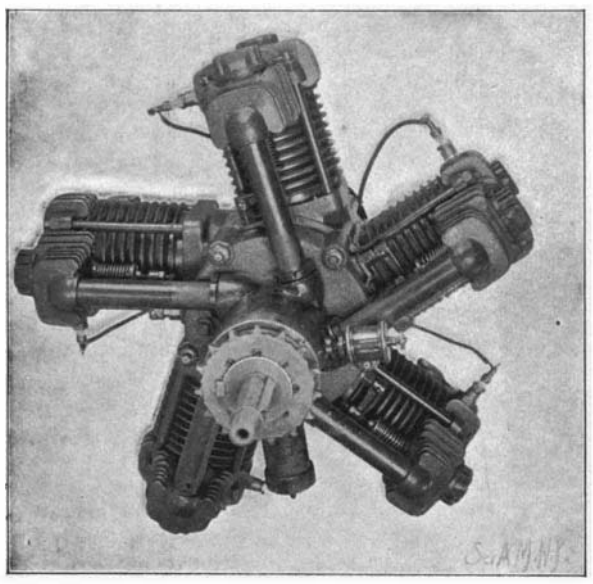
Gasoline Automobiles

A NOVEL AIR-COOLED GASOLINE MOTOR.

There has recently been placed on exhibition in the shop of the Balzer Motor Company, of this city, an air-cooled gasoline motor of altogether new and original design which seems pretty certain of solving the problem of the light air-cooled motor for automobiles. It is about as close to a constant thrust rotary motor as any designer has come, yet it has only the simple parts of three or five ordinary high-speed motors.

The five-cylinder motor is shown in the two illustrations. One with three cylinders has been in use



THE BALZER REVOLVING CYLINDER AIR-COOLED GASOLINE MOTOR.

for a year on a carriage, and has been found to give good results and little or no trouble. The motor shown herewith weighs 300 pounds and develops 10 horse power at a speed of 500 revolutions per minute.

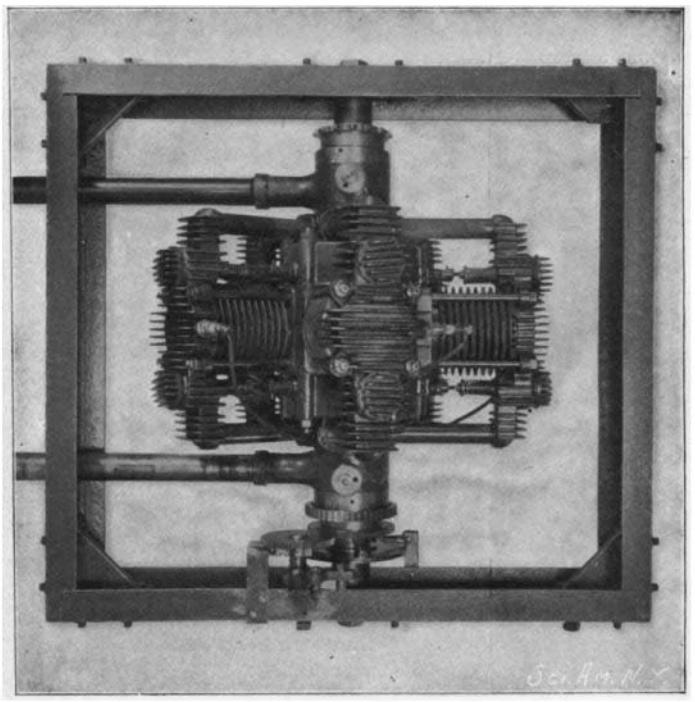
The Balzer motor differs from all others in having a stationary crank shaft and cylinders which rotate around it. The cylinders, instead of being perpendicular to the crank shaft, are set at a slight angle to it, as it has been found in practice that this arrangement gives better results. The cylinders are set in the center casting and fastened to it by four long bolts which also pass through lugs in the heads and hold them tight on the cylinders. This is a well-known method of assembling an air-cooled motor, and offers many advantages in the way of quickly taking the engine apart. Since the cylinders rotate in the Balzer motor, it is not necessary to get under the carriage to examine them, as any one may be brought around to the point where it is most easily inspected. Furthermore, the rotating cylinders act as a flywheel and thus do away with all the dead weight that forms so much of the total weight of the ordinary gasoline engine. Besides the momentum of the cylinders being thus made use of, the pistons are arranged to balance each other as much as possible, so that when one is on the working stroke the one opposite is compressing. This gives a practically perfect balanced motor, and one of great flexibility, giving a strong torque at widely varying speeds.

