MILITARY SCIENCE

Falling Death

Bombs Over Modern Cities Impend More Dreadfully Than Sword in Ancient Fable of Damocles—All Are Menaced

By DR. FRANK THONE

THE BOMB has taken the place of the fabled sword of Damocles, in the modern tale of the world's worst fears. It is a millionfold worse than the keen blade hung by a single hair over the head of the feasting king. It is not hung even by a hair: it rides wings on the thin uncertain air itself. Nor is its possibility of harm confined to the luckless one just beneath. When it falls it converts itself into ten thousand weapons that strike with lethal impartiality in all directions. Not Damocles alone but all that are at the feast, and the scullion in the kitchen, the cellarer among the winecasks, the groom in the stables, share the peril now. Death has grown democratic in this age.

For all the terror in which they justly hold bombs, most people know relatively little about them. They are narrowly egg-shaped objects, with fins or tails to guide them straight; they are filled with high explosive and something to make it go off. That is about the total picture, in the average person's mind.

It is a fairly accurate outline, too, so far as it goes. Details fill in the sketch, but they do not extend it greatly. But there are some things about bombs that are worth looking at a bit more closely. Since the world has to be unwilling neighbor to these disagreeable customers, one might as well gain what profit one can from the forced acquaintance.

Streamlined, With Fins

A bomb is essentially a case, more or less streamlined, filled with high explosive or other militarily useful load and fitted with a detonating fuse. It usually has tail-fins, to keep it nose-down as it drops.

The fuse is not what we have become accustomed to thinking of as a fuse, from our childhood experience with firecrackers and skyrockets. It is not a sputtering, powder-filled wick, to burn down until it reaches the explosive charge and touch it off with a bang.

To most of us, it would seem more appropriate to describe it as a trigger mechanism, for it consists of mechanical means for striking against an explosive cap, like the primer in the base of a rifle cartridge or shotgun shell, only bigger. That fulminate cap explodes a small charge packed around it, which in turn detonates the main mass that fills the bomb. The whole thing is an adaptation of the mechanical fuse of an artillery shell, which it rather closely resembles.

The simplest form of a bomb fuse is a rod with its outer end projecting a little beyond the pointed nose of the bomb and its inner end resting against the cap. When the bomb strikes, the rod is pushed in, and that's all there's to it. This simple form, however, is relatively little used.

More usual is a fuse in which a small cylindrical weight can slide within a hollow cylinder. As the bomb falls, the weight stays back toward the tail end. When the bomb strikes, the weight is carried forward by its inertia—just as you feel yourself trying to "go on through the floor" when an elevator stops its descent with too much of a jerk. At the nose end, the weight finds the detonating cap waiting for it. Many bombs, especially the big ones, have two such internal fuses, one each in nose and tail, so that if one fails the other makes sure it explodes.

Two Kinds of Fuses

Some fuses are built to act instantly, as soon as the nose of the bomb touches something solid. They are designed for effect at the ground surface, among troops in the open or in uncovered trenches. Other fuses, called the "delay action" type, hold up the explosion for a split second, until the bomb can penetrate through the roof of a dugout or a house or the deck of a warship, and then go off to wreak maximum destruction inside.

Bombs themselves are divided into four main classes, known respectively as demolition, fragmentation, incendiary and chemical. The first two classes are filled with high explosive; the last two contain mainly chemicals and have only enough explosive charge to break them open and scatter their contents.

Demolition bombs are what the world's cities fear most. They are the missiles that have laid waste great sections of cities in Spain's recently ended civil war, that have wrought wholesale destruction in invaded China. They are what may ruin London or Berlin even this very night.

Demolition bombs range in weight from a few pounds, barely enough to wreck a garage, to two-ton monsters containing 1,000 pounds of TNT, sufficient to disable a battleship with one blow—provided they hit it squarely and in the right spot. They may be very thin-shelled, to carry the largest proportion possible of their weight as explosive, or they may be thicker shelled "penetration bombs" with smaller charges and delay-action fuses, designed for breaking and entering before they do their deadly work.

Undesirable Explosives

Explosives used in bombs are usually TNT, guncotton or other materials that are very powerful yet relatively safe to handle. There are plenty of extremely high explosives, like nitroglycerin and various combinations of liquid oxygen and carbon, phosphorus, or other substances, that are more powerful than TNT, but military men don't like to monkey with them, because they are "tricky"—likely to be set off by a slight jar, or even for no apparent cause at all, so that they are almost as dangerous to your own side as to the enemy.

In 1898 the U. S. Navy had a special gunboat, the "Vesuvius," armed with big air guns for firing bombs loaded with explosive gelatin—a mixture of guncotton and nitroglycerin. The "Vesuvius" wasn't popular with the rest of the fleet. They didn't like her cargo, and preferred to have her stay away off, all by herself.

For this reason, aviation ordnance men declined to become excited over reports of a "secret" German explosive involving the use of liquid oxygen, alleged to have been used in the bombing of Barcelona. Even though their business may be devastation, they prefer not to risk devastating their own airdromes and ammunition dumps. Destructive to the enemy, safe to yourself, is the ideal of the orthodox bomber as it is of all soldiers.

Demolition bombs include the biggest built, but their brother high-explosive missiles, the fragmentation bombs, do

not rise above the middleweight class. They are built with moderately thick walls, designed to break into small pieces when they explode and to act as a shower of missiles against troops caught on the road or elsewhere in the open. It is unlikely that fragmentation bombs will be much used in attacks on cities. The objectives of such attacks will be arsenals, factories, dockyards, railday terminals, government buildings, and so on—material rather than human targets, calling for smashing with demolition bombs rather than killing with fragmentation weapons.

