

June 19, 1923.

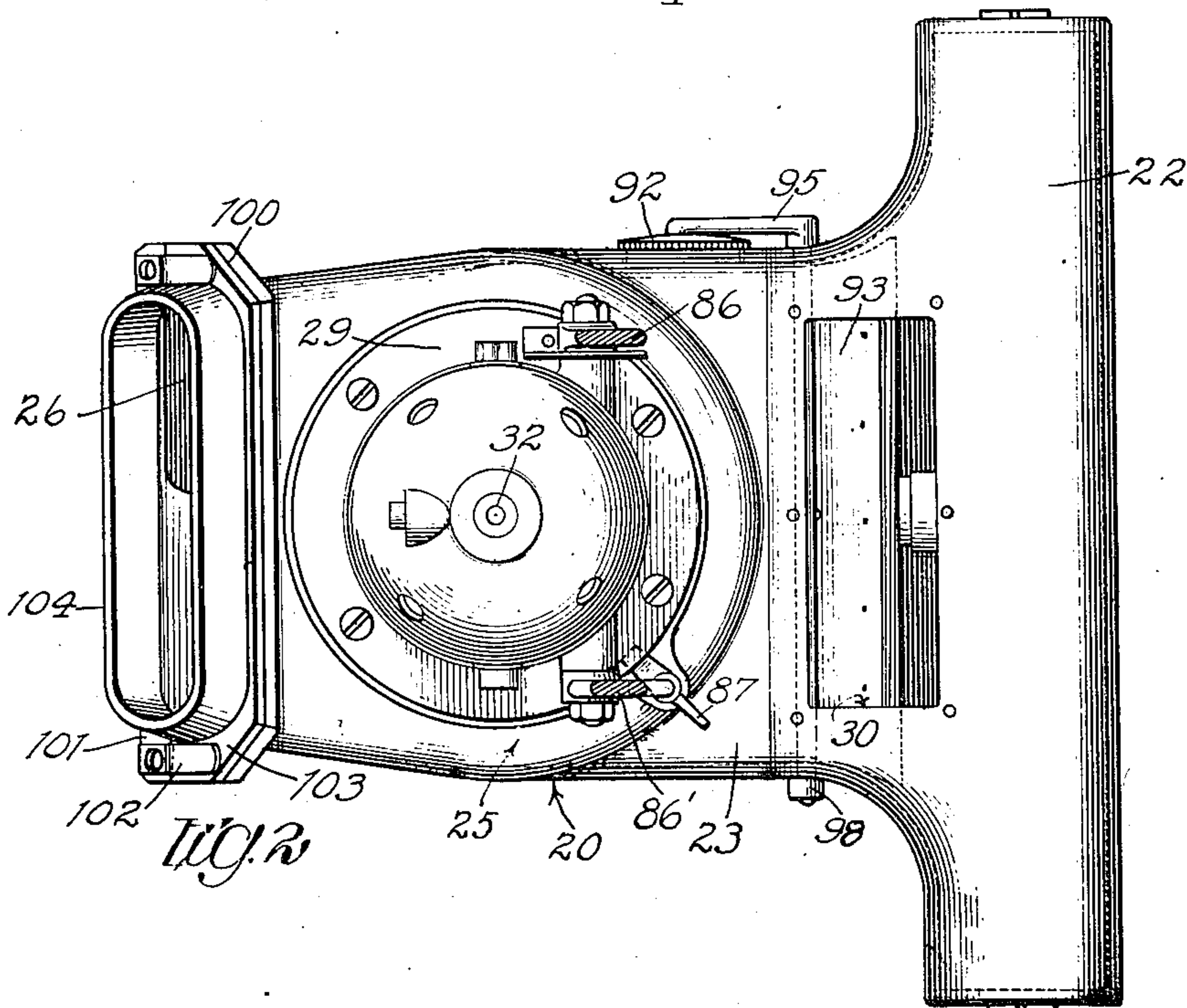
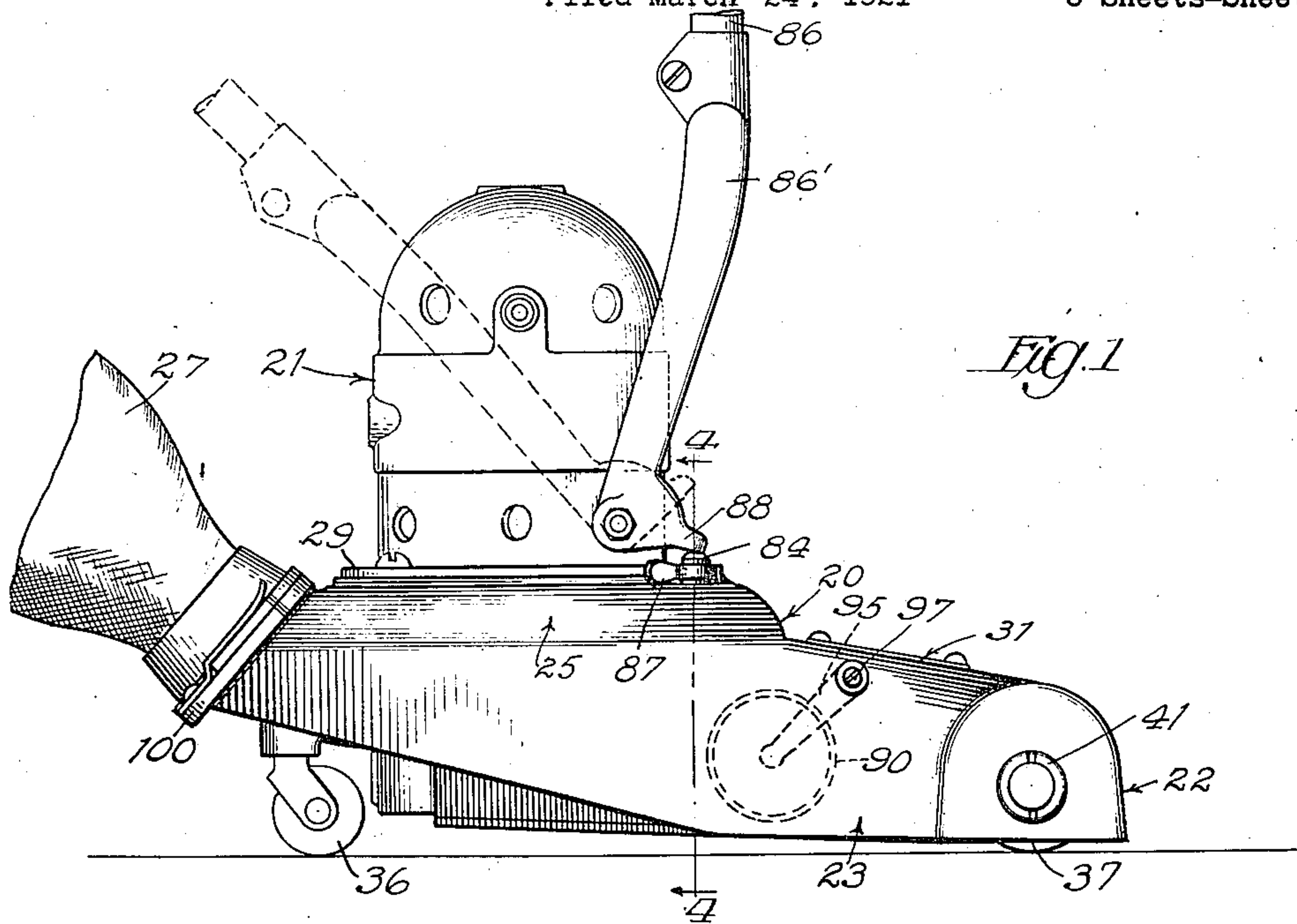
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J. T. HUME

VACUUM CLEANER

Filed March 24, 1921

5 Sheets-Sheet 1



Inventor  
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By Redon Kilben Davis & Macaulay Attys

June 19, 1923.

