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THE WISCONSIN ENGINEER

APRIL 1935

MEMBER, ENGINEERING COLLEGE MAGAZINES, ASSOCIATED

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The WISCONSIN ENGINEER

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With the Contributors —

● John Bogen, ch'35, is evidently hurt by the apparent success of the new developments in automobile design today. He raises his hands and with colossal, prophetic invective decrees, "The best is yet to come."

● Nestor Gutierrez, m'37, a son of a son of a former president of the Republic of Colombia in South America surveys the engineering possibilities in his native country.

● Edward Bennett concludes his series of articles on economic recovery. Read it critically, and if you have any suggestions, pro or con, drop the *Engineer* a line.

The May Issue —

● Ernest Nygren, m'35, talks about seamless steel tubing in his sleep. One night, one of the cubs on the staff walked in on Ernest during one of his nightmares—when the notes he took were added end to end, a story on *Seamless Tubing* was the result.

● James Van Vleet and Kurt Wendt have been puddling around with Bakelite, applying a few stresses thereon, and with the use of polarized light, have revealed the nature of stress distribution. They call their fun "Let's LOOK at Stress."

● G. G. Post, of the Milwaukee T.M.E.R. and L. Co. will discuss the Engineer's Responsibility and Opportunity.

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Saint Pat's Dream

The good saint dreamed,
In fancy dim saw scenes drift by,
Saw lawyers pass until it seemed,
The whole of life had gone awry!

He dreamed--in dreaming planned,
A day of days, a joy indeed,
For all true sons within the land,
Who duty-bound upheld his creed.

Saw the gathering of his forces,
Hurling war cries to the breeze,
Lords of Nature's vast resources,
Masters of the land and seas.

Saw lawyers bowing, lawyers scraping,
Filling all the air with wails,
Heard them pleading and beseeching,
Saw them ride along on rails!

And the P. A. D.'s did grumble,
And the Fiddledephees did groan,
Egg-filled pockets made them tremble,
As they stood before the throne.

"Hail the King!" the plumbers shouted,
And the shysters bowed in fear,
Their downfall plainly flouted,
By old Saint Pat the Engineer!

BY R. DEWITT JORDAN

The WISCONSIN ENGINEER

VOLUME 39, NO. 7 APRIL, 1935

Automotive Diesel Developments

By J. S. Bogen, ch'35

Gasoline vs. Diesel Engine. The passenger car industry today is not inclined favorably toward the Diesel, principally because the small high speed engine is still in more or less an experimental stage. In our modern passenger cars, we have become so blasé to the simpler pleasures that we demand super-powered cars with pick-up nearly equal to that of a rocket, and with power to climb the worst hill in high gear, with no speed drop. To satisfy this demand, there has been developed commercially, an engine capable of tremendous feats, yet, in general, incapable of lasting long under the service it is supposedly built for. This engine has brought better material, better workmanship, and better design, to the auto industry.

The fast pick-up and good hill climbing qualities, that the people demand of a modern car, make it doubly hard to introduce a new engine to the industry. New units usually have flaws of one type or another, which must be ironed out as they are discovered in service. The American Manufacturers lack sufficient confidence to install radical engine improvements that, at the partial sacrifice of some of the more spectacular characteristics, will lower operating expenses and provide greater reliability over long periods. The Diesel has tremendous advantages, and when it reaches the same stage of development as the gasoline engine, it will be much more efficient.

The principal drawback at the present time, is the matter of flexibility. A Diesel will not take fuel suddenly, in large doses, as will a gasoline engine; it is necessary to feed fuel gradually. Work at the present time is being concentrated upon fuel processing. The control of combustion is necessary if any degree of smoothness and flexibility is to result. In the small high-speed Diesel (the solid injection type referred to throughout), the time for injection and combustion is so short, that everything must be very precise and positive, with no dripping at the nozzle, or sudden slugs of fuel being admitted.

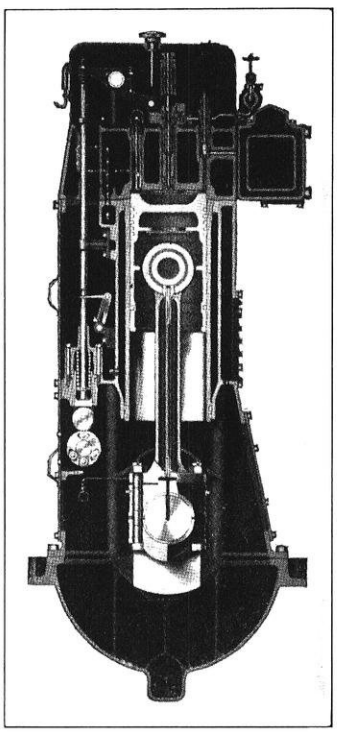
The ignition lag is a very important characteristic of the fuel. Detonation is the source of roughness in the engine, and is usually thought to be caused by the accumulation of fuel at a greater than normal temperature before ignition. It is varied by many factors, two of which are, the auto-ignition temperature of the fuel under existing pressure conditions, and the turbulence in the cylinder, which supplies sufficient oxygen for the fuel to form the complex and the subsequent complete oxidation to carbon dioxide and water. E. W. J. Mardles, in the "Faraday Society Transactions," advocates the theory that the hydrocarbon fuels first form a complex molecule, consisting of a molecule of the fuel with a molecule of the oxygen. This complex molecule then acts as a catalyst in promoting complete oxidation of the rest of the fuel charge. The lighter fractions form carbon monoxide immediately. Carbon monoxide acts as an inhibitor towards detonation. Bach, in the "Moniteur Scientifique," claims that this semi-catalytic action of carbon monoxide is also due to the formation of a complex molecule of the structure

Diesel Powered Truck Tractor

$O=C\begin{matrix}/O\\ \backslash O\end{matrix}$. The role that the ignition delay plays here is obvious, and, if we are to control combustion by mechanical means, this delay must be minimized. It has been shown experimently

possible, by treating fuel oils, to develop an oil that will give the minimum of delay, and still burn with sufficient slowness, decreasing possible detonation when injected in large quantities.

In combustion chamber design, the only radical thing which has arisen lately is the addition of an air space to the cylinder, in the form of an air bottle or pocket. The advocates of this design say they can produce cards similar to those of a Corliss engine, with a completely variable cut-off. The air bottle keeps the pressure from suddenly rising too high, and it therefore smooths out the roughness. The important question is, "What does it do to the economy?" Economy is affected by changes in combustion, and it most certainly is the dominating factor in the use of an engine. Other factors being equal, economy determines the marketable success of the engine.



Open Chamber Type

Combustion Control. There has to be perfect co-ordination between the fuel and the combustion chamber design as well as the method of injection. By means of injection, we have been trying to control the combustion. This method is satisfactory in large slow speed engines where the injection period is appreciable. When the engine is small, and the rotational speed high, the injection period becomes very short, and the amount of fuel to be metered likewise decreases. There must be no drip, and, if the fuel is to be injected gradually, the valves must be very tight, since the pressures are very high — 3,000 pounds and above, usually. Moreover in multi-cylinder engines, the timing must be equal, which necessitates equal lengths of lead lines from the nozzles to the pump, and absolute accuracy in the pump metering quantities. This means watch-like accuracy of small parts, upon which some large forces must be applied to generate the required pressures. The lubrication of the pump is carried out by means of the fuel oil whose lubricating qualities are very doubtful, especially with the trends towards low viscosity distillate oils for small engines. There are two types of solutions to this problem, neither of which is completely satisfactory for engines of 1200 rpm and higher. One is to meter and completely control the fuel at a relatively low pressure and then shoot it into the cylinder; the other, a more common type is that of metering and dispersing at the injection pressure. Much can be said for each type, but, as speeds go up, there will need to be more development along this line.

