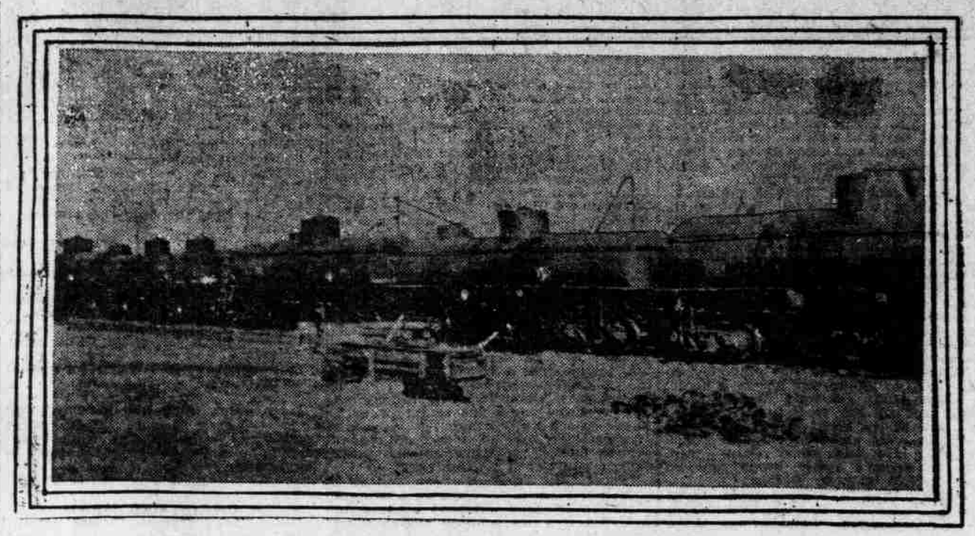
Trying for Standardization of Our Gasoline

Can Gasoline Be Defined?—Two Bureaus of the Government Are Trying for a Standardization of Gasoline—The Problem.

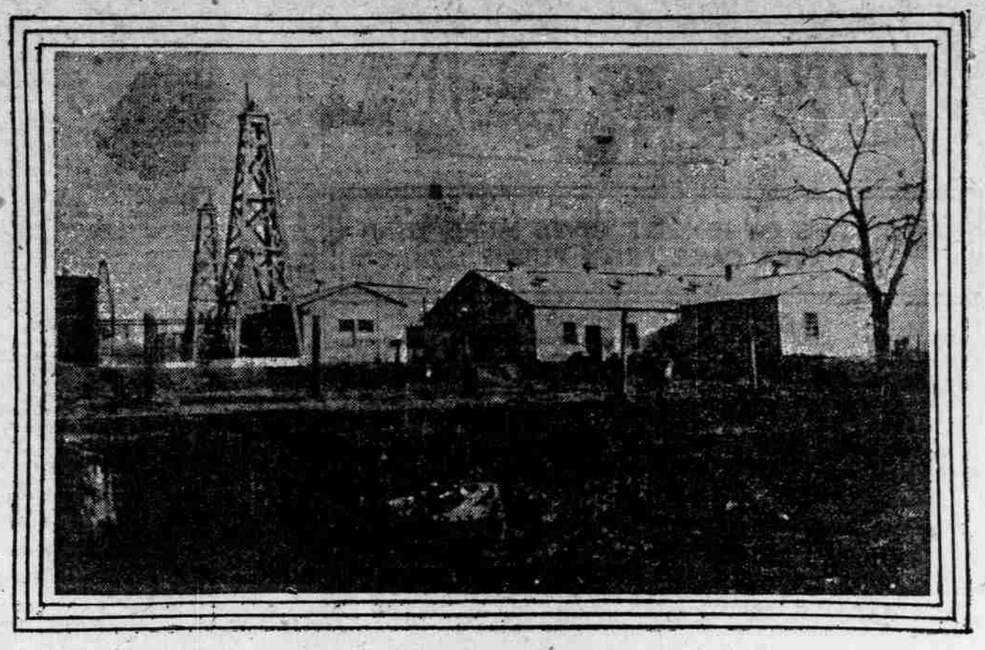
Special Correspondence
WASHINGTON, D. C.,

MOTORISTS everywhere are complaining. "The grade of gasoline that we are buying nowadays for our automobiles," they say, "acts queerly in our engines. What's the matter? We're paying more for gasoline today than we ever paid before and we are getting a poorer product. How is that?"