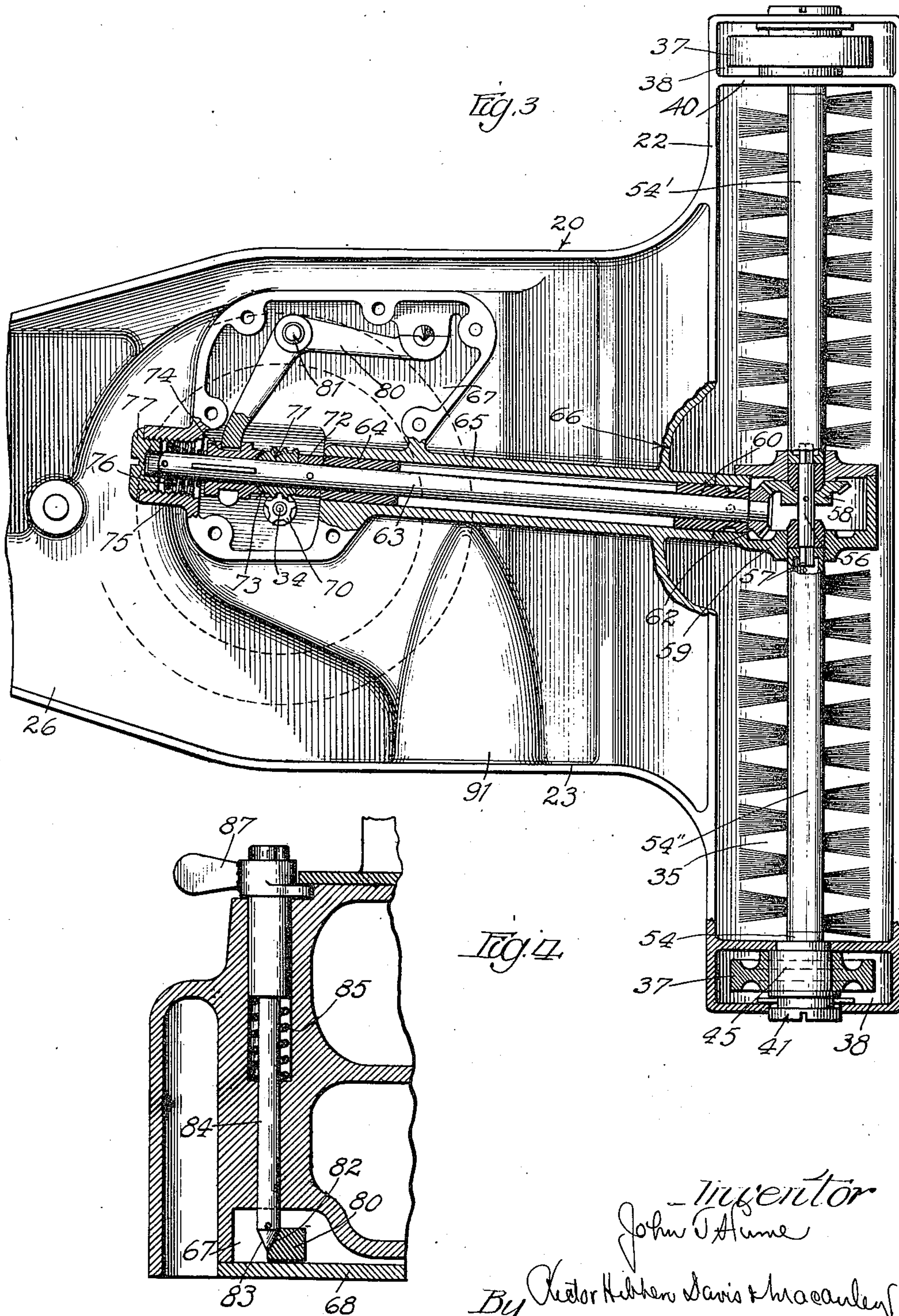
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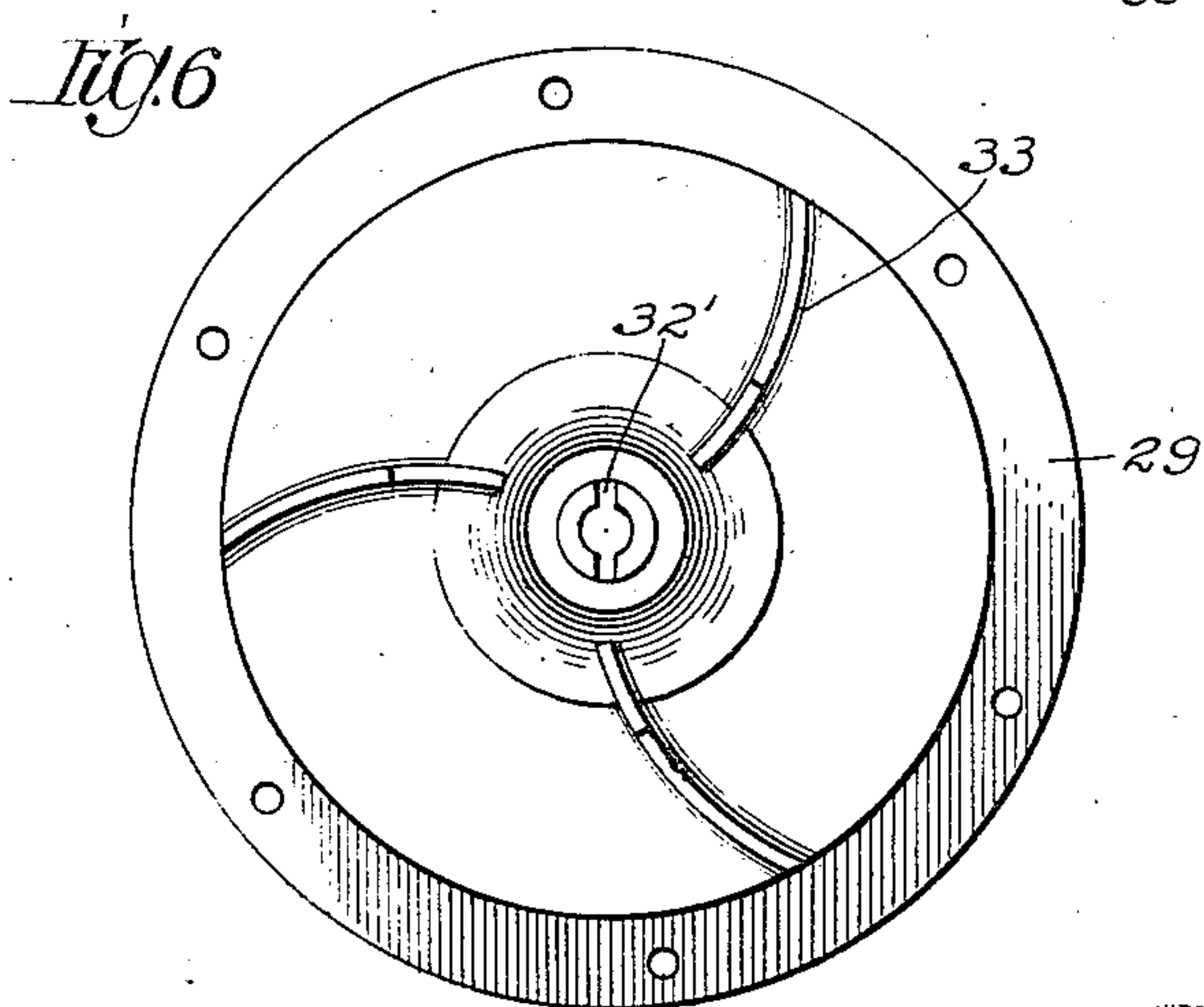
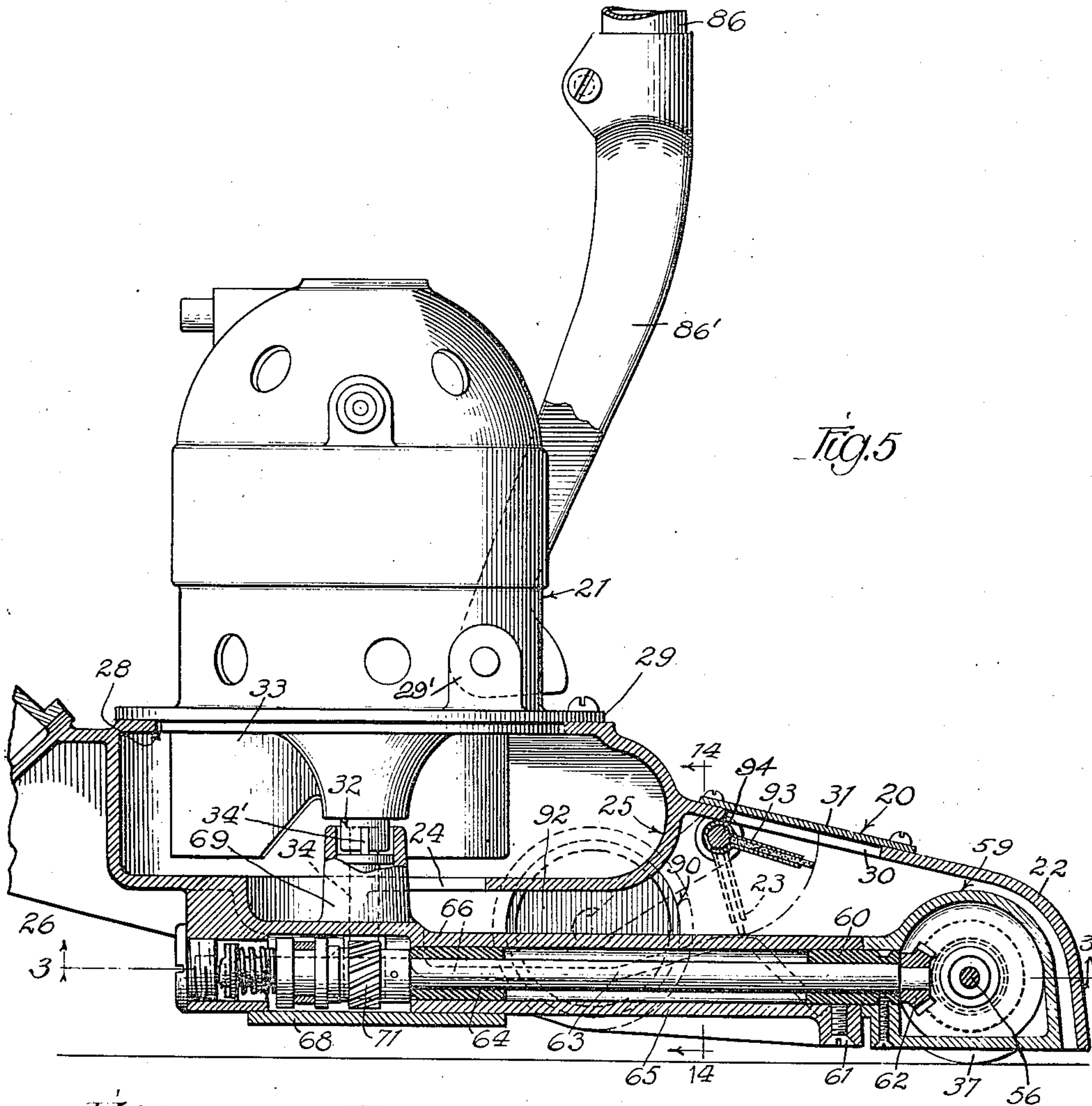
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VACUUM CLEANER

