

## SINEWS OF WAR *The Use Of Metals And Minerals*

**T**HE five big "M's" of modern warfare are Men, Money, Munitions, Minerals, Metals. Little is known of the Minerals and Metals, perhaps because they do not lend themselves to spectacular stories, but without them the war would soon be over. Here are some facts about these strange products which contribute to the defence of the nation:

"A cargo of 10,000 tons of bauxite has been detained by the contraband control." You have read statements like that on many occasions, and may have wondered what it is about bauxite that makes it so important.

Bauxite is the mineral from which nearly all the world's aluminium is produced, and aluminium is one of those metals that have become as essential to mechanised warfare as iron or steel. Although aluminium is the commonest metal, being present in almost every clay and rock, very few minerals contain it in a sufficiently high percentage to make it economic to extract the metal.

### THE ARMADA

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wreck, when they touched shore they would be clubbed and stripped of their clothing and jewellery. If they avoided disaster at sea and gave up the unequal struggle with hunger and starvation and wind and storm; and landed to give themselves up, and still escaped the Irish, they would be taken by the English and shot.

Man and the sea combined against them to turn their sorry flight back to Spain into a horrible tragedy. In the month of September alone 8,000 Spaniards perished between the Giants' Causeway and Blasket Sound, 1,000 were put to death by Bingham, 3,000 were murdered by the Irish, and the rest were drowned.

That was not all. The popular de Leyva, carrying with him the flower of Castilian youth, time after time tried to make a safe landing or a safer escape into the Atlantic. Time after time he failed. The second time he was wrecked he still contrived to land 1,400 men safely from the two galleons under him. They were fortunate to find some sort of sympathy from O'Neil in the north of Ulster. But there was threat of an English expedition against them. When they were fed they became strong and a source of danger to their doubtful hosts. De Leyva put off in a reconditioned galleon with half of them in October weather. They safely passed Rossan Point, Tory Island, Lough Swilly, and Lough Foyle, and then when the worst of the journey was over, they struck a rock off Dunluce and were all drowned.

It was the end of the Armada. It was the end of Spain. And it was the beginning of Britain.

France is the chief source of bauxite, with Hungary, U.S.A., Dutch Guiana, Italy and Yugoslavia following in that order. It takes about 4 tons of bauxite to produce one ton of aluminium, plus a considerable quantity of electricity—the equivalent of four tons of coal for every ton of aluminium.

We are apt to think of aluminium in terms of aeroplanes, but it has hundreds of other uses. Many people imagine that aluminium is the lightest metal in general use. This is not correct—magnesium is lighter, a metal of which Germany has considerable deposits and is the highest producer. Magnesium is roughly two-thirds the weight of aluminium, but it is not so strong.

It can be alloyed with other metals to increase its strength, but German aeronautical engineers have been inclined to build on the theory that a warplane is not likely to last long, so that "built to last" is waste of materials.

### What is Cinnabar?

If you read of cinnabar being detained, you may remember that this is the mineral from which mercury is obtained and wonder why a metal with which you are chiefly familiar in thermometers and barometers should be considered contraband. It would be difficult to fight a modern war without mercury. The discovery of mercury fulminate, which detonates when struck, revolutionised warfare.

It made possible the cartridge, the quick-firing gun, breech-loading, with shells and torpedoes which exploded on contact. There are substitutes for mercury in detonators, but they are not easy to manufacture.

In modern war, measuring instruments play a very important part. The properties or density of mercury render it ideal for barometers, its conductivity of heat ideal for thermometers and its electrical properties ideal for contact-breakers. A country cut off from its mercury supply would be seriously handicapped; it would have great difficulty in securing effective substitutes.

A great deal is heard about Germany's iron supplies. War cannot be fought with iron alone. Indeed, pure iron would not be of much use—it is an expensive chemical curiosity. Minute quantities of other elements are necessary to produce the hard, yet tough, metal which forms armour plate, or the wear-resisting steel of gun barrels. A little of these other elements goes a long way in making the steels necessary for modern war—but this little is as essential as the vitamins in our daily diet.

