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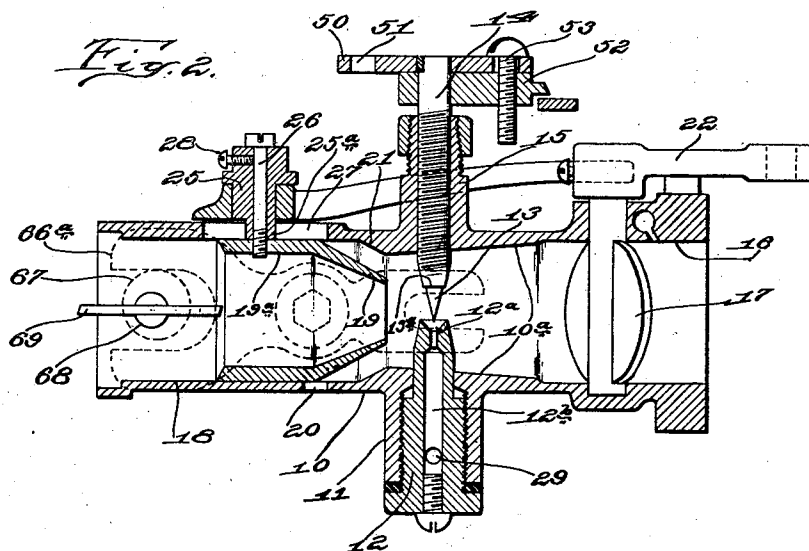
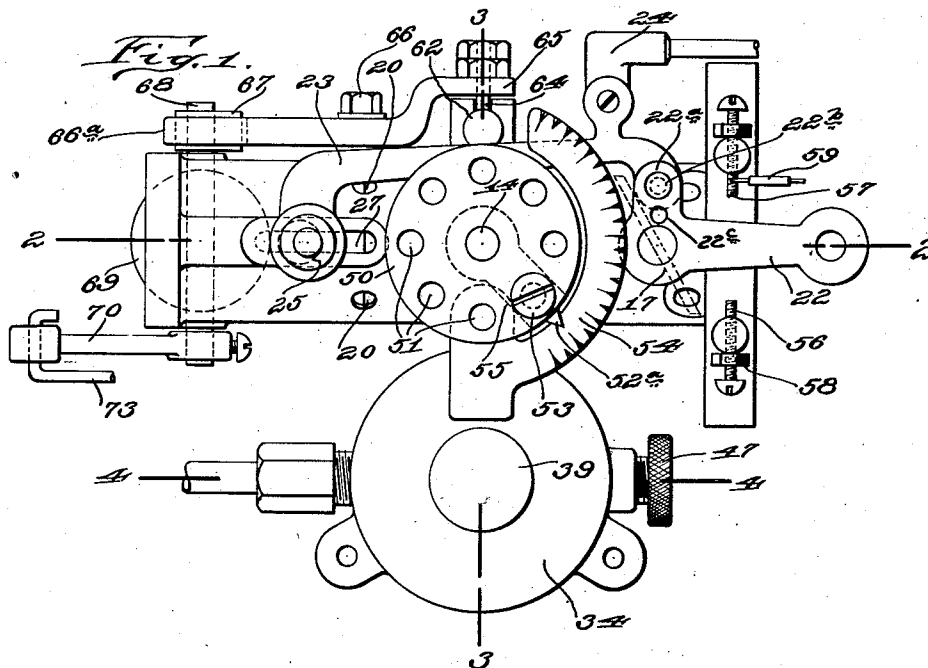
J. J. BUCKLEY

