

### THE BURSTING OF A WATER TANK AND ITS EFFECT.

Two water tanks, each of one million gallons capacity, recently burst at Parkersburg, W. Va., within twenty seconds to one minute of each other, according to different observers. The tanks were about eleven feet apart, and it is probable that the bursting of the second was caused by the flying parts of the first. Although the two tanks held but two million gallons, nearly half the sidewalks of the town were flooded over an area of one-half mile wide and three-quarters of a mile long, the water between curbs reaching a depth of twelve to fourteen inches.

The tanks were sixty-five feet in diameter and forty feet in height, and were erected twenty-four years ago. The bottoms were made of  $\frac{3}{8}$ -inch plates, laid on a bed of mortar with a course of stone masonry about 2 feet wide around the circumference. The walls of the tanks were composed of ten course plates, each 4 feet wide and varying in thickness from  $\frac{3}{4}$  inch at the bottom of the tank to  $\frac{3}{16}$  inch at the top. An examination made after the accident seems to prove that the walls of both tanks parted in nearly straight lines, perpendicular to their bottoms, and at points beginning a few feet from the base and extending more than half way to the top.

Of the effect of the bursting of the tanks and the rush of water, some idea may be gathered from the accompanying illustrations. A 45-foot iron ladder, which had been fastened to the side of one tank, was wrapped around the trunk of a tree. One of our pictures shows a wrecked house, which was actually occupied at the time of the accident. The collapsed tanks themselves after the accident looked very much like deflated balloons.

#### General Processes and Present Condition of Electrometallurgy.

The advantages presented by the employment of electrical methods of metallurgy have caused the production in recent years of many special metals and alloys by electrical methods and have suggested the application of electricity to the commoner metals. Some of the principal processes now or soon to be in use are the following:

**Antimony.** Borchers electrolyzes a solution of antimony in sodium sulphide, using anodes of lead. Siemens and Halske employ a solution of antimony sulphide in an alkaline sulphide. Gin, Izart and Thomas electrolyze the sulphoantimonite of sodium. Betts extracts antimony from residues of copper, refining by solution in hydrofluoric acid.

**Bismuth.** In Becker's process a solution of bismuth or its compounds in ferric sulphate or ferric chloride

manufactured by Siemens & Halske in Berlin. Girod has made a little ferro-tantalum by reducing tantalite in the electric furnace.

**Carborundum, or Carbide of Silicon.** The factory at Niagara Falls employs ten furnaces of 1,000 horse-power, with an electromotive force between 100 and 260 volts, and produces annually 1,500 tons of carborundum. A few tons are made annually in Savoy and there is a third factory in Bohemia. For the purpose of supplying the European market a large factory is being constructed in Germany, where the Acheson patent has been annulled.

Titanium is produced in the form of ferro-titanium and also in small quantities as carbide, silicide, and boride of titanium, which are extremely hard substances employed as abrasives and in cutting precious stones.

**Sodium.** The total production of electrolytic sodium is 1,200 tons in America and 200 tons in Europe annually. Various processes are employed in numerous factories.

**Calcium.** About 100 tons are annually produced.

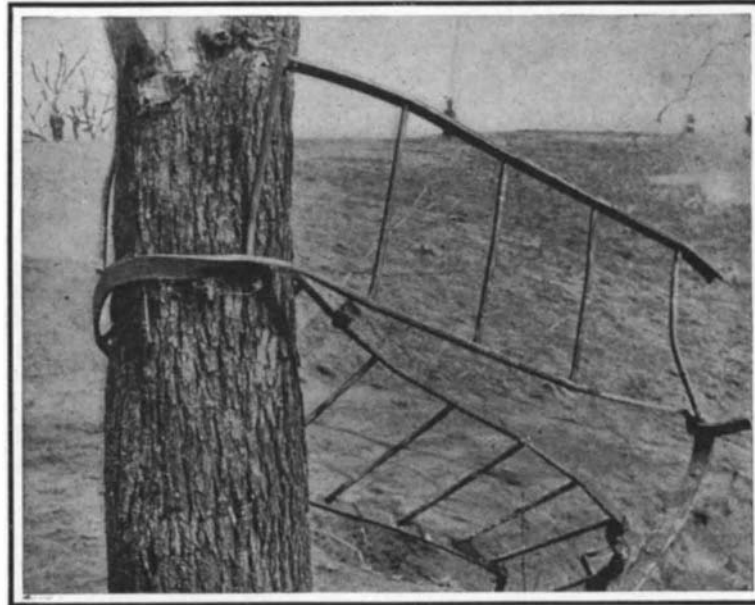
Magnesium is made almost exclusively in one establishment near Bremen. The production does not exceed 300 tons per year.

