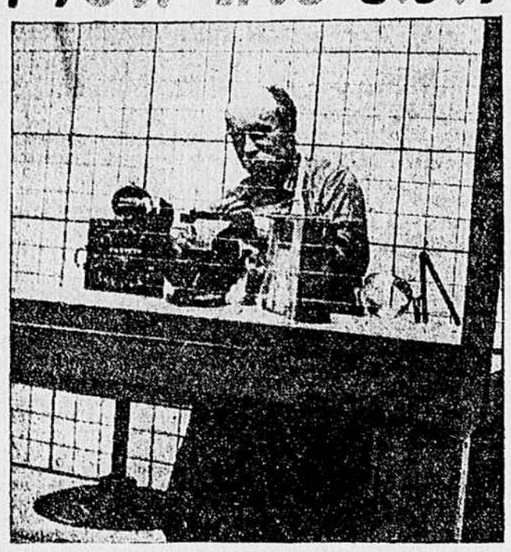
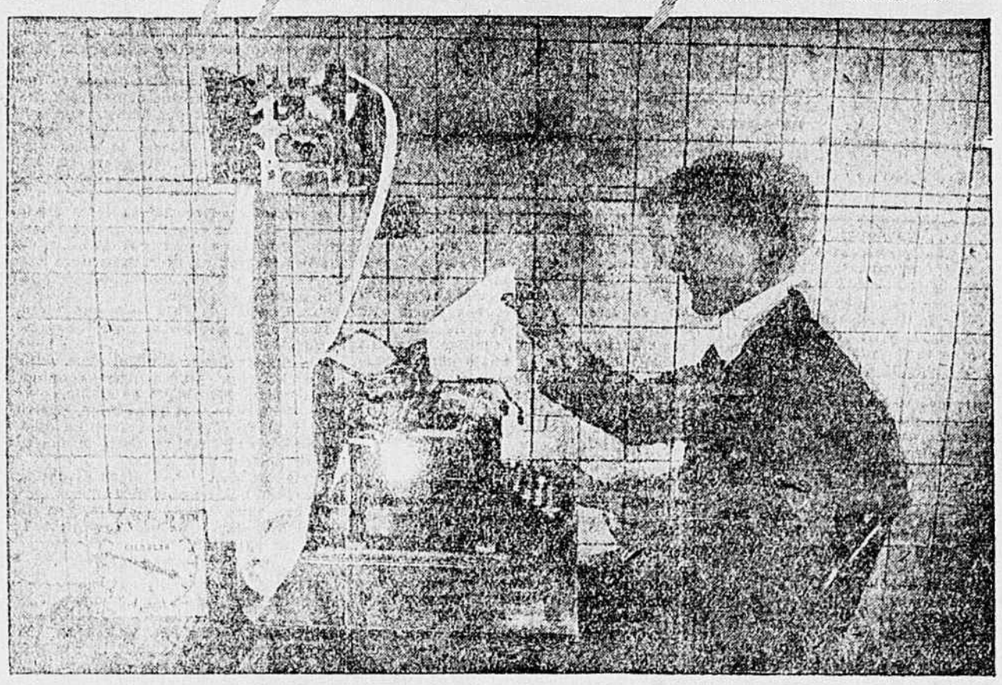
How the U.S. Plans to Restore War Cripples to Usefulness

The Remarkable Study of Workers' Motions That Will Enable Even the Worst of Battle-Wrecked Soldiers to Be Self-Supporting as Long as He Has Just One Finger Working



A Part of the Photographic Chart of the Motions of a Worker Whose Legs and Body Are Totally Paralyzed, Leaving Him Only the Use of His Arms and Hands. Repairing Typewriters, Time Clocks and Other Delicate Mechanisms Are Some of the Many Kinds of Work Which the Government's Efficiency Experts Have Demonstrated That Such a Man Can Be Trained to Do.



One of the Photographic Charts Recording the Motions of a One-Armed, Partly Paralyzed Man Operating a Typewriter. The Dotted Outlines Show the Position of the Man's One Remaining Arm When Striking the Keys and When Tearing Off the Paper, Which Is Fed Into the Machine from a Roll. The Wall of the Laboratory Where This Photograph Was Made, Is Marked Off in Squares to Facilitate Measuring the Exact Extent of Each Motion.

