

get enough nourishment, and pernio or chilblains follow.

Permanent disfigurement and long periods of incapacitation can be largely prevented by early recognition and treatment of the condition. No specific treatment, in the sense of a cure, is avail-

able, but the New York doctors report "best results" from forcing into the tissues by means of electricity a chemical (acetyl-beta-methyl choline) which dilates blood vessels. Proper clothing to protect the legs from undue exposure is also advised.

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AERONAUTICS

Italy's Air Force Weaker Than Several Years Ago

Loss in Spanish Civil War is Reported as 1,000 Planes; Many of Those Now in Service Are Obsolescent Types

WHILE Italian entrance into the war on Germany's side will certainly be no help to the Allies, Mussolini will have to do battle with an army and air force both of which had to be reorganized from top to bottom last winter; a navy weaker in capital ships although stronger in lighter vessels than the French fleet; and the poorest reserve of resources and raw materials of any major power in Europe.

Despite the general impression to the contrary, the Royal Italian Air Force three months ago included only 3,100 obsolescent planes, an article in *Popular Aviation* will declare. The article is based on reports this spring by the Rome air attaches of two powers, necessarily not identified. First line aircraft total 2,100, the reports agree.

Most recent Italian military plane types, including the fast Breda 88 twin-engined bomber (340 miles an hour) and a modern single-seat fighter, the Fiat G-50, were either unsuccessful or too expensive and had to be abandoned, it is stated. Newest Italian fighter is a low-wing all-metal monoplane, the Macchi 200, which has not been long in production, however. Mainstays of the force are still the trimotored Savoia-Marchetti 79 bomber and the Fiat CR-42, a little biplane fighter. Both saw service in the Spanish civil war when Mussolini was busy "non-intervening." Biplane fighters have long since been withdrawn from active service by other powers. Speed of the S-M bomber is 295 miles an hour, fully up to standards of present service planes, but there is no immediate modern replacement for it because of the Breda's failure.

The state of Il Duce's air arm is sur-

prising, the article comments, but can be explained by the fact that the Spanish civil war cost Italy 1,000 planes—500 shot down by the Loyalists and 500 left behind when the Italian troops and pilots returned home—and that Italy is a poor nation industrially. She was at the head of the air parade for years by being one of the first countries to appreciate the importance of air power. In the last few years, however, other nations have entered the race and have already outstripped her or will because of their greater resources. Even this air force, however, may be able to cause the Allies great difficulty because the French *armee d'air* is small and is reported to have been badly hurt by German raids against airdromes in France during the last three weeks.

Italy has already apparently mobilized 2,000,000 of her total of 7,500,000 troops and reserves. Not more than 4,000,000 are likely to be called up any time in the near future, however. This represents a fighting force of 120 to 130 divisions. Estimates of the number of soldiers France has available to meet a thrust across the Alps by such an Italian force agree on 1,000,000 as the maximum. France's border with Italy, however, favors the Allies, as the Alpine passes spread out into France. The French command thus has the opportunity to attack the Italian detachments coming through the passes before they can assemble.

Italian army equipment is not on the same scale as that of the Nazi army. Last fall, Marshal Badoglio reported to Mussolini that the army was not in any shape to fight a major war for months to come, and the reorganization heralded by

the sweeping cabinet changes of Oct. 30 resulted. How much progress has actually been made is another matter on which information is naturally scarce. Sledgehammer armored divisions such as the Germans unleashed on the western and northwestern front, however, are not to be expected. The Italian tank corps, for example, is known to be equipped largely with light highspeed Fiat tanks and not the heavy monsters forming the spearheads of the Nazi columns. The Whippet tanks were proved fairly well useless in Spain. The French 25 mm. anti-tank gun is useless against 30-ton Nazi tanks, but it should be effective against the lightly armored Italians.

At one time this winter, equipment shortages were so severe that a part of the troops then on active service did part of their service in sneakers instead of army boots, according to several American witnesses. The boots they should have had had been sold to France to raise badly-needed foreign exchange.

The Italian navy is relatively strong. Four modern capital ships are in commission and four under construction, not many compared with France's eight and three. Twenty-one Italian cruisers of all types are in service, and 14 are on the ways, however, as compared with 18 and three for France. As of Oct. 1, 1939, Italian destroyers outnumbered their French equivalents, 98 to 70, but France has 30 under construction against a dozen new Italian units. Over-age and under-age Italian submarines are 155; France has 76. Both have 26 undersea craft a-building.

In Bad Economic Straits

Italy has been in desperate economic straits since the start of the war. Tourist trade, a major source of income, has simply dried up. Basic raw materials are all normally imported and have been affected by the British blockade. Coal, of which Italy produces less than a tenth of her requirements, has been so hard to get that a number of factories were closed for weeks at a time. Ordinarily, Italy burns German coal brought from Hamburg by ship. The Germans and Italians both say rail shipments are meeting her needs, but not even the Italians believe that.

Here are some of the sinews of war which Italy does not produce: coal, iron, manganese, copper (Yugoslav deposits are near at hand but are small), petroleum, wool, chromium, nickel, tin. Of the important metal ores, only bauxite for aluminum is found in large quantities in

the peninsula. If Germany is resource-starved, Italy's condition defies description.

Some war supplies for Italy and the Reich both are believed to have leaked through the Allied contraband control, but Rome newsmen are unanimous in agreeing that the quantities were small.

