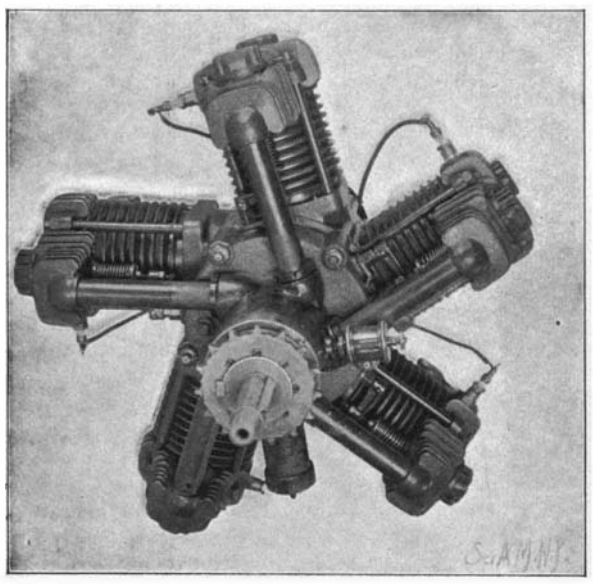
Gasoline Automobiles

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.

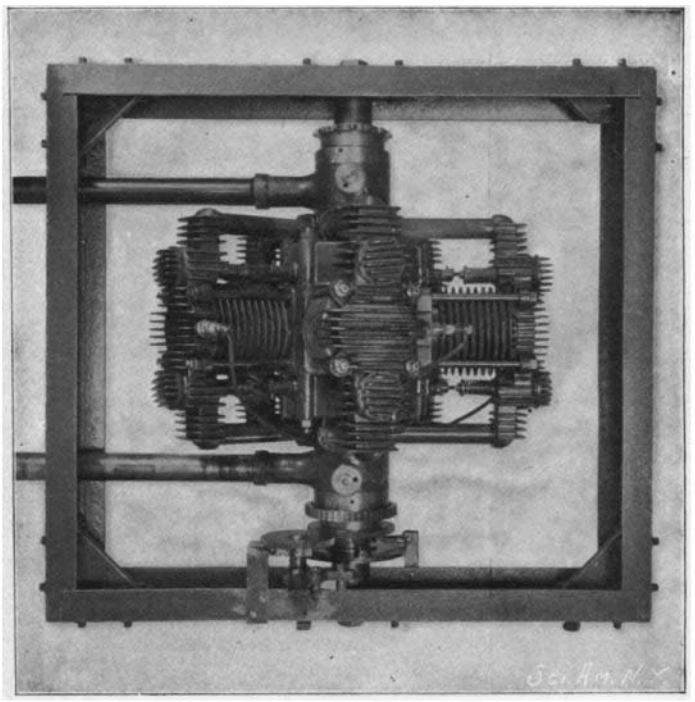
The Balzer motor differs from all others in having a stationary crank shaft and cylinders which rotate around it. The cylinders, instead of being perpendicular to the crank shaft, are set at a slight angle to it, as it has been found in practice that this arrangement gives better results. The cylinders 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.

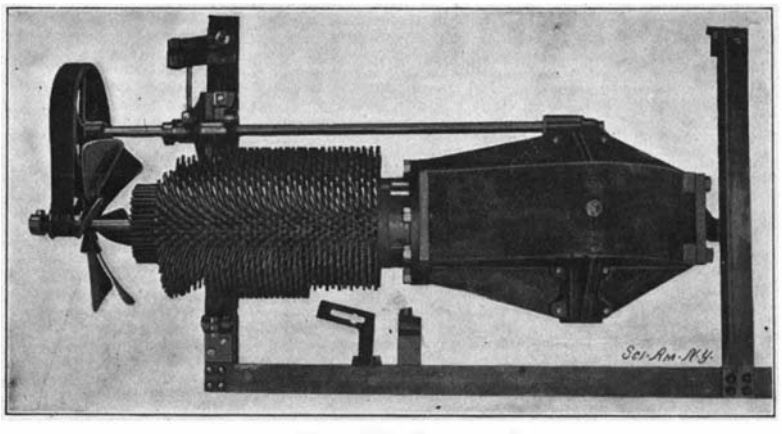


THE BALZER REVOLVING AIR-COOLED MOTOR—PLAN VIEW.

