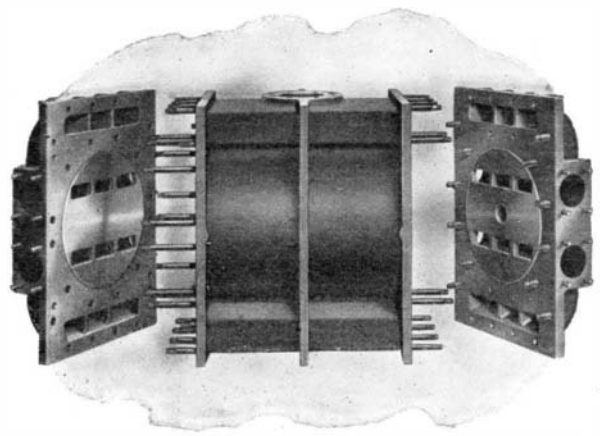
AN ADVANCE IN STEAM ENGINE DESIGN.

In meeting the invasion of the power field by new prime movers and long-distance electrical transmission of water power, the steam engine has held its own, and has even increased its field of usefulness by rapid improvement in both efficiency and simplicity. One of the best examples of this new era of progress in steam engineering is the new Atlas four-valve engine manufactured by the Atlas Engine Works, of Indianapolis.

In the effort to produce an engine that would be simple, durable, and highly economical of steam, the



THE FOUR-VALVE ENGINE CYLINDER.

Atlas designer has turned for economy to the Corliss principle of separate, semi-rotating valves for inlet and exhaust, and has improved on the Corliss economy by placing the valves directly in the cylinder heads, thus giving the shortest possible steam passages, the least possible condensation, and the lowest clearance, while he has lost but little of the economy by stripping the gear of all such complications as dash-pots, wrist-plates, governor cams, crab-hooks, and rocker-arms with their offsets and lost motion. A shaft governor is used, and the two steam valves are operated by one rod directly from an eccentric, which is a part of this shaft governor.

The two exhaust valves are operated by a rod from an eccentric which is keyed to the shaft. The operation is thus as thoroughly simple as that of the slide-valve engine, and experience has shown that it is no more likely to get out of order, and requires no more expensive attendance, than does the ordinary automatic single-valve engine.

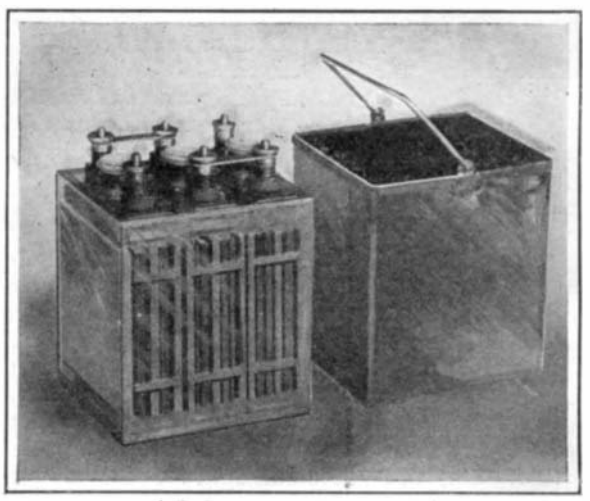
Exhaust valves have always been operated in this way on the Corliss, and it has been demonstrated by the Atlas that with a shaft governor that is just right and correctly proportioned valves and ports, backed by the nicest accuracy of workmanship, a cut-off practically as precise and a regulation as close, can be had with this simple four-valve construction as with the delicate and complicated mechanism of dash-pots and releasing gear that is essential to the Corliss.

The engine has removable journals and is built in sizes varying from ten-inch to twenty-six-inch cylinders, in both self-contained and side-crank forms of transmission, with splash or sight-feed oiling systems. The speed range recommended runs from 125 to 250 revolutions per minute according to the size of cylinder and length of stroke, and the engine finds its field of usefulness limited only by its speed limits.

AN IMPROVED LIGHT-WEIGHT IGNITION STORAGE BATTERY.

Our illustration shows the general appearance of a new light-weight ignition cell put up in celluloid jars by the Müller Porous Plate Accumulator Company, 205 West 41st Street, this city. The battery illustrated consists of three 5-plate cells having a capacity of 25 ampere-hours, and furnishing a total of 6 volts. The cells and containing case complete weigh only 12 pounds, which is extremely light for a battery of this voltage and capacity. The battery shown was constructed especially for use on a flying machine, but the greatest sphere of usefulness for cells of this kind is on automobiles. Not only are these batteries of about half the weight for the same capacity of cells used heretofore, but the plates are constructed after a special process which gives them great porosity and a long life. They can be charged and discharged a large number of times, and at a high rate, without injury, and, what is more important with an ignition cell, they can be left standing in a discharged condition for a long time without any loss of capacity. In other words, abuse of this character, which would completely ruin some of the light-weight foreign ignition cells, will cause no perceptible difference in the efficiency of this improved battery. The capacity, unlike that of most ignition accumulators, is fully equal to the rating.

