Steel Frame and Oil Engines in R-101

The world's largest airship, the R-101, built for service on the England-India air route by British governmental engineers, is a novel craft in structure, material, engines and other details. First of Britain's rigid lighter-than-air craft to take the air since the ships planned or started in wartime, the R-101 in her tests and first long voyages will be watched by aeronautical engineers the world over. The first flight of the R-101 was on October 14, when London was visited.

Although some 50 feet shorter than the world-circling German airship, the Graf Zeppelin, the R-101 is 130 feet in diameter, just 30 feet larger in waist measure than the Graf. Its lifting gas displacement is 5,000,000 cu. ft. as compared with the 3,710,000 cu. ft. of the Graf Zeppelin. The Los Angeles, the German-built airship of the U. S. Navy, is just a million cubic feet capacity smaller than the Graf Zeppelin.

The R-101 is a sister in size to the other British airship, the R-100, now nearly ready for flight. Whereas the R-101 is government-built, the R-100 is the product of the Airship Guarantee Company, a private firm that is building for the government. Slightly fatter and some 55 feet longer than both the R-101 and the R-100 are the two U. S. Navy airships that shortly will be laid down at Akron, Ohio, and finished several years hence.

Whereas all other airships built, even the R-100, rely on an aluminum alloy, duralumin, as the material for the structural members that form the frame of the airship, the R-101 principal frames are made of stainless steel tubing, looking much like the frame of an ordinary bicycle. Aluminum alloy is used for minor structural members that support gas bags, walkways and cabins.

The whole of the two-deck passenger cabins, with dining, sleeping and recreational accommodations for 100, is contained within the hull in order to reduce the air resistance that would be caused by a car slung below the great cigar-shaped structure. In this construction detail the R-101 anticipates the new U. S. Navy airship designs.

Hydrogen is the lifting gas used in the R-101 since America has a monopoly on the non-inflammable helium gas that holds the Los Angeles aloft. Although hydrogen is highly explosive when mixed with air, and voyagers on the Graf Zeppelin were rigidly prohibited from smoking, the R-101 is equipped with a smoking room that would be a credit to an ocean liner. Special ventilating methods prevent any of the dangerous hydrogen gas, millions of feet of which are above the smokers' heads, from entering the smoking compartment. The dining room on the R-101 will seat 50 guests. There is a springy floor in the lounge or main cabin that is designed especially for dancing. About the size of a tennis court, the main saloon has a balcony at each end with non-splintering glass observation areas. The sleeping compartments are declared to be more luxurious than those of the ordinary European sleeping car.

For the first time in history a great airship is propelled by heavy oil engines, eliminating the highly inflammable gasoline which is considered quite as dangerous as hydrogen lifting gas. Five Beardmore engines, each developing 600 horsepower, especially designed for the R-101, provide the motive power. These Diesel engines, built for aircraft use, are self-igniting by the heat of fuel compression, and thus sparkplugs and their troubles are eliminated. Since heavy oil injection is used, carburetors are also lacking. Waste heat from the two side engines, which are close to the cabins and saloons, is utilized in heating the quarters of crew and passengers. Fans drive air over a radiator serving both engines and the hot air is circulated in the living quarters.

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Diet Affects Dental Development

The development of teeth, both as to speed of growth and structure, is greatly influenced by diet, studies reported by Drs. E. V. McCollum and Henry Klein of the Johns Hopkins School of Hygiene and Public Health have shown.

Teeth of swine fed on a deficient diet, such as would cause rickets in rats, developed more slowly and were poorer in structure and position than teeth of swine of the same age that had been fed a normal, balanced ration. A remarkable difference in size of teeth and lower jaw bone was found in the animals as a result of the differences of diet.

The food of the low calcium diet was softer and less abrasive to the finger touch than that of the normal and high calcium diets, yet the teeth of animals fed the low calcium diet were ground down almost to the gum margin. This is further evidence pointing to the faulty structure of the teeth because of the low calcium diet.

Teeth of animals fed the deficient diet not only grew more slowly but were also less calcified as shown by X-ray examination, and there was more malposition of teeth among these animals than among the other two groups.

Of animals fed the normal diet 5 per cent, or about one-twentieth, had malposition of the teeth, and of those fed the high calcium diet a few more, 6 per cent, had this condition. Among animals fed the low calcium diet the condition occurred in 17 per cent, or nearly one-fifth. When the animals were fed for the first year on the deficient diet and for the second year on an adequate diet, the permanent erupted teeth showed a large amount of malocclusion, Dr. Klein found.

Swine were chosen for the investigations because these animals have two sets of teeth, a temporary and a permanent, because they have omnivorous dietary habits, and because they have a comparatively long suckling period for the young. Three types of diet were fed: a normal one; one having a high calcium and low phosphorus content; and one having a low calcium, high phosphorous content. The high calcium diet caused a slower growth of teeth and poorer structure than the normal diet but a growth and structure better than that of animals fed the low calcium diet.

All the comparisons were made on animals of the same age that had been fed these diets from the very beginning, the mothers having been given the diets while the young were suckling.

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