**Zinc.** Many attempts have been made to produce zinc both in the wet and dry way by electrical methods. The most interesting of the wet processes is that of Houpfner, which produces zinc 99.9 per cent pure and is in operation at Wilmington near Chester.

At present only two factories are using the dry processes, the Canada Zinc Company of Vancouver and a factory in Europe. The

electro-metallurgy of zinc appears destined to have a grand future.

**Aluminium.** Numerous processes have been devised. The price of the metal has been greatly decreased and the market is likely to become glutted if new uses are not found. In France 140,000 horse-power will soon be employed in the manufacture of aluminium, the annual production being 20,000 tons. The Swiss factories have a capacity of 1,000 tons per year, and this will soon be increased to 6,000 tons. Aluminium is also produced in constantly increasing quantities in England, Germany, Austria, Italy, and the United States. The European annual production will soon amount to



Forty-five-foot iron ladder wrapped around tree by the rush of water.

is subjected to electrolysis.

**Vanadium.** In 1893 Moissan obtained by the electric furnace ferro-vanadium containing 4 or 5 per cent carbon. Girod produces ferro-vanadium containing 25 or 50 per cent vanadium and 1 to 3 per cent carbon.

Beckett treats vanadium trioxide with silicon and carbon in the electric furnace. Gin electrolyzes ferrous fluoride dissolved in fused calcium fluoride, employing as an anode a mixture of carbon and vanadium trioxide. The cathode is a bath of iron. Ferro-vanadium is manufactured by Beckett at Niagara Falls and by four European companies.

**Tantalum.** Almost all the tantalum produced is



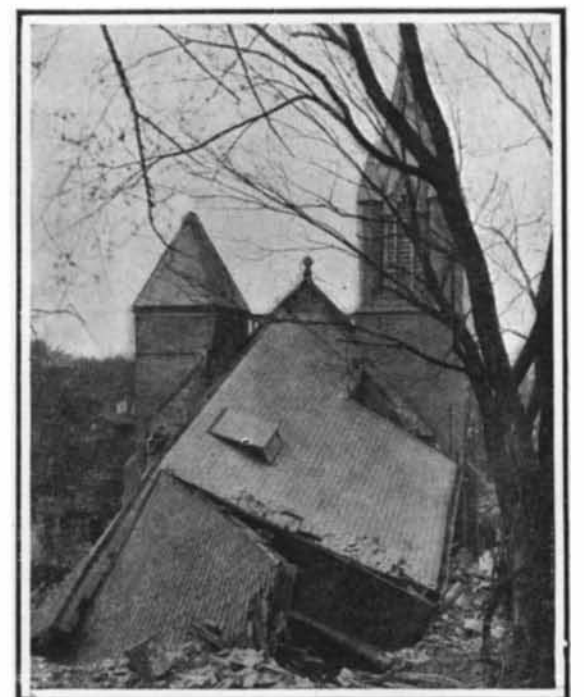
Side of one of the tanks which was found over 100 feet from its foundation.



Remnants of the Lutheran church of Parkersburg after the accident.



These two houses were carried one block away from their foundations. Two of the occupants perished; five escaped.



Lutheran church carried one block. Organ parts were found five blocks away.

30,000 tons, to which America will be able to add 15,000 tons. In 1909 the capital invested in this industry will certainly exceed \$30,000,000. The price of the metal has fallen below 18 cents per pound.