The Fuel Problem. Combustion changes in the fuel start immediately after injection and do not necessarily make a noticeable difference in the pressure conditions but do vitally affect the further oxidation of the fuel. When fuels are oxidized too quickly, (detonated in the engine cylinder), the pressure rises as an explosion wave, giving excessive shock to all parts. This necessitates heavy engines and will not allow the use of some of the new alloy parts. The heavy parts keep the inertia up and, therefore, add to the degree of inflexibility. The ideal manner in which to eliminate this trouble would be to use a catalyst. The problem at hand is to increase the average burning temperature without incerasing the maximum too much, and to increase the mean effective pressure with an actual decrease in the present maximum pressures. A desirable catalyst would be one that would cause a complete release of energy by all the fuel over a definite period of time, so that there would be no detonation. This effect has been noted in spark ignition engines when the percentage of carbon monoxide is raised and colloidal copper introduced with the fuel.

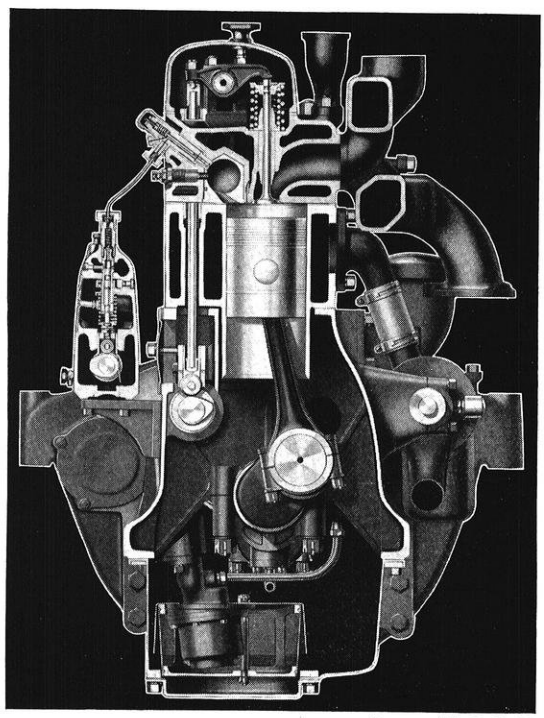
Engine Design. High speeds usually simplify the structural design of engines of this type, since the engines are inherently smaller and smoother running. In order to keep the weight down and to make the roughness unnoticeable, the high speeds are necessary. To keep the torque reasonably high in transportation service, the speeds must be relatively high, if the engines are to be capable of being substituted directly for gasoline engines. Some of the new materials, light metal alloys of a strength equivalent to that of steel, make it possible to keep down the weight, even for heavy duty engines as low at ten pounds per horsepower. The welded frame type of structure while not applied to small engines as yet, offers possibilities, since its strength can be made equal to that of the cast type. It is used in the high speed railroad Diesels at the present time. A definite advantage in using aluminum pistons and alloy connecting rods lies in the fact that by cutting down the inertia stresses, we make the balancing easier. A decrease in the maximum pressure exerted in the cylinder will also be a great aid in balancing.

Nozzle design has always been a big question. Even though it has been nearly solved today, it is something that must be watched. The fuel, if it is sprayed against a part of the cylinder, must be sprayed against an uncooled part, so that vaporization and atomization will take place. The holes must be at the correct angle to get good distribution in the chamber. They also must be fine enough to give atomization. The important factors to be considered in nozzle design are: penetration, degree of atomization, and dispersion.

It may then be said that the principle developments to be expected in the small high speed Diesel today in order to adapt it to the pleasure car field, will have to be mainly in getting some co-ordinated work upon fuels, combustion chamber design, fuel pumps, and the acquiring of materials of construction that will withstand higher temperatures. This latter problem will come up when catalysts, that raise the burning temperature, are introduced into the fuels. This will tend to promote better efficiency in engine operation and probably will give a greater degree of control to

the combustion reaction. However, in raising the temperatures, lubrication problems result which are not easily solved. The lubricating oils available today do not usually withstand high temperatures without considerable breaking down. In the testing of lubricants, the standard methods reveal many important points, but there are often found oils which test alike physically and yet give entirely different degrees of service. Before engines of this type can be placed in the hands of the general public, oils that are completely fool-proof must be developed. They are subjected to a great deal more severe service in Diesels than in gasoline engines.

In buying lubricating oils, many characteristics are to be looked for. Viscosity should be high enough to prevent too thin conditions at the elevated cylinder temperatures, and yet be low enough to give easy flow under the coolest conditions to which the engine is subjected. Stability, as a



—Courtesy Waukesha Motors

Pre-combustion Chamber Type

function of the carbon residue, is a very important property. The flash point indicates relative volatility. Ordinarily, it is a poor indicator of the quality of the film formed. An extremely high flash point (normal value 350-375° F.) is of no advantage, for some oil must burn in the upper cylinder anyway. The easier it does this, the cleaner will be the combustion. Sludging is important, since it may cause clogging of the passage-ways. It is usually caused by oxidation of the oil. If there is blow-by, soot and unburned fuel will be pushed down into the oil, causing the same effect. An oil filter should be part of every engine. It will save many dollars for replacement parts.

The Pre-Combustion Type. As far as combustion chamber design is concerned, we are really far behind times. It seems a shame, but a very high percentage of the engine builders of the country are not really building American engines. They are building engines of European design. In addition, most of the small high speed Diesels are of the pre-combustion chamber type, a type that was given up in the larger full Diesels years ago, because of the inherent disadvantages. Perhaps the author is prejudiced, but it seems that the time has come for the Americans to get busy and do some real engine designing. This applies to all sizes of Diesels.

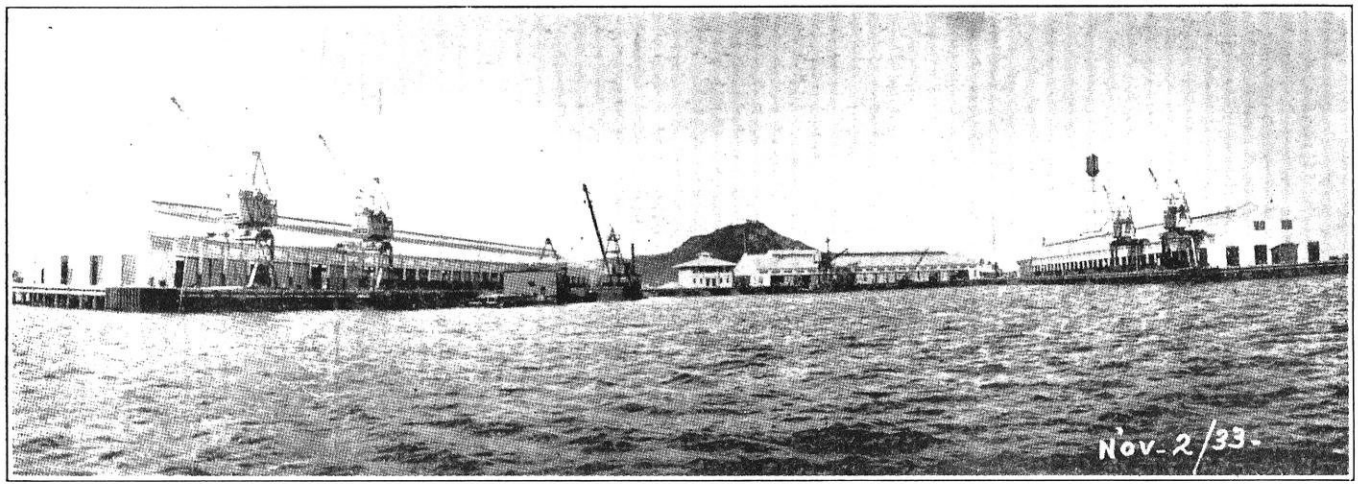
The pre-combustion chamber has some advantages. It has been shown that engines can be built as straight Diesels having no pre-combustion chambers, high rotational speeds, and good functioning qualities as well. Pre-combustion chamber engines are usually less economical. It is hard to scavenge a pre-combustion chamber well enough to get rid of all exhaust. This cuts down the amount of fresh air available with a given clearance volume. Having partly burned gases in the chamber means that there will be less actual oxidation of the fuel there; and the partly oxidized products are pushed out into the cylinder proper after the expansion stroke has started, oxidation being completed there. This means controlled combustion, since the possibility of detonation is very much reduced. Furthermore, if the pre-combustion chamber is of the right design, a great deal of turbulence results, which means good combustion. A highly favored type is the comet type of chamber. This has the entrance passage to the cylinder tangential to the chamber wall. In some European engines, notably German, the pre-combustion chamber often consists of a vertical cylinder, the entrance to the main chamber being of such smaller diameter than the pre-chamber itself. Fuel is injected into the top of the pre-chamber. It is claimed that this type provides much better economy than do other types. The real advantages come in controlled combustion, greater flexibility, smoother operation, easier starting, and a reduction of ignition lag, because a hot spot can be maintained in the chamber.

