

to the hardy mariner. He must obtain his domestic charts from the Department of Commerce, his foreign charts from the Navy Department, and his nautical almanac from the Naval Observatory—and he will in some circumstances get sailing directions from the Army. In a fog he may get radio signals from both the Navy and Commerce, and listen to fog horns and look for lights and buoys provided him by Commerce; if he sinks his life is saved by the Treasury. He will anchor at the direction of the Army, who rely upon the Treasury to enforce their will. His boilers and lifeboats are inspected by the Department of Commerce; his crew is certified by one bureau in commerce, signed off in the presence of another, and inspected at sailing by the Treasury, and on arrival by the Department of Labor.

It is possible to relate the same sort of story in our governmental relations to industry to our domestic and foreign commerce.

The moral of all this is that economy could be made by placing most of these functions under one head, not only economy to the government but to the mariner. Congress would know what it spends in aid to navigation and the government could develop definite policies in giving proper assistance and lastly could remove from the hardy mariner's mind his well-founded contempt for the government as a business organization.

The economic changes in the world, growing out of the war, and their reflex upon our trade and industry make it vital if we are to maintain our standards of living against increasing ferocity of competition that we shall concentrate and enlarge our national effort in the aid, protection, stimulation and perfection of our industrial and commercial life. There can be no real Department of Commerce or commercial policies to these broad purposes so long as the instrumentalities of the government bearing on these questions lie in half a dozen departments.

We want no paternalism in government. We do need in government aid to business in a collective sense. In a department we do not want to either engage in business or to

regulate business. We need a department that can give prompt and accurate diagnosis from both a foreign and domestic point of view of economic events, of economic tendencies; of economic ills; that can promptly and accurately survey economic opportunity, economic discrimination and opposition; that can give scientific advice and assistance and stability to industry in furnishing it with prompt and accurate data upon production, supplies and consumption; that can cooperate with it in finding standards and simplifications; that can by broad study promote national conversation in industry and the elimination of waste; that can study and ventilate the commercial side of our power possibilities; that can study and advise national policies in development of rail, water and overseas transportation; that, in fact covers, so far as government functions can cover, the broad commercial problems of trade, industry and transportation. This can be accomplished more by coordination of existing governmental facilities than by increased expenditures.

THE AMERICAN ENGINEERING COUNCIL¹

IN these days when societies multiply and increase it is a fair question to ask whether there is need for such an organization as the Federated American Engineering Societies. That many believe there is such a need is attested by the large number of societies that have already joined the organization and by the promise that others will come in. Aside from this, however, it is well to clear our minds as to just what the aims of this organization may be and what it may hope to accomplish. I am not unmindful of the vast amount of useful work that has been done by individual engineering societies in this country, not only in the somewhat varied lines for

¹ Address by Dexter S. Kimball, dean of the college of engineering of Cornell University and vice-president of the American Engineering Council, at the dinner given by the Engineers' Club of Philadelphia, April 16, in honor of Mr. Herbert Hoover.

which they have been specifically organized, but also in a broader way as affecting state and national issues. At the best, however, these individual organizations are concerned, for the most part, with service to the individual, and while not confined to such, these societies have been able to work in a broad way for the public welfare only through combined organization of some kind. All thinking engineers are aware of the inefficient manner in which much of the engineering and industrial features of our government, city, state and national, are conducted, and the experience of our local engineering societies in working for a better and more economical policy in the conduct of these affairs in cities, as well as the success that has attended such organizations, as the Engineering Council, in trying to assist on questions of broader scope all lead to the belief that a Federated Engineering Society, which can speak for all engineers in the important affairs concerning which we are justified in speaking, must be productive of beneficial results. It is almost axiomatic that in a nation such as ours where industry is the great factor of our existence these statements must be true. Industry is the life of our nation, and engineering is the backbone of industry. Surely if any class of men have a right, or better still, a duty, to band themselves together for the betterment of the fundamental industrial principles of our nation, engineers, using the term in a broad sense, have full justification for so doing. These are matters of common knowledge to all engineers and scarcely need to be defended or explained.