1,744,865

CARBURETOR

Filed Nov. 17, 1921

2 Sheets-Sheet 1



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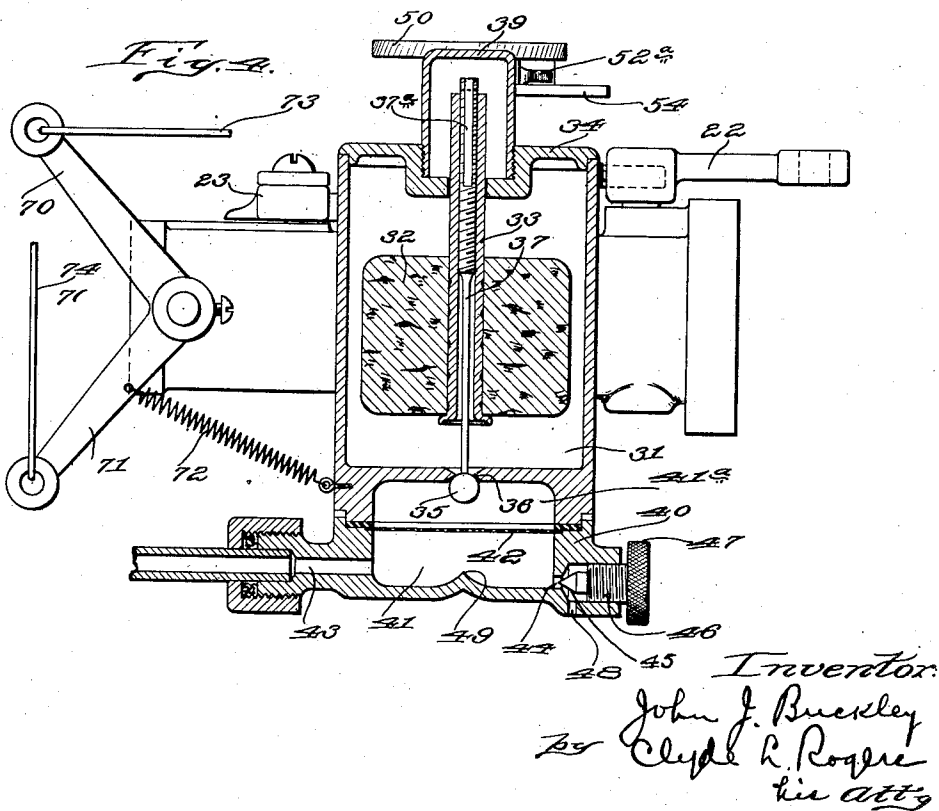
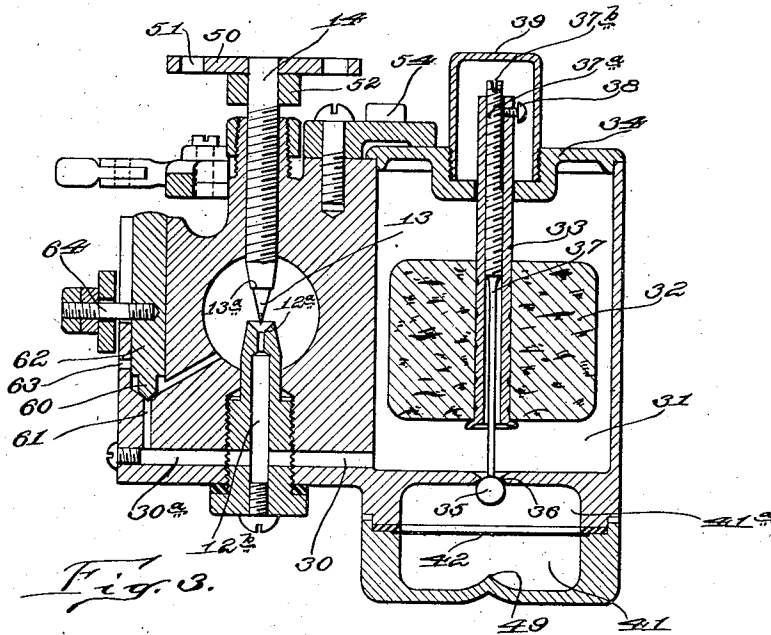
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

JOHN J. BUCKLEY, OF BOSTON, MASSACHUSETTS

CARBURETOR

Application filed November 17, 1921. Serial No. 515,837.

The object of the invention is to provide a carburetor capable of producing such properly proportioned and properly mixed bodies of air and fuel as will produce a combustible mixture capable of properly satisfying all demands of the engine whether running at varying low or high speeds and under all atmospheric conditions.

The invention can best be seen and understood by reference to the drawings in which embodiments thereof are shown especially applicable for use in connection with internal combustion engines or devices, and in which—

Figure 1 is a plan view of a carburetor embodying the invention;

Figure 2 is a longitudinal vertical section thereof on line 2—2 of Figure 1;

Figure 3 is a transverse vertical section on line 3—3 of Figure 1; and

Figure 4 is a vertical section on line 4—4 of Figure 1.

