Feb. 28, 1939. A. A. DICKE 2,149,116

CARBURETOR

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Fig. 1.

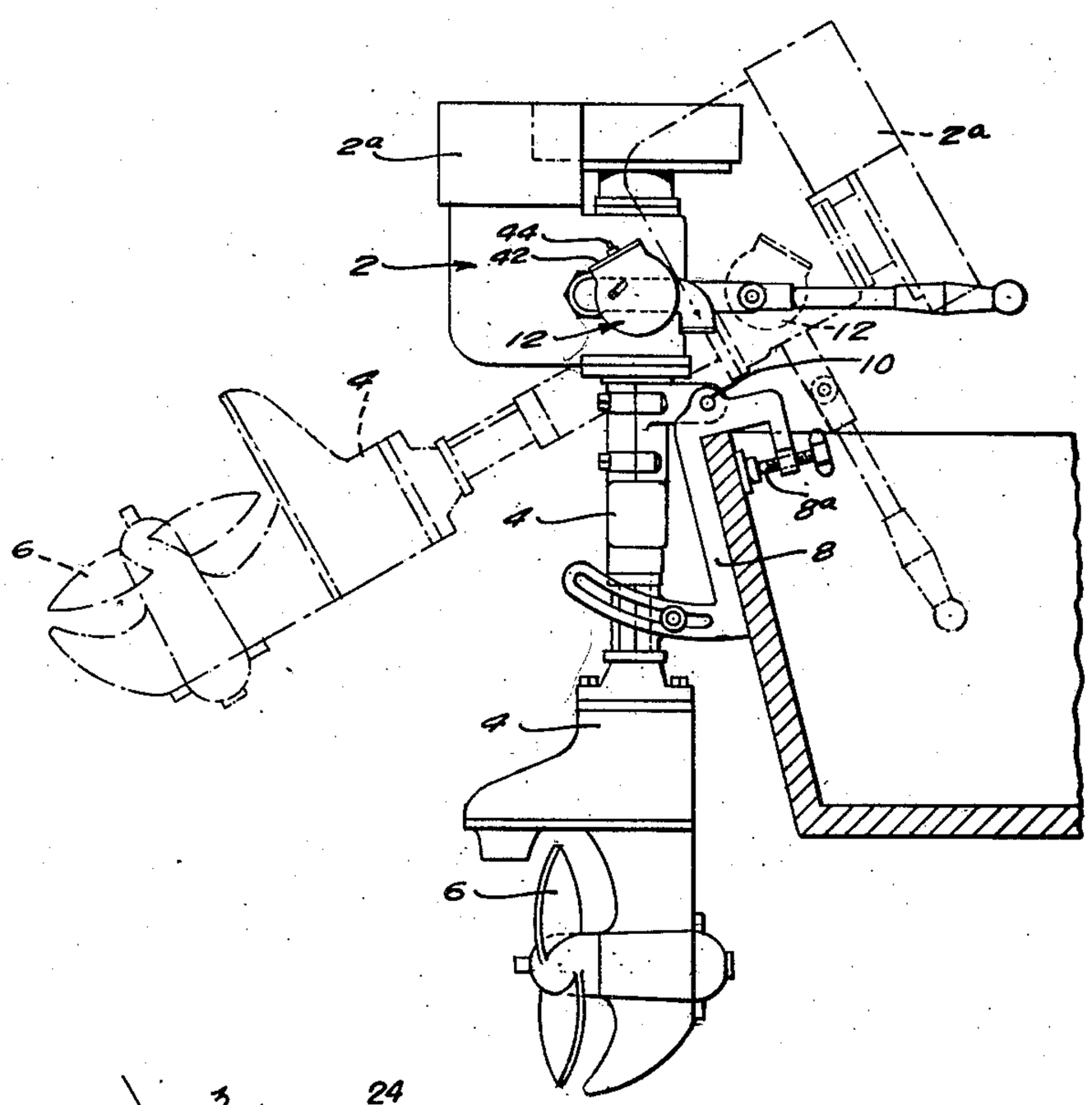

Fig. 2.

