ENGINEERING AND SCIENCE

Monthly

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SEPTEMBER
VOL. 6 • NO. 9
1943

Whirlwind's BROTHER

IT'S a 2-to-1 bet that your home electricity is born in a man-made hurricane five times as ferocious as any Nature ever cooked up. Engineers call it a steam turbine-generator.

A steam turbine is a kind of cross between a mammoth windmill and a giant's spinning top. It takes steam hot enough to heat the pipes a dull red, and squeezes the energy out of it until, 1/30 of a second later, all that's left is water too cool to bathe the baby in. The turbine turns a generator which passes this energy on to you as electricity—so you can use it to cook an egg, or freeze ice cubes, or make bombs to blast the Axis.

This machine isn't the sort of job that a manual training class would turn out! Just one part, small enough to hold in your hand, may handle more power than a dozen trucks. And the steam takes the turbine rotor for such a dizzy ride that if it were turned loose on the Atlantic seaboard, it would roll to San Francisco in four hours!

Today's turbine-generators turn out, from one ton of coal, more electricity than three tons used to give. That saved America millions of tons last year, plus precious man-hours in mining and transportation—all because G-E engineers, along with boiler and power-plant designers and engineers of electric service companies, have been improving turbines for 40 years.

More important yet, they have given us a wonderfully efficient machine to drive our ships of war—drive them faster and farther than those of our enemies.

War cannot destroy the ingenuity and experience that created the modern turbine—in fact, it stimulates them. And they will help to create for us better and richer lives in the peaceful years to come. *General Electric Co., Schenectady, N. Y.*

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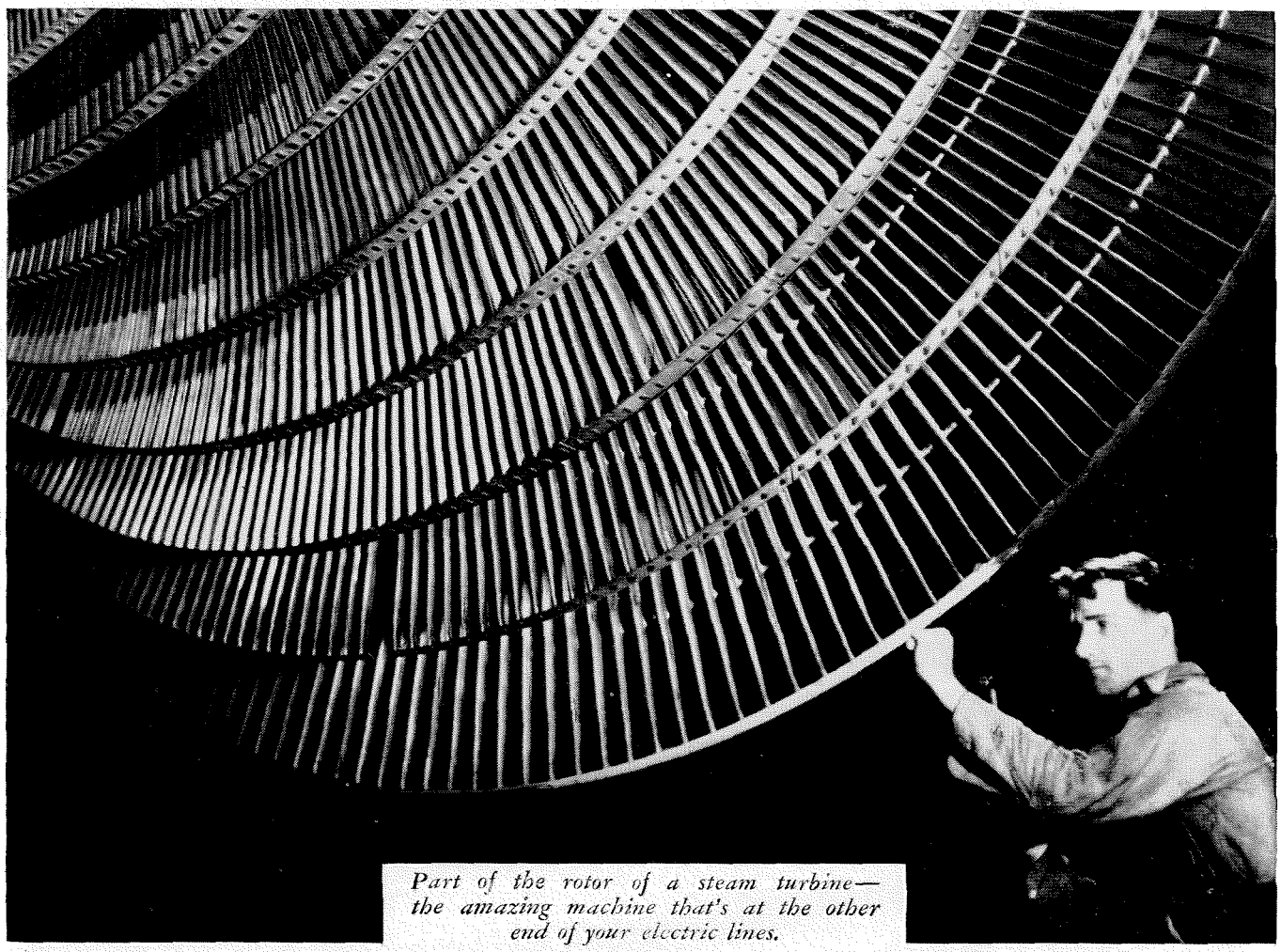
You are invited to listen to the "Hour of Charm" 10 p.m. EWT, Sundays, on NBC, and to "The World Today" at 6:45 p.m. EWT, Monday through Saturday, on CBS.



Part of the rotor of a steam turbine—the amazing machine that's at the other end of your electric lines.

GENERAL ELECTRIC

952-452C-211

BY-LINES

HALLAN N. MARSH

Mr. Marsh received his degree from Caltech in Mechanical Engineering in 1922, studied a year on a fellowship, and since 1923 has been with the General Petroleum Corporation where he is now in charge of the Production Engineering and Equipment Section. He serves on technical advisory committees to the Petroleum Administrator for War, and for the War Production Board.

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LAWRENCE A. APPLEY

Mr. Appley has been concerned with manpower problems throughout the present emergency, serving as special consultant to the Secretary of War, and now is Executive Director of the War Manpower Commission. He is on leave as vice-president of Vick Chemical Company, and formerly was noted for his work with the educational and training program of Socony Vacuum Company.

●

CHESTER STOCK

Dr. Stock, Professor of Paleontology at the Institute since 1926, has guided the progress of paleontological research in the western states and Mexico, and has contributed to the study of early man in America. Dr. Stock has made important fossil discoveries in the California Coast Ranges, and has conducted important field studies under a John Simon Guggenheim Memorial Foundation fellowship.

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EDWARD O. GUERRANT

Dr. Guerrant, Instructor in History at the California Institute of Technology, has made a special study of the United States foreign policy in Latin America. He has published several articles on various aspects of the Good Neighbor Policy. Each month Engineering and Science will present an article on contemporary problems by members of the Institute staff, alumni, and other qualified authors.

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ENGINEERING AND SCIENCE MONTHLY is published monthly on the 25th of each month by the Alumni Association, Inc., California Institute of Technology, 1201 East California Street, Pasadena, California. Annual subscription $2.50; single copies 35 cents. Entered as second class matter at the Post Office at Pasadena, California, on September 6, 1939, under the Act of March 3, 1879.

ENGINEERING AND SCIENCE Monthly

The Truth Shall Make You Free

CONTENTS FOR SEPTEMBER, 1943

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The September issue of ENGINEERING AND SCIENCE MONTHLY, Vol. VI, No. 9, follows the June issue, Vol. VI, No. 4, of the Alumni Review. Since the magazine under its new title will be published 12 times a year, the number of the first issue has been changed to conform with the numerical sequence of the month of September.

Life Cycle of Progress

A Statement of Our Editorial Policy

By DONALD S. CLARK
Editor-in-Chief

WITH this issue for September, 1943, we present *Engineering and Science Monthly*, which takes the place of the *Alumni Review*, and will be published on the 25th of each month. *Engineering and Science Monthly* has the endorsement of the California Institute of Technology, as well as the Alumni Association, and will endeavor to reflect all current development in the fields of engineering and science.

Dr. Millikan, on page 5, has given readers of *Engineering and Science* the core of its editorial policy when he states that the fundamental science of yesterday is the applied science of today . . . We may extend this thought to state that today's fundamental science will be given expression in the engineering of tomorrow. Thus the function of this publication will be faithfully to reflect in ink and paper, by word and illustration, this life cycle of progress.

More specifically, we plan that each issue of *Engineering and Science* will be a well-balanced expression of the theoretical and the practical; articles on discovery and development in the field of pure science—interspersed with features, news, and running comment on the application of these pure sciences in the field of engineering and its related subjects.

In presenting this material every effort will be made to eliminate feature articles which are restrictive in the sense of a particular commercialized product, or which have an advertising flavor. Every department in the magazine, including editorials, feature articles, book reviews, and shorter items, will be directed toward carrying out this policy.

Two sections, "C. I. T. News" and "Alumni News," appear on pages 19 to 24. These will be regular features of the *Monthly*. "C. I. T. News" will give readers a running review of happenings which directly affect the Institute. The section "Alumni News" is planned for you who are members of the C. I. T. family. In it, as in the *Alumni Review*, you will be able to follow your Caltech contemporaries through their family life, their military, industrial, or professional careers. The success of this section depends upon you. If you don't send us the news, we can't print it. We ask your cooperation in making this a lively and interesting section of *Engineering and Science*.

The Editorial Board also requests that the Alumni and the Institute staff join in our effort to make *Engineering and Science* truly representative of the high standard which they, as individuals, have set in their technical and professional fields. If special experience has qualified you in any of the fields covered by our editorial policy, we ask that you submit articles for publication in the *Monthly*. If you as an alumnus have suggestions for the improvement of this policy, we should like to have you submit them to us for our consideration. And by all means send us the latest news of your own progress.

ENGINEERING AND SCIENCE
Monthly

Vol. VI No. 9 September, 1943

An Introduction to "Engineering and Science Monthly"

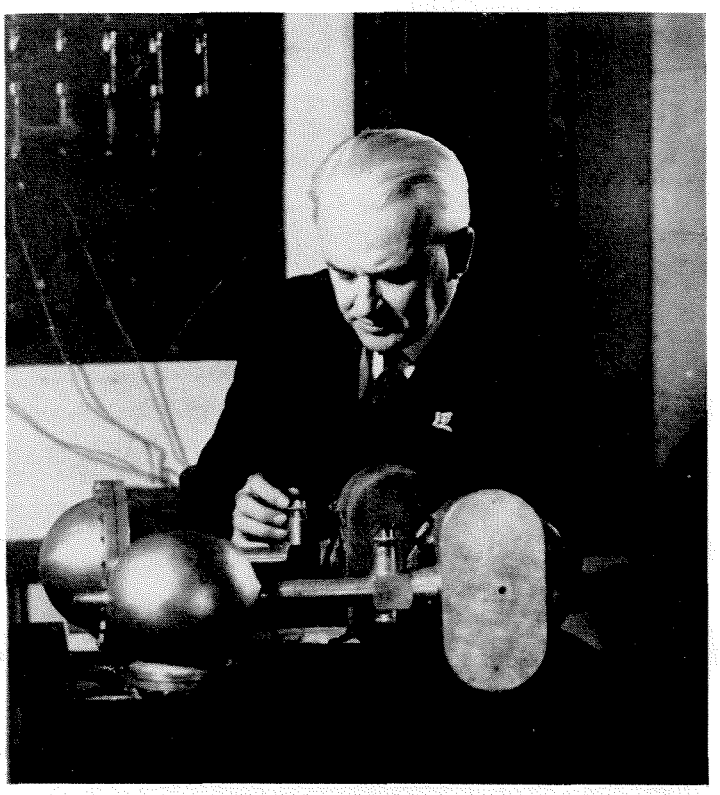
By DR. ROBERT A. MILLIKAN
California Institute of Technology

A NAME such as "Engineering and Science" for a magazine that is to be used for the presentation of technical and semi-technical articles by those who have graduated from, and those who are connected with, the California Institute of Technology is very appropriate, for it reflects the very close association that should exist between these fields, an association the creation of which has in fact been one of the most distinctive objectives in the Institute's development. It is a familiar but a very true observation that the fundamental science of one generation is the applied science of the next. The solution of the problems associated with the war has furnished very recent and very powerful verification of the correctness of this assertion.

¶ With the inauguration of this magazine which replaces the "Alumni Review" a new means has been provided for the dissemination of information on the technical work of Institute graduates in the general field of engineering and science. With the greater circulation anticipated, it is hoped that more people will thus have an opportunity of seeing the high caliber of the work of Tech men. The new magazine will also provide another outlet for interesting information resulting from the developments going on at the Institute itself.

¶ Far too often both the engineer and the scientist have lost sight of another phase of the Institute's work that is highly important; namely, the relation of technical training to the broad problems involved in management and even in discharging the responsibilities of good citizenship. In developing its somewhat unique curriculum, the Institute has striven to find and to maintain a proper balance between technical and non-technical fields. The new magazine also should, and doubtless will, reflect this policy by carrying some reading matter pertaining to fields not directly related to purely technical work.

¶ The fields of industrial relations and industrial engineering are becoming of ever increasing importance in the Institute's work as more and more of its graduates are being drafted for the responsibilities of management. I note with interest the article in the present issue of "Engineering and Science" entitled "Manpower Dynamics" by Lawrence Appley which presents the type of information both engineers and scientists will wish to keep in mind. The Institute, particularly through the initiative of Professor Robert D. Gray, has stimulated an active interest in these fields, and the readers may expect to hear more on the various aspects of this work. Watch for it!



DR. ROBERT A. MILLIKAN

¶ The alumni are by far the best representatives of the Institute's ideals, training and accomplishments, and through their contacts can exercise a vital influence on the future place of C.I.T. in American life. Reciprocally the prestige of the Institute is an invaluable asset to every alumnus. I am confident the new magazine will pay good dividends both to the Institute and to its alumni. No association and no contract is a good one unless it serves the interests of both of the contracting parties.

The Month in Focus

Oil Is Ammunition

HALLAN Marsh's article, "Oil Is Ammunition," is especially timely as borne out by events of the past few weeks since Mr. Marsh wrote this article. In paragraph 8 on page 7 Mr. Marsh states, "Rumanian crude production, which constitutes over 35 per cent of the whole European Axis output, is confined to a small area, definitely known, where continuous bombing could within a short time make effective inroads upon the German oil supply. . . . Extensive efforts are justified toward the destruction of Axis sources of petroleum supply wherever they can be found."

At the time Mr. Marsh's article for this issue of *Engineering and Science Monthly* was in preparation, the Allied victory in Sicily facilitated a mission by American bombing planes over the Ploesti oil fields in Rumania, with spectacular and gratifying results.

Despite these military successes which effectively decrease the supplies of the Axis countries, a problem still faces the Allied Nations in the field of petroleum. All of us will profit by reading "Oil Is Ammunition," for it presents a logical explanation for the necessity for conservation of petroleum products.

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Government War Plants

The development of government-owned industrial plants and facilities is brought out by the latest figures on government-financed plants. During the past three years the government has spent 25 billion in financing plants and facilities.

Steel production has been expanded to such an extent that the government at the end of the war will own approximately 10 per cent of the total steel production capacity of the United States. Among its properties at the present writing are a quarter-billion dollar steel mill in Utah, a plant of approximately half that value in Pennsylvania, one costing 85 million in Illinois, and over a hundred smaller plants scattered throughout the United States. Most of these plants are operated by private industries for the government. Government investment in these plants is approximately a billion dollars.

The annual aluminum producing capacity of government plants at the end of the war will be greater than that of all plants owned by private industry. Plants built for the aluminum industry by the government since the beginning of the war have cost 760 million dollars.

Magnesium production in government plants will amount to 92 per cent of the total capacity of government and private projects. Government investment in this industry is approximately half a billion dollars.