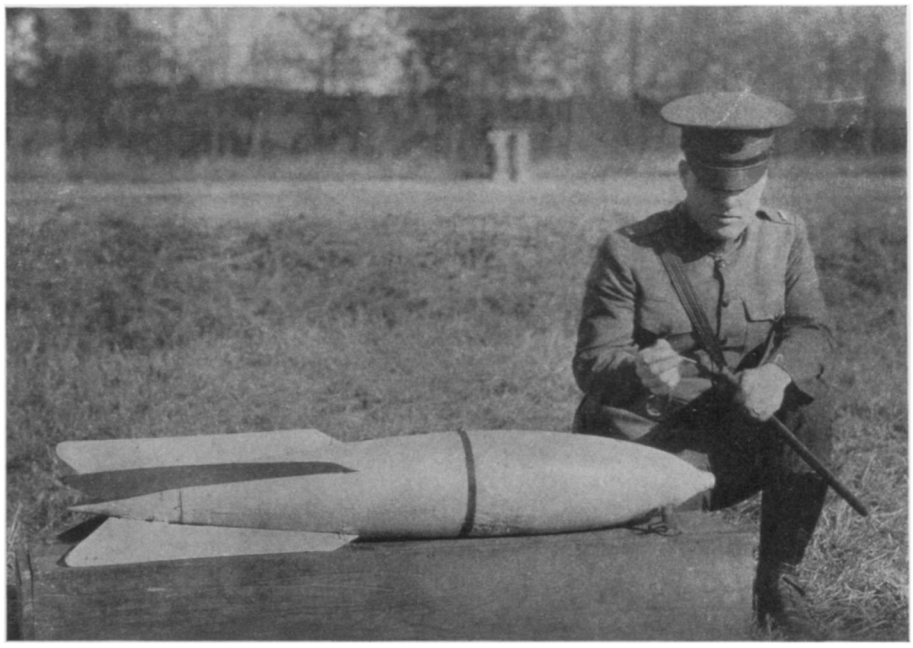
Cities do have good right and reason, however, to fear the third class of bombs, the incendiaries. These are designed to break through roofs and scatter their flaming contents inside the buildings. Incendiary bombs are usually quite small; they are the smallest of aerial weapons. It is better to start as many fires as possible than a few big ones: fire is the one weapon that increases itself instead of becoming spent. So incendiary bombs are mostly only a couple of pounds in weight, and are intended to be dropped in scores or hundreds.

Their effect is of course proportionate to the combustibility of the cities against which they would be used. Of all the nations, probably Japan has the cities most vulnerable to fire, the United States the least. European cities average about alike—pretty good kindling, under their roofs of slate and tile.

Thermit a Favorite

Various petroleum mixtures have been tried as incendiary bomb fillers, but ordnance men generally prefer solids to liquids, as being safer and less messy to handle. The well known industrial welding mixture, Thermit, is a favorite because of its stability and because of the terrifically hot flame it engenders when it is set off. The makers of incendiary bombs also like the highly inflammable chemical elements phosphorus and magnesium. A magnesium bomb built around a core of Thermit has something of a mode in European military circles just now, as being both light and hot.

The final class of bombs, the chemical bombs, are the center of hot dispute, and have been for years. Will they be useful against cities or not? The old scare-tales, of a single plane wiping out a city by dropping a single bomb of a super-poison-gas, have more or less subsided lately. Yet there is no denying the dread people have of gas. It might be said that even without the dropping of a single gas bomb, nations of Europe have done each other an immense amount of damage already, through the enforced distribution of gas masks to the civilian population and the equipping of bomb-proof shelters with gas-proofing and air-purifying devices—all at immense expense.



ONLY A LITTLE ONE

Yet this small bomb can carry enough high explosive to demolish an ordinary house. Its bigger brothers, capacious enough for the officer to get inside their shells and stand up without crowding, might crush forts or full-sized ships with a single blow.

Despite the bitterness of the late civil war in Spain, the contending forces did not use gas against each other, neither have the ruthless Japanese used it in their attacks on crowded Chinese cities, nor the Germans over Warsaw. In all three of these defenseless lands gas would have had terrific effect on the civilian populations because of the utter lack of gas masks and the inadequacy of other protective measures. Why did the armies that gained control of the air—Japanese in China, Nationalists in Spain, Germans in Poland—spare the cities of their enemies this crowning horror when they laid on all the rest?

The answer remains an enigma in the dark clouds that overhang the world's sky at present. Perhaps not until a greater war parts these portentous curtains on the West, to let pass the flying hosts of the Winged Death, shall we be permitted to know.

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PSYCHIATRY

World War Mental Cases Will Grow Until 1947

AMERICA is still paying for the World War in the most precious sort of coin—men's minds.

The number of World War soldiers who are patients in hospitals for mental disease is still going up and will continue to increase, it is estimated, for another eight years. In 1929, a decade after the war, 18,393 veterans were hospitalized for mental disease. Now, another decade later the number has gone up to 29,000. By 1947, it is estimated by the U. S. Veterans' Bureau, the peak will be 40,000.

This figure does not include a much larger number suffering from mental and nervous diseases, but who are kept out of hospitals lest they bog down into "hospitalosis."

The total number of World War veterans receiving compensation for neuro-psychiatric disease on January 1, 1929, was 54,785.

Today, it is 89,119, of which 67,366 cases are directly traceable to the war.

What will it be in 1947 when the peak is reached? No man knows.

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To save bulk in transit, tin cans are sometimes shipped in collapsed form.