**A NOVEL FRENCH AEROPLANE.**

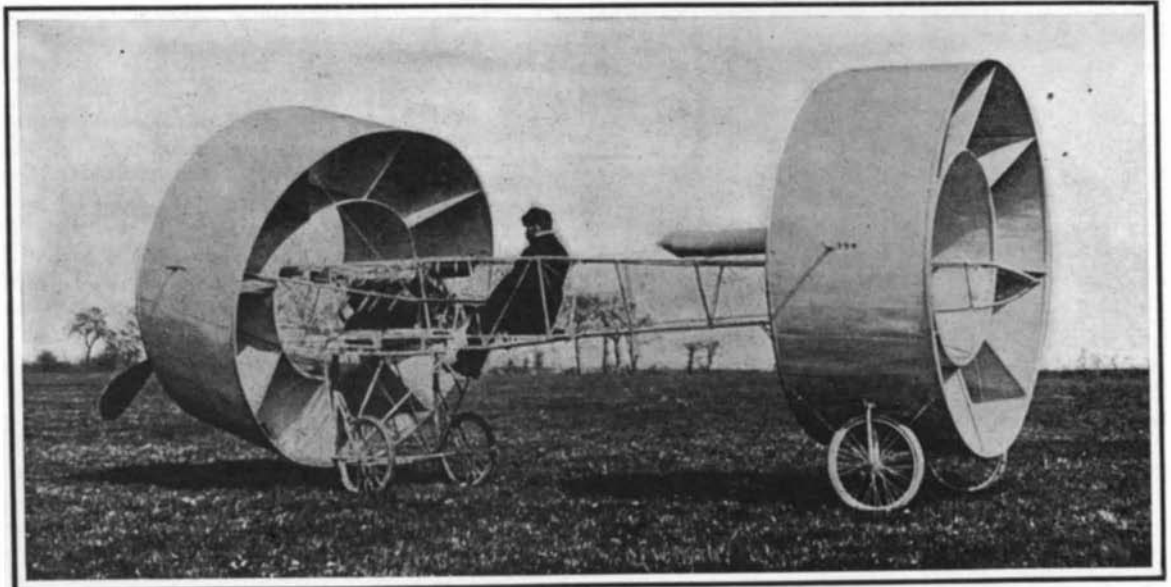
The peculiar aeroplane illustrated on this page is that of M. Givaudan. It has recently been constructed at Vermorel. It is of the multicellular type, and consists of two concentric drums mounted near the ends of a body framework that passes through the center of each, and carries at its forward end a tractor screw. These drums are united by small planes spaced uniformly apart, thus forming a cellular structure. The front cell thus formed is movable in every direction, while the rear one is stationary. The carrying surfaces of this machine are so formed, that the machine will have the same amount of supporting surface whatever its lateral inclination may be, so that when it tips to one side in making a turn, or from any other cause, the weight carried per square foot of surface remains the same; while, on the other hand, the center of gravity being situated below the center of pressure, the machine will return automatically to its normal position and be in equilibrium. The two cells are placed sufficiently far enough apart, so that the front one will not interfere seriously with the one at the rear. There are no rudders, the movement of the front cell both sideways and up and down being used in place of these to direct the machine both laterally and in a vertical plane.

The radiating planes of the drums act as carrying and stabilizing surfaces. Only the projecting surface of these radiating planes is counted upon as useful carrying surface. Within both the front and rear drums there is a horizontal cross shaft supported upon the main frame. The front cell rests on the main frame by a bearing, which makes it possible for this cell to oscillate about a vertical axis, while the horizontal shaft just mentioned can oscillate upon a horizontal axis.

already been given their first trials. At the present time there are completed or under construction upon the society's grounds, a monoplane, four biplanes, and one triplane, as well as a new helicopter.

One of the novel machines now completed, and which has already undergone several tests, is the triplane of

the propellers will draw the air back below the middle plane, and thus tend to check or neutralize the interference of the lower plane. The two propellers, which are driven in opposite directions by chains from the motor, are 8 feet in diameter, with an 11-foot pitch. They are made of wood and have quite narrow blades,



The Givaudan circular aeroplane—a new French machine of novel design.

