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Perpetuating a Blunder

PRESS announcements, said to have been inspired by the State Department, make the point in discussing the Geneva Protocol, soon to be voted upon by the Senate, that the leadership which America assumed at the Washington Conference on the Limitation of Armament would be jeopardized and the United States placed in the position of having first proposed that chemical warfare be abandoned and then of having repudiated its own proposal, if the protocol fails of ratification. Are the best interests of the United States to be jeopardized by a lack of courage on the part of our Government in frankly admitting that a blunder was made at the Washington Conference?

Our readers know that the general committee first sought the advice of the committee of technical experts, of which Edgar F. Smith was chairman, but refused to take their report into consideration, and therefore remained incompetent to decide the points at issue, having no knowledge for their guidance other than that derived from pacifist propaganda. France, closer to the possible danger than the other powers, has steadfastly declined to ratify that part of the treaty, and therefore none of the nations attending the Washington Conference are actually bound. Nevertheless, in some respects the United States has continued its work as if the treaties were in effect.

It is said that the object of the Geneva Protocol is to make it possible for nations not present at Washington to adhere to the same principles. If that is all, it would seem unnecessary for the United States to reaffirm her position. Reports to the League of Nations, upon which we commented last month, and the suggestions of still other committees lead to the belief that there is a well-organized and persistent effort being made to leave countries well equipped chemically for national defense unprepared and practically defenseless through a control of the chemical industries themselves.

A blunder was committed at the Washington Conference for the Limitation of Armament. If we refuse to correct that blunder and insist upon following it through to its logical conclusion, we may be called upon to entertain seriously some suggestions that are utterly absurd. The State Department urges the adoption of the Geneva Protocol, so that we may not be inconsistent with the action of the Washington Conference. The next step is already under consideration in some quarters and is to the effect that the nations bind themselves to make no appropriations and offer no subsidies for the promotion of work incident to chemical warfare, either as a defensive or offensive weapon. To be consistent, we shall have to subscribe to this proposal, and do away with even our present limited activity, which seeks only to acquire such information as would enable us to defend ourselves in case of emergency.

Then comes the League of Nations, admitting that no practical plan for the abolition of chemical warfare has been devised, and says that the only way to regulate it is by the international control of the chemical industry. And since we have gone on record and affirmed our stand, if we are to be logical and consistent we must submit to such control. While those now in authority give assurances that submission to such dictation is not contemplated, men and administrations change.

Thus, step by step, for the sake of being consistent and of maintaining our leadership as a nation desiring a restriction of armament, we shall find ourselves not only forced into a helpless, defenseless position, easily overcome by any who, on occasion, disregard international agreements, but with our chemical industries more or less under the dictation of foreign groups which are as much interested in the situation for commercial reasons as for peace.

The Geneva Protocol itself provides that after one nation has violated its agreement, the other nations are considered to be at liberty to retaliate, which shows to what extent the signatories have their fingers crossed.

In common with some other misinformed enthusiasts, the State Department and its spokesmen continue to refer to the inhumanity of chemical warfare. If we are to discuss various forms of warfare in terms of humanity, shall we take the word of the State Department, or shall we go to the American Legion, the Association of Military Surgeons, the Military Order of the World War, or the Reserve Officers' Association? These groups, which have had experience, say that the use of poisonous gases in war is more humane and less destructive of human life and less productive of human suffering than other methods of warfare.

There is nothing to gain but much to lose by refusing to ratify the blunder made at the Washington Conference. The State Department may be embarrassed by a failure to ratify the protocol, but such embarrassment would be of less consequence to the American people than submission to the progressive moves being made to impair our defenses.

Shall Industry Be Blamed?

A CHEMIST or two appear willing to debase their science and to assume a considerable risk for the sake of turning a few pennies. Advertisements have reached us offering to supply, to any who will purchase, certain chemical reagents which, in skilled or unskilled hands, can be relied upon to detect a long list of substances now authorized as denaturants for industrial alcohol. We have not read the directions which undoubtedly accompany the material supplied, but we are reminded of our courses in qualitative analysis, and while we know that some types of tests can be made by one unskilled in chemistry, it seems a grave matter to encourage the average man to risk his health or life on his interpretation of such a test.