Now, if we really get busy and design engine and fuel to match, this same result can be obtained in an open chamber type engine, and far more simply.

Present Day Application. The Diesel, adapted to truck service, is very satisfactory, as evidenced by the rapidly increasing number of Diesel Trucks — not only new ones, but a large number of conversions as well. Savings in the neighborhood of fifty per cent on running expenses can be expected, including maintenance. Also, it is possible, with a Diesel of the same rating as a gasoline engine, to cut down time schedules because of the inherent overload capacity of the Diesel.

To apply these trucking results to passenger cars would not be a fair generalization at present, but, if some big manufacturers will push the Diesel development with as much gusto as they do minor improvements on their gasoline engines, it should not be so long before Diesel cars are available. The advantage to the public would be tremendous. On the Pacific Coast, where Diesel trucking predominates, many filling stations carry fuel oil regularly. The number doing this in increasing rapidly.

It is well to remark in closing, that these are only a few of the matters in consideration today, and that this article does not attempt to treat any one in detail, but seeks to call to mind only some of the salient points.



Dock Recently Constructed in Port of Cartagena on the Caribbean Coast

Potential Opportunities in Colombia

By NESTOR GUTIERREZ

FOR years the production of bananas and coffee has been the chief occupation of the people of Colombia. These two industries have provided employment for the bulk of the country's 9,000,000 population and have been the major source of income; yet Colombia, busily engaged in agricultural pursuits, has comparatively neglected her greatest asset — her natural resources.

At present Colombia is classified as the world's largest potential oil field, the principal producer of platinum, and in fact produces half that mined in the world, and in addition is the world's number one producer of emeralds. Gold is found in both lodes and placers and there are abundant coal resources. Silver, copper and iron are present in appreciable quantities.

Yet the extent to which these resources are developed in proportion to the abundant supply is negligible. Looking at the situation from another angle it will be found that the Central American and Caribbean countries, including Colombia, buy more from the United States than from any other country. Colombia is their best customer and in turn they are one of Colombia's largest markets. Colombia specializes in the production of a single commodity and to a large extent depends upon the outside world for the things which she herself uses.

Since the United States is the nearest middle latitude country, Colombia finds it convenient to trade here. With the start of the depression in 1929 Colombians realized, out of necessity, the need to produce their own products. A new spirit of home development was instilled in the populace.

The country imports a wide variety of materials for constructional purposes. This trade furnishes evidence of the dependence of tropical areas on middle latitude mills and factories. For larger buildings, as well as for many other types of construction, iron and steel, cement, copper goods and other materials are imported. Quantities of galvanized iron are imported for roofs and even walls of cheap or temporary buildings.

The iron ore needed for the manufacture of these materials is present in Colombia in large quantities, yet because of a lack of modern machinery to mine, smelt and transport the ore from mining point to smelting plants, development has been retarded.

Large scale mining awaits the development of transportation facilities, improvement in technique, the rise of a skilled labor class, and the bringing in of capital to undertake new enterprises.

The rapid development of the oil districts in Colombia has grown from a small initial shipment in 1926 to a total exportation of 22,000,000 barrels of crude oil in 1929. It may seem a paradox that the finished product of Colombian oil is more expensive in certain sections of Colombia than the same oil is in New York. The situation is so acute that oil bought in a city only several hundred miles distant from the well is considerably higher in price than the same oil shipped to the United States, refined here, and shipped back to Colombia.

Though the Colombian market is not large enough to absorb the amount of oil that its fields are able to produce, an efficient and cheap process of refining enough of the crude oil for local use would be welcomed. The only means of transporting the crude oil which leaves the country is through pipe lines. The Tropical Oil Company operates an aqueduct of this type to carry the oil the several hundred miles from the wells to the coast, where it is transported to foreign refineries in tank vessels. Several other pipe lines are under construction, but the upkeep on a system of this type is so high that a more practical means is sought.

In the mining districts large quantities of machinery are in demand, and the oil wells create a need for well drilling apparatus and pumps. The mines require engines and

dynamos, fans for ventilation, pumps to keep the mines free from water, hoists and cages to lift ore out of the mine, and in some cases crushers to concentrate the ore before it is shipped. Many a middle latitude factory is kept busy filling the orders coming from the demands for machinery and equipment, while at the same time all the raw materials are close at hand in Colombia, and only the factories, engineers and skilled workers are needed for production at home.

The extension of telegraph, telephone and lighting systems all call for imported materials. The water power to produce the electricity used in these systems is close at hand and merely needs harnessing.

The equipment for maintaining healthy, sanitary conditions in the tropical regions of Colombia requires the importation of great quantities of iron pipe, tile, boilers, engines and chemicals. The same situation holds true to a certain extent for improved technique in the field of tropical agriculture, which from a mechanical standpoint is still in its first stages. New machinery at lower than imported prices will be imperative before long.

Probably the greatest problem that the country faces is that of transportation. Though Colombia is bordered on the north by the Caribbean and on the west by the Pacific, has the Magdalena River running north and south through almost its entire length, and the Amazon on its southern border, the country is virtually crippled for lack of satisfactory transportation facilities. The Magdalena River is not navigable at the points where passage is most needed. The port of Barranquilla on the Caribbean coast at the mouth of the river is not really a port, for the river at that point is stopped up by delta formations which the Colombian government has spent approximately $9,000,000 in attempting to dredge and remove. Consequently the real port of Barranquilla is at Puerto Colombia, 17 miles nearer the coast. This makes it necessary to transport freight from Barranquilla to its real seaport at Puerto Colombia. This causes considerable additional expense and a solution to the problem of permanently dredging and clearing the channel of the river at Barranquilla is sorely needed.

The Magdalena River furnishes the only possible means of access to the interior. Therefore an improvement in the channel, so that commercial vessels might penetrate further into the productive centers of the country, would open up the country considerably.

The construction of modern up-to-date port facilities is progressing rapidly at the better ports. At Cartagena, on the Caribbean coast, the Frederick Snare corporation of New York is finishing construction of a $2,850,000 dock. The port of Cartagena is also a terminus for the oil pipe-line from Barranca Bermeja, 325 miles distant.

Because of the mountainous nature of certain portions of Colombia, railroads of any length are exceedingly impractical from a commercial standpoint. Not only the mountains but the frequent heavy rains cause landslides which in most instances almost wipe out the tracks. Some means of constructing these roads so that they will be out of range of these ravages, which in the short space of a few hours have washed away entire sections of railroads, are sorely needed. The same situation applies for highways. Communication between interior cities is not practical from a commercial standpoint. The situation is so acute that mail and freight are carried on mule packs to the interior settlements. The cost and delay of such a method of transportation brings considerable pressure to bear upon the need for better communication.