10 indicates the hollow horizontally disposed body of the carburetor having a longitudinal passage through it. The intermediate portion of the body constituting the mixing chamber is provided with a Venturi tube 10^a, the wall of which, forming the mouth of the tube, converges to form a contracted portion or choke and from which choke the wall diverges in the well known manner of a Venturi tube. Depending from the body 10 is a boss 11 having threaded therethrough a vertical fuel nozzle plug 12 having a mouth 12^a. The nozzle extends into the chamber of the venturi at a point back of the contracted portion or choke thereof and preferably just back of the choke before the wall of the Venturi tube has diverged to any material extent. The extension of the nozzle into the chamber of the Venturi tube is such that the mouth of the nozzle will preferably lie about centrally disposed within the bore of the Venturi tube. Gasoline or other combustible fluid is directed to the nozzle by way of an inlet 29 from a reservoir or source of supply

as will later be explained. Co-operating with the fuel nozzle for controlling the passage of fuel through it is a needle valve 13. This valve is borne by a stem 14 threaded to turn within a boss 15 on the wall of the casing with extension through the casing and wall of the Venturi tube opposite the mouth of the fuel nozzle. Manual adjustment of the needle valve and its fixing in adjusted position is thus provided. Mounted on the upper end of the stem 14 of the needle valve is a disk 50 having a series of holes 51 spaced circularly therearound. Arranged to turn on the stem of the valve beneath the disk 50 is a combined pointer and stop arm 52. This arm is adapted to be fixed in any one of a series of turned positions by a threaded pin 53 passed through a selected one of the holes 51 and threaded into the arm. 54 indicates a graduated segment suitably mounted to co-operate with the extremity 52^a of the pointer arm 52 and by which any adjusted position of the needle valve may be gauged with nicety. The segment 54 is also provided with a stop shoulder edge 55 with which the arm 52 is adapted to have engagement for limiting the turning movement of the stem 14 of the valve, it being understood that the arm 52 will be set with respect to the disk 50 so that it will be stopped when the needle valve is fully seated, thus preventing injury to the valve by attempts to screw it in too far.

That portion of the body of the carburetor lying back of the Venturi tube provides a cylindrical delivery passage controlled by the usual butterfly throttle valve 17 turned by a lever 22 operable between stops 56, 57 on the carburetor body. The stops are equipped with locking nuts 58.

That portion of the body of the carburetor lying forward of the Venturi tube presents a bore of cylindrical form, the open front end of which provides an inlet for primary air which passes through the bore. In this bore an air nozzle 19 is slidably fitted. The front

portion 19^a of this nozzle is formed as a cylindrical sleeve longitudinally reciprocable within the body 10. The air nozzle 19 is centrally positioned within the bore just adjacent the mouth of the Venturi tube forward of the mouth of the fuel nozzle so that it may deliver a strong current of primary air entering through the front end of the bore directly across the mouth of the fuel nozzle at the contracted portion or choke of the Venturi tube. The passage of primary air through the bore of the valve body is controlled by a choke butterfly valve 69 of the usual type.

Thus positioned, it will be seen that the air nozzle 19 co-operates with the inwardly-converging wall 21 at the mouth of the Venturi tube to form a generally conical passage between them which converges in the direction of the mouth of the Venturi tube so that secondary or auxiliary air admitted to enter by way of this passage will be directed to pass through the choke of the Venturi tube and like the primary air will be delivered across the mouth of the fuel nozzle.