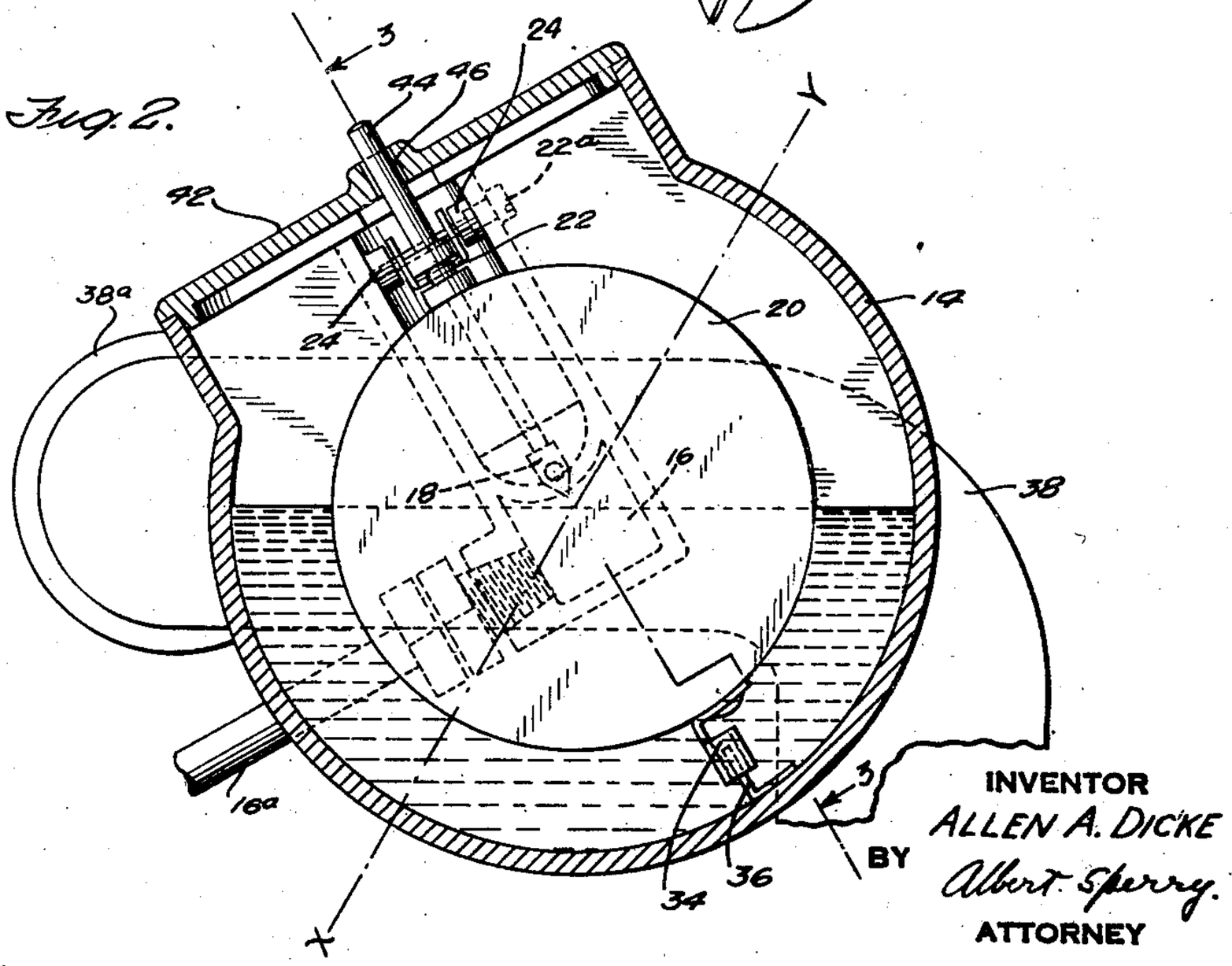

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Fig. 3.