Two 50-ampere-hour cells giving 4 volts, for example, weigh only 16 pounds, and yet they will be found sufficient to run a four-cylinder car at least 1,200 miles. Comparing these figures with those of other ignition cells, it will be seen that, durability aside, the battery is a decided advance over what has been done before as regards light weight.



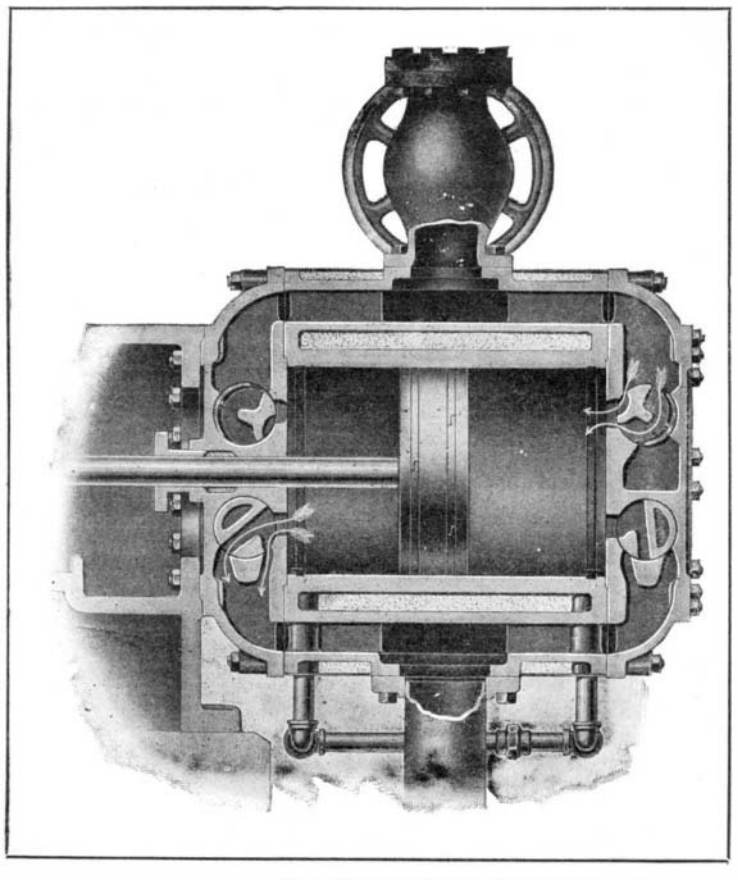
IMPROVED LIGHT-WEIGHT IGNITION STORAGE CELLS.
Voltage, 6. Ampere-hours, 25. Weight, 12 pounds.

A NEW ADJUSTABLE FLOAT-FEED CARBURETER FOR USE WITH GASOLINE OR ALCOHOL.