Secondary or auxiliary air is admitted to the generally conical passage between the air nozzle 19 and the wall 12 of the Venturi tube by way of an inlet comprising a series of openings or perforations 20 through the body of the carburetor and spaced circumferentially around it. The sum of these perforations constitutes a substantial cross section area sufficient when they are opened to admit a requisite quantity of secondary or auxiliary air to effect in conjunction with primary air and fuel a balanced combustible mixture to satisfy the demands of the engine, dependent upon the opening of the throttle valve. The relative position of the perforations 20 with relation to the sleeve 19^a is such that when the sleeve and air nozzle with it are moved rearwardly to a full back adjusted position the perforations are completely closed by the sleeve and when the perforations are thus closed primary air only will be directed through the air nozzle onto the fuel nozzle as above explained. Upon adjusting the sleeve and attached air nozzle in a forward position the perforations 20 are gradually and progressively opened, thereby admitting an intake of auxiliary air in a gradually increasing amount depending upon the amount that the sleeve is moved. The sleeve and attached air nozzle are moved forward for opening the perforations 20 simultaneously with the opening of the throttle valve and the amount of movement imparted to the sleeve and nozzle and consequent amount that the perforations 20 are opened depend upon the amount of opening of the throttle valve, the perforations being fully opened only when the throttle valve has been moved to a full open position. This effect is obtained by a link connection between the

throttle valve and the sleeve. For this purpose there is connected to the lever 30, which operates the throttle valve, a bell crank arm 22^a to which is pivoted a bar 23. The arm 22^a is preferably equipped with a plurality of holes as 22^b, 22^c, spaced different distances from its pivot. The inner turned end of the bar 23 is engageable with these holes selectively so that the distance that the bar 23 is moved as the throttle lever is operated may be varied as desired. The outer turned end of the bar 23 has fitted to turn within it a head 25. The inner portion of this head is reduced as indicated at 25^a and this portion is arranged to fit slidably in a longitudinal slot 27 in the body 10 of the carburetor adjacent the sleeve 19^a. The head 25 is eccentrically mounted on a stem 26 fixed into the sleeve 19^a and projecting outwardly through the slot 27 in the carburetor body. Suitable means such as a set screw 28 is provided for securing the eccentric head to the stem 26 in any position to which the head may be adjusted. The purpose of the eccentric head is to permit adjustment or initial positioning of the sleeve 19^a and air nozzle within the bore of the carburetor body with relation to the throttle valve and also to the fuel nozzle, this being accomplished by turning the head 25 on the stem 26 to the required adjusted position and then setting the set screw 28. In practice, it is preferred that the initial positioning of the sleeve and air nozzle and the adjustment of the link connection between it and the throttle valve will be such that the opening of the perforations 20 by movement of the sleeve 19^a will commence only when the throttle has been opened about $\frac{1}{8}$ of its full opening from a closed position, and the full opening of the perforations 20 will only be effected when the throttle has been moved to a full open position. When thus initially positioned, the air nozzle will assume an advanced position, in fact, a position well inside the mouth of the Venturi tube in fairly close proximity to the fuel nozzle as shown in Fig. 2 and from this position the air nozzle is moved back by the opening of the throttle valve until the perforations 20 are fully open corresponding with the full open position of the throttle valve.

The passage through the fuel nozzle 12 communicates by a port 29 and a passage 30 with the float chamber 31 at one side of the cone housing. This chamber has a float 32 operative therein which is fixed on a hollow stem 33, the upper end of which projects up through the top 34 of the float chamber at all times. The valve 35 which controls the passage 36 into the float chamber is borne at the lower end of a stem 37 extending through the hollow stem 33 with its upper portion 37^a threaded therein and having a projecting extremity 37^b which may have a kerf to receive a screw driver. Thus by ap-

plying a screw driver or like tool to the projecting end of this stem 37^a, the valve 35 may be adjusted to a nicety with respect to the float. Suitable means shown as a set screw 38 may be provided for clamping these parts in adjusted position. It will thus be noted that the float valve 35 may be adjusted with respect to the float whenever required without opening the float chamber or exposing it to dirt or foreign matter. A dust cap 39 is shown as threaded into the top 34 protecting the projecting ends of the stems 33, 37. The float chamber 31 has detachably secured to the bottom thereof a housing 40 which is hollowed out to constitute the bottom portion of a lower reservoir 41, the upper portion 41^a of which is formed underneath the bottom web of the float chamber proper. A fine mesh screen 42 is clamped in place between these two reservoirs being held in place by the clamping of the housing 40 to the base flange of the float housing proper. The housing 41 has an inlet connection 43 for the gasolene at one side thereof and a drain port 44 at the bottom of the other side thereof. This port is closed by a needle valve 45 borne by a threaded stem 46 having a knurled operating head 47. The valve point 45 operates in an open space around the port 44 and discharges through a port 48, being thus self-cleaning and self-seating. Between the inlet connection 43 and this drain port the bottom of the lower reservoir is formed with an upwardly projecting rib 49 for the purpose of promoting the deposit of sediment as will be understood. This lower reservoir with the interposed filter 42 is of great value and advantage in filtering off any water and sediment that may be contained in the gasolene which may be instantly and easily eliminated by opening the drain valve 45.

