

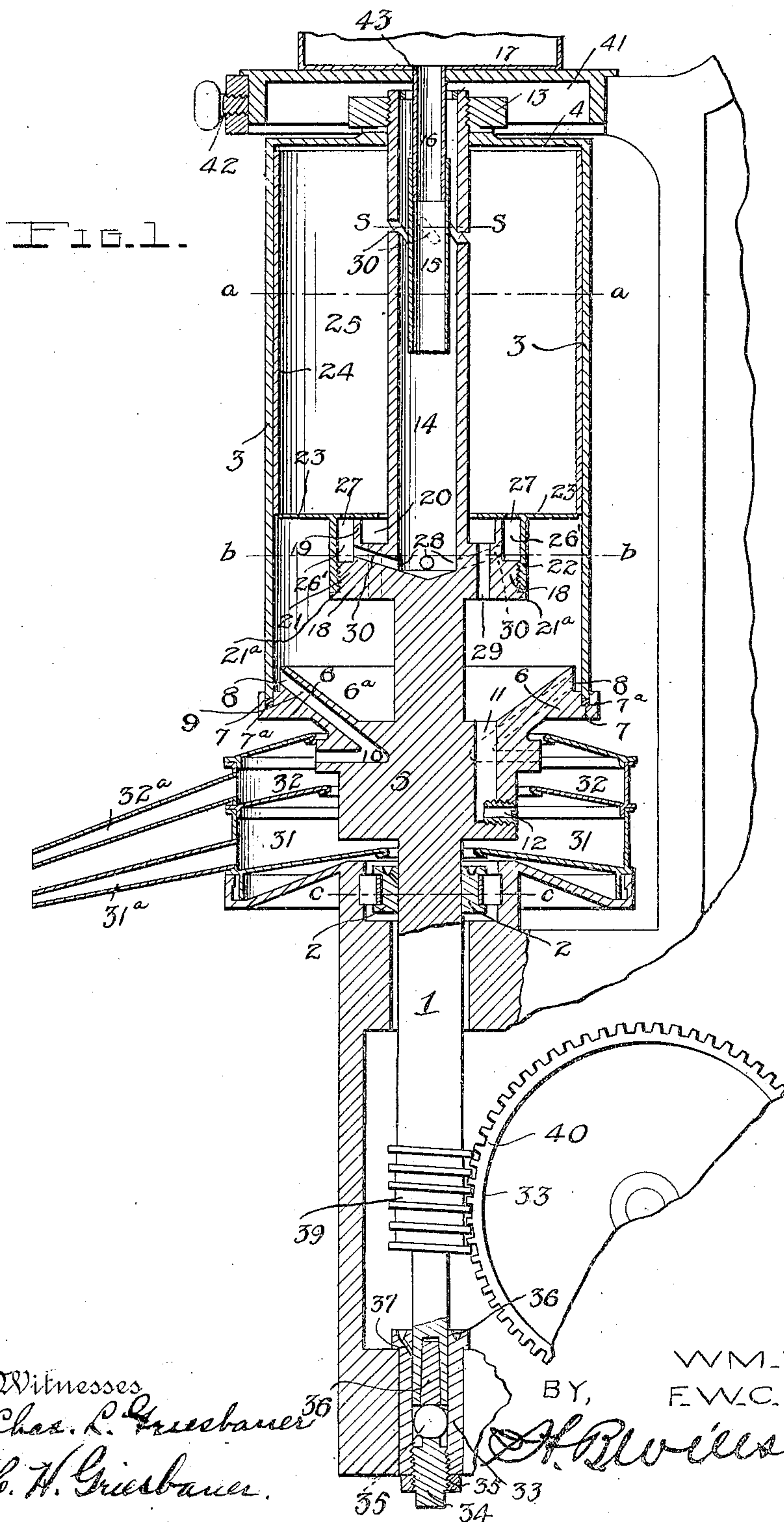
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PATENTED FEB. 25, 1908.

W. WITT & F. W. C. HARTMANN.
CENTRIFUGAL CREAM SEPARATOR.

APPLICATION FILED APR. 11, 1907.