By Rene Bache

THE fear of being so badly wounded that he will be a helpless dependent on charity all the rest of his life need never haunt any man who fights under the American flag. No matter what wreckage war makes of his body, no matter how it tears his flesh, shatters his bones or paralyzes his nerves, he can still look forward to becoming a useful member of society again, able to support himself and his family in a number of different trades or professions.

For the first time in the history of the world a nation is sending its men into battle with the most positive assurance as to their welfare when peace is finally won. Even the soldier or sailor who comes out of the present war with only the use of a single index finger remaining to him will have his choice of earning a good livelihood at any one of ten or a dozen occupations.

This encouraging outlook for the men whose crippled bodies will form a large part of the cost of making the world safe for democracy is made possible by the new science that has been organized for the especial purpose of restoring war cripples to usefulness. Its plans, begun by the Government before the war had been long under way, are already sufficiently advanced to assure the worst of war's human wrecks economic independence and, in some cases, a greater degree of such independence than many normal men enjoy.

The new science takes hold of the wounded soldier where the doctors and surgeons leave off and forms the logical and much-needed supplement to their miracles. Wonder-working antiseptics, greater skill with the knife and other advances in medicine and surgery have long been keeping the spark of life aflame in bodies so terribly maimed that humanity is often tempted to think them better off dead. But now that a way has been found of preventing these crippled men from becoming life-long burdens to themselves and the community, medical science will be justified in going to still greater lengths in saving life.

How can an armless or legless man best earn his living? What kinds of work are open to the man with only a finger and a thumb remaining on his right hand? Which positions in the business and professional worlds can be successfully filled by men who are blind, or by those who are partially paralyzed?

All these and scores of similar problems are now being solved by the new science in a special Government department at Washington. And by the time the first shiploads of wounded men begin to arrive from France it is expected to have a suitable place for every war cripple to step into the minute he is able to work.

The department is under the direction of Major Frank B. Gilbreth, a well-known mechanical engineer and a leading authority on industrial efficiency. With him are associated some of the foremost efficiency and occupational experts in America.

The science of fitting crippled soldiers back into industrial or professional life depends for its success upon what is known as motion study. This is something that has long been used by efficiency experts in their efforts to increase the worker's output and lessen his fatigue. It consists of recording, classifying and analyzing all the motions used in doing a certain kind of work and seeing how many, if any, of them can be simplified or entirely eliminated.

In an especially equipped laboratory at Washington Major Gilbreth and his associates are making elaborate photographic charts of all the 500,000 distinct and separate motions of which the normal human body is capable. Other charts will show just which of these motions are necessary in every kind of labor. Still others will give accurate pictures of all the motions which the different types of war cripples are still able to perform. A comparison of the labor motion charts with the chart of the motions possible to any given cripple will reveal in short order all the occupations into which this particular man will fit.

The unattractive but exceedingly serviceable working arm designed by Prof. Amar for one-armed French soldiers. The socket can be fitted with different appliances especially adapted for certain kinds of work. It is proving serviceable for shoveling, as shown in the photograph, and for other kinds of heavy outdoor labor.

Take, for instance, a soldier who has suffered the loss of an eye, one arm and both legs, whose body has been almost completely paralyzed and his remaining arm partly so. To ascertain whether such a man can operate a typewriter, Major Gilbreth would first make photographic charts of his motions to determine how much the fingers of his remaining hand can be used, whether he can hold that hand over the keyboard, and also whether his paralysis permits the swaying of his body a distance of two inches backward and forward.

If he can do these things, Major Gilbreth will know at once that he can operate a typewriter, and if his previous education is sufficient he will promptly be trained for that work. The photographic studies of a normal man operating the typewriter, have, you see, demonstrated that the work can be done with one hand, provided the operator still retains enough control over his body to be able to sway it back and forth two or three inches.

But how, you will say, could a man thus crippled insert and withdraw the paper from his typewriter? This is only one of many similar difficulties which Major Gilbreth and his corps of efficiency experts have already surmounted. They did it by devising a typewriter which carries a big roll of paper instead of single sheets and which permits the paper being cut or torn off with one hand.