Synthetic rubber plants costing 625 million are in operation, with an annual output one-third greater than total peace production prior to the war.

Government investment in aviation tops the list with a total of 10 times the value of privately-owned industry—a total of nearly three billion dollars. The government owns 521 plants for the production of aircraft and parts and accessories.

What is to become of these plants after the war? Before venturing an answer to this question it should be recognized that the important thing now is to operate these plants efficiently. However, some thought should be given to the problem of what is to be done with this great investment when peace comes, and whether or not such plants will have a salvage value. Three possible methods of solving the problem may be considered:

1. To dismantle any plants which would represent a liability either to government or industry and scrap the machinery. 2. To sell or lease the plants to private industry for postwar operation on the basis of the inevitable heavy demand for all types of commodities and equipment. Many of these plants could be converted to peacetime manufacturing in newly-developed fields. 3. Operation by the government of government-owned and controlled factories. The government's policy may cause serious difficulties for private industry or, if properly directed, may be of considerable assistance in establishing a sound peacetime economy.

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Productionists and Militarists

The article by Lawrence Appley calls to mind the necessity for clarification of our ideas regarding the importance of the contributions which men are making in winning the war. The man on the street who is unfamiliar with production, engineering and science may be unjust in his evaluation of the contribution the young civilian is making to war industry. Patriotism does not always wear a uniform. Young men with active and creative minds are required not only by the armed forces, but also by industries producing war materiel and by agencies engaged in research and in development of new and improved weapons, methods and materials. The men and women in civilian occupations who are contributing their share to the successful conclusion of the war will not receive campaign medals, nor will they gain public and individual acclaim when the war is over. They are, however, a vital part of the war program, serving their country as patriotically as the men in uniform.

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Civilian and Military Administrators

Events during the past few months have given a strong background to the War Department's plan for training engineers and executives for positions in occupied countries as administrators for rehabilitation of municipalities, industries, utilities, and agricultural areas. Many of the men trained for that purpose are now actually serving in North Africa, Pantelleria, and Sicily.

The United States Army School of Military Government of Charlottesville, Virginia, trains qualified commissioned officers in filling these positions.

Columbia University has established a course of training which continues for a period of 48 weeks and is

(*Continued on Page* 17)

OIL IS AMMUNITION!

By HALLAN N. MARSH

NOTHING is more vital to winning the war than an adequate supply of petroleum products for all essential purposes. Airplanes, battleships, tanks, submarines, trucks, and cargo vessels might as well be destroyed by the enemy as to be unsupplied with fuel and lubricants. A General of the United States Army declares that oil is the number one military necessity. Two-thirds of the tonnage required to support an expeditionary force is oil! It requires 1,600 gallons of gasoline to fly one heavy bomber from England to Berlin and back. Thousand-plane raids . . . ? And the block busters they drop when they get there, bust the block because they are filled with TNT, made from petroleum! Literally, *oil is ammunition!*

Airplanes and ships and tanks and TNT couldn't be made if workers couldn't get to work. Most of us realize how dependent upon the automobile we are for getting to work. We have found that resort to other forms of transportation isn't a solution, if too many try to do the same thing. Maybe we have overlooked the fact that all of the alternative forms of transportation also depend upon petroleum for lubrication, and most of them for power. Trains, busses, steamers and airliners are powered with petroleum, and even the electricity that moves the streetcars is generated in part by petroleum. Many defense plants are solely dependent upon trucks to bring in material and deliver products.

RATIONING

Gasoline and fuel oil rationing as first applied in the East was necessitated by diversion to direct military use of tankers that formerly hauled 90 per cent of the East's oil from the Gulf Coast. Nation wide rationing was primarily a rubber conservation measure. But if we are to fight an all-out war against Germany now, and conserve a margin with which to defeat Japan next, it appears that gasoline rationing will have to be continued and probably made more stringent, for the sake of saving this vital and irreplaceable natural resource. Why? Let's see how the United States is fixed for liquid ammunition.

Statements and statistics about oil supply seem conflicting and confusing, but the main points are easily grasped. All published figures are estimates, and to some extent a matter of opinion, so there is no use in worrying about minor discrepancies. There are a variety of useful factors that sound similar but which are quite different. Primarily, reserves must be distinguished from the rate at which they can be produced.

RESERVES

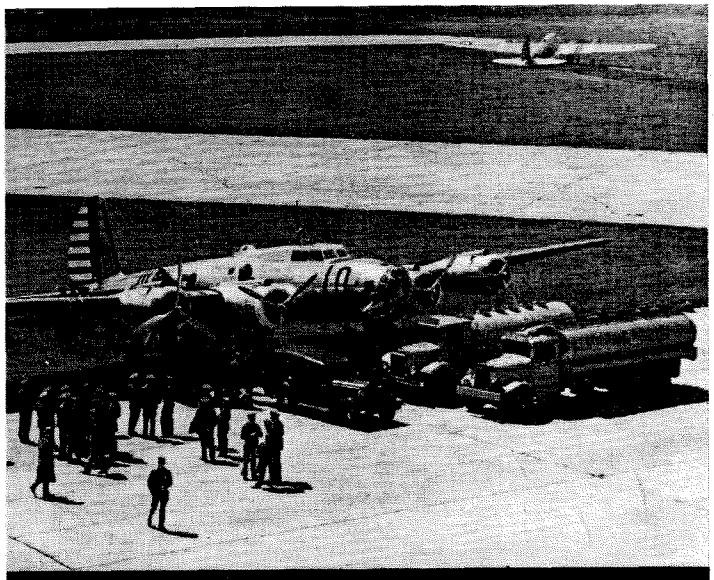
Above-ground storage of crude oil in the United States normally amounts to about a quarter billion barrels, which is about a 60-days' supply and may be neglected in long-range considerations.

Underground reserves are commonly estimated at about 20 billion barrels. This term refers to the amount that already has been pretty well located, and which can be recovered by conventional methods of production. It is to be expected that more oil will be discovered from time to time, and that some currently unrecoverable oil will become recoverable as technique improves or prices increase. Thus the 20 billion barrel figure is a minimum.

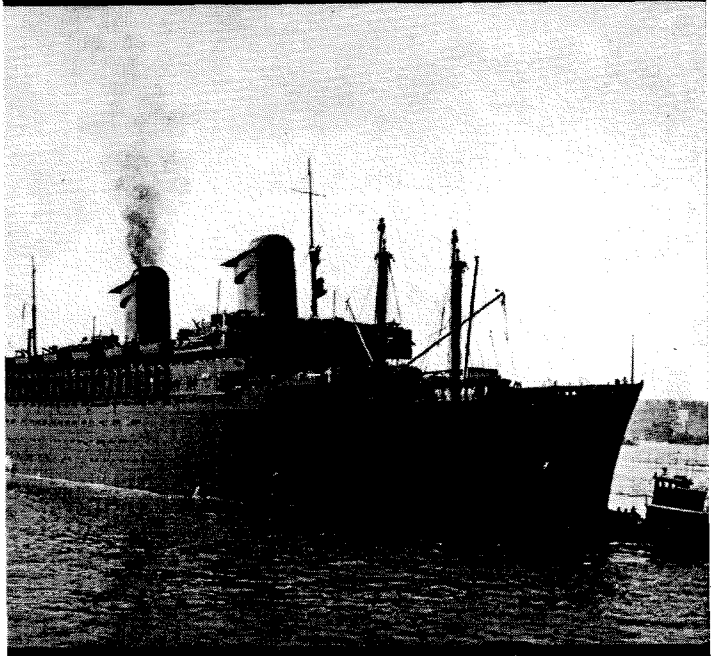
It should be emphasized that the amount of recoverable reserves depends upon production practice, so that this figure, commonly looked upon as a constant, is really a variable. One of the chief factors affecting the recovery is the rate of production. It appears that high ultimate recovery generally demands low rate of recovery.

Production in the United States for the last three years has been about 1.4 billion barrels per year. Comparing this figure with the reserve figure of 20 billion barrels indicates a 14-years' supply. So, for the duration, why worry?

Productive capacity, or the rate at which reserves can be recovered, has limits independent of the reserves. Each oil well has a "potential" rate at which it can pro-



"Fill 'er up for a trip to Berlin . . . 1,600 gallons!"



Off for Africa (burning 33,000 gallons of oil a day).

duce for a short time. But most wells cannot sustain their potential rate for any length of time. Unfortunately this rate has been measured, optimistically estimated, and quoted, perhaps because it is more tangible than significant.

Recently there has been a growing understanding of the term "reservoir performance." An underground porous reservoir has hydraulic and thermodynamic characteristics that can often be measured with satisfactory engineering accuracy. Oil may be partly displaced from such a reservoir by the expansion of its dissolved gas or of a free gas cap, or by natural water encroachment. The latter is considered most efficient. Low rates of withdrawal tend to permit the gas or water piston to keep up with the oil, thus maintaining pressure. Excessive rates cause fingering of water or gas with consequent by-passing of oil. Hence a study of reservoir performance often establishes a maximum efficient rate for the pool as a whole, which can be prorated back to the individual wells.

Maximum efficient capacity for the United States, according to the Petroleum Industry War Council, will decline from about 1.6 billion barrels in 1943 to 1.5 in 1945, with "minimum essential demands" at 1.5 in 1943 and 1.6 in 1944 and 1945. Thus there will be a small surplus (of capacity, not actual production) this year, and increasing deficits in subsequent war years.

The efficient capacity can be exceeded somewhat for a few months, as an emergency measure, but only at the expense of reduced subsequent capacity and ultimate recovery. Producing at less than the maximum efficient rate tends to build up the productive capacity. Any unnecessary use of petroleum, even at present, subtracts from the reserve and productive capacity for this vital ammunition. In this connection it is significant that stocks of finished gasoline declined over 5 million barrels during a recent month and over 14 million barrels in 12 months.

Even at an efficient rate of production, productive capacity declines naturally. Although the present known reserves are 14 times as great as our annual consumption, it will actually take some 40 years to recover 90 per cent of these reserves. To maintain productive capacity, as well as to maintain a backlog of reserves, it is necessary to keep up the discovery of new reserves.

DISCOVERY

The United States has been aggressive in discovering oil. Since the first oil well was drilled in Pennsylvania in 1859, we have produced nearly twice as much as all the rest of the world combined. This has contributed immeasurably to the prosperity of the country, but it means that there is a lot less oil to be found. Progress in geology and geophysics accelerated discovery during the early thirties, but for the last four years, discoveries have been small. Perhaps this is just a run of bad luck. Perhaps it means that the search has been too successful in the past. Certainly more oil fields will be found, but probably at the expense of more intensive geological work and exploratory drilling.

Published figures are confusing as to whether reserves are being maintained. Estimates of the proven reserves of fields discovered during each year are generally small compared with the year's usage, and in the last four years this ratio has been much smaller than usual. However, the development of a field is rarely completed in the year of discovery, so that extensions and revisions are made in subsequent years.

Adding these revisions, we get figures more nearly resembling those for usage. If these revisions represented only extensions of fields, the situation might not be bad. It is understood, however, that the revisions represent in part more optimistic (and perhaps more realistic) appraisals of fields that are not being extended. This continual reappraisal makes each year's estimate better than preceding ones, but leaves the amount of new discovery questionable. It is the opinion of the Petroleum Administrator for War that "for four years we have been using oil faster than we have been finding new reserves." Many agree with him.

Drilling of exploratory wells is continuing, and new fields are being discovered about as frequently as in the past, but they are smaller. It is easier to find a big field than a small one. Petroleum Administrator Ickes thinks that "the biggest fish have been caught."

Geological work can determine where oil can *not* exist, and where it *may* exist, but only drilling determines where it *is*. It takes an average of eight wildcat wells to locate one new field. New discoveries are therefore the result of intensive effort and great risk of capital. Such wells

are ordinarily drilled only with the hope of reward for any success that may be obtained. At the present time oil companies are required to pay more to the government in taxes (gasoline, income, property, and others too numerous to mention) than they can pay in wages, salaries, and dividends combined. However, despite higher taxes, higher labor costs, higher material cost, 50 per cent curtailment of steel allotment, draining of experienced personnel to the armed forces and newer defense industries, and frozen products prices, the industry has been asked to drill 50 per cent more wildcats this year than ever before.

"ENGINEER'S OIL"

It has long been known that with present technique and prices, much oil is left in the ground when wells are economically depleted. The recovery actually ranges from zero, where reservoir rock is found to contain oil but to be of too low permeability to yield it at a commercial rate, to possibly 80 or 90 per cent where oil is fluid and permeability high and the rock is preferentially wet by the displacing water. It is commonly estimated that the average recovery is approximately 30 or 40 per cent. United States recovery to date has been about 27 billion barrels. Adding the 20 billion of recoverable reserves gives 47 billion. If this represents 40 per cent of the total oil discovered, then the discovered oil unrecoverable by present methods is 70 billion barrels! Don Knowlton of the P.A.W. says it is the engineer's job to devise and sell means of recovering as much of this "unrecoverable" oil as possible, and aptly labels it "engineer's oil."

Engineers are alert to this possibility, and much technical progress is being made. Some more tangible progress is being made, but as Mr. Knowlton recognizes, there are legal and political problems, as well as scientific problems.

CALIFORNIA

California is the only oil producing state west of the Rockies. Transportation of oil from other states is not economic at any time, and is not feasible now. Japan has taken the only important sources of oil in the Orient. Therefore California must not only supply the Coast, but must provide the main supply for the United Nations in the Pacific.

California is now producing approximately at its maximum efficient rate of some 780,000 barrels daily, an increase of about 30 per cent over pre-war levels, despite a reduction of some 25 per cent in sale of taxable (civilian) gasoline. Stocks are declining significantly. The increase of industrial and military usage can be inferred. These obligations will undoubtedly increase, and may require further curtailment of unnecessary usage. Certainly no one who understands will complain!

ENEMY POSITION

How are our enemies supplied with liquid ammunition? Of course we have no access to direct and current information, but those whose business it is should be able to make good estimates. Past production has been charted, and there is much indirect evidence on which such charts can be extrapolated. Garfias, Whetzel and Ristori presented an authoritative summary before the A.I.M.E. in New York in February from which the following is extracted:

". . . . Japan is now getting at least 33 million barrels a year, which exceeds by 8 million barrels its greatest peacetime yearly consumption. As long as Japan can hold the conquered fields of Dutch East Indies and Burma it will encounter no difficulties as to source of supply. Its greatest problem will be ocean transportation and to some extent refinery equipment.

"The output for 1942 of the European Axis countries and controlled areas is . . . about 112 million barrels or 20 per cent greater than in 1941." (This figure includes synthetic.) ". . . almost 50 per cent of the German supply is now petroleum substitutes.

"Rumanian crude production, which constitutes over 35 per cent of the whole European Axis output, is confined to a small area, definitely known, where continuous bombing could within a short time make effective inroads upon the German oil supply.

"When (German) military operations are passive, small accumulations are possible, but when they are active, shrinkage of reserve stocks could be considerable. . . . Extensive efforts are justified toward the destruction of Axis sources of petroleum supply, wherever they can be found."