The proposed international highway to run from Alaska to Buenos Aires in the future will pass through the center of Colombia. Links of this great trail have been constructed and at present more are in process of construction. The highway will pass down the Pacific coast, through Mexico and the Central American provinces on into Colombia, splitting the country east and west, and proceeding on down to Buenos Aires.

Between certain ports on the Caribbean there are practically no railway connections. This absence of local transportation serves to emphasize the fact that South America is made up of separate districts, each producing for middle latitude markets, but having relatively little trade among themselves.

The central eastern portion of Colombia possesses most of the best highways and railroads, yet even much of this region depends upon primitive means of transportation when right in their back yard they have water power waiting to be harnessed.

The only use made of the electrical potentialities for transportation is in running huge cable lines. Cable transportation in the highlands is the most important dependable conveyance. Colombia has three or four of the largest cable systems in the world. A picture of the World's Fair sky ride gives an understanding of the appearance of one of these systems. Imagine a ten hour ride in a cable car at an average height of 500 to 1000 feet above the earth or about the height of the Woolworth tower in New York, and at the highest point traveling at 1000 feet or over at a height approximately that of the Empire State Building. In spite of this cable transportation is the most dependable and safe. At the outset it was used mainly for the carrying of freight, but recently it has been extended for passenger use. Such a cable is operated between Mariquita and Manizales.

The only problem which engineers have run up against in the construction of these cables is the location of a solid base for the cable towers along the line. The construction and efficient operation of these cables is looked upon as an exceedingly unusual mechanical engineering success. If the problem of land transportation continues to remain unsolved more of these cables will have to be built.

The lack and danger of land transportation accounts for the fact that Colombia has developed one of the most efficient air services of the South American countries. Yet this service is entirely amphibian, because of the lack of suitable landing fields. The construction of landing fields and airports will undoubtedly be a coming development along this line.

In short, what Colombia needs is a skilled labor class, wide awake engineers, and the capital to execute their ideas. She has the materials.

Speeding Economic Recovery by a Corrective Credit Award

(*Part II*)

By Edward Bennett

The space available in the "Engineer" has permitted only the briefest outline of the consumer credit strategy of recovery. In other pamphlets and papers, the author has dealt in some detail with such topics as the effect of the Act upon prices, the effect of the redemption tax on purchasing power, the campaign to insure the use of the award of credit, the effect of the award in facilitating the transfer of workers from the capital goods field, and the cyclic return of the award to the citizens pool.

The Strategies of Recovery

To rapidly reduce unemployment to normal proportions, purchase orders for goods and services must be rapidly increased to the level at which they exceed (at present prices) the existing volume of purchase orders by four billion dollars in each quarter year period. The volume must be held at this level by the permanent expansion and use of public or private credit at this rate for a period of 5 or 6 months, that is, until there has been a general restoration of workers to the payrolls of the nation's industries. After the general resumption of production, the resulting purchasing power in the form of wages, interest, and dividends, if properly distributed and properly exercised, is sufficient to continue full employment.

Now all the strategies of recovery have one thing in common, namely the award and use on a large scale of bank credit money. The strategies differ from one another in the provisions; (a) as to whom and by whom the credit is to be awarded, (b) as to the rapidity with which it is to be awarded and put to use, and (c) as to the method of liquidating the award.

To throw light on these strategies, there has been prepared a flow chart entitled "Pools and Streams of Money: Showing the Cyclic Return of Money to the Users."

On this chart, five of the *pools* from which money may originate, and in which it may accumulate, are represented by the five rectangles labeled, Citizens' Pool, Government Pool, Bankers' and Insurance Pool, Merchants' Pool, and Producers' Pool.

Issuing from these pools and terminating in other pools are flow lines, each line being labeled to show the purpose for which money streams from one pool to another. Some of these streams are *single-way streams,* and others (indicated by double lines) are *two-way* streams. For example, the money which issues from the pools as "wages" to employees is a single-way stream, but the streams labeled "loans," "undivided surplus," and "depreciation reserve" are two-way streams, since money may pass in either direction along these streams. To avoid a confused tangle of flow lines, some of the very obvious money streams have been omitted; for example, the streams of money from the Government Pool to the Merchants' Pool and to the Producers' Pool for "goods" and for "new plant" are not shown.

The following facts about the creation and circulation of money will be helpful in the use of this chart:

a. It is within the power of myriads of individual citizens acting as members of any of the five pools except the *Government Pool* to bring into existence bank credit money, and to start it into circulation by the placing of purchase orders for goods or services.

b. The Congress may legislate into existence and start into circulation either paper money or bank credit money.

c. It is within the power of any member of the Citizen's Pool who receives more than a subsistence income to throttle the circulation of money, by secreting (i. e., by failing to use or to loan for the use of others), some substantial portion of his income.

d. It is within the power of business managements to throttle the circulation of money by diverting such undue amounts of the corporate incomes to the "undivided surplus" and "depreciation reserve" accounts (and in some cases to the payment of dividends) that worth while uses (invesments) cannot be found for all the moneys so diverted.

Because of the uncontrolled inflation for private profit, and the losses and contractions inspired by the fear of the effects of fear which followed the crash of 1929, the volume of the streams of money which issue from and return to the Citizens' Pool is so low that the streams are now carrying only three-fourths of the volume of goods and services which they readily carried in the years before the crash.

Classified as to the manner in which credit may be used to swell the streams of money for restoring employment, the main strategies of recovery are three in number.

The *laissez-faire* strategy was the passive acceptance of the devastation of unrestrained deflation, and of then waiting for ingenious citizens to slowly win the award of credit from bankers and investors by conceiving of pleasure cars, radio, and transport systems, systems of domestic refrigeration and air conditioning, jig-saw puzzles, cosmetics, laxatives, fabricated houses, etc., — the production and sale of which holds the promise of profit to the promoters. This strategy was discarded during the early years of this depression as being frightfully costly and hazardous.

The present orthodox system utilizes government credit to put the unemployed to work on public works, and

awards government credit to captains of finance and production, so that men may be set to work and paid wages to manufacture goods and plant in anticipation of a demand for the product. Now, *manufacture in anticipation of a demand is a gamble* which is not undertaken unless there is a reasonable expectation of a profit. Because of the uncertainty of profits to users of credit, economic recovery under this strategy has been distressingly slow.

The untried strategy of awarding government credit to consumers, so that purchase orders by ultimate consumers may first be placed, and men may then be set to work and paid wages to manufacture goods, will not be a gamble but will be a response to a demand for the goods expressed by purchase orders. This article advocates the use of this strategy through the enactment by Congress of the proposed National Consumer Credit Act.*