Two bureaus of the government are busy answering these questions and many more like them, and trying to effect a remedy. The remedy, however, which is proposed—a federal standardization of gasoline—will not altogether quell the automobilists' com-



TRANSPORTING CRUDE PETROLEUM TO A GASOLINE DISTILLERY.



A GASOLINE DISTILLING PLANT.

will continue to have trouble, for the old-fashioned engine was built to consume a light fuel oil. And the gasoline of today, as well as the gasoline of the future, is not a light oil. In fact, it contains a large amount of the heavy oils.

The new automobile models, in the face of the decreasing world supply of pure gasoline, are constructed to meet the situation and use heavier oils. The poor little model of a few years ago, built before this condition was generally recognized, must sputter along, hissing and choking itself to death.

Here is the situation as the bureau of mines sees it: The demand for gasoline the world over has steadily increased, due primarily to the increased use of the automobile. This automobile industry, remember, has had a phenomenal growth; the mush-

VAN H. MANNING,
Director of bureau of mines.

room, springing up overnight, can hardly be compared with it.

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"On January 1, 1916," says Director Van H. Manning of this bureau, "there were two and a quarter million automobiles in use in the United States. It is estimated by automobile manufacturers that there will be in excess of three and a quarter million in use by January, 1917, and by January, 1918, there will be in excess of four and one-half million automobiles in use. These figures are in addition to the increased use of motor trucks, farm tractors, stationary gasoline engines, motor boats, etc."

What has been the result of this increased use of the automobile? The answer is obvious—a steadily increasing demand for gasoline. But what is the effect of this increased demand for gasoline? An attempt on the part of refiners to make up for the decline of the gasoline-rich crude oil in the country's largest source of supply—by distilling a grade of gasoline which contains more of the heavy oils than formerly.

Hence the automobilists' complaint.

And now the point is reached where this variable quality—gasoline—which first seems one thing and then turns out to be another, must be standardized, so that a basis may be provided for the consumer to know what he is getting when he spends his money.

Dr. S. W. Stratton, the director of the bureau of standards, has appointed a committee, composed of the heads of the bureau's laboratories, to determine if standardization be possible. Can gasoline be defined, he asks. If so, he orders, go ahead and do it. And so the experimental work is about to begin, with what results the future will disclose.

The problem is not an easy one to handle. Gasoline, being a distilled product, is not regulated offhand. It is indeed a question whether a standard range can be established. Where to draw the line marked gasoline, and where to begin the line marked kerosene or any of the other oils which the crude material gives up in the distillation process, must be settled by careful experimentation.

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The trade name, gasoline, covers a group of mixed oils; the scientific name, gasoline, must apply to an oil with precise qualities. In establishing this scientific status the bureau of standards will test samples of different grades of gasoline in the laboratory for their chemical composition, density, flash point or boiling point, and in engines for actual service condition. After these scientific tests the quality of gasoline will not be a vague characteristic; it will be a definite determination, and upon it the final standardization will be based.

How to make effective this standard, once it is established, will be the next step. Secretary Redfield has this matter under consideration.

The Retail Merchants' Association of Washington, D. C., which began this campaign for purity in gasoline, has stirred up an important matter. The facts concerning this most desirable fuel oil are coming before the public in greater quantity than ever before.

The bureau of mines has done a vast amount of research in regard to the petroleum industry which will be of the utmost importance in any government action to be undertaken on the subject.

