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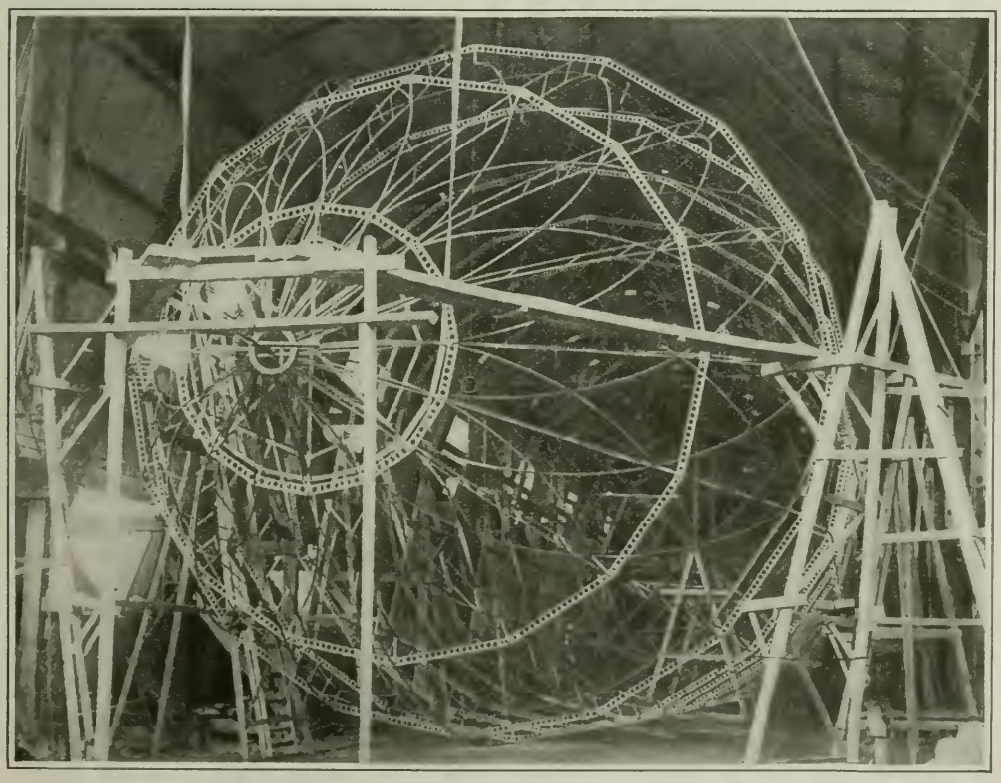
A Pigmy Zeppelin

A PIGMY Zeppelin (pigmy as Zeppelins go) with a basket-work frame of layered wood has been recently built for the British Government by a number of American constructors, including T. Rutherford MacMechen, president of the Aeronautical Society of America, and Walter Kamp, a prominent American aeronautical designer.

One of the chief efforts of the designer has been to reduce the weight of the hull and car without sacrificing strength, and this has been accomplished, he believes, by the substitution of laminated wood for the aluminum which composes the framework of the Zeppelin. The rings which are used to keep the hull in cylindrical form are made of thirty-nine thin layers of mahogany, carefully glued together, and covered by a steel collar. Thirty-two wooden ropes, hardly as thick as a man's thumb, wind again and again around the hull, weaving the whole



A pigmy Zeppelin which is being built for the British Government by a company of American constructors. The framework of this novel airship is made of ropes and laminated wood, so closely woven together as to resemble a huge mesh of wood and wire

into a great mesh of basket-work. Sixteen slender members form the longitudinals, running from bow to stern, and intersecting the spirals of wooden rope where they cross each other. The function of the spirals and longitudinals acting together is to distribute the gas lift and strains evenly to all points of the hull.

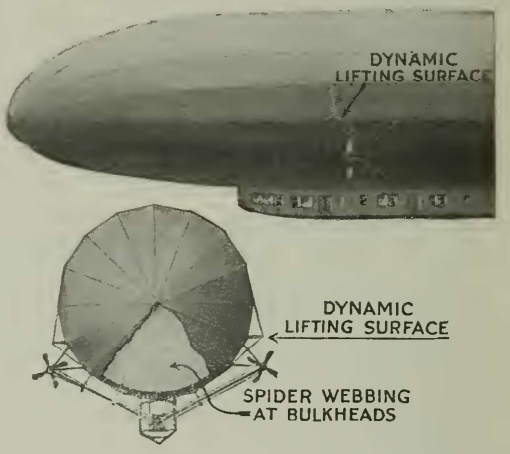
There are, in reality, two hulls, the inner enclosing thirteen balloonets or gas bags and the outer supporting a waterproof and airtight envelope or skin. Twenty-nine ribs, or transverse girders, encircle the inner hull, and a spider web of wire cables stiffens the alternate ribs and forms the bulkheads between the balloonets.

Two eight-cylinder, sixty-horsepower motors have been installed, and by means of cable drives transmit the power to four propellers mounted high above the car, two being placed on each side of the slender torpedo-like hull.

In hot weather, or when the airship passes through a heated stratum of air, the gas expands, exerting more lifting power, and causing the airship to rise. To control this tendency, the gas has to be artificially cooled, or it will be necessary to release some of the valuable hydrogen to allow the ship to retake its proper altitude. On the contrary, if a sudden wave of cold air strikes the gas bag, the gas immediately contracts, and part of its lifting power is lost. If there is no means for heating the gas and expanding it, ballast will have to be dropped from the car, thus compensating the decreased lifting power of the gas by a lighter weight which it has to carry.