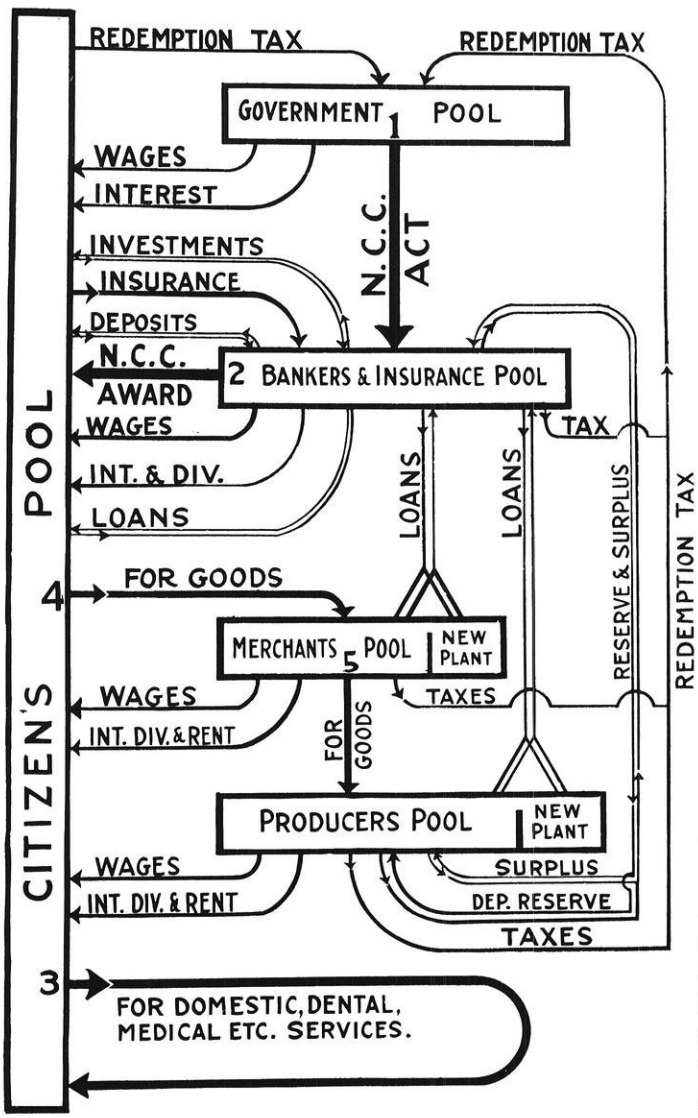
The Consumer Credit Strategy of Recovery

The proposed Act has six important features: The Act is designed to rapidly restore the unemployed in the most direct way to their *normal occupational activities* in the idle private industries by making a grant of $100 in bank credit or currency to each and every adult citizen and $50 to each minor.

It will restore the size of the stream of purchase orders for services and durable and non-durable goods to its predepression (normal) volume within a short period, say, one month, after its enactment. The award, totaling ten billion dollars of government credit to consumers, is to be made in the 120 days following the enactment of the Act.

The instruments of award, that is, the bank credits and the currency, will be redeemed and retired, not in 30 years or 20 years or even in 10 years, but in a three or four year period. The Act levies a Redemption Tax adequate to liquidate the entire credit transaction in less than four years. This Tax is in the form of a 5 per cent surtax (with no personal exemptions) of the net incomes of all corporations and all residents of the United States whose net incomes exceed $300 per year.

The award of equal amounts of cash or credit to all citizens and the *delayed* but fairly rapid redemption of the credits by a 5 per cent surtax on all net incomes, constitutes a new and orderly banking technique for rapidly expanding credit for the welfare of the *entire* social body, and for correcting a harmful distribution of the national income.



The universal award of credit and its redemption by taxes constitute the most highly socialized form of banking,—namely, truly non-exploitive *consumer credit banking* conducted by the government through the agency of existing banks, and at a total cost to the consumer of less than 1 per cent of the credit advanced.

The proposed technique is the technique of a free collectivism and not that of a dictatorship. The essence of the measure is compensation and not dictation. The proposed enactment is not special interest legislation. It is a recovery measure and not a reform measure. While the measure is not directed toward the correction (in the sense of change or reform) of any detail of the methodology of production and distribution, yet it is broadly corrective. It is broadly corrective in the sense that it concerns itself with the end result of economic organization and effort. This end result is the pattern of the distribution of the stream of national income, and the effect of the existing stream pattern on the foundations of the economic structure through which it flows. Finding the stream so patterned and so directed that it periodically undermines the foundations, it passes the entire stream into the Citizens' Pool through a compensatory screen. The purpose is to so alter the pattern that the full productive possibilities of the stream can be utilized as it again flows from and returns to the Citizens' Pool. This compensatory technique is a clear-cut example of how a government may intervene in the economic affairs of the people to correct or *compensate* for the extreme swings and dislocations of an individualistic business econ-

(Continued on page 121)

*This proposed Act is presented and discussed in greater detail in a booklet entitled "A Consumer Credit Technique for Restoring Employment," by Edward Bennett.

The Most Famous of All Engineers Returns

By Robert Whiteside, c'36

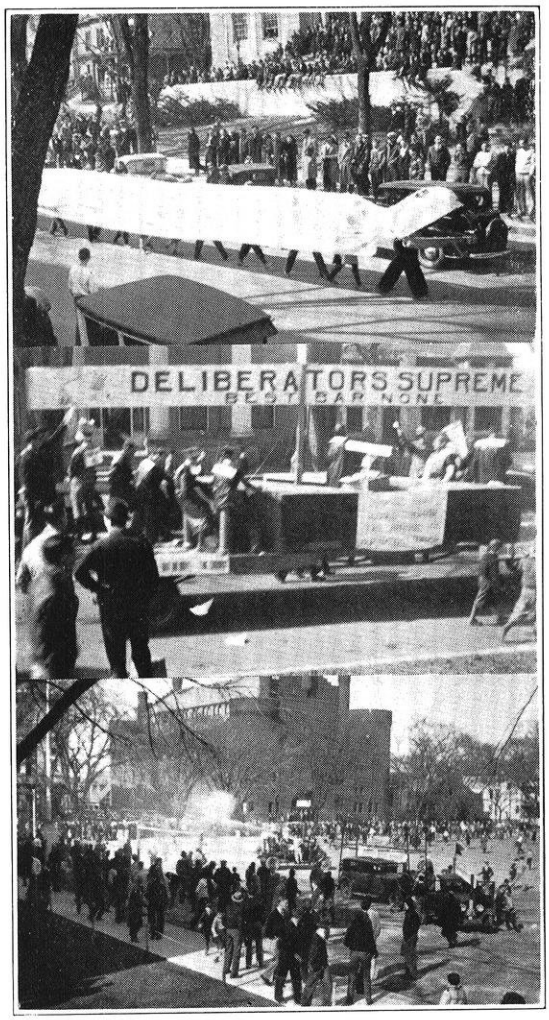
THE spirit of St. Pat hovered over the campus for a few hours on Saturday, April 6, after a week's delay, and when he finally departed, it was very probably with a pleased smile on his lips. The engineer's spirit has not died entirely, and hampered more by the police than by the timid lawyers, the annual St. Pat parade wended its way over its usual course.

Guarded by Carl Amundson c'4 and Jack Bender c'4, St. Pat in the person of Victor Pape c'4, led the annual parade which made up in quality what it lacked in size. Organizations from the Supreme Court down to the Daily Cardinal came in for a bit of riding, while one float suggested Glenn Frank for president.

In the professional group the Civils with a clever dig at the Supreme Court were awarded first prize, while the Mining Club, lampooning the Daily Cardinal by representing reporters as a group of thieves, took second. The Chemicals, suggesting Frank for president, were third, and fourth prize went to the Mechanicals with their poke at the "Nude Deal."

Triangle, with their float asking the question, "Which is Redder?" meaning the State Capitol or the University, took first place among the fraternities, and Kappa Eta Kappa, backing Hitler for the Union Board, took second.

Ernie Ziehlsdorff c'4 won first with his individual float depicting Public Work Project No. 1000000000 . . . , and Stan Schmale ch'1, who put Johnson, Coughlin and Long in a bath tub under the caption, "Keep the Fight Clean," took second. Faustin Prinz m'2 won a prize for his carefully cultivated beard, and prizes for one man stunts went to Al West c'4 riding the N-ormous S-chnozzle L-eague, John Roller e'1 with "Engineer's Septuplets," Leonard Britzke e'4 who depicted a Mr. Bull Shooter, a Complete Collector of Campus News, and Wayne Reesman e'1 ridiculing the Pink Slip by wearing a piece of clothing of that nature. George Faulkes c'3 won a prize for his two man stunt of "Fishing for Suckers."



