FIG. 1—THE PIONEER STROMBERG MODEL
*This is the present evolution of the original Stromberg. It is a single-jet or nozzle type and uses a glass float chamber*

FIG. 2—THE DOUBLE-JET STROMBERG TYPE
*This is the latest Stromberg creation, a two-nozzle design for six-cylinder cars or those with large four-cylinder motors*

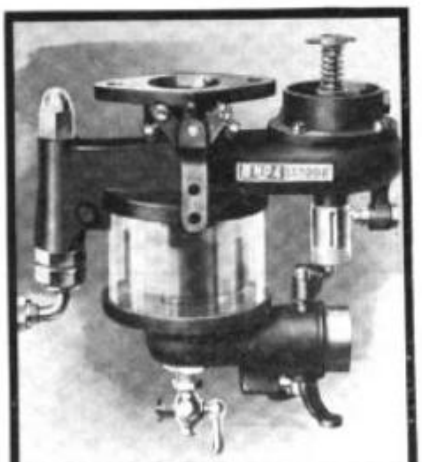

FIG. 3—STROMBERG MODEL B
*This carbureter is for small air-cooled motors and others with thermo-syphon water circulation. It has no hot-water jacket*

# Adjusting the Stromberg

## Modus Operandi by Which Carbureters May Be Tuned Up —Process of Manufacture

THE carbureter, being one of the easiest parts of a motor to adjust and tamper with when the engine misses or in anywise acts cantankerously, is it any wonder that if an occasional miss occurs in one of the cylinders, if overheating symptoms present themselves, if there is lack of power on any speed, that a few turns are given the adjustment on the auxiliary air valve, or the float level, or the spraying nozzle or any other part that is susceptible to adjustment. It is but natural these are the simplest parts to reach.

It is much easier to change the spring tension on an auxiliary air valve than it is to remove a spark plug to see if the insulation is cracked or if the sparking points are too far apart. It is generally much easier to give the needle valve in the spraying nozzle a turn, than it is to look for short circuits in the electric wiring; or to test if there is poor compression due to a valve not seating and so causing periodic missing; or to investigate if the battery is weak; or to go over the essentials of a magneto; or to discern if enough oil is being fed to the motor; or a score of other causes that may be the cause of the lack of power, heating of the motor and cylinders missing occasionally or periodically.

It is essential, however, for a driver to know the mechanical details of his carbureter, to know the modus operandi, to know how to adjust, where adjustments must be made, and to try to learn when a motor trouble is occasioned by a disordered carbureter, and when by ignition faults, lubrication troubles, and refrigeration.

### The 1912 Strombergs

In the 1912 line of Stromberg carbureters there are three models; each is intended for a particular type of motor, and each is designed for such. In all three the basic principles of operation are alike, and while they differ in details their troubles are similar and their cures the same. The three models for the present season are officially labeled:

Model A, for four-cylinder water-cooled motors with positive water circulation through the cylinder jackets by pump. This is the pioneer Stromberg model and was put on the market approximately 5 years ago. Fig. 1.

Model B, is for air-cooled motors or water-cooled types in which water circulation is by thermo-syphon means. It is a concentric type of carbureter, Fig 3, and is intended for motors with horsepower up to 30.

Model C is the latest one, is for six-cylinder motors, or very large four-cylinder types, and differs from A and B in that it has two spraying nozzles, a main nozzle within the casing at N Fig. 2 and an auxiliary nozzle at N 1, the latter operated by the auxiliary air valve.

Before proceeding to the necessary details in adjustment of these models a general conception of how they are designed and how they operate is essential. Figs. 4 and 5 show this. Fig. 4 shows model C with its two nozzles N and N1, and the illustration explaint model A by eliminating the auxiliary N1. Fig. 5 shows model B for air-cooled or thermo-syphon motors.

In all three the gasoline system is regulated by a hollow copper float F, which through two pivoted levers, raises or lowers the needle valve for regulating the flow of gasoline from the gasoline tank. In the illustration the valve is raised to allow gasoline to enter by way of the connection U, and through the filter screen G2, carried in the universal coupling G. By means of a locking nut G1, this coupling can be set at any angle, making it readily adaptable to all motors.

The float so regulates the gasoline level that it rises to 3/16 inch below the top of the nozzle N. This is enough leeway to prevent overflowing from the nozzle, which would result in what is known as flooding, or too much gasoline.