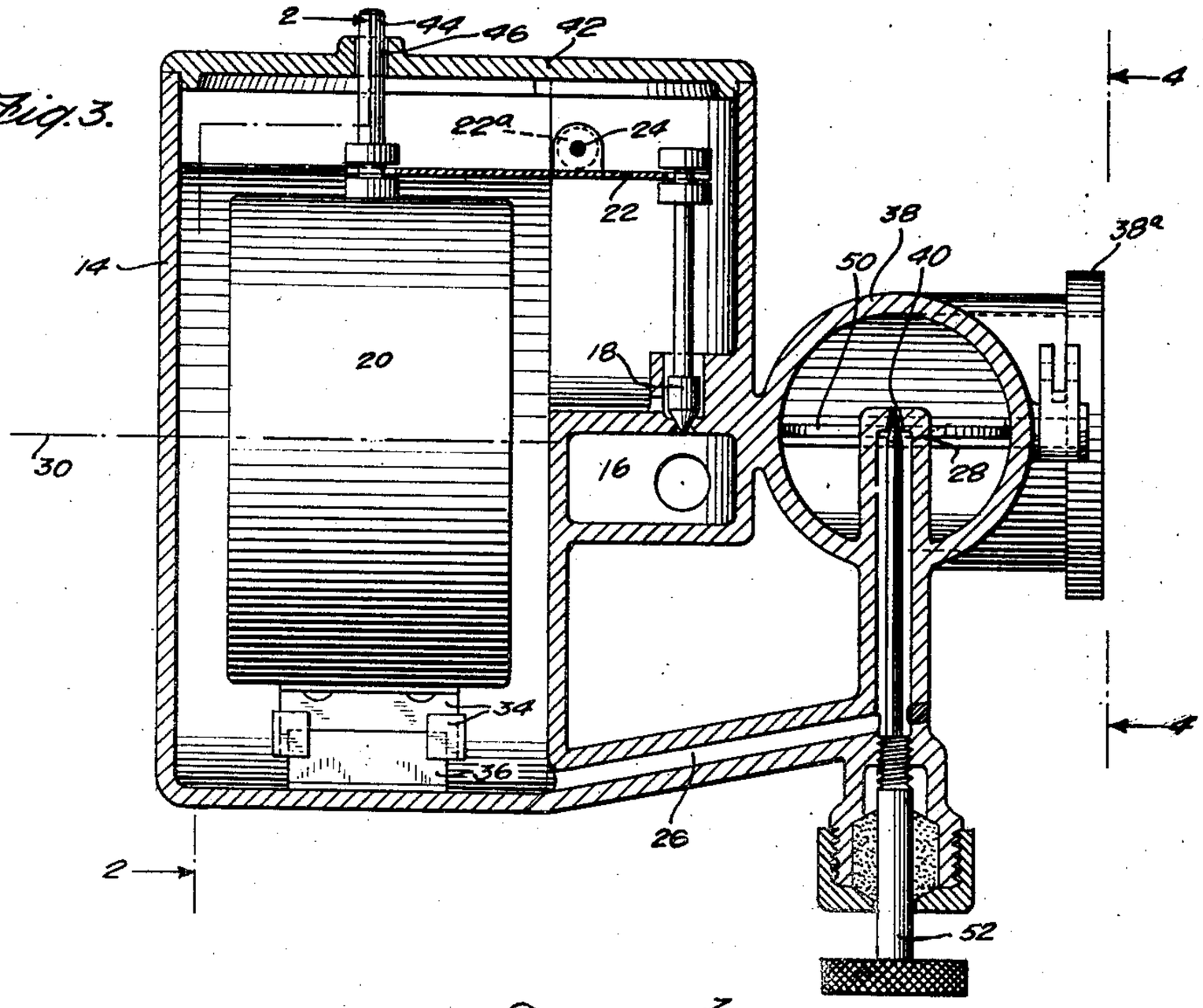
