A. HOWARTH.

CARBURETER.

APPLICATION FILED SEPT. 29, 1913.

1,105,200. Patented July 28, 1914.

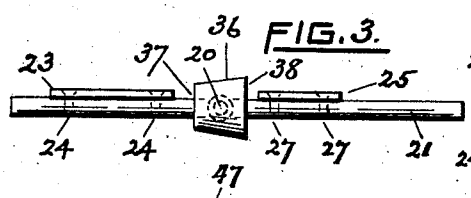

FIG. 3.

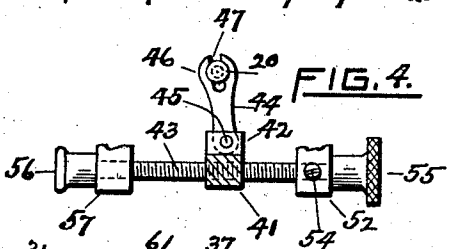

FIG. 4.

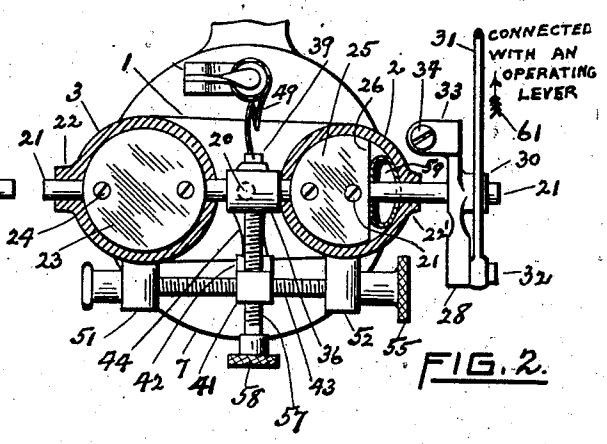

FIG. 2.

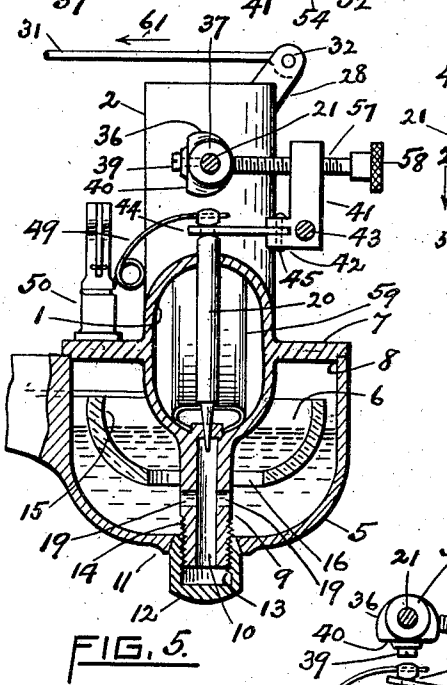

FIG. 5.

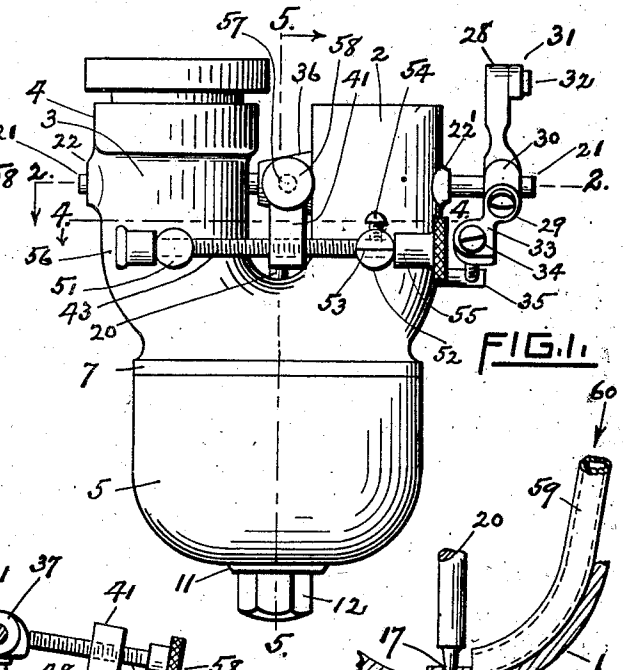

FIG. 1.