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Fig. 7

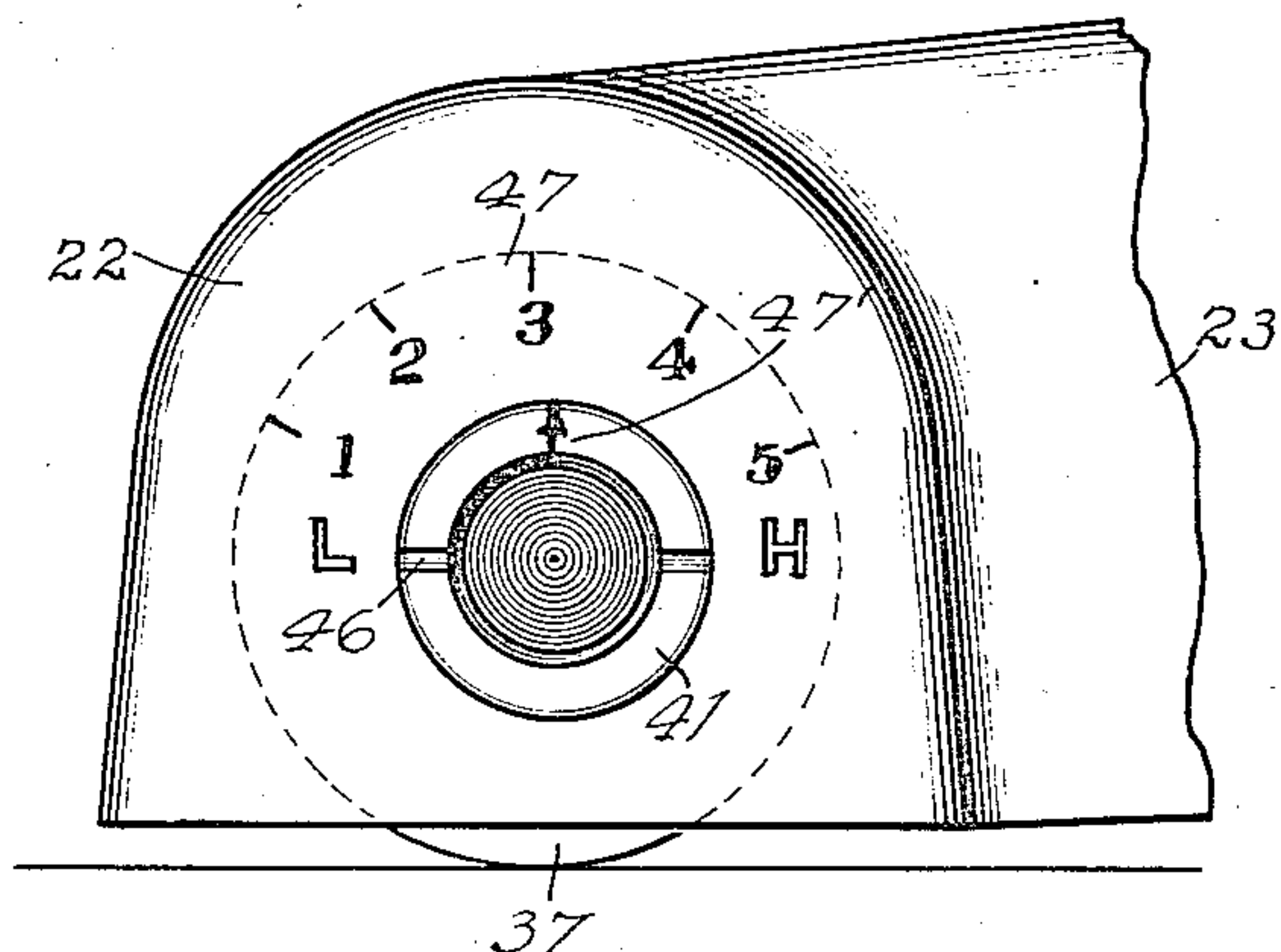


Fig. 9

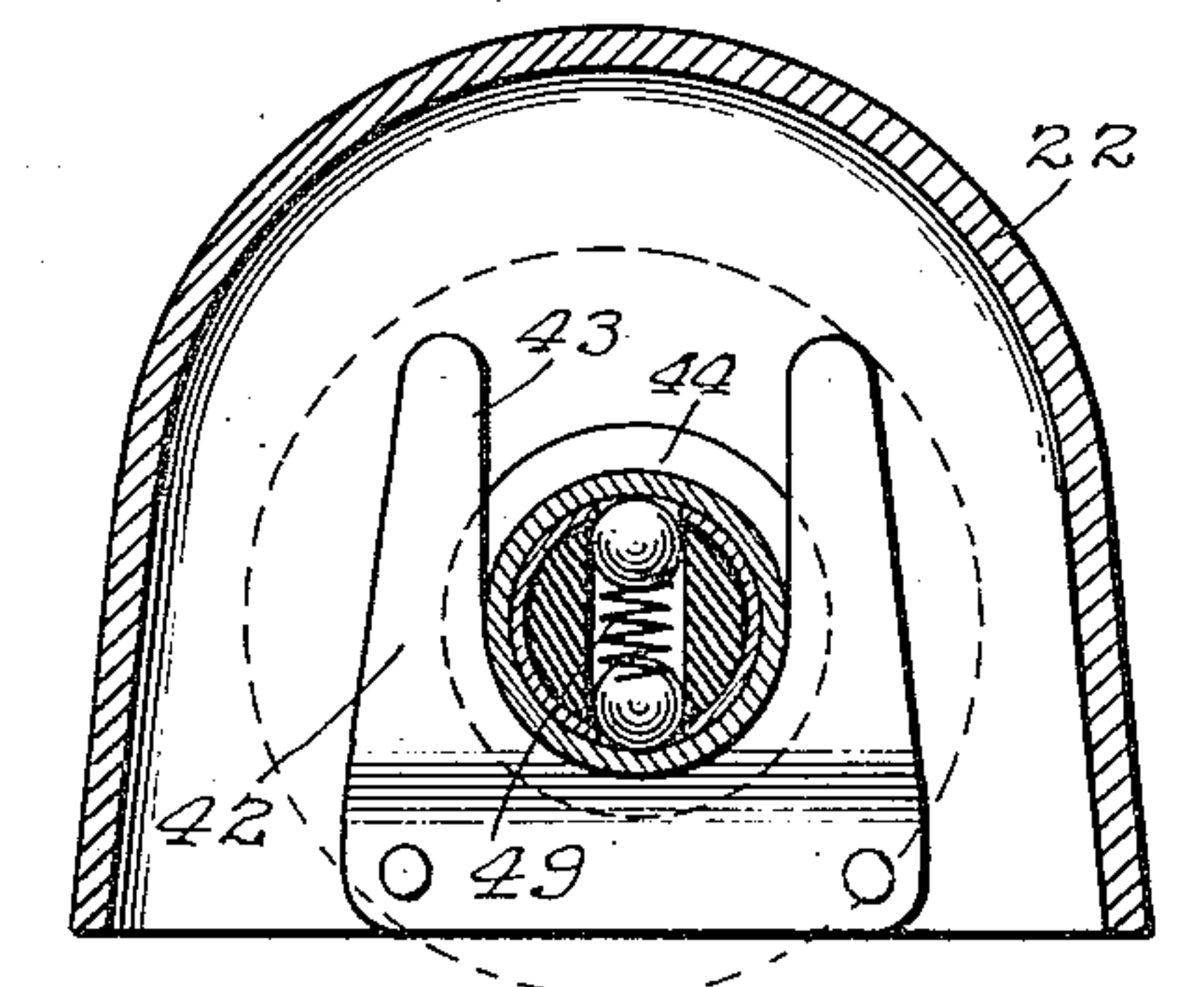


Fig. 8

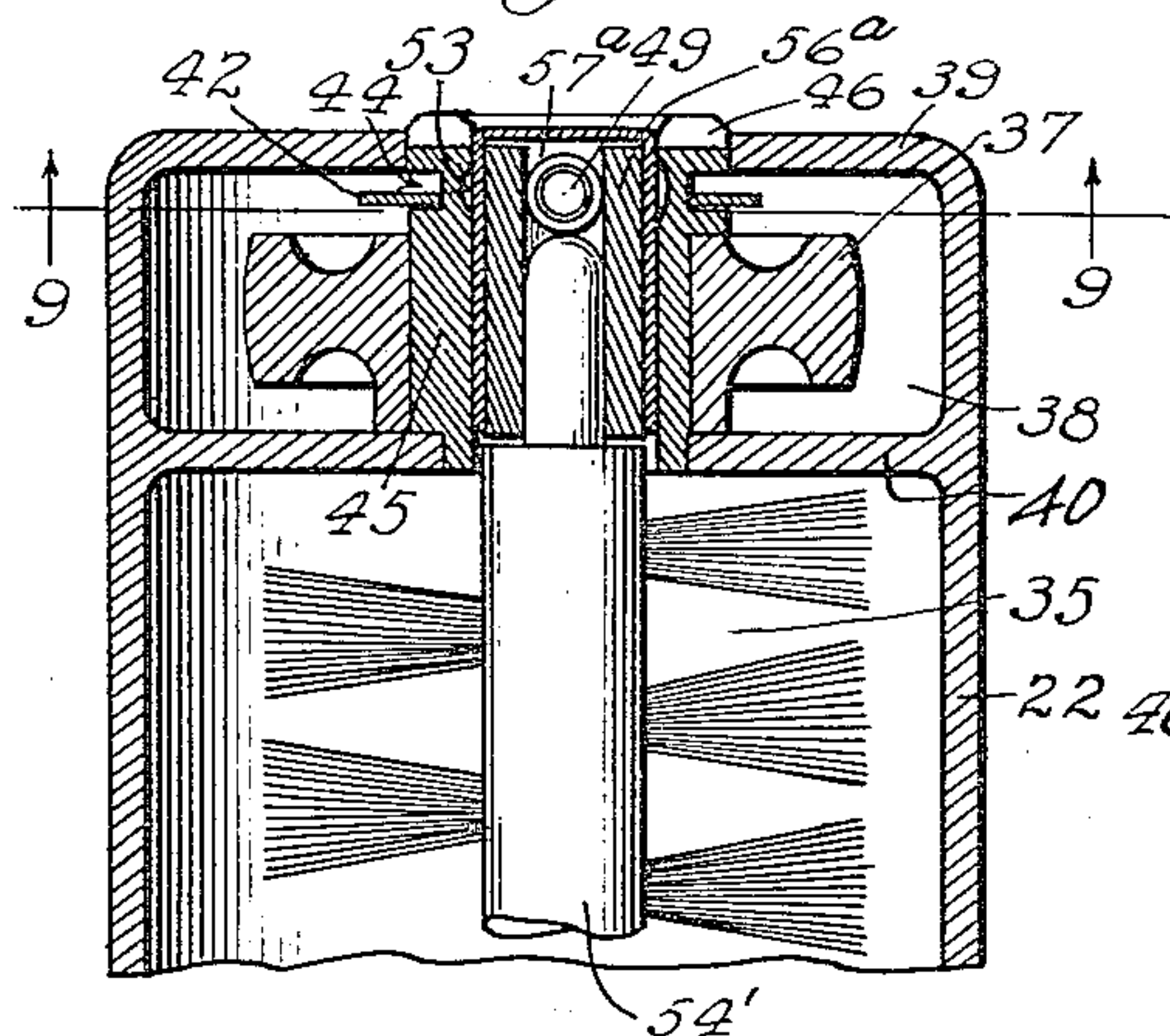


