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TRAVELLING 120 MILES AN HOUR

(see page 594)

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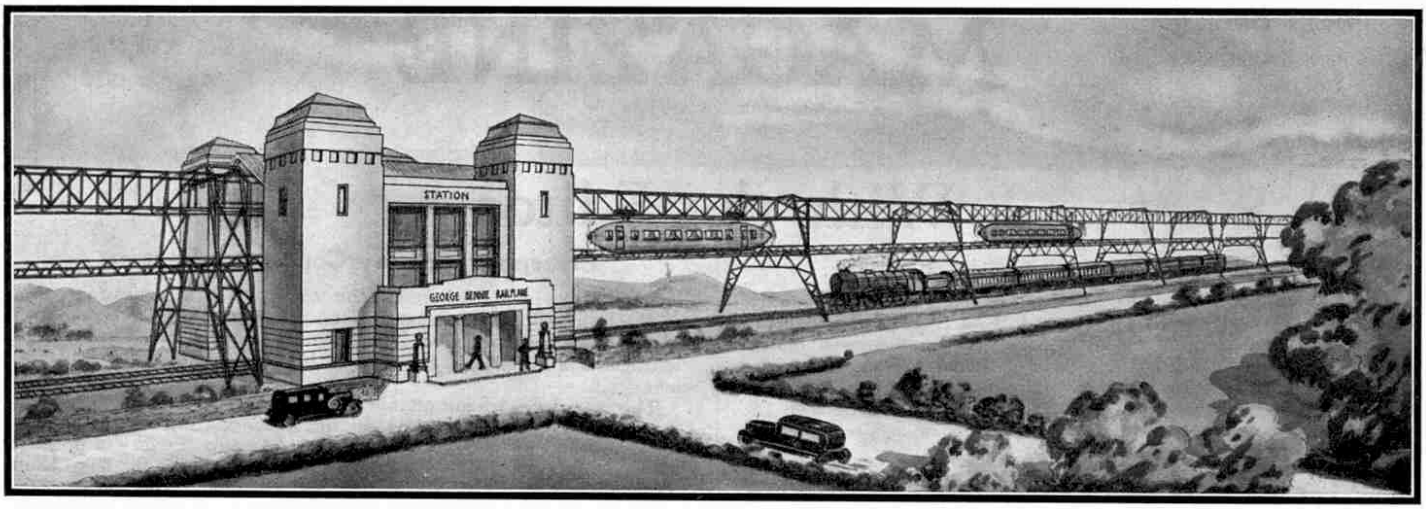
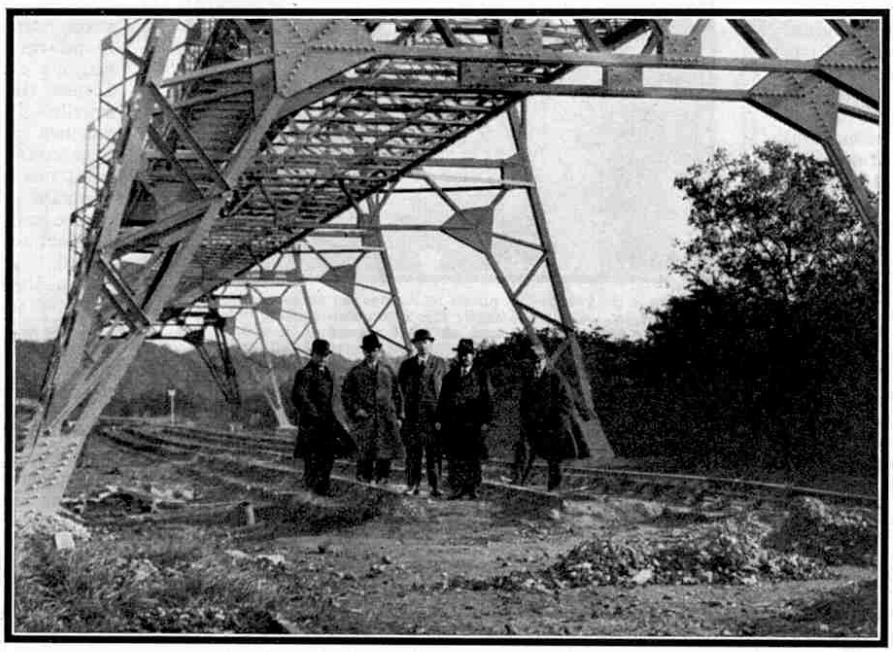
High-Speed Transport by Overhead Railway