Engineers on Parade

The parade showed no evidence of having been postponed a week, and nearly all engineers forgot sliderules and books to join in at least a part of the proceedings. A large number of spectators lined the streets, and even though searching police removed a large number of eggs from almost every float, Madison cleaners should do a rushing business even if only half of the eggs thrown found human marks. St. Pat himself stopped an especially over-ripe egg, and engineers protecting the sacred Blarney Stone were well be-splattered. State Street, near the university section, saw most of the activity, and it was here that some person opened a fire hydrant in a futile attempt to stop the parade.

The annual trek completed, the engineers congregated on the lower campus to complete ceremonies with a short speech by St. Pat, who was cheered lustily every few words he spoke. A bit more horseplay, during which at least one student was given a ducking in Mendota and the crowd was sprayed with water from a pump and hose carried on a truck, completed the excitement, and the spirit which is seldom shown by engineers disappeared to come into view a year hence when St. Pat returns to view his favorite sons celebrating in his honor. So, until next year, we say good-bye to the most famous engineer of all.

ON THE CAMPUS

RESEARCH ON HYSTERESIS LOSSES

Among our more or less diligent and enterprising seniors is Ralph Schaper, chemical, who is conducting an interesting bit of research to determine the hysteresis loops of steel cores. The purpose of this experimentation is to determine the qualifications of these alloy steels for electro-lifting magnets. With the assistance of Professor Tracy of the E. E. department, Schaper has set up an electrical circuit whereby data on the flux densities of the cores is obtained by the use of a ballistic galvanometer. A mid-west firm is interested in the results of Schaper's research project which was begun in February.

WELDING CONFERENCE

The Mechanical Engineering Department of the University of Wisconsin is planning a Welding Conference for May 2 and 3, 1935.

The purpose of the conference is to bring together engineers, superintendents, welders, and others interested in welding equipment, and supplies to hear experts on the subject of welding tell of the latest and best methods in this field.

The plan is to have speakers in the forenoon and one talk in the afternoon, the remainder of the afternoon to be given to demonstrations by leading exhibitors who will have the "last word" in welding equipment and supplies. A talk each evening with demonstrations by exhibitors will round out each day's program.

Students in the College of Engineering are invited to attend.

Members of the committee are:—Professor J. M. Dorrans, chairman; Professor G. L. Larson, Professor B. G. Elliott, R. N. Schumann, N. F. Hollander and C. F. Peters.

A. S. M. E. SPONSERS LECTURE

The American Society of Mechanical Engineers is sponsoring the visit of Mr. A. H. Fetters, chief mechanical engineer of the Union Pacific System, to the University Tuesday, April 16.

Mr. Fetter will give an illustrated talk on the stream line train that the Union Pacific has developed.

PROF. EDWARD BENNETT

Rigorously exact . . . quiet, rather self contained . . . slight of stature . . . has light brown hair and bushy moustache . . . of course, the ever present bow tie and pince-nez spectacles . . . no doubt is there, as to whom we have in mind . . .

Born on the threshold of a new era . . . raised in the heart of the nation's industry . . . Pittsburgh, with its iron, coal, steel and smoke . . . Member of class of '97, University of Pittsburgh . . . B. S. in E. E. . . . stepped right into Westinghouse as apprentice . . . began research on lightning arresters . . . first

EDWARD BENNETT

step up the ladder in 1900 as research engineer . . . developed the Nernst lamps for Mr. Westinghouse . . . must have been a success . . . went to Nernst Lamp Co. as chief engineer . . . next tried his hand at consulting and contracting . . . then switched to signal work and radio. . . .

Heard the call of the young West . . . headed for Utah engaged in power station design and research work on long distance transmission of power . . . joined the emigration of engineers to Wisconsin and became Assoc. Prof. in E. E. 1909-13 . . . another step up as Prof. . . . elected chairman of the Dept. in 1918 . . . still going strong.

Has a flock of honorary fraternity and society pins . . . such as Tau Beta Pi, Eta Kappa Nu, Sigma Xi, Phi Kappa Phi and Kappa Eta Kappa.

Author of numerous research articles and discussions . . . member of nine or ten engineering and scientific organizations . . . has wielded the gavel for the A. I. E. E. and S. P. E. E. in recent years as vice-president . . .

Keen, analytical mind . . . great math scholar . . . persistent advocate of practical system of engineering units and terms . . . since 1929 has devoted his energies and expert knowledge of economics to the vast problems of the Depression . . . published several pamphlets on a consumer credit technique for restoring employment . . . urges enactment of a national consumer credit act. . . .

Admired and respected by fellow colleagues . . . little known among the students . . . carries about him a natural dignity . . . entirely professional make-up . . . enjoys the out-of-doors . . . likes to take long walks . . . used to make frequent camping trips . . . his reading habits can only be surmised . . . economic subjects undoubtedly head the list . . . he is anxious to aid in pulling us out of this six year tailspin . . . here's hoping he succeeds. . . .

SCHOOL FOR PROFESSORS

That the engineering faculty members can still be placed in the category of students was concluded when the regional meeting of those engaged in engineering education was held April 11-12 in the mechanical engineering building, and all the "boys" went back to school. Dean Turneaure presented the welcome address as the convention opened for a two day session. Topics for discussion by prominent men in the field of engineering education included the training of engineers for public service and administrative positions, and the present and future of the S. P. E. E. Professors L. F. Van Hagan and E. D. Ayres were among the speakers on these subjects. Saturday, April 13, was devoted to group conferences on the many phases of engineering training courses. Faculties and representatives of Iowa State College and the Universities of Illinois, Iowa, and Minnesota also participated in the conference.

PARADE SIDELIGHTS

They're off!—No, it's only the snake manned by two engineers and sixty kids crawling ahead of the procession — The can hauling Schmale's entry eliminated — No brakes, think of it, an engineer's car without brakes? — The efficient police officers confiscating two cases of excellent ammunition get the bronx cheer. — Delay, more delay, and the parade's away. (This is getting verse and verse)—Smiling St. Pat Pape, well guarded by Cap'n Jack Bender and Carl Amundsen, greets the crowd and almost loses a wig and mustache.—The A. S. C. E. float takes up about one-third of the length of the procession. "Tiny" Paul West makes a good bartender. The civils would think of taking along refreshments, but they had no beer to spare for the outsiders. "Red" Wagner as Hugh Johnson and Art Sperling as Kingfish Long are having a great time. —The mechanicals' entry "Spirit of the Nude Deal" and Saue's clever get-up draws a great deal of mirth and comment from the curb-sitters. — St. Pat is a ladies' man we find out as he bows to all the girls on Langdon St.— Everything going along smoothly and the parade starts around the square. — The parade stops. What's the matter? — The cops are searching the floats. — It's two weeks before Easter, but they're looking for eggs anyway. — Oh! Oh! The civils are found carrying the forbidden hen fruit and are escorted to the station. Tearfully they give up "all" their supply and they are allowed back into the procession. — The parade starts down State Street and the gang grows tense. Anything can happen now. — Hold her! The mules pulling St. Pat try to go into high gear when someone tosses firecrackers under them. A very low stunt — Bam! All hell breaks loose. The skies are darkened and the sun is hidden by the shower of eggs that rain down from above the Madison Steam Laundry. The lawyers have attacked. The engineers duck, but their defenses strengthen and they retaliate. Eggs produced apparently from nowhere fly up as fast as they are coming down. The lawyers retreat and the day is saved. Wonder where all the eggs came from if the cops did search the floats? — Another small attack from above the Pharm, but the crack shots from the engineering school quickly stopped that. — All the while Sam Kotz was desparately trying to get the pump going on the truck hauling the water, but no luck.—The parade pulls up on the lower campus and St. Pat Pape and the engineers gather around the Blarney stone. Pape kisses the stone without meeting the same fate that Schneller did last year when he tried it.—The parade is officially over, but the crowd swarms around looking for trouble. — Kotz finally gets the pump going.—How quickly the crowd did disperse when they saw that water coming. — Some excitement down at the lake front. — Two stubborn fellows receive a little rough treatment and an early season 'dunking' in Mendota. — Temperature 35° F. —Br-r-r-! All quiet at the Y. M. C. A. and no mud-slinging at Lake and Langdon.— Guess we'll call it a day. — The honor of the engineers is upheld and the war is over until next year. — St. Pat parades? We're all for 'em.