The control of the lifting power of the gas in the MacMechen dirigible is in the heating and cooling process. To keep the hydrogen from cooling and losing its lifting power, hot vapor from the engine is blown into the foot-wide space between the balloonets and the outer skin of airtight cloth. To cool and condense the gas for descent, or to prevent its expansion to an extent that causes an undue inflation of the gas bags, cold air is introduced into the same space by means of a luminum disks with revolving shutters at the bow and stern.

It is claimed that by this method of construction a rigid airship has been built which is one-third lighter than it is possible to build a Zeppelin of the same relative size. The hull and car weigh 2,190 pounds, and the gas capacity is 108,000 cubic feet, or about one-tenth that of the latest Zeppelin monster. As hydrogen is usually rated by aeronauts, this quantity will lift about three and one-half tons, or seven thousand pounds. With engine equipment and crew, the airship weighs about 5,300 pounds, leaving a margin of 1,800 pounds for ballast, explosives and additional fuel. The length of the hull is 236 feet over all. The designers claim that their airship



will make about seventy miles an hour, or about ten miles an hour faster than the speed of a Zeppelin.

The Popular Science Monthly believes that this airship will prove disappointing to its builders and to the British Government. Previous experiments with wooden frames in dirigibles have proved costly failures. The Zeppelin's first rival, the Schütte-Lanz dirigible, was built with wooden framework, and proved much heavier than a Zeppelin of the same dimensions. Laminated wood was used in the experiment and this was found faulty and discarded. The Zeppelin of to-day is the product of practical experience, as is the second, and successful, Schütte-Lanz, which discarded the weblike wooden frame for the lighter metal ribs and strakes of the Zeppelin. Such a solid frame as that of the pigmy airship would not do for a

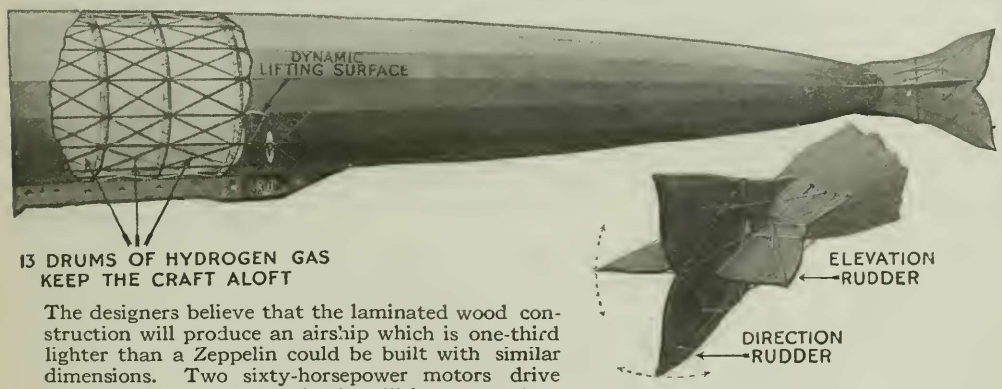
larger dirigible, for it loses the greater lightness for the same strength of a small structure. In a small dirigible resistance against propulsion is so much greater than the lift available for engine power in the large craft, that it completely discounts the small craft's structural advantages. Any improvements in lightness and strength will, therefore, never make this pigmy Zeppelin a superior in speed to its larger and more powerful rival.

The whole idea of a small and speedy "aerial destroyer" is mistaken, since in a dirigible everything has to take second place to speed; otherwise Zeppelins, which cannot seek safety in landing, would be at the mercy of the wind.

The rope drive to the propellers has been proved greatly inferior to bevel gearing, chains and belts. The cable drive was tested on the first Gross-Basenach, but was quickly discarded.

The most meritorious feature of the design of the pigmy Zeppelin is in the alternate heating and cooling of the gases by hot vapor from the engine and cool air sucked in by blowers. This certainly should prove of valuable assistance to the dynamic lift-control without entailing much additional weight.

In conclusion, it seems that the idea of a wooden frame has been tried, approximately in its present form, and found lacking. The rope drive has been succeeded by more efficient means of power transmission, and the entire trend of dirigible construction has been to increase the lifting power, and consequently the size, in order to achieve greater power and speed. Whether the Zeppelin has been a success or not is a mooted point, but the Zeppelin has been the only dirigible that has accomplished anything of note in this war, and the smaller dirigibles have been permanently relegated to their hangars.



The designers believe that the laminated wood construction will produce an airship which is one-third lighter than a Zeppelin could be built with similar dimensions. Two sixty-horsepower motors drive four propellers, and the airship will be expected to make more than seventy miles an hour at full speed

A Barbed-Wire-Proof Fabric

ONE of the most trying tasks incident to trench fighting has been considerably lightened by the appearance in the British trenches of gloves made of a fabric which is said to be impervious to barbed-wire points. The fabric is made up into mittens, with the first finger and thumb separate. The fabric is waterproof, and in addition the gloves are insulated for gripping electrically-charged wires.

The same material is applied to the manufacture of sleeping-bags, which, when opened, may be thrown over a barbed-wire entanglement to allow a soldier to climb over the sharp points without injury. When made up into vests or tunics, the fabric is strong enough to turn shrapnel splinters, or even a bullet when it has lost part of its momentum. The interlining is antisepticized, so that if a bullet goes through, it takes into the wound enough antiseptic wool to prevent poisoning.

The materials used in the manufacture of this remarkable fabric have been sedulously kept secret this far.