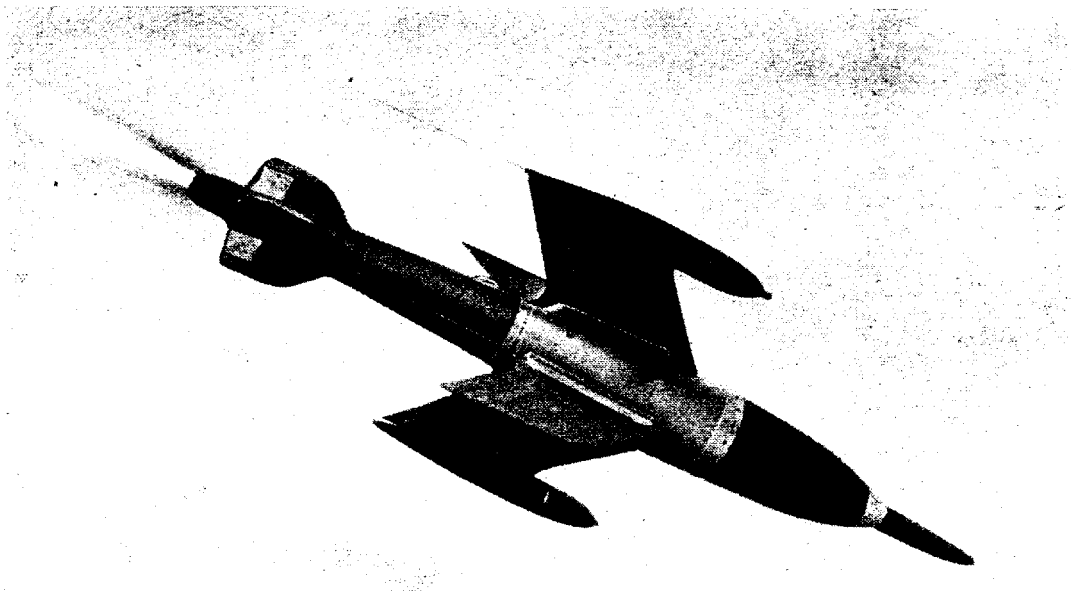

FIG. 3—X.4 ROCKET

GUIDED WEAPONS

BY

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On each occasion of the debates on the Service estimates in the House of Commons in recent years, reference has been made to the guided weapons with which it is planned to arm H.M. Forces in the near future, and from time to time pictures of such missiles hurtling through space appear in the national press. The gunnery and ordnance engineer officers of the Navy may, perhaps, be wondering just what will fill their magazines in the future. A review of the guided weapons field may begin with the work of the German ' rocketeers ' for the period 1935–45.

German Missiles

There were, of course, the *V.1* and *V.2* missiles ; approximately 3,000 of the latter were launched operationally against this country during the last war. The launching weight of the *V.2* was 12½ tons, of which the warhead weighed 1 ton ; the maximum speed was 3,500 miles per hour. The rocket burned for only 65 seconds, which gave it a range of 200 miles. The standard of craftsmanship put into the production was very high ; many engineers are surprised that such accuracy and finish as that given to the turbo-rotor, shown in FIG. 1, should have been used for a machine designed to make only one journey.

Many readers may have heard only of these two missiles, but in fact, the enemy military experts put their rocket development to almost every possible weapon use. FIG. 2 shows *Wasserfall*, a supersonic radio-guided rocket which