The Bennie "Railplane" System



ONE of the greatest problems of the present day is that of finding means of coping with the ever-increasing demand for safe and rapid transport for passengers, mails, newspapers, and perishable goods. The roads in many cases are already carrying more traffic than they are capable of doing with safety, and railways suffer from the disability of having to cope with a mixture of traffic with widely varying requirements in regard to accommodation and speed. Really rapid travel for passengers, and goods that are light and not bulky is, at present confined to air transport. Up to a point this is very successful, but it is attended with uncertainty on account of weather conditions and other factors.

The solution of the problem lies in separating fast traffic from slow traffic, and dealing with it by entirely independent methods. This might be done by providing additional roads or railways for fast traffic only, on the surface, underground, or overhead. Surface construction involves the acquiring of land in a suitable position, which would naturally involve enormous expenditure. Subterranean roads or railways are very costly to construct and involve heavy maintenance expenses for artificial lighting and ventilation, and for the necessary lifts and escalators. Overhead construction offers a much more promising method of dealing with the problem, from the point of view of economy in both construction and maintenance.



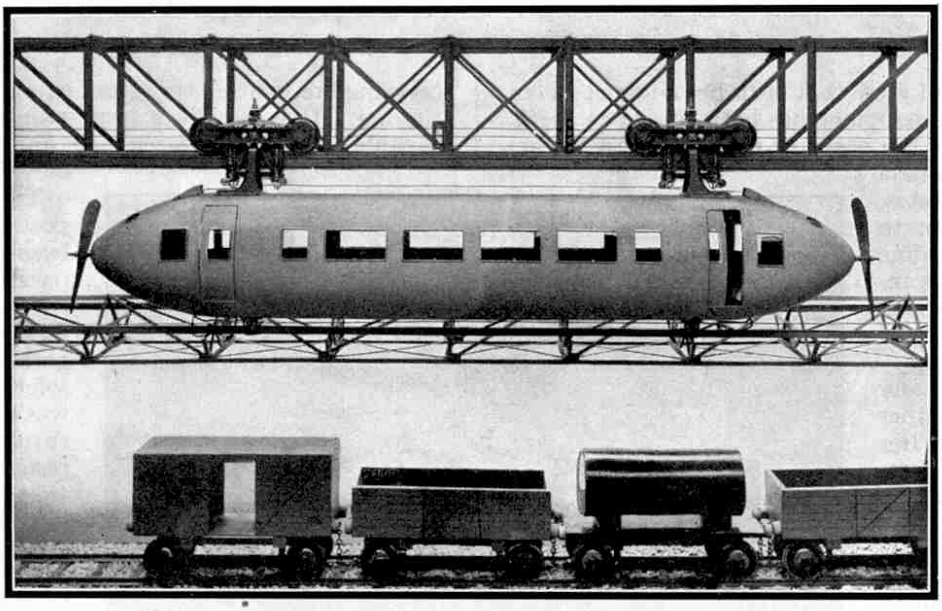
The two illustrations on this page show the test line of the Railplane erected over the track of the London and North Eastern Railway at Milngavie, near Glasgow.
The lower photograph shows a close-up view of a portion of the Overhead structure of the installation. Mr. Bennie, the inventor of the system, is second from the left in the group. We are indebted for our illustrations to the George Bennie Railplane.

In dealing with traffic of the type to which we have referred the first requirement is speed of transport, great haulage power being a secondary consideration on account of the lightness of the traffic. For this reason the construction of overhead railways of the same type as the existing surface railways would involve a great deal of unnecessary expenditure, in addition to failing to provide the necessary speed.