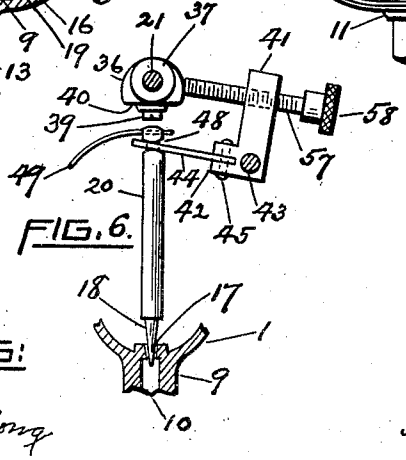

FIG. 6.

FIG. 7.

WITNESSES:

Bertha L. Burlong

Arthur P. Johnson

INVENTOR

Albert Howarth

By Warren R. Perce

Attorney.

UNITED STATES PATENT OFFICE.

ALBERT HOWARTH, OF PROVIDENCE, RHODE ISLAND.

CARBURETER.

1,105,200. Specification of Letters Patent. Patented July 28, 1914.

Application filed September 29, 1913. Serial No. 792,411.

To all whom it may concern:

Be it known that I, ALBERT HOWARTH, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Carbureters, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to carbureters for supplying gasolene vapor to motors and consists of the novel construction and combinations of the several parts as hereinafter described and claimed.

My improved carbureter is characterized by an air-intake valve for the admission of atmospheric air and a throttle valve for discharging carbureted air to the engine for explosion, which valves are mounted on one valve rod so as to operate in unison, to the same angular extent and without loss of motion; and also by adjustable means operated by a cam fixed on said valve rod for varying at will the quantity of gasolene supplied to the carbureter.

In the accompanying drawing like reference numerals indicate like parts.

Figure 1 is a front elevation of my improved carbureter. Fig. 2 is a top plan view of the same. Fig. 3 is a view in front elevation of the valve for the intake of atmospheric air, and of the throttle valve, both mounted fast on one valve rod, together with the conical cam fastened on said rod and adapted to actuate the gasolene-regulator, to vary the amount of gasolene supplied to the motor. Fig. 4 is a view, partly in top plan and partly in section on line 4—4 of Fig. 1, and shows the mechanism set for limiting the movement of the gasolene-regulator. Fig. 5 is a view, partly in elevation and partly in section, of the several parts seen on section line 5—5 of Fig. 1. Fig. 6 is a detail view of the gasolene-regulator and the gasolene orifice, whose discharge is controlled thereby, and the adjustable means set to limit the opening and closing movements of the gasolene-regulator. Fig. 7 is a detail view of the gasolene-regulator and the gasolene-discharge orifice, together with the air tube in relation thereto for the supply of primary atmospheric air to the gasolene so discharged into the carbureter.

In the drawings the reference numeral 1 indicates the casting which constitutes the body of the carbureter. It has a general U-shape form, the upright portion designated as 2 being tubular and adapted to serve as auxiliary means for the admission of atmospheric air whenever and to whatever degree the operator may desire; and the upright portion designated as 3 being tubular and adapted to conduct and discharge at will to the manifold of the engine the carbureted air to operate the several pistons of the respective cylinders. The tubular portion 3 has a tubular flange 4, which is internally screw-threaded.

The float chamber 5 is cup-shaped and serves to hold the gasolene supply. The gasolene is represented therein at a level indicated by the dotted line 6. A circular disk 7, integral with the body 1 of the carbureter, serves as a cover of the float chamber 5 and has a circumferential lip, as illustrated at 8 in Fig. 5. A vertical tube 9, having a cylindrical bore 10, extends down from the bottom of the U-bend of the carbureter body 1 and is integral therewith, being cast in one piece with it. At the bottom of the float chamber is a circular opening, as shown in Fig. 5, and an annular flange 11.

A nut 12, having a tubular socket 13, which is screw-threaded, is provided with a closed bottom. It has its upper end tapered or cone-shaped to fit in the circular opening in the bottom of the float chamber 5, and by means of its screw-threaded bore it engages with the screw-threaded cylindrical surface 14 of the tube 9, thus holding the float chamber 5 firmly in position and bringing the top edge of said chamber into closure with the circular lip 8 of the disk or cover 7 of carbureter body 1. The inner annular edge of the upper end of the nut or cap 12 is tapered or cone-shaped and so fitted and held in the circular opening in the bottom of the float chamber 5 as to form therewith a gasolene-tight joint.