Fig. 10

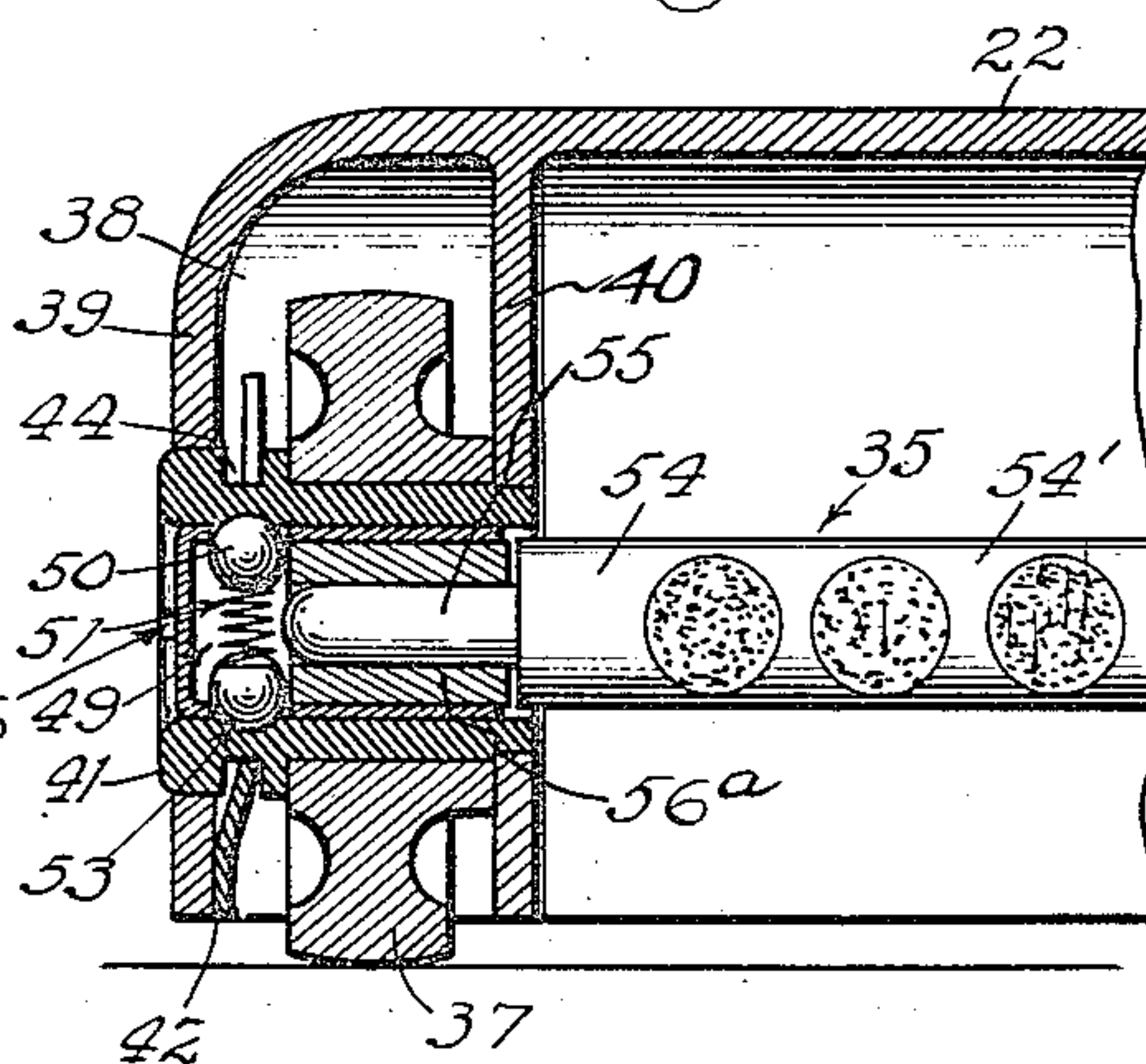


Fig. 11

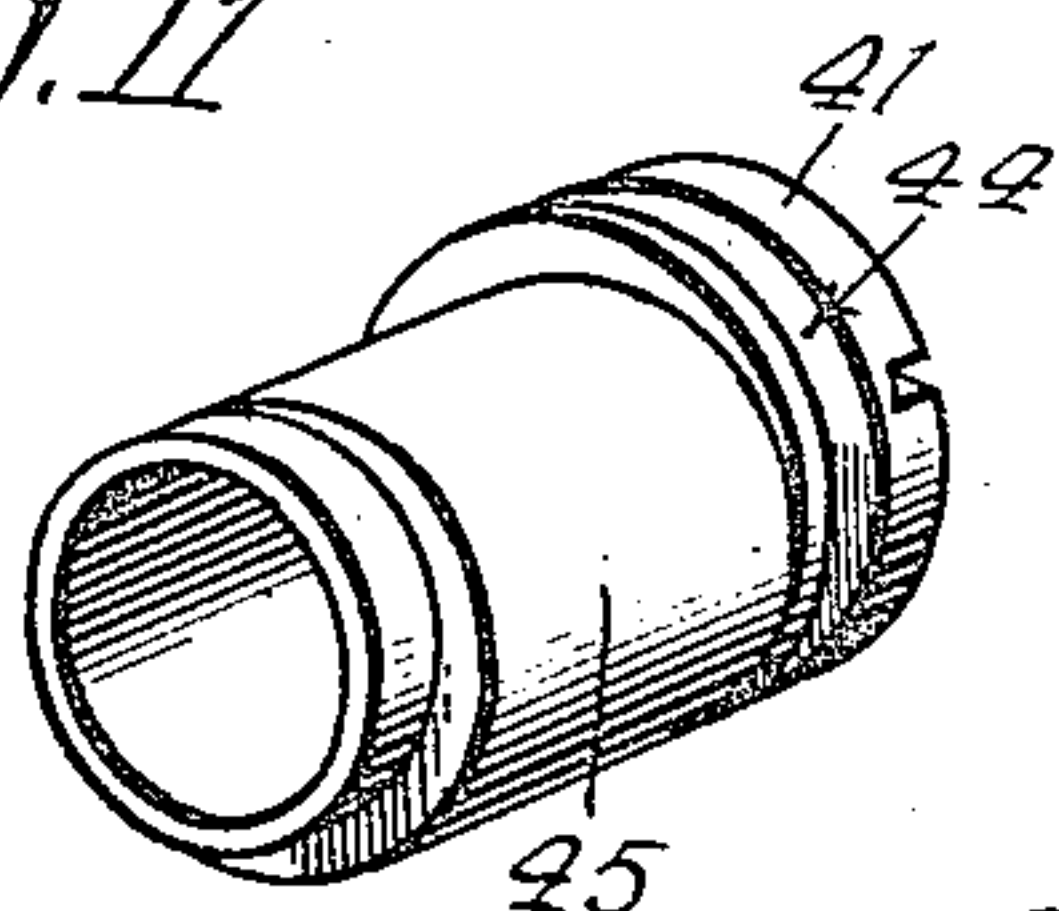


Fig. 12

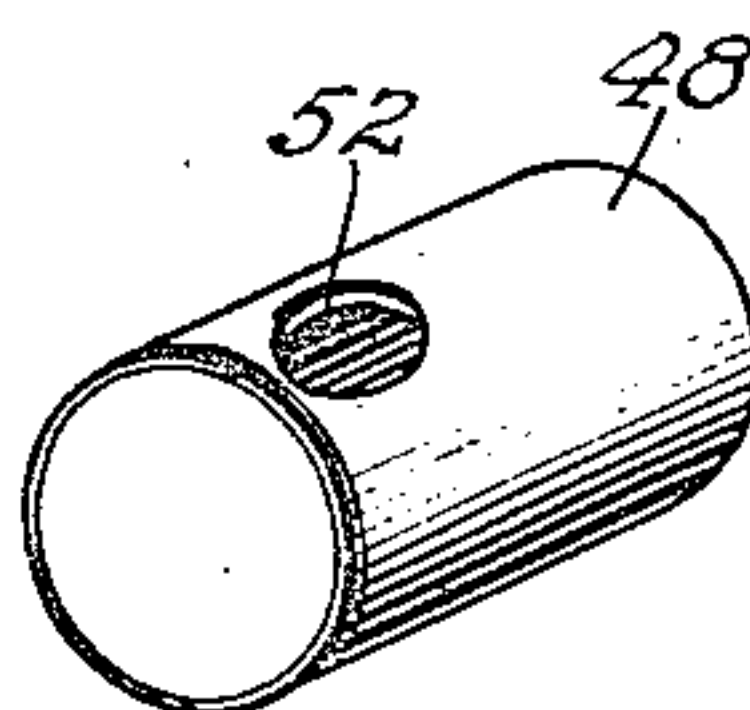


Fig 13

