their own axes, while at the same time they are carried around with the drum. On the other hand, if the controlling-wheel 8 be left loose or free to turn on the drum-trunnion 4 the whole train of gearing, made up of the parts 6 to 8, inclusive, will turn with the drum, the wheel 8 turning on the trunnion 4 without causing the shafts 5 or any thereof to turn on their own axes. The two outer shafts 5

pass through cross-bar 3. The opposite head of the drum is provided with three openings or passages fitted with closures 10, having bearings in the form of journals 11 for co-
 5 operation with the shafts 5 to detachably support a series of three working rollers 12. Said working rollers 12 are preferably made of wood and are provided on their ends with bearing-plates 13. The bearing-plate 13 at
 10 one end of the roller is provided with a square socket *c* to receive the square end of its supporting-shaft 5, and the bearing-plate 13 at the other end of the roller is provided with a round socket *c'* to permit the plate 13 to fit
 15 over the journal-bearing 11 in the corresponding closure 10. These bearing-plates are best shown in Figs. 6 and 7. The closures 10 are each provided with a suitable locking device, which, as shown, consists of a lever 14, mount-
 20 ed on the outer end of the journal 11 and having pivoted thereto lever-arms 15, the outer ends of which have cam-surface faces and work through guide-keepers 16, fixed to the drumhead. The lever 14 is free for a limited
 25 rotary motion on the journal 11, and the radial arms or levers 15 are pivoted to the lever 14 at such points that under the rotary motion of the lever 14 the arms 15 will be forced outward and through the keepers 16,
 30 and in virtue of the camming action, due to the inclined or wedge-shaped faces of the levers 15, it follows that the closure 10 will be forced tightly to its seat and there held. The joint between the closure 10 and its seat in
 35 the drumhead is suitably packed by a proper gasket 17, of cork or other suitable material. A nut 11^a holds lever 14 on journal 11. The openings subject to the closures 10 are of the proper size to freely pass the working roll-
 40 ers 12 and the water-circulating cans, which are substituted therefor, as will presently be noted. The drum 1 is also provided with the customary peripheral opening, fitted with a suitable cover or closure 18, for the introduc-
 45 tion of the cream, removal of the butter, &c.

One of the drumheads, preferably the one carrying the gears 6 and 7, is provided, as shown, with an annular gear-wheel 19. As shown, the gear-wheel 19 is an internal gear
 50 and is engaged by a pinion 20, fixed to a counter-shaft 21. The shaft 21 has its bearings in the frame-pedestal A² and in a supplemental frame A, as shown in Fig. 1. The shaft 21 has fixed thereto a pair of gear-wheels
 55 22 and 23, differing in size and number of teeth. A shaft 24 is provided with a pulley 25 for the application of a belt to impart motion thereto from any suitable source. The shaft 24 is provided with a pair of gears 26 and 27, shown
 60 as formed on a common hub, which gears 26 and 27 also differ in size and number of teeth and are reversely related in point of position relative to each other as compared with the gears 22 and 23 on the counter-shaft 21. The
 65 gears 26 and 27 are splined to the shaft 24 with freedom for sliding motion thereon and are subject to a shipper-lever 28, pivoted to

the frame A and engaging with a suitable collar 29, formed on the hub of the gear 26. This construction affords a differential or
 70 change-speed drive for the rotary drum. As shown in Fig. 1, the larger gear 26 of the main shaft 24 is in engagement with the smaller gear 22 on the counter-shaft 21; but
 75 it is obvious that by shifting the gears 26 and 27 the smaller member 27 on the main shaft 24 may be thrown into engagement with the larger member 23 on the counter-shaft 21. Hence the drum 1 may be rotated at two dif-
 80 ferent speeds, the higher of which is adapted for use when churning and the lower of which is adapted for use when working the butter.