Referring to the plan view of the motor, the two large pipes seen running to it are the inlet and exhaust pipes respectively. They open into chambers in the base, and from these chambers individual inlet and exhaust pipes lead to the head of each separate cylinder. The charge is thus taken in on one side of the head and passes out on the other, and as both inlet and exhaust valves are mechanically operated, there can be no sticking of the inlet valves. Consequently, each cylinder is certain of receiving a full charge every time. The sparking plugs are now placed in the inlet chamber, just over the inlet valve, although in the illustrations they are shown in the center of the cylinder head. The position they are now in keeps them out of the path of any oil that works past the piston, as the inrushing charge of gas tends to keep the inlet chamber free from it, and, further, centrifugal force throws it into the highest part of the head. The oil is fed to the motor through the hollow crank shaft and drips upon the stationary crank. It is then thrown out into the various cylinders, and how thoroughly it lubricates them, as well as how efficient the cooling of the cylinder is, can be seen from the fact that when one of the cylinder heads was removed after the motor had been run half an hour in the presence of the SCIENTIFIC AMERICAN representative, about half a tablespoonful of oil was found on top of the piston in its natural state, and not all burned as it undoubtedly would have been in a stationary air, or, for that matter, water-cooled engine. An examination of the spark plug of the same cylinder showed it apparently clean and free from oil, thus demonstrating the action of centrifugal force and the inrushing gas in keeping the oil out of the firing chamber.

One of the most interesting features in connection with this motor is the method of producing the jump spark in the five cylinder heads. The arrangement is quite simple and, though daring in the extreme from an electrical standpoint, seems to work admirably. To start with, but one spark coil is used. This is a rather large-sized one of the Dow brand, fed by six cells of dry battery, and when one understands that it has to produce nearly 1,500 sparks a minute in order to fire the five cylinders (which explode alternately, giving five explosions every two revolutions) one sees that it must be a strongly built, well-insulated coil. The coil, however, is not the chief thing of interest in the sparking arrangements, but the method of switching the secondary current produced by it to the different cylinders. This is accomplished by a large fiber disk, into the surface of which are set five properly spaced brass plates. Each plate is connected, by rubber-covered flexible wire running along and through the motor casting, to a sparking plug. The disk and wires can be seen in the plan view of the motor. The make and break of the primary circuit is accomplished by a double cam acting on a spring with platinum points in the usual manner. The novel part of the arrangement is the switching of the secondary current. This has been tried by some foreign manufacturers, but the general practice is to have a separate coil for each cylinder and ground one end of the primary and secondary wires of each coil by a common wire to the engine. This method will be found described in the description of the new Panhard machines in the current number of the SUPPLEMENT.

As already stated, the motor can be readily dismounted and all the parts reached quickly. When the cylinder and head are removed the piston then exposed to view will be found of interesting construction. It has two wide heavy rings, over each of which are slipped four smaller rings. The latter are mismatched and pinned to the large rings, so the joints can never get in line. The connecting rods are fastened to the pistons by universal ball and socket joints, which leaves the pistons free to turn in the cylinders and thus wear evenly all around. The cams that operate the valves are geared so as to always travel ahead of the cylinder in order to open the valves at the proper time.