There is, however, a much greater and deeper reason in my opinion why we have need for a society of this kind. We are all prone to think that the problems of our day and date are peculiar and unlike any that have gone before. As a matter of fact, history teaches us just the contrary and a superficial examination of any of the great civilizations that have preceeded us will show that basically they differ very little from the one that we now enjoy. The great fundamental principle of all civilizations is division of labor;

at once the most effective tool that man has ever devised, it is at the same time the cause of his greatest difficulties. Because, wherever division of labor is employed, coordinated effort necessarily follows. We know of no civilizations built up by a single individual, though Robinson Crusoe is reported to have made a very good effort. Nor do we know of civilizations that were built up by a limited number of persons. Basically, civilization is possible only where there is a wide use of division of labor accompanied by coordinated effort. But with coordinated effort comes always the difficult problem of awarding fairly and justly the fruits of labor, and from the beginning of time men have wrestled unsuccessfully with the problem of "what is mine and what is thine." As far back as we can read history we find industrial codes aimed at the solution of this difficult problem. The Mosaic code, based on a much more ancient Egyptian code, the remarkable code of Hamurabi and a still more ancient code recently discovered, all bear witness that this problem is very ancient indeed and has always been the one great problem incident to the use of division of labor and the building up of a civilization. The solutions offered by these ancient codes are for the most part of a legal character, often very arbitrary and intended more as a means of keeping the peace rather than as a solution of the problem on the ground of merit and justice. And to a large extent we have inherited these viewpoints in our modern industrial codes.

Wherein does modern industry differ from these ancient civilizations? The advent of the modern machine era and the extension of the use of scientific methods have carried division of labor to a degree undreamed of by our ancestors a few hundred years ago. If the ancient civilizations were complex ours is infinitely more so and the difficulty of defining "what is mine and what is thine" has increased many fold.

And the solutions we have been offered for this problem are many and curious. The advocates of single tax, prohibition and women's rights, of various kinds of tariff,

of various schemes of taxation are all quite sure that if their measures are enacted the millennium would be here. If the ancient civilizations were complex ours is chaotic, and further extension of our complex industrial system makes this personal problem more and more difficult.

Out of this chaotic condition, however, three viewpoints to-day stand out above all others and are well worthy of careful consideration. The first is the conviction that is rapidly taking root in the minds of thinking men that industry should be considered a means of supporting the human race, and not as a means of personal corporate or state profit: the conviction furthermore that all men are entitled to a certain amount of physical, mental and spiritual well-being, and that the nation which can develop such well-being is the one that will endure.

The second is a conviction that no adjustment of these difficult industrial matters can be enduring that is not based upon justice. It is true that justice varies with time and place, but whatever stands for justice at the time and place considered, is the only basis on which enduring industrial adjustment can rest. This conviction differs from the old legal viewpoint quite markedly, and it is well illustrated in our changed point of view concerning accident compensation. For hundreds of years accident compensation was based on legal verdicts inherited by us from old English common law and having sometimes little to do with justice. The modern compensation law is an effort to adjust these matters on the ground of justice and the fair deal.

The third conviction is that there can be no justice where there is no knowledge. Any one who has read carefully the history of industrial disputes during the last few years can not fail to be impressed with the truth of this statement. Wherever a wide knowledge of fact can be obtained, adjustments usually are not difficult, but an enduring adjustment can never be accomplished where facts are not known.