The parts so far as described constitute a combined churn and butter-worker. When churning, the controlling gear-wheel 8 is left
 85 loose or free to turn on the drum-trunnion 4. Hence, as hitherto noted, the entire train of gears 6 to 8, inclusive, would be carried around together under the rotation of the drum, but will not turn relative to each other,
 90 and hence the shafts 5 and the working rollers 12 will not turn on their own axes. When, however, it is desired to work the butter, the hand-lever 9 is thrown into a position to hold the controlling-wheel 8 and lock the same to
 95 the frame, thereby preventing rotation thereof. When this is done, the pinions 7, fixed to the outer ends of the side members of the shafts 5, must travel around the stationary gear-wheel 8 under the rotary motion of the
 100 drum, and hence the said pinions 7 will impart motion to the shafts 5, which carry the same, and through the connected gears 6 will cause all of the working rollers 12 to turn together. The relative motions of the drum 1
 105 and the working rollers 12 when the controlling-gear 8 is held stationary are indicated by the arrows in Fig. 5. The corresponding direction of rotation for the driving-gear is indicated by the arrows in Fig. 1. The drum 1
 110 is provided with suitable perforated paddles 30, fixed to the drumheads and extending lengthwise of the drum at a slight distance below the periphery of the drum and set on the proper angle to deliver the butter carried
 115 upward thereby under the rotary motion of the drum to that pair of the working rollers 12 which are turning toward each other from above. Hence the butter will be caught and worked between the said pair of rollers.
 120

Instead of two side rollers for coöperation with the central roller it is obvious that three or more might be employed. So far as we know, we are the first to provide any construction
 125 affording a central roller having its axis coincident with the axis of the drum and two or more side rollers, with all of said rollers geared outside of the drum or inside the drum so as to turn together on their own axes under the rotary motion of the drum, and also
 130 the first to combine therewith a controlling-gear adapted to be locked to the frame or to be permitted to turn loosely thereon at the will of the operator for causing the working

rollers either to receive rotary motion on their own axes while carried with the drum or to be carried with the drum without receiving any independent rotary motion of their own.

5 Directing attention to Fig. 10, which shows the tempering devices in working position, the numerals 31 represent a pair of water-cans adapted to be substituted for the side or lateral members of the working rollers 12.
 10 The cans 31 are provided at one end with heads 32, which serve as the closures for the openings in the drumhead, through which the rollers 12 and the cans 31 can be inserted and removed. The can heads or closures 32
 15 are in shape exactly the same as the closures 10, which are applied when the rollers 12 are in use, and have the same identical locking devices as the closures 10. Instead of trunnions, however, the can-heads 32 are provided
 20 with pipe-sections 33, extending outward through the closures. The closures 32 themselves serve as the bearings for the cans 31 at one end, and at the other ends the said cans 31 are provided with seats adapted to fit
 25 over the heads of the stub-shafts 5. The seats in the cans 31 for receiving the heads of the stub-shafts 5 are of circular form and larger than the square heads of said shafts, so that if any rotary motion should by acci-
 30 dent or otherwise be imparted to the shafts 5 no motion would be communicated to the cans 31. The two cans 31 are connected by a detachable cross-pipe 34 and union-nuts 35. An inflow or supply pipe 36, made up of sep-
 35 arable sections connected by a right and left screw-threaded union 37, passes in through the discharge-section of an outflow-pipe 38, which is also made up of two separable sections connected by corresponding union 39.
 40 The inflow-pipe 36 taps the pipe-section 33, leading to one of the cans 31, and the outflow-section 38 taps the pipe-section 33, projecting from the other can 31. The outflow-pipe section is larger than the inflow-pipe, and the
 45 latter enters through the former, while the former passes outward through the hollow trunnion 2 of the drum. With these cans and pipe connections applied as described it is obvious that hot or cold water may be cir-
 50 culated therethrough, as may be required, for tempering the cream to bring the same to the proper temperature before churning.

With the construction hereinbefore described it is obvious that means are afforded
 55 for the interchangeable use at will of water-circulating devices to temper the cream and of proper devices for churning and working the butter. It must be also obvious that the change from one to the other can be made
 60 without drawing off the cream. For example, suppose the tempering devices, together with the central member of the working rollers, to have been applied first, as would naturally be the case, or, in other words, that the parts
 65 first used be those shown in Fig. 10. After the cream had been tempered by the circulation of the hot or cold water, as required, the