### No Controlling Needle

The nozzle N is without any controlling needle valve. The nozzle is merely a short vertical pipe with a narrowed orifice at the top. Nozzles in different sizes of carbureters have different diameter of orifice. A 1¼-inch carbureter, which is the popular size and suitable for a four-cylinder motor ranging in size between 3-inch bore, 4-inch stroke and 4-inch bore and stroke, uses a 59-gauge nozzle, but the buyer is also given two additional nozzles, one 58-gauge which is a little larger than the 59, and also a 60-gauge which is a little smaller. Some conception of the diameter of orifice in these nozzles can be gained by knowing that a 72-gauge opening equals .00049 inch, and a 48-gauge one equals .00454 inch. The former is the smallest size nozzle used and the latter the largest. With every different carbureter model and every different size three nozzle sizes are given. A 1-inch size takes a 62 as standard with 61 and 63 as over and under sizes. The reader must remember that the smaller the number designating a certain gauge the larger is the orifice diameter. On the 1.5-inch sizes 55.5 is standard with 54" and 56 as extras.

### Glass Float Chamber

The use of a glass float chamber on all three models makes it an easy job to see the level of gasoline in the float chamber and as a checkup on the correct level, a horizontal line is scratched on the body part of the carbureter this line marking the proper level of the fuel in the nozzle. The level on the float chamber should check up with this mark, if not a variation of 1/16 inch above or below the line is permitted but variations beyond this limit call for a change of float level, an easy task.

The float level is varied as follows: Fig. 6 a section of a float chamber shows how the float F rests on the two levers F1 and how these in turn are pivoted on the block F2 so that the inner ends bear upwards against the sleeve V1, which sleeve carries the needle valve V. As the float comes down, due to lack of gasoline the needle valve goes up, as illustrated, and allows more fuel to enter. The upward movement of the sleeve V1 is retarded by a coil spring V3 and just as the tension of this spring is increased or reduced so the work required to lift the needle valve is changed. The spring tension can be varied by removing the acorn-shaped cover V5 and turning down the adjusting nut V4. Turning the nut down increases the spring tension and so lowers the float level and also lowers the level of the gasoline in the nozzle. Turning the adjusting nut up raises the float level and also the gasoline level in the nozzle. This is the only con-

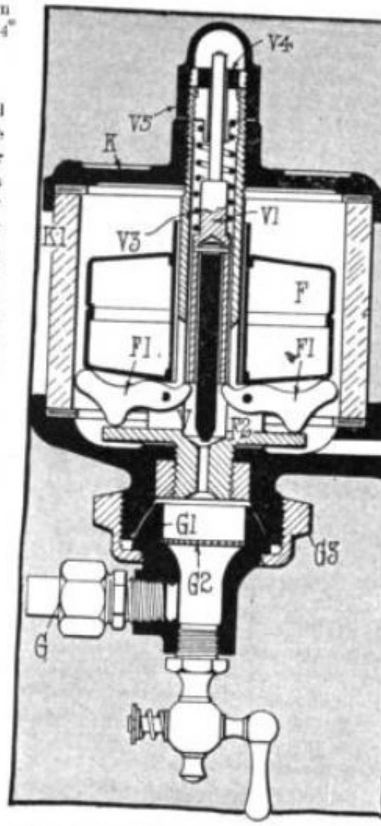


FIG. 6—STROMBERG FLOAT CHAMBER

*The parts are: F, copper float; F1, float levers; F2, support; V, needle valve; V3, spring; V4, adjusting nut; V5, nut cover; K1, float chamber glass; G1, universal union; G, coupling; G3, lock nut; G2, strainer*