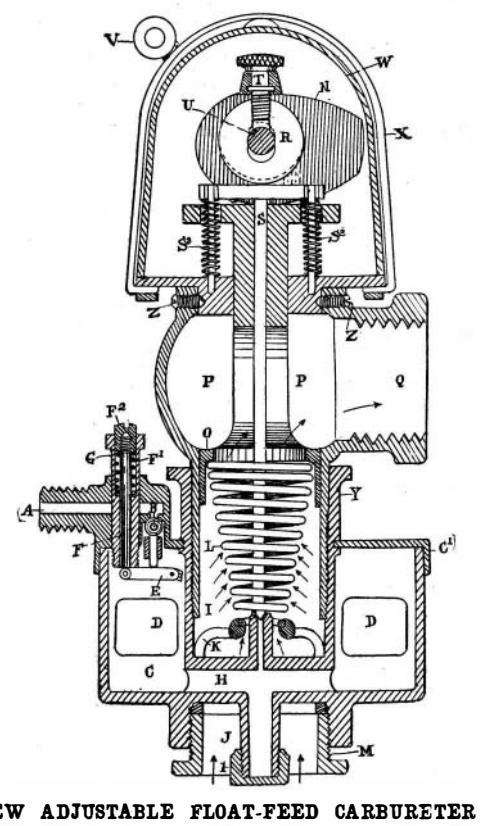
The accompanying cut gives a longitudinal section of a new adjustable carbureter, which has a novel feature in the form of a coil spring, that acts as a throttle in connection with a slightly movable needle valve placed in the spraying nozzle. As can be readily seen, the mixing chamber of the carbureter is located in the center of the float-feed chamber. The main air supply enters through the pipe, *J*, placed below a spider, *K*, that surrounds the spraying nozzle. *J* is threaded in the bottom of the float chamber, so that it can be screwed up and made to raise the spider, *K*, to a greater height, if necessary. Above the throttle spring, *L*, there is placed a slidable piston, which extends upward and ends in a flanged top above the carbureter. This piston is bored out in the center, to allow of the passage of the mixture from the interior of the spring, *L*, through to the chamber, *P*, and connecting pipe, *Q*, which leads to the inlet pipe of the motor. Passing downward through this piston, and terminating in the spraying nozzle, *I*, is a needle valve, *S*, for regulating the quantity of fuel drawn from the spraying nozzle. This valve is supported upon two coiled springs that surround studs, S^2, in the flange on its top. An eccentric, *R*, mounted between two cams, *N*, on a shaft, *U*, above the piston and needle valve, is used to control the movement of the latter. The throw of this eccentric is varied by a thumb screw, *T*, and is very slight. A lever, *V*, on the shaft, *U*, rotates the cams and eccentric, thus depressing both the piston, *O*, and the needle valve, *S*, at the same time, and in a given ratio. As *O* descends it compresses the spring, *L*, closing together the large top coils first and the stiffer bottom coils (which are farther apart) last, if it is fully compressed. The result is that, as the needle valve is closed down, the passage of the air around it is made smaller, thus increasing the suction and causing the ratio of air and fuel to be kept constant. The result is that the engine can be throttled down to a great extent, or speeded up as high as possible with a practically perfect mixture throughout the entire range. There is no possible chance of the carbureter getting out of order from the weakening of the spring, as the action of the latter is not depended upon to control the mixture. The carbureter is, consequently, not automatic in the ordinary sense of the term, but it is far simpler and surer in its action than any of the automatic carbureters that have so far been produced. When once the needle valve and throttle spring have been set to produce the proper mixture, there is no chance of their being disturbed.

The circular cork float, *D*, is suspended by a flexible wire link from the lever, *E*, pivoted on the bottom of the plunger, *F*, which is pressed upward in a tube, *G*, by means of a small spring, F^1. By pressing down on cap, F^2, this plunger, *F*, can be depressed and made to carry with it the lever, *E*. The small plunger above *E*, which holds the ball valve in place, is thus allowed to drop, the valve opens, and the float chamber tends to fill, thus flooding the carbureter at the spraying nozzle. The adjustment of the fuel level within the nozzle is obtained by raising or lowering the plunger, *F*. This raises or lowers the fulcrum of lever, *E*, and changes the point at which the float closes the ball valve. The float chamber, *C*, is screwed on to the pipe which forms the mixing chamber of the carbureter, and its cover, C^1, is locked in place by the jam nut, *Y*. The gasoline connection is made at *A*, and the chamber may be drained by unscrewing the cap 1. *Z Z* are retaining screws for the top of the carbureter, for the purpose of enabling the same to be placed at any desired horizontal angle to the body portion. The cams and eccentric are incased by cover, *W*, which is held in place by the steel spring, *X*.

In a recent demonstration of this carbureter made before our Automobile Editor, the inventor, Mr. B. F. Walker, of Bridgeport, Conn., started the engine cold on wood alcohol. To do this it was necessary to prime the engine with a few squirts of the alcohol, but after it had run a few moments it could be stopped and started without priming. A single-cylinder runabout fitted with a 4¾ by 6-inch engine was found to show considerably more speed when run on wood alcohol in place of gasoline. The combustion was very good, there being but little odor from the exhaust. One of these carbureters is, we understand, being used on an Oldsmobile touring car in the Glidden tour, and it will be interesting to compare the results obtained with it as to fuel consumption with those obtained with the carbureter ordinarily used. The ability to start the engine, when cold, with wood alcohol augurs well for the use of the carbureter in connection with grain alcohol when the new law allowing the use of the latter goes into effect. The demonstration also shows that this design of carbureter is very effective in producing an intimate mixture.



SECTIONAL VIEW OF FOUR-VALVE ENGINE CYLINDER.



A NEW ADJUSTABLE FLOAT-FEED CARBURETER FOR USE WITH GASOLINE OR ALCOHOL.