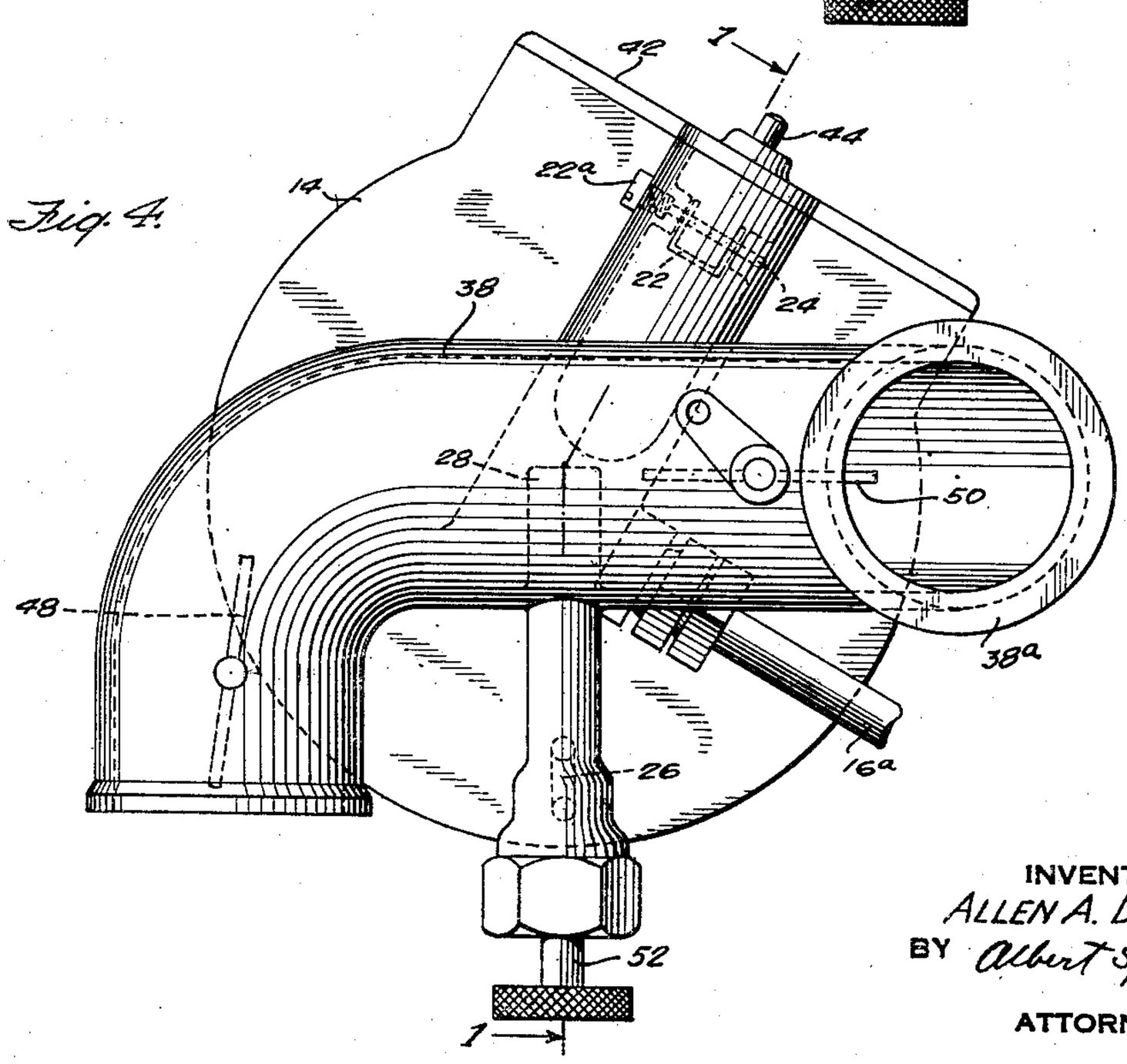