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 KNOX FAN-COOLED MOTOR.

THE KNOX COMBINATION SURREY.

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

an angle steel frame, to which the body is also bolted, and from which it can be removed by taking out four bolts.

One of the vehicles was recently run from New York to Springfield without any difficulty at an average speed of fifteen miles an hour. The roads were very muddy, and two-thirds of the trip was made in a cold and driving rainstorm.

The wheel base is 5 feet 9 inches long, tread 54 inches, tires 30 by 3 inches on all four wheels; the rear axle is solid from hub to hub and made of nickel steel; the differential gear is in one of the rear hubs; heavy roller chain drive is employed; the mud guards are of leather, 10 inches broad; large ½-inch double ball-bearings are used on both front and rear axle; and the motor is equipped with variable jump spark ignition, employing eight cells of dry battery, four in use and four in reserve.

A little device has also been attached whereby the engine may be positively started by a quarter turn of the starting handle. The main seat is very broad and has a high, comfortable back with springs in both the cushion and back. The company is getting many orders for this new model, especially from men who have had a great deal of experience with all kinds of motor vehicles, and have placed their orders only after giving the machine many practical and difficult tests. The carriages are equipped with all the extras usually furnished, including mud guards, lamps, roller boot and odometer.

THE EMPEROR'S YACHT "METEOR III."

Among the many debts that Germany will owe to the present Emperor is that of his having practically introduced yachting, and established it as one of the national German sports. His present, most active interest in yachting may be said to date from the time of his purchase of the English cutter-yacht "Thistle" from the Glasgow syndicate which built her and sailed her unsuccessfully off Sandy Hook for the America Cup. The original "Meteor" was opposed by the Burgess sloop "Volunteer," and made about as poor a contest for the cup as any yacht that ever came over for it. Although not suited for championship honors, she was a beautifully constructed and stanch craft, and was sailed by the Emperor for many years in the earlier days of his yachting enthusiasm. His next yacht "Meteor II." was a composite steel and wood racing craft, which combined in herself the best features of "Britannia" and "Valkyrie III." She was very successful in her races and was an easy winner from everything she met on the other side of the water.

"Meteor III.," which was designed by Cary Smith & Barbey, of New York, is an improved and enlarged "Yampa"—the latter, a very successful schooner that was designed by Mr. Smith and spent a great deal of her time in European waters. The "Yampa" eventually passed into the hands of the German Emperor, and under the name of "Iduna" has figured largely in the foreign regattas. The Emperor was so well pleased with the "Iduna" that last fall he placed an order with these architects for the construction of a larger and faster yacht, which should embody the best features of the "Yampa," and have incorporated in her the valuable experience which they had gathered from the construction and performance of their later racing schooners "Amorita," "Elmina" and "Muriel."

The dimensions of "Meteor III." are as follows: Length over all, 161 feet; length on water-line, 120 feet; beam, 27 feet; draft, 15 feet; the least freeboard is 4 feet 6 inches; the taffrail is 6 feet 6 inches from the water-line, and the eagle at the figurehead is 11 feet from the water. The model differs not a little from the type for large, fast yachts which has been prevalent of late years. Thus, there is a slight hollow in the load water-line at the bow, and while the modeling of the hull shows the customary S section, the vessel is much fuller below the water-line and shows less of the flat floor than we have been used to in the later yachts, and compared with them she is a much more wholesome model. The line from the fore-foot to the stern-post is similar to those which characterize Mr. Cary Smith's designs, and the whole model is marked by the individuality which is seen in "Amorita" and the other racing schooners which have been so familiar in the races and annual cruises of the New York Yacht Club.

The frames and plating of the yacht are of steel; the former consisting of steel angles 2 by 3 inches; the keel is formed of a trough of steel, into which the lead ballast is run. In this respect she differs from the Herreshoff boats in which a lead bulb is cast separately and secured to the hull by bolting.