A cup-shaped float 15 is mounted in the chamber 5 in the well-known manner and has a central circular opening 16 for the passage of the tube 9 therethrough. At the upper end of the bore 10 of the tube 9 there is a gasolene-discharge orifice 17, which is shown open in Fig. 6 and closed in Fig. 7. The gasolene level 6 is maintained in the float chamber 5 just below the upper surface of this gasolene-discharge means 17, as represented in Fig. 5.

A gasolene-regulator 18 may be conical,

or may be flattened on one or more sides, or made with any point suitable for the purpose, as heretofore used in the art, and is adapted to fit into the gasolene-discharge orifice 17, more or less as desired, to permit or prevent the flow of gasolene up through the orifice 17 from the gasolene chamber 5 into the carbureter. The gasolene from the float chamber 5 flows through the feed openings 19, 19, into the bore of the tube 9. The gasolene-regulator 18 extends down from a cylindrical rod 20, which may be integral therewith and which near its upper end passes slidingly through an opening made therefor in the upper portion of the U-body 1 of the carbureter.

A valve rod 21 is rotatably mounted in two tubular bosses 22, 22′, which are integral with and extend from the tubes 3 and 2, respectively. A circular disk 23 serves as a throttle valve and when closed, as seen in Fig. 2, fits in the tubular portion 3 of the carbureter body 1. The disk 23 is fastened in position upon the valve rod 21 by screws 24.

An intake valve 25 for the admission of atmospheric air when and in quantities desired by the operator (and hereinafter called the air-admission valve) has a circular periphery measuring preferably about 240° and also has a straight edge or chord constituting the remainder of the border or margin connecting the two ends of said arc, as shown at 26. The valve 25 is fastened upon the valve rod 21 by screws 27.

A lever arm 28 is mounted on the rod 21 and fastened there by a set screw 29, which passes through a boss 30 of said lever arm into holding contact with the valve rod 21. A throttle rod 31 is mounted upon the lever arm by a pivot 32 and is operated by a connecting lever (not shown). At the opposite end of the lever arm is a flange 33, through which a set screw passes to contact with a projection or lug 35 extending from the tubular portion 2 of the carbureter body 1.

A cam 36 has the form of a truncated cone and its two ends 37, 38, are parallel to each other. This cam 36 has a straight bore, which is eccentrically located lengthwise of the cam, as illustrated in Figs 5 and 6, and through that bore the valve rod 21 passes and is fastened therein by the set screw 39. One side or face of the conical cam 36 is squared off, as shown at 40. That radius of the cam 36 which is shown horizontally in Fig. 5 and perpendicularly in Fig. 6 is the shortest radius, and the other radii of said cam increase regularly in length from said minimum radius for about 135° therefrom.

A rocker arm 41 has a rearwardly bent extension 42, provided with a screw-threaded bore at the corner of said arm, through which bore a screw-threaded rod 43 passes engageably, so that the rocker arm 41 can have a limited oscillation on the screw rod 43, as can be seen by comparing Figs. 5 and 6. A finger 44 is mounted on the extension 42 of the rocker arm 41 by means of a pivot 45. The finger 44 has a rounded outer end 46, which is bifurcated, as shown at 47, to engage loosely the cylindrical rod 20 in the annular groove 48 thereof (Fig. 6) near the upper end of said rod. A bent and coiled spring 49 is attached to the primer 50, or some other suitable support, and its free end passes loosely through a diametrical slot in the upper end of the cylindrical rod 20, as shown in Figs. 5 and 6. The screw-threaded rod 43 is loosely supported in the two bosses or projections 51, 52. The projection 52 is horizontally sawed or split, as shown at 53 in Fig. 1, and a screw 54, pinching said split boss 52, serves to hold the screw rod 43 with sufficient friction so that it will keep its place when adjusted. The screw rod 43 is turned by the head 55, operated by hand, and a blind nut 56 at the opposite end of the screw rod 43 also serves to secure said screw rod in its adjusted position.

A screw 57, having a knurled head 58, passes through the upper end of the rocker arm 41 and its inner end bears against the conical cam 36.

A curved tube 59 (hereinafter called the primary air tube) has its upper end always open to the outer atmosphere, just beneath the valve rod 21, as seen in Fig. 2, and its lower end is always open and is in contact with the edge of the gasolene-discharge orifice 17, as seen in Figs 5 and 7.

