the pay load, but as regards the stresses in the structure, this is unimportant. That it does matter a very great deal to the commercial aspect is granted, but the advantages of heavy-oil compression-ignition engines were regarded as being so great that the installation of engines of this type was chosen, the designers knowing full well that in so doing they were losing a great deal of pay load which would have "looked well on paper." But the use of petrol engines would not have advanced our knowledge to any important extent, while the installation and running of heavy-oil engines has taught us a good deal already and will teach us more when longer cruises can be undertaken. Already the heavy-oil principle appears to have achieved what was expected of it, the main exception so far being the question of reliability, which will be ascertained as soon as longer flights are made. The heavy engine weight was the price paid for this knowledge, and those who should know assure us that it is merely a question of time and development to reduce the weight very materially.

Certain airship critics have made much of the mooring difficulties, and have even predicted that if an airship at the mast were caught in a strong wind and this wind, as sometimes happens, changed direction suddenly, the airship would probably suffer severe damage. On November 11 the wind at Cardington reached gale force, gusts of 80 m.p.h. or more occurring. On one occasion the wind veered through an angle of about 135 degrees in a period of one minute. This condition was easily met by the airship, and the stress-recording apparatus indicated that there was an ample margin of safety before stresses of a dangerous magnitude were reached.

On Sunday and Monday last, November 17 and 18, R.101 carried out an extensive cruise, remaining aloft for 30½ hours, covering a distance of more than 1,000 miles, and carrying out turning tests at various speeds. On this cruise the airship had on board 54 persons all told, comprising 8 official observers, 4 officers and 42 men. At the end of the flight there was enough fuel left for at least another 35 hours. It is gathered that the engine installation functioned entirely satisfactorily, so that the minor trouble encountered on an earlier flight, when bends in some pipes fractured, have evidently been entirely overcome. During this flight the airship encountered very varied weather, including fog, but in spite of the latter, she was brought to the mooring mast and made fast quite successfully in the dark. This provided a useful experience in mooring under unfavourable conditions.

During the cruise, turning trials were carried out at various speeds, and gave, it is understood, satisfactory results. This statement will probably convey very little to the average non-technical reader. It might, therefore, be pointed out that it was as a result of precisely such turning tests that R.38 broke up, due to the lack of knowledge then available concerning the loads that such manœuvres might throw on the structure. Much work has since been done on this subject, and the tests with R.101 indicate that her strength is up to calculations. Among the remaining tests to be made, an opportunity may occur to test the strength in a strong vertical current when the airship flies towards the east at a later date. If the airship can be proved strong enough for these. there is little that wind and weather can do to damage her. A thick covering of snow is always to be feared, as it results in loss of buoyancy, but it should not seriously stress the structure.

Altogether, it can now be claimed that the technical tests have proved the new form of construction to stand up to its work in the matter of strength. There still remains, on the technical side, to find out how the durability compares with the Zeppelin type, but there is reason to believe that in this respect R.101 will be, if anything, superior to the older form.

R.101 has made a good start, and Col. Richmond and Major Scott and all those associated with them in the work of producing R.101 are to be congratulated on the results of their long and arduous task. The future may still have set-backs in store for us, but in the meantime a very good beginning has been made.

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The Age of Large Aircraft

In last week's issue we published on this page a photograph of the latest Junkers monoplane, the type G.38, which has recently undergone its first test flights. At a time when very large heavier-than-air craft are being produced by several constructors, mainly abroad, the subject of the large machine is of more than passing interest. To us, it has always appeared that sight is apt to be lost of the fact that there is no particular virtue in size as such, except possibly in the case of the large flying-boat, in which, other things being equal, the large machine may be assumed to be more seaworthy than the small. Other than that, it seems to us that the large machine is not worth while unless it can be shown to have either a higher performance or a better pay load for each horse power expended. The Junkers G.38, however, appears to be something rather more than a mere experiment in size. It has long been the ambition of Professor Junkers to realise a machine which he terms a "Nur-Flügel Flugzeug" (*i.e.*, a "wing-only" aeroplane), because, if all external organs except the wing itself could be suppressed, the ratio of lift to drag would be improved a good deal. In the G.38, Professor Junkers has not quite attained his ideal, but he has succeeded in making the fuselage small in proportion to the wing, and in burying the four engines inside the wing. Part of the passengers' quarters are located inside the wing roots, and to some extent realise the old Junkers' patent. The engines are entirely housed in the wing, and in order to get the propellers well clear of the leading edge, special extensions of the propeller shafts have been employed, in which we gather some form of spring coupling is incorporated. Fairings or cowlings over these shafts provide a smooth streamline flow from propellers to wing.

These are the main innovations in the Junkers' G.38, and it is of considerable interest to learn that the detail design and general lay-out of the machine is such that the designers have been able to cheat the "scale law" to a considerable extent while doubtless getting good aerodynamic efficiency. We are informed by the Junkers works that the tare weight of the G.38 is 13 metric tons (28,600 lbs.), and that the permissible gross weight is 20 to 24·1 metric tons (44,000 to 53,000 lbs.). Presumably, the higher figure represents an overload such as might be incurred in a very long non-stop flight. But even taking the lower figure, one obtains a disposable load of 15,400 lbs. To attain such a ratio in so large a machine is no mean achievement.