Nothing is more vital to a United Nations victory than an adequate supply of oil products for essential

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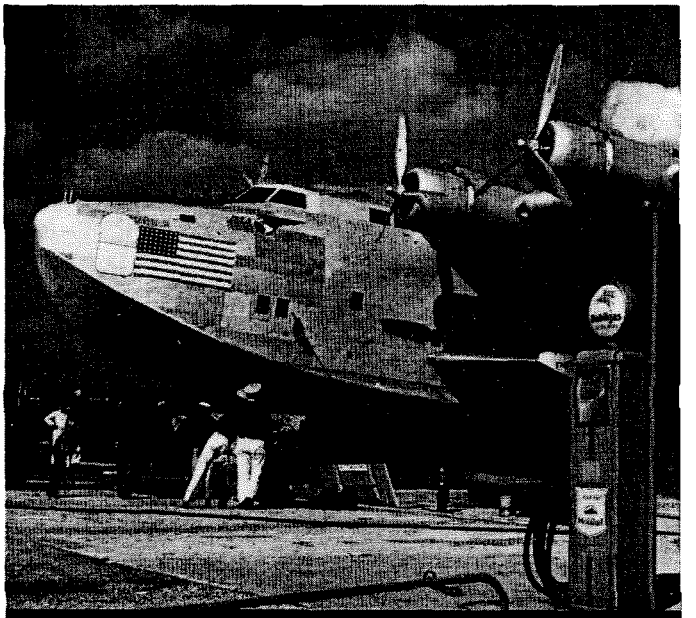
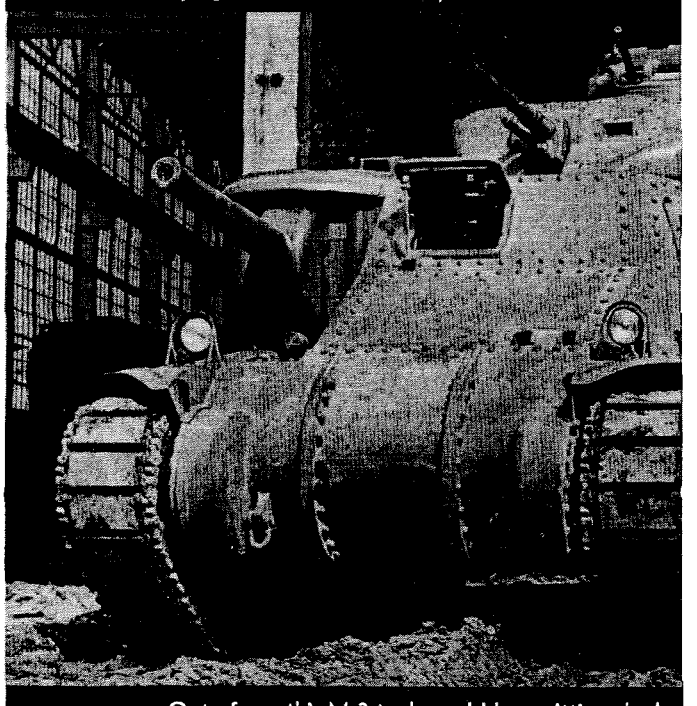
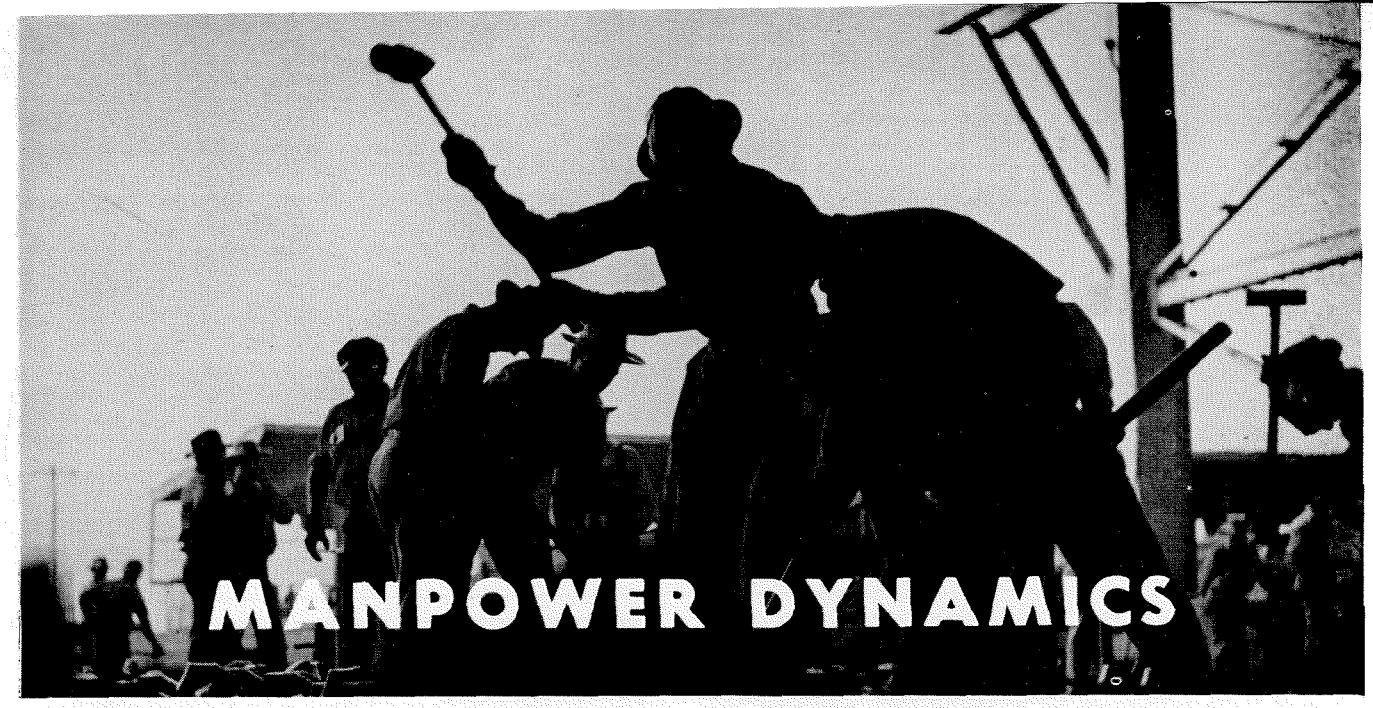


Carrying the war to the enemy, but not on an "A" bo



Out of gas this M-3 tank would be a sitting duck.



MANPOWER DYNAMICS

By LAWRENCE A. APPLEY

IN July, 1940, there were 500,000 men in the armed forces of the United States. In July of this year there were about 9,200,000. In July, 1940, there were 4,100,000 workers in munitions industries. In July, 1943, there were 9,700,000. In July, 1940, there were 48,100,000 workers in uniform and in the employed labor force and in July, 1943, there were 64,600,000. These few figures are in themselves dynamic. They are so dynamic that few comprehend their significance. In fact, I doubt if there is a human being alive today who can fully comprehend all of the changes and adjustments that have taken place in this short period of time. At the same time it is true that upon the extent to which we can understand the forces that have been in motion depends the nature of our personal convictions concerning the immediate future.

It is my hope in this discussion to outline some of the dynamic factors involved in the mobilization and utilization of the nation's manpower in time of war so that we might better understand what has happened, better comprehend what must happen, and thereby enjoy fully deserved pride in our accomplishments and unswerving confidence in the future.

WARTIME ECONOMY

This is a wartime economy and not a peacetime economy. While that is a simple and obvious statement we do not always realize the vital differences in the two. To understand the manpower problem we must understand the type of economy in which it exists.

Manpower needs and production loads cannot be predicted with the same accuracy and skill over the same periods of time when a nation is fighting a war as they can when that nation is at peace. Consumption trends which can be estimated and planned with some degree of accuracy in peacetime are now governed by the degree of success or failure of military campaigns.

The course of war cannot be accurately predicted. Despite popular conceptions derived from the early campaigns of the Axis powers war cannot be run by the calendar. Neither can it be predicted in terms of past war experiences.

The pattern of war does not remain static. You cannot have millions of men fighting under varying and changing conditions without having their needs change in terms of specifications, quantity, quality, and location. This influences manpower and production schedules and every predicted change in these schedules is felt in every community of the country.

In peacetime the needs of a worker who is taken out of the production line are much different from his needs when he is taken out of the line in wartime to enter the armed forces. The 10,800,000 men taken out of the production line to enter the armed forces create an obvious hole in the productive capacity of the country. What is seldom realized, however, is that these 10,800,000 men in the armed forces not only create a loss in production but also place a tremendous additional load on the production facilities of the country because of their far greater need in terms of equipment, supplies, munitions, and machines of war.

This tremendous production which the armed forces require for their support and needs is not in turn translated by those men into productiveness which contributes to the standard of living of the nation. The significance of this observation is that it is impossible for any sane human being to conceive that we can supply men and material for war and at the same time preserve or even approximate our civilian standards of living in peacetime. War requires sacrifices by all whether they be in uniform, in the production line, in the home, or contributing to the maintenance of civilian economy. This is a "manpower dynamic" that is essential to our understanding of the manpower problem.

UNCERTAINTY IN MANPOWER PLANNING

The War Manpower Commission is the agency of the Federal Government to which has been assigned the responsibility for planning and administering those programs required to mobilize and utilize the human effort in this country. We have been criticized by individuals and groups of individuals for our indefiniteness in many respects and for changes in program and activities. It is my sincere belief that if those individuals understood and accepted the factors involved in this problem they might consider their criticism as being a bit unjustified. Nothing would delight us more than the possibility of telling every worker and employer in this country exactly what he might expect over the next three, six, nine, or 12 months. That individual or group of individuals

who can predict the course of the war over the next 12 months could give every worker and employer a manpower calendar in terms of quantity, quality, and location. No one, however, has yet hazarded a prediction along this line which he is willing to support to the point of taking the full responsibility for the results upon the lives of 135,000,000 people.

All manpower plans and estimates are subject to certain changing conditions which are all elements of a wartime economy. Some of them are as follows: Casualties, physical standards required by the armed forces, production schedules and requirements in relation to the materials of war, legislation, manpower needs of employers of all types, dependency and occupational status of individuals, and so forth and so on. The changes in most of these are influenced by military campaigns and needs. The test of success in manpower planning and administration is quick adaptability to these changes as they occur or are imminent. This is one of the "dynamic factors" influencing the manpower problem of the nation.

MANPOWER ARITHMETIC

All of the statistics bearing on the manpower question might not only be boring but also would be too voluminous to be easily comprehended. Following, however, are a few significant figures which are at the very heart of the nation's activities.

There are 22,000,000 men between the ages of 18 and 37 inclusive registered by Selective Service Boards. This includes all men regardless of physical, military, or occupational status. Approximately 14,000,000 of these men can meet the physical requirements for military service.

The armed forces will require 10,800,000 of this 14,000,000 by the end of this year. That leaves us a balance of 3,200,000. Of this number 1,500,000 will be deferred for agriculture.

By simple arithmetic we now have 1,700,000 left for non-agricultural deferment. While that is more than are now occupationally deferred it must be realized that there are many men who have been deferred for dependency who, if they were not so deferred, would be for occupation.

Before we jump to the conclusion that there are a possible 1,700,000 deferments of able-bodied men for non-agricultural occupations, we must realize that none of the above figures provide for any replacement which will be needed to maintain the armed forces at 10,800,000. That need will be determined by the human cost of the military campaigns that are ahead of us. Neither do they provide for personal hardship cases.

This manpower arithmetic is another one of the "dynamic factors" which influence the handling of the manpower problem.

MANPOWER ALLOCATION AND DISTRIBUTION

The whole manpower situation has definitely shifted within the last few months from one of utilizing the manpower reserves of the country to one of allocation and distribution of the manpower that we have. In July, 1940, there were 9,300,000 unemployed in this country. Within the next few months there will be less than a million regularly unemployed and these will be unemployables. The regular labor reserve is gone. New resources have to be developed and that which we have must be used to the greatest advantage in this war effort.

Allocation and distribution of manpower when there is no manpower reserve requires some kind of control of the common manpower pool. If various Government and private employers requiring workers were permitted to recruit where they pleased, when they pleased, and as they pleased, you would get a chaotic condition in the labor force of this country that would definitely retard the war effort and would quite possibly compromise our chances of ultimate success. That would mean that one employer would be recruiting from another and you would have wild competition in incentives. This the country cannot afford in wartime.

If it is accepted that control is necessary, then it is a matter of personal judgment as to where that control should rest. The only logical conclusion would seem to be that the Federal Government should exercise these controls in time of war. This is a "dynamic factor" in dealing with the manpower problem and unless it is accepted by the country as a whole the problem is made doubly difficult.

VOLUNTARY VERSUS COMPULSORY CONTROL

Control of the common manpower pool can be voluntary or compulsory. That, of course, is an elementary observation. It has, however, quite specific implications. The extent to which control must be voluntary or compulsory is dependent upon the amount of administration required.

The amount of administration required depends upon the cooperation which the public gives the Government agencies to whom the responsibility for control has been delegated. If industrial management, labor, and agriculture are willing to exercise voluntary control within the framework of Federal Government policies and

(*Continued on Page* 14)

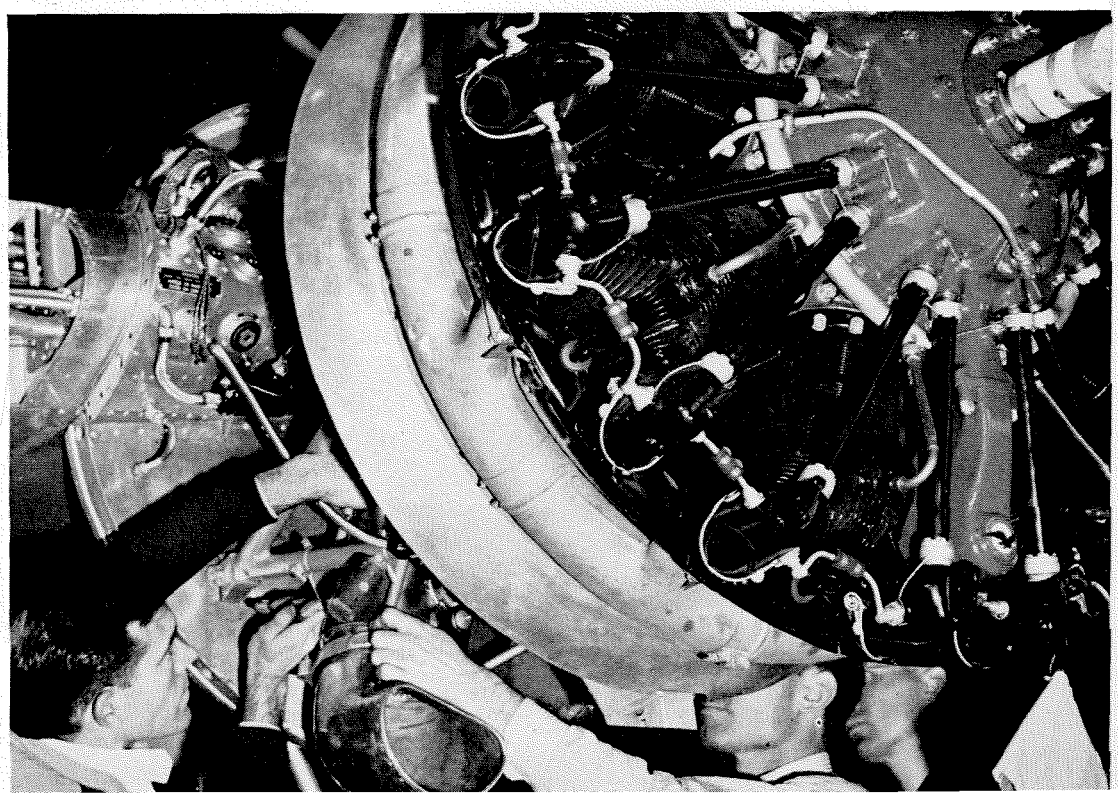


FIG. 1. Outline map of Mexico showing location (x) of Pleistocene deposits of San Josecito Cave in the southern part of the State of Nuevo Leon.