A very interesting system of transport designed to meet these special requirements has been invented and patented by Mr. George Bennie of Glasgow, and is known as the "George Bennie Railplane System of Transport." This system makes use of cars suspended from a rigid overhead structure at the standard bridge clearance in this country of 16 ft. above ground level, and adopts airscrews as the means of propulsion. It combines the safety of ordinary railways with something of the speed of aircraft, and it

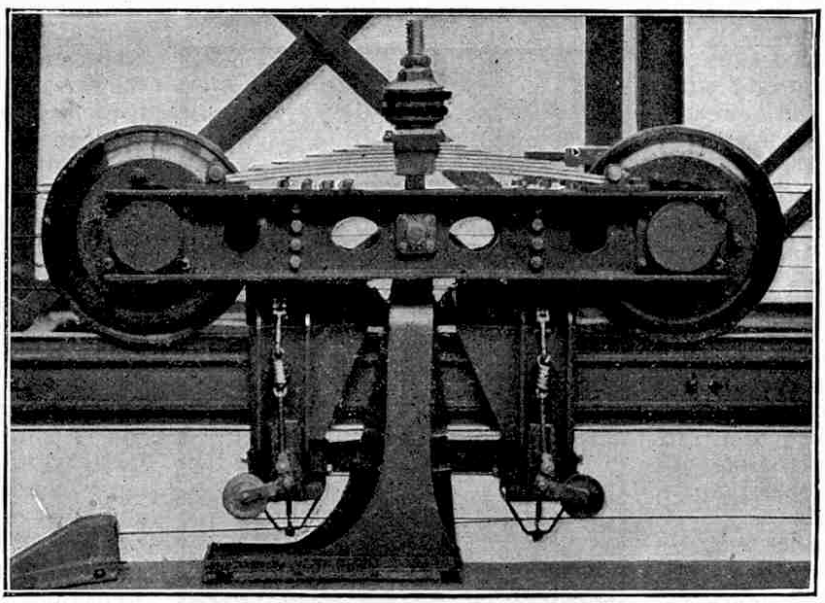
offers a reliable and comfortable means of rapid transport independent of atmospheric conditions. It has the further very important advantage of not interfering in any way with existing roads or railways. The system is not intended to offer a substitute for railways, for obviously it is not capable of dealing with heavy and bulky traffic. What it does is to open up wide possibilities for the safe and rapid transport of passengers, mails and light goods.

Owing to the facts that the line is elevated above the ground upon supports occupying only very small areas of land, and that the rolling load due to the car is only from 10 to 12 tons loaded, it follows that the cost of constructing tunnels, deep cuttings, high embankments and bridges is entirely eliminated. The system can be constructed along or across existing roads and railways without any difficulty or interruption, and can be carried over agricultural land without interfering with work to any appreciable extent.



Side view of the Railplane car, showing the method of suspension.

The cars are carried and controlled on an overhead track and propelled by airscrews in a similar manner to airships. By the adoption of a single overhead rail and modern ball and roller bearing devices for all rotating parts, combined with airship lines in car construction, friction is reduced to a minimum. One of the most important points about the Railplane is that it is a non-adhesion drive. The effect of this is to relieve to a very considerable extent the friction that is due to the weight of the car on the suspending rail. The overhead tracks are carried on trestles or columns placed at suitable intervals, and a rigid guide rail is provided beneath the cars to prevent undue swaying of the cars. The design of the bogies is such as to check the tendency of the cars to rise in the air beyond the amount required for relieving the weight on the laminated springs of the bogies.



Close-up view of one of the car suspension bogies.

By adopting the principle of two-point suspension of the cars from bogies having a very small wheelbase, the alignment of the track is capable of following the configuration of the land, thus rendering possible the selection of a route that will reduce construction costs to a minimum and permit of the linking up of towns and villages that lie widely scattered. The undulations of the ground can be followed without any difficulty as the cars are capable of ascending and descending gradients much more severe than those met with on ordinary railways. Many of the engineering problems of ground railways are thus absent. The wheels of the cars themselves run on roller bearings and embody the Bennie patented silent wheel construction, which consists of an annular ring of rubber interposed between the hub casting and the tyre.

Propellers are placed at the front and the rear of the car and are driven by electric motors, the current being collected from a live rail. In cases where electric energy is not available internal combustion engines may be used.

Assuming that the lines were level and that ball and roller bearing devices were used on all rotating parts, Mr. Bennie claims that the friction could be reduced to 5 lb. per ton of load. The total friction to be overcome in moving a car would therefore be 50 lb., to which has to be added air resistance. With an average horsepower of 120 a speed of 120 m.p.h. could be attained on the level. The motors are capable of 100 per cent. overload for a short period, to meet the demands of rising gradients and head winds.

