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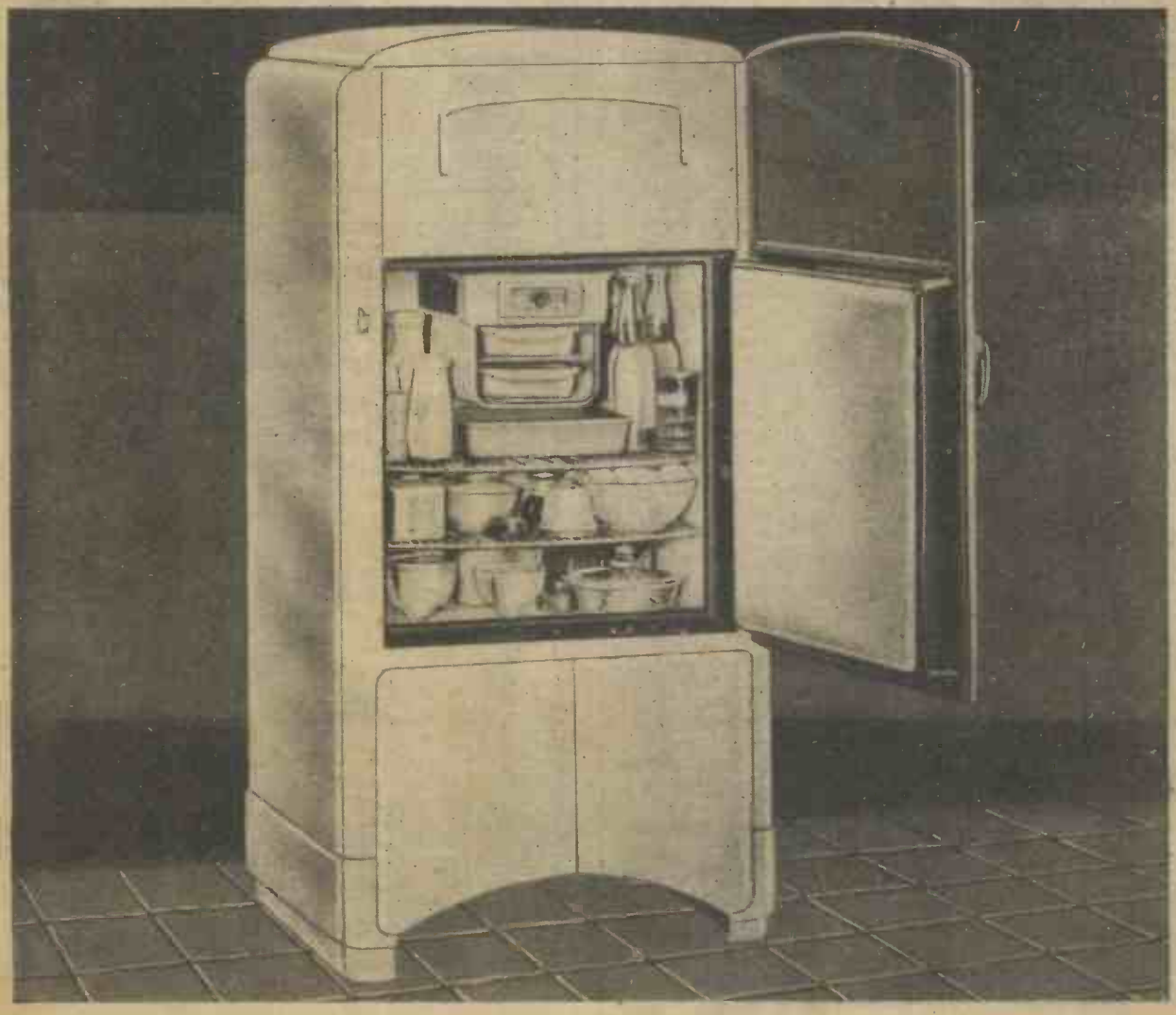

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Rocket Propulsion

Rocket-mail Experiments—in India and Cuba: Modern "Rocket-line" Apparatus

By K. W. GATLAND

(*Continued from page 201, March issue*)

SINCE 1934—until after the outbreak of the present war—experiments with rocket mail carriers have been conducted in India; these due to the efforts of a small group of individuals, headed by Stephen H. Smith, of Calcutta, secretary of the Indian Air Mail Society.