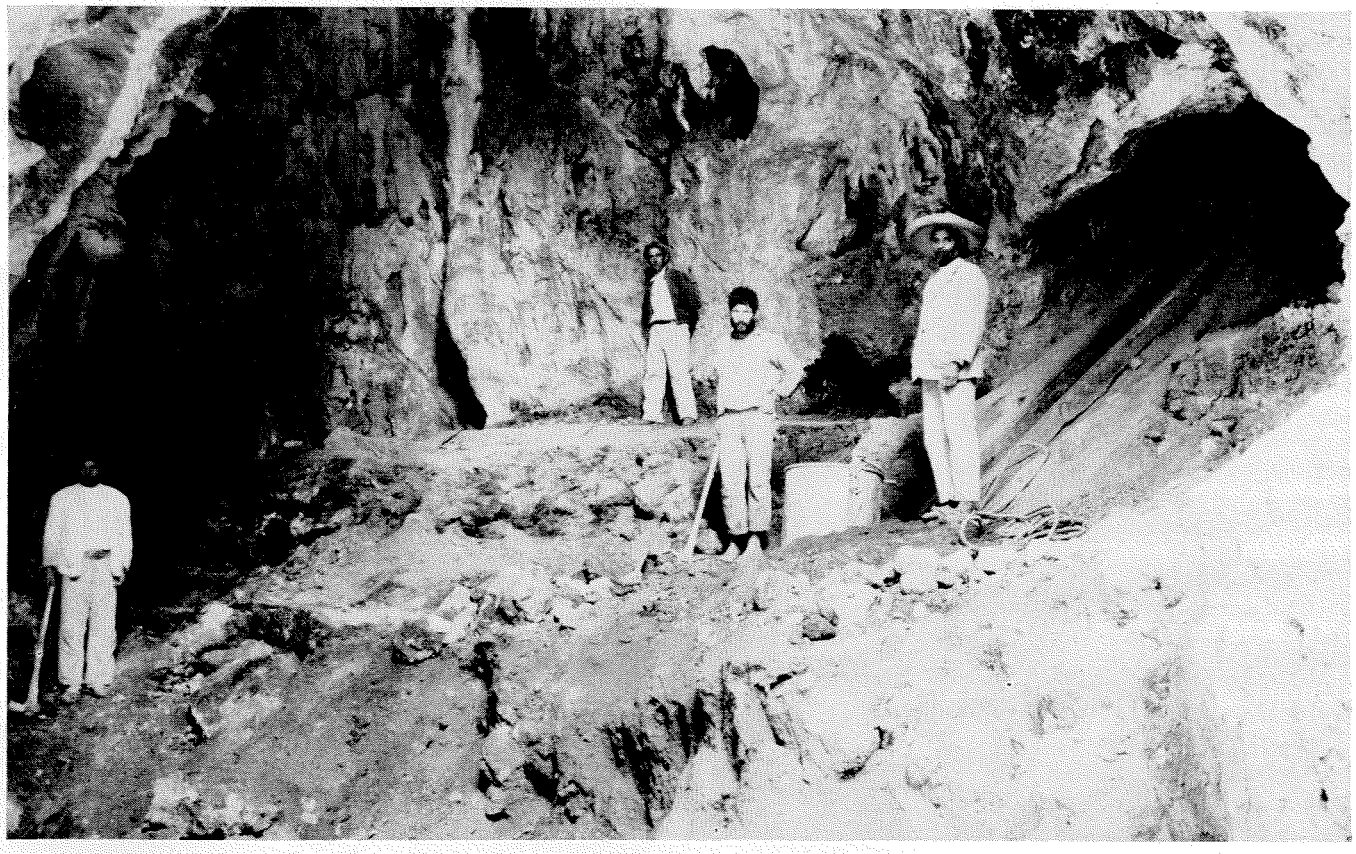


FIG. 2. View taken during an early stage in the excavation of the deposits at the north end of cave. San Josecito Cave, Nuevo Leon, Mexico.

The Cave of San Josecito, Mexico

New Discoveries of the Vertebrate Life of the Ice Age

By CHESTER STOCK

SOME of the more noteworthy fossil assemblages of birds and mammals known from the North American continent come from the Ice Age. It is perhaps not surprising that this should be the case, since in geologic history the Pleistocene occurs immediately before the Recent and is, relatively speaking, not far removed from the present in terms of years. One would normally expect to find the paleontological records for this next to last stage better preserved than those of earlier periods, since time and a changing earth are some of the factors responsible for an unsatisfactory preservation of fossil material. As a matter of fact, varied and well preserved representations of the vertebrate life of the Glacial Period, exclusive of those of man, are not uncommon in brea deposits, cavern accumulations, and in certain alluvial, lacustrine and fluviatile deposits of the United States, as well as in the frozen muck and gravels of Alaska.

Remains of Pleistocene animals are likewise known from many places in Mexico, but the types that have been identified at any one locality on the basis of such materials are often numerically few. Occurrences of different kinds of fossil mammals in the alluvial and lacustrine deposits of the Valley of Mexico were described many years ago and these supply most of the available information regarding Mexican Pleistocene life. Naturally the skeletal remains of large prehistoric animals, that come to view as a fossiliferous formation erodes away, are among the first to attract notice and attention. In the popular mind today the "huesos fosiles" refer more often than not to the bones of large animals like mastodons or elephants. Paleontologists, however, in their search through the past do not discriminate between large and small forms found fossil. Indeed, their concern is rather with the fragmentary state of the remains and with an absence of diversity among the creatures represented. For on the basis of faunal information often depends the more important conclusions that are drawn with regard to the evolution of individual kinds of animals, their habits and habitats, as well as their age relationships.

Furnishing probably the best and as yet most satisfactory information regarding the vertebrate life of the Ice Age in Mexico is a fauna recently obtained from San Josecito Cave. This cavern occurs in the Sierra Madre Oriental of southern Nuevo Leon (figure 1) at an elevation of approximately 7,400 feet. The name is derived from a mountain village near which the cave is located. This village is situated some 15 or 18 miles from Aramberri and a shorter distance from Zaragoza; travel between either place and San Josecito is made on mule back. The cave or inclined fissure occurs in folded, late Jurassic limestones and is of exceptional size, having a length of more than 80 feet and an average width of 35 feet. The chamber contains a considerable thickness of sediments (figure 2). From the level where digging started, the fossiliferous strata continued downward to a depth of more than 60 feet. The cavern extends above

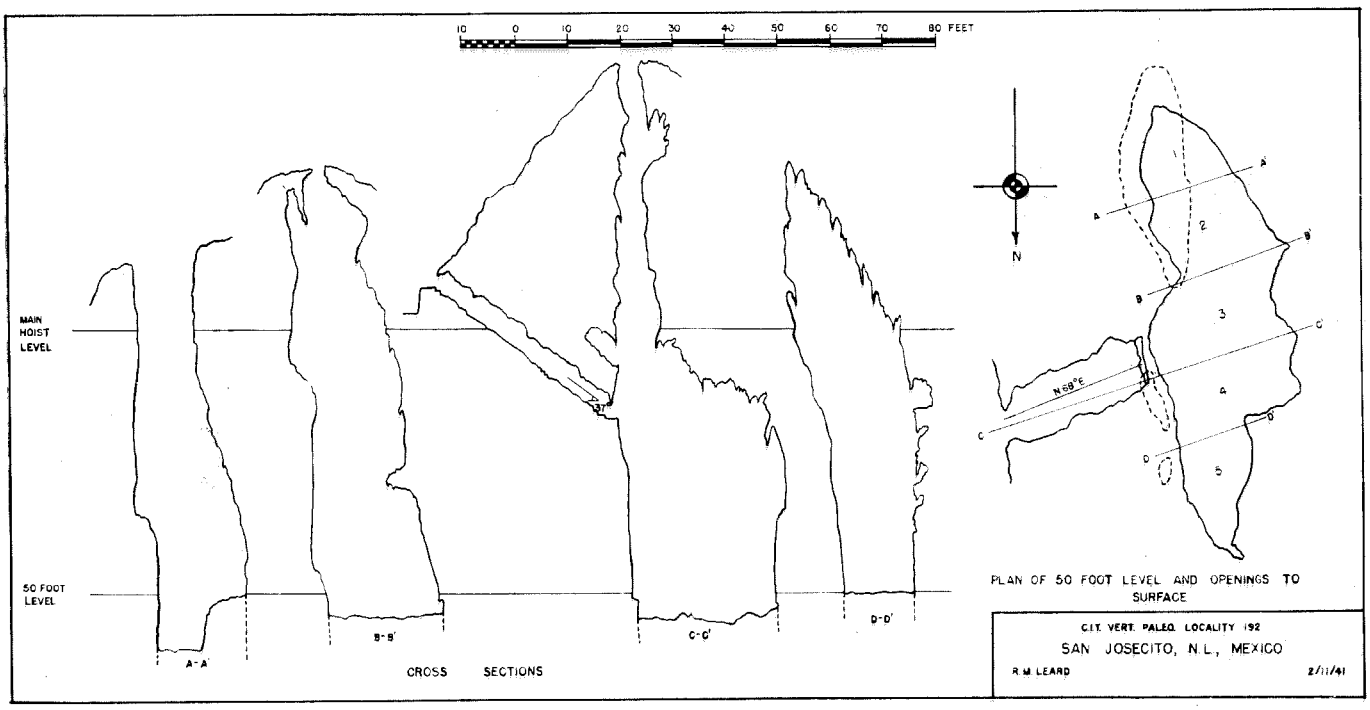


FIG. 3. Plan and vertical cross-sections of cave when the excavations had reached below the 50-foot level. San Josecito Cave, Nuevo Leon, Mexico.

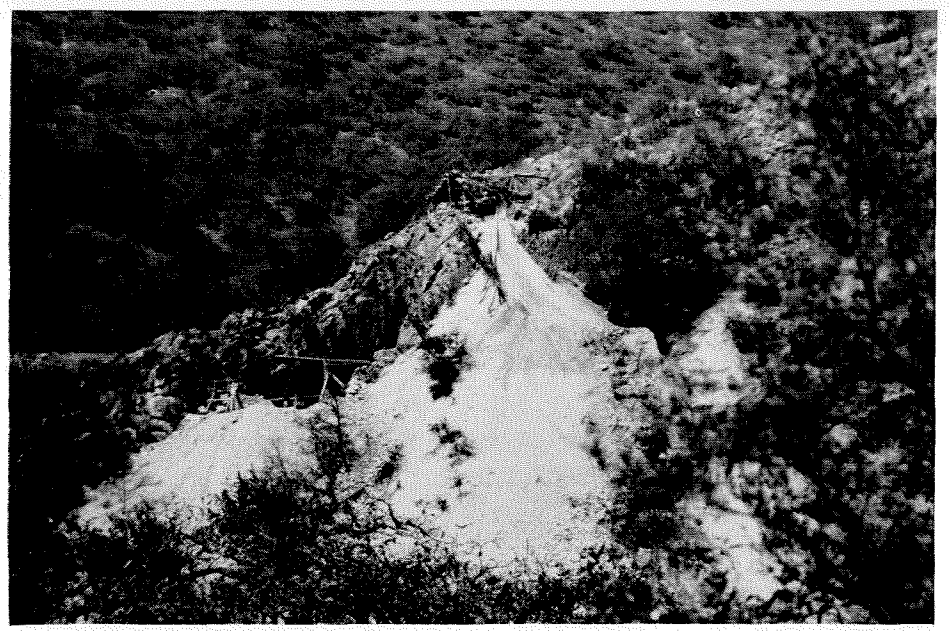


FIG. 4. View from the east showing upper hoist house, winch and headframe at main opening below. Note type of vegetation on the mountain slope. San Josecito Cave, Nuevo Leon, Mexico.

this original level of the cave fill, reaching a height in places of more than 40 feet. Several openings to the outer mountain slope occur in the roof, and a larger exit, which was subsequently enlarged in the progress of excavations, is present in the south wall of the cave (figure 3). Existence of these openings has significance since through them or through comparable entrances have come probably many of the animals whose remains are preserved in the cave deposits.

The sediments consist for the most part of unconsolidated, grayish cave dirt, generally of a fine consistency. These deposits came from outside the cavern, and were either washed in or accumulated through aeolian action. Often thickly interspersed in these beds are fragments of limestone, varying greatly in size, that have fallen from the walls and ceiling. Charcoal is also found in the cave dirt and may be a product of forest fires that occurred from time to time on the outer mountain slope (figure 4). The attitude of the cave deposits as seen at certain levels during the progress of the excavations suggests that periodic subsidence of the sediments occurred. Perhaps this was due to further leaching of the limestone at the bottom of the chamber, thereby lowering the level of the fill material and affording opportunity for still greater thicknesses of deposits to accumulate.

Mammal and bird bones are abundantly distributed in the sediments. Land and freshwater shells are present. While a number of complete skeletal elements were obtained, much of the osseous material is scattered, crushed or broken. Doubtless, the great number of limestone blocks and spalls that dropped to the floor contributed the principal damage (figure 5). Trampling of the organic material by large animals that had floundered in the cave may also account for some of the breakage. On the other hand, the amazingly good preservation of remains of fossil birds suggests that destructive forces were not always at work. Although the bones are friable, no great difficulty is experienced in removing them from the surrounding matrix. When, however, the latter becomes wet as during the rainy season, the lighter and more fragile bones and teeth are likely to crumble and disintegrate.

The San Josecito deposits are remarkable for the evidence they furnish of former presence in this region of Mexico of a large and varied avian and mammalian life. The birds alone form the largest and most diversified assemblage of living and extinct types ever recorded from a Pleistocene cave. Forty or more species are represented; 11 of these are extinct. Prominent among the latter are raptorial birds like the western black vulture, Merriam's teratorn with a wing spread greater than that of the California condor, and the curious Daggett "walking" eagle, these and others being specifically identical with birds found fossil in the brea deposits of California.

FIG. 5. Detailed view of cave deposits showing mixture of fossil bones and rocks. San Josecito Cave, Nuevo Leon, Mexico.

A great-footed turkey, a swimming rail, and an ancient curlew, all extinct, are recorded for the first time. An extinct road-runner, previously known from a Pleistocene cave in New Mexico, is likewise present.

Among the fossils, yet belonging to species still living, are the California condor, hawks, eagles, a thick-billed parrot, the first of its breed ever found fossil, bandtailed pigeon, mourning dove, owls, raven, and small perching birds. On the basis of this information ornithologists are able to extend considerably the geographic range of many extinct birds that were characteristic of the Ice Age. It is evident that the areal distribution of many living species, represented by fossils in the cave, has undergone contraction since the Pleistocene. The California condor is a noteworthy example of this. Study of the osseous material clearly indicates that certain birds nested or roosted in the cave, while the bodies of others were probably brought in by predatory animals. The common occurrence in the deposits of bones of the raven in all stages of development points unmistakably to the fact that this bird frequented the locality in large numbers.