The accommodations of the yacht are, as would be expected from her great size, extremely commodious. Aft on the deck is a steel house from which a companion leads to a vestibule below, from which access is had aft to a ladies' cabin which extends the full width of the ship. From the vestibule a passageway leads forward, on the port side of which are staterooms for the use of the Emperor's staff, while on the starboard side of the passageway are the Emperor's private apartments; among these is a stateroom 13 feet square with a large bathroom adjoining. The main saloon, which is at the forward end of the passageway, is a splendid apartment 18 feet in length and extending the full 27 feet width of the yacht. It contains a piano, lounges, fireplace and a table which augurs well for the imperial hospitality, inasmuch as it will seat twenty-four persons. Just forward of the saloon is a kitchen 15 feet in length by 18 feet in width. On the port side of the kitchen are staterooms for the cooks and stewards. Forward of the kitchen is the crew's galley, a stateroom for the captain and one for the mate and boatswain. Then follows a steel bulkhead, beyond which is the forecastle for the crew, which contains twenty-four bunks.

In designing the sail plan the yacht has been given sufficient canvas to insure her combining the requirements of a comfortable cruiser with those of a fast racing yacht, her total sail plan being a little under 12,000 square feet, which is not so much as that carried by the "Columbia" by 1,000 feet, and is about 2,000 feet less than that carried by "Shamrock II."—but they, of course, were out-and-out racing craft. The mainmast, which is 21 inches in diameter, measures from deck to cap 89 feet. The main topmast is 60 feet over all; 17 feet of which are in the doublings, making the total height from deck to truck 132 feet. The main boom is 82 feet over all. The foremast, which is 20 inches in diameter, measures 84 feet from deck to cap. The foretopmast is 55 feet over all, with 16 feet in the doublings, the total height from deck to truck being 123 feet. The fore-boom is 36 feet in length. The base line measured from the end of the main boom to a point half-way between the jib stay and the jib topsail stay is 192 feet. The bowsprit reaches 24 feet outboard. The main-gaff is 48 feet long, and the fore-gaff 36 feet long. The club topsail spars are 52 feet and 41 feet long. When the club topsail is set the head of the sail may be 150 feet above the water. The career of "Meteor III." will be watched with great interest, and there is no doubt that in the hands of such an ardent yachtsman as the Emperor she will be a constant competitor throughout the yachting season in European waters.

In point of size "Meteor III." should be compared with "Gleniffer," which previous to the launching of the Kaiser's yacht was the largest fore-and-aft schooner in the world. As it is "Meteor III." is slightly the larger vessel. "Gleniffer" is 157 feet over all, 26 feet 7 inches beam, and 18 feet 3 inches in depth. "Meteor III." is, therefore, 4 feet longer, 5 inches broader and 1 foot 3 inches deeper.

In placing the order for his last and finest yacht with an American firm the Kaiser paid a distinct tribute to the skill of our designers and builders in the construction of large cruising and racing schooners. The American schooner is as historically famous as the English cutter, and in proof of this one has only to call to mind such names as "America," "Sappho," "Henrietta," "Dauntless," and the more modern "Yampa," "Amorita" and "Colonia."

The Kaiser has tactfully requested the President's daughter to christen his new craft, and the occasion is to be rendered doubly famous by the presence of Prince Henry. The double-page supplement showing the great schooner as she will appear under full sail will have a timely interest for our readers.

GASOLINE AUTOMOBILES—1902 MODELS.

The Haynes-Apperson Two-Passenger Runabout.

The two-passenger runabout, 1902 model, shown by the Haynes-Apperson Company at the Chicago Exposition will embody the latest improvements incorporated in their machines. These include direct gearing, water circulation by means of a radiator and pump, a new design of steel wheel rims of greater strength than used in earlier machines, and improvements in the carbureter, clutch and a new pump feed lubricator. The motor is a double-cylinder engine with cylinders arranged horizontally on opposite sides of the shaft—an arrangement that gets rid of troublesome vibration. The sparking device is of the make and break positive contact type, which the company claim is not affected by wet weather and muddy roads. The particular model shown weighs 1,250 pounds; the motor is of 6 horse power, wheels are 32 inches in diameter, and the carriage is handsomely finished with leather upholstery. The machine has three speeds forward and one reversed, all controlled by a single lever. The Haynes-Apperson people entered two machines in the New York and Buffalo endurance contest, and they finished second and third out of a field of 89 that started. All of the Haynes-Apperson carriages are fitted with wood wheels, which the company claim to have found equal to the most exacting requirements of the road. A feature on which much emphasis is laid is the fact that they are larger in diameter than those customarily in use, and that consequently there is considerably less jar in traveling over rough roads than there would be with smaller wheels.

