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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