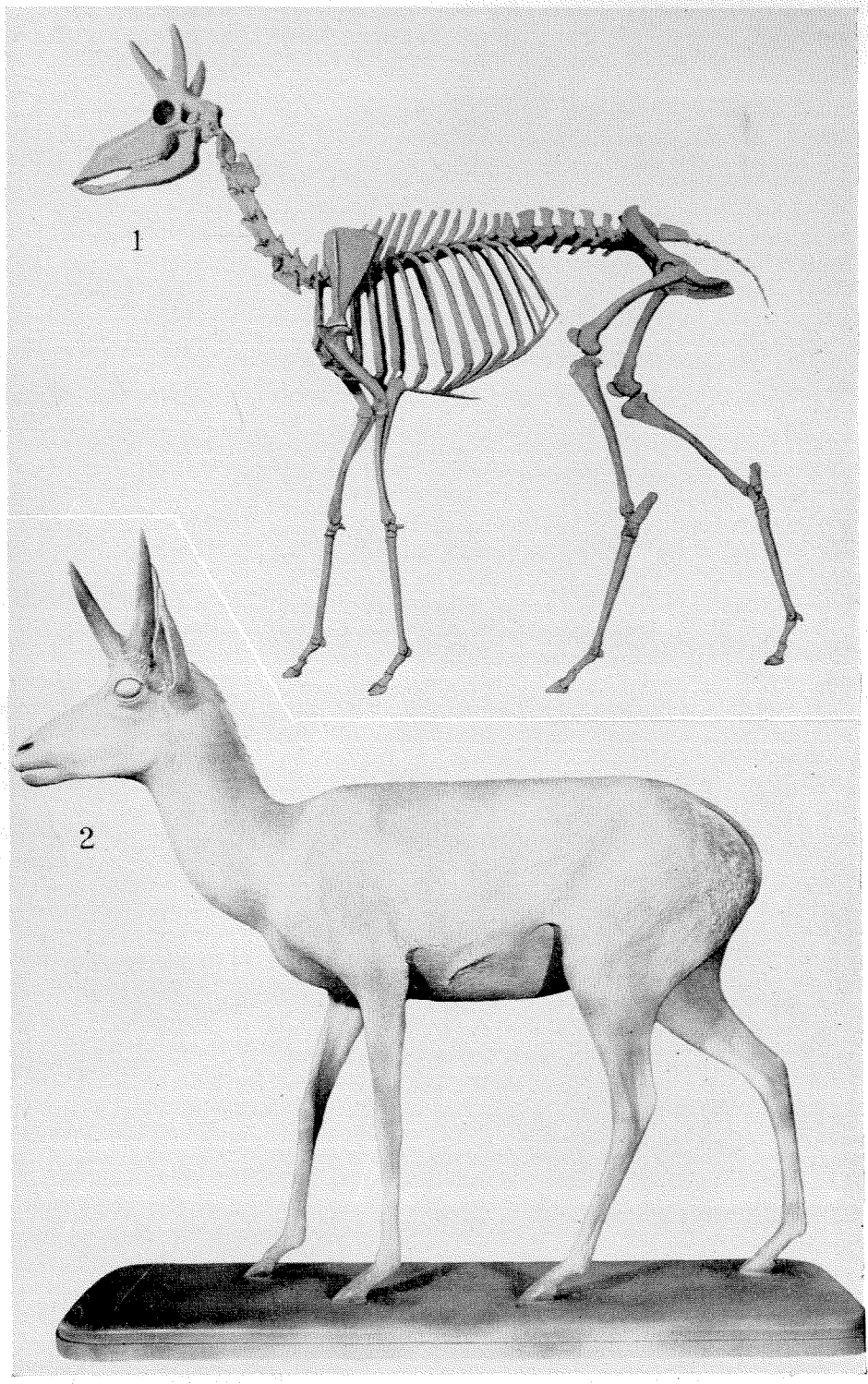


FIG. 6. An extinct four-horned antelope (*Stockoceros conklingi* [Stock]), one of the more common mammals found fossil in the cave deposits. (1) Skeleton by Fischer, (2) restoration by Otto; after Furlong. Size greatly reduced.

The fossil mammalian assemblage is nearly as large and varied as the avifauna, for approximately 40 species are represented. Man is not included in the present list since his bones were found only in the uppermost, disturbed portion of the deposits. As might be expected, rodent remains are very abundant and their identification demonstrates the presence of the marmot, squirrels, a porcupine, gophers, mice, rats and lemming. Dwarf rabbits and cottontails occur. Hoofed mammals are also present in numbers. The most common type among these is a four-horned antelope. This creature differs from the modern pronghorn in the structure of its horns. Its skeleton is like that of the living antelope, but the limbs are slightly heavier, the body as long but not so tall as in the latter. Sufficient material is available to construct a mounted skeleton, on the basis of which a restoration has been made (figure 6). Next in abundance is an extinct species of deer, having a size more like that of a dwarf elk, and thus is distinctly larger than the largest mule deer of today. Much less in evidence is the true deer. Of much interest because of possible climatic implications, are several individuals of a bovid related to the muskoxen. Another type, rather rare and unusual in its presence, since its nearest relative has a much more northerly range today, is a small mountain goat. Curiously, only two or three bones of llama-like camels were found.

Additional herbivores include the ground sloths Nothrotherium and Megalonyx. The former is much

more abundant than the latter. Another common herbivore is the horse. This animal is smaller than most of the horses of the North American Pleistocene. Evidently sufficient verdure was present in the vicinity of the cave to sustain both grazing and browsing mammals. Apparently individuals of these larger animals floundered into the cave or their bodies were dragged in by carnivores.

Remains of an extraordinarily diversified assemblage of flesh-eaters are found in the San Josecito deposits. The cats include the sabre-tooth, the jaguar, the giant jaguar or great lion, pumas and lynx. The canid family is represented by foxes, coyotes and the extinct dire wolves. A black bear and an extinct short-faced bear are recorded. Among the smaller carnivores are the weasels and skunks, including the hog-nosed skunk. Insectivores and bats have been found fossil, and among the latter the vampire bat is perhaps the most interesting.

A survey of the entire mammalian assemblage makes the conclusion inevitable that the life of the Ice Age in this region of Mexico was far more abundant and more diversified than that of the present. Definite impoverishment of the bird and mammal assemblages has come with the passing of the Pleistocene and the advent of Recent time. It appears logical to conclude that the richness of this past life developed under optimum climatic conditions, furnishing for the herbivores even greater opportunities to obtain food than prevail in the area today. It should be mentioned in this connection that the cave occurs now in an elevated region supporting a pine and oak plant association. More extensive grasslands interspersed with forests, and existing under at least a slightly cooler climate with greater rainfall than the present, may comprise some of the major features of the environment in which these organisms lived.

Thus, from San Josecito Cave comes a tangible link with the life of the immediate geologic past. The kinds of creatures that once lived in and about the locality are, for the most part, readily identified by the "dry bones" entombed in the strata laid down in the cavern. The facts of occurrence and association of the fossils furnish likewise a basis for an interpretation of the conditions under which the birds and mammals existed. This material record of an episode in later geologic history not only adds many new facts to paleontology, but also extends geographically the picture of the Pleistocene life of the North American continent.

Manpower Dynamics

(Continued from Page 9)

standards, a minimum of administration is required and the success of voluntary control is assured.

Any control, however, impinges on individual rights and privileges. Unless it is accepted that certain individual rights and privileges must be restricted in time of war, voluntary restrictions cannot be developed and compulsory ones might be imperative. This is another "dynamic factor" in dealing with the manpower problem.

The mechanism has been established by which management and labor can agree to the restrictions upon freedom of movement to which they will both submit themselves. This mechanism is known as War Manpower Commission voluntary stabilization agreements. The National Management-Labor Committee of the War Manpower Commission has referred to these agreements as types of voluntary compulsion. That may sound a bit facetious but it is extremely fundamental. If we are willing to write our own rules and are willing to abide by those rules it is a much more pleasant form of self-denial than rules which are promulgated by others and forced upon us. The only enforcement behind such rules is honor and loyalty and, after all, what greater form of enforcement is there? This is another "dynamic factor" in dealing with the manpower problem which can only be realized to the extent that the people of this country accept the implications of this basic principle.

The handling of the manpower problem starts and should be handled almost entirely within the employer's individual establishment. In dealing with manpower the employer must give ample consideration to the type of management practices which exist in his establishment, the caliber of the supervision, the nature of the labor relations, the personnel program, policies, and practices that exist.

For decades an educational process has been going on toward the creation of better employer-employee relationships. Particularly since the last war there has been a rapid development in this field. Those employers who will review the constructive proposals that have been made since the last war will soon solve their own manpower problems. They will immediately give personal and diligent attention to turn-over, absenteeism, the use of types of workers not qualified for military service, and the extent to which the full capacities of workers are being utilized.

Since the manpower situation in time of war requires individual sacrifices, there are no exceptions. If it is appreciated, therefore, that there must be restrictions upon both management and labor, it will likewise be appreciated that the nature of those restrictions and how they will be administered should be worked out jointly by all parties affected. This is a "manpower dynamic" of the greatest import. How much longer will some of us fail to accept it?

SUMMARY

This has been a rather general presentation of specific principles. There is nothing in it which makes news or startling headlines. To some it may even be dull and boresome. It may, to others, be disappointing since it does not answer their own specific problems.

This presentation is a sincere attempt on my part to introduce into this discussion certain basic factors which must become dynamic in the consciousness of those who hope to contribute tangibly to the mobilization and utilization of the nation's human resources. Anyone who does not accept the fact that wartime economy is different from peacetime economy, that manpower plans cannot be definite predictions, that there is one correct answer to manpower arithmetic, that the problem is now allocation and distribution of manpower, that controls are necessary, that the extent to which the controls are voluntary is dependent upon the amount of administration required, and that in the last analysis the manpower problem has to be solved in the establishments in which the work is being done by the workers and the employers who are held responsible for getting it done, will find that adequate handling of the manpower problems facing him is impossible.

It is a great satisfaction to realize that there is a growing understanding of these manpower dynamics. There is increasing indication of the willingness of local communities and establishments to solve these problems at the source. This is a hopeful sign.

The Argentine Revolution

Shadow of the Man on Horseback

By EDWARD O. GUERRANT

ON June 4 there was a revolution in Argentina. A military committee headed by General Rawson and General Pedro Ramirez overthrew the isolationist government of President Ramon Castillo in Buenos Aires in a lightning coup d'etat. The rebels encountered slight resistance; there was little bloodshed. Ramon Castillo took refuge on the minesweeper *Drummond* and radioed that he had transferred his government to that vessel in the River Plate. Shortly afterwards, realizing that further resistance was futile, he capitulated. Meanwhile General Rawson had set up a new government which lasted only two days to be immediately followed by one under the leadership of General Ramirez, the former Argentine War Minister.

UNDERLYING CAUSES OF COUP D'ETAT

The rapidity and success of the revolutions surprised the world. Observers scanned the news from Argentina for clues as to the underlying causes of the coup d'etat. On the first day of the revolt crowds surged through the streets of Buenos Aires shouting "Death to fascists, long live democracy," and stoning pro-Axis newspapers and German business houses. An official proclamation of the Ramirez government stated: "We will fight to maintain the real and integral sovereignty of the nation, to fulfill its historic traditions, to make effective and absolute the true, loyal union of American collaboration, and to comply with international pacts and promises." Another proclamation exposed the venality and corruption in the Castillo government.

The popular demonstration in Buenos Aires and the proclamations of the revolutionary leaders, especially with regard to compliance with international pacts, were such that many observers in the United States attributed the revolution solely to a rising tide of antagonism against the pro-Axis tendencies of the Castillo regime. On June 4, Secretary of the Navy Frank Knox said: "It looks as if the pro-Axis Administration there has been unhorsed." The revolution attracted special attention in the United States for two reasons. First, representatives of this government urged at the Rio de Janeiro Conference of January, 1942, that the 21 American nations sever relations with the Axis powers. Argentina alone had not complied with the recommendation. Accordingly, it was thought that the revolution might foreshadow such compliance. Second, the established interest of the United States Government in Latin American affairs since 1933 suggested that a revolution in a nation as important as Argentina would warrant close attention. Judging from the unfolding of events since June 4, it now seems that the causes of the revolution can be found both in the field of foreign policy and domestic relations.

ARGENTINA'S FOREIGN POLICY

Turning first to Argentina's external affairs one must consider the Rio de Janeiro Conference. This meeting stemmed from a convention adopted at Lima in 1938 which permitted any American nation to call a conference of the foreign ministers of the Pan-American Union in any emergency. After Pearl Harbor the United States called a meeting at Rio de Janeiro to consider the measures to be taken arising from the Axis onslaught in December, 1941. Quite naturally this country desired unanimous Pan-American action against the Axis. Such unanimity at the Conference on the severance of relations was finally reached toward the close of proceedings after Argentina had persistently opposed the recommendation. Argentina had been at odds with the other American nations and particularly with the United States in the five Inter-American conferences held since 1933, and the Rio de Janeiro gathering was no exception. After Argentina had agreed reluctantly to sign the recommendation, she refused to implement the declaration by severance of relations. This brought strained relations between Argentina and the other states in the Western world. The reaction of the United States, for instance, has been to refuse lend-lease aid to Argentina while granting it to others in Latin America. The reason is obvious. The President of the United States could hardly decide that Argentina was resisting the aggressor nations and was vital to the defense of this country while she retained her contacts with the Axis. It was the hope of the United States that the recent revolution would bring an alteration in Argentina's foreign policy. This result may be forthcoming, but it has not occurred yet.

The isolationist policy of Ramon Castillo possibly contributed to the revolutionary movement. While the texts of the lend-lease agreements between the United States and various Latin-American nations have not been published, it is known that this country is supplying some of Argentina's neighbors with military equipment. For instance, the United States has spent a substantial amount of money in Brazil in constructing permanent airfields and other military installations. As the major belligerent nations are obviously not in a position to sell arms to Argentina, and as the United States will not extend lend-lease aid, she cannot procure adequate military supplies either in Europe or America. Vis-a-vis the other Latin-American countries, Argentina is becoming increasingly weaker.

It was probably wishful thinking on the part of many in this country to attribute the revolution solely to the international situation. Even as reputable a newspaper as the *New York Times* missed the mark in an editorial which stated: "There is little doubt that the revolution was brought about by a split within the conservative camp and that this split was not on domestic issues but on foreign policy." It was most certainly only a cleavage in the conservative camp, but if the break occurred chiefly over foreign affairs there has been little indication of this.

A "PALACE REVOLT"

Before examining the purely internal aspects of the Ramirez revolution, it is expedient to understand the nature of this revolt which is characteristic of many

Latin-American revolutions. Obviously it was not an organic, social or economic change such as the French or Russian Revolutions. It was merely a palace revolt—in this case the substitution of one conservative regime for another. That Generals Rawson and Ramirez succeeded so easily, and that revolutions occur so often in Latin-American countries and so infrequently in Anglo-Saxon nations, has amazed some Americans. This phenomenon can be accounted for largely by the difference in Latin and Anglo-Saxon legal traditions. In England and in the United States the law is considered superior to any individual. The power of the government is limited, and the people have guarantees against governmental excesses in such documents as the Bill of Rights, the Habeas Corpus Act, the United States Constitution, and similar legal landmarks. Because of this theory of the superiority of the law over individuals, revolutions have been relatively rare in Anglo-Saxon nations. They have usually occurred only when the peoples have felt they were suffering intolerable abuses.

TRADITION OF INDIVIDUAL LEADERSHIP

On the other hand, there is no similar tradition in the Roman law—the legal background of the Latin-American countries. The precedent has been the superiority of individuals to the basic law. In Latin America, particularly, there has been the tradition of leadership of various strong men—witness such individuals as Simon Bolivar, Jose de San Martin, Bernardo O'Higgins, and Agustin de Iturbide in early revolutionary times, and the modern authoritarian rulers in the Dominican Republic, Guatemala, Brazil, and elsewhere. During the early days of Latin-American independence these leaders were called *caudillos*, and the term still remains today. They were military men—almost literally on horseback. There is no exact counterpart in United States history. This country has had its political bosses and Huey Longs, but in most cases these leaders have not been military men and have not had quite the same qualities of personal leadership as the *caudillos*. While *caudillo* leadership was more widespread a century ago than it is now, it certainly has not disappeared. As one Latin-American authority has put it: "Over all the countries of Hispanic America, there is still the shadow of the man on horseback."

Generals Rawson and Ramirez did not ride into Buenos Aires on horseback probably because the horse is outmoded. Nevertheless, the acts of the new regime indicate how closely these men resemble earlier *caudillos;* they also indicate the difference between the legal traditions of the United States and Latin America. One of the first moves of the revolutionary government was to dissolve the Argentine Congress. This would hardly have happened in the United States. While the Constitution of the United States allows the President to dismiss Congress in case of a disagreement between the two Houses as to the time of adjournment, this has never been done. Then, after dissolving the Argentine Congress, the new regime issued the following proclamation:

> Provisional President Ramirez, in view of the diffusion of false news tending to sow confusion and disorder, announces that the situation is absolutely normal and that he firmly maintains the power which he has just assumed.
>
> He also announces that he will take the severest measures to suppress with the greatest energy attempts of such nature which will be considered from now on as treason.

The above statement concerning treason, while a logical one to make, is somewhat amusing when one considers the action General Ramirez had just taken against President Ramon Castillo.

Stern measures in suppressing freedom of speech were taken as indicated in this proclamation:

> In order to avoid circulation of r u m o r s tending to create confusion among the public, all civil and military authorities will immediately detain those who spread alarming or tendencious news. When detained those who are proved guilty will remain at the disposal of the government for corresponding measures according to martial law. (Signed) Ramirez.