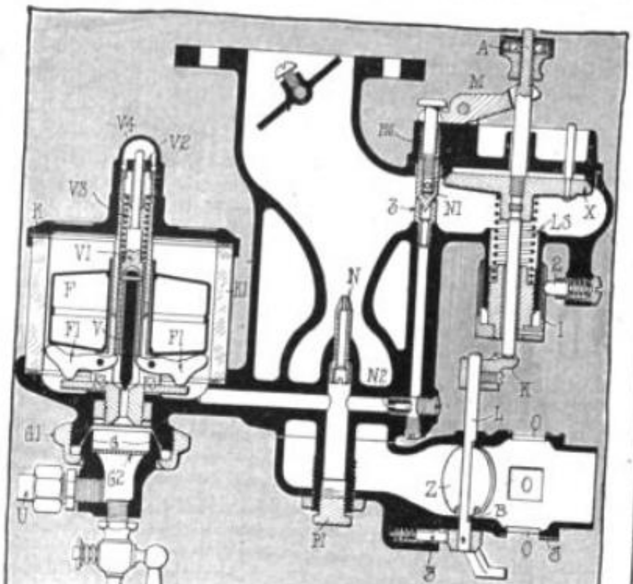


FIG. 4—STROMBERG CARBURETER, MODEL C

*This is a double-jet carbureter intended for six-cylinder motors or large sizes of four-cylinder designs. The secondary nozzle is regulated by a governing needle, N1, interconnected with the auxiliary air valve*

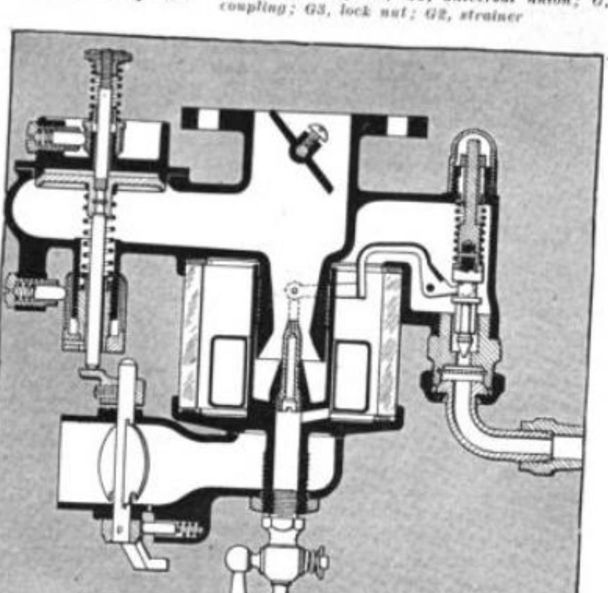

FIG. 5—STROMBERG CARBURETER, MODEL B

*This is a concentric carbureter type built for air-cooled and thermo-syphon motors. The float regulation of the gasoline needle valve is through a peculiar shape of lever arm, illustrated herewith* trol provided on the gasoline system, beyond the use of the extra size nozzles provided with the carbureter.

**Stromberg Air System**

The air system is shown in completeness in Fig. 4 and practically the same in Fig. 7. The main air supply enters by a base opening through the horn-shaped casting H and passes up through the venturi-shaped mixing chamber in which the nozzle N is located. The shape of the venturi, or hourglass passage is to direct the air current towards the tip of the nozzle and so accomplish a thorough mixing of the gasoline particles with the air.

There is a second air supply, namely through the spring-controlled auxiliary air valve X, which valve is located above the nozzle N and so the air coming through this valve does not pass the nozzle and therefore does not play a direct part in mixing or breaking up the gasoline as it issues from the nozzle. The secret of the auxiliary air valve is that it does not open on low motor speeds but only after speeds of 300 to 500 crankshaft revolutions per minute. When it opens it reduces the current of air passing the nozzle and so the pull on the gasoline is reduced and a smaller quantity of gasoline enters the mixture in proportion to the air entering it. In this way the auxiliary air valve, while directly providing more air indirectly, regulates the amount of gasoline from the nozzle. By a nicety of adjustment of the air valve it is possible to get the proper amount of gasoline at all engine speeds.

**Construction of Air Valve**

The construction of the air valve is an interesting detail of the carbureter. It is a flat disk valve X with beveled face and is controlled by two springs, one below and the other above. The lower one LS, LS is called the low-speed spring, the upper one HS, the high speed spring. You use the lower one to get the proper adjustment for slow engine speeds, the upper one for the medium and higher speeds. You can change the tension of either spring, there is an adjusting nut AN with a locker I to hold it in any position and also another NB for the upper spring. The theory of the two springs is that the lower one is set so as just to hold the valve seated when the motor is running idly and slowly at which the upper spring is entirely free of tension. The upper spring acts as a bumper to resist valve opening after a certain point and the greater its tension the harder the valve is to open.