Morris Bokor. This machine is shown in one of our illustrations. Its three planes have a spread of 26 feet and a width of 6½ feet, making a total surface of 507 square feet. A 14 x 2½ foot horizontal rudder has 70 square feet additional supporting surface, while the tail, consisting of two pairs of surfaces at a sharp dihedral angle, is 14 feet long and has 72 square feet. The total weight of the machine, with water, oil, and gasoline, and with Mr. Bokor on board is 1,181 pounds,

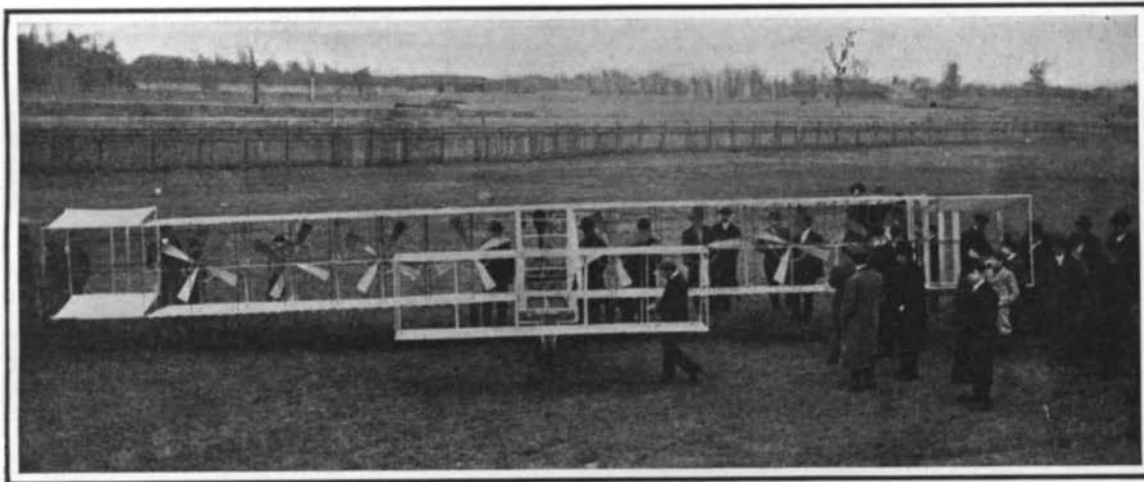
covered partly with cloth. The propellers make one revolution to 3½ of the motor. They gave 248 pounds thrust at 500 R. P. M. with the machine held stationary. The motor used is a four-cylinder, 4 x 4-inch, A and B four-cycle automobile motor. The inventor claims 38 horse-power for it at 1,800 R. P. M., but this figure is probably somewhat high. The motor alone weighs 310 pounds, but with all accessories including a 15-pound magneto, a 30-pound Livingston radiator, 30 pounds of water, and 34 pounds of fuel and fuel tank, the weight is 419 pounds.

The main feature of the Bokor aeroplane is the use of a pendulum seat for the aviator, which is connected by cables to the ends of the lower plane at the rear. The outer rear parts of this plane are supported upon flexible trusses running along it, and which are in turn carried upon hinged rods extending back from the vertical uprights at the ends of the planes.

When the machine tips to one side or the other the aviator's seat remains horizontal and exerts a pull upon the flexible rear edges of the lower plane, thus giving it the proper inclination to cause the machine to right itself again. Another feature of this aeroplane is the tail, consisting of two large tetrahedral-like cells, which should aid in giving the machine stability. Since the photograph reproduced herewith was taken, the inventor has mounted his aeroplane upon skids. In starting, the whole machine is placed upon a four-wheeled chassis, to enable it to run along upon the ground. This chassis is left behind when the machine rises. In all probability, however, a larger engine will have to be installed before the triplane can be made to soar.

The other American aeroplane which we illustrate is that of Mr. Wilbur M. Kimball, the secretary of the Aeronautic Society. Mr. Kimball, it will be remembered, last fall built a helicopter consisting of a large number of small propellers. In constructing his bi-

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Front view of the Kimball biplane.

The notable features of this machine are the multiple propellers and rudders between the planes at the rear of the wing tips.

Inclination of the front cell in a vertical direction varies the angle of incidence, and causes the machine to rise or descend; it thus takes the place of the horizontal rudder. Inclination of the cell in the horizontal direction fulfills the rôle of the vertical rudder. This double movement of the cell is obtained by means of a rod connecting two levers of sufficient length to make the operation of the cell possible without too great fatigue. The levers have a band-brake arrangement to hold the cell in the position in which it is set.