What has this to do with the work of the engineer? A very great deal indeed. A few

years ago the engineer was looked upon as one who built and designed machines or structures. With the growth of his technical and scientific background it has become necessary for him to assume the management of industry and to-day he stands as the foremost figure in industrial management. This has brought him for the first time in close touch with the human element of industry and face to face with the great problem of the distribution of wealth. Up till recent times he was not expected to know of these matters and much less was he expected to have any wise ideas as to the solution of the problem. It should be remembered, however, that the engineer in thus enlarging his field has brought with him the most powerful mental tool that the human has devised, and which we call commonly the "scientific method." With this method he has conquered and subdued nature. At the present time he is teaching the human race a better and more efficient means of organizing industry. It remains to be seen whether he can apply this method to the solution of the old time problem of "what is mine and what is thine." It should be remembered that this problem has been wrestled with by many able minds but it will also be remembered that many of those who have given much time and thought to these problems did not have the intimate knowledge of industry, and of those who work in industry that is the possession of the engineer to-day. If he undertakes the solution of this problem with the same energy and vision that he has applied to fields that he has already conquered, I am hopeful for the result.

I see, therefore, in the Federated Engineering Societies something more than an organization to assist city, state and nation in the solution of technical problems. I see in it an opportunity for the engineer to study and to solve the last remaining problem of civilization. I see in the society a means of gathering data on the industrial problem such as we have not possessed and in general of obtaining that knowledge, which as I have

already indicated, is absolutely essential to this great problem.

And I am not without hope that the engineer will qualify for this work. There are many indications that their ideas are stirring in the minds of forward-looking men. At the last election Mr. James Hartness, well known as an engineer and inventor, was elected to the Gubernatorial chair of the State of Vermont, an honor, so far as I know, that has never before been conferred upon an engineer. And it was with the greatest satisfaction and pleasure that engineers, not only in this country, but elsewhere, viewed the selection of Mr. Herbert Hoover as Secretary of Commerce. These are pioneer workers in a field hitherto controlled by the lawyer and the politician, and their progress will be watched with the keenest interest and sympathy by all engineers. Of the success of their mission no engineer has the slightest doubt, for we are well aware that these men will bring to the problems of state the methods that have enabled the engineer to subdue nature and build up civilization.

Can there be any question that back of a movement as great as this we need an all-embracing Society of Engineers; a society whose business it will be to foster the solution of the great problems of industry which are the problems of the engineer. The functions of such a society will differentiate sharply from those of an individual society in that as before stated, the individual society is more likely to deal with service to the individual. This society is organized for service to the nation. It is a challenge to national service. There is no question in my mind that it has a bright future and is worthy of the support of engineers of all kinds and in all places.

PLAGIARISMS

THERE have been published in recent numbers of *SCIENCE*¹ communications from correspondents more or less involving the interest

¹ *SCIENCE*, January 14, 1921; February 11, 1921; March 4, 1921.

which revolves around what we are apt to call plagiarism. They are concerned for the most part with matters of not very serious import in scientific circles and the communications are marked by courtesy and good humor. These amiable features are sometimes absent in the more earnest and specialized realms of research and the whole subject is only too often conducive to unfortunate and wearying controversy and to permanent and deplorable enmities between the best of men and those least likely, one would think, knowingly to rob a fellowman of credit for original work. One not himself drawn into the heat of such conflicts is often led to believe that a more thorough understanding of some of the implications and correlations, a more just appreciation of the numerous underlying springs which move the human mind would modify it. A more constant keeping in view the history of science, a realization of how numerous are the expositions of facts, before the world becomes attentive even to the most obvious of them, would cause these deplorable incidents to become less frequent. The character of the recent outbreak in *SCIENCE* was mild and it was devoid of bitterness, as most incidents are which present such examples of the humor and worldly common sense of the participants, as these communications do. The chances of unfortunate consequences being remote it is perhaps an opportune time to say something of the broader aspects of the subject of plagiarism.

Its wide affiliations are best appreciated in an analysis of the underlying principles to which I have referred. Many will be disposed to criticize what may seem the too wide significance I give to the term. Many look upon it only as one of evil import. However, it is easier to expand its usual limitations a little than to find or invent a name which after all would only here and there overlap the commonly accepted outlines of the usual term.

Its most sinister acceptation interests us but little. When a man affixes his name to a long essay or a book which another man has written it would perhaps be better to call it thievery. I remember one such instance