The regulation accomplished by this auxiliary air valve is easily followed: Let us suppose that the gasoline level is correct, 3/16-inch below the nozzle tip, but the motor is not giving speed enough. This may be due to not enough gasoline and too much air. To remedy this, screw down the upper adjusting nut NB, making the valve much harder to open. What is the result? It takes much more motor suction to open the valve, consequently there is a stronger suction on the gasoline in the nozzle and more gasoline is used in proportion to air, giving the required richer mixture. On the other hand let us suppose that when running slowly the motor "loads up," as the carbureter expert expresses it, meaning that too much gasoline is issuing from the nozzle and at slow speeds there will be missing and perhaps some very black smoke coming out of the exhaust—a certain indication of too rich a mixture. How can you lessen the gasoline supply? First ascertain if the gasoline level is correct by the horizontal line on the casing and if correct then loosen the tension on the high speed spring HS. This lets the valve open on slight motor suction, allowing more air to enter and so not requiring so much to pass the nozzle. This lessens the motor suction on the nozzle, and the desired weaker mixture results. Too weak a mixture causes popping.

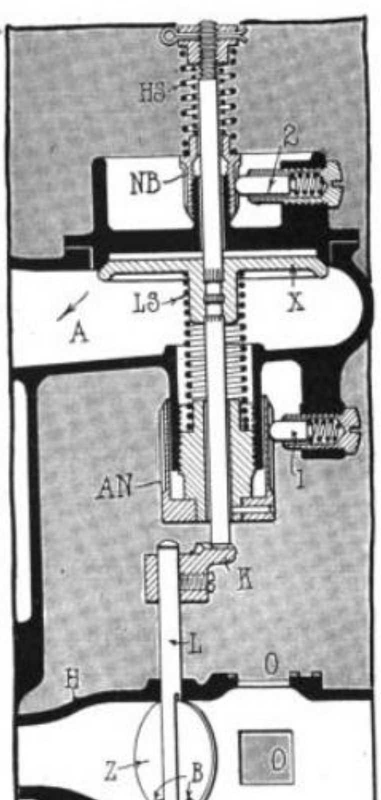


FIG. 7—THE AUXILIARY AIR VALVE

*The parts of the air system are: X, auxiliary air valve; LS, low speed spring; AN, adjusting nut for lower spring; HS, high speed spring with adjusting nut NB; 1 and 2 are locking devices for the adjusting nuts; Z is starter valve; O, season adjustment sleeve*

The introduction of heavier grades of gasoline during the past year or so has led to improvements in carbureters to facilitate starting, one of which is the starter valve, Fig. 7. This is a standard butterfly valve Z which normally rests parallel to the sides of the horn piece so as not to obstruct the air passage. When starting the valve is turned at right angles to the passage, thus entirely obstructing it except for a couple of openings B in the valve. When so shut the air supply is cut off so that when the motor is cranked the entire suction is exerted on the nozzle and much gasoline drawn out, as is needed. But a combination with the auxiliary air valve is needed, the air valve must be held shut otherwise when the motor is cranked the valve would be sucked open, the pull on the gasoline cut down and too lean a mixture drawn into the cylinders. The interlocking mechanism with the air valve is illustrated in the form of a cam K on the top of the prolonged stem L of the valve, the cam resting against the lower end of the auxiliary air valve, when the shutter valve is closed. This is a simple and non-adjustable inter-connection.

**Improved Starting Methods**

The use of heavy grades of gasoline has further called for the attachment of the intake horn H to which can be attached a length of flexible metal tubing extending to a drum or cylinder around the exhaust manifold so that only hot air from around the manifold is drawn into the carbureter. The object of hot air in cold weather is that it raises the temperature of the gasoline and aids in volatilizing or breaking it up. In the cold winter weather all hot air is needed, in hot summer weather not a bit of hot air is needed, and between these extremes every variation may be required. To meet these all-season requirements a season adjustment is added. It is a simple device in the horn H and is as follows: In the horn is a series of openings O cut in a circle around the horn. Over the horn at this point is a tight-fitting sleeve or band with corresponding holes.

**Getting Right Temperatures**

This sleeve may be rotated circumferentially so that at one time the holes in the horn coincide with those in the sleeve, whereas at another time the solid part of the sleeve will close all of the holes in the horn. By varying the size of these holes O it is possible in different temperatures to get just the correct amount of cold or heated air. Naturally in cold winter these holes are all closed and when the mercury gets above 80 they are all opened. Because of this adjustment it is not necessary to take off the flexible tube connection in the summer.