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Fig. 14

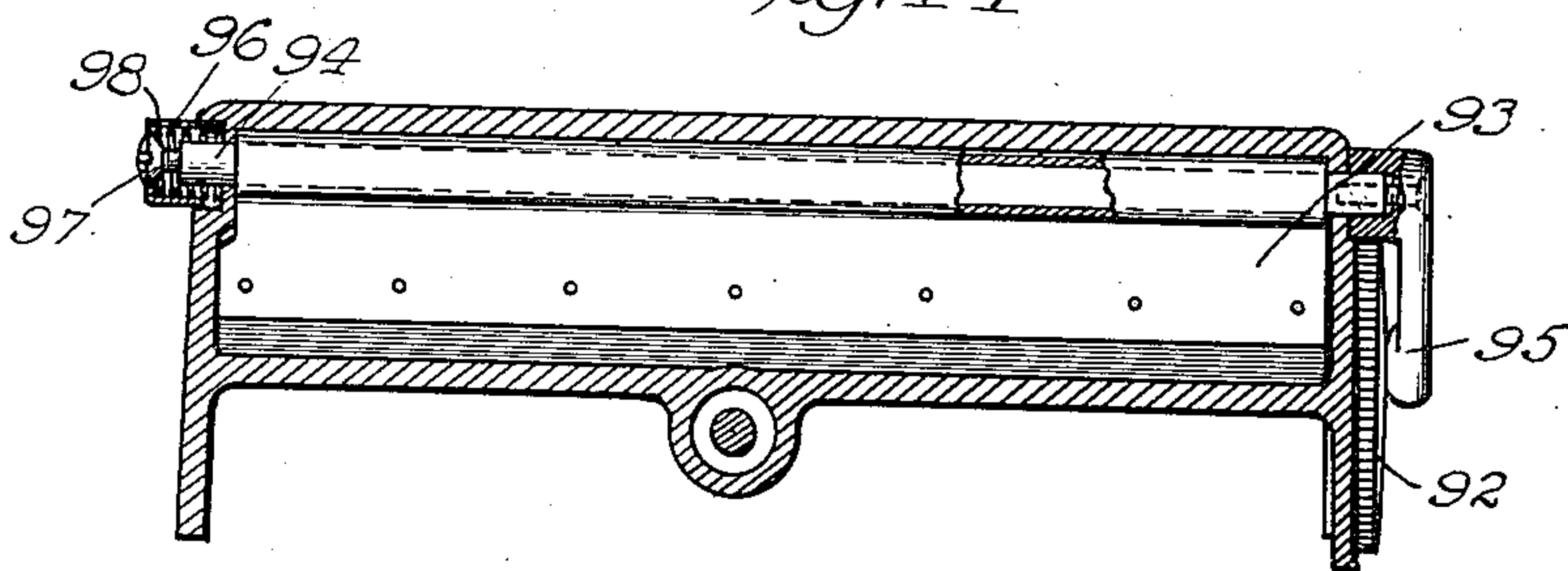


Fig. 15

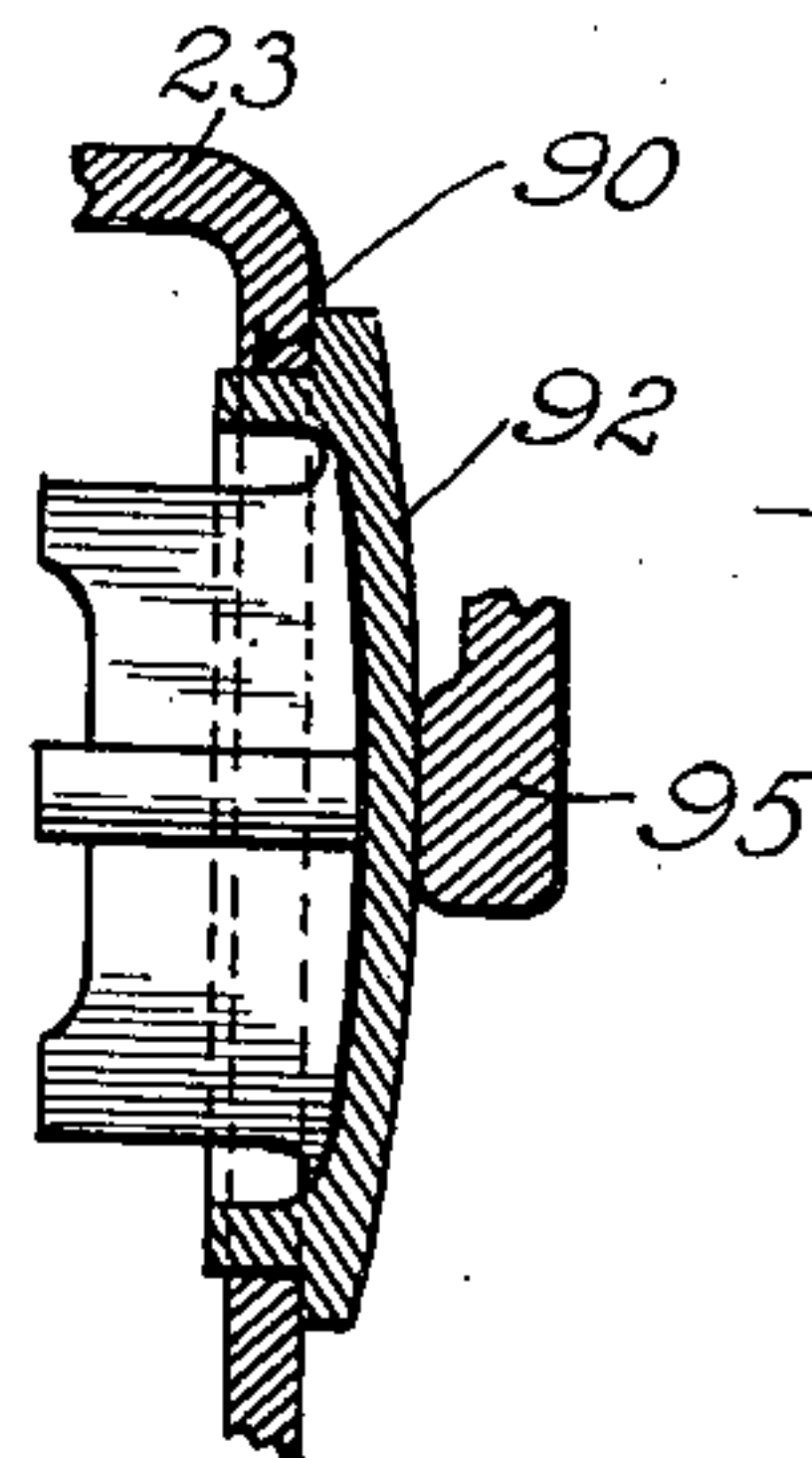
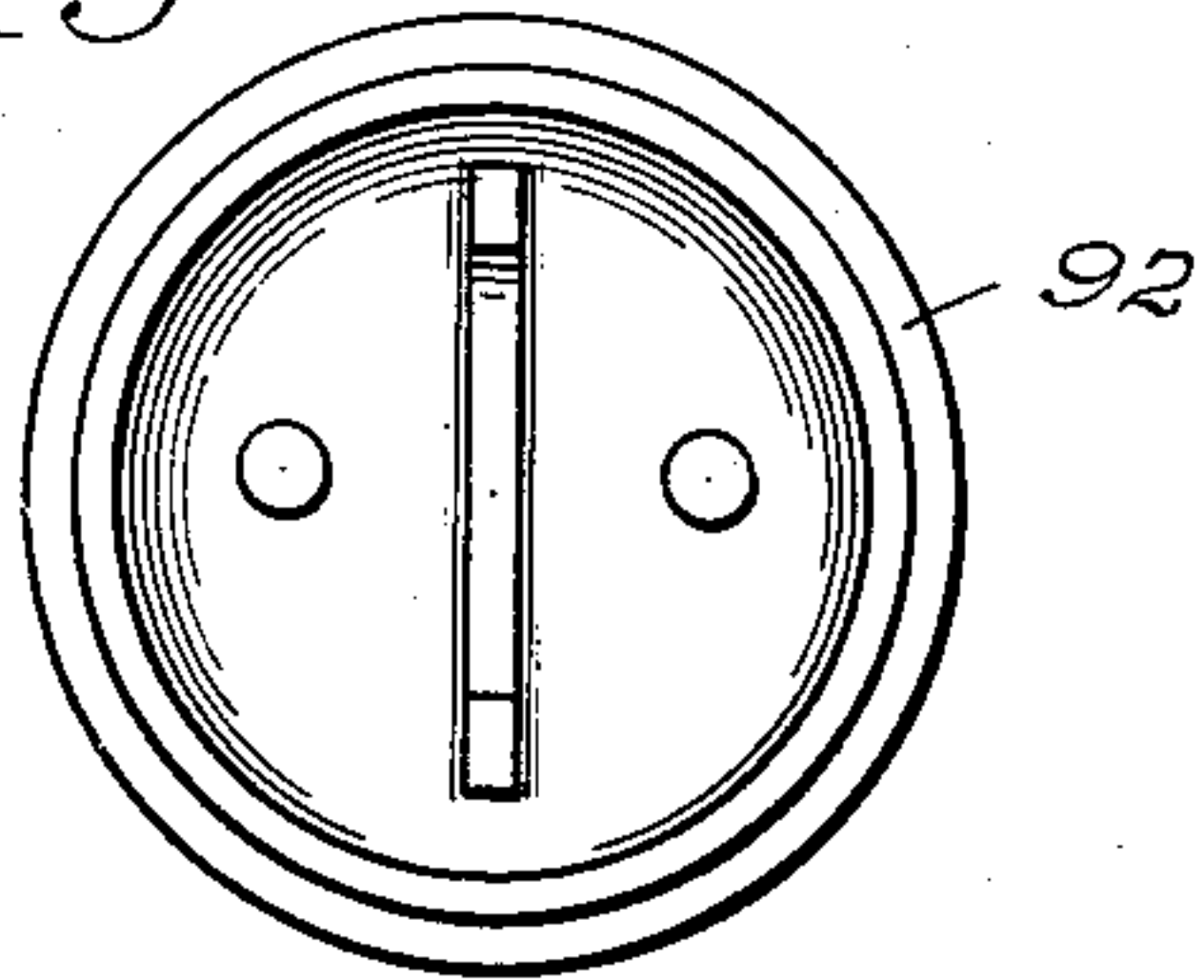