Fig. 4.



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2,149,116

CARBURETOR

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Application October 17, 1933, Serial No. 693,912

7 Claims. (Cl. 115—17)

My invention relates to carburetors for internal combustion engines and particularly to carburetors adapted for use on motors or engines which may be tilted or moved about a horizontal axis either when in use or when inactive.

Outboard motors, airplane engines, and motor car engines are typical of those to which my invention is particularly applicable. For instance, outboard motors are commonly constructed so as to tilt about a pivot to permit the propeller to be raised over obstacles in the water or to enable the motor to be used in shallow water. The motor is also tilted to an inclined position when it is not in use, particularly when anchored in shallow water. The carburetors now used are generally constructed with a float chamber in which a supply of fuel is maintained during use, but when the motor is tilted, the carburetor is moved therewith and the level of the fuel in the float chamber with respect to the spray nozzle or jet from which the fuel is discharged into the mixing device is altered, so that either too much or too little gasoline is fed to the engine. For this reason, the operation of the carburetor and motor becomes irregular. Furthermore, even though the motor is not operated when it is tilted to its inactive position, gasoline leaks out of the float chamber about the cover, or drains through the spray nozzle and flows into the bottom of the boat. If the valve between the gasoline tank and the carburetor is not closed, the whole tankful of gasoline may drain out into the boat. This not only wastes gasoline but makes the boat untidy and oily producing a dangerous and very undesirable condition. Even when the motor is not tilted so far as to cause the gasoline to be spilled out of the float chamber. the level of the liquid in the float chamber may be considerably altered or the position of the float with respect to the liquid in the chamber may be changed when the motor and carburetor are tilted, so that the operation of the engine becomes irregular. In addition, in motor vehicles, upon quick acceleration or deceleration, the gasoline in the carburetor tends to collect at one side of the float chamber and assume an angle oblique to its normal position, resulting in the same effect as produced by a tilted carburetor.

In order to overcome the difficulties presented by carburetor constructions of the prior art, I have devised a novel type of carburetcr including a float chamber, float, and discharge nozzle or jet, in which the elements are maintained in substantially the same relative positions even though the engine and carburetor are tilted through a very large angle. In constructions embodying my invention, the level of the liquid in the float chamber and the position of the float which controls the flow of liquid into the float chamber remain the same with respect to the horizontal axis about which the carburetor is tilted even when the engine is inclined at an angle of 45° to 60° or more from normal. The position of the spray nozzle with respect to the liquid level is also maintained substantially the same throughout tilting of the motor and carburetor.

One of the objects of my invention is to insure uniform operation of a carburetor in various angular positions.

Another object of my invention is to provide a carburetor having a float chamber and a float which maintain the same relative positions with respect to a horizontal axis when the carburetor is tilted through a large angle, viz. the float chamber and float being so formed that when the carburetor as a whole is oscillated about a transverse axis the plane of the liquid level therein will always pass through a single transverse line, assuming that no liquid is added or removed therefrom.

A further object of my invention is to provide a carburetor in which the relative positions of the liquid level in the float chamber and of the discharge outlet through which the liquid is passed into the mixing device remain substantially the same when the carburetor is tilted, or upon sudden acceleration or deceleration thereof.

A further object of my invention is to provide a carburetor having a float chamber with a float therein which is formed with walls spaced from the walls of the float chamber an equal distance on all sides thereof throughout that portion of the float and chamber which are in contact with the fuel in various positions of the carburetor.

These and other objects and features of my invention will appear from the following description thereof in which reference is made to the accompanying figures of the drawings illustrating a typical embodiment of my invention.

In the drawings:

Fig. 1 is an illustration of an outboard motor having a carburetor thereon embodying my invention.