Mr. Manning, in an address before the association on October 4, stated the content of these researches briefly.

"According to the geological survey," he said, "our future supply of petroleum is only sufficient to last us from twenty-seven to thirty years at the present rate of consumption. This does not take into consideration any increasing demand as the years go by. In order to supply the fuel for future automobiles it will be necessary to make better use of our crude oil production in the future than we have in the past.

"In discussing the various problems involved we must bear in mind that while the demand is steadily increasing the production of crude oil, which is the raw source of gasoline, is remaining approximately stationary, if it has not been declining in the past year.

"A year ago gasolene was selling at 11 cents a gallon and was a drug on the market, due to the tremendous production of crude produced by the Cushing field in Oklahoma. This production, however, has declined from over 300,000 barrels of crude oil per day to less than 60,000 barrels per day. The Cushing crude contains from 25 to 30 per cent gasoline."

The Cushing field, to which Mr. Manning referred, has been the greatest source of oil in the United States. It is situated in Oklahoma, in what is known to petroleum technologists as the great mid-continent field. It is said that at least 3,500 separate wells have been drilled in the Cushing field alone.

Dwelling for a moment on statistics, it might be interesting to state that the United States furnishes 66 per cent of the world's supply of gasoline and that its crude oil contains the highest gasoline content. Mexico supplies 8 per cent and Russia 16 per cent; these countries contribute the largest portion of foreign oils, but in both cases the gasoline content is low.

Besides the mid-continent field, the United States has nine other major fields. These are designated as the Appalachian, Lima-Indiana, Illinois, north Texas, northwest Louisiana, Gulf and Colorado-Wyoming-California fields.

In 1915, when the latest figures were compiled, these fields produced 281,000,000 barrels of crude oil out of the 425,000,000 barrels produced by the entire world. How to get the greatest amount of gasoline from this supply is the aim. Refiners have partially met this demand by introducing three new elements into the manufacture of gasoline. These are the increased use of cracking stills; the increase of the "end point" in regular distillation, and the increased development of so-called casing head gasoline. All of these methods incorporate more heavier oils in the product than formerly.

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The process of the distillation of gasoline has a number of technical points, which need explanation if the layman is to understand the subject. Mr. Manning undertook this work of explanation in his recent address.

"The end point is a term used in distillation of gasoline," he said, "and is usually considered to be the temperature at which 95 per cent of the gasoline will distill off if distilled in a proper flask at the proper rate. The end point is important because it is a measure of the readiness of the gasoline to vaporize, which is necessary and desirable information to have in selecting suitable fuel for gasoline engines.

"The refiners have increased the end point of the gasoline of today, and by the use of heavier oils for gasoline have been able to increase the percentage of gasoline obtainable from a given amount of crude oil.

"Refiners are co-operating along another line to the same end, namely, to increase the amount of gasoline and at the same time to keep the price down to a reasonable basis, by means of cracking kerosenes and heavier oils, thereby converting a certain proportion of the crude oil which was not formerly utilized for that purpose into gasoline.

"Last year there was produced by cracking processes approximately 2,000,000 barrels of gasoline. This year it is estimated that there will be produced more than 5,000,000 barrels of gasoline by cracking processes. This is all the more striking when it is considered that these 5,000,000 barrels will be made from oils which in the past did not enter into the making of gasoline, and indicates the possibilities of the present production of crude oil to supply the future requirements of the automobile.

"For automobile engineers have foreseen the difficulty that the old-fashioned engines would have with these heavier fuels and have improved their engines and carburetors; and the refiners, taking advantage of the work of the automobile engineers, have gone ahead with their plans for increasing the use of the heavier oils in gasoline.