In situations where the surroundings rendered it necessary or advisable, the trestles and the overhead structural work could easily be designed to be in harmony with their surroundings. As a general rule the structural work would be of steel, but if the conditions prevailing or economic considerations called for alternative methods, reinforced concrete, timber, or a combination of the two could be used with satisfactory results. Another point

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Fighting the Forest Fire Menace—

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was dismantled, taken down to the lake and carried out to a safe distance on a raft. After a desperate struggle the rangers who were fighting the fire were able to save the post and when all danger was over the apparatus was brought back and fitted up again ready for further service.

Apart from permanent observation posts the task of fire-fighting in the old days had to be carried out by patrols consisting of a ranger and his assistant who travelled by canoe along the various waterways. These patrols accomplished some wonderfully good work but they were always hampered by the fact that their range of vision was so severely limited. It was quite possible for them to pass close to a fire and yet know nothing about it. Smoke was really their only guide and when it was observed the ranger stepped ashore and set about the laborious and difficult task of following the smoke up to the scene of the fire. Having located the fire he then had to make his way to the nearest telephone in order to call up the necessary assistance and this involved the loss of very valuable time. The aeroplane has changed all this by providing a means whereby the patrols can watch large areas of forest and travel quickly to the scene of a fire, estimate its extent, and report to head-quarters by wireless. More than this aeroplanes are able to render very valuable assistance during the fighting of a big fire by reconnoitring and keeping the fire-fighters informed of every fresh development.

Observation posts situated on hill tops are now being supplemented in some areas by observation towers. For instance a steel tower 110 ft. in height, with a glass enclosed cabin at its top, is to be erected near Doaktown in New Brunswick. It will be used by the Provincial protection service to overlook vast timbered areas of the south west Miramichi river district and it will be the 25th tower in the existing system of forest protection towers located in the provinces.

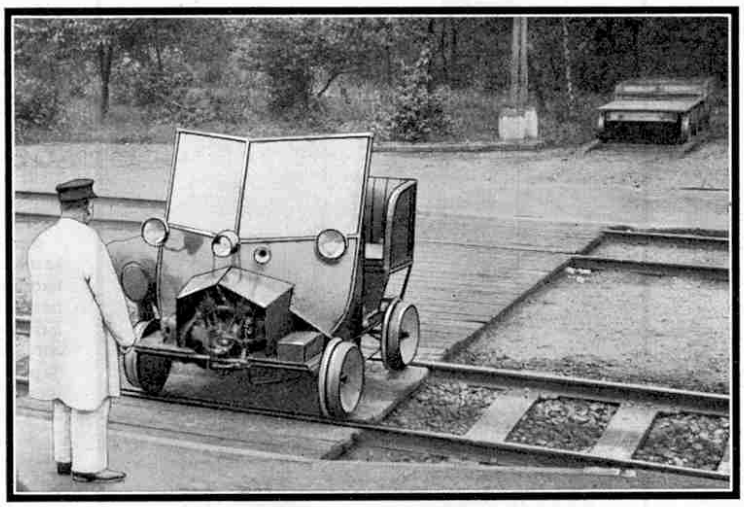
High-Speed Transport—

(*Continued from page 595*)

is that an elevated roadway for fast motor traffic and foot pavements for pedestrians could be provided above the rail track.

Mr. Bennie was awarded a gold medal at the Industry Exhibition in Edinburgh and a gold medal at the Glasgow Exhibition in February 1930, for merit in respect to his system; and a large-scale model installation of the Railplane system aroused considerable interest among scientists who attended the meetings of the British Association held in Glasgow in September 1928. In demonstrating his model Mr. Bennie explained that his Railplane was designed in the first instance to be constructed over a railway. His idea was that if the Railplane were erected over an existing line the permanent way would be left free for dealing with ordinary goods traffic, the Railplane being reserved for passengers, mails and perishable goods. The cigar-shaped cars would each accommodate 50 people. As regards safety, Mr. Bennie showed that by reversing the propellers the car could be pulled up in less than half its length without the application of any friction brakes. Power and hand brakes are however fitted to the car.