Fig. 2 is a vertical sectional view of the carburetor illustrated in Fig. 1 taken on the line 2—2 of Fig. 3.

Fig. 3 is a vertical sectional view of the form of carburetor illustrated in Figs. 1 and 2, taken

on the line 3—3 of Fig. 2, the float being shown in full.

Fig. 4 is an elevation of the carburetor looking from right to left of Fig. 3.

In the drawings, I have illustrated a conventional outboard motor comprising an engine 2 having a drive shaft housing 4, and a propeller 6. In motors of this character, it is usual to mount the engine, drive shaft and propeller on a bracket 8 secured to the boat on which the engine is to be used as by clamp screws 8a. In order that the propeller may be raised out of the water into an inactive position and to permit the motor to be tilted so as to raise the propeller over obstructions in the water or when the boat is used in shallow water, the motor and associated parts are pivotally secured to the bracket 8 for movement about a horizontal axis 10. The carburetor 12 is secured in fixed position relative to the engine 2 and the gasoline supply tank 2a so that when the motor is tilted the carburetor moves with the engine and tank about the axis 10.

As shown in the drawings, the carburetor is provided with a float chamber 14 to which fuel, such as gasoline, is supplied through an inlet passage 16 controlled by the valve 18. Movement of the valve is effected in the usual manner by means of a float 20 through the arm 22, pivotally mounted at 24 in the upper portion of the float chamber, so that fuel is maintained at a substantially constant level in the float chamber at all times. The density of the float 20 is so selected that when it is submerged to its central axis it has just sufficient buoyancy to close the valve 18 and thus to maintain the liquid level as shown. Gasoline is supplied to passage 16 through a tube 16a connected to tank 2a. Gasoline or other fuel is drawn from the float chamber through the conduit 26 to the spray nozzle 28 or other discharge device for mixing fuel with air to form an explosive mixture for the engine.

The float chamber 14 is formed so as to permit the carburetor to be tilted through a relatively large angle, say 45° or more, without permitting the gasoline to spill out of the carburetor. While the size and shape of the float chamber may be varied considerably in different constructions or uses of the carburetor, I prefer to employ a float chamber the inner walls of which are in the form of a figure of revolution with respect to an axis 30 coinciding with the normal liquid level maintained in the chamber. As illustrated, the float chamber is substantially cylindrical in form throughout that portion thereof in which the liquid is maintained. Tilting of the carburetor about the axis 30 therefore does not alter the position of the liquid with respect to the axis 30. Since the axis 30 of the float chamber is parallel to the axis 10 about which the motor is movable, tilting of the motor is the equivalent in its effect upon the liquid in the float chamber to tilting of the carburetor alone about the axis 30. For this reason, the level of the liquid maintained in the float chamber remains the same when the motor and drive shaft are either in the full line position or the dotted line position shown in Fig. 1.