The operation of my improved carbureter is as follows. Gasolene is supplied in any usual manner to the float chamber 5, and maintains therein a constant level, as shown at 6, which level is just below the upper edge of the gasolene discharging orifice 17. The gasolene is admitted to the carbureter from the float chamber by the rise of the gasolene-regulator 18 from its closed position in the valve seat 17, shown in Fig. 7, to its open position shown in Fig. 6. The engine suction then draws up through the opening or gasolene-discharge 17 into the U-bend or lower portion of the carbureter body a small jet of gasolene, and the primary atmospheric air, rushing down the primary air-tube 59, as indicated by the arrow 60, strikes with great force this jetting gasolene, which passes up in the opening (while the gasolene-regulator 18 is in its elevated position illustrated in Fig. 6.) This gasolene, so discharged, is seized by the air-current and dashed against the inner surface of the U-bend of the carbureter body 1, opposite to the lower end of the primary air tube 59, and is thus dissipated into a fine spray and drawn up into the cylinders by the piston suction of the engine.

The rod 31, pulled by the operator in the direction of the arrow 61, moves the lever arm 28 from the position illustrated in Figs. 1, 2, 5 and 7 (in which the valves 23 and 25 and the gasolene regulator 18 are represented as closed), to a position more or less open, as determined by the extent of the throw of the lever arm 28, at the will of the operator. In such closed position it is seen that the gasolene-regulator 18 fills the orifice 17 of the gasolene discharge and the throttle valve 23 is horizontal and fully closes the tubular portion 3 of the carbureter. At that time the air-admission valve 25 is also horizontal in the tubular portion 2 of the carbureter. The primary air-tube 59, however, is permanently open, as also the adjacent air-spaces at the two bent ends, which are shown in Fig. 2; thus allowing at all times free access of atmospheric air to the bottom of the U-bend of the carbureter and to the gasolene-discharge orifice 17. In this closed position the rocker arm 41 stands perpendicularly as seen in Fig. 5, and the inner end of the screw 57 abuts the cam 36 in line with the shortest radius of said cam. The finger piece 44 at this time extends horizontally and by its bifurcated end 46, 47, engaging in the annular groove 48 of the cylindrical rod 20, crowds the said rod and the gasolene-regulator 18 into the closed position in the gasolene-discharge orifice 17, as shown in Figs. 5 and 6, under the force of the spring 49. When, however, the throttle rod 31 is drawn by the operator in the direction of the arrow 61, the valve rod 21 is oscillated from the position shown in Fig. 5 to the position shown in Fig. 6 (or to some less extent, according to the length of the pull of the throttle rod 31), and consequently, the increasing radial dimensions of the cam 36 causes said cam to push outwardly, more and more, against the inner end of the screw 57 and so rocks (or, rather, oscillates) the screw rod 43, to a limited extent, thus lifting the gasolene-regulator 18 and its rod 20, against the tension of the spring 49, as fully exhibited in Fig. 6. This single oscillation of the valve rod 21 moves to the same degree the throttle valve 23, the air valve 25 and the cam 36, all of which are fastened to said valve rod, as shown in Figs. 2 and 3. The result is that the valves 23 and 25 the cam 36 and the gasolene-regulator 18 operate in unison, and maintain constantly the same proportional relations with one another. Thus the air-admission, the gasolene-feed and the carbureter-discharge are all controlled by the one operation of the throttle rod 31, in one direction to open and in the opposite direction to close, and always without any lost motion.

In previous carbureters of the class to which my said invention belongs, the operating lever has been connected to the various valves and gasolene-supplying means by toggle joints, gears, or other mechanical loosely-connected devices, but in the use of such loosely coöperating parts there is necessarily a considerable lost motion, with the accompanying disadvantages. In my construction there is no lost motion and all connections are positive and accurate and rigidly set and maintained in their adjusted and proper mutual relations.