The Balzer motor has passed the experimental stage and will be found entirely practical. The company have built many different small, light-weight motors on this principle during the last five years, some of which show great ingenuity. In one, for instance, a mechanical igniter of the wipe spark type was included with the positively operated valves. It will thus be seen that the motor, although constructed on a novel principle, is not a recent invention, but is, in its present state, the perfected form of an invention itself half a decade old. It should, therefore, soon find its way into light, high-powered automobiles in place of fan-cooled and water-cooled motors, with their various complications.



THE BALZER REVOLVING AIR-COOLED MOTOR—PLAN VIEW.

THE KNOX TWO AND FOUR-PASSENGER CARRIAGE.

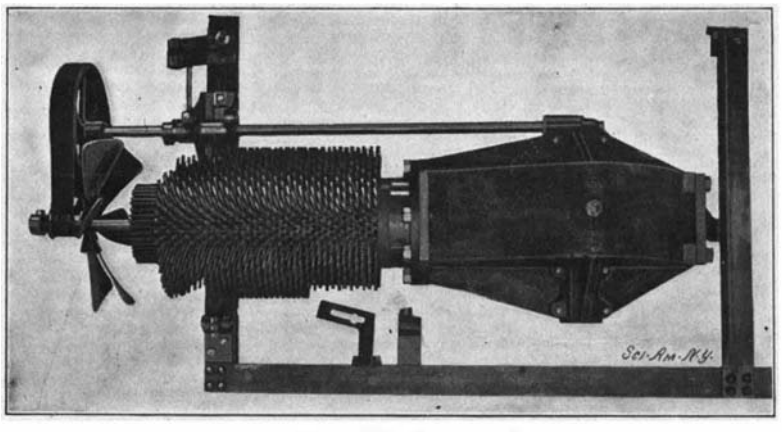
The illustration shows the combination two and four-passenger carriage of the Knox Automobile Company, of Springfield, Mass. It is their latest and most popular production, and was designed to supply the demand for a strong, powerful, simple, and neat-appearing single-seated vehicle which can be easily fixed to carry four persons by simply opening up the front seat. It also makes a very desirable touring car on account of its long wheel base, large carrying spaces, and its extremely easy riding due to its special spring construction. This vehicle has many desirable features, used exclusively by the company, and on which strong patents have been obtained.

One of the best features is the cooling of the engine by grooved pins and forced air system, which the company guarantees to give perfect results under all conditions, and which makes the Knox one of the few practical motor vehicles of its weight and power in the world that operate without water and get rid of the many nuisances connected with its use.

The long side springs with swiveled ends give the most flexible and easiest-riding vehicle possible over all conditions of roads, and as all the mechanism is mounted on these springs the wear and strain on it is very slight. The carriage is driven by a single horizontal cylinder, 8 horse power medium-speed gasoline engine, located in the front part of the body and so arranged that it may be got at from all sides for inspection. The valves open directly into the head of the cylinder. The compression is high, and in connection with the variable sparking arrangement the greatest power is obtained that is possible with this size cylinder, which is 5 inches diameter by 7 inches stroke. The company guarantees that it will run the vehicle at a speed of thirty miles an hour, climb a 12 per cent grade at twelve miles an hour, and a 30 per cent grade on the low speed.

Another feature is an emergency hand brake, operating on the rear axle and entirely independent of the two foot brakes. This brake will stop and hold the vehicle in either direction on the steepest hill. It is self-locking and is a great safeguard against accidents. There are large carrying spaces in both the front and rear of the body. Ten gallons of gasoline are carried, which is sufficient to run the vehicle two hundred miles. The vehicle can be backed by pressing a pedal with the foot, and the two forward speeds are obtained by moving the hand operating lever to the right or left.

The engine and mechanism is mounted on



THE KNOX FAN-COOLED MOTOR.

THE KNOX COMBINATION SURREY.