A NOVEL AERIAL TOY YACHT.

The utilization of the wind in propelling wheeled vehicles equipped with suitable sails, on level roads or hard sand beaches, is well known. In the illustrations herewith we have the same application of wind force in an ingenious and simpler way, which will prove very attractive to young people as well as older yachtsmen, in that it provides a source of amusement of a scientific character.

The principal points of novelty are that the yacht, after traversing the length of wire, automatically comes about and sails in the opposite direction, which is repeated and may be kept up indefinitely as long as the breeze blows.

The yacht body is suspended from a wire frame shaped like an inverted triangle, at the two upper corners of which are two grooved housed wheels which travel on the track wire. The upper cross wire of this frame loops around the mast and steadies it in a vertical position. The frame terminates at the bottom in a swivel plate, through the center of which the metal mast tube projects, the lower end being swaged to permit the yacht body to freely rotate on it.

Passing through an angle plate riveted to the deck and attached to the swivel plate by a projecting pin, is a push rod surrounded by a coiled spring. The pressure of this spring between the angle plate on the deck and the shoulder of the rod holds the yacht to its course until it has reached the end of the track wire.

By means of a nut on the outer end of this rod the angle or position of the yacht body may be varied relatively with line of the wire, thereby adjusting the yacht for heavy or light winds, or according to their direction.

The yacht is made to go about by two long steel feelers, one end of which is attached to the outer end of the bowsprit. These are of piano wire heavily plated to prevent rusting. The free ends of these feelers are formed into hooks which are snapped onto the track wire. One feeler is pushed ahead of the yacht and the other trails aft on the wire.

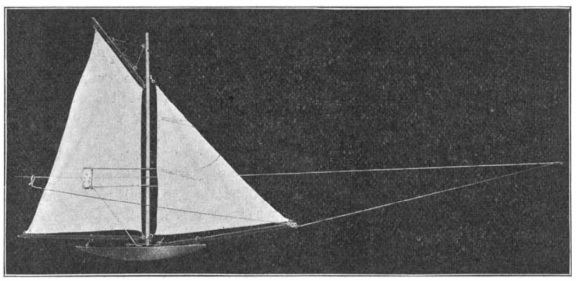
The operation of these feelers is shown in the lower illustration. The feeler which was ahead of the yacht has reached the buffer spring clamped on the wire at the end of the run. The momentum of the yacht body in striking this spring through the feeler causes the bowsprit to turn around, thus turning the yacht onto the other tack, and causing it to run to the opposite end of the course. In the illustration showing the yacht turning, the full form of the supporting frame will be observed, as it passes between the sails.

In the upper illustration, the wire feeler which traveled ahead of the yacht body before turning is now seen to follow or trail after it.

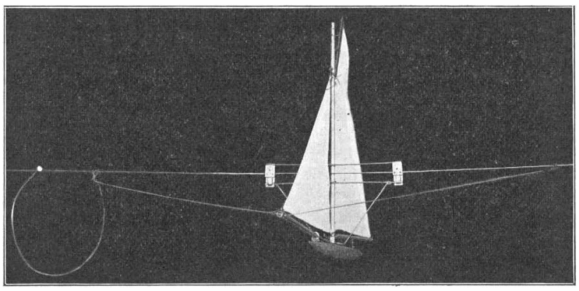
The yacht sails best on a beam wind, and by the adjustments previously spoken of can be accommodated to meet almost any wind, strong or weak.

Mr. George Breed, a mechanical engineer of Philadelphia, Pa., is the inventor. Being unable to find a suitable name for this novel flying yacht, he has offered a prize for the best name that is sent in. Particulars of the competition will be found in our advertising pages.

The most interesting sport to be had with this boat is in racing two of the yachts. For this purpose two wires are stretched parallel in a favorable place, and the contestants "toss up" for choice of position, which is the windward wire. The race is arranged to be to the end of the course and return, either once or as many times as may be agreed upon. Another method is to see which yacht will make the most trips in a given time. Each contestant holds his yacht until the word is given, then simply lets go without in any way helping the yacht to start off.



A NOVEL AERIAL YACHT.



AERIAL YACHT COMING ABOUT.

It is found that the race is not always won by the yacht on the windward wire. Much depends on the seamanship of the contestants and the ability to adjust the yachts to the varying wind. The successful racer is the one who has carefully studied the behavior of his yacht in all conditions of wind.

It is usual to have a stretch of fifty feet of wire between two posts on buildings for a sailing course, but it can be longer if more wire is provided.

THE KREBS AUTOMATIC CARBURETER FOR GASOLINE ENGINES.

Commandant Krebs has quite recently invented a carbureter for gasoline engines, which has some new and extremely valuable features. One of the great disadvantages of all carbureters used hitherto was that there appeared to be no satisfactory method of securing a uniform composition of the explosive mixture of gas and air at all speeds. The regulation of the composition of this mixture either had to be effected entirely by hand, or else it was accomplished by more or less automatic devices that were far from satisfactory. The new carbureter, however, performs this function perfectly, since it is based on the following new principle: When the motor is running at its minimum speed, the air is drawn in through an aperture of fixed dimensions, while another series of apertures of variable size is closed. As the speed is increased, and, consequently, as the flow of gasoline tends to become greater, more air is required, and this additional supply is admitted through the variable apertures, which now open more and more in proportion to the quantity of fluid that is used. The special features of the new device are two:

1st. The shape of the apertures for the additional air supply, which has been determined by calculations based on the results of a series of experiments.

2nd. The principle by which the variable apertures open in proportion to the flow of gasoline.

Regarding the first point, without entering into details, it may be stated that the form of aperture chosen is Y-shaped; it can be seen in Fig. 1, where these variale apertures are denoted by *M*. For low speeds, the top of the Y only is open, while for higher speeds the lower part also is gradually uncovered.