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"Recently," Mr. Manning continued, "owing to the remarkable development of the casing head gasoline industry—that is, obtaining gasoline from natural gas—there has been obtained a product called blended gasoline. The casing head gasoline as derived from natural gas is too volatile to be used directly. It is therefore mixed with oil just a little lighter than kerosene but heavier than gasoline. It is an important addition to our fuel oil resources, the production amounting to approximately 5 per cent of the total production of gasoline this year."

The addition of these three methods explains the low grade of the fuel which dealers are now supplying and also explains some of the difficulties which people are having with their automobile engines and carburetors.

Looking to the future, scientists have been busy trying to devise plans for perpetuating the supply of gasoline. As Mr. Manning has said, the supply bids fair to last out only thirty years more. Between now and a time thirty years distant, many ways will probably be devised for producing new fuel supplies. Already the bureau has its eyes fixed upon the oil shales in Colorado and Utah as a substitute source for a certain amount of gasoline.

Field investigations of these oil-producing shales are being carried on at present by the geological survey to find out their exact distribution, richness and quantity. The bureau of mines is at work testing methods for the utilization of the rock. The result of the investigation so far shows that these shale areas do constitute a latent petroleum supply, the gasoline content of which can be conservatively estimated in billions of barrels. The survey reports that shales of no greater oil content have long been mined and distilled in Scotland.

It has also been suggested that benzol might be used as a substitute for gasoline, in case the price of the latter product reaches prohibitive heights. Scientists have reason to believe that Germany is now using benzol exclusively for her motors. Indeed, automobile owners of Europe have used it generally for some time.

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Benzol is a by-product recovered in the manufacture of coke, and the United Stateas in 1915 produced about 14,000,000 gallons of it. At present it is consumed in this country in the manufacture of explosives, dyes and chemicals, and it is not thought that it will be converted into a fuel for automobile engines, as the American car is not adjusted properly for its consumption. Furthermore, it sells for 20 cents a gallon; a price which almost equals that of gasoline at the present time.

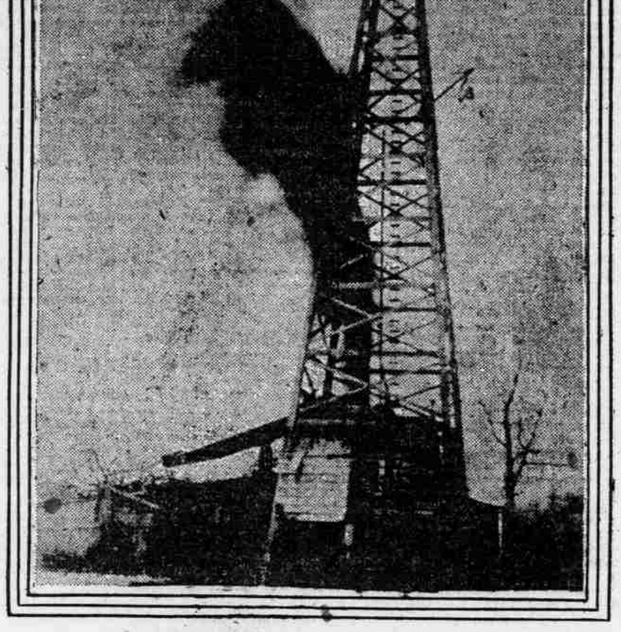
The bureau of mines has compiled a vast amount of information on this subject, which will be invaluable to the bureau of standards in its latest attempt at a standardization of gasoline. The information is also at the disposal of the general public. The bureau will shortly issue a set of specifications for the general supply committee of the government, which Mr. Manning says will be of interest to all users of gasoline. The bureau also will soon publish the results of its recent investigation bearing on the quality of gasoline sold in the open market.

Mr. Manning emphasizes that the bureau, in all of its efforts to co-operate in the movement for a standardized gasoline, wishes to keep before the public the fact that no specifications should be drawn up which would exclude certain materials now being used satisfactorily in the distallation for this would restrict the supply and automatically increase the price. Also, it is desirable that as much of the crude supply of the country should be utilized as is possible.