water-circulating devices can be detached and removed and the side members of the working rollers be applied without drawing 70 off the cream. To do this, the drum would be revolved until one of the water-cans 31 should be at its highest point. The drum might have been loaded with cream to a point slightly above the axis of the drum, which is 75 about the usual load. The upper can would then be above the cream-level. The pipe 35 could then be detached from the two cans, the closure for the upper can be unlocked, the screw-union 37 manipulated to disconnect 80 the two sections of the inflow-pipe, and the upper can be removed. One of the side rollers 12 could then be inserted and applied to its proper shaft 5 at one end and the corresponding closure 10, with the bearing 11, be 85 brought into proper position relative to the drumhead and the roller and the lock made fast. This would bring one of the side rollers into working position and tightly close the opening through which the change had 90 been made from the upper can to the corresponding roller. By then imparting a half-turn to the drum the other can would come to the highest position and be above the cream-level, and a like substitution could be 95 made, thereby bringing the other member of the side rollers into working position in lieu of the removed can. The parts would then all be as shown in Fig. 1 or as required for use in churning and working the butter. 100 This provision for the interchangeable use of cream-tempering devices and proper devices for churning and for working the butter without drawing off the cream from the drum is a great convenience and effects a large 105 economy in merchant-creameries. Apart from this interchangeable feature of the two classes of devices, the detachable feature for the working rollers and all the parts employed within the drum is an important thing in 110 itself for the sake of cleanliness. Absolute cleanliness is essential for securing the best product in machines of this class. Inasmuch as the working rollers can all be readily detached and removed from the drum, every- 115 thing can be kept thoroughly clean.

By actual usage we have demonstrated the efficiency of the improvements herein disclosed for the purposes had in view.

It will of course be understood that modifi- 120 cations might be employed without departing from the spirit of our invention.

What we claim, and desire to secure by Letters Patent of the United States, is as follows:

1. A rotary drum or shell mounted to turn 125 on a horizontal axis and provided with stub-shafts, in one drumhead, geared, outside the drum, to turn together, and bearings in the other drumhead, for coöperation with said stub-shafts, to interchangeably receive and 130 support detachable rollers and water-circulating devices, substantially as and for the purposes set forth.

2. A rotary drum or shell mounted to turn

on a horizontal axis, provided with stub-shafts in one drumhead, geared, outside the drum, to turn together and provided, in the other drumhead with openings or passages, and re-
 5 movable closures for said openings, provided with bearings which coöperate with said stub-shafts to permit the interchangeable application and use of rollers or water-circulating devices, substantially as and for the purposes
 10 set forth.

3. A rotary drum or shell mounted to turn on a horizontal axis, and provided with stub-shafts, in one drumhead, geared, outside the drum, to turn together, and provided, in the
 15 other drumhead, with openings or passages fitted with removable closures having bearings which coöperate with said stub-shafts to permit the interchangeable application and use of rollers or water-circulating devices,
 20 and equipped each with a locking device for tightly securing the closure to the drum, substantially as described.

4. In a combined churn and butter-worker, the combination with a rotary shell or drum,
 25 of a central roller having its axis coincident with the axis of the drum, two or more side rollers radially equidistant from the central roller, with said three rollers geared to turn together by gears carried with the drum, a
 30 controlling-gear, loose on the fixed frame and engaging pinions fixed to the projecting ends of the side-roller shafts, and means, operative at will, for preventing the rotation of said controlling-gear, substantially as de-
 35 scribed.

5. In a combined churn and butter-worker, the combination with a rotary drum or shell, and a differential or variable speed drive for rotating the same, of a central roller in the
 40 drum, having its axis coincident with the axis of the drum, two or more side rollers radially

equidistant from said central roller, with said three rollers geared to turn together by gears, outside the drum, and carried therewith, a con-
 45 trolling-gear loose on the fixed frame and engaging pinions on the projecting ends of said side-roller shafts, and a hand device for locking said controlling-gear to the shaft, at will, substantially as and for the purposes set forth.

6. In a combined churn and butter-worker, 50 the combination with a rotary drum or shell, having roller passages or openings in one head thereof fitted with closures, of a central roller and two or more side rollers within the drum, detachably secured therein and re- 55 movable through said openings in the drum-head, and stub-shafts mounted in the opposite drumhead for engagement with said rollers, which stub-shafts are geared outside the drum to turn together, a controlling-gear loose on 60 the fixed frame and engaging pinions on the projecting ends of the side-roller shafts and a hand device engageable with said gear for preventing the rotation thereof, at will, sub-
 65 stantially as described.

7. In a combined churn and butter-worker, the combination with a rotary drum or shell, of detachable working rollers, stub-shafts in one drumhead and roller-passages in the op-
 70 posite drumhead, fitted with closures having bearings for coöperation with said stub-shafts, to support said rollers, and permit the removal and insertion of the same through said passages, substantially as described.

In testimony whereof we affix our signa- 75
 tures in presence of two witnesses.

DENNIS E. VIRTUE.
 GEORGE A. HAGEDORN.

Witnesses:

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