FEW LIMITATIONS

There is little in this decree to suggest that there are many limitations on the government in Argentina. A Ramirez decree of June 18 was added evidence that the days of the *caudillos* are not ended. This decree announced the cancellation of the presidential election scheduled for September 5. Such procedure differs radically from the practice in the United States where the election date is set and cannot be arbitrarily altered and certainly not abolished. On the day of the decree concerning the cancellation of the election President Ramirez said "the army would re-establish the national constitution and impose respect for it."

While the new regime announced that its policy would be one of acts and not words, its acts have chiefly concerned domestic affairs. The one notable exception has been the order cancelling cable facilities that have permitted Axis nations to transmit code messages. This was in compliance with a resolution adopted at the Rio de Janeiro Conference.

As far as can be determined at present, on the basis of partial evidence, one of the major factors precipitating the revolt was the corruption of the Castillo regime. There were various scandals which undermined confidence in the government. One of the most notorious was the weekly lottery conducted by the Government of Argentina. The prizes run sometimes as large as $1,500,000 a week. It was discovered that the numbers to be drawn were known to a small group of people close to the government. This disclosure followed reports of maladministration and corruption in the judicial and executive branches of the government. One observer who released his story from Montevideo to avoid the censorship in Buenos Aires said that "Electoral fraud had been raised to the level of a fine art and extensively used in all elections." These irregularities, coupled with the fact that Castillo had reportedly picked the next president, Robustiano Costas, virtually assuring him of election, aroused public indignation. That Senor Costas' fortune is based on sugar, and that a government decree during the Castillo regime raised the price of sugar, did not add to the tranquillity in Argentina.

SUMMARY

It would seem that the present leaders of Argentina, being military leaders, would realize that, while neutrality and isolationism might have been a conservative and realistic policy from 1940 to late in 1942, at present, with the tide of war turning strongly against the Axis, it is the part of wisdom to get on the Allied bandwagon for reasons of purely national interest if nothing else. If the Ramirez government does eventually sever relations with the Axis, which will be inevitable in the event of total Allied victory, there are competent observers in this country who think it will not redound greatly to Argentina's credit in the Western world, coming so late in the course of the war.

ELECTROSHOCK

A SUCCESSFUL device for administering electroshock treatment to overcome certain types of insanity has been developed in the Caltech laboratories. The instrument, developed by a group of physicists and physiologists, is now in satisfactory operation at numerous state hospitals, and at the Langley-Porter Clinic in San Francisco.

The electroshock treatment has been in use for several years, but physicians were handicapped because there was no way of determining in advance the resistance of the patient, and therefore the strength of the current administered could not be accurately controlled. The resistances for the required large shock currents show appreciable variation, not only from patient to patient, but also in the same patient at different times. These resistances vary from about 100 to 300 ohms. This new device automatically adjusts the voltage to compensate for differences in resistance, thereby enabling the physician accurately to prescribe the necessary current dosage.

The electroshock treatment consists in the passage of alternating current for a few tenths of a second through electrodes placed on the temples of the patient. The treatment is administered two or three times a week for four to six weeks. The shock produces unconsciousness, followed by convulsion lasting about one and one-half minutes. Five minutes after the shock the patient is normal, remembering nothing of the experience.

The Month in Focus

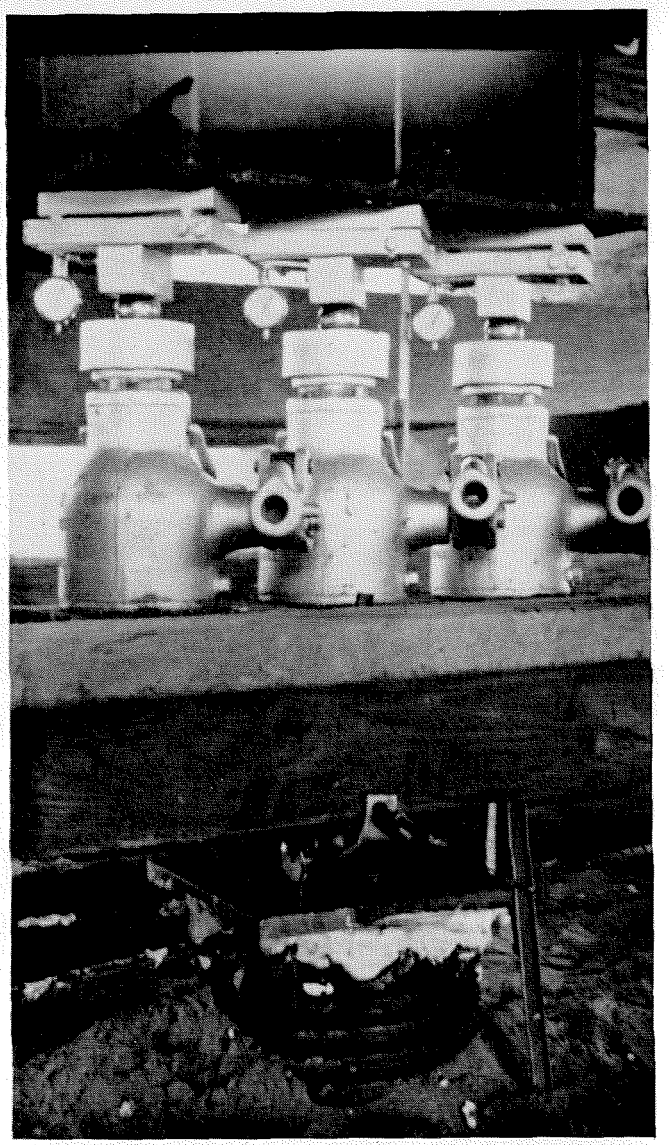
(*Continued from Page* 4)

divided into a civilian section and a military section. The military section consists of naval officers being prepared for foreign service in military government and corresponds with the Army School at Charlottesville.

The Columbia University training program differs from the Charlottesville plan in several respects. The army program is under direct military planning and control, and the naval plan is under civilian direction with civilians acting as director and as regular professional staff members of the University. The training program is accommodated within the graduate facilities of the school. Non-military personnel are permitted to enroll there for foreign training. The Navy, however, has not planned to utilize the service of civilians in this capacity on completion of their training. Civilian graduates of the school will presumably find employment in such government departments as the Lend-Lease Administration or in private industry maintaining foreign offices.

The course at Columbia University was set up on the assumption that the civilian administrator will be asked to perform certain service functions of government in relief, health, and factory administration, work with refugees, and social work pertinent to conditions brought about by the war.

The trainees in this civilian course are selected on the basis of experience, language ability, and general background, as well as their academic education. Business men, administrators, lawyers, college professors, engineers, agricultural experts, social workers, economists, and others have enrolled for the course.



Three beam gauges applying a total load of 150 tons in a pile load test.

THE BEAM GAUGE

THE difficulty of measuring loads accurately in tests of structures in the field, load tests on piles, and tests to determine the bearing capacity of soil, led to the development of a stable type of testing apparatus known as the beam gauge. The device, designed by Professor Frederick J. Converse of C. I. T., is described below. The beam gauge is simple, accurate, stable, and adaptable to many types of usage.

The principle of the beam gauge is shown in figures 3, 4, and 5. In figure 3 a steel plate (10) is shown resting on knife edge supports (11 and 12). A load, *P*, in the center of the beam deflects it as in figure 4. If a steel bar (13) is attached to the side of the beam at one end, outside of the knife edge support, its right end will move down a distance (d), figure 5, when the beam is deflected. A measuring device attached to the beam will indicate the movement (d) and may be calibrated to measure (d) in terms of the load, *P*.

Figure 1 is a plan view, and figure 2 is an elevation of a beam gauge as constructed. Part 20 is a heat-treated steel plate, as represented by line 10 in figure 3. Part 23 is a steel bar bolted and dowelled to the left end of plate 20, and usually also tack welded to insure a rigid connection. The bar passes completely around plate 20 without touching it, except at the two ends, one on each side of plate 20, where it is fastened to the plate at the left of knife edge 21. The beam is supported on two knife edges (21 and 22) fastened to a base plate 24. The bolts, 26 and 26a, pass through drilled holes in plate 20 with plenty of clearance, and are threaded into the base plate 24. Their purpose is to hold the two parts together for ease in handling, and they are kept only finger tight, so as not to affect the stresses in the beam.

The load is applied to the top of plate 20 through a block, 33, having two knife edges, 35 and 35a. This block has a spherical seat into which a ball, 36, fits. Another block, 37, with spherical seat fits on top of the ball and receives the thrust from the loading device.

When load is applied to the ball and socket joint, beam 20 deflects and arm 23 moves down, carrying with it the dial gauge 31 attached to the arm by the post, 30. The spindle of the dial gauge 32 bears on the end of the beam 20, and the relative movement between the arm and the end of the beam is indicated by the pointer of the dial. The dial is calibrated to read the load applied. For a beam gauge with a capacity of 50 tons, the dial is graduated in 0.001-inch divisions and records a total of 250 divisions for the 50-ton load. A movement of one division on the dial is therefore equivalent to 400 pounds change in load. If readings are taken to one-fourth of a division, the least reading is 100 pounds. This is 0.1 per cent of 50 tons or 1 per cent of five tons. For lower loads the accuracy decreases in direct proportion to the load.

The beam gauge may be placed in any position, such as horizontal or upside down. Yielding of the knife edges has no effect on the dial readings, the beam and deflection measuring device being a self-contained unit. Load may be applied by any kind of a jack.

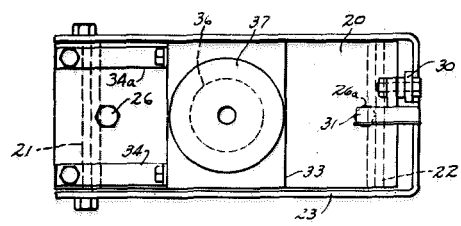


Fig. 1.

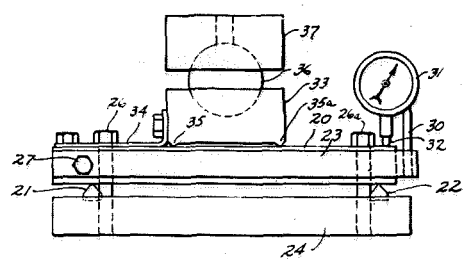


Fig. 2.

Fig. 3.

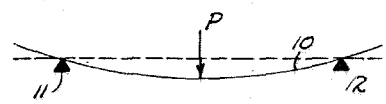


Fig. 4.

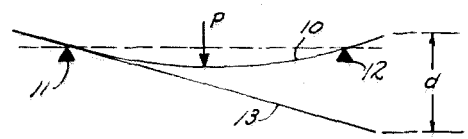
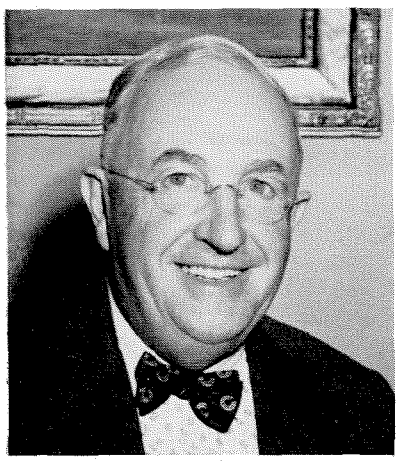


Fig. 5.

C. I. T. NEWS

JAMES RATHWELL PAGE

TRUSTEES of the California Institute of Technology at their last annual meeting elected James Rathwell Page of Los Angeles president of the Board. In this office he succeeds Allan C. Balch, whose death last May terminated ten years of service as head of the Institute's trustees.



JAMES R. PAGE

Mr. Page has been an Institute trustee since 1929. He is also a member of the California Institute Associates and was president of that group from 1933 to 1937. A long-time resident of Los Angeles, Mr. Page has been prominently identified for many years with both the financial and civic affairs of the community. He is a trustee of the Good Samaritan Hospital, the Barlow Sanitarium, the Philharmonic Orchestra, and the All-Year Club of Southern California, and is president of the Los Angeles Community Chest. He is a director of several southern California corporations and a partner in the firm of Page, Hubbard and Asche.

At the same meeting of the Institute's Board of Trustees one new member, Keith Spalding, of Pasadena, was elected. He is the son of the founder of the universally known firm of A. G. Spalding & Co.

EAGLE ENDOWMENT

The bulk of the John H. Eagle estate was left to the California Institute of Technology, it was disclosed recently when the will was filed in probate court, Los Angeles. Four-fifths of the $7,000,000 estate, after bequests to relatives and employees are deducted, goes to the Institute to be invested in a fund known as the "John H. Eagle Endowment," to be used for the promotion of research in physics, chemistry, and the causes, prevention and cure of disease, and for awarding prizes for notable advances in those fields, to be known as "John H. Eagle awards for scientific achievement."

The will stated that Mr. Eagle chose Caltech as the beneficiary of the bequest because he was "inspired in great measure by his admiration and affection for Dr. Robert A. Millikan."

Mr. Eagle stated, in his will, that he prefers to leave the purpose for which the fund will be employed to the judgment of the Board of Trustees of the school.

Mr. Eagle was 74 years old when he died in July of last year. He was a retired Pennsylvania silk manufacturer who came to California in 1930.

RECEIVES CITATIONS

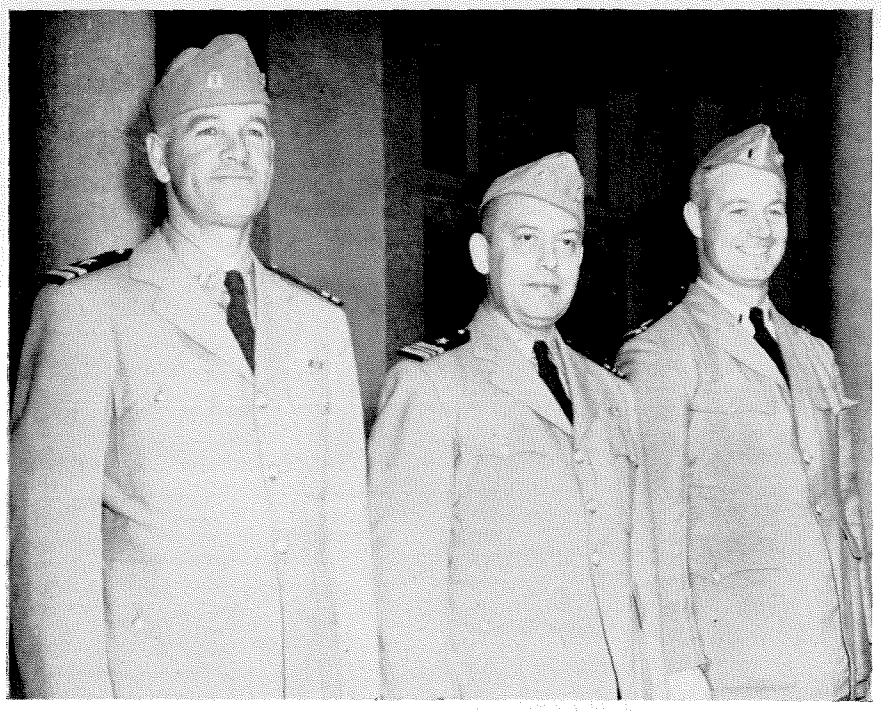
BRIGADIER General Carlyle H. Ridenour, '18, whose bomber wing has carried out "highly successful" raids on Rome and Naples, has received the Air Medal and Oak Leaf Cluster to the Air Medal. Major General James H. Doolittle decorated General Ridenour on July 4 in North Africa with the Air Medal, setting forth in the accompanying citation that it was "for meritorious achievement while participating in six sorties against the enemy." Two days later the Oak Leaf Cluster was awarded "for participation in five sorties."

Previously, General Ridenour had received the Silver Star medal for gallantry in action. He had led several

BRIGADIER GENERAL CARLYLE H. RIDENOUR

missions which resulted in extensive damage to Axis military installations and shipping.

Mrs. Ridenour, of Pasadena, has received letters from the General telling of the location of their base in a desert valley that has been extremely hot. More recently his wing has been moved to a beach base.



AT LEFT:

Left to right: Lieutenant Miles E. Morgan, executive officer; Lieutenant Commander E. W. Mantel, commanding officer of the unit; and Lieutenant (j.g.) Stanley F. Murphy, athletic director.