Fig. 16

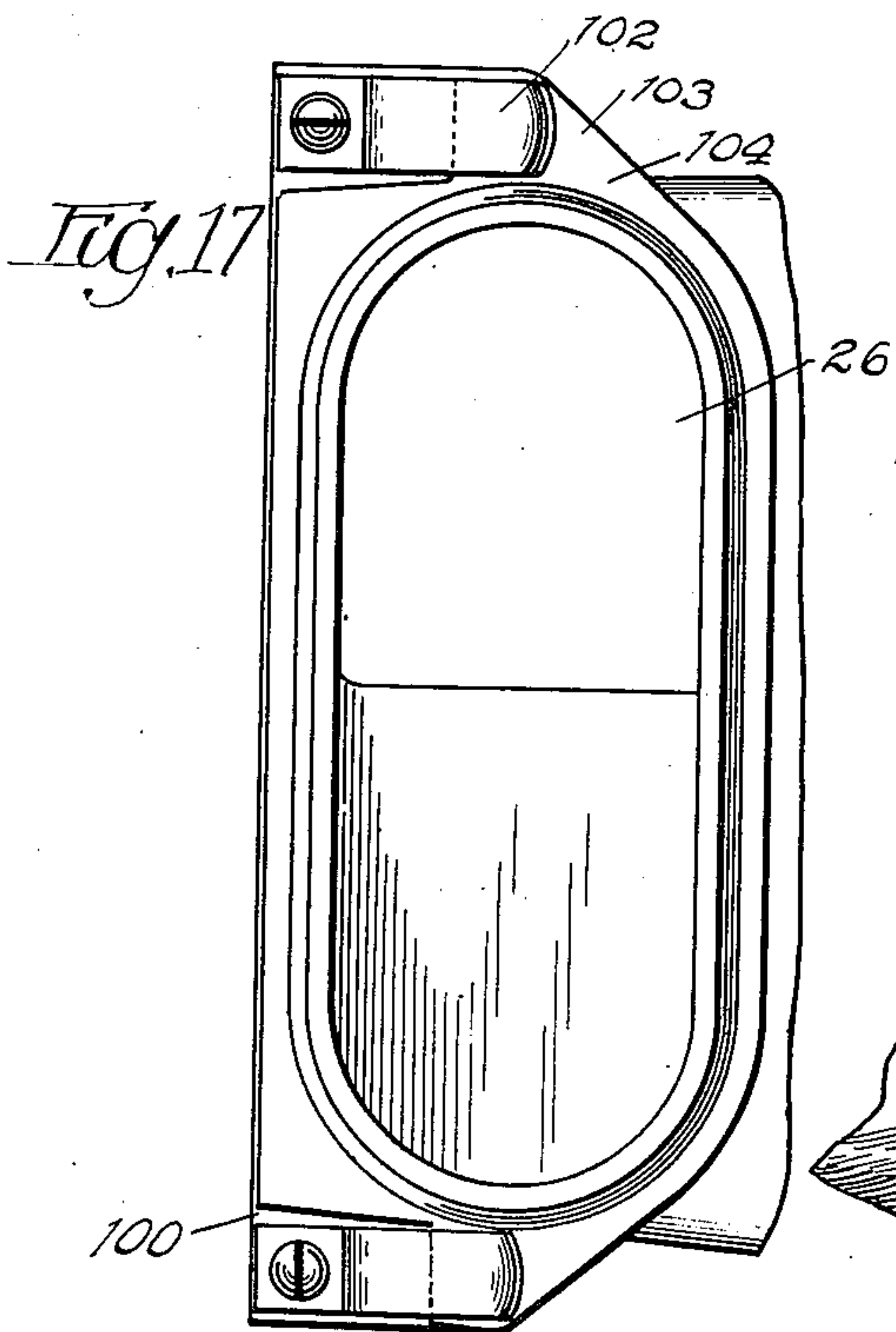


Fig. 17

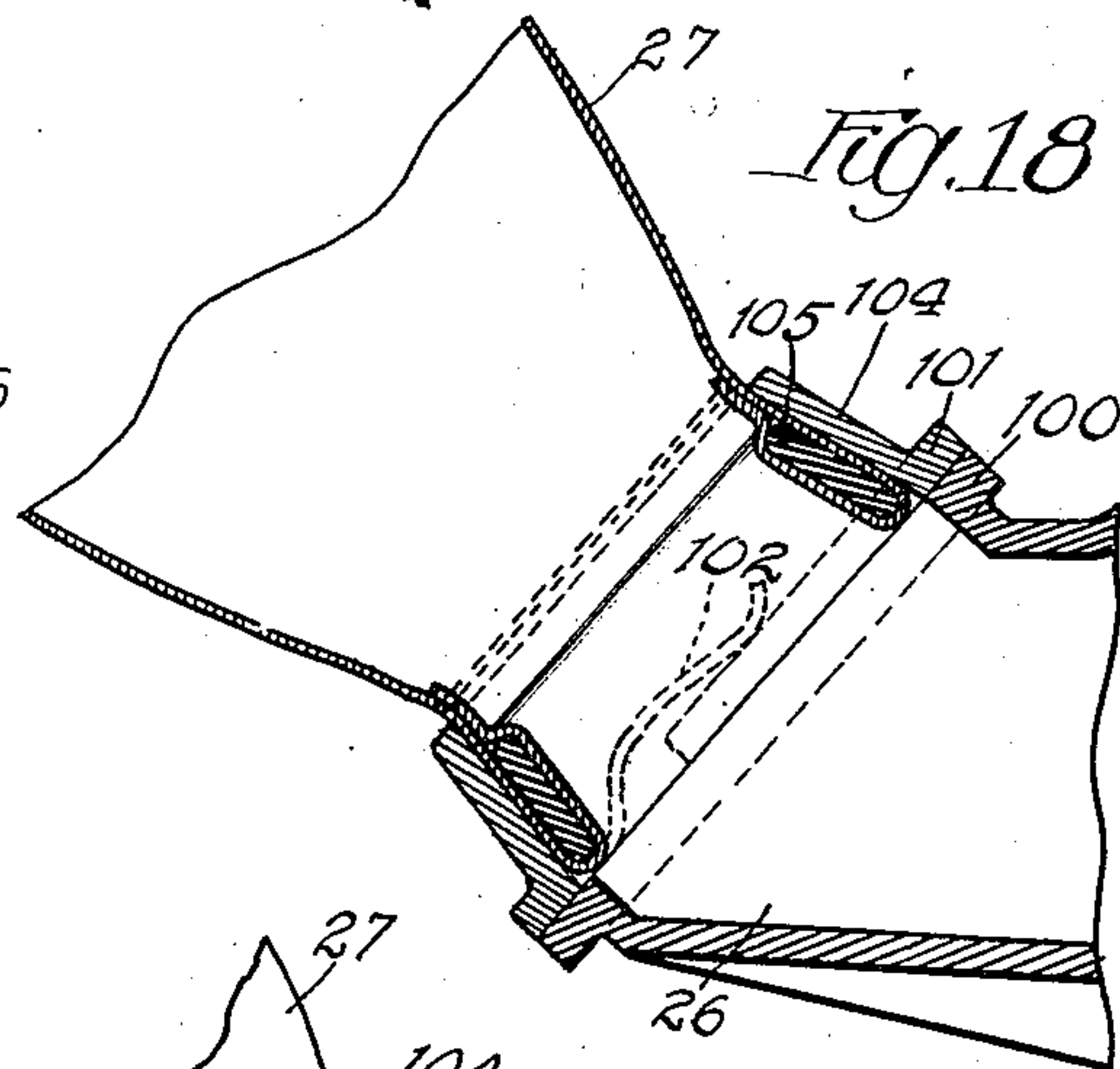


Fig. 18

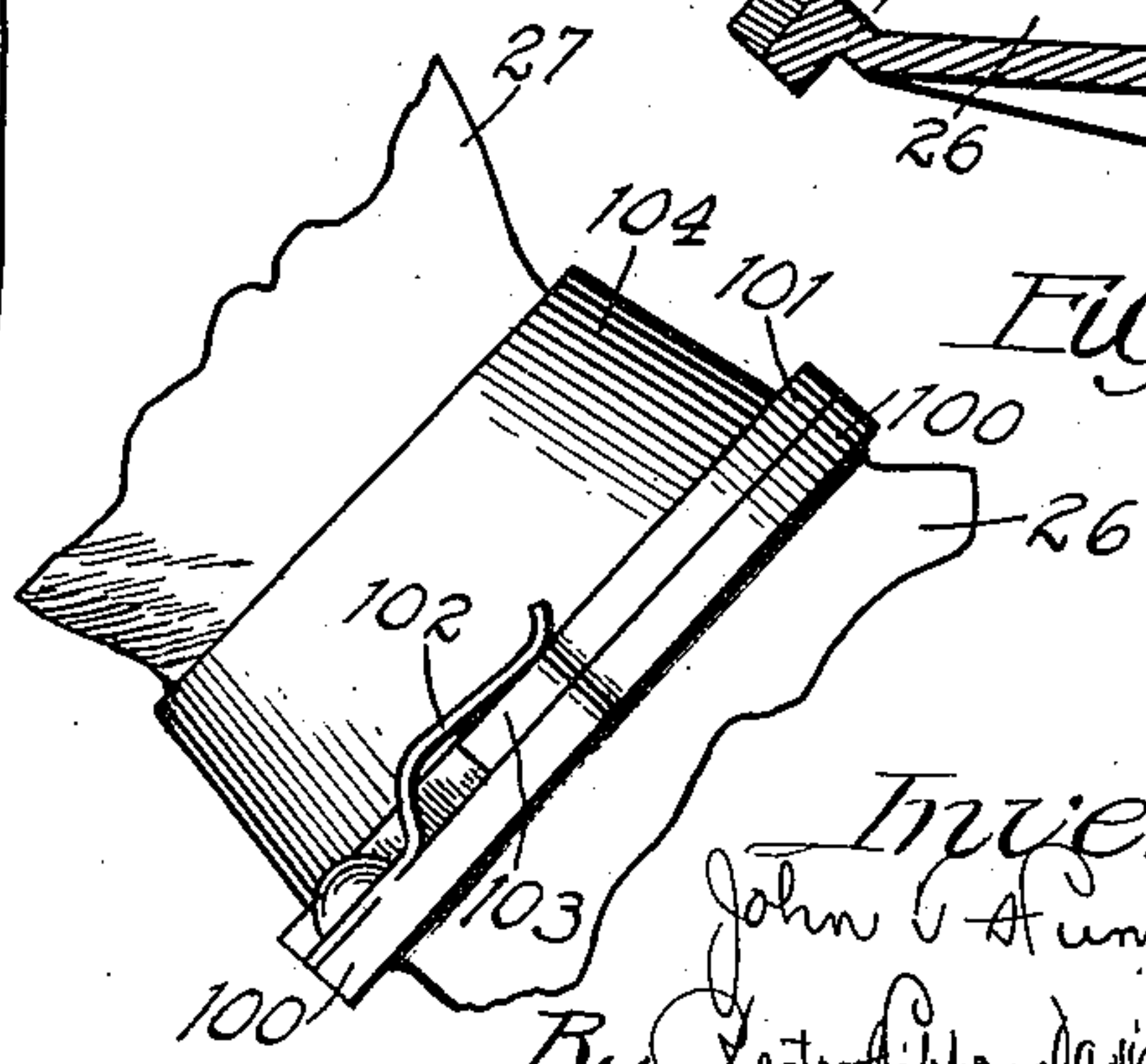


Fig. 19

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# UNITED STATES PATENT OFFICE.

JOHN T. HUME, OF CHICAGO, ILLINOIS, ASSIGNOR TO HURLEY MACHINE COMPANY,  
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## VACUUM CLEANER.

Application filed March 24, 1921. Serial No. 455,010.

*To all whom it may concern:*

Be it known that I, JOHN T. HUME, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Vacuum Cleaners, of which the following is a specification.

My invention relates to vacuum cleaners and in some of its features of construction more particularly to cleaners having rotary-brush-equipped nozzles.

Among the objects of my invention are to provide novel constructions and arrangements for mounting and driving a brush, for controlling the operation thereof, for cutting the nozzle out of action when the cleaner is being used with hose attachments, for effectively mounting the carrying wheels and for generally improving the machine in lightness, manufacturing facility, durability, and ease of maintenance and repair.

In the drawings wherein I have illustrated an embodiment of my invention in a single form for purposes of disclosure, but without intent to limit myself in the broader aspects of my invention to the precise construction shown, Fig. 1 is a side elevation of a vacuum cleaner with parts broken away; Fig. 2 is a plan view thereof with parts broken away and with a cover plate removed; Fig. 3 is an enlarged inverted horizontal section on line 3—3 of Fig. 5; Fig. 4 is an enlarged vertical section on line 4—4 of Fig. 1; Fig. 5 is an enlarged section, with parts in elevation, taken substantially fore-and-aft through the center of the machine; Fig. 6 is a bottom view of the fan; Fig. 7 is a detail of the nozzle-end; Fig. 8 is a horizontal section therethrough; Fig. 9 is a cross-section on line 9—9 of Fig. 8; Fig. 10 is a vertical section through the nozzle-end; Figs. 11, 12 and 13 are perspective details of cam, thimble and bushing, respectively, employed in such nozzle-end; Fig. 14 is a section on line 14—14 of Fig. 5; Fig. 15 is a detail of a cap; Fig. 16 is a section showing the cap in place; Fig. 17 is a plan view of the discharge-mouth plate; Fig. 18 is a section showing the bag-mouth attached to such plate; and Fig. 19 is a side elevation of said parts.

The general relation of the parts associated with the cleaner casing 20 and the motor casing 21 will be readily understood from the drawings. Said cleaner casing comprises a transversely-disposed, bottom-opening, long nozzle-structure 22, of suitable width for brush-reception, merging into a somewhat narrower, parallel-sided air-passage portion 23 leading rearwardly from the nozzle to the bottom opening or eye 24 of horizontal fan-casing 25, the tangential outlet 26 whereof exhausts into the collector bag 27, in usual fashion. The horizontally-disposed top opening 28 of the fan casing is overlain and closed by a detachable plate 29 that preferably takes the form of a flange integral with and affording support for the motor casing 21, and the air passage 23 may have in its top wall an opening 30 covered by detachable plate 31. The vertically disposed motor shaft 32 carries the fan 33 and at its lower end has suitable provision, such as notch 32' to engage the shaft rotatively in endwise-separable relation to a corresponding cross-bar portion 34' of a vertical stub shaft 34 which forms an element of the connections by which the brush 35 in the nozzle is driven from the motor.

The cleaner casing is mounted on small wheels, these being preferably a rear central caster 36 swiveled in a suitable stud of the base casting, and a pair of front wheels 37 each of which is mounted in an open-bottomed bay 38 at each respective end of the nozzle casting. These front wheels, of course, extend somewhat below the bottom plane of the nozzle and preferably are adjustable as to extent of their bottom-projection. In the specific construction shown the end wall 39 and partition wall 40 forming the sides of each bay are apertured to receive a hollow bearing-sleeve 41 that is endwise removable from its seat but is normally retained in position by a key-plate 42, of spring metal, that is detachably secured to end-wall 39 and has its notch 43 coacting with a circumferential groove 44 in sleeve 41. Between its ends sleeve 41 has an eccentric portion 45 on which the wheel 37 turns, so that by inserting a tool in the end-kerfs



46 of the sleeve and turning the latter against the friction of its bearings and its key 42 to desired position (indexed by indicia 47 on the casing and a pointer 47' on the sleeve) the eccentric 45 may be made to project the wheel 37 to just the desired extent.