The designers and builders of typewriters and every kind of machinery are being organized in an effort to find ways of changing these machines so that they can be operated by men physically subnormal. Thus the man who before the war was an expert operator of a machine that required a certain amount of use of his feet may find, if he is so unfortunate as to come back from France with both legs gone, that the machine has been skilfully altered so that he can still operate it with his hands alone.

It may be said that a soldier crippled in such a way as the one we have described will never be able to compete successfully with normal typewriter operators. It must be remembered, however, that cripples often attain wonderful dexterity with the few muscles whose use remains to them. The case is the same as with the blind whose other senses become much more acute as their sight fails.

With the proper training, a cripple who was naturally adapted for typewriting could undoubtedly do as good and as much work as a man with two hands who was not fitted by nature for such work. And the ability to operate a typewriter even at a very moderate degree of speed might very possibly be of the greatest service to a crippled soldier in connection with other work he could do.

The typewriter, of course, presents many unusual difficulties for anyone lacking the use of half his fingers and thumbs. Major Gilbreth cites it as one of the most striking examples of the wonderful possibilties of the new science of restoring cripples to usefulness.

The work of this Government department will not end with pointing out several jobs that a cripple could fill. Each case will be studied individually and each man will be assigned to work for which he is best fitted by education, experience and natural talent. And when this work is found he will be trained in it by experts until he is able to attain an efficiency that in many cases is expected to equal that of the great majority of normal men.

The method of making the photographic charts of motions on which the new science relies is a long and complicated one, requiring most painstaking care in order to insure absolute accuracy. The crippled or normal worker whose motions at some occupation are to be studied is placed in the centre of a specially constructed room and surrounded by a battery of motion picture cameras. The instant the worker starts the cameras begin reeling off their record of his motions, taking them from all possible angles.

Experts with stop watches watch the operations and record the time consumed by each part of them. The pictures made are then studied with the greatest care to see just which of the motions are absolutely necessary and which might be eliminated or might be performed either by some other part of the body or by the addition of some simple automatic device to the machine used. The worker is photographed time and again before the experts decide that they at last have a chart in which motions are reduced to their simplest form and number.

"With this extensive chart system," says Major Gilbreth, "it will be possible to know almost instantly just how many different occupations a crippled man may be capable of filling. It will not be necessary to wait until he is discharged from the hospital to begin thinking about his future, and we will not have to leave him dependent upon the charity of the nation and his friends while he makes a hit-or-miss effort to find something at which he can earn a living.

"Our work is so comprehensive and is being so carefully thought out that it permits of more surprises and provides for every possible emergency. Even before we have seen the man himself we will almost know from his hospital record just what work he can do and how to go about educating him for it."

The departments of labor in the various States are being asked to co-operate with Major Gilbreth's department in finding possible employment for crippled soldiers. In Pennsylvania two sets of questions seeking information on this subject have been sent out to more than 25,000 employers.

The first of the questionnaires asks employers to indicate the number of positions in their plants where men suffering from various types of disability could be advantageously employed, ranging from loss of fingers on one or both hands, through thirty-eight different classes of disability, including blindness, deafness, loss of speech, repulsive facial disfigurements, and general health impairment which would prevent heavy manual labor. The results from this questionnaire will provide a complete card index for the State of Pennsylvania, indicating where men handicapped by various degrees of disability as a result of their war service may be placed in proper employment to be not only self-supporting, but also be of material aid to industry itself.

The second questionnaire requests employers to indicate positions in their plants now held by disabled workers. This will provide the department with extensive information indicating possibilities of employment for men disabled in war service.

The huge collection of motion study charts which Major Gilbreth is making may be of the greatest service outside of the especial purpose for which it is being prepared. It has already been suggested that many of these may be used to excellent advantage in speeding up the work of munitions factories and other industries which are falling far behind in their efforts to supply the needs of the nation's army and navy.

This Is the Elaborate French System for Testing the Strength of a Soldier Who Was Badly Wounded in the Legs, in Order to Find Out What Work He Is Still Capable of Doing. With Breathing Apparatus Fastened Over His Mouth He Is Made to Pedal This Stationary Bicycle as Fast as He Can. The Apparatus on the Table Records the Exact Amount of Power Developed By His Legs, and Also the Rate of His Lungs' Respiration.