In order that the supply of fuel from the supply tank 2a of the engine to the float chamber may not be altered by movement of the float with respect to the liquid in the chamber as a result of tilting the motor, the float 20 is so formed that the amount of liquid displaced is the same in any position which the float may assume relative to the fuel level as a result of tilting the motor. This result may be attained by forming the float with walls spaced uniformly from the walls of the float chamber throughout that portion of the float which passes into and out of contact with the liquid upon rotation of the carburetor through a large angle, say 45°, or more. As shown, the float is in the form of a cylindrical member of such specific gravity that it is immersed in the liquid to a sufficient extent to maintain the axis of the float substantially in alignment with the axis of the float chamber and also in alignment with the liquid level maintained in the float chamber. With this construction, it will be apparent that tilting of the motor from the full line to the dotted line position shown in Fig. 1 does not alter in any way the relative positions of the float, the float chamber, and the liquid within the chamber. This will be readily apparent if it is assumed that the carburetor shown in Fig. 2 is tilted to a position in which the liquid level is represented by the line XY. That portion of the float which is submerged in tilting the carburetor to the latter position is equal in volume to that portion which is exposed by such tilting (which is accomplished in the form shown by cylindrical shape of the float, although various other shapes of float would accomplish the same result). Furthermore, the space between the float and the walls of the float chamber which is filled by liquid when the carburetor is tilted, is equal in volume to the space which is vacated by such tilting (due to the cylindrical form of the walls in the form shown, although various other forms of chamber would accomplish the same result, the shape thereof taking into consideration the shape of the float to be used). As a consequence, according to the present invention, there is a certain transverse horizontal line (30 in the form shown) which lies in the surface of the liquid in all positions of tilting of the carburetor. The vaporizing nozzle 28 is preferably located just above this line which may be referred to as the "liquid level line". This insures uniform operation of the carburetor at all times and in various angular positions of the motor. The angle of the surface of the liquid relative to the chamber may be varied not only by tilting of the motor but also by the effects of acceleration and deceleration of the boat or other vehicle in which the carburetor is used. For example, a rapid deceleration, as by the application of brakes, will cause the liquid to move forward in the chamber and assume a level approaching the plane XY, i. e., a plane at right angles to the resultant of the action of the force of gravity and the decelerating force. However, in view of the construction shown and described, this change in position of the liquid does not cause the float to drop and cause additional fluid to enter so that when the braking stops and the liquid surface returns to horizontal its height is neither higher nor lower than normal.

If the float were positioned at either side of the center of the float chamber, tilting of the carburetor would cause the float to be moved up or down with respect to the inlet arm 22 so that the valve 18 would be raised or lowered and the supply of liquid to the chamber and the carburetor be altered. To control its motion the float is preferably held in the center of the float chamber by suitable means such as the brackets 34 carried by the float which slidably engage a projection 36 secured to the float chamber. The slight movement of the valve in the float chamber

due to the rise and fall of the liquid as it passes into and out of the float chamber may therefore take place as required without danger of displacing the float materially from the center of the float chamber.

In order that movement of the float within the float chamber may take place readily at all times and when the carburetor is tilted to either of its extreme positions, I prefer to employ means serving to guide the float in its movement within the chamber and which at the same time present the least resistance to the movement of the float. As shown in Fig. 2 when the carburetor is in the position shown in full lines, corresponding to the normal vertical position of the engine, the float will move up and down with changes in the level of the liquid along a line inclined at an angle of say 30 degrees to the left from vertical. However, when the carburetor is tilted so that the liquid takes up the position indicated by the line X—Y, as when the motor is tilted to the dotted line position of Fig. 1, the movement of the float will be along a line inclined at the same angle to the right from vertical. Movement of the float as described is in substantially a straight line bisecting the angle between the planes assumed by the surface of the liquid in the chamber when the carburetor is moved to each of its extreme positions. Operation of the float is therefore the same in both extreme positions of the engine, and is at no time along a line at such an angle relative to the surface of the liquid that any material resistance is offered to the movement of the float.

In order to permit easy assembly of the parts, the carburetor is provided with a cover **42** for the float chamber which may be secured in place by any suitable means and a stud **44** on the top of the float is journalled in an opening or recess **46** in the cover. The float may be easily introduced into the float chamber when the cover is removed and positioning of the brackets **34** on the bottom of the float in engagement with the projection **36** in the bottom of the float chamber may be readily effected and thereupon the valve **18**, and rocking lever **22** are put in position, thereupon the pivot screw **22***a* is put in place.

The carburetor may be provided with the usual choke **48** and throttle **50** and adjustment of the flow of liquid through the outlet **40** in the spray nozzle **28** may be regulated by adjustment of the needle valve **52** as in the usual carburetor construction. The carburetor is attached to the engine in any desired way as by clamping the collar **38***a* to the engine intake passage.