Not only do all those connected with such enterprises assume a serious risk, but we anticipate that industry will be blamed in case of deaths which may follow the decision of the layman who, after making these tests, decides that a

given liquor is potable. In the minds of many it is always the diversion of specially or completely denatured alcohol that is responsible for a series of tragedies and, as has been noted before, the Government has even been accused of poisoning the people. It is not the Government that is to blame, for under the supervision of qualified men the Government allows to be distributed a carefully labeled material which, by odor and taste, gives warning that it is unfit to drink. If poisoning and deaths occur, the fault lies with those who illegitimately endeavor to unravel denatured alcohol and with those who provide the inexperienced layman with tests which he is led to believe can be made with security with his untrained hand and eye.

International Coal Conference

NOW and again an individual or a group renders a conspicuous service to science and the industries which depend upon it. The Carnegie Institute of Technology, and particularly President Baker, have performed such a service in arranging and successfully carrying out plans for the International Conference on Bituminous Coal, held in Pittsburgh November 15 to 18. Some fifteen hundred were in attendance, including a large group of chemists and numerous representatives of the petroleum industry intensely interested in promised developments.

Interest naturally centered about the reports of advance abroad. Progress of research upon the carbonization of coal in Great Britain was ably reported by C. H. Lander, director of the Fuel Research Laboratories, and the hydrogenation of carbon monoxide to produce hydrocarbons and their oxygenated compounds in France and in Germany was discussed by such leaders as Georges Patart, Franz Fischer, and Friedrich Bergius.

Europe, always more careful of natural resources than America, has been taught a further lesson in economy by the World War. This has had a stimulating influence in the definite search for petroleum substitutes, and in this we find many examples of those factors usually found in research work of any magnitude. These scientists have worked on undaunted by the enormity of the problem. Bergius produced ordinary anthracite from sawdust, a most difficult piece of work, merely as a preliminary to an understanding of the constitution of coal to guide him in achieving his main purpose—the direct liquefaction of coal. The extent to which research upon complex problems lies in the field of large organizations was emphasized. In the Bergius development approximately one hundred and fifty men have been constantly employed and millions of dollars spent during the past fifteen years. We also find a pleasing example of international cooperation, for at present this work has the advantage of an advisory committee, containing two representatives of the British Fuel Research Laboratories where a duplicate experimental Bergius unit is being erected.

The splendid accomplishments of Professor Fischer emphasize the great potentialities of catalysis. His announcement gave data revolutionary in character. By the perfection of catalysts he now synthesizes a variety of petroleum hydrocarbons from such simple materials as carbon monoxide and hydrogen, at atmospheric pressures and at temperatures below 300° C. By selecting the proper catalyst and regulating pressure and temperature, products are obtained ranging from methanol on through the higher alcohols, as accomplished by Patart, to oily products and paraffin-like bodies, as obtained by Fischer. Although it has been recognized that many catalytic reactions could not be considered wholly satisfactory so long as great pressures and high temperatures were essential, improvements in catalysts, particularly for the synthesis of ammonia, have rapidly advanced. Longer life and higher yields have been the result. It has remained for this conference to hear of work on a large scale at atmospheric pressures and comparatively low temperatures. At atmospheric pressure with cobalt or iron as a catalyst, Fischer has been able to obtain, at will, hydrocarbons varying all the way from propane and butane through gasoline and lubricating oils to paraffin, the determining factor being the alkali mixed with the catalyst.

It is also important that the men who have originated the problems and prosecuted the research are the men who continue to lead the work now that it has entered upon commercial phases. The mechanical triumphs are noteworthy, as shown by Bergius' success in causing a plastic mass of coal and oil to flow through pipes, be pumped into reaction vessels under high pressures, and pass from one such vessel to another in the two stages of hydrogenation. Not only are the scientific accomplishments outstanding but the engineering as well.