Although this group constructed, and fired, in all well over 150 rocket carriers, the experiment for which they are best known was one made in commemoration of the Coronation, on May 12th, 1937.

The "Coronation Rocket," which was 7ft. in length and contained 200 items of mail, was shot from the reclaimed grounds beyond Alipore. Just prior to the actual mail flight, a small pilot rocket was fired off in order to determine the nature of the wind above ground level. It ascended from the special launching rack—designed for the "Coronation" mail carrier—at about 45 deg., and landed half a mile distant.

In accordance with the observed flight path of the pilot rocket, the launching apparatus was reset, and the large mail carrier fitted for firing. When ignited, the "Coronation Rocket" rose swiftly, against a stiff wind, to land well over a mile from the point of take-off. The mails were immediately recovered and taken by car to a Calcutta post office, where final delivery was made through the normal postal service.

The Indian experiments, however, were by no means all concerned with the carriage of mails. Many of Smith's rockets have been employed in emergencies to carry foodstuffs and first-aid equipment. Such carriers have been used with good effect on many occasions; in delivery across rivers swollen by monsoons, and by bringing supplies to families isolated through widespread flooding.

Specially designed rockets have also carried livestock, including live fowl, and even a snake. These tests were made to gain some idea of the effects of rapid acceleration on living organisms. As a result it was found that the relatively low accelerations of the Smith rockets had little adverse effect on the occupants. The carrier rockets were landed by parachute.

Although Smith can hardly be said to have developed original rocket mechanisms of any great significance, in many ways he improved upon some of the devices originated by the earlier postal-rocket pioneers. As Schmiedle, in Austria, had done before him, Smith built several postal rockets on the "step" principle. These consisted of two distinct sections, each section containing both propellant and mail, designed to deliver their individual postal loads at two separate destinations, situated in the path of flight. Accuracy was achieved through varying the amount of powder in the rocket charges; and by means of a parachute, released as soon as the fuel became exhausted, each section was wafted gently back to the ground at the appropriate point.

Other methods employed in India included a "boomerang" rocket designed to take-off, discharge its mail, and then return to the point of ascent. Smith also constructed "telescopic" mail carriers, designed to vary their carrying capacity in accordance with different types of cargo.

Mail Rockets in Cuba

In October, 1939, some of the most enterprising postal-rocket experiments yet made are stated to have taken place in Cuba under the auspices of the Club Filatelico de la Rep. de Cuba (Philatelic Club of the Cuban Republic).

According to the *Airpost Journal*, one particular experiment concerned the firing of a large postal rocket from the Army Target Field, Havana, to Matanzas, a distance of about 50 miles. It is unfortunate that, apart from a newspaper report, which described the trial as "completely successful" essential details of the rocket and its performance are entirely lacking.

Of particular significance, however, is the fact that these experiments were officially recognised by the postal authorities—three such firings took place in October, 1939, on the 1st, 3rd and 15th.

Postal-rocket experimentation has also taken place in many countries other than those already mentioned; including Holland, Belgium, France, Luxemburg, Italy, Yugoslavia, North Africa, Mexico, and Australia.