While I have illustrated and described a preferred form of carburetor, embodying my invention, the float chamber and float may take various forms other than that shown herein, provided tilting of the carburetor does not alter the relative positions of the float, the liquid level in the float chamber, relative to the "liquid level line" and the outlet opening through which liquid is discharged from the spray nozzle. Thus, for example, I may employ a float chamber and float which are in the form of a cylinder with a vertical axis provided the walls of the float are spaced uniformly from the walls of the float chamber and the amount of the float extending above and below the normal liquid level are sufficiently extended to permit tilting of the carburetor through a relatively large angle without covering or exposing either the upper or lower end thereof. With this construction, tilting of the carburetor does not alter the position of either the float or the liquid level within the float chamber for the reason that the volume of the liquid displaced on one side of the axis is equal to the increased volume of liquid on the other side of the axis in all positions of the carburetor, when tilted through a relatively large angle.

The forms of my invention herein illustrated and described represent typical embodiments of carburetors that may be made to embody the features of my invention. However, it should be understood that numerous changes may be made in the form, size, and arrangement of the parts employed without departing from the spirit and scope of my invention.

What I claim is:

1. In combination with an outboard motor tiltable about a horizontal axis to either of two extreme positions, a carburetor movable with said motor having a float chamber the inner walls of which are in the form of a figure of revolution about an axis parallel to that about which said motor is movable throughout that portion of the chamber with which the liquid contact changes when the motor is moved from one extreme position to another, a float within said chamber controlling the passage of liquid thereto having the walls thereof above and below the normal liquid level maintained in the chamber spaced substantially uniformly from the walls of the chamber, and means restricting movement of the float within the chamber to a plane substantially bisecting the angle between the plane assumed by the surface of the liquid in said chamber in each of the extreme positions of the motor and the carburetor.

2. In an outboard motor adapted to be tilted about a horizontal axis for a normal operating position to a tilted non-operating position, and having a carburetor carried thereby and movable therewith, and comprising a float chamber and a liquid fuel inlet valve controlling float therein, said float chamber being formed with an opening near its top located rearwardly of the center of the chamber and float, and said float chamber and float being so constructed and formed that the surface of the liquid fuel remains below said opening when said outboard motor is tilted to the non-operating position.

3. An outboard motor adapted to be tilted about a horizontal axis from a normal operating position to a tilted non-operating position, said motor having a carburetor carried thereby and movable therewith, and comprising a float chamber and a liquid fuel inlet valve controlling float therein, said float chamber being formed with an opening near its top, and said float chamber and float being so constructed and formed that the surface of the liquid fuel remains below said opening when said outboard motor is tilted to the non-operating position, said opening being so located that it is directly above the float when the motor is midway between its extreme positions.

4. An outboard motor adapted to be tilted about a horizontal axis from a normal operating position to a tilted non-operating position having a carburetor carried by the motor and movable therewith, said carburetor having a float chamber and a float therein for maintaining a supply of liquid fuel therein, said float being mounted within said chamber for rectilinear motion only within a plane which bisects the angle between the liquid surface in operating and in non-operating position of the motor.

5. In an outboard motor adapted to be tilted about a horizontal axis between two extreme

positions, and having a carburetor carried by the motor and movable therewith; said carburetor having a float chamber and a float therein, said float chamber being formed with an opening near its top of a size sufficient to permit insertion and removal of said float, said opening being positioned directly above the center of the float when said motor is midway between said extreme positions.

6. In a carburetor, in combination, a substantially cylindrical float chamber, a cylindrical float therein, and means for confining the movement of said float to a single plane including bracket means on said float, and engaging projecting means mounted upon the cylinder wall of said float chamber and cooperating slidably with said bracket means.

7. In a carburetor, in combination, a chamber having a cover, a float therein, means for guiding said float including a projection on said float journaled in said cover, bracket means on said float, and projecting means on the inside of said chamber slidably engaging said bracket means whereby said float is confined to movement in a single plane.

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