The device to vary at will the quantity of gasolene to be fed to the carbureter is regulated, adjusted and set by turning the head 55 of the screw-rod 43. This rod is screwable in the fixed bearings or bosses 51, 52, and causes by its turning the rocker arm 41 to travel on said threaded rod in a nut-like manner. But as the cylindrical rod 20 is confined to a linear movement in a perpendicular direction only, such travel or movement of the rocker arm 41 upon the screw rod 43 changes the angular direction of the finger piece 44, horizontally, as illustrated in Figs. 2 and 4, and vertically, as shown in Fig. 6. The depth of the slot 47, however, allows such change of angle, although the rod 20 is always vertical. The purpose of this adjustable travel of the rocker arm 41 upon the screw rod 43 longitudinally thereof, is to enable the inner end of the screw 57 to contact at the will of the operator, whichever circumferential line of the conical cam 36 he may desire, according to the speed which he chooses. The nearer the larger end of the conical cam 36 the inner end of the screw 57 is so set, the larger is the circumference of the conical cam against which the screw bears and consequently the greater is the outward tipping movement of the rocker arm 41 pivotally on the screw rod 43 and therefore the higher is the tilt of the finger piece 44 and the elevation of the gasolene regulator 18 and its rod 20, all as exhibited in Fig. 6. Thus the requisite increase of the gasolene-supply to the carbureter is regulated and maintained. But if it is desired to diminish the amount of gasolene supplied to the proportionate supply of air given by the air-admission valve 25, the operator turns the head 55 of the screw rod 43 by hand so as to move the rocker arm 41 on said rod toward the small end of the conical cam 36 to the proper position where the circumference of said cam is less. The consequence is that the angular tilt of the finger piece 44 is decreased and the cylindrical rod 20 and its connected gasolene-regulator 18 are thereby moved downward and so diminish the amount of the gasolene supply to the carbureter.

It is to be understood in the proper use of my improved carbureter the gasolene-regulator is never closed entirely, for there must always be a sufficient gasolene supply

to carburet the constant supply of primary air which passes down through the always open air-tube 59. However, there can be no actual discharge of gasolene into the carbureter until engine action is established to suck up gasolene, because the gasolene-level 6 is always below the upper edges of the gasolene-discharge orifice 17. The gasolene-regulator 18 is therefore always set (by the screws 43 and 57) to such a position as immediately to respond to the cranking action in starting the motor or to the regular piston suction, but in a low position. By opening the throttle valve 23 and the air-admission valve 25 by means of the throttle rod 31, more air is admitted to the carbureter and an increased supply of gasolene is allowed, which is always proportionate to the increase of the air supplied through the tube 2 by the opening of the valve 25.

I claim as a new and useful invention and desire to secure by Letters Patent:—

1. In a carbureter, the combination of a rocker shaft mounted in supports; means for rocking said shaft; a throttle valve fastened on said shaft; an air-admission valve fastened on said shaft; a gasolene-supply chamber; a gasolene-regulator discharging into the carbureter; a valve seat for the throttle valve; a valve seat for the air-admission valve; a fixed rod mounted in supports; an adjusting arm movable along said rod; a cam on the rocker shaft; and means from the adjusting arm in contact with said cam adapted to vary the gasolene-supply to the carbureter.

2. In a carbureter, the combination of a carbureter body; a throttle valve; a valve seat for the throttle valve; an air-admission valve; a valve seat for the air-admission valve; a receptacle for gasolene; a gasolene-supply regulator; a spring normally closing the gasolene-supply regulator; a rocker shaft; means to rock said shaft; an eccentrically mounted cam fastened on the rocker shaft; a rod mounted in supports and extending parallel to the rocker shaft; a bent lever mounted movably upon said rod and adjustable thereon; and regulable means intermediate said bent lever and gasolene-supply regulator adapted to open to a predetermined degree the gasolene-supply regulator against the pressure of said spring.

3. In a carbureter, the combination of a carbureter body; a throttle valve; a valve seat for the throttle valve; an air-admission valve; a valve seat for the air-admission valve; a receptacle for gasolene; a gasolene-supply regulator; a rocker shaft; means to rock said shaft; a spring normally closing the gasolene-supply regulator; an eccentrically mounted cam fastened on the rocker shaft; a screw rod mounted parallel to the rocker arm; an arm mounted by a screw thread on the screw rod; an adjusting screw mounted in the last named arm and having its inner end in operative contact with conical surface of said cam; and a link connection between the last named arm and the gasolene-supply regulator, all combined as shown and adapted to operate said two valves and the gasolene-supply regulator in unison and to the same proportionate extents.