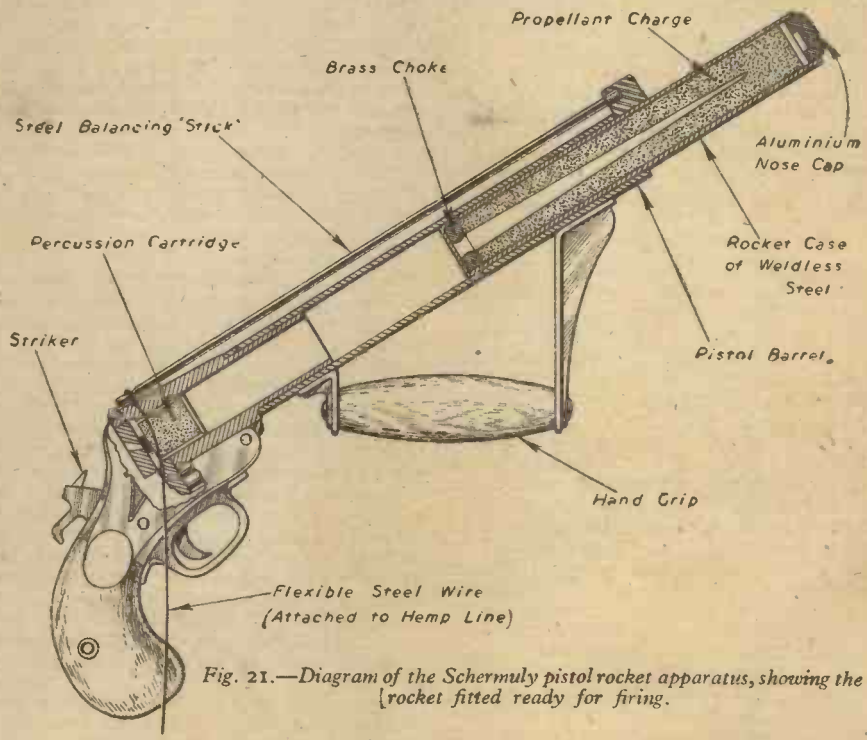

Fig. 21.—Diagram of the Schermuly pistol rocket apparatus, showing the rocket fitted ready for firing.

These further references conclude the historical record of the postal rocket. It is unfortunate, however, that in almost every instance there is complete lack of information concerning the rocket carriers themselves and their performance.

The great majority of these experiments concerned powder rockets in their most elementary forms, and many of the individuals responsible had neither the development of the rocket, nor the betterment of postal communication at heart—as promoters, they were solely interested in the financial return. Satisfaction was theirs if the rocket carrier flew for merely a few feet; no one could say that the covers they later offered for sale, had not been actually flown. It mattered little, therefore, whether the distance covered was rated in feet, or miles; in any case, the mails were ultimately recovered and delivered through conventional postal channels—a letter taken aloft in a toy kite, and then posted for normal delivery, would have as much significance. Few indeed of the postal-rocket experiments had any official character—admittedly, in some cases, the trials were viewed with "official interest," but it was invariably little more than just that. Many philatelists and collectors of historical proofs were naturally intrigued by the revolutionary mode of rocket transport and were quite prepared to pay large sums for the flown covers. In actual fact, many of the flights concerned could easily have been duplicated by any "scientifically inclined" schoolboy, and, indeed, often have.

There were, of course, certain notable exceptions. Quite a number of the rocket carriers embodied design features which had definite bearing on development; the parachute landing mechanism, the "step" principle, and winged rockets, among other innovations such as the launching catapult, owe much to the work of the postal-rocket pioneers. Among those whose work in this regard deserve special mention are the following: Schmiedle (Austria, Yugoslavia), Zucker (Germany, Great Britain, Holland, Belgium), Smith (India), and the Carver group (U.S.A.), as well as those responsible for the experimentation in Cuba. These authorities either carried out, or at least centred their efforts toward, the carriage of mails in competition with the normal delivery service—by projecting mails over difficult country, across water expanses, and in cases of emergency. Under such conditions, the mails carried obviously have a genuine historical interest, and British collectors of such material are fortunate in that the world's largest representative stocks are available in