The nozzle 12 is of special construction, having a relatively large passage 12^b extending therethrough upward to a point relatively near its delivery end, where the passage is restricted and terminates in the relatively wide hollowed out mouth 12^a to form a small basin to retain a quantity of fuel. The needle valve 13, made relatively thick and tapering to a point, passes through the mouth 12^a when the valve is moved down for the lower end or point thereof to control the amount of fuel admitted to the mouth or basin 12^a by way of the restricted portion of the passage 12^b leading into the bottom of the basin or mouth. The needle valve is also provided a small distance backward from its point with a ledge or shoulder 13^a against which the escaping fuel impinges by capillary action. In other words, when the needle valve is adjusted into position to control the inflow of gasolene into the mouth or basin 12^a the shoulder 13^a will be brought into a position where the gasolene within

the basin and then filling the basin will tend by capillarity to rise on the tapered body of the valve and impinge against the shoulder and cling to the shoulder, thereby forming a thin ring of gasolene around the valve between the shoulder therein and the gasolene in the mouth or basin, but raised above the top surface thereof where it can be atomized for promoting the complete vaporization thereof by the air concentrated to pass across the hollowed out mouth of the fuel nozzle and between it and said shoulder.

The action just described will prevail to a certain extent even when the needle valve, or fuel control valve, is not provided with a shoulder for the reason that the fuel in the hollowed out mouth or basin, through which the needle valve is passing, will rise by capillarity on the valve an appreciable distance above the surface of the contained fuel where it may be blown off and atomized to make a proper combustible mixture with the air. With the shoulder, however, the amount of fuel lying above the surface of the fuel in the basin is materially increased and consequently the action materially bettered.

The raising of the fuel above the level of the main body of fuel in the basin so that it can be acted upon by the incoming air is especially useful in starting the engine when a relatively strong mixture is desired, the arrangement being such that under ordinary conditions no choking of the air or other expedient is necessary to effect an initial starting of the engine. While it might be considered that the strong incoming air current would prevent the rising of the fuel by capillarity as aforesaid when the engine has once started yet the operation of the carburetor would seem to negative this conclusion inasmuch as after the engine is once started the carburetor is capable of producing such properly proportioned and properly mixed bodies of air and fuel as will produce a combustible mixture capable of properly satisfying all demands of the engine whether running at varying low or high speed and under all atmospheric conditions. The conclusion is that the capillary action continues at all times, especially after the fixture above the basin has once become wet by the fuel, for otherwise a too lean a mixture would be obtained considering the relatively large volume of air admitted especially when the auxiliary air is being admitted.

The screw 57 regulating the opening movement of the throttle and auxiliary air inlet is preferably equipped with a seal 59 which may be applied in a manner so as to limit the extent to which this stop screw may be adjusted, and thus the extent to which the throttle may be opened is determined, and the owner of the machine may apply this seal so that the throttle cannot be set to cause the

machine to operate above a predetermined rate of speed without tampering with the seal 59. My invention also includes an improved self-seating priming or choke valve. This
 5 consists in a cone valve 60 slidably mounted in the housing at one side of the mixing chamber and controlling a passage 61 from an extension 30* of the passage 30 directly into the
 10 mixing chamber. The cone valve 60 constitutes a reduced extremity of a sliding pin or block 62 which is arranged to control an air inlet 63 whereby upon an opening movement of the priming valve this air port 63 is also opened permitting fuel and air to be
 15 drawn directly into the mixing chamber. For operating the valve pin 62 it is equipped with a stem 64 extending outwardly therefrom which is engaged by an end of a yoke lever 65 fulcrumed to the housing at 66 and
 20 having its other extremity forked as indicated at 66* and engaged by an eccentric 67 fixed on a shaft 68 to which the choke butterfly valve 69 controlling the inlet passage 18, is also secured, the arrangement of this eccentric being such that when the priming
 25 valve 62 is opened, the choke butterfly valve 69 is closed and vice versa. The priming and choke butterfly valves are operated by one or the other of the levers 70, 71 which
 30 are provided for selective use and these parts are normally held by a tension spring 72 in position so that the priming valve 62 is closed and the choke valve 69 open. The opening of this priming valve permits a rich mixture
 35 of fuel and air to pass directly into the mixing chamber for starting the engine upon pulling on either of the rods 73, 74 connected with the respective arms 70, 71 and when the pull on these rods is released the spring 72
 40 will instantly close the priming valve and restore the choke butterfly valve 69 to open position.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present
 45 embodiment to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the
 50 scope of the invention.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