Mr. W. A. Williams, chief gasoline technologist of the government, says that the United States has been using the choice portion of her great oil supply and practically selling the rest, which constitutees a greater percentage, for a mere pittance to get it out of the way.

"It is like eating the choice meat of a fowl and throwing the remainder away," says Mr. Williams. "Such extravagance in regard to our oil supply should be remedied."

Thirty years is a very short time!



SHOOTING AN OIL WELL.

National Research Council for Preparedness Has Been Appointed

Organization of Men of International Repute Appointed by the President to Assist in Putting This Country in a State of Preparedness—a Notable List of Names—Their Work.

Special Correspondence
WASHINGTON, D. C.,

SO quietly that it has hardly been noticed, an organization has been formed which will revolutionize American preparedness and production.

During the past summer the American Academy of Sciences—an organization established soon after the close of the civil war for the promotion of pure science—moved primarily by the condition of national helplessness and by a patriotic desire to remedy it—undertook the formation of a national research council, whose purpose is to assist in putting this country in a state of preparedness by the co-ordination and co-operation of all its scientific men and organizations.

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This suggestion met the approval of President Wilson, who last June requested the following men, with titles involving an extended alphabet in capitals, to act upon the committee: George E. Hale, John J. Carty, L. H. Baekeland, Michael I. Pupin, Edward G. Conklin, John M. Coulter, Gano Dunn, Simon Flexner, W. W. Keen, A. A. Michelson, Robert A. Milliken, Arthur A. Noyes, E. C. Pickering, T. W. Richards, C. E. Skinner, C. R. Van Hise, Victor C. Vaughan, William C. Welch and W. R. Whitney, from civil life, and Admiral D. W. Taylor, Gen. William Crozier, Surgeon General Gorgas, Dr. W. H. Holmes, Van H. Manning, Charles H. Marvin, Lieut. Col. George O. Squier, S. W. Stratton and Dr. Charles D. Walcott, from the government offices.

This brings into co-operation for scientific purposes representatives of the great centers of scientific investigation of the country; but it is their effort, acting through committees and subcommittees, to bring all persons and organizations into a union of action for American efficiency.

These busy men are taking this big burden without pay or other compensation direct or indirect, other than that satisfaction which comes from service well rendered to one's country.

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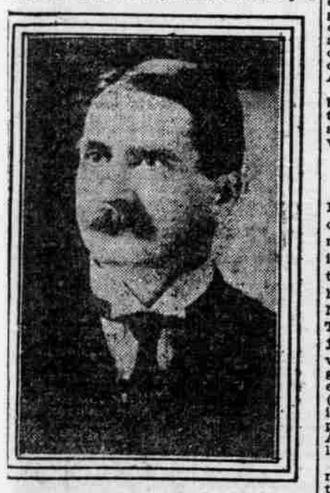
At the organization meeting Dr. Hale, the astronomer, was chosen chairman, and subsequently five committees were appointed. One can readily appreciate the benefit to the country at large in having committees headed by such men as prof. A. A. Noyes, Dr. Simon Flexner and Prof. M. T. Bogart to deal with such live subjects as the nitric acid supply, preventive medicine and synthetic and organic chemistry, but it does not stop even at that, for those committees (theorists, do you call them?) will act in co-operation with the committee of physicians and surgeons, with the American Chemical Company and similar bodies.

The organizing committee has recommended (1) the preparation of a national inventory for research; (2) suggestion of certain important research problems for solution; (3) the promotion of close co-operation; (4) co-operation and support of educational institutions; (5) co-operation with research foundations; (6) encouragement in co-operating laboratories of research, designed to strengthen the national defense and to make the country independent of foreign sources of supply in event of war.



REAR ADMIRAL DAVID W. TAYLOR,
U. S. N.

DR. S. W. STRATTON.

These men are not mere theorists, and their plans are not dreams. They are the philosophers, if one pleases so to call them, who not by magic, but by reason and thought attain the big things of history and nature which people must learn before the United States will be an efficient nation.

