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ENGINEERING *and* HEALTH

PLAINTIFF'S EXHIB
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By HARVEY N. DAVIS

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R FRIENDS the doctors belong to an appealing profes-ion. They deal with human suffering and work mira-les of relief. The practicing physician touches the is patients and their families in times of minor or ma-, brings calm competence for them to lean on, initiates ul activity when the urge to do something is especially nd renews and strengthens the courage of all con-. The hospital provides, sometimes a little too im-ly, but nevertheless effectively, a kind of care that the household can but seldom afford. The research worker icine wins dramatic victories over one disease after by methods that the educated layman can compre-en if he cannot fully understand the detail of the technique. To the general public it all seems like a personification of science at its best, working untir-of the benefit of mankind. Perhaps it is for this rea-, at least in reasonably prosperous times, generous-men and women are so easily persuaded to make liberal hospitals, medical schools, and institutes for medical

own profession commonly makes no such emotional ap-the lay public. Our achievements are too often thought aving an industrial rather than a human significance. n in the street admires and trusts the engineer in a blind metimes extravagant fashion, but this admiration tends cold and impersonal as that which he accords to one of chines. Does not the engineer deserve a warmer and ffectionate appreciation? If only we could make clear to rs and to the public some of the things we are doing or to do, that touch intimately the personal lives of men, we not hope that the respect now commonly accorded us tinged with more of the emotion-stirring loyalty that an inspire active cooperation?

With this thought in mind that I have chosen to inquire t extent the engineer can be thought of as rivaling the ian in the promotion of health. In appraising this competition, let us not forget that, while the engineer's ements are never as dramatic, spectacular, or individual-is the saving of a life or the restoration of a sufferer gorous effectiveness, the engineer deals, not with indi-s, as do most physicians, but with the great masses of women, and children that constitute modern communi-If, then, the intensity factor of his health work is, per-less than that of the physician, its quantity factor is, in l, immeasurably greater. But any appraisal of the effec-s of any sort of work, in physics or in life, depends on agnitude of a product containing both an intensity and a ity factor. If, then, the intensity factors of the various eering activities that promote health are found to be far r than that zero which alone could nullify the significant ct, it is, perhaps, not unreasonable to suggest that the en-rs of today are contributing quite as much to the promo-f health as are the physicians.

e most obvious, because the most direct, contributions of neers to the promotion of health lie, of course, in the field of sanitation. By bringing abundant supplies of pure water into towns and cities, a boon that only those who have lived or traveled in arid regions can fully appreciate, by building sewers and sewage-disposal plants, by modern methods of refuse collection and disposal, by the invention and fabrication of modern plumbing fixtures which make cleanliness easy, and by a patient persevering fight against atmospheric and stream pollution, engineers have undoubtedly saved many lives and relieved the world of much suffering. While the medical men have had to lead the way in attacking such diseases as hookworm, malaria, and yellow fever, it has been the sanitary work of engineers that has put this hard-won knowledge into practical effect on a large scale over considerable areas. Indeed in the whole field of public-health work and of preventive medicine in which so many forward-looking physicians are actively engaged, engineers are their indispensable allies. The tremendous influence which these various sanitary and other advances have had on the general health level of the population as compared with that which prevailed in the middle ages is too striking to require further comment.

In the important matter of diet also, the work of the engineer has been of importance. By the development of tin plate and of intricate machines for fashioning it, he has made possible the canning of food on a tremendous scale, thus broadening and enriching the diet of the nation, and making available at all seasons, and in the most out-of-the-way places, foods rich in vitamins and hormones. The development by engineers of refrigeration on ships, on trains, in cold-storage warehouses, and in the home, including the newest methods of quick freezing, has contributed to the same end. Irrigation, often involving engineering projects of enormous magnitude, has helped the farmer to produce food in greater abundance and often of finer quality. Still more fundamentally, the ships, trains, and motor trucks, by means of which most of the food of the nation is brought to those who consume it, were invented and developed, and are fabricated and maintained by engineers. Without them no modern urban population could exist. By these means engineers have profoundly affected the dietary habits of whole nations and have made possible the elimination of deficiency diseases and of the lowered resistance to infection that malnutrition causes.

In the matter of housing, also, engineers have played their part. They have improved the materials and methods of construction, and therefore both the availability and the usefulness of buildings of every sort. They have flooded houses, offices, and workshops with eye-saving light. They have provided the central heating plant that insures a uniform controllable temperature throughout a house. Air conditioning is just around the corner. By developing transportation they have enabled an urban population to find over a far-flung area more healthful living conditions than were available even to the well to do of, let us say, two centuries ago.

In all these obvious ways engineers have contributed to the maintenance and improvement of the health of vast numbers of people. This is, however, by no means the whole story. There are certain other activities of engineers that have an even more significant effect on the health level of a nation.

Consider first, all that is involved in what is called a national

ater address delivered at the Semi-Annual Meeting, St. Louis, June 20–23, 1938, of THE AMERICAN SOCIETY OF MECHANICAL NEERS.