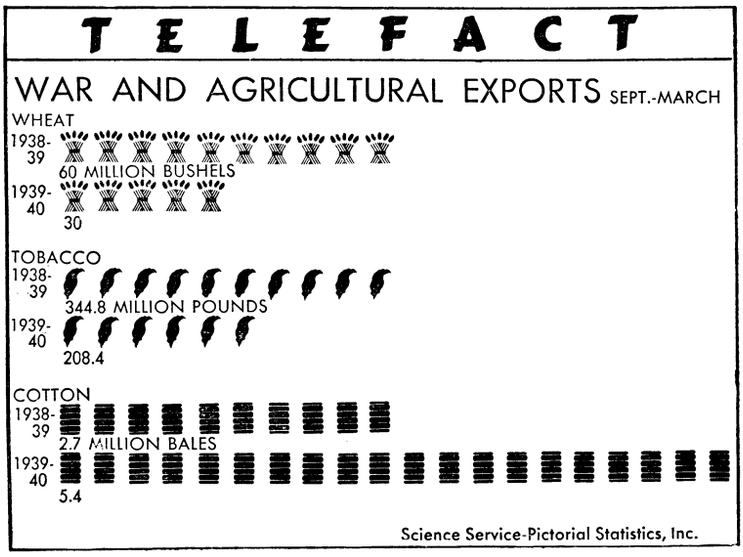

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ENGINEERING

Leadless Storage Battery Sought by Nazi Germany

WITH importation of lead and nickel eliminated by British blockade, intensive efforts are now being made in Germany to develop an electric storage battery dispensing with their use, the U. S. Bureau of Mines has been advised by Consul Sydney B. Redecker, at Frankfort-on-Main.

In order to stimulate the quest, the High Command of the German Army has offered a prize of 10,000 Reichsmarks (about $4,000) to any person or organization "that succeeds in developing a new chemo-electric storage system that will meet all the mechanical and other requirements of storage batteries now in use." January 1, 1941, is the time limit for inventors to submit their proposals. The German Army will have the right to use, without cost, any proposals that meet with its approval.

The following comment is made by Mr. Redecker:

"The development of a suitable leadless storage battery would be an achievement of far-reaching consequences for Germany's entire wartime economy. It would not only enable Germany to produce storage batteries upon a scale adequate for meeting existing automotive requirements but would enable greater use of electrically-operated vehicles instead of those operated by liquid fuel, gasoline, Diesel oil, etc., of which there is a great shortage in Germany.

"Efforts in the past contemplating the use of electrically-operated vehicles have resulted in failure owing to the fact that the requisite batteries would entail much greater consumption of lead and other imported metals."

A storage battery does not really store electricity. Its operation is essentially the same as any battery, even the common dry cell, where a chemical reaction is accompanied by the production of electricity. With the storage battery, unlike the dry cell, the reaction is reversible. When current is fed to the battery, it is restored to its "charged" state.

When a storage battery is charged, one set of the lead plates is covered with peroxide of lead. These are immersed in sulphuric acid solution. As the battery discharges, both plates become coated with lead sulphate. When the battery is charged again, the negative plate is changed back to lead, and the positive to lead peroxide.

Thomas A. Edison invented a type of storage cell that does not use lead, and this is widely used in this country. Instead of acid, a solution of caustic potash is employed as the liquid. Nickel peroxide takes the place of the lead peroxide, while the plates are of iron. About half the weight of the lead cell, it has a number of advantages. It is not as well adapted for automobile starting, but can be used for electrical operation of vehicles. Presumably because of the shortage of nickel in Germany, this does not solve their problem.

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PSYCHOLOGY

Shy, Unfriendly Dogs Are Just Born That Way

"NICE DOGGIE. Here, Pooch! Come get the bone."

But not every Pooch responds to such overtures of friendliness. Instead of coming forward with wagging tail, he may approach "with mincing steps, tail motionless and dragging, and with frequent retreats to safer ground."

Shyness and unfriendliness in dogs is a fear response and is an hereditary trait, Dr. Frederick C. Thorne, of the Vermont College of Medicine, Brandon, Vt., has discovered (*Jour. Genetic Psychology,* June).

Using three simple tests for measuring the friendliness of untamed dogs to an unknown person, Dr. Thorne found that most dogs became friendly rapidly. About one-fourth, however, showed varying degrees of unfriendliness that was not modified by training.

Even when the dog's confidence had been won by Dr. Thorne, the animal was

no more friendly to strangers than he had been at the beginning of the experiment. When raw juicy meat was offered the dogs instead of dog biscuit, the friendly animals accepted the meat with alacrity, but the shy dogs became even shyer and showed more fear. Left alone, however, they ate both meat and dog biscuit.