2 SHEETS—SHEET 1.



Witnesses
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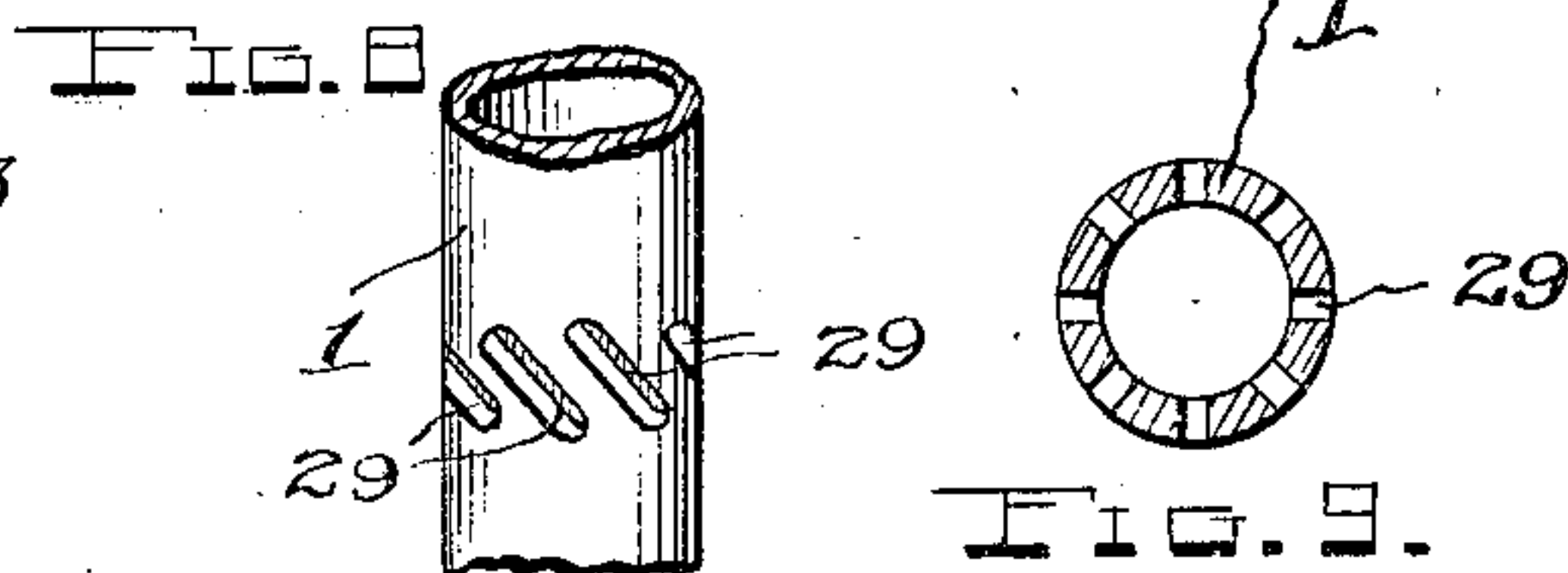
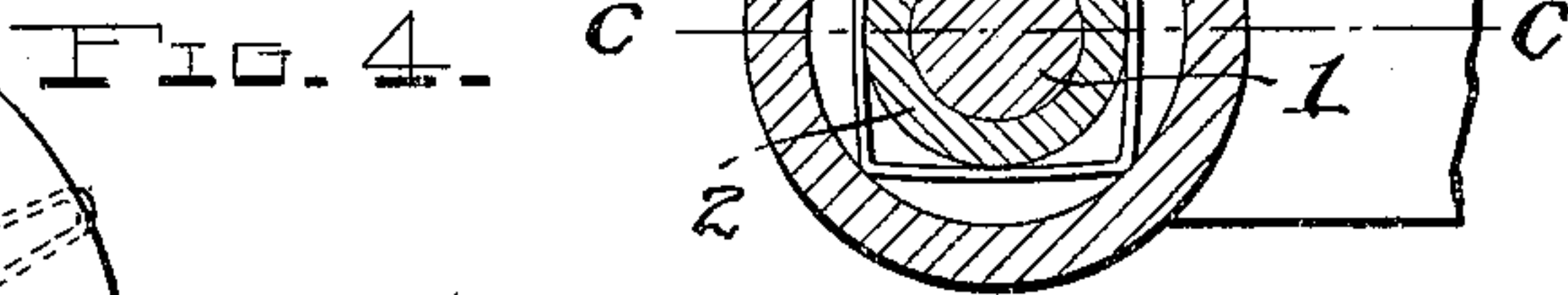