Before the use of the hot air intake pipe carbureter makers used the hot water jacket surrounding the mixing chamber to keep it warm and prevent condensation of the gasoline particles after they issued from the nozzle. Two Stromberg models use the waterjacket, the exception being model B, the concentric-float type used for air-cooled motors and thermo-syphon types. In summer weather it is recommended to shut the water out of the jackets. The value of shutting the water out of the carbureter jacket was well illustrated some years ago in connection with the Algonquin hill-climb. A certain car was not able to make the hill under a certain time with the hot water of the cylinder jackets circulating around the carbureter. The water was shut off and nearly 3 seconds cut from the time required to climb the hill. In this same contest another peculiarity in carbureter adjustment came up. A certain car was not able to get enough air into the mixture for the best speeds. It used an auxiliary air valve but still the motor did not give the speed. To remedy the trouble a few small holes were drilled in the intake manifold and enough extra air obtained so that better time was made. With the modern carbureter, improvements in the air valve have taken care of such carbureter shortcomings as this.

**Drivers Should Study Adjustment**

The adjustment of his carbureter should be understood by every car driver. Directions for such adjustments are generally given in detail in instruction books, but so often these precious volumes are thrown aside when the instrument is purchased and are never seen again. There are a few general laws on carbureter adjustment and while the rules of setting one make will not suffice for another, a knowledge of adjusting in general will aid in every particular case.

With the Stromberg the gasoline and air can be adjusted. The gasoline adjustment is simple. The level in the float chamber must correspond with the line on the carbureter body. Instructions as to how this may be done have already been given.

The adjusting of the air or setting the auxiliary air valve is more difficult. To begin you adjust first for low speed. Start the motor and turn the adjusting nut AN up or down until the valve seats lightly and the motor runs slowly without missing.

For highspeed adjustments turn the high speed adjusting nut NB up until the motor runs without backfiring; backfiring is due to too lean a mixture. If on the other hand black smoke comes out of the muffler the mixture is overrich and the nut will have to be turned down.

Supposing that with this done the motor does not give sufficient speed on high, suppose further that the nut BN is raised, making the valve as difficult to open as possible in order to give a rich mixture and still the desired speed does not come, it is practically a certainty that a large nozzle is needed, provided of course that all necessary steps have been taken to ascertain that the carbureter is at fault and that the trouble does not lie with faulty ignition, lubrication or water circulation. In its instructions on adequacy of nozzles the company says: "If after the adjusting nut AN is correct you find that the valve is off the seat with the motor at rest, the nozzle is too large. If on the other hand you find that the nut BN has to be turned up so high that the high speed spring is in contact with the small nut on the top of the air valve stem when the motor is at rest, in order to get the proper mixture on high speed, the nozzle in use is too small."

**Possible Troubles**

Aside to carbureter troubles which may be due to improper adjustments there are other troubles which come up too high or too low float adjustment are in this category. Each has its symptoms and its causes. A too high float level may be due to dirt under the needle valve, Fig. 6, preventing its seating properly and entirely shutting off the flow of incoming gasoline, the result being flooding of the nozzle. A second cause is a sticking needle valve, the needle valve being up as illustrated but held from coming down by small particles of dirt, which may enter through a small perforation in the acron cap V4. The only remedy in either case is removing the top of the float chamber and cleaning thoroughly. A third and very rare cause of too high float level is a weak spring. A spring is normally equal to the life of a carbureter.

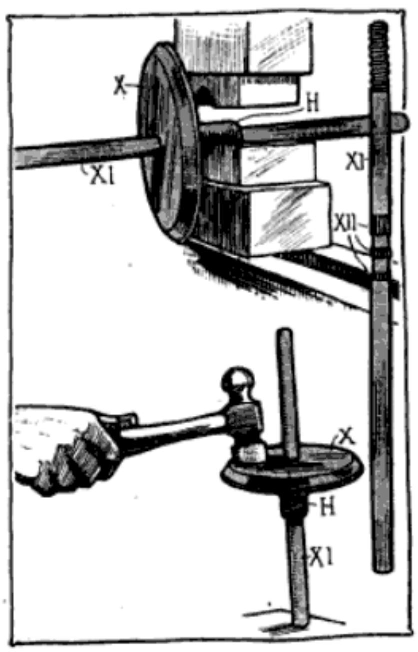


FIG. 8—STROMBERG AUXILIARY AIR VALVE

*This valve is a brass mushroom-type X on a Bessemer steel stem X1. The stem is serrated at X11 and the hub part H of the valve is crimped onto the stem, the soft metal filling the serrations, and making a job that will not readily loosen up when device is in use*

There are one or two causes for too low a float level, which is chiefly caused by not sufficient pressure in the gasoline tank if a pressure system is used; or in a gravity system there may not be sufficient head for steep hill work. The horizontal line on the carbureter body is the great criterion for determining proper float level.