Attention Freshmen!

Entries for the *Wisconsin Engineer* Drawing Contest will close on the 30th of April.

●

Judges of the contest are:
Professor P. H. Hyland
Professor W. S. Cottingham
Professor R. W. Fowler

Prizes:

Eastman Kodak — *Photocraft*

$5.00 Wahl Pen and Pencil Set — *Brown's Book Shop*

Pocket Slide Rule No. 1441— *Gatewood's*

●

but remember, your entry is a part of your regular class work!

FACULTY BRIEFS

Sigma Xi, honorary graduate scientific fraternity, claimed the membership of four prominent young engineering instructors in recognition of their achievements in scientific research. The electrical engineering and mechanics department tied for honors, with two men from each department receiving the coveted honor.

Frederick A. Maxfield and Vernon M. Murray are the E. E. representatives while Richard S. Hartenburg and George W. Washa hail from the department of Mechanics.

WENDT AND WITHEY WRITE NEW BULLETIN

"The Strength of Light Steel Joists," is the title of Bulletin No. 79 of the Engineering Experiment Station Series recently published. It presents the results of tests made from 1930 to 1932 on various types of light joists designed for building construction. The bulletin suggests basing design upon a "Useful Limit Load" which marks the limit beyond which set and deflection are likely to be objectionable. The tests were made as thesis projects under the direction of Prof. M. O. Withey. The computations were checked and revised by Mr. Kurt F. Wendt.

DO YOU KNOW THEM?

Although this department has never "gone the way of all flesh" and succumbed to the age old scheme of giving "orchids" to deserving people, yet it is deemed appropriate to recognize several men on the campus for their peculiar traits, habits or characteristics, which mark them as outstanding and colorful.

Gentlemen, we present for your approval: Prof. L. E. A. Kelso, for his absolute unquestionable sincerity; Richard S. Hartenburg for his "fast comebacks" and witty quips; R. A. Rose for his Diesel Mania; and Prof. R. S. McCaffery for his apparently unexhaustible and entirely effective well of dry humor.

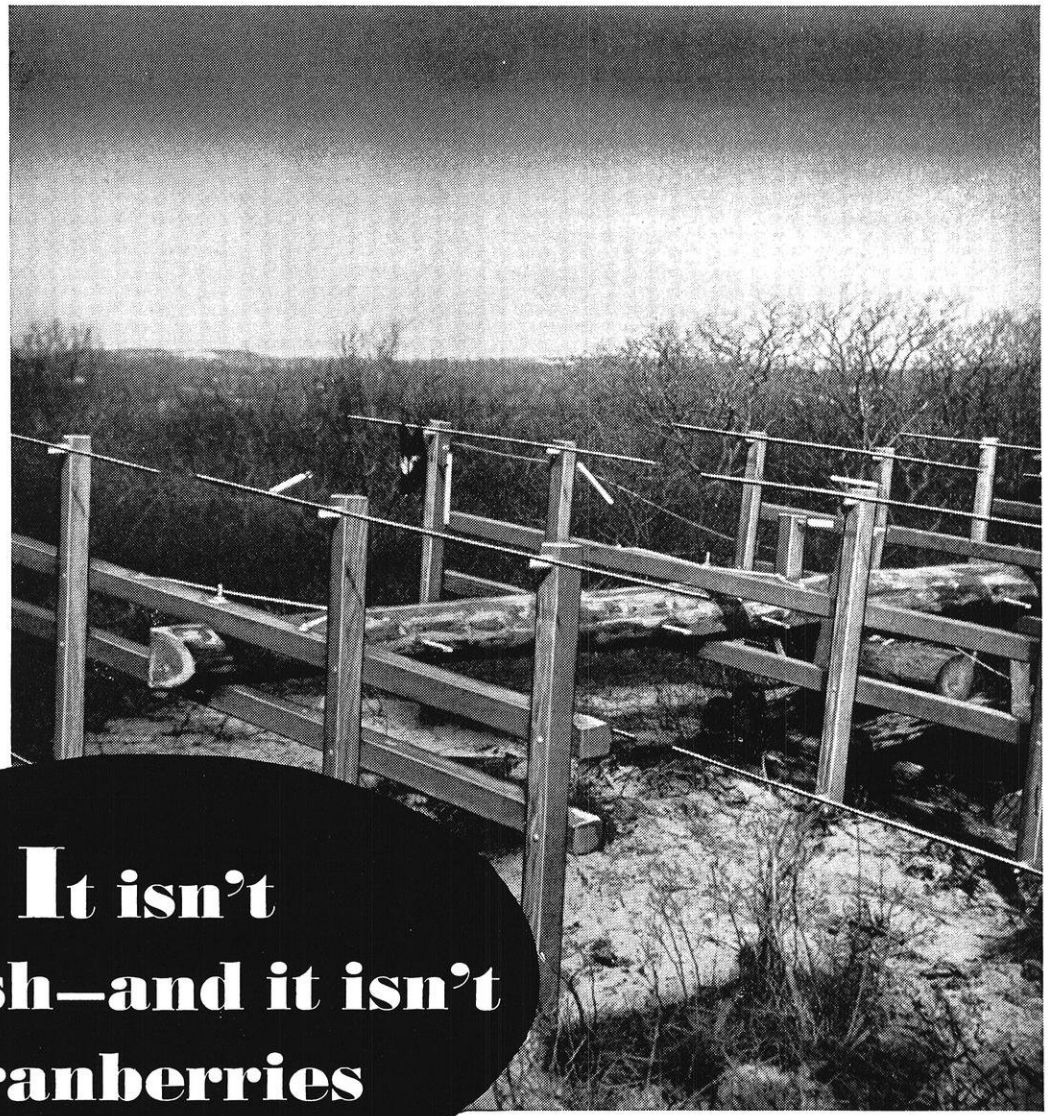
THIS N' THAT AT THE MINING SCHOOL

The Miners at their February 20, 1935, meeting handed themselves a "New Deal" in revising the old constitution and adopting the new one. It was aimed to keep up with present conditions. The Mining Club was voted to be affiliated with the A. S. M. E. — another step of wisdom.

Eli Mullen wonders—"would it be possible to re-use the platinum wires in exploded blasting caps?"

Meetings of the Mining Club will be held twice a month after this. Students will preside at one of the meetings and professors will be told for a change; at the following meeting they will be given their chance.

Muckers, Kemmer and Schults served sandwiches and coffee following business meeting. Chairs were gathered around Prof. Shorey while he recounted some of his harrowing experiences.



It isn't codfish—and it isn't cranberries

It's an ultra-short wave radio telephone antenna—before being raised above the dunes of Cape Cod. ¶ For some years, Bell System engineers have been studying ultra-short waves. They have developed automatic transmitters and receivers which may be connected with regular telephone lines at points far from central offices. They hope such radio links will be useful in giving telephone service to points difficult to reach by usual methods. ¶ The installation on Cape Cod—which is now undergoing service tests—is just one more example of Bell System pioneering in the public interest.

Why not telephone home one night each week? Bargain rates after 8:30 P. M.—reverse the charges if your folks agree!

BELL TELEPHONE SYSTEM

« ALUMNI NOTES »

CHEMICALS

GILES, W. RALPH, '25, is development engineer with Smith, Kline and French. His address is 209 Lantwyn Lane, Narbeth, Pa.