Shy dogs, he found, were all related to other dogs which had been shown to be shy. Forty of the shyest animals in the group were second, third and fourth generation descendants of a single bitch who was known as a fear-biter. Even when raised from birth with friendly animals, shy dogs do not lose their shyness. Unfriendliness, however, could not be conditioned in animals that were friendly at the start.

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ECONOMICS

Japan to Suffer Most From Ban on Aviation Gas Exports

Sales Within Western Hemisphere Permit Canada To Obtain Unlimited Supplies in This Country

JAPAN is due to be much harder hit than Great Britain, by President Roosevelt's recently imposed ban on the export of American aviation gasoline to points outside the Western Hemisphere. A leak in the embargo as wide as a hangar door exists at our northern boundary.

Canada can, and presumably will, be licensed to purchase all the aviation gasoline she wants from American refiners. To be sure, applications for export license require the ultimate consumer to be named—but so far as is known at present, the naming of the Royal Air Force as ultimate consumer need not prevent the sale to Canadian agents.

Japan might seek a similar middleman somewhere in this hemisphere — but where to find one, in the face of probable frown on Uncle Sam's suddenly sterner visage, might be another problem.

Even should the embargo be sufficiently rigidly interpreted to prevent any of our aviation gasoline being re-shipped to Britain, it would be quite unlikely to be clamped down so tight as to prevent Canada from obtaining the great supplies she now needs for her huge aviation training program, now just fairly hitting its stride. British as well as Dominion student pilots are roaring through Canadian air with Yankee fuel in their tanks. And since that air is strictly within the Western Hemisphere the law can be observed to the very letter and still leave plenty of room for American aid and comfort to the enemies of Nazi Europe.

Another possible legal leak in the embargo might be found by exporting crude oil instead of gasoline. Britain has far greater refining facilities than Japan (provided they are not blitz-bombed into ruins during the next couple of weeks) and can probably produce aviation gasoline from American crude oil at a much greater rate, if it becomes necessary.

As a matter of fact, that seems to have been the case up to the end of 1937. In that year, the United Kingdom imported 753,000 barrels of crude oil from this country, besides much larger quantities from other lands. Imports of American crude dropped to 89,000 barrels in 1938, while imports of motor fuel from this country jumped from 1,294,000 barrels to 1,555,000.

Crude oil exports from the United States to Japan were 15,995,000 barrels in 1937, and they rose to 21,290,000 barrels in 1938. It is doubtful whether Japan's refinery capacity can stand the strain of an attempt to produce all, or nearly all, of the aviation gasoline needed for her bombers over China out of imported crude oil, even supposing she can get it.

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MILITARY SCIENCE

Robot Bombardier Spaces Fall of Bombs Accurately

A ROBOT bombardier, that automatically gives a series of electrical impulses so that a bombing plane can lay its deadly eggs in any desired number and at regular intervals, has just been granted patent number 2,209,380 by the U. S. Patent Office. The inventor is Ralph L. Bell, of Raspeburg, Md., who has assigned the rights to the Glenn L. Martin Company, of Baltimore, one of the principal builders of bombers.

The bombs are in racks from which they are released electrically, either by pressing a button, or from a bomb sight so arranged that the electric impulse is given when properly aligned with the target. With Mr. Bell's invention, it is possible to start the series either with a button or from the bomb sight. Then the bombs are dropped, in any desired number, and at equally spaced points along the ground. The machine automatically takes into account the ground speed of the airplane. The entire device is connected by means of plugs, so it can easily be removed from one plane and used in another.

The control is accomplished by a motor. This is connected to a dial that indicates the intervals between bombs, on a series of concentric circles, corresponding to different ground speeds. In use, the aviator must know his speed; he adjusts the motor until the hand shows, on the correct circle, the intervals at which he wants his bombs dropped. Then he sets another dial to the number of bombs in the train, and the machine does the rest. A third dial indicates the number of bombs remaining in the rack.

Another device useful in aerial warfare has been patented by Josef Tichy, of Brno, Czechoslovakia. Assigned to a Czechoslovak corporation, it probably now is in use by the Germans.

This is an instrument for measuring, from the ground, the speed of an approaching plane, so that the fire of anti-aircraft batteries can be adjusted. The height of the plane above the ground must be determined with other methods. As it comes toward the observer, he sights through the device, and counts, in seconds, the time it takes the plane to pass between two points on a horizontal index. On a dial he sets the altitude, then, opposite the time measured, is shown the plane's speed.

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