The second point will be best explained after reference to our illustrations. The gasoline enters the carbureter through the pipe *Z* (Figs. 1 and 2). It passes through a filter *I*, which can be detached by unscrewing the nut *N*, as shown in Fig. 2, into the float-feed chamber *B*, the float of which maintains a constant level in the spraying nozzle *D*. So far there is nothing new. When the engine is first started, it draws in a charge of air through the invariable aperture *A*, and this causes to issue from the nozzle *D* a spray of gasoline, the volume of which corresponds to the depression obtained by a speed of 200 revolutions per minute.

For speeds greater than this, the requisite quantity of additional air enters by the apertures *M*, and mixes with the gas. The proper adjustment of the apertures *M* is controlled entirely by the depression produced in the carbureter by the suction of the motor piston. In order to effect this, the carbureter has two hollow, cylindrical, sliding pistons, which serve to close or open certain ports in front of which they reciprocate. The first of these *G* (Fig. 1), or *F* (Fig. 2), is connected by means of rod *H* with the governor, by which it is operated in the ordinary way characteristic of the Panhard motors. The first piston is, in fact, simply a throttle valve controlled by the ball governor, and at will, also, by the operator. The second piston, which serves to uncover the right proportion of the variable apertures, is dependent solely on the depression in the suction pipe. In general, the motion of the second piston closely follows that of the first, since the first, by feeding more or less gas to the motor, regulates its speed, and therefore its suction, the strength of which determines the depression in the carbureter.

The second piston *K*, hollow like the first, moves vertically. Its rod bears at the top a rubber diaphragm *Q* (Fig. 3), fastened around its outer edge to the case *O*, which it works. The chamber formed in the case *O*, above the diaphragm *Q*, has only one opening to the air—a small central hole 2 mm. (0.078 inch) in diameter, so that when the disk *Q* is drawn down by the suction of the motor and recedes from the top of the box *P*, the air enters comparatively slowly into the chamber *PQ*, which readily expands by the distending of the rubber diaphragm. Similarly, when the disk rises under normal pressure, and the action of the spring *R*, the motion takes place gradually, as the air in *P Q* escapes through the hole in the center of the lid. The large dimensions of the disk are essential in order to render the piston *K* sensitive to small changes in the depression. The small hole in the lid insures an even and gradual action of the valve. Thus the cylinder *K*, moving over the Y-shaped, variable apertures, admits a regulated supply of air in accordance with the degree of vacuum produced by the piston of the motor; and the constant proportion of the constituents of the fuel gas is attained with a perfection never reached before. The result is that a perfect mixture is obtained at all times, and thus the maximum power at a given speed is always to be had from the motor. The obtaining of the 15 parts of air to 1 of gas (by weight) that go to make up a perfect mixture, is no more left to chance or hazard, but is always mathematically and precisely assured.

The new carbureter is fitted to all 1903 Panhard and Levassor automobiles, and was one of the features of the recent Paris and New York automobile shows.—Specially prepared for the Scientific American from an illustrated description in La Locomotion.

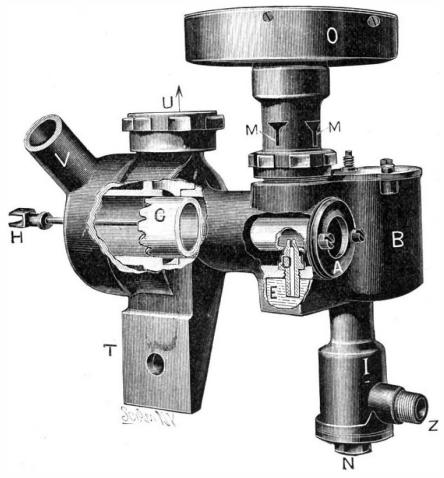


Fig. 1.—GENERAL VIEW OF THE KREBS AUTOMATIC CARBURETER.

A, main air passage; *B*, float-feed chamber; *D*, atomizing nozzle; *E*, gasoline; *G*, throttle valve; *H*, throttle valve stem connected to governor and actuated by movement of governor balls; *I*, filter; *M M*, auxiliary air openings; *N*, cap for removing filter; *O*, box containing auxiliary air valve diaphragm; *T*, lug for attaching carbureter; *U*, connection to suction pipe of motor; *V*, pipe for carrying off water from water jacket; *Z*, gasoline inlet pipe

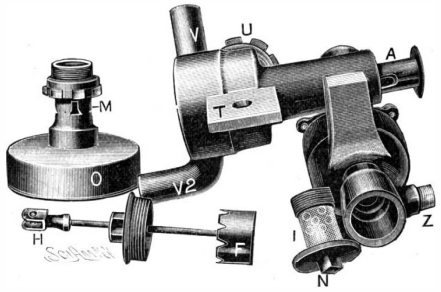


Fig. 2.—PRINCIPAL PARTS OF THE CARBURETER.

O, box containing rubber diaphragm that operates auxiliary air valve; *M*, auxiliary air openings; *F*, throttle valve; *I*, filter; *A*, main air tube withdrawn to show its shape.

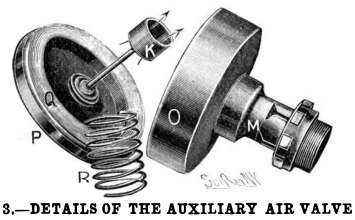


Fig. 3.—DETAILS OF THE AUXILIARY AIR VALVE AND ITS DIAPHRAGM.

P, metal cover of box *O*; *Q*, movable disk fastened to *P* by rubber ring; *K*, air valve that closes openings *M M*; *R*, spring that presses *Q* against *P* when suction of motor ceases, and that causes *K* to close progressively openings *M M*.