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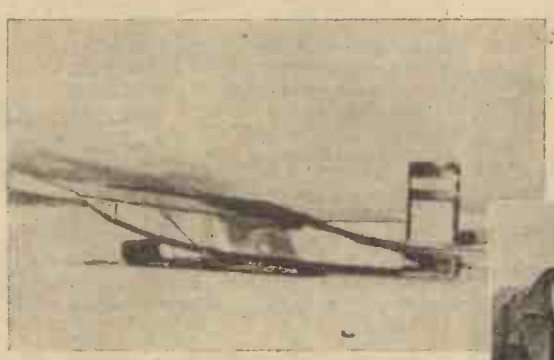
The Greenwood Lake Rocket 'Plane Trials (1936)

Interesting pictures of pre-war experimental flights with postal rocket 'planes, including the Roberti machine



One of the rocket 'planes tied to the sledge on which it was conveyed to the launching site.

Willy Ley (who designed the 'planes), clad in an asbestos suit, addresses the cameramen.

Six-year-old Gloria Schleich christening the aircraft prior to the launch.

The postal cargo being packed aboard.

Charging the tanks with liquid oxygen.

The second 'plane in flight after taking off directly from the ice. (A photograph showing the first flight trial was given in "Practical Mechanics," February, 1945, p. 157.)

The mail is retrieved from the damaged aircraft after the wing had fractured due to structural weakness.

(Above) Willy Ley fires the fusee.

(Left) The German experimenter, J. K. Roberti, preparing a powder-rocket trial in Holland, 1934.

(Right) The Roberti rocket, instead of rising, is blown to pieces on the launching rack.

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this country (Francis J. Field, Ltd., Sutton Coldfield, Birmingham).

Modern Rocket-line Design Methods

Although the requirements of the rocket-line carrier are not so critical, technically, as in most of the types previously mentioned, it is obvious that certain aspects of performance demand particular attention. This is especially true since upon the effectiveness of the apparatus may well lie the difference between life and death during emergency at sea.

The authority chiefly responsible for the development of rocket-line apparatus during the present century is the Schermuly Pistol Rocket Apparatus, Ltd., a firm whose beginnings date back to the early 1900's in the work of the late William Schermuly, reference to which has already been made. (PRACTICAL MECHANICS, August, 1944, p. 375.)

The pioneer apparatus of W. Schermuly has its counterpart to-day in the Schermuly pistol rocket apparatus, which is the first equipment of its kind to be approved by the Board of Trade. In recent years, the pistol appliances have achieved almost universal adoption, and now comprise a principal emergency item on all British, as well as a very large number of foreign, ocean-going vessels. Well over 100 coastguard stations, extending all round the British shores, are similarly equipped.

Both large and small ships, as well as the shore stations, are catered for by the various sizes of apparatus which have been made commercially available. Essential details of the types and sizes at present in use are given n the accompanying table.

Rocket-line Sea Rescue Apparatus

The efficient design of sea-rescue rocket apparatus is conditioned by several important factors. The greatest of these is obviously, dependability—under all conditions of weather and emergency.

One of the most severe problems to be countered is—or rather was—*damp*.

SIZES AND PARTICULARS OF SCHERMULY PISTOL ROCKET APPARATUS

No. 1 Size	Range in calm weather	300-350 yds.
	Nominal weight of rocket	6 lb. approx.
	Length of rocket body	19 ins.
	Diameter of rocket body	2 ins.
	Lines	¼ in. circ., hemp line with a minimum breaking strain of 350 lb. each 350 yds. long.
No. 2 Size	Range in calm weather	220-250 yds.
	Nominal weight of rocket	2½ lb. approx.
	Length of rocket body	13 ins.
	Diameter of rocket body	1⅝ ins.
	Lines	½ in. circ., hemp line with a minimum breaking strain of 350 lb. each 250 yds. long.
No. 3 Size	Range in calm weather	130-150 yds.
	Nominal weight of rocket	1 lb. 2 oz. approx.
	Length of rocket body	8½ ins.
	Diameter of rocket body	1¼ ins.
	Lines	⅜in. circ., hemp line with a minimum breaking strain of 350 lbs. each 150 yds. long.
No. 4 Size	Range in calm weather	130-140 yds.
	Nominal weight of rocket	1 lb. 2 oz. approx.
	Length of rocket body	8½ ins.
	Diameter of rocket body	1¼ ins.
	Lines	⅜in. circ., hemp line with a minimum breaking strain of 240 lb. each 250 yds. long.

