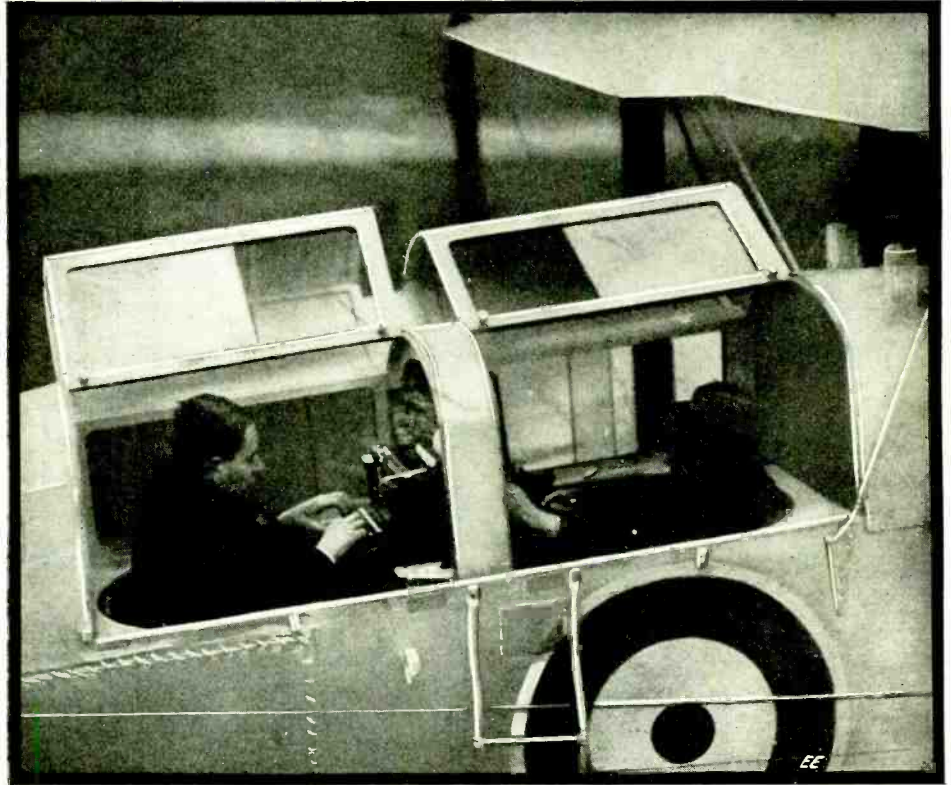


## Typewriting in an Airplane

The photograph herewith demonstrates how the warring countries of Europe are fast adapting themselves to peacetime pursuits, in sport, pleasure and business. This illustration shows what was formerly a powerful French bombing plane converted into a business man's traveling plane, and fitted with an up-to-date office, including a typewriter. Many business men of today do not lose even a moment's time, once they leave their home for the office, and have typewriters fitted in their automobile. One

The Photograph Herewith Shows How a Powerful French Bombing Plane of Large Size Was Converted, After the Signing of the Armistice, Into a Model Business Man's Plane. In the Spacious Cabin of the Plane There Is Ample Room for a Desk and a Typewriter, and the Business Man May Carry His Secretary With Him. The Cock-pit Here Shown Is for Passengers, and Is Separate From the Pilot's Compartment.



of the leading New York newspaper editors, Arthur Brisbane, has a typewriter fitted in his car, and makes the trip from his home night and morning with his ever-ready "mill" at his side, in the event that he may wish to dash off a new editorial inspiration before it has flown away—unregistered. The same idea of recording thoughts on the wing, as it were, holds as well for business men as for authors and editors. Not only this, but in the spacious airplane cock-pit here shown, the business man using such a modern conveyance to or from business can carry his secretary along.