They are men of the class which made possible the marvelous preparation of Germany for a war which it may lose, and for commercial and industrial successes unequaled by any country which has not learned from the men who labor and think in co-operation for the common good.

Prof. George F. Hale, the chairman, is one of the foremost astronomers of the world and is the director of the Mount Wilson observatory, California. Dr. John J. Carty, chief engineer for the American Telephone Company, found the phantom wire, designed the transcontinental telephone lines, and is now girdling the world with wireless telephone systems.

Dr. L. H. Baekeland, born in Belgium, a chemist of high attainment, is an advocate of a fixation plant for nitrogen. Prof. John M. Coulter of Princeton is a zoologist. Prof. Edward G. Conklin of the University of Chicago is eminent as a botanist. Gano Dunn is the head of a great civil engineering firm.

Dr. Simon Flexner, pathologist, bacteriologist, has by his research saved more lives for humanity than have been lost in the bloodiest battle of Europe. Dr. William H. Holmes, anthropologist, geologist, artist, philosopher, is at the head of the National Museum. Dr. W. W. Keen of Philadelphia is one of the foremost surgeons of the country, a specialist on brain operations; he is the president of the American Philosophical Society.

Prof. A. A. Michelson of the University of Chicago is one of the leading physicists of the country. Prof. Robert A. Milliken of the same university is the well known experimental physicist. Massachusetts Institute of Technology is represented by Prof. Arthur A. Noyes, Harvard sends Prof. E. C. Pickering, the astronomer, and Prof. Theodore W. Richards, the chemist; Columbia, Prof. Michael Pupin, the physicist.

C. E. Skinner of Pittsburgh is the director of the laboratory of the Westinghouse company. Dr. C. R. Van Hise, the geologist, is president of the University of Wisconsin, and Dr. V. C. Vaughan, student of bacteriology and physiological chemistry, comes from Ann Arbor. Dr. William R. Welch, president of the Johns Hopkins Medical School, president of the Academy of Science, is one of the world authorities on pathology, and Dr. W. R. Whitney, a chemist, is the head of the laboratory of the general school.

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Gen. Gorgas, surgeon general, U. S. A., brings the co-operation of the entire medical service of the army. Gen. Crozier will have the aid of the metallurgists; Col. Squier is a specialist in radio-telegraphy, and is at the head of the army aeroplane service. Admiral Taylor, chief naval constructor, is one of the first mathematicians, and probably the foremost authority on ship designing and the effect of wave motions. The director of the bureau of mines, Mr. Van H. Manning; chief of the weather bureau; Charles F. Marvin, director of the bureau of standards, and Dr. Charles D. Walcott, geologist, secretary of the Smithsonian Institution, complete the list.

This organization, so beneficent in its conception, was created because these men saw a sad condition. They knew that this country has been so prodigal of its natural resources and unscientific in their development, that a reform had to come. They saw that Germany may be going down, but not without impressing upon the civilized world the splendor of the mobilization of its industrial resources to sustain her military power.

It is not yet fully known to how great an extent this has been accomplished through the co-ordination of the efforts of her scientists—the men who investigated and experimented in the great industrial laboratories until they showed to producers of their nation the best way to turn out their products.

Cut off by blockade from the markets of the world, the Teutons have made the most of their own natural resources; and their scientists, whom other nations—the United States among them—in their ignorance have treated tolerantly, if not with contempt, have devised ways to meet the demands of the trying times. The manufacture of powder and explosives for this war requires nitrates in almost unlimited quantities, and in its small area of farming lands Germany must have nitrates for the intensive farming doubly necessary now to produce food for her armies and her people.