This new work takes on significance, even though we in America as yet seek no substitutes for petroleum. It is applicable to some of our domestic problems, such as the utilization of tars and coke derived from coal and petroleum, and as a factor in our expanding gas industry. We may properly even now consider material supplementary to petroleum to prolong our supplies of automotive fuels. No one knows just how long our petroleum will meet our requirements. It is probable that liquid fuels from coal will compete with such fuels from oil shale.

For a long time we looked upon alcohol as a possible supplementary fuel to gasoline. In addition to the inadequate supply, even under the best conceivable conditions for annual growth of sugar- and starch-bearing plants in the Tropics, we have come to realize that as much energy is required for the production of the alcohol as would be derived from burning it in a motor. Alcohol will undoubtedly play some part in our fuel program, but at the moment it seems certain that a supplementary fuel of importance will be derived from coal, not as a by-product of distillation, but through either the synthesis of hydrocarbons by the hydrogenation of carbon monoxide or the direct liquefaction of coal itself. Geologists tell us that to date we have used but 25,000,000,000 tons of the 3,140,000,000,000 tons of coals available in the United States. With such reserves of raw material and such progress in efficient utilization as reported at the coal conference our future supply of motor fuels seems assured.

The Carnegie Institute of Technology has cultivated a new field of useful work in conceiving and organizing the conference. It certainly has established its claim upon future activities in this field, and of all places Pittsburgh seems peculiarly well fitted as a center for such discussions. We applaud President Baker and his colleagues, and hope that future conferences may be held at such times and along such lines as the best interests of all concerned may dictate.

Helium Underseas

DISCUSSIONS have centered to such an extent about the use of helium in balloons that it is something of a surprise to find it important in undersea explorations. Deep-sea divers follow an occupation made more hazardous by the absorption of nitrogen by their bodies while working under pressure. Nitrogen exists in the blood and body tissues in simple solution, and the amount that will be dissolved depends upon barometric pressure, temperature, and the coefficient of solution of the gas. When a diver has been exposed to an atmosphere at high barometric pressure for some time and this pressure is subsequently released, bubbles

will form in the tissues and blood vessels unless sufficient time at gradually reduced pressures is afforded for the gas to escape quietly into the blood and thence from the lungs. This difficulty is called caisson sickness or "bends." The bubbles are most dangerous if formed in the spinal cord and brain, causing paralysis or death, and the control of decompression to prevent the formation of bubbles is one of the most difficult problems in caisson and diving work.

The coöperative experimental work carried on by the Navy, United States Public Health Service, and the Bureau of Mines, has shown that by replacing the nitrogen of the air with helium and also reducing the oxygen content below that of normal air, a synthetic atmosphere can be made that will permit decompression in one-third to one-fourth the time required for air, and that the deleterious effects from nitrogen poisoning can be prevented. The advantages of helium are that it is only about half as soluble as nitrogen, thereby greatly reducing the amount of excess gas that a man will accumulate under pressure, and also, because of its smaller molecule, it will diffuse more rapidly than nitrogen and hence facilitate the escape of the gas.

The first notable work in which this synthetic atmosphere was used was in salvaging the hull of the U. S. Submarine S-51. The possibilities of using the synthetic atmosphere of helium and oxygen during the entire period divers are under pressure would be almost unlimited but for the high cost of helium, and instead of an hour on the bottom at 135 feet, nearly two hours could be spent without increase in hazard. Work could also be done at greater depths, making possible the salvaging of many wrecks now beyond reach.

Helium, which sprang into prominence as a result of the war, like many other war babies, has now grown up to do useful work in a world at peace.