The symptoms for too high a float level exhibit themselves when the motor is running idle and starting up. There will be missing and perhaps black smoke emitted from the muffler, but with the motor under speed both of these will disappear, recurring again on low speeds and re-starting.

It is almost impossible to lay down any definite law for chasing down a carbureter trouble. The different carbureter companies maintain service departments in conjunction with many of their branches and in these employ expert trouble men. In 90 per cent of the cases of supposed carbureter troubles these men report that the fault lies in the ignition system, in lubrication, or some other place. Frequently the spark plug points are too wide, the batttery weak, or a connection loose.

In beginning the diagnosis of a trouble look first at the float level and see that it checks up with the standard line.

Second, go to the low speed spring adjusting nut, and see if with the motor throttled or running idle the valve X seats. It may be the spring is too strong or too weak. If too strong it can be detected by the amount of pressure necessary to open the valve. This is gauged by pressing down on the top of the valve stem with the finger. On the other hand, if too weak the valve X will not be seated.

Third, if the gasoline level and air valve are correct, but the motor still misses look for leaks in the joints of the intake mani-

Fourth, if the manifold is found to be all right, examine the spark plugs for cracked insulation and for the points being too wide. If a magneto is used the points should be 1/64-inch apart, and a little wider for a battery. It will be found satisfactory to have them 1/32-inch for the battery. The wider gap for the battery results in a hotter spark than if close together.

**Investigating Troubles**

Supposing that the spark plugs are found correct, the magneto should be looked through, and also the wiring. There may be a short circuit or dirt under the distributer parts, or the breaker mechanisms of the magneto. If, however, the magneto is found correct and there still is a missing, the chances are a larger nozzle in the carbureter is needed, because the miss would indicate that the motor is not getting sufficient gasoline.

Troubles with a leaking float are very rare in these days of improved construction. When a float leaks its weight is increased and the indication of this in a carbureter action is a lowering of the float level which can be checked up by the hor-

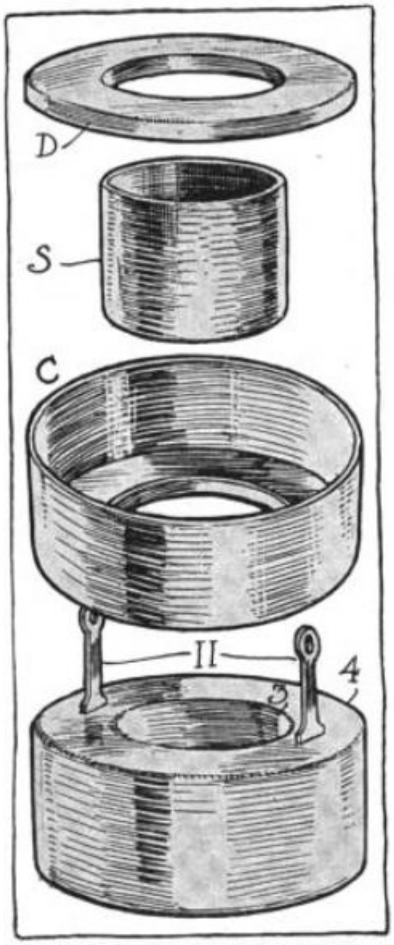


FIG. 9—MODEL B FLOAT DESIGN

*In Stromberg model B a stamped copper float is used made in three parts, cup C, sleeve S and cover D. The circle of soldering is designated by 4*

izontal line. The presence of a leaky float is verified by shaking the float in the hand, the noise of the gasoline within it being easily distinguished.

**Guarding Against Leakage**

In order to guard against float leaks every precaution in manufacture is taken. The Stromberg float construction in models A and C is shown in Fig. 10: the float the cup portion C, the cover D, and the sleeve S. These three parts are soldered together, the points of soldering being designated 1 and 3 where the sleeve unites with the top and bottom, and at 2 where the cup and cover unite. The cup and cover portion are copper stampings, whereas the sleeve S is a length cut from a copper tube. In putting the cover D into the cup portion it fits snugly within and having a slight taper leaves an annular space between it and the top edge of the cup which is filled with solder thereby insuring a gas-tight joint. The construction of the float in model B is similar, excepting that the sleeve S is of larger diameter and the float has the two vertical portions I for hinging to the level mechanism which works the needle, as illustrated in Fig. 5.