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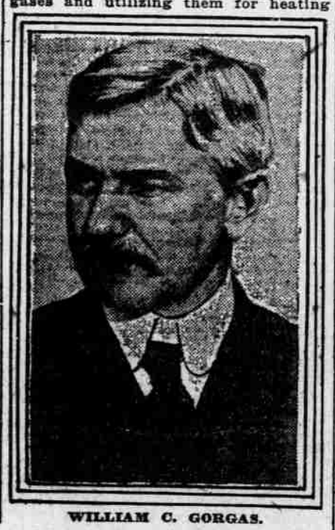
While the United States has been sending great part of the coal consumed in steel making up in smoke, Germany has by the adoption of by-product ovens been conserving all the gases and utilizing them for heating and lighting and for the manufacture of coal-tar products, dyes, benzol and nitrates. This, however, did not give nitrates enough for the war supply, even though the whole production was used for powder, leaving no nitrates for the land; that is why her 1915 crops were so light.



WILLIAM C. GORGAS.

The alarming situation was put up to her industrial scientists, and they were ordered to find nitrates or a substitute. They knew there was plenty of nitrogen in the atmosphere—"free as air"; and these practical German students of the laboratory found a way of extracting it.

Fixation plants were erected under their direction, and successfully operated. That is why the German crops of 1916 are plentiful, and why the ammunition makers have all the nitrates they need.

Benzol is necessary in making high explosives such as nitro taluol and its variants. Through the use of by-product ovens it has been supplied in abundance as the allies have learned to their cost on many battlefields.

Motor trucks have played their part in this the greatest conflict the world has known. Whence has Germany obtained her supply of gasoline? None can come from its colonies; none can come from this country. Now the Russian advance has cut off the supply from Galician fields; and still the motors are running.

While the exact method by which benzol has been made to take the place of gasoline is not positively known, benzol is what they are using.

Thus we have the illuminating contrast, Germany taking nitrates out of the air, America letting benzol waste itself in the atmosphere, when the price of gasoline is going up and the supply of oil-producing gasoline is going down.

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But automobiles are not run upon gasoline alone; they must have tires, which in this country and the lands of the allies are made of rubber. Germany has no means of procuring the raw article from abroad or at home. Where do they get their supplies? The Deutschland did not carry very many tons; and many tons are used up in a day.

The belief among well informed men in this country is that among the many surprises in the scientific world, to be made known when the war is over, will be the story of synthetic rubber. Necessity may be the mother of invention, but the German chemist-engineers have proved themselves to be excellent foster mothers.

The United States wants 800-ton submarines; but it cannot get them because American builders do not know how to make heavy oil-burning engines to drive them; but all nations have learned that the German engineers have solved the problem.

Germany needs copper for cartridge cases, big and little; it is known that she has stripped the roofs of houses, palaces and cathedrals to obtain the metal, to her now more precious than all the gold which has found its way from the coffers of Europe to the melting pots of the United States assay offices.

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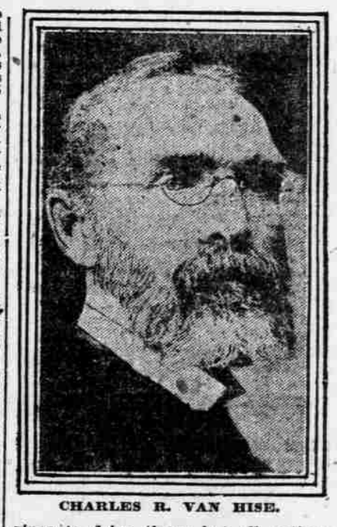
How the German industrial scientists have done it no one here knows, but somehow they have found a way of eking out the limited amount of copper that the country has. German machine guns have not remained silent. The enormous orders recently given by the allies to the United States copper companies show how great that metal is in demand by belligerents.

When the end of the war comes—what?

Another contest will be on—one in which, since the prize will be money, the United States will be a contestant. It will be for commercial supremacy; the best prepared country will have the biggest chance, and all nations that have not learned the one lesson of preparedness will fail.



CHARLES R. VAN HISE.