The early line-carrier rockets, which had paper cases, were fired by matches—no easy matter under storm conditions; and more difficult still if the fuses were made damp by a watery atmosphere. For this reason the rockets sometimes failed to "fire," and lives were lost when, had a more efficient appliance been available, they might well have been saved.

It was this reason that inspired Schermuly to develop the "weather-proof" pistol rocket line-thrower (Fig. 21); an apparatus in which are combined the principles of both the *gun* and the *rocket*. With reference to the diagram, details of operation are as follows: The tubular case of the rocket is of weldless steel, fitted with a brass choke. It has a "piston" fit in the pistol barrel. The rocket is not fired directly from the barrel, but rather ejected by means of the firing of a small percussion cartridge, which serves to force the rocket from the muzzle by virtue of gas pressure—in the same way as a shell fired from a gun—the heat generated subsequently effecting combustion of the rocket charge immediately upon leaving the discharging apparatus. The rocket, thereby, derives an initial impetus which adds materially to its range.

The diagram is sufficient to illustrate the weatherproof characteristic. The powder charge is completely enclosed, and, therefore, immune to damp. Faultless operation is thus ensured under all conditions.

The object of the hand grip is not only to facilitate steady aim but also to aid correct elevation; the relative position of the grip and the pistol barrel being the approximate elevation for the range of the particular size of apparatus concerned.

The smaller types can be fired directly from the hand, with no other support, but as a precaution against the blast of the rocket, an asbestos gauntlet is provided as part of the equipment.

The largest pistol projector requires slight external support because of the greater recoil. A special tripod is available for the mounting of this apparatus (as shown in the opening article of this series—*Practical Mechanics*, July, 1944, pp. 330–1), but in many instances this is more a convenience than a necessity, as a hand rail or even a taut line would serve the aim just as effectively.

In addition to these highly creditable factors, there is still one other—*portability*. The Schermuly apparatus is remarkably light and far less cumbersome than contemporary line-throwing equipment; it can be carried, and fired, single-handed.

The Boxer apparatus affords an interesting comparison in this respect; its weight complete—including rockets, hawsers, buoys, and ropes—is 16 cwt. Because of this, it is impractical to carry the modern Boxer equipment aboard ship; which it is necessary to transport by trailer on land. The largest Schermuly appliance has a total weight of 60lb., which includes the projecting pistol, rockets, lines and waterproof containers—the apparatus complete packs up into a box less than 2ft. square.

Because of its compactness, the Schermuly projecting gear has a varied use; it can throw a line with extreme accuracy and rapidity, and its use is not limited to the coastguard and the seaman. The apparatus has been used with effect by the Fire Departments in gaining access to points beyond reach of the escape ladder. The pistol rocket is also so designed to fire Very signals.

It is rare indeed that any mechanism overcomes completely all the problems entailed in its operation. The Schermuly apparatus is one such device, as thousands of seamen are able to testify; many of whom owe their very lives to its ingenuity.

(To be continued.)

Rescue by Airborne Lifeboat

RESCUE from the sea by lifeboats dropped from aircraft is now a feature of the work of R.A.F. Coastal Command Air/Sea Rescue Service. Lifeboats fitted with two 4 h.p. two-stroke engines, containing everything needed by men suffering from wet and exposure, such as warm waterproof clothing, food, and medical supplies, are dropped from a height of 700ft., suspended by six parachutes. The first rescue by airborne lifeboats was made on May 6th, 1943, and since that date many more have been carried out.

The crew in a dinghy making for the lifeboat dropped by a Warwick aircraft seen flying overhead.

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