The shaft of brush 35 is sustained in the removable sleeves 41, preferably coaxially with the sleeve-bearings, so as to be unaffected in the location of its axis by any adjustment for wheel-projection and so as to be readily removable without necessity for displacing the wheels. Specifically each sleeve has an axial cylindrical bore into which is slipped an inwardly-open-ended thimble 48, preferably closed at its outer end. This thimble is preferably held in place by a friction-latch 49 shown as comprising two balls 50 thrust by an interposed spring 51 through holes 52 in the thimble and into engagement with an internal groove 53 of the sleeve 41. The brush-shaft or spindle 54, which preferably is smaller in diameter than the thimble, may have its reduced end 55 supported in a bushing 56<sup>a</sup> (preferably of oil-impregnated wood or the like) which is slipped into the thimble, such bushing preferably having its end notched at 57<sup>a</sup> to accommodate the friction latch 49.

I prefer that brush-spindle 54 be made in two sections 54' and 54'', individually demountable, but rotatable in unison. The shaft members or spindles 54', 54'', may be of any construction suitable to act as brush centers, but preferably their inner or adjacent ends are connected in endwise detachable slip connection so that thimbles 48, in retaining the shaft 54, act also to maintain the brush spindle-sections 54', 54'' in connection one with the other. Specifically, the coupling between these spindles comprises, as shown, a short metallic shaft member 56 having square (or other non-circular) coupling projections 57 engaging in corresponding recesses in the extremities of respective spindles, said shaft member carrying a detachable bevel-gear element 58. This coupling finds support in a gear casing 59, which extends transversely across the major portion of the nozzle and is mounted on a bushing 60 that in turn finds bearing in the rear wall of the nozzle and is retained as by set screw 61.

Gear 58 is engaged by a companion gear 62 carried on the connecting shaft 63 that bears in bushings 60, 64 of the hollow strengthening rib 65 formed along the under side of the bottom wall 66 of the air-passage portion 23, shaft 63 being driven from the vertical stub shaft 34.

There is formed in the bottom of the base casting a shallow gear-casing 67 in which,

when its bottom plate 68 is screwed on, the gearing and clutch connections that intervene between vertical shaft 34 and communication shaft 63 are completely housed.

The motor driven stub shaft 34 drives shaft 63 to rotate the brush structure through the intermediary of gearing and clutch mechanisms suitably controlled by the operator and this control is preferably effected in whole or in part by manipulation of the handle by which the machine is pushed about. Thus the motor-driven stub shaft 34, passing down through a bearing boss 69 that extends up through the fan casing eye from the floor 66, carries on its lower end a worm-pinion 70 meshing with a worm-gear 71 that is rotatively loose on shaft 63, one end of said gear bearing against collar 72 fast on the shaft and its other end being conically formed as at 73 to constitute one member of a friction clutch, the other member 74 of which is slidably, but non-rotatably, mounted on the shaft 63. The outer end of shaft 63 receives a spring 75, interposed between a disk 76 on the shaft and the end of clutch-member 74, access to the shaft (for its withdrawal) being had through an orifice closed by dust-cap 77. A bell crank shipper-lever 80, for forcing said shiftable clutch element out of such normal, spring-pressed engagement, is pivoted on a stud 81 in the gear-casing and its power receptive arm has a beveled cam face 82 to be acted upon by the beveled or pointed end 83 of a push rod or controller 84 that extends vertically through the casing wall to the exterior thereof and is normally sustained by a spring 85. When depressed against spring tension by the operator, the beveled lower end of this push-rod will throw the shipper lever laterally to disengage the clutch, thereby leaving gear 71 free for idle rotation without driving the shaft 63 or the brush that is geared thereto. Push rod 84 is dominated, preferably, both by the main handle 86 and by a latch 87 that may be thrown into and out of operative position by the toe or hand of the user. The handle has the customary yoke 86' making pivotal connection with lugs 29' on the plate 29, and one foot of the yoke has a projecting toe 88 so disposed that when the pushing-handle 86 is thrown forward from its normal inclined position (shown in dotted lines in Fig. 1) to the position somewhat in advance of vertical or over dead-center (as shown in full lines) push rod 84 is depressed and held in that position by the unbalanced weight of the handle. The latch 87 rotatably mounted on the push-rod may then be swung (Fig. 4) to engage its toe under the edge of plate 29, to keep the push-rod down.