In regard to the costs of the Railplane, Mr. Bennie claims that the cost of constructing a double line of railway on his system would be between £17,000 and £19,000 per mile; as against £25,000 to £30,000 per mile for a double line of tramway track, £47,500 to £65,000 per mile for a double line of railway of the usual type, and £800,000 per mile for a double line of tube railway.



One of the miniature motor cars fitted with railway wheels, on which platelayers on the Danish State Railway can run up and down the tracks. The car is being garaged after a tour of inspection.

In addition to the inch-scale working model in Mr. Bennie's showroom, a full-sized Railplane test line has been constructed over the London and North Eastern Railway Company's track at Milngavie, near Glasgow. On this line a full-sized electrically-driven Railplane car, constructed by William Beardmore and Co. Ltd., of Dalmuir, will be thoroughly tested. If successful the invention should go far toward solving the pressing problem of really economic high-speed transport, and therefore the results of the tests will be awaited with great interest, not only by the railway world but also by the travelling public.

Photography Simplified

The second of a series of interesting booklets by Burroughs Wellcome & Co., under the title of "*Photography Simplified*," deals with the question of development by the "time and temperature" method, which is not only the most scientific but also the safest method. In the old days development was full of pitfalls and when really good results were obtained many of us were thankful and, to tell the truth, rather surprised! The method outlined in this booklet is not only simple but completely free from uncertainty; and it enables even a beginner to obtain the best possible results from all his exposures. The booklet includes illustrations showing the difference between correct and incorrect development and demonstrating the improvement in poor negatives that can be effected by suitable intensification and reduction. A thin negative, in which detail is present, but is too faint to print out, can be improved wonderfully by intensification; and reduction will make an opaque, over-exposed or over-developed negative into one that will give quite a satisfactory print.

A copy of this attractive and practical little booklet will be sent post free to any reader who mentions this Magazine, by Burroughs Wellcome & Co., Snow Hill Buildings, London, E.C.1.

Lighting of Air Routes—(*Continued from page 603*)

lighting arrangements are exceedingly elaborate and of the highest efficiency. The main feature is the neon gas beacon that enables aircraft to locate the aerodrome from a distance. An ordinary white light has certain disadvantages for such a purpose, particularly on account of its lack of distinctiveness, which renders it liable to be confused with motor car headlights, or even with street lights. For this reason a neon gas light is used which, on account of its distinctive red colour, stands out prominently among all other lights. Another point in favour of the neon light is that it is found to be superior to white light in penetrating fog or mist. The candle-power of the beacon is 6,080, and it has a normal range of 45 miles, although it has been seen in unusually favourable weather conditions from a distance of about 80 miles. A portable floodlight mounted on a 30 h.p. tractor can be elevated up to an angle of 45 degrees from the horizontal, and also rotated. It thus affords a means of sweeping the sky with a powerful beam, and of providing a horizontal and stationary beam over which an incoming aircraft may land. The beam is of 1,000,000 candle-power, and is capable of illuminating the aerodrome for a distance of 600 yards for landing purposes. There are also automatic red flashing lights to mark the boundary of the safe landing area, and red obstruction lights to warn pilots of the presence of high structures in the vicinity.

Night flying has been developed to a considerable extent in Germany, and excellent systems of route lighting are in use. These include revolving beacons, neon lights and intermittent lights of various types for different purposes. The air routes originating in Germany are developing rapidly, and a corresponding development of route and airport lighting is certain to take place in other countries on the Continent.

Important Notice

We have pleasure in announcing yet another reduction in the price of the Meccano Nuts and Bolts. This reduction is made possible by reason of the fact that we have recently introduced in the Meccano factory some wonderful new machines which, whilst working with perfect accuracy, are capable of turning out no less than 150,000 Nuts and Bolts every day.

The Nuts and Bolts are now obtainable in boxes containing one dozen, fifty or one gross. It should also be noted that the two parts may now be obtained separately, boxes in which a dozen bolts or nuts are packed being included in the range of Meccano products. The new prices are as follows:—

No. 37	Nuts and Bolts, per box of		12	3d.
,, 37f	,,	,,	50	1/-
,, 37g	,,	,,	144	2/9
,, 37a	Nuts only	,,	12	2d.
,, 37b	Bolts only	,,	12	2d.