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AERONAUTICS

Lightning Not Menace To Modern Planes

MODERN all-metal transport planes have successfully withstood at least 50 cases of lightning discharges since their introduction five years ago. In no case has there been serious damage to the plane and the risk to flight from this cause is no serious menace, says E. J. Minser of Transcontinental and Western Air in a report to the Civil Aeronautics Authority.

For the aviation industry the General Electric Company has been making a survey of the small holes produced by the lightning strokes and correlating them with laboratory studies on artificial lightning.

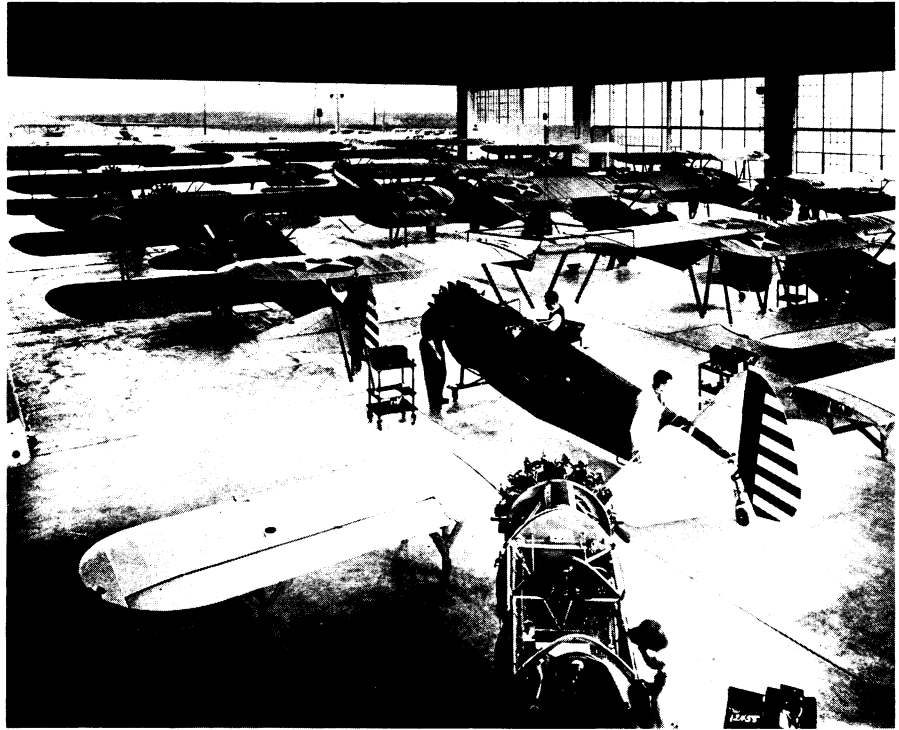
It is found that the cumulus type of cloud that brings summer showers is the most dangerous cloud formation, especially in the temperature zones around freezing: 25 to 35 degrees Fahrenheit.

Zones of positive and negative charges are built up in such clouds, says Mr. Minser, and it is believed that as the metal plane passes through the transition region between these inner cloud zones it acts as a conductor and "igniter" of the lightning discharge within the cloud.

Initial warning to the pilot when flying in a cloud is a strong increase in static and the appearance (at night) of a brush discharge of electricity known as St. Elmo's fire. The static crescendo builds up and ends in the crash (like a shotgun discharge) about the plane.

New pilot rules are helping prevent the lightning hazard. Pilots are cautioned now to avoid instrument flying through cumulo-type clouds especially on a level when the temperature is between 25 and 35 degrees Fahrenheit. Also to drop down and reduce speed when conditions indicate imminence of a lightning strike. And finally to turn on all lights in the cockpit if they must continue the flight in the lightning hazard region. This last rule minimizes the blinding blast of light when the lightning strikes and prevents temporary blindness to the pilot.

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TRAINING PLANES

Advancing toward the open end of the Stearman Aircraft Division of Boeing are these training planes, part of the largest peace-time order ever placed by the United States Government.

AERONAUTICS

British Fighter Plane Has Turrets That Fire Broadside

Unusual Gun Arrangement Gives "Mystery Ships" Superiority But They Are Too Few to Affect Issue

IF LONDON reports are accurate, a rising toll of Nazi warplanes is marking as a success a new British development in air fighting—the mounting of broadside-firing turrets on fighters.

The R.A.F.'s Boulton Paul Defiants, first sent into action a few weeks ago, have won a marked ship-for-ship superiority through their unusual gun arrangement, although the English "mystery ships" are too few in number to affect the issue decisively now, and it should be possible for the Nazis to contrive an adequate defense.

Conventional fighters are armed with fixed guns which fire forward. Bombers carry weapons with a limited field of fire mostly front and rear and designed to deal with the tail-on attack of ordinary

fighters. Both types are thus vulnerable to the broadside fire of a power-driven turret in a plane cruising alongside. The Defiant's bullets, in other words, come from a quarter in which most bombers and fighters are largely blind. All three standard Luftwaffe bombardment types, the Heinkel 111K and Dornier 17 and 215, and Junkers 88, are at present without real protection against attack from the side, for example.

The Defiant's turret, which fires four machine guns, is a development of the R.A.F.'s bomber turret, whose success in defending British bombers convinced the Air Ministry that special fighters should be built around it. The Defiant and the Blackburn Roc, a naval combat ship, resulted. Continued success of these