For connection of any customary hose-tool to the suction side of the fan, I provide



through one side wall of the air chamber 23, between the fan-eye and the nozzle, an orifice 90 of circular form, the bottom wall of the air chamber being suitably shaped as at 91, Fig. 3, to conform to the margin of the orifice.

Normally this opening is covered by cap 92 (Fig. 16) which I preferably arrange to work in conjunction with a shutter for closing off the air-passage 23 between the nozzle and the fan. Shutter 93 is a blade (preferably of metal, with a felt edging) mounted on cross-shaft 94 so that it may be swung (as shown in Fig. 5) from normal, open position to closed position, cutting off the passage 23. The shaft 94 has on one end a lever 95 which, when moved to open the shutter, overlies cap 92 and retains it in place but which swings away from the cap to free it for removal, when closing the shutter. The other end of shaft 94 preferably has a spring 96 coiled around it, to put tension on the shaft and aid frictionally in maintaining the parts in either extreme position, this spring being adjustable by screw 97 and housed in a little shell 98.

The bag 27 may be accommodated by an advantageous quick-detachable connection with the fan-discharge port 26. Specifically, 100 represents an elongated flange-plate formed at the end of the discharge passage from the fan and 101 denotes a bag-frame plate that substantially covers the flange 100 except for corner spaces on which are mounted spring clips 102 to overlie lugs 103 of the bag-frame plate. This bag-frame has a taper-flange 104 surrounding its elongated mouth-opening and the bag has its hem stiffened with a border-wedge 105 so that it will make retaining frictional engagement with flange 104. The bag is thus made quick-detachable with greatest ease, and the oblate mouth of the bag-frame insures quick-emptying of the bag.

In résumé of some of the commendable features, the nozzle travels on the wheels housed in its end-bays, such wheels being adjustable for projection by turning the eccentric-bearing sleeve 41; the brush-spindle, bearing in parts mounted in such sleeves 41 is not displaced when the wheels are adjusted but is removable from its bearings by endwise displacement of thimble 48 against the resistance of friction latch 49; such spindle being made in two separable sections coacting with the gear-carrying shaft-member 56 appurtenant to the removable gear-housing bracket 59; the brush-driving gearing is all advantageously housed, for dust-proofness, and yet is easily accessible and removable; the starting and stopping of the brush is clutch-controlled and the operator's pushing-handle is arranged to control, through the vertical push rod 84, the action

of the friction clutch 74, push rod 84 having also a toe-latch 87 to lock it in clutch-loosening position; the nozzle air-passage has a cut-off shutter 93 to be closed when a hose-tool is inserted in side orifice 90, and the lever 95 for such shutter coacts with the closure 92 for such orifice to latch it in place when the shutter 93 is open, so that in moving the closure, in the course of applying the hose tool, one simultaneously but unconsciously closes the shutter; and the bag-mouth mounting (101, etc.) is made both quick-detachable and easy-emptying.

It will be observed that, throughout, the machine is very simple from the manufacturing standpoint and that it is advantageous in lightness, compactness, durability and efficient performance.

I claim:

1. In a portable vacuum cleaner, the combination with a casing providing a nozzle and a fan chamber with which the nozzle communicates, a fan in said chamber, a motor driving said fan, and a brush rotatable in said nozzle, connections driven by said motor for operating said brush, a manually operable clutch included in said connections, a main pushing handle for the casing, and means on said handle to control said clutch.

2. In a portable vacuum cleaner, the combination with a casing providing a nozzle and a fan chamber with which the nozzle communicates, a fan in said chamber, a motor driving said fan, and a brush rotatable in said nozzle, connections driven by said motor for operating said brush, a manually operable clutch included in said connections, a main pushing handle movably mounted on the casing and connections between said handle and said clutch to control the clutch by movement of said handle.

3. In a portable vacuum cleaner, the combination with a casing providing a nozzle and a fan chamber with which the nozzle communicates, a fan in said chamber, a motor driving said fan, a brush rotatable in said nozzle, connections driven by said motor for operating said brush and including a shaft having a fixed axial position arranged intermediate the brush and said motor, and a manually operable clutch for connecting and disconnecting said intermediate shaft and the motor.

4. In a portable vacuum cleaner, the combination with a casing providing a nozzle and a fan chamber with which the nozzle communicates, a fan in said chamber, a motor driving said fan and having a shaft, and a brush mounted in the nozzle, of brush operating connections driven by the motor and including a horizontally extending shaft having a relatively fixed axis of rotation, means at the forward end of said shaft for connecting the same with the brush, and



means including a shiftable clutch for connecting the other end of said shaft with the motor shaft.

5. In a portable vacuum cleaner, the combination with a casing providing a nozzle and a horizontal fan chamber with which the nozzle communicates, a fan in said chamber, a motor driving said fan, and a brush mounted in the nozzle, of brush operating connections driven by the motor shaft and involving a shiftable clutch, a shipper-lever for disengaging said clutch to stop the brush, a main pushing handle pivoted on the casing, connections operatable by pivotal movement of said handle for throwing said shipper-lever, and manually operable latch means for retaining said shipper-lever in thrown position independently of movements of the pushing handle.

6. In a portable vacuum cleaner, the combination with a casing providing a nozzle and a fan chamber communicating therewith, a fan in said chamber, a motor driving said fan, gear connections between the motor shaft and the brush spindle including a stub-shaft vertically disposed, a horizontal shaft extending along the casing bottom into operative relation with the brush spindle, gearing between the stub-shaft and the horizontal shaft including a gear rotatively loose on the horizontal shaft and provided with a clutch member, a complementary clutch member non-rotatably but slidably mounted on said horizontal shaft, a spring normally maintaining said clutch members in engagement, a shipper-lever controlling the last said clutch member and lever operating means extending to the exterior of the casing.

7. A structure as set forth in claim 6 wherein the means for operating the shipper-lever includes a vertically extending, spring-elevated push-rod and the casing has pivoted thereto a main pushing handle arranged, when thrown to one position of its pivotal movement, to depress said push-rod and hereby actuate the shipper-lever to release the clutch.

8. A structure as set forth in claim 7 providing latch means for maintaining the push-rod depressed.

9. In a vacuum cleaner, the combination of a casing having a nozzle, wheels in the nozzle, and means for adjusting said wheels in respect of their projection beyond the nozzle-bottom, comprising rotatably adjustable bearing members for the respective wheels each having an eccentric portion said bearing members being demountably slip-fitted into the nozzle-ends for axial withdrawal, and means for latching said bearing members against axial displacement.

10. In a vacuum cleaner, the combination of a casing having a nozzle, wheels in the

nozzle ends, a brush having a spindle extending between said wheels, and a mounting for said wheels and spindle for adjusting the wheels relatively to the nozzle and spindle, comprising sleeves rotatably mounted in the nozzle structure concentrically with the brush spindle axis, said sleeves having eccentric portions for supporting and adjusting the wheels.

11. In a vacuum cleaner, the combination of a casing having a nozzle, sleeves supported in the nozzle ends, wheels mounted on said sleeves and projecting below the nozzle, thimbles mounted in said sleeves and endwise removable therefrom, and a brush structure in the nozzle having its spindle mounted in said thimbles.

12. A structure as set forth in claim 13 having friction latches for engaging the thimbles with the sleeves against accidental displacement.

13. A structure as set forth in claim 14, wherein the friction latch comprises a spring-pressed member carried by and protruding from the thimble and the sleeve is internally recessed to receive said protruding member.

14. A structure as set forth in claim 14 wherein the thimble is provided with opposed apertures and the sleeve with an aligning groove, the friction latch comprising balls arranged in and to protrude from said thimble apertures, and a spring interposed between said balls.

15. In a vacuum cleaner, a casing having a nozzle, wheels in said nozzle, wheel-supporting members rotatably engaging the nozzle ends and having eccentric portions affording bearing for the respective wheels, each said member having a groove, and retaining spring members carried by the nozzle engaging said grooves.

16. In a portable vacuum cleaner having a nozzle, a horizontally-extending air passage therefrom, a fan chamber into which said air passage opens, and a hose-tool receptive orifice constantly open to said passage, a shutter for closing and opening said air passage between said orifice and the nozzle, and separate means for closing said hose-tool receptive orifice from the exterior thereof.

17. In a portable vacuum cleaner, the combination of a casing providing a nozzle, an air passage therefrom, a fan chamber into which said air passage opens, and a hose-tool receptive orifice to said passage, of a closure for said orifice, means for opening and closing the passage located between the tool receptive orifice and the nozzle, an operating means for the last said means constituting a retainer for the orifice closure.

18. In a portable vacuum cleaner having a nozzle, a horizontally extending air passage



therefrom, a fan chamber into which the  
said passage opens, and a hose-tool recep-  
tive orifice through the side of said air pas-  
sage; a shutter for closing said air passage  
5 pivoted near the top of the casing and ex-  
tending transversely of the air passage be-  
tween the said orifice and the nozzle, said  
shutter having a shaft extending beyond  
the casing, a lever on said shaft adapted,  
when the shutter is opened to overlie the 10  
side orifice, a closure for said side orifice  
arranged to be latched by said lever, and a  
friction spring for holding said shutter in  
open or closed position.

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