Modern Competition

THE changes that have taken place in competition in the last century are common knowledge. The small manufacturer of a hundred years ago was likely to have a fair territory to himself until the demand for his products increased to the point of attracting some other manufacturer to his locality, or until some employee became bold enough to go into business for himself. As transportation developed, the territory he could serve increased, as did the competition he had to face. Individual plants became larger and stronger, until after a time it began to be recognized that many advantages could be found in an association of companies. We then entered the so-called combination or trust era. We passed from the competition of individual plants to the competition of groups of manufacturers, which promised to end in monopolies until the Government intervened.

We have never gotten over the idea that combinations are always in restraint of trade, and few people believe that the "interests" can ever be otherwise than wicked. Our various federal commissions are careful that an association of trade interests is made as unattractive as possible, and at times the courts have required the dismemberment of efficient organizations with advantages accruing to nobody.

Transportation and communication have continued to develop. We have examples on every hand of how the world shrinks, and in many lines of business modern competition is world-wide and not only between great combinations of capital and resources but actually between nations.

The I. G. (Interessengemeinschaft) is a familiar example. None of us know its real ramifications. Beginning as a government-encouraged dye trust, it has consistently reached out in all directions to bring into its organization those producing its raw materials, the latest development being a community of interests with the Riebeck lignite enterprise.

Lately four British chemical companies have combined—Brunner, Mond & Company, the Nobel Industries, the United Alkali Company, and the British Dyestuffs Corporation. Sir Alfred Mond describes as conservative an estimate placing the capitalization at approximately 500 million dollars, and although the four great component parts of the combination are to retain their autonomy, the trust will form a connecting link in finance and policy and will be the general staff of this new unit in the fight for the world's commercial supremacy. Steps have been taken to protect the new trust from the danger of foreign control and "it is not formed with the idea of raising prices and creating a monopoly, but for the protection of both the capital and labor involved by eliminating risk and realizing the best economic results." The key to the real purpose of the merger is that the British chemical industry will now be able to deal with groups in other countries on terms of equality.

Although we are not without powerful organizations in the chemical industry of America, we continue to labor under the difficulties imposed by laws enacted nearly a generation ago, useful at the time, but woefully out of date in this era of world competition. Action on constructive suggestions should not be too long delayed, for even now industry, without the extensive coöperation possible only through such trade combinations, finds itself at a disadvantage.

Dye Costs

THE United States Tariff Commission has published a table of costs, which not only emphasizes how small a factor the cost of the dye is in the total cost of the fabric or garment, but leads one to wonder why dyes other than reasonably fast are used in the textile industry. The dye in a man's madras shirt costs a quarter of a cent if sulfur dyes are used, and only one cent if the fast vat dyes are employed. If he prefers a printed cotton shirting, the basic and chrome colors will cost a quarter of a cent and the vat dyes only one cent more per shirt. The differences between the cost of fast and fugitive dyes are just as striking in other cases, and seldom is the dye in all the clothes we have on, including our overcoats and hats, worth more than thirty cents.

In 1925 American production of vat dyes, other than indigo, increased 43 per cent over the preceding year, a record peak of more than 2,600,000 pounds being reached. The total, including indigo, was 31,730,000 pounds—nearly 10,000,000 pounds greater than the 1924 production. Not only was such a notable increase recorded, but the prices of domestic dyes declined for low-priced as well as high-priced dyes. The weighted average price of all domestic dyes sold was about 13 per cent less in 1925 than in 1924, the price in 1925 averaging 47 cents per pound, as compared with 54 cents in 1924, and $1.26 in 1917.

We have, then, excellent fast dyes available at reasonable prices and in adequate quantity. It seems unfortunate that such dyes should not be more universally used and that the manufacturer and retailer of dyed materials should not so price these wares as to encourage the public to expect and demand such fast dyes as America is now in position to offer. Too often a difference of a cent in the cost of the dye becomes a dollar in the retail price of the garment. To be sure, there are many uses where even a small difference in the dye costs must be a determining factor, and where fugitive dyes have a proper place, but in textiles, where the cost of the cloth must be added to the more important item of labor, let us use only those dyes which the chemist knows will give satisfaction.