WIND OPERATED CHARGING & LIGHTING PLANTS

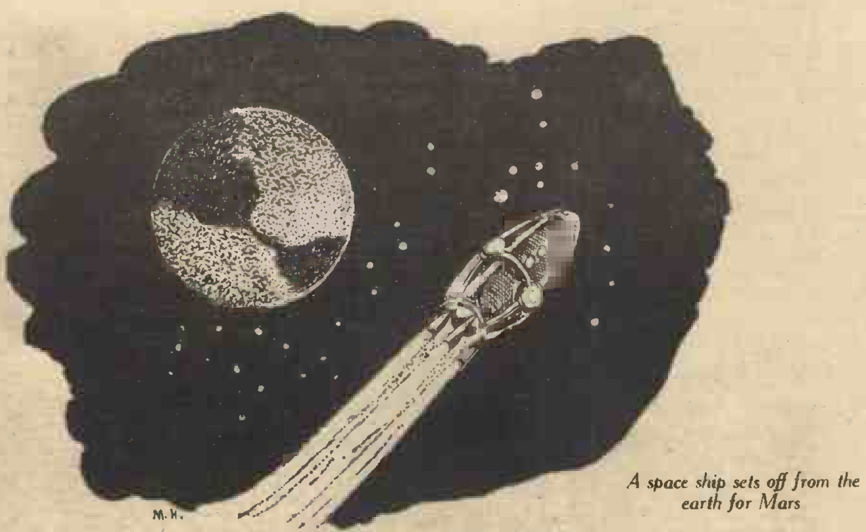
NEWNES

PRACTICAL MECHANICS

OCTOBER 1939

6D.

BEYOND THE GRAVITY FIELD



A space ship sets off from the earth for Mars

The Cold Facts about the Prospects of Interplanetary Travel

ONE curious fact which becomes apparent in reading through the history of human discovery is the extraordinary prevision which enables men to visualise the actual form of an invention long before anyone has come within miles of realising it as an actual possibility.

Readers who have seen the prints of "Henson's Aerial Steam Carriage," which was patented in the 1840's, will have been struck by the way in which the ingenious Henson anticipated in his design the pusher monoplane of seventy years later.

I mention this ability of the inventive mind to foresee the inevitable course of human ingenuity because there are men working to-day on a problem that has long captured the imagination of mankind; the problem of interplanetary flight.

A number of the most important difficulties in the way of rocket-flight (to which the interplanetary pioneers are pinning their faith) have been overcome. In Europe, Willy Ley is the leading "rocketeer," author of a number of works on the subject of interplanetary flight, and the founder of an international space-travel society.

In Soviet Russia, Tsiolkovsky has interested himself with marked success in the same pursuit. The former air-ace, Major-General Udet, has taken keen interest in the question of rocket-flight, and the movement has received considerable support from the German Government.

Now let us see what are the major problems involved in achieving rocket-flight to the extent where interplanetary travel becomes possible.

First, the question of power. This, unless some genius learns to liberate atomic energy in larger quantities than is at present possible, will be supplied by the high explosive force of (in all probability) a mixture of liquid oxygen and liquid hydrogen, kept under extremely high pressure and released into the firing chambers, from which the ignited gases are expelled through the rocket tubes.

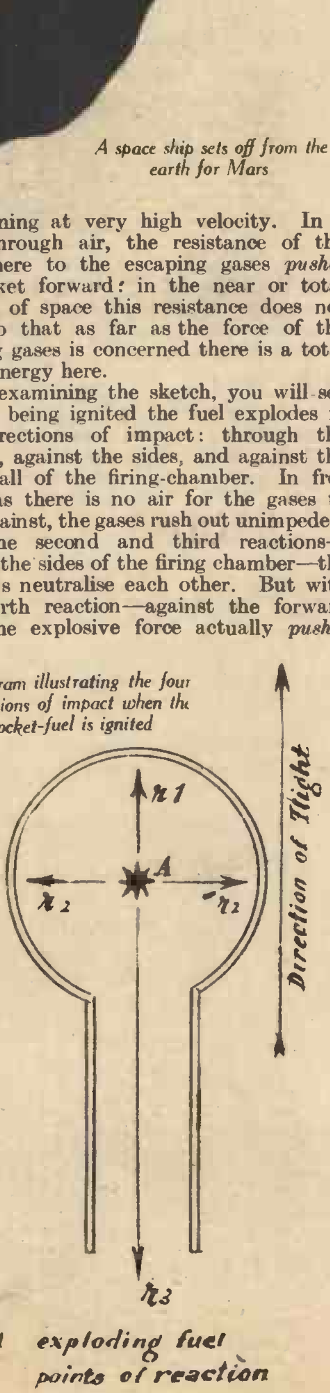
Why rockets stand supreme in the list of all possible motive-agents is because a rocket will travel in a vacuum. A glance at the sketch will show the reason for this. Think of a rocket in flight, with the exploded gases rushing out of the rocket-tube.

When the fuel is ignited it shoots out of the opening at very high velocity. In a flight through air, the resistance of the atmosphere to the escaping gases *pushes* the rocket forward: in the near or total vacuum of space this resistance does not exist, so that as far as the force of the escaping gases is concerned there is a total loss of energy here.

But, examining the sketch, you will see that on being ignited the fuel explodes in four directions of impact: through the opening, against the sides, and against the front wall of the firing-chamber. In free space, as there is no air for the gases to react against, the gases rush out unimpeded.

In the second and third reactions—against the sides of the firing chamber—the reactions neutralise each other. But with the fourth reaction—against the forward wall—the explosive force actually *pushes* the rocket forward. So that even with the loss of energy caused by the absence of an atmosphere the rocket can still travel in a vacuum.

Diagram illustrating the four directions of impact when the rocket-fuel is ignited



It is probable that when interplanetary flight does arrive rocket-ships will use retractable wings in order to take advantage of the earth's atmosphere while they are still within it.

As to the speed that must be attained in order that the ship may be able to overcome gravitational force and leave the earth's gravity-field—well, this is a simple problem in mathematics, giving the "velocity of escape" as 4.90 miles per second. There is also another important point to be remembered. We should naturally, in attempting to leave the earth, take advantage of the eastward equatorial rotation of .28 miles per second so that, in order to leave the earth in an eastward direction above the equator, we should need to attain a velocity of no more than 4.62 miles per second.

Nor is this figure—high as it seems—impossible to achieve even with ordinary molecular energy, and the rocket-flight pioneers are not discouraged by a necessary speed of four and a half miles per second. Indeed, the main difficulty in establishing interplanetary travel on a sound basis will not arise in any problems of engineering, but through the danger of the asteroid belt—countless mineral particles, ranging in size between pebbles and lumps of ore several miles long.

They are all that remains of what was once a planet, exploded in some cosmic catastrophe. They represent a great danger to the space-traveller of the future, and much ingenuity will be needed to overcome this peril.

The dangerous effects of the "cosmic rays" are well known now, but the space-ship will probably be supplied with a double skin containing ozone, a very thin layer of which is all that protects us here on earth from these rays' harmful effects.

These are the main problems. Modern experience has shown that speed in itself is not dangerous to the human system: only acceleration—or sudden acceleration, rather.

CHANGE OF NAME

IN the last three issues of "Practical Mechanics" announcements have appeared on behalf of the Delta (Nottingham) Manufacturing Company of Nottingham.

Owing to an infringement, it has been mutually agreed that this firm's name and the name of its products shall be changed. The firm in future, will be known as the Homray Projector Company, and its products marketed under the name "Homray"; the address remains as before, 46 High Pavement Nottingham. England.