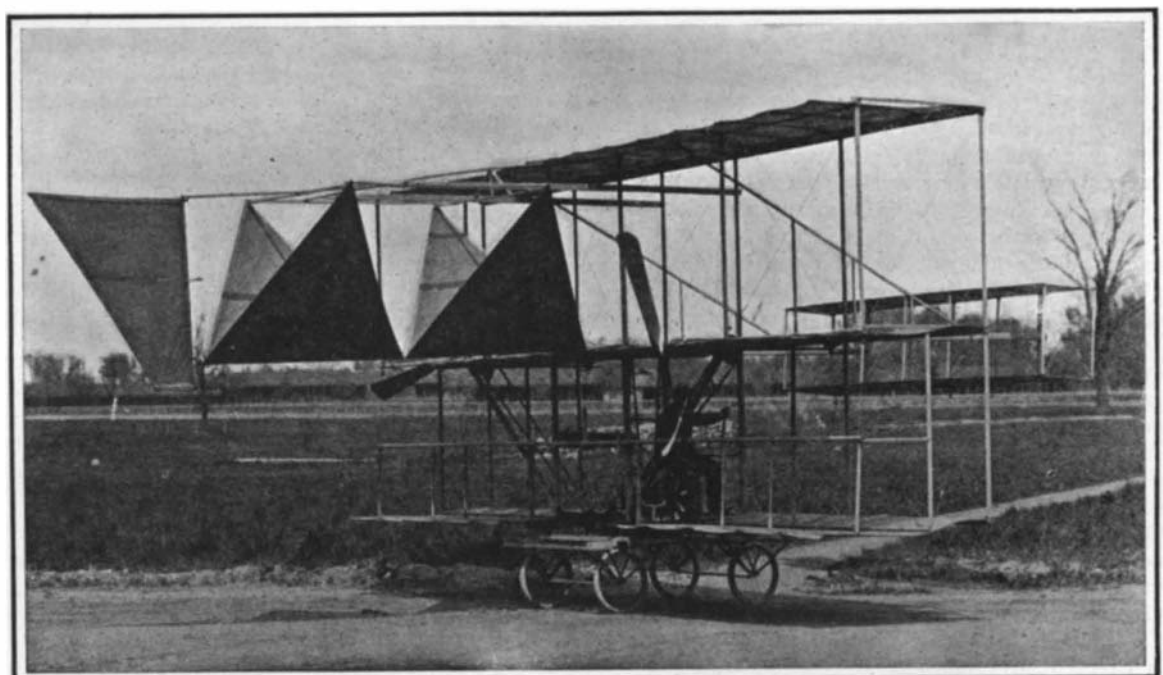
The machine rests on four wheels, the front pair of which can be turned in order to steer the machine. The wheels are fitted with suitable springs to absorb the shock when landing. The propeller is 2.4 meters (7.87 feet) in diameter, and is driven from the motor through reduction gears. The motor is a special eight-cylinder V engine of the air-cooled type. The bore and stroke are 90 and 120 millimeters (3.6 and 4.8 inches) respectively. The motor develops 40 horse-power and weighs 80 kilogrammes (176 pounds) including the fly-wheel, two carbureters, and magneto. All the valves are mechanically operated from a single camshaft. This motor, notwithstanding its light weight and the fact that it is air-cooled, has been run several hours consecutively. M. Givaudan is one of the first men to construct a motor of the V type and place it upon the market.

This new aeroplane is very interesting, but it is doubtful whether a freakish machine of this kind can be made to operate satisfactorily. If any successful trials are made, we shall be glad to apprise our readers of the fact.

**SOME NEW AMERICAN AEROPLANES.**

Recent activity by members of the Aeronautic Society has resulted in the production of several new aeroplanes at Morris Park, one or two of which have

so that the usual ratio of weight to supporting surface—2 pounds to the square foot—is closely adhered to. The upper and lower planes are 6 and 5 feet above and below the middle plane respectively. The inventor's theory as to why less space between the lower and middle planes can be used than is required between the middle and upper one is that the draft of



Three-quarter rear view of the Bokor triplane.

The double V-shaped tail and swinging aviator's seat (which warps the lower plane) are this machine's main features.

**NEW FRENCH AND AMERICAN AEROPLANES.**