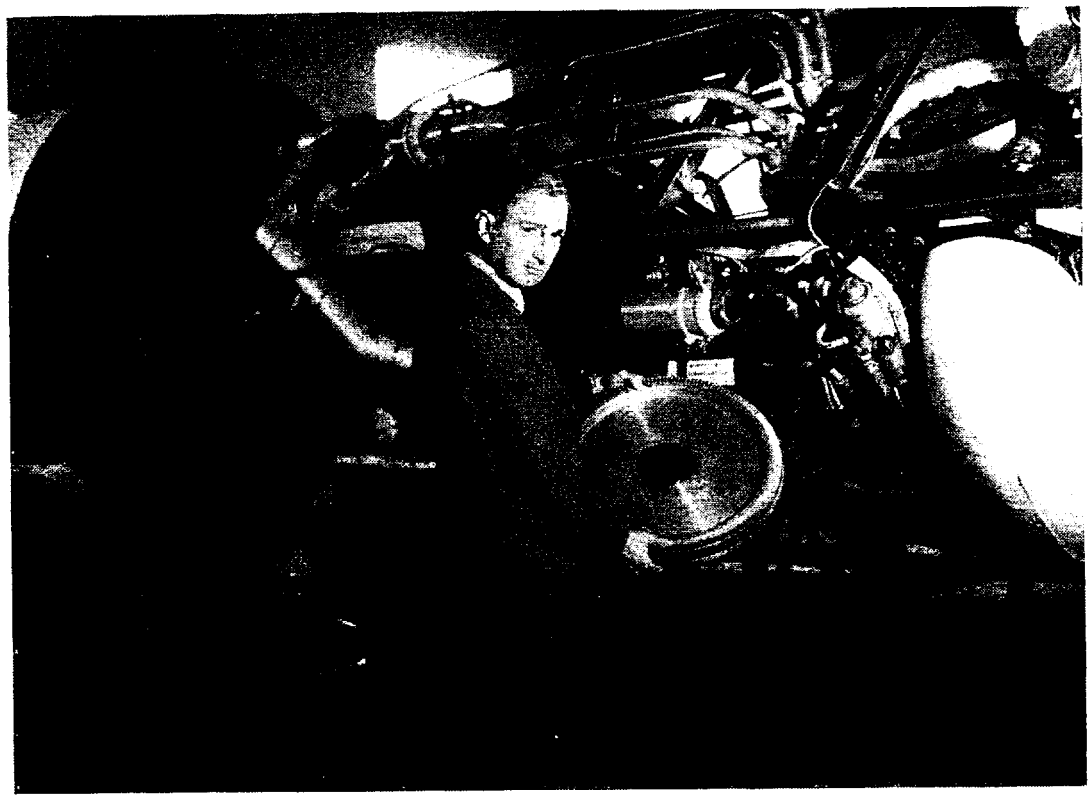

FIG. 1—V.2 PROPULSION UNIT

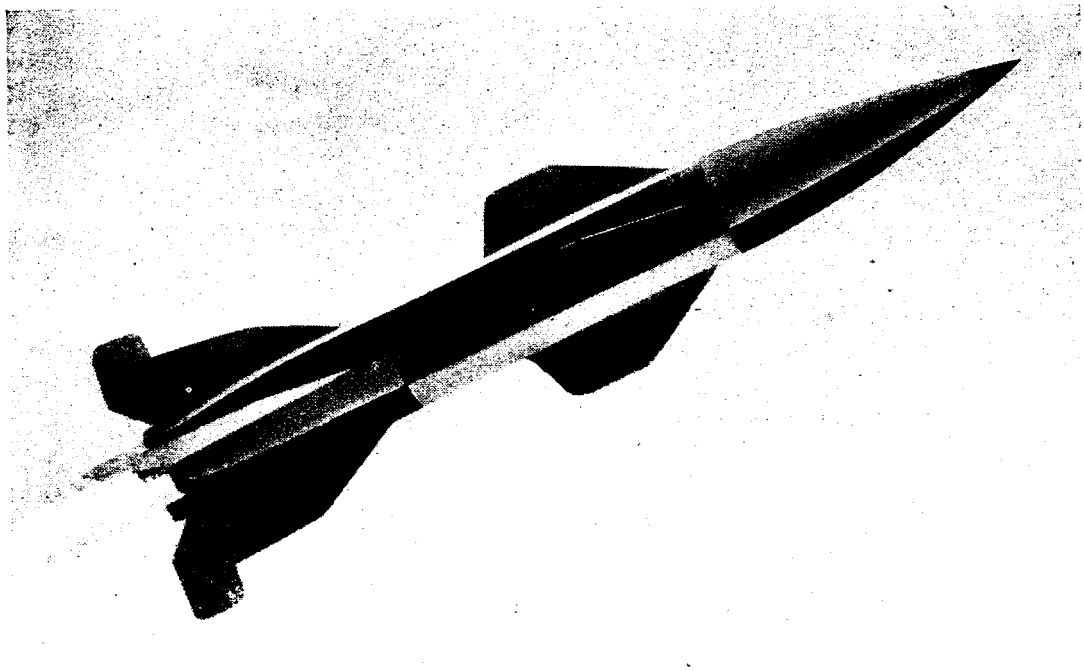

FIG. 2—WASSERFALL

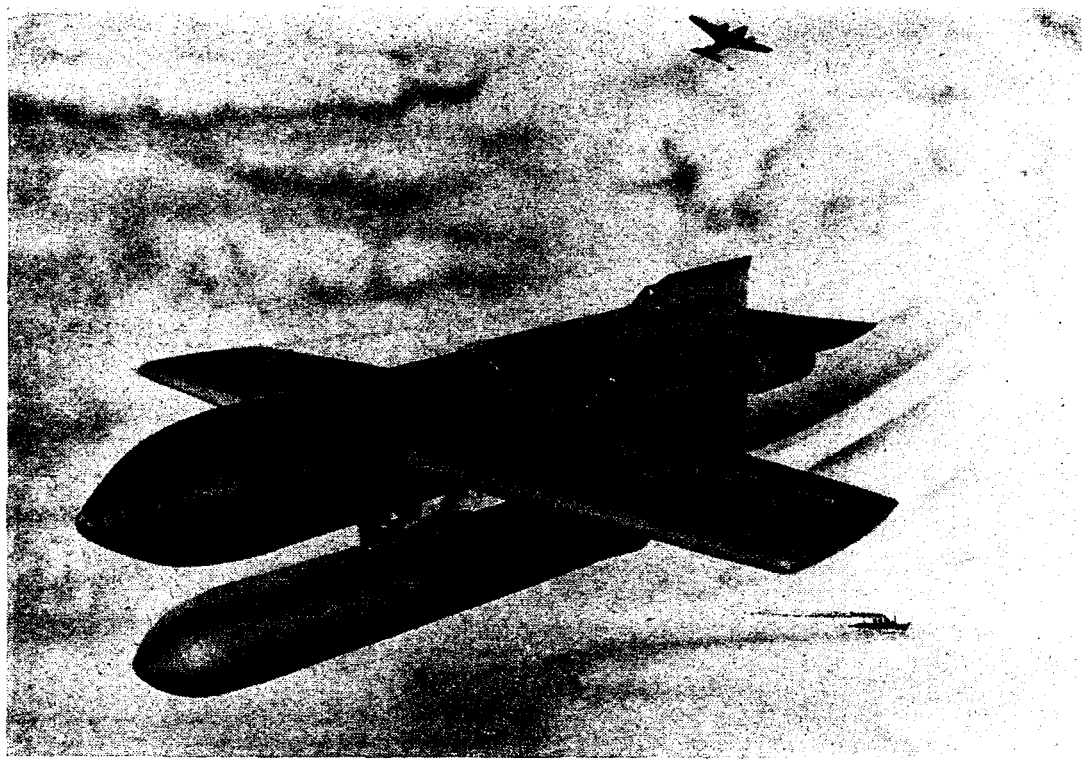

FIG. 4—H.S. 293 GLIDE BOMB

carried a warhead weighing 300–600 lb. The liquid propellant motor burned for 45 seconds. Basing their opinion on the analysis of the German rocket effort at the close of the War, many consider that, had the enemy concentrated on destroying our bomber formations by the use of this missile rather than trying to frighten the British public with their *V.1*s and *V.2*s they would have added considerably to their war effort.

X.4, the subsonic wire-guided air-to-air missile, which was launched from a parent aircraft, is shown in FIG. 3. This had a weight of 132 lb and a warhead of 44 lb. It had an overall length of 6·2 ft and a span of 1·87 ft. Against the allied navies the Germans launched their *H.S.293* glide bomb (shown in FIG. 4). It had a launching weight of 1,730 lb and attained a speed of 375 miles per hour. It will be noticed that the warhead formed a very large proportion of the total weight. This weapon could be controlled by radio or wire link and it had a range of 16,000 yards. While a third of these bombs were defective on launching, of those that functioned correctly, one-third produced direct hits.

Other missiles produced by the Germans included the anti-aircraft rockets *Rheintocher,* Mks 1 to 3, all of which only reached the test flight stage, the *Rheinbote* multi-stage solid fuel rocket, the *Enzian* anti-aircraft rocket with wrap-round boosts and the *Schmetterling* subsonic radio-guided flak rocket.