4. In a carbureter, the combination of a U-shaped body comprising two parallel tubes opening therefrom each circular in cross section; a straight valve rod mounted rotatably in said tubes diametrically thereof; a lever arm fastened upon one end of said valve rod; a pull rod pivotally connected with the lever arm at the outer end thereof; a circular throttle valve fastened upon the valve rod adapted to open or close at will one of said tubes; an air-intake valve fastened upon said valve rod and always extending in the same plane as the throttle valve, which air-intake valve has a periphery consisting in part of a true arc and the remainder consisting of a straight line or chord of said arc and is adapted to partially close or open at will the other of said tubes; and a gasolene-supply regulator opening into the U-bend of the carbureter adjacent to the inner ends of said tubes.

5. In a carbureter for supplying gasolene to a motor, the combination of a carbureter body comprising two parallel tubes opening therefrom; a valve rod rotatably mounted in said tubes diametrically thereof; a lever arm adapted to rock the valve rod; a throttle valve fastened on the valve rod and adapted to open and close at will one of said tubes; an air-admission valve fastened on the valve rod and adapted to partially open or partially close at will the other of said tubes; a cam fastened on the valve rod and rotatable therewith; a chamber for containing gasolene; a gasolene-supply regulator; a spring normally pressing said regulator on the upper end thereof; a pivotally mounted rocker arm; a screw mounted in the rocker arm and in contact at its inner end with the cam; and a finger piece pivotally mounted upon the rocker arm and having a longitudinal slot at its outer end extending into an annular groove near the top of said regulator.

6. In a carbureter for supplying gasolene to a motor, the combination of a carbureter body comprising two parallel tubes opening therefrom; a valve rod rotatably mounted in said tubes diametrically thereof; a lever arm adapted to rock the valve rod; a throttle valve fastened on the valve rod and adapted to open or close at will one of said tubes; an air-admission valve fastened on the valve rod and adapted to

partially open or partially close at will the other of said tubes, a chamber for containing gasolene; a gasolene-supply regulator; a spring for pressing downward the gasolene-supply regulator; a cam having the shape of a cone frustum mounted fast on the first named valve rod; a screw rod mounted and longitudinally movable in supports extending from said parallel tubes; an arm having a screw-threaded bore mounted movably on said screw rod by engagement therewith; a swiveling finger mounted pivotally at one end on said arm and loosely engaging the upper end of the gasolene-supply regulator; and an adjusting screw mounted in the said arm and having its inner end in contact with the conical surface of said cam.

7. In a carbureter, the combination of a carbureter body comprising two parallel tubes opening therefrom; a valve rod rotatably mounted in said tubes diametrically thereof; a lever arm adapted to rock the valve rod; a throttle valve fastened on the valve rod and adapted to open or close at will one of said tubes; an air-admission valve fastened on the valve rod and adapted to partially open or partially close at will the other of said tubes; a chamber for containing gasolene; a gasolene-supply regulator adapted to discharge gasolene by the suction of the motor; a spring for pressing downward said regulator; a cam having the shape of a cone frustum mounted fast on the first named valve rod; an arm; a rod on which said arm is loosely mounted; means for imparting a movement to said arm along said rod; and means operable by said cam and arm arranged to vary at will the rise of the gasolene-supply regulator.

8. In a carbureter for supplying gasolene to a motor, the combination of a carbureter body comprising two parallel tubes opening therefrom; a valve rod rotatably mounted in said tubes diametrically thereof; a lever arm adapted to rock the valve rod; a throttle valve fastened on the valve rod and adapted to open or close at will one of said tubes; an air-admission valve fastened on the valve rod and adapted to partially open or partially close at will the other of said tubes; a chamber for containing gasolene; a gasolene-supply regulator; a spring for pressing downward said regulator; a cam having the shape of a cone frustum and also a straight longitudinal bore which is eccentrically located therein which cam is mounted by said bore upon the first named valve rod and fastened in position thereon; a screw rod mounted and longitudinally movable in fixed supports; a rocker arm having a screw-threaded bore and mounted on said screw rod by engagement therewith; a swiveling finger mounted pivotally at one end on said rocker arm and loosely engageable at its opposite end with an annular groove in the neck of said regulator; and an adjusting screw mounted in the rocker arm and having its inner end in contact with the conical surface of said cam.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT HOWARTH.

Witnesses:
BERTHA S. FURLONG,
ARTHUR P. JOHNSON.