### Everybody Has It

One of these elements every nation has in plenty—carbon. The others come from all parts of the world. One of the most important is nickel, of which about 90 per cent. of the world's production comes from Canada. Europe produces only about 3 per cent. of the world's nickel needs.

Another is manganese, produced by Russia, India, South Africa and other countries. Manganese serves a double

## NATIONAL LEADERS: Sir Archibald Sinclair

**S**IR ARCHIBALD SINCLAIR, Secretary of State for Air in the Churchill Cabinet, is the man whose nightmare task it is to make the British Air Force stronger than that of Germany. One of his speeches struck the first blow which led to the complete change in Britain's conduct of the war, and made Winston Churchill Prime Minister.

Sir Archibald, a Liberal, has always had the ear of the House of Commons. To-day, he commands its closest attention. He has been in the House since 1922 continuously; flying was always one of his hobbies, but in recent years he has made a special study of economics and agricultural problems. In 1931, when the second Labour administration collapsed, Sir Archibald became Secretary of State for Scotland, his first Cabinet post, but he resigned in 1932 over the Ottawa Trade Agreement.

He is a clear and vigorous speaker, expressing his ideas with liveliness, humour and precision, and he has courage, industry, and knowledge to aid him in debate. He takes punishment with a smile, and he led his small Liberal party in the Commons with a kind of joyous faith.



Sir Archibald is not yet 50. He thinks and works at high pressure, sometimes 24 hours a day. He served throughout the last war, and rose to the rank of major. He lives at Thurso Castle, in North Scotland, or did before the war; has four children, and saws wood to keep himself fit.

purpose in steel. It gets rid of impurities, ensures sound metal and it forms alloys with valuable properties. It is possible to use other substances, but it is doubtful whether they are as effective. Germany paid a million pounds for manganese in 1938.

Chromium and tungsten are two other metals the steel-maker needs. As with the other metals, only small percentages—from 0.5 to 5—are required, but these percentages are essential to the best work. Steel can be made without them—as they made it before the new steels were discovered—but the handicap would be tremendous.

Some of these metals, such as tungsten, are necessary for making the tools that make the weapons. This metal is also used for electric light filaments. Electric lamps, incidentally, call for nickel.

A high nickel alloy has the useful property of having exactly the same rate of expansion when heated as glass—hence its use in lead-in wires in all kinds of electric lamps, and wireless valves. The only other suitable metal is platinum.

Platinum is necessary for the chemical industry, but our contraband control is not likely to catch much of it except, perhaps, in jewellery. It has the advantage that it seldom "wears out."

### Goes Up in Smoke

Tin must now be considered a strategic material, for apart from canning it is used in certain parts of machinery. Asbestos is unique in its fire-resisting properties, and should be a material easy to control, since it comes from overseas.

Mica for insulators might be considered a strategic material, but substitutes would not be hard to make.

There are many other materials which might be listed as strategic. Molybdenum, for instance, is an excellent substitute for tungsten of which by far the greater part of the world's production is in the U.S.A., with only Norway in Europe producing two or three per cent. of world consumption.

Titanium has the property of forming a compound that divides easily into minute fragments—ideal for smoke-screens, the white particles forming an impenetrable cloud.

## PRISONERS OF WAR

### How to Communicate by Letter

**P**ERSONS desirous of communicating with prisoners of war interned abroad are advised to acquaint themselves with the conditions under which communication is permitted. The Postmaster-General (the Hon. P. C. Webb) stated recently that full information in this matter is available at principal Post Offices. Communications must not exceed one sheet of notepaper, both sides of which may be used, and the name and address of the sender must appear on the cover of the letter and other article. These are two important provisions that are sometimes overlooked by correspondents.