British Missiles

The security of British interests will permit in an article which must be graded no higher than ' restricted ' only the briefest touch on the up-to-date activities of our research scientists. However, one can glance at the ' straws in the wind ' and gather some picture of the future weapons. At the Society of British Aircraft Constructors' Show in 1952 was displayed a liquid propellant rocket motor (FIG. 5), designed to deliver a thrust of 2,500 lb for 40 seconds. The general

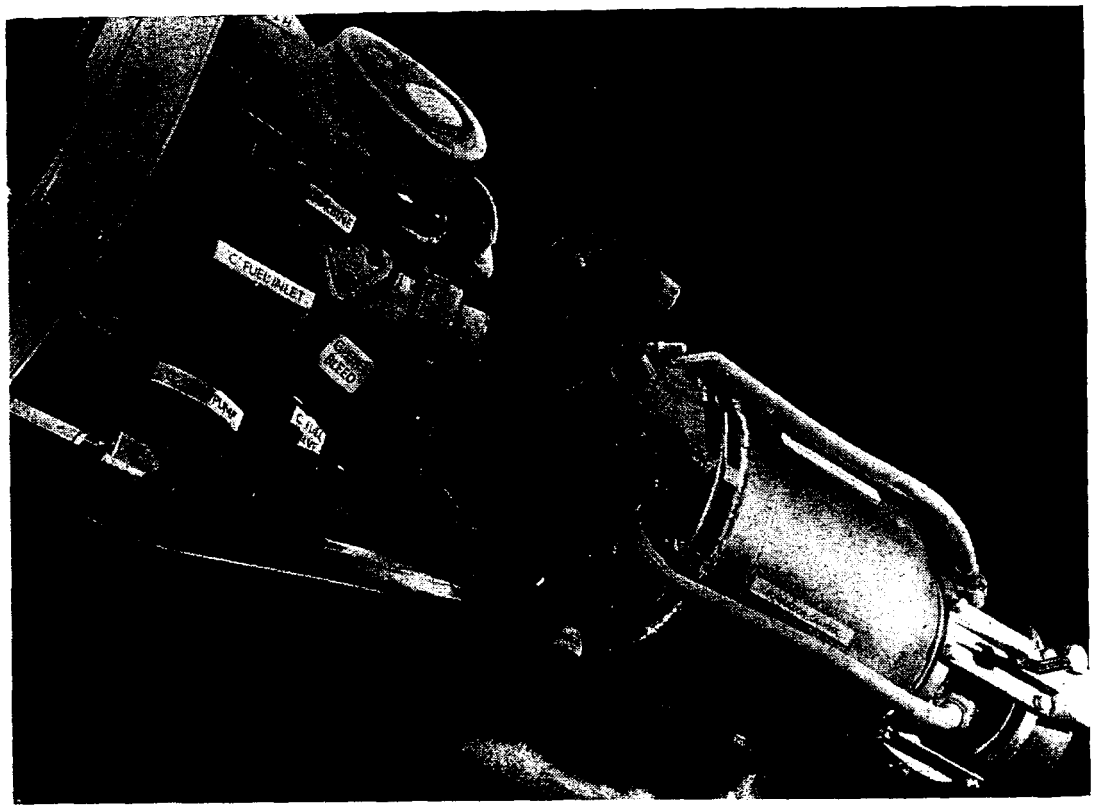

FIG. 5—BRITISH ROCKET MOTOR

design and development of the motor was carried out at a Ministry of Supply research establishment, whereas the manufacture and design of the motor as a power plant was undertaken by the Fairey Aviation Co. Ltd. The oxidant was 80 per cent hydrogen peroxide and the fuel ' C-fuel ', a mixture of methyl alcohol, hydrazine hydrate and water. The fuel and oxidant were self-igniting on mixing, so that no special ignition arrangements were necessary. The propellants were pumped from the tanks to the combustion chambers by means of a turbo-pump unit. The specific propellant consumption (including turbine) was 0·565 lb propellant/lb thrust/second, the total consumption being 14 lb/second.

At the Society's Show in 1953 two solid propellant rocket motors were displayed. The larger of these, which contained a cordite charge in a high tensile steel case, had a total weight of 175 lb and produced a total impulse of 20,000 lb sec. The design and development of these motors was carried out at a Ministry Research Establishment and the steel cases were produced by special processes by the Chesterfield Tube Co. Ltd. and British Messier Ltd. The former company use their cold drawn process, while the latter use fabrication of sheet steel welded by automatic processes which they have developed. Clearly both government establishments and industry are capable of producing both liquid and solid propellant motored weapons. Claims were made in reports by the B.B.C. in mid-October 1953 that these were indeed practical weapons. Such claims seem to be well founded, and in due course gunnery officers may expect to be launching missiles rather than firing guns.