THE NAVY'S V-12 PROGRAM

ON JULY 1, 535 students arrived on the campus of California Institute of Technology to start training in engineering under the Navy's V-12 program from which successful candidates will emerge with degrees in engineering and commissions as ensigns in the United States Naval Reserve. This large group of students, many of them former Caltech men, came from high schools, colleges, and from the ranks of the Navy.

V-12 students are rated as apprentice seamen of the Navy, and in addition to their education, housing, food, clothing, and medical services, they receive the apprentice seaman's base pay of $50 a month. The Navy students occupy the student houses on the campus, and civilian students have moved to quarters off the campus.

The educational facilities of the school are operating for the Navy group along the same lines as they have been conducted in the past to fit civilian students for engineering degrees.

Lieutenant Commander Eugene W. Mantel, U.S.N. (Ret.), commanding officer of the V-12 unit, is a graduate of the United States Naval Academy, class of 1920, which graduated in 1919 because of World War I. From the time of his graduation until 1925 Commander Mantel served at sea and then retired to enter business. He was recalled in December, 1941, to active duty.

Lieutenant Miles E. Morgan, U.S.N.R., executive officer of the unit, was assistant superintendent of schools in Santa Monica before entering the Navy. In World War I he was in the Army Air Service.

Lieutenant (j.g.) Stanley F. Murphy, U.S.N.R., previously coach and instructor at Marshall High School in Chicago, is administrator of the physical fitness program of the V-12 unit.

Lieutenant (j.g.) Ebon B. McGregor, Medical Corps, U. S. N. (Ret.), medical officer of the unit, was recalled to active duty and assigned to the Institute in June, 1943.

The faculty had feared that many of the Caltech traditions would become lost with the advent of the Navy program, and with the necessary change in routine and discipline. However, it has been gratifying to note that the apprentice seamen are entering into the school activities and are exhibiting a fine school spirit. Dances and other social functions are attended by the V-12 students as well as by the civilians. The Navy is represented on the staff of the weekly campus newspaper, the California Tech, and a great number of these students are taking advantage of student body membership.

The Caltech Honor System has been recognized by the Navy, and Commander Mantel has entrusted the operation of the system to the Associated Student Body, and consequently all matters concerning the Honor System will be handled by the Board of Control.

MRS. A. C. BALCH PASSES

MRS. Janet Jacks Balch, widow of the late Allan C. Balch, who had been an associate of the Institute for many years and president of its Board of Trustees, passed away August 4, three months after the death of her husband.

Mr. and Mrs. Balch will be remembered by the California Institute of Technology and other educational institutions for their generous endowments toward buildings and improvements on the campus. They assisted in the creation of the Kerckhoff Biological Laboratories, founded the Balch School of Geological Sciences, and financed the building of the Athenaeum, a social center for associates at the Institute.

Mr. and Mrs. Balch had celebrated their golden wedding anniversary two years ago in April and a reception was given at the Athenaeum in their honor. Approximately 3000 guests attended.

Together Mr. and Mrs. Balch have done much for the community and have won the esteem of all for their devotion to the Institute and their participation in social and civic affairs.

PROFESSOR CLAPP RETIRES

W. Howard Clapp, professor of mechanism and machine design at the California Institute of Technology, retired at the close of the last school term. He joined the Institute staff as instructor in 1911, and has been a professor since 1918. The Alumni Association presented Professor Clapp with its first Honorary Life Membership for his interest and cooperation in alumni activities.

WAR TRAINING COURSES

ON July 1 the Institute began another year of participation in the government-sponsored program of special war training courses. As in the past, these courses are given tuition free; they are all designed to supply trained personnel for essential war industries or to facilitate upgrading of men and women already employed in such industries. Listed below are the courses scheduled to begin during September, 1943. Others may be added to this list later. Unless otherwise specified, classes will meet on the Institute campus in Pasadena.

ADVANCED EXPOSURE AND NEGATIVE CONTROL
Date and place to be announced later; 2 evenings weekly, 14 weeks.

ADVANCED TOOL ENGINEERING
Begins September 15; 2 evenings weekly, 12 weeks.

ADVANCED TOOLING PROBLEMS
Begins September 14; 1 evening weekly, 10 weeks.

AIRCRAFT FITTING ANALYSIS
Begins September 1, Long Beach Junior College; 1 evening weekly, 20 weeks.

AIRCRAFT PRODUCTION ILLUSTRATION
Begins September 24; Art Center School, 2544 West 7th St., Los Angeles; 2 evenings weekly, 8 weeks; 3 evenings weekly, 12 weeks; total, 20 weeks.

CHEMISTRY AND PHYSICS OF PHOTO-TRACING, I
Begins September 24; Art Center School, 2544 West 7th St., Los Angeles; 2 evenings weekly, 12 weeks.

CHEMISTRY AND PHYSICS OF PHOTO-TRACING, II
Begins September 27; Art Center School, 2544 West 7th St., Los Angeles; 2 evenings weekly, 14 weeks. (A special class for swing shift workers will meet during the day, 2 days weekly.)

ELECTRONIC CIRCUITS
Begins last week in September; 3 evenings weekly, 10 weeks.

ELEMENTARY DIFFERENTIAL EQUATIONS WITH ENGINEERING APPLICATIONS
Begins second week in September; meeting place to be arranged; 1 evening weekly, 14 weeks.

ENGINEERING MATERIALS AND PROCESSES
Begins September 21; 2 evenings weekly, 10 weeks.

INDUSTRIAL RELATIONS AND PRODUCTION ENGINEERING

(The courses listed below will begin the week of September 13. Unless otherwise noted, they will meet 2 evenings weekly for 13 weeks. The starred courses will also be given at El Segundo High School, beginning the week of October 18).

***COST ANALYSIS AND CONTROL**
***COST ESTIMATING**
FACTORY COST CONTROL (1 evening weekly)
***INDUSTRIAL MANAGEMENT**
***INDUSTRIAL RELATIONS FOR SUPERVISORY PERSONNEL**
INDUSTRIAL WAGE INCENTIVES
LABOR RELATIONS FOR SUPERVISORY PERSONNEL
MANUFACTURING INDUSTRIES AND PROCESSES
***MOTION AND TIME STUDY**
PRODUCTION CONTROL
***SELECTION AND PLACEMENT OF PERSONNEL**
***TECHNIQUES OF TRAINING PERSONNEL**
***WAGE AND SALARY DETERMINATION AND JOB ANALYSIS**

FUNDAMENTAL ENGINEERING MATHEMATICS, II
Begins September 20; 2 evenings weekly, 18 weeks.

FUNDAMENTAL ENGINEERING MATHEMATICS, III
Begins September 23; 2 evenings weekly, 18 weeks.

INTRODUCTORY ELECTRONICS
Begins last week in September; 3 evenings weekly, 10 weeks.

MATERIALS TESTING LABORATORY
Begins September 22; 1 evening weekly, 12 weeks.

MATHEMATICAL PROBAB'LITY, STATISTICS, AND NUMERICAL METHODS FOR WAR WORKERS
Begins forth week in September; meeting place to be arranged; 1 evening weekly, 14 weeks.

METALLOGRAPHY LABORATORY
Begins September 20; 2 evenings weekly, 12 weeks.

MINING METHODS
Begins September 8; 2 evenings weekly, 12 weeks.

PLASTICS, I (Chemistry and Technology)
Begins September 20; 1 evening weekly, 17 weeks.

PLASTICS APPLIED TO AIRCRAFT, I (Chemistry and Technology)
Begins September 21; University High School, 11800 Texas Avenue, West Los Angeles; 1 evening weekly, 17 weeks.

PHYSICAL METALLURGY FOR ENGINEERS
Begins September 21; 2 evenings weekly, 12 weeks.

PRODUCTION DESIGN
Begins September 21; 2 evenings weekly, 12 weeks.

TOOL ENGINEERING—JIGS AND FIXTURES
Begins September 13; 2 evenings weekly, 12 weeks.

Detailed information about any of these courses, together with prerequisites for enrollment, can be secured by writing or telephoning to the WAR TRAINING OFFICE, California Institute of Technology, Pasadena, 4. Students accepted for enrollment are eligible to apply for supplementary gasoline, if this is necessary for class attendance. The Institute will endorse such applications.

MERCHANT MARINE CALLS

The Merchant Marine needs engineering officers to man its growing fleet.

Special concessions have been made in providing a post-graduate course to men holding accredited mechanical and electrical engineering degrees whereby these men may qualify within three or four months to obtain their licenses as Third Assistant Marine Engineers.

Any qualified Caltech alumni may apply for this training by contacting Andrew G. Wilson, Port Representative, Recruitment and Manning Organization, War Shipping Administration, 642 Avalon Boulevard, Wilmington, California.

Oil Is Ammunition!

(Continued from Page 7)

purposes. Rationing, originating for other purposes, will probably have to be continued and perhaps made more stringent, to conserve petroleum.

Known recoverable reserves represent 14 years' supply, but productive capacity will be inadequate unless discovery is accelerated. There is hope for the future in improved recovery practice.

California must provide the main supply for the enormous demands of the United Nations in the Pacific. The rest of the United States is a major source for the Atlantic. Japanese and German supplies are small compared to ours, but were greater in 1942 than in 1941.

Axis nations could be greatly handicapped by destruction of part of their oil supply. Our own supply might just as well be destroyed by the enemy as used unwisely.

Oil is ammunition—use it wisely!

ALUMNI NEWS

1917

Secretary: C. W. Sopp, 2047 Las Lunas, Pasadena, California.

DR. PAUL D. V. MANNING is the director of research at the International Mineral and Chemical Corporation in Chicago.

1918

Secretary: E. H. Imler, Route 2, Box 94, Imperial, California.

FRITZ KARGE, former president of the Alumni Association, is back with the Pipeline Division of the Union Oil Company after having spent a year with the Fluor Corporation in Los Angeles. He spoke at the annual convention of the American Society of Engineers in Los Angeles in July on the subject of the design and construction of an alkylation plant for the production of high octane gasoline.

1920

Secretary: J. R. Black, 2131 Monterey Boulevard, Hermosa Beach, California.

ROBERT BLACK has been named president of the Board of Trustees of the Redondo Union High School, Redondo Beach, California.

1922

Secretary: Al Knight, 1301 Stratford, South Pasadena, California.

FIRST LIEUTENANT FREDERIC A. MAUER, C.M.P., is now Assistant Chief of the Continuous Security Branch, Southern Security District, 9th Service Command, with his office in Los Angeles. His duties are to inspect industrial plants and facilities having important contracts with the War and Navy Departments or the Maritime Commission. The inspections are for the purpose of preventing interruptions to production and to improve the safety of the plants. Before this assignment, Lieutenant Mauer was with the San Francisco Chemical Warfare Protection District.

CHARLES W. VARNEY was recently elected mayor of Alhambra, California, for his second term. He owns his own business, the Alhambra Business Men's Association, a credit bureau, and he is also personnel manager of the Alhambra Foundry.

DR. RAYMOND AGER, professor of electrical engineering at Cornell University, is on a short leave of absence, and is doing research work at the California Institute of Technology.

1924

Secretary: Loys Griswold, 1440 Allen Avenue, Glendale, California.

ALBERT GOULD is doing research work at the Institute.

1926

Secretary: D. P. Macfarlane, 1625 Casa Grande Street, Pasadena, California.

DR. WILLIAM A. LEWIS recently published the first in a series of articles in the Westinghouse Engineer on the principles of high speed relaying. Dr. Lewis is director of electrical engineering at Cornell University. In June he was active at the S. P.E.E. convention in Chicago.

FELIX O. FRICKER, civil engineer for the Los Angeles County Flood Control District in Los Angeles, spoke at the American Society of Engineers convention in Los Angeles in July.

1927

Secretary: Kenneth Belknap, 6191 North Figueroa Street, Los Angeles 42, California.

CHAPLAIN VERNON P. JAEGER, of Camp White, Oregon, has been promoted to Lieutenant Colonel. He recently called at the campus while on a short furlough with his family, who live in Pasadena.

HARRY K. FARRAR, engineer with the Southern California Telephone Company, is teaching an E.S.M.W.T. night course in radio at the Los Angeles City College.

1928

Secretary: Ralph Cutler, 1812 South Raymond Avenue, Alhambra, California.

CAPTAIN F. GUNNER GRAMATKY recently returned to the United States from Central America where he was engaged in important work with the Corps of Engineers on the Pan American Highway.

1929

Secretary: Al Cramer, 271 Seale Avenue, Palo Alto, California.

MORTON SHIELDS recently accepted a position as engineer with Holloway and White Heating Company in Pasadena.

FREDERICK CLINE is assistant director of the Pan American Highway, with his headquarters in Los Angeles. His work takes him frequently to Central America.

MAJOR THOMAS EVANS, of the Corps of Engineers, was formerly on the staff at Ft. Belvoir, but is now engineer specialist training officer in Washington, D. C. He recently visited the campus while on a tour of inspection of army engineer specialist training schools in the west.

LIEUTENANT COLONEL LAURENCE LYNN is now at Ft. Belvoir, Virginia, where he has succeeded COLONEL WILLIAM R. SHULER as chief instructor of the engineering division.

1930

Secretary: Ernest Hillman, 1520 Glendon Avenue, Los Angeles 24, California.

FRANCIS BODE is now living at Longview, Washington.

1931

Secretary: Ray Labory, 1645 South Manhattan Place, Los Angeles, California.

GLEN CHAMBERLAIN is in the engineering department of Permanente Metals.

1932

Secretary: Howard W. Finney, 1031 West 47th Street, Los Angeles, California.

EDWARD C. KEACHIE is a First Lieutenant in the Army Labor Relations Department at the San Francisco Office of the U. S. Army Engineers.

LIEUTENANT COMMANDER THOMAS TARBOTT is in charge of utilities for the Navy at Corpus Christi.

LIEUTENANT COLONEL WILLIAM R. SHULER recently reported as S-3 from duty at Ft. Belvoir. He is now serving with the Amphibious Command.

1933

Secretary: John E. Meskell, 2242 East Midwick Drive, Altadena, California.

LIEUTENANT ARTHUR MATHEWSON is stationed at the Naval Air Station in San Diego. He has been connected with the West Coast Fleet Air Command since March.

DR. PAUL F. HAWLEY is employed as Patent Solicitor for the Standard Oil Company, and in addition to this work is Supervisor of Evening Instruction in Radio Communications at the Illinois Institute of Technology. He has done a fine job in getting the evening program organized.

DR. LEWIS PIPES is a member of the faculty of the electrical engineering department in the graduate school at Harvard. He is on a short leave of absence doing special research work at Caltech. Dr. Pipes presented a paper at the physics, electrical engineering, and mathematics seminar at Caltech recently on the subject of non-linear systems.

WILLIAM W. MOORE, counsulting engineer for Dames and Moore, spoke at the annual convention of the American Society of Electrical Engineers in Los Angeles in July on the subject of foundations for quay walls on deep soft clay.

1934

Secretary: J. Robert Schreck, 506 North Encinita Avenue, Temple City, California.

LIEUTENANT (j.g.) ROBERT ANDERSON is stationed at New Guinea.

NICK UGRIN has left the Union Oil Company to accept a commission in the Navy. He has been training at the University of Arizona.

LIEUTENANT COLONEL PAUL H. DANE and Mrs. Dane are the parents of twins, Patricia Ann and Paul Allen, who were born July 3.

LIEUTENANT JACK DESMOND has been stationed at Ft. Monmouth for several months, but is now receiving special training at Harvard University.

GILBERT McCANN presented a seminar at the physics and electrical engineering seminar at Caltech in July, and spoke at the A.I.E.E. convention in Los Angeles. He is with the Central Station Department of Westinghouse Electric in East Pittsburgh as a transmission engineer.

1935

Secretary: Allan Ray, Route 2, Box 920, Mountain View, California.

ADRIAN GORDON, of the R.A.F., has recently been promoted to Wing Commander. He is stationed in Iceland.