The Gasmobile Stanhope.

The Gasmobile embodies all the features of the best French machines, and the motor and machinery are so situated that they can easily be inspected.

The 25 h. p. four-cylinder engine of the Gasmobile stanhope, vertically disposed within the framework of the car, produces, when in motion, but a slightly perceptible vibration. The system of lubrication is most thoroughly carried out. Besides a small quantity of oil in the crank-case, automatic oiling devices are also provided. The water circulation is established by a rotary force pump. Both the inlet and exhaust valves are thoroughly water-jacketed. The Gasmobile vaporizer is highly efficient, simple in construction and never-failing. Its throttling feature, together with the quickly adjustable timing of the sparking device, make it possible to vary the speed of the motor over a range more than ample to secure the greatest variation in speeds desirable. Gasmobile engines are readily started notwithstanding their high compression. They are not, strictly speaking, high-speed motors. They are of slightly greater weight and larger proportions than other so-called high-speed motors, and therefore while quite as powerful as the latter, are more durable, since they do not run so fast.

The expanding friction clutch, which transmits the power from the motor to the driving-gear, ranks high among devices employed for this purpose. It is positive and substantial and will take hold of the clutch casing attached to the flywheel gradually, thus causing the car to start smoothly and without jerks.

At the right of the chauffeur three levers, forged from tough steel and operating on a double notched sector, serve for starting, stopping and reversing, and changing from the first to the fourth speed, as well as for operating the main brake.

The Gasmobile stanhope has a 71-inch wheel base and the regular standard tread of 56½ inches. All four wheels are 32 inches in diameter, and fitted with clincher tires. Three forward speeds and one reverse are furnished, and the 12 horse power motor will drive the machine as high as 30 miles an hour.

The Fischer Gasoline-Electric Omnibus.

The Fischer Motor Vehicle Company have for the past five years been perfecting a combination system, which possesses all the good qualities of the electric and gasoline combined, while the disadvantages inherent in each alone are practically eliminated by the combination.

The system consists of a combined gasoline engine and dynamo, one motor for each (rear) drive wheel, and small storage battery and controller. It will be noticed that there is no mechanical connection between the engine shaft and vehicle drive wheels, therefore the dynamo is free to run at a practically even speed, producing a constant supply of electricity. The electric circuit is so arranged that when running the vehicle under normal conditions (loaded on the level) the current goes directly from the dynamo (through the controller) to the motors; but when coasting down grade, slowing up or in general when less power is needed than that furnished by the engine, the current is automatically taken up by the battery, which is connected to the wiring at a point between the dynamo and controller. Again, when extra power is needed, as in ascending steep grades or starting heavy loads, the battery promptly furnishes the deficiency. This action—the carrying the peak of the load—does not have to be watched by the operator, being entirely automatic. As the output of the engine does not vary, no governor is required, and the gas and air mixtures can be set permanently for perfect combustion. This insures great saving in fuel and prevents the usual bad odor. As the speed of the engine is almost constant, the balance is nearly perfect, thus preventing vibrations. Another very important and convenient feature is the starting of the engine, which is accomplished by simply throwing in a switch controlled by the driver.

Fig. 1 shows an 18-passenger omnibus recently completed. Fig. 2 is a photograph of one of the standard running gears, which consists of an angle steel underframe to which various parts of the machine are attached. The front portion carries the gasoline engine, dynamo, controller, and steering gear. The front axle, instead of being made of the usual heavy forging, is trussed somewhat on the principle of a bridge, and carries extra long and flexible platform springs, bolted to the brackets on the frame. The rear axle with the wheels, springs, two motors and reduction gears forms a complete driving unit. All parts subject to wear are entirely incased so as to be properly lubricated and at the same time protected against dust and moisture. No reach is used, the half-elliptic springs conveying the power from the rear axle to the frame. The water cooler is suspended under the frame between the front and rear axle. The illustration, Fig. 2, shows the running gear complete in every respect, and Fig. 3 the body in place, making a finished bus.

The power equipment consists of a 10 horse power,