## Recording Galvanometer and Tuning Fork Timer

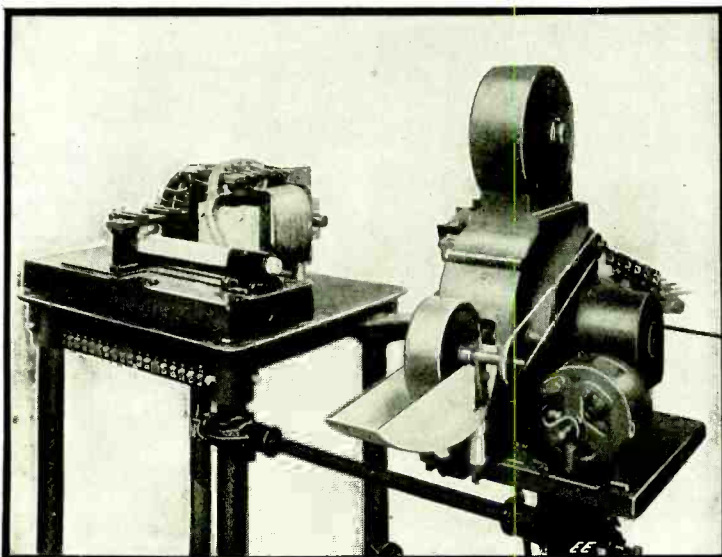
An ingenious recording galvanometer and tuning fork timer, as used by the U. S. Signal Corps, is shown in the photograph herewith. The recording galvanometer employs a paper tape, especially prepared by a chemical process, on which the light image reflected from the galvanometer mirror is photographically recorded, and the tape is afterward past thru a chemical bath, which develops the image, similar to the usual photo printing method. Wherever accurate measurements have to be made by means of such a recording device, in which the fluctuations of an electric current are to be recorded in the form of an undulating or wavy line, running along the recording tape, it becomes necessary to accurately space off the tape, so that the time period of each current variation can be readily determined, such as cycles per second, the interruptions

of a circuit per second, its frequency, etc. To solve this problem, use is here made of a simple and yet extremely accurate timer in the form of a musical tuning fork. It is well known that when such a fork is struck by a wooden hammer, that it vibrates with a certain musical note, depending upon the length of the fork and its other physical dimensions. This is the principle upon which the tuning fork timer, which has helped to solve many of Uncle Sam's intricate wire problems in electricity, operates. To one leg of the vibrating tuning fork there is attached an electrical contact which controls a second light image in front of the moving tape and at regular time intervals, this auxiliary timing circuit is closed so as to give spots of light on the paper tape at definite intervals, so that it becomes a simple matter to determine just how many pul-

sations of the galvanometer string, and in turn the current passing thru it, have taken place in a given space of time. These tuning fork timers are electrically operated in a very ingenious manner. The electromagnet is placed between the limbs of the tuning fork, and by means of a contact placed on one of the limbs, the magnetic circuit is made and broken many times per second, in exactly the same manner as the movement of ordinary vibrating bell functions.

The electrical tuning fork timer, as here described, has been used during the war in solving difficult problems in connection with harbor and coast-defense work, etc. The accurate periodic timing and the closing and opening of an electric circuit by this form of device, have proven very useful in many acoustic or sound problems on which they were engaged to the scientists connected with the Naval Advisory Board and the National Research Council, which covered the recording of sounds from coast defense and warship guns over considerable distances for the purpose of determining by *sound ranging* the distance at which a gun was located when it was fired, etc. Also much study was carried on during the war on the behavior and performance of various calibres of guns by detecting sound and other resultant characteristics whenever the gun was fired. In such work as this, the apparatus here shown, or similar apparatus, proved very useful, and in fact invaluable.

The United States Signal Corps Laboratory developed a great many new and novel instruments during the war. Some of these were not only ingenious and radically new both in conception and design, but marked a new era in scientific apparatus, especially that class of instruments which would lend themselves to use in the field where it is usually considered impossible to design an instrument of extremely sensitive nature, which will possess the proper qualities of high sensitivity and ruggedness so as to withstand rough usage.



The Accompanying Photograph Shows an Ingenious Recording Galvanometer and Electric Tuning Fork Timer as Used by the U. S. Signal Corps in Studying the Velocity of Sound of Large Guns and for Other Purposes Connected with Harbor and Coast Defence. The Recording Galvanometer Employs a Paper Tape Prepared by a Special Process, on Which the Light Image Reflected from the Moving Galvanometer Is Photographically Recorded. The Paper Tape Is Afterward Past Thru a Chemical Bath Which Develops the Image in the Same Manner as Photograph Prints Are Exposed and Developed. The Tuning Fork Carries an Electrical Contact on One of Its Prongs, and It Is Caused to Vibrate at a Constant Period by an Electromagnet Placed Between the Prongs, the Circuit of Which is Opened and Closed by the Vibration of the Fork Itself.