SCHINK, LUDWIG, '32, is still with Armour and Company and writes that Chicago is presenting many interesting and unique experiences.

GRISWOLD, FRANK L., '20, died of pneumonia at his home in Brooklyn, New York, on February 12. Since his graduaton from Wisconsin, Mr. Griswold has been a teacher of chemistry at the Long Island University. He also served in the engineer corp during the World War.

BITTNER, VICTOR F., '23, has a position with the Peoples Gas and Light Company of Chicago as an engineer. His address is Mt. Prospect, Ill.

UMBREIT, STANTON, '16, who is an electrical engineer, obtained a British patent the latter part of last year for an alloy for radio use in regards to the Marconi Wireless Telegraph Company, Ltd.

MINERS AND METALLURGISTS

TIEMANN, THEODORE D., '30, has a position with the Victory Fluorspar Company, Elizabethtown, Ill., as a mining engineer.

EASTWOOD, LA VERNE W., '29, Ph. D.'31, who has been teaching metallography and metallurgy at the Michigan College of Mining and Technology, has accepted a position with the Alumnium Corporation of America.

FROST, OSCAR J., '82, M. E.'85, who was a well-known assayer in the mining circles of the Rocky Mountain region, died at his home in Denver after a week's illness.

After finishing his work at Wisconsin, Mr. Frost took some graduate work in chemistry at John Hopkins and then later became associated with the Boston and Colorado Smelting Company at Argo, Colorado. However, for the past thirty-five years has had his own assay offices and laboratories. During this time Mr. Frost built up an enviable reputation and was recognized as an authority in chemistry and scientific investigation. His wife, Mrs. Cary Cooper Frost, and a daughter, Mary, survive him.

TONER, HAROLD J., M. S.'34, who was with the Federal Inspection Bureau at Chicago, has been transferred to the Brooklyn Navy Yard where he is metallurgist.

MURPHY, JOHN M., '24, passed through Madison recently on his way to Washington to get a longer time period on the air for his radio station at Duluth.

ELECTRICALS

TEARE, B. RICHARD, '27, is assistant professor of electrical engineering at Yale.

HEIDER, SHIRLEY A., '34, has been testing heating, plumbing and ventilating equipment since August, 1934, at the Trane Company of La Crosse, Wisconsin.

WEAVILL, CLAYTON H., '32, has a position in the office of the Northern States Power Company at Viroqua.

BLAKE, GEORGE B., '10, E. E.'11, is out in Hollywood, Calif., where he is manager of the Hollywood Marvel Products Company.

SCOTT, ALLISON F., '17, who is with the American Radiator Company of New York City, has supervision over general sales. His home address is 72 Sterling Ave., White Plains, N. Y.

AULTMAN, DWIGHT E., Jr., '24, is at present on CCC duty commanding a supply company at Fort Sill, Oklahoma.

ANDRAE, STEPHEN C., '25, has a position teaching in Los Angeles.

BROOKS, RALPH R., '26, who is an engineer in the Electrical division of the Barber Colman Company, is in charge of production and inspection. His address is 530 N. Church Street, Rockford, Ill.

MECHANICALS

KEELETER, PAUL, '33, has a position with the Ross Heater and Mfg. Company, Inc., in Buffalo, New York, as engineer in the sales department.

HELMKE, E. C., '35, has obtained a position with the Gisholt Machine Co.

HEGER, L. E., '33, is with the Trane Company of La Crosse.

TANNEWITZ, C. L., '30, has a position with the Bucyrus-Erie Company of South Milwaukee, Wisconsin. His address is 707 Hawthorne Avenue.

DOBROGOWSKI, R. A., '32, is located at the Bucyrus-Erie Company of South Milwaukee.

CIVILS

BRANSTAD, RCHARD E., '12, who was star center on the University of Wisconsin Western Conference football championship team of 1912, died after being critically injured in an automobile crash near Denver on February 25. A companion was killed instantly.

Mr. Branstad was an engineer with the Bureau of Reclamation at Denver and had just returned from the Boulder Dam project. He also served the government overseas as an engineer during the late war.

POSS, ROBERT J., '30, has a position as inspector on the construction of the new breakwater being built at Port Washington, Wisconsin. **HUNDER, MARCUS B.,** '30, and **SCHLONDROP, EDWIN,** '29, are two other Wisconsin men doing inspection work on the same job for the U. S. Engineering Department, while **ALDER, ORV,** '31, is timekeeper for the Great Lakes Dredge and Dock Company on this job.

ROEMING, GEORGE C., '30, has been with the Emergency Welfare Relief Commission of Michigan since the beginning of December. He was formerly working on soil erosion at North Bend.

GREILING, ROBERT E., '29, has a position with the Greiling Brothers of Green Bay as a civil engineer.

EVANS, WILFRED, '17, has been elected president of the Delta Upsilon Alumni Club of Kansas City.

CHRISTENSEN, A. E., '13, who is a national director of the Associated General Contractors of America, is a member of the contracting firm of Christensen-Gardner, Inc., Salt Lake City, Utah. The firm was awarded and commenced the first NRA Project which was a paving project eleven miles long. Mr. Christensen was also the general contractor for the University of Utah football stadium.

WITHEY, NORMAN H., '32, son of Professor Withey, and A. G. Timms, both of the Portland Cement Association, have been awarded the Wason research medal for their paper on "Temperature Effects on Compressive Strength of Concrete."

VIEREG, J. RICHARD, '34, was married on March 2nd to Marjorie A. Sleight of Sagola, Michigan. Dick is with the Highway Commission at La Crosse.

THE CRITICAL ANGLE---

In Which Engineers Put Forth Their Comments of the Play on the Stage . .

CAPACITY TO GROW "A company hires and keeps engineers that have a 'capacity to grow'." So spoke a representative of the American Society of Mechanical Engineers at a meeting in the Mechanical Engineering Building several mornings ago.

Capacity to grow. Not many of us have been considering that aspect of our education. Thus far, most of us are principally desirous of a technical education—a start. Then, we are hoping that experience will do the rest. And that is the knot that tangles the reels from which we pay out our lines of life. Experience. Many a man has gone from one concern to another, gathering what he calls experience. Indeed, that is what he has gathered. But to what avail, if he has merely gathered? Sponges absorb great amounts of water, but you surely would never use a sponge to pump water.

Therein lies the point. The man with the capacity to grow is the man who is ever enlarging his range of experience. He is the man who is always doing something new, yet he does not remain a jack-of-all-trades, because he gains each bit of knowledge with a view to bettering himself in that field of work which interests him most. More and more, his facility for increasing his experience becomes better. And most important of all — all these little tricks for solution, all these methods, all the facts to which he has been exposed during his mental and physical peregrinations — each and every one of these he manages to employ in solving the problems which confront him. All the time, he engages in this type of mental calisthenics with greater and greater agility.

Such a man, gentlemen, is the man with a capacity to grow.

CONSTRUCTION OR DESTRUCTION Engineers are in a paradoxical position in regard to war. There is perhaps no other profession that has so effectively harnessed the almighty forces of nature for the betterment of man. And likewise there is no other group of men who in their destructive efforts have been more successful in undoing all the benefits that they have brought to man by their perseverance and ingenuity.

At the portals of progress engineers tame mighty streams to turn the wheels of industry, perfect machines that transcend the human hand in skill and accuracy. In the background the "big-Bertha-and-bullet" man exploits engineers as well as society in the struggle to produce bigger and better cannons that will wreak destruction more surely and completely — that will reap untold profits after being sold with the aid of the navy. Sanitary engineers during peace study how to furnish populations with clear water, free from disease germs, while during war they turn their hand to bacteriological warfare, introducing epidemics of cruel death-dealing sickness.

We engineers are the technological rulers of the universe. If we have any desire to engage consistently in construction instead of destruction, if we have any feeling of social responsibility worthy of the power which we wield, we must be the