Before the floats are assembled into a carbureter they are given a strenuous test on air tightness. They are placed in a large tank partly filled with gasoline and 25 pounds air pressure placed on the gasoline. After being immersed in this for 8 hours they are removed and held beneath the surface of hot water. The hot water is intended to heat any gasoline which might enter the float and cause it to pass off in the form of air bubbles which can be readily distinguished rising to the surface of the water. The company recommends that whenever a user has a leaky float he should at once forward it to the nearest branch, or to the factory.

## NO NEW ENGLISH MOTORS

London, May 11—Apart from the Argyll Co., which introduced the single-sleeve motor at the last motor show, no other firms have yet introduced commercially any new type of motor. With regard to this Argyll engine, action has been brought against the Argyll Co. by the proprietors of the Knight engine, for infringement of patent. This case will be before the courts sometime during the summer.

The Reno Sphinx engine, which has been already developed to a small extent in the United States, a company having been formed for the American rights, is making progress in this country, and an engine of this type has been under demonstration for the past 2 or 3 months, with very satisfactory results. There is every indication that before the next Olympia show, this motor will be adopted by one or more British manufacturers.

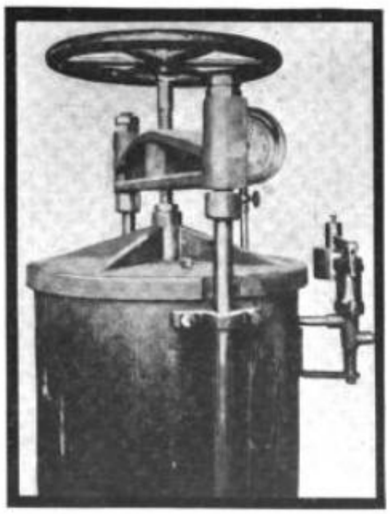

FIG. 11 STROMBERG FLOAT TESTING

*Before the copper floats are approved they are given a test under air pressure in this large tank to see if gasoline can be forced inside them*

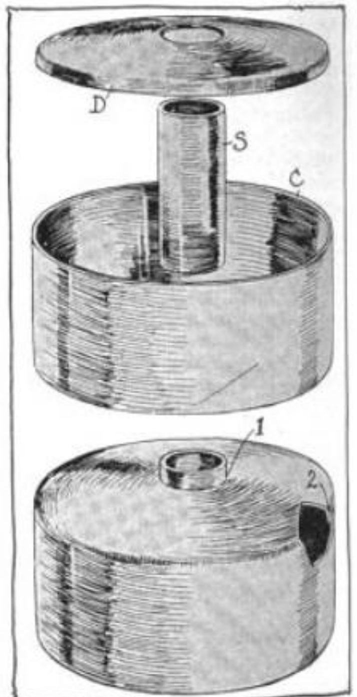


FIG. 10—FLOAT CONSTRUCTION MODELS A AND C

*In Stromberg models A and C the copper float is made in three pieces, cup A, cover D and sleeve S, all three of which are soldered carefully together. The parts C and D are stampings*

Compared with the poppet-valve engine of the same dimensions, the Reno motor is said to show better speed and greater hill-climbing capacity. There also is a marked absence of noise as compared with the poppet engine, and there appears to be no difficulty as regards lubrication. The ease with which the valves of this engine can be removed is a remarkable feature; for instance, any ordinary driver can remove the valve from the cylinder in a time not exceeding 4 minutes.

## CROPS IN THE NORTHWEST

Minneapolis, Minn., May 27—Crop conditions in the northwest still promise well. Selection of seed, building of silos and conservative expenditures, with improved methods, are suggested by a Minneapolis commercial paper house as features of the situation promising well in North Dakota. Thomas Cooper, head of the North Dakota Better Farming Association, says the cool weather has served to drive the roots of grain down and that small grain seeding is practically done. Some more oats and flax is to go in. There is too much moisture in the northern counties, and the eastern and southern portions could stand more rain. George Lawrence, minister of agriculture, says that prospects for a bumper crop in southern Manitoba never were better. Ninety per cent of the wheat is sown and the acreage is to be the largest ever. Small grains will average better than last year.