GENERAL SCIENCE

Half Million Scientists

This estimate by the director of the National Roster of Scientific and Specialized Personnel does not include medical and social sciences.

➤ THERE ARE between 400,000 and 500,000 trained or qualified scientific men and women in the country, excluding the medical and social sciences, and the services of nearly all of them in some way contribute to or support the war effort.

This is the estimate of Dr. Leonard Carmichael, director of the National Roster of Scientific and Specialized Personnel and president of Tufts College, in a statement in *Science* (Aug. 13).

There is reason to believe, Dr. Carmichael states, that over three-fourths of the half-million or less scientists are engaged directly or indirectly in war work. This includes those who are in the Army and Navy and who use their scientific training not necessarily in the scientific specialty for which they prepared.

"Our colleges and their laboratories, our industries and their laboratories, and our government and its laboratories," Dr. Carmichael says, "have become an integrated partnership in the prosecution of a war in which the full might of our scientific and technological capacity is brought to bear upon the enemy.

"Thus, when an individual scientist, without complaint and without heroics of any sort, willingly relinquishes a higher paying and more conveniently located job in order to assume a particular wartime task, his decision to transfer more often than not is based on the higher need for his services in the new undertaking rather than because of any lack of contribution to the war effort in the position vacated. To the individual scientist, the question today is not 'where can he serve' but 'where can he serve best.' Cold figures can not tell his story, but the enemy has already been made to understand it."

Making an estimate of the number of scientists in war work is difficult, Dr. Carmichael explains. He analyses the physicists as an example. There are somewhat more than 7,000 men and women in America who have a master's degree or the equivalent in physics. There are 4,000 more with bachelor's degree who have been treated by the National Roster as professional physicists. This might justify the statement that there are 11,000 physicists in America. On the other hand the number of them who are capable of doing advanced independent research is 2,000 or at most 3,000.

Science News Letter, August 21, 1943

ENGINEERING

Pre-Stressing Lengthens Life of Machine Parts

➤ MATERIAL INCREASES in the life span or fatigue strength of machine parts, as in airplane or automobile engines, can be obtained by pre-stressing the surfaces of these parts. This suggestion was offered by J. O. Almen of the General Motors Research Laboratories in a report prepared for the Society of Automotive Engineers.

There has been no marked advance recently in super-strength alloys, Mr. Almen pointed out, or any other engineering improvements in the life of dynamically loaded parts. The idea of pre-stressing is not a new one either, for that matter. Our village blacksmith knew and used this technique in making wagon and buggy springs, axles and other heavily loaded parts. After the parts were forged into shape they were severely hammered to improve their strength.

Since fatigue failures result from tension stresses, never from compressive stresses, and since any surface, no matter how smoothly finished, is a stress raiser, he suggests pre-stressing a thin layer of the specimen through compression by shot blasting, peening, hammering, tumbling or by pressure operations by balls or rollers. Tests have shown an increase in fatigue strength whether applied to highly finished or roughed surface specimens. Excessive compression can undo all the value of surface compression. Therefore precaution must be taken to see that there is an equalization between the internal tension stress and the compressed surface.

Corrosion and surface damage causes fatigue stress. Highly finished surfaces may give one a false sense of security, for in the process of finishing, generated heat promotes serious surface tension stress. Other undue surface stresses can be caused by machining, metal cutting or metal punching. In bolts, the weak points are in the thread and in plating the thread with a soft metal to avoid corrosion. Rolling the bolts will increase their fatigue durability. He thus points out that there is a definite place in future design for application of fatigue studies. Emphasis ought to be placed on fatigue surfaces and mechanical failures instead of always examining the fault from a metallurgical standpoint. Metallurgical examination is only part of the answer to the materials' failure. Fatigue of materials should be studied by all three departments — metallurgical, engineering and production.

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ENGINEERING

Air-Conditioning Unit for Small Houses Patented

➤ A GREATLY simplified, light-weight air-conditioning system for small homes, which can be installed in existing buildings, is an outstanding item among the 558 inventions on which patents have recently been granted by the U. S. Patent Office. It is the design of R. E. Gould of Oakwood, Ohio, who has assigned rights in his patent, No. 2,320,035, to the General Motors Corporation.

Most air-cooling apparatus for dwellings combines motor-compressor, cooling coil and circulating fan in a single unit, which has to be installed in the attic. But such a unit is usually too heavy for the attic of a small house. Mr. Gould obviates this by the simple device of placing his motor-compressor in the basement, leaving only a simplified, light-weight cooling coil and blower to be installed in the attic. The refrigerating unit in the basement cools water from the city mains, which is then carried to the cooling coil in the attic. At times, the inventor points out, the city water will be sufficiently cool so that it will not be necessary to operate the mechanical refrigerating unit at all.

The complicated system of ducts used in conventional air-conditioning systems is also dispensed with in this invention. The cooled air from the attic is simply permitted to flow down stairways and through halls, its distribution being assisted by leaving windows slightly open.

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