ROBERT A. McRAE has been a rancher and civil engineer in Venezuela, but recently returned to Los Angeles.

ALLAN RAY is in the process department of Permanente Metals, San Jose.

ENSIGN FRED B. MALONEY, U.S.N.R., is on active duty in the South Pacific.

DR. JESSE HOBSON was very active at the S.P.E.E. convention in Chicago in June, as a member of the hospitality committee and as a participant in various discussions. He is with the electrical engineering department of the Illinois Institute of Technology.

1936

Secretary: Holly Dickinson, 5016 Maywood, Los Angeles 41, California.

LIEUTENANT (j.g.) RAYMOND H. F. BOOTHE was married on Saturday, July 20, in Los Angeles. He recently returned from a year's service with the Seabees in Alaska.

HUGH F. COLVIN and Mrs. Colvin are the parents of a daughter, Carol Ann, who was born July 10 in Los Angeles.

CAPTAIN C. A. MORSE has been all over the United States with the Army in the last two years. At present he is on maneuvers in the California desert.

TYLER THOMPSON has been officially reported as interned in Singapore by the Japanese. He may be addressed as follows: "Rev. Tyler Thompson, American Internee, Changi, Singapore, via New York City." Also indicate on the envelope that he is a civilian internee with mail postage free.

ROBERT JERAULD is manager of Felcker Manufacturing in Torrance.

LIEUTENANT (j.g.) JACK PALLER, CEC, U.S.N.R., was a civilian employee of a contractor in Hawaii when Pearl Harbor was attacked. He was later sent to Midway in time for the June 4 battle there. He was sworn into the Navy on April 26, 1943, and since that time his life has been comparatively calm. He is with the 7th Naval Construction Regiment.

1937

Secretary: Paul Schaffner, 212 45th St., Manhattan Beach, California.

LIEUTENANT COMMANDER ALFRED WILSTAM died in the South Pacific 11 days after sailing from San Diego. After leaving Caltech, he enlisted in the Navy and took his flight training at Pensacola, Florida, where he received his wings and a commission as ensign. He had flown more than 2,700 hours as a naval aviator. Details of his death are not known.

LIEUTENANT (j.g.) ROBERT S. CAMPBELL and Mrs. Campbell are the parents of a baby daughter who was born in June.

THOMAS S. HARPER has completed a year's internship at the Presbyterian Hospital in New York and has received his naval orders to report for active duty.

1938

Secretary: Charles Clark.

JAMES R. BALSLEY, Jr., was married on August 1 at Norwood, Massachusetts, to Miss Jane Elizabeth Barry.

LEVERETT DAVIS was married to Miss Victoria Stocker of Salem, Massachusetts, in the library of the Athenaeum in July. He received his Ph.D. degree at Caltech in June and is now an instructor in the physics department.

RICHARD WIMPRESS and Miss Suzanne Otis of South Pasadena were married on August 10. He is employed in the engineering department at Caltech.

1939

Secretary: Kenneth R. Bragg, 902 Rexford, Beverly Hills, California.

CARL JOSEPH SCHNEIDER was killed in an auto accident on April 6, 1943, while on active duty in the Southwest Pacific battle area. "Bud" was a Marine Corps dive bomber and had engaged in many successful expeditions.

BURT ROUDEBUSH is with the research department of Texaco in New York.

1940

Secretary: Gilbert Van Dyke, 354 South Mentor, Pasadena, California.

ROBERT C. BRUMFIELD was married on August 6 to Miss Marion Johnson of Hollywood.

1941

Secretary: Richard Vaughan.

ENSIGN GENE L. EDWARDS is attending electronics school at Harvard University.

LIEUTENANT (j.g.) JAMES M. WATKINS, Jr., is stationed at the Navy Department in Washington, D. C.

CAPTAIN FRANK G. CASSERLY is now stationed at the Marine Corps School at New River, S. C., as instructor. Captain Casserly was called into active service immediately after Pearl Harbor. He was stationed at San Diego, the Philadelphia Navy Yard, and in March went overseas for special service with the Marine Corps.

WILLIAM L. DENISTON and Miss Marjorie Fletcher were married on August 28.

ENSIGN JOHN J. PAULSON, U.S.N.R., is on active duty with the Pacific Fleet. He received his training at Dartmouth, Bowdoin, and the Massachusetts Institute of Technology.

ENSIGN BRUCE LAWRENCE, U.S.N.R., and Beverly Jan Gray, of Pasadena, have announced their engagement. The wedding plans depend upon naval orders.

WILLIAM CHAPIN is in the process department of Permanente Metals.

ENSIGN SIDNEY GALLY is an instructor at the Massachusetts Institute of Technology.

HUGH BRADNER is with the Navy Ordnance Laboratory.

DELBERT THOMAS is with the research department of the Associated Oil Company in San Francisco.

1942

CHARLES M. BROWN and Miss Kathleen Sanders were married on June 12 at Hollywood. They are living in San Pedro where Charles is stationed by his company, the RCA Service Company, in connection with work for the Navy.

LIEUTENANT FRANK FLECK has resumed his work as navigation instructor at the Navigation Training Squadron at San Marcos, Texas, after completing a short training at the Massachusetts Institute of Technology.

SECOND LIEUTENANT KENNETH URBACH, A.V.S., has left the Federal Telephone and Radio Corporation and is now on active duty at Ft. Monmouth, New Jersey.

MARTIN GAYER returned to Pasadena in June after having spent a year with the United States Engineers in Costa Rica. He is now employed as instructor at Caltech and is working for his Masters' degree.

GEORGE DALL and OTHNIEL HORNE are attending the Air Corps Engineering School at Yale University. FRANK GIVEN and FRANK WOOD have recently completed the same training there.

H. GEORGE OSBORNE recently completed a course in diesel engineering at Cornell University and has been assigned to duty on a submarine chaser.

SYDNEY GOLD left in July for Bahrein Island in the Persian Gulf as a field engineer for the Standard Oil Company.

RICHARD ANDREWS was married on June 27 to Miss Dorothea Lepick of Occidental College. Richard is employed as an aerodynamicist at Northrop Aircraft, Inc.

WARREN GILLETTE finished midshipman's school in New York and is now on active duty on a submarine.

ENSIGN LEIGHTON TRUE is attached to the Naval Ordnance Laboratory in Washington, D. C., but expects to be transferred to the Bureau of Ships. He has completed a course in Marine Mine Warfare at Yorktown, Virginia.

LIEUTENANT (j.g.) CARTER HUNT, U.S.N.R., is back in the United States after five and one-half months in Africa. He has been assigned to the Brooklyn Navy Yard for temporary duty. A large group of Tech alumni met at the home of BOB DENSMORE upon Lieutenant Hunt's arrival in New York.

GEORGE LIND and Miss Jo Sully of Long Beach were married on June 26. George is employed as an instructor at Caltech.

BOB DENSMORE, of the Texas Company, is editor of a mimeographed newspaper, KOODKID, which has been started to provide a convenient means of correspondence among the 1942 members of Section F, Applied Chemists, and their Tech friends.

KENNETH SCHURENMAN has been engaged in Navy construction work in New York Harbor, but is being transferred to the Seabees for overseas combat construction.

ORVILLE SCRIBNER has joined the air force and is receiving training in meteorology at Grand Rapids, Michigan.

IRVIN SEEGMAN is a civilian employee for the United States Navy Bureau of Ships in Vallejo as a rubber technologist.

EVERETT W. VAN NESS is employed by the Associated Oil Company in San Francisco.

PETER KAFITZ and BOB McKINZIE are with the Naval Ordnance Laboratory.

ALBERT ALBRECHT, immediately upon his graduation from Tech, went to the Radiation Laboratory at Cambridge for special work. He is now located in Southern California with Gilfillan Bros., Inc., manufacturers of radio equipment, as engineer.

1943

SAMUEL P. MORGAN, who graduated highest in the class of 1943, shortly before his 20th birthday, had one of the highest scholastic records ever made at the Institute. He has been accepted as a teaching assistant in physics at the University of California and is also doing graduate work.

STANLEY SNOWDEN and Miss Viola Peters of Cleveland, Ohio, were married in Pasadena on June 20. Dr. Snowden received his Ph.D. degree in June and is now an instructor at the Institute.

RALPH M. WILLITS has completed training for his E-V(G) commission at the New York Reserve Midshipman's School, and is now attending radar school at Harvard University. He will then attend the Massachusetts Institute of Technology for three months advanced training.

ROBERT F. McLEAN was married on June 25 to Miss Gladys Wall of Pasadena. They are living in San Diego where Robert is employed by Consolidated Aircraft Corporation.

CHAD DAUWALTER is an engineering assistant at Vega Aircraft Corporation and teaches engineering mathematics at the Hollywood Annex Plant.

ENGINES GET ACID INDIGESTION TOO!

WHEN AIRCRAFT ENGINES are being shipped, or lie idle in storage, they are subject to a peculiar malady. They get "acid indigestion!" Fuel residues left over from test runs form highly active acids that can corrode pistons, cylinder walls, bearings and other internal parts.

America's armed forces came face to face with this fact when they first began to ship aircraft engines to all parts of the globe. Immediately they sent out an urgent call for a preventive that would *effectively* stop corrosion and prevent rust caused by internal condensation. They got what they wanted.

Union Oil Company's answer was Stop Rust B, which can deliver a motor in "factory-perfect" condition anywhere in the world. It meets specification AN-VV-C-576b and is being used in large quantities by the armed forces today.

Stop Rust B has a top notch lubricating oil base. It is a preferential wetting agent that covers and protects metal surfaces completely. It won't drain off for months, stays put as long as the engine is idle. It neutralizes acids, keeps water away from metal surfaces. *It effectively prevents rust and corrosion!*

When drained out, Stop Rust B leaves no residue that could harm engines when put back into service. In fact, engines can be used immediately without flushing. The residue actually improves the lubricating oil—gives it a "break-in" quality.

So if you ship aircraft engines or other equipment that requires internal protection against rust and corrosion, get in touch with Union Oil Company by phone, wire, or letter. Stop Rust B can be supplied in 53-gallon barrels or in bulk.

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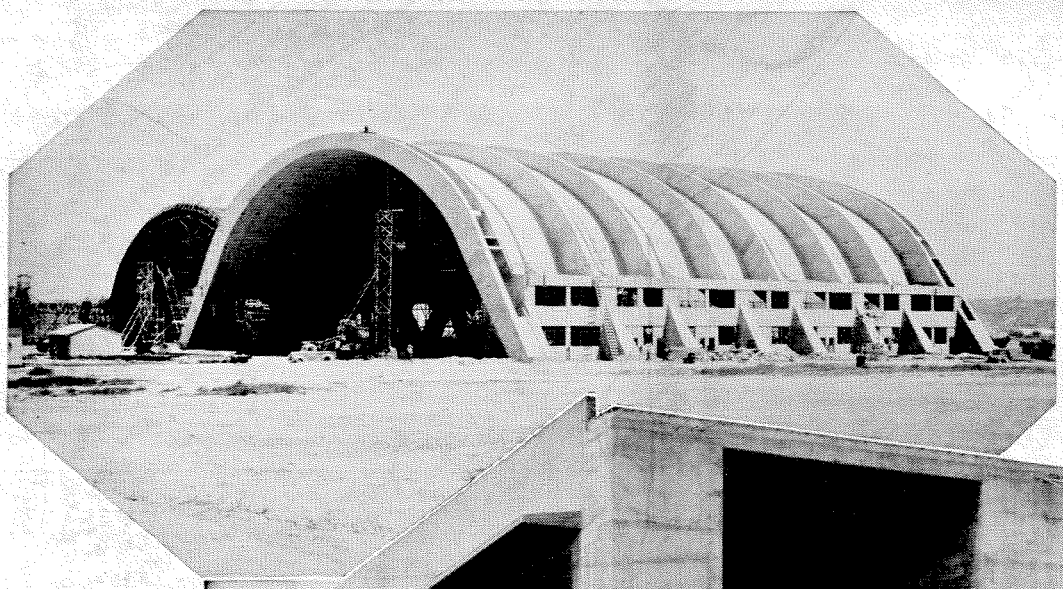
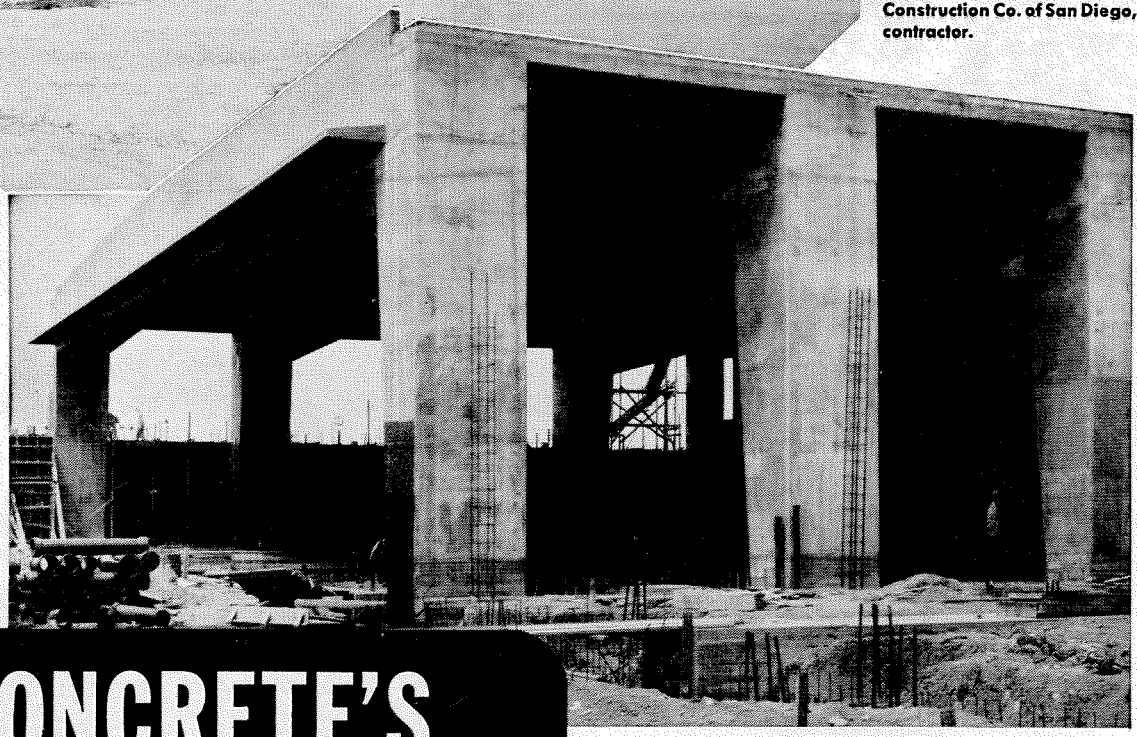


Navy hangars at San Diego, Calif., are thin-shell, barrel-type structures of reinforced concrete with arch ribs of 294-ft. span and 81-ft. rise. Designed by Roberts and Schaefer Co., consulting engineers, Chicago; Joe H. Lapish, Washington, D. C., associate architect. Golden and Trepte Construction Co. of San Diego, contractor.



CONCRETE'S adaptability helps design for war needs

National Guard hangars at Des Moines, Iowa, are reinforced concrete with 150-ft. clear spans. Bents of hollow rigid-frame construction. Concrete girder roof with 3-in. slab. Architect and engineer, William N. Nielsen; structural engineer, Les Forsyth, both of Des Moines.

Concrete's *adaptability* is helping build to win! Two examples are the firesafe hangars shown, respectively of arch and rigid-frame design.

Equally resourceful uses of concrete are found in army depots, ship yards, arsenals, and war manufacturing plants. *Concrete, using widely available materials and conserving critical materials, can help you design efficiently, build rapidly and provide the fire resistance and stamina so important in war works.*

And since the bulk of the materials are local, concrete *SAVES TRANSPORTATION.*

Technical assistance on concrete is offered to engineers, architects and builders on war projects. Write for literature helpful in the design of firesafe hangars or other structures.

PORTLAND CEMENT ASSOCIATION
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A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

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