55 1. In a carburetor of the horizontal type having a chambered body with front main and auxiliary air inlet openings and back of said openings a Venturi tube, a fuel inlet nozzle disposed at right angles to the passage
 60 through the Venturi tube and rearward of the choke of said Venturi tube and extending into the bore thereof, and the top end of which fuel inlet nozzle is fitted with a hollowed-out mouth to afford a small basin, a
 65 fuel control valve arranged above said fuel

inlet nozzle with extension through the hollowed out mouth thereof, a nozzle arranged forward of the mouth of the fuel nozzle and the fuel control valve co-operating with said fuel nozzle whereby a concentrated jet of
 70 main air of relatively large volume will at all times be directed across the hollowed-out mouth of the fuel nozzle, a throttle valve, means connected with said throttle valve for controlling the entry of auxiliary air depending upon the degree of opening of the
 75 throttle valve, and means whereby entering auxiliary air will be directed to pass with the main air across the mouth of the fuel nozzle.

2. In a carburetor of the horizontal type having a chambered body with front main and auxiliary air inlet openings and back of said openings a Venturi tube, a fuel inlet nozzle disposed at right angles to the air passage
 85 through the Venturi tube and arranged rearward of the choke of said Venturi tube and extending into the bore thereof and the top end of which fuel inlet nozzle is fitted with a hollowed-out mouth to afford a small basin, a fuel control valve oppositely arranged with relation to said fuel inlet nozzle, a shoulder on said fuel control valve outstanding from its surface and occupying a position spaced
 90 from the mouth of the fuel nozzle, a nozzle arranged forward of the mouth of the fuel nozzle and the fuel control valve co-operating with the fuel nozzle whereby a concentrated jet of main air of relatively large volume will at all times be directed across the hollowed-out mouth of the fuel nozzle and between it and said shoulder on the fuel control valve, a throttle valve, means connected with said throttle valve for controlling the entry of auxiliary air depending upon the degree of opening of the throttle valve, and means whereby entering auxiliary air will be directed to pass with the main air across the mouth of the fuel nozzle and between it and said shoulder on the fuel control valve as
 95 said.

3. In a carburetor of the horizontal type having a chambered body with front main and auxiliary air inlet openings and back of said openings a Venturi tube, a fuel inlet
 115 nozzle disposed at right angles to the air passage through the Venturi tube and arranged rearward of the choke of said Venturi tube and the top end of which fuel inlet nozzle is fitted with a hollowed-out mouth to afford a small basin, a fixture oppositely arranged with relation to said fuel inlet nozzle to extend into the hollowed-out mouth thereof, a shoulder on said fixture outstanding from its surface and occupying a position
 120 spaced from the mouth of the fuel nozzle, a nozzle arranged forward of the mouth of the fuel nozzle and said fixture co-operating with the fuel nozzle whereby a concentrated jet of main air of relatively large volume will at all
 125
 130

times be directed across the hollowed-out
mouth of the fuel nozzle and between it and
the shoulder on said fixture, a throttle valve,
means connected with said throttle valve for
controlling the entry of auxiliary air depend-
5 ing upon the degree of opening of the throttle
valve, and means whereby entering auxiliary
air will be directed to pass with the main air
across the mouth of the fuel nozzle and be-
10 tween it and the shoulder on said fixture as
aforesaid.

In testimony whereof, I have signed my
name to this specification.

JOHN J. BUCKLEY.