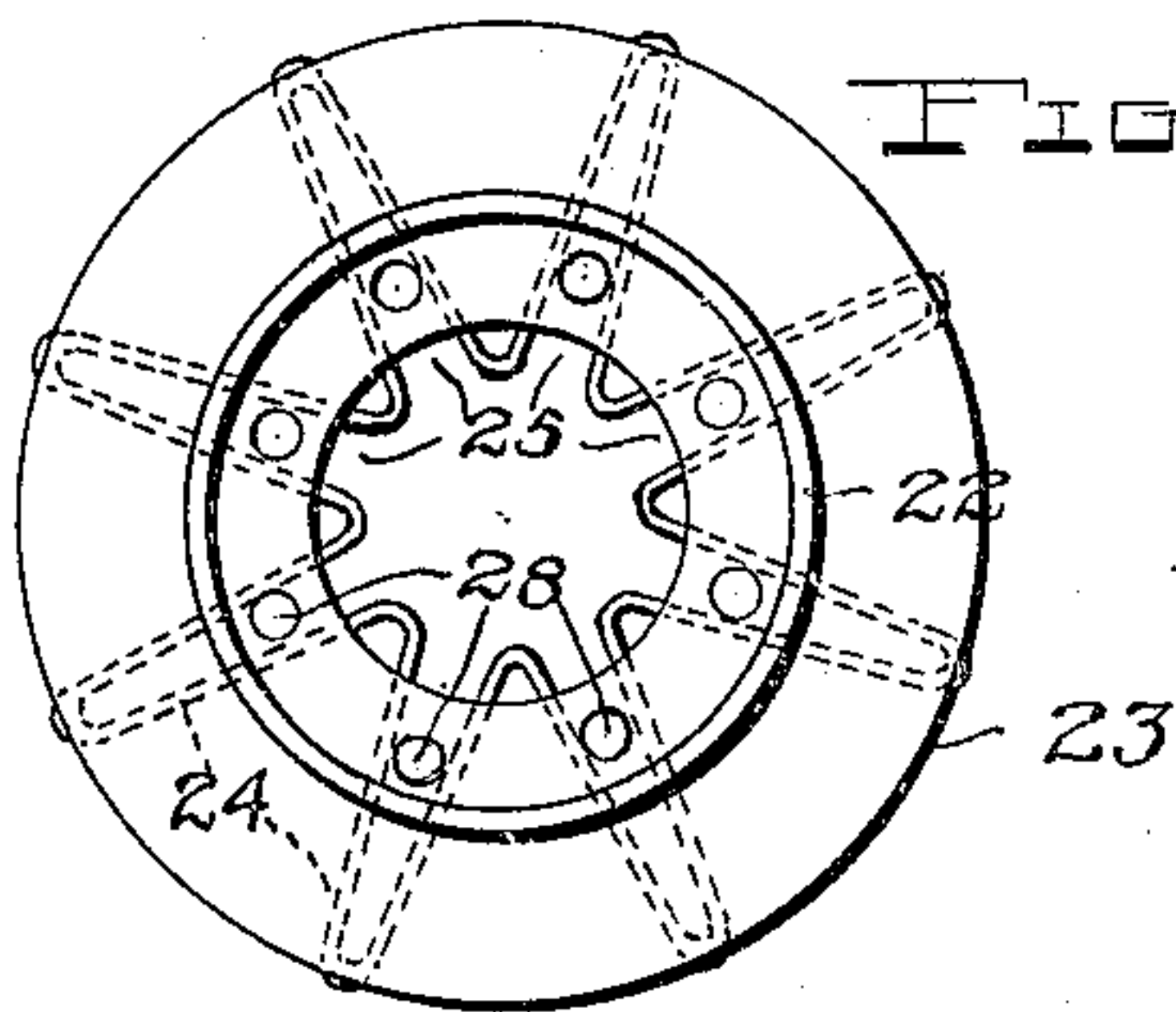
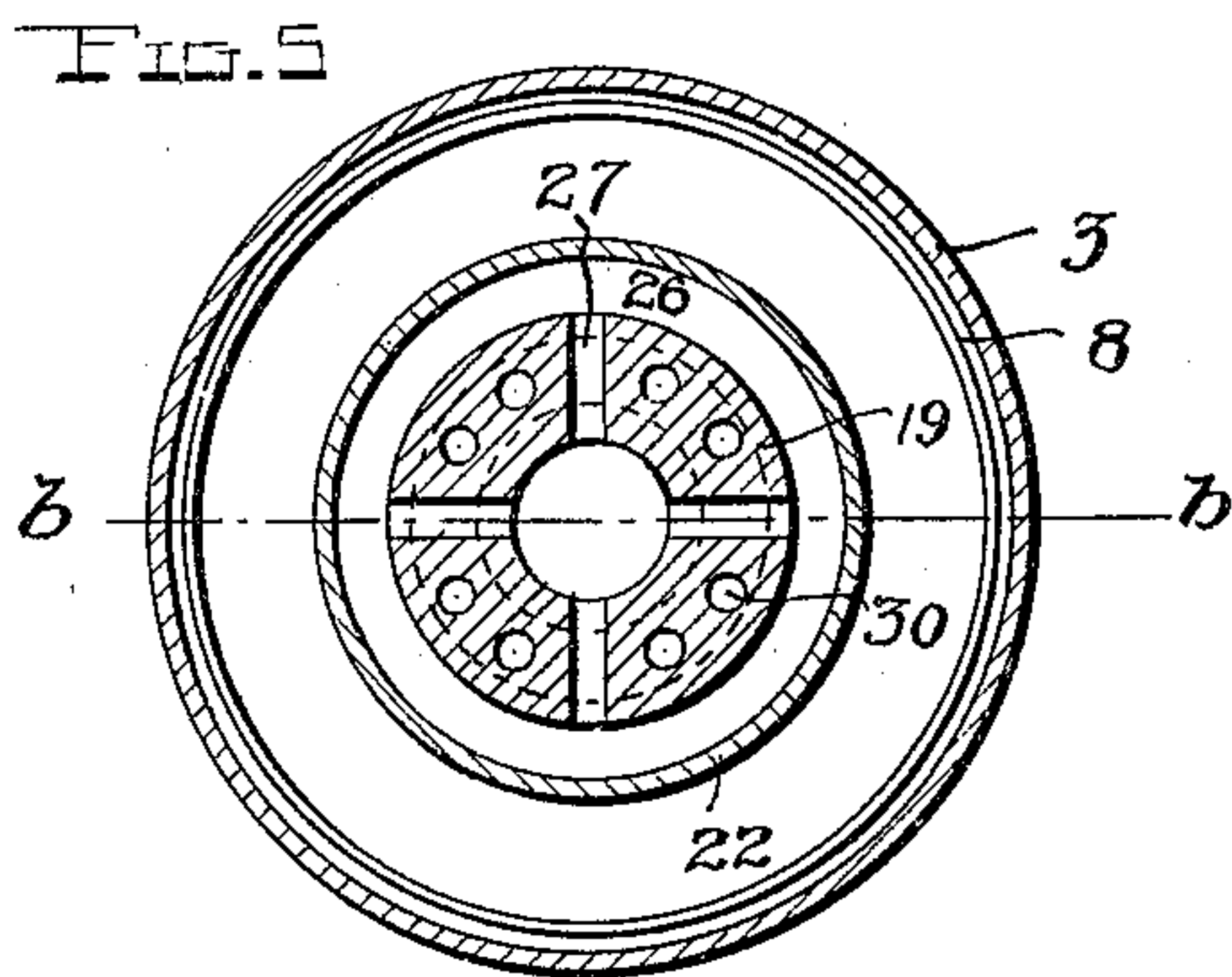
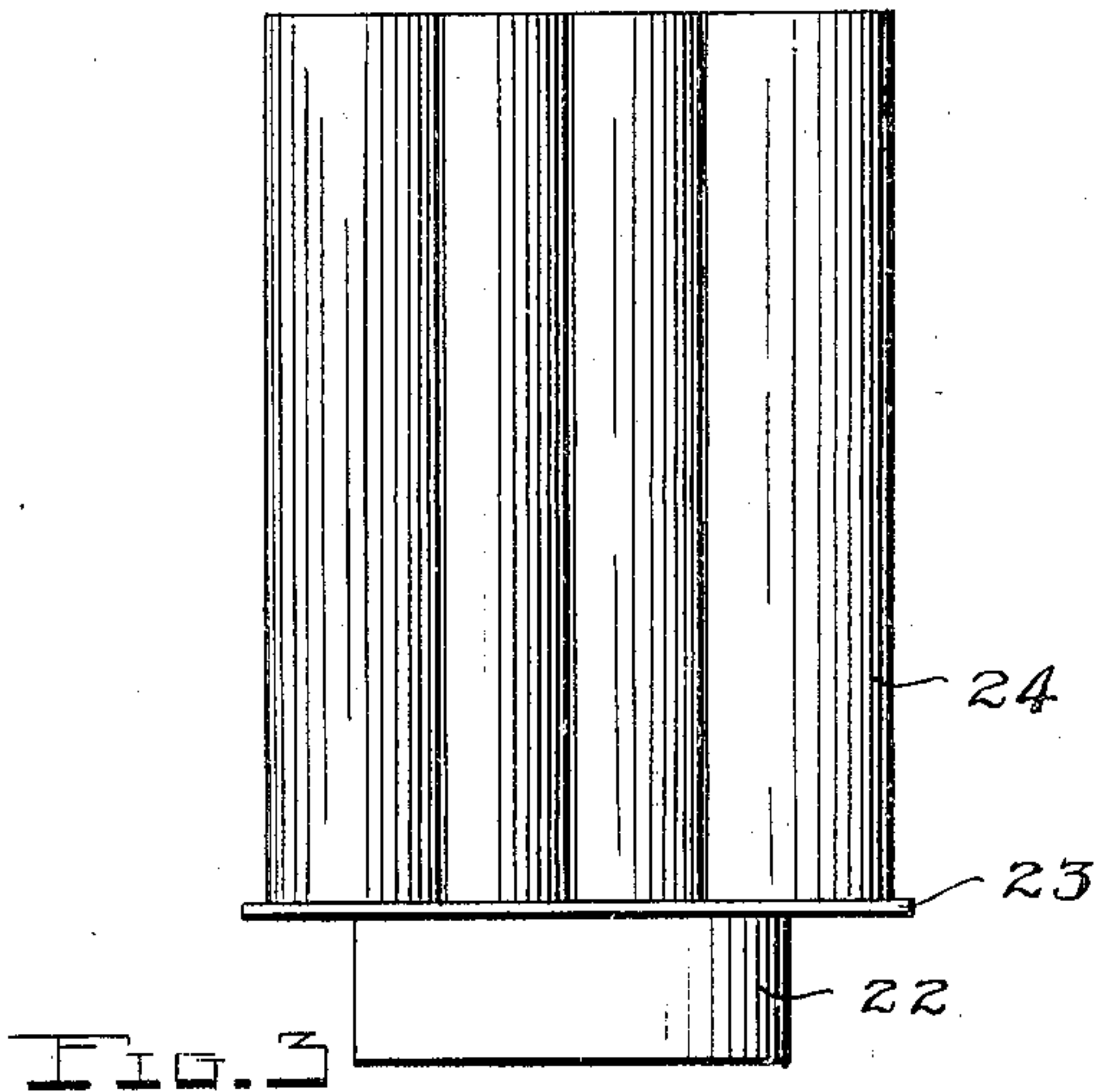
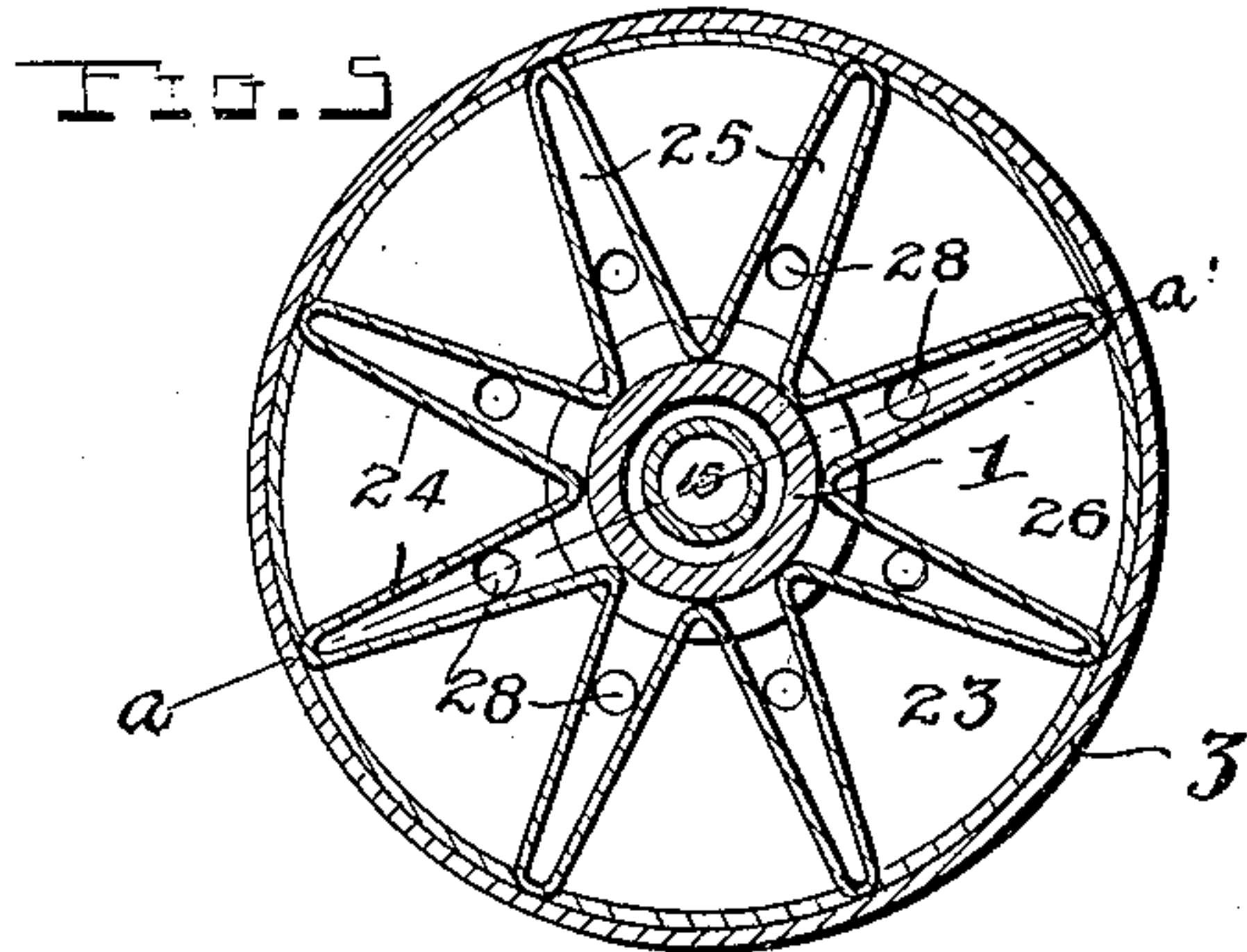
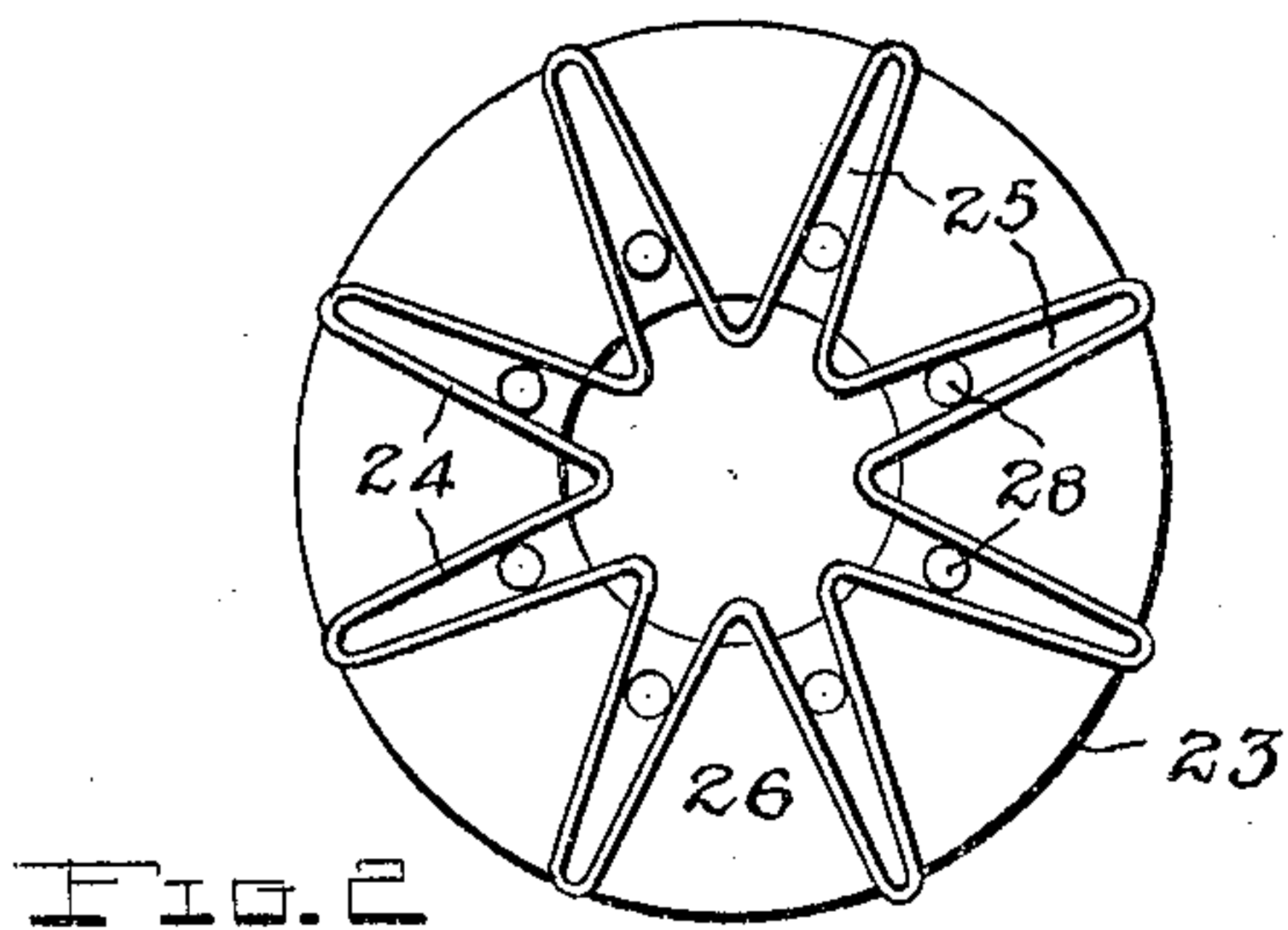


FIG. 9.

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CENTRIFUGAL CREAM-SEPARATOR.

No. 879,994.

Specification of Letters Patent.

Patented Feb. 25, 1908.

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To all whom it may concern:

Be it known that we, WILLIAM WITT and FREDERICK W. C. HARTMANN, citizens of the United States, residing at Ripon, in the county of Fond du Lac and State of Wisconsin, have invented certain new and useful Improvements in Centrifugal Cream-Separators; and we do 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.

This invention relates to improvements in centrifugal cream separators.

The object of the invention is to provide a cream separator of this character so constructed and arranged that the capacity of the same will be greatly increased over that of other machines of similar size and of the common or ordinary construction.

A further object is to provide a separator, which will be simple, strong, compact and durable in construction, efficient and reliable in operation and so constructed as to be readily taken apart for cleaning or other purposes.

With the above and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be hereinafter described and claimed.

In the accompanying drawings:—Figure 1 is a vertical central sectional view of the separator; Fig. 2 is a top plan view of the star-shaped separating device; Fig. 3 is a side view; Fig. 4 is a bottom plan view of the same; Fig. 5 is a horizontal sectional view on the line *a—*a** of Fig. 1; Fig. 6 is a similar view on the line *b—*b** of Fig. 1; Fig. 7 is a horizontal sectional view on the line *c—*c** of Fig. 1; Fig. 8 is a detail perspective view of a portion of the chambered operating shaft, showing the arrangement of the vent openings therein; and Fig. 9 is a horizontal sectional view on the line *s—*s** of Fig. 1.

Referring more particularly to the drawings, 1 denotes the supporting and operating shaft of the separator, said shaft being mounted in a flexible bearing 2 on a suitable supporting frame 2^a. Arranged on the upper end of the shaft 1 is a separating bowl 3, said bowl being closed at its upper end, as at 4. On the shaft 1 is formed an annular enlargement 5, on the upper end of which is formed an annular head 6, in the upper side of which around the shaft 1 is formed a con-

ical-shaped basin or recess 6^a. The head 6 is provided with an annular flange, in which is formed an annular groove or channel 7 adapted to receive the lower open end of the bowl 3. A packing ring 7^a is arranged in the groove or channel 7 between the lower edge of the bowl and the bottom of the groove or channel, thereby forming a fluid-tight connection or joint between said parts. Between the outer annular wall of the head 6 and the adjacent inner wall of the lower end of the bowl 3 is formed an annular space 8. In the head 6 is formed a series of radially-disposed inclined passages 9, the upper ends of which open into the annular space 8 around the upper end of the head, while the lower end of said passages communicate with short, radially-disposed horizontal passages 10 that open through the sides of the enlargement 5 immediately below the head 6. In the head 5 is also formed a vertically-disposed cream passage 11, which communicates at its upper end with the lower end of the conical-shaped recess or basin 6^a formed in the upper side of the head. The lower end of the passage 11 communicates at its lower end with a tubular nipple or adjusting screw 12, which is screwed into a threaded opening formed in the side of the enlargement 5 at the lower end of the passage 11. By screwing the tubular nipple inwardly or outwardly in the threaded opening, the richness in butter-fat of the cream drawn there-through may be determined.

The bowl 3 is securely held in position on the shaft 1 and forces it into fluid-tight engagement with the packing ring in the groove of the head 6 by means of a clamping nut 13 adapted to be screwed into the threaded upper end of the shaft 1, as shown. The shaft 1 is provided in its upper end with a chamber 14, which extends downwardly therein, as shown. Supported upon an arm or bracket of the main supporting frame of the machine is a reservoir or hopper 17, in the lower end of which is arranged a feed tube 15. The lower end of the tube 15 fits or telescopes into a feed tube 16 that projects downwardly into the chamber 14 in the upper end of the shaft 1. The milk from the reservoir or hopper 17 is fed through the tubes 15 and 16 into the chamber 14. On the shaft 1 opposite the lower end of the chamber 14 is formed an annular enlargement 18 having on its upper side an annular upwardly-projecting flange 19, between which and the

outer side of the shaft is formed an annular channel or cup 20. On the enlargement 18 is formed an annular shoulder 21, on the lower edge of which is formed an annular flange 21^a. The shoulder 21 is provided with exterior screw threads and screwed upon the same is an upwardly-projecting sleeve or collar 22. On the upper end of the collar 22 is arranged a plate 23, the diameter of which is considerably greater than that of the sleeve or collar 22, thereby forming a projecting annular flange around the same. In the plate 23 is formed a centrally-disposed aperture, through which the shaft 1 projects, said aperture being of greater diameter than the shaft, thereby forming between the outer wall of the shaft and the wall of the aperture a space, through which cream is adapted to pass into the cup or annular space 20. Supported upon the plate 23 is arranged a separating device 24, which is preferably substantially star-shaped in cross section and formed of a single sheet of metal bent to form a series of radial projections 24 that separate the space in the cylinder 3 above the plate 23 into a series of compartments 25, 26. The inner ends of the projections 24 extend beyond the edge of the aperture in the plate 23, so that the spaces 25 and 26 communicate with the cup 20 below the plate 23. The plate 23 is also provided with a series of apertures 27 that afford communication with the spaces 25 and the annular space 26' formed between the sleeve or collar 22 and the adjacent outer wall of the cup or channel 20. The channel 20 is in communication with the lower end of the chamber 14 in the shaft 1 by means of a series of passages 28 arranged in the head 18 below the cup 20. In the head 18 is also formed a series of vertically-disposed passages 29 arranged between the passages 28 and affording communication between the cup or channel 20 and the lower portion of the cylinder 3, thereby permitting the discharge of the cream from the cup 20 to the basin 6^a formed in the upper end of the head 6, the cream being discharged from said basin through the passages 11 and the apertured screw or plug 12, as clearly indicated by arrows in Fig. 1 of the drawings. In the shaft 1 adjacent to the upper end of the same and affording communication between the chamber 14 formed therein and the spaces 25 and 26 of the separating device are a series of obliquely-disposed passages 30. The passages 30 are so arranged that the upper end of one passage projects over the lower end of the next adjacent passage, thereby forming a practically continuous opening from the passage 14 to the separating device.

Arranged upon a suitable support on the main frame of the separator and surrounding the enlargement 5 on the shaft 1 are compartments 31 and 32 to receive the cream

and the skimmed milk, which is respectively discharged therein through the passages 11 and screw plug 12 into the enlargement 5 and through the passages 9 and 10 in the head 6. The receptacles 31 and 32 are, respectively, provided with discharge spouts 31^a and 32^a by means of which the cream and skimmed milk therein are conducted therefrom.

The lower end of the shaft 1 is journaled in a bearing sleeve 33 arranged in the main supporting frame, said sleeve having screwed into its lower end a bearing plug 34, on the upper reduced end of which is arranged a ball 35. In the lower end of the shaft 1 is arranged a bearing plug 36 that rests and turns upon the ball 35. The plug 34 is preferably held in place by means of a jam-nut 35. In the upper end of the sleeve 33 is arranged an oil-receptacle 36, which communicates with the interior of the sleeve 33 through ports 37. In the main supporting frame of the machine above the lower bearing of the shaft is arranged a second bearing sleeve 33^a, through which the shaft passes, said sleeve being yieldingly supported in the frame by a rectangular flexible supporting collar or frame 34^a. The sleeve 33^a is provided with an oil receptacle and ports similar to those shown and described in the sleeve 33. On the shaft 1 adjacent to its lower end is arranged a worm 39, which is adapted to be engaged by a worm gear 40, said gear being mounted and driven by suitable mechanism, not shown.

In the arm or bracket on the upper end of the main supporting frame is arranged a removable platform 41, which is held in place by a set screw 42 and is adapted to support the reservoir or hopper 17. The platform 41 is provided with a centrally-disposed passage 43, through which the feed tube 16 from the hopper 17 is adapted to pass into the upper end of the chamber 14 of the shaft 1. By removing the platform 41 and the hopper 17 and unscrewing the clamping nut 13 from the upper end of the shaft 1, the bowl 3 may be readily removed to afford access to the separating parts arranged therein, thus permitting said parts to be easily cleansed or repaired when necessary.

In the operation of the machine, when the bowl is rotated very rapidly, the milk in the hopper 17 passes down the feed tube into the chamber 14 in the shaft 1. The centrifugal force carries the milk to the wall of the chamber where it passes downwardly along said wall and out through the radial passages 28 into the annular chamber 26' between the sleeve or collar 22 and the outer wall of the cup 20, from whence the milk will pass upwardly through the passages 27 into the V-shaped spaces 25 between the radial projections of the separating device 24, where the heaviest parts will be thrown outwardly

against the vertical walls of said compartments and will gradually pass up said walls and over the upper edge of the same at the top of the bowl. After the skimmed milk
 5 passes over the walls, the same enters the compartment 26 and passes down there-through and out between the outer edge of the plate 23 and the inner wall of the bowl 3
 10 into the space below the plate 23, where it runs down said wall into the annular space 8 between the upper portion of the head 6 and the adjacent wall of the cylinder, from whence the skimmed milk is conducted by the passages 9 and 10 to the skimmed milk
 15 receptacle 22 and is conducted therefrom through the discharge spout 32^a.

The cream contained in the milk flowing into the V-shaped spaces 25 being too light to be carried up and over the walls of said
 20 spaces passes to the center and against the walls of the shaft 1 and passes downwardly through the center opening of the plate 23 into the cup 20, from whence it is conducted through the passages 29 and discharged into the basin 6^a, from which it is discharged
 25 through the passage 11 and hollow plug 12 to the cream receptacle 31, from whence it is discharged through the spout 31^a. Should any of the cream be carried over the wall of
 30 the spaces 25 it being lighter than the milk will pass to the center against the inner points or apexes of the walls of the V-shaped spaces 26 and will run downwardly and be discharged at the lower end thereof into the
 35 cup 20, from whence it will be discharged through the passages 29 into the basin 6^a, as hereinbefore described.

In the operation of the machine, owing to the rapidity with which the bowl is revolved,
 10 there will always be a space around the shaft both inside and below the separating device and in the center of the shaft chamber 14, which will not be filled with milk or cream, and in these spaces the air and gases from the
 15 milk will accumulate. In order to prevent the accumulation of this air and gas, which would cause the milk to froth and bubble, thus clogging the machine, suitable provision is made for the escape of the air and
 50 gas from the V-shaped spaces of the separating device. This escape is preferably provided for by providing the holes or apertures 30 in the shaft 1 adjacent to the upper
 55 end thereof and above the lower end of the feed tube 15, so that the accumulated air and gas may freely circulate and pass through the hollow shaft around said tube and up-
 60 wardly out of the upper end of the chamber 14 at the top of the shaft. The milk flowing from the lower end of the feed tube forms a wall across the space between said end and the wall of the chamber 14, thus preventing the upward escape of the air in said chamber,
 65 thereby causing the gas to pass freely through the passages 28 with the milk and

into the channel 26' and from thence upwardly through the passages 27 into the V-shaped spaces of the separator. The air in the space below the plate 23 will escape upwardly through the passages 29. It has
 70 been found that by thus venting the interior of the bowl and other parts of the machine, the rapidity with which the latter will separate the milk and cream is greatly increased and all of the butter-fat will be removed. 75

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation. 80

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention, as defined by the appended
 85 claims.

Having thus described our invention, what we claim as new and desire to secure by Letters-Patent, is:—

1. In a cream separator, the combination
 90 with a rotary bowl, of a feed chamber extending downwardly within the axis thereof, means for introducing milk into the upper end of said chamber means for permitting
 95 air to escape from said chamber intermediate its ends, a separating device arranged in said bowl and removably connected to the axis thereof, and means to conduct the milk from the lower end of said chamber to said separating device, substantially as described. 100

2. In a cream separator, the combination
 105 with a revolubly-mounted shaft having in its upper end a vertically-disposed chamber, the upper portion of the wall of said chamber being provided with obliquely arranged slots,
 110 of a bowl removably attached to said shaft when operated thereby, means to introduce milk into the chamber of said shaft, a separating device removably connected to the latter within said bowl, means whereby the
 115 milk is conducted from the chamber to said shaft through said separating device, and means to discharge the separated milk and cream therefrom, substantially as described.

3. In a cream separator, the combination
 120 with a revolubly-mounted shaft having in its upper end a vertically disposed chamber, of a supporting head formed on said shaft, said head having arranged therein milk and cream passages, and a cream receiving basin,
 125 a bowl removably-mounted on said shaft and head, a hopper arranged above the upper end of said shaft, telescoping feed tubes connected to the lower end of the hopper and projecting into the chambered upper end of
 130 the shaft, a cup arranged on said shaft within the bowl, said cup having formed therein radially-disposed discharge passages communicating with the chamber of said shaft, a collar arranged on said cup to form an annular space

around the same, which communicates with the discharge passage therein, a plate arranged on the upper end of said collar above said cup, said plate having formed therein
 5 apertures which communicate with the cup and with the annular space around the same, a separating device arranged on said plate in the upper portion of the bowl by means of
 10 lower end of the chamber in said shaft are separated and discharged through the passages in the head on said shaft, and independent receptacles arranged on said head to receive said separated milk and cream, sub-
 15 stantially as described.

4. In a cream separator, the combination with a revolubly-mounted shaft having a chambered upper end, a bowl mounted on said shaft to turn therewith, a cup formed
 20 on said shaft, a collar arranged on said cup to form an annular channel, a plate on said sleeve and cup, said plate having inlet and discharge passages to communicate respectively with said channel and cup, and a sep-
 25 arating device arranged on said plate, said device forming a series of radially-disposed V-shaped separating spaces in said bowl, substantially as described.

5. In a cream separator, the combination
 30 with a revolubly-mounted shaft chambered in its upper end and having formed therein

an annular series of gas and air vents arranged obliquely around the shaft, a head on said shaft having a series of milk and a series of cream discharge passages formed
 35 therein, a bowl having a closed upper end, means to removably secure said bowl on the shaft, a recessed enlargement formed on said shaft within said bowl, said enlargement having milk discharge passages communicat-
 40 ing with the chamber in said shaft and cream discharge passages formed therein, a collar removably mounted on said enlargement to form an outer annular channel, a supporting plate on said enlargement, said plate having
 45 formed therein a series of milk passages to communicate with said annular channel, and a cream discharge aperture surrounding said shaft and communicating with said cup, and a separating device arranged on said plate to
 50 form a series of V-shaped separating spaces in the upper portion of said bowl, substantially as described.

In testimony whereof we have hereunto set our hand in presence of two subscribing
 55 witnesses.

WILLIAM WITT.
 FREDERICK WM. C. PARTMANN.

Witnesses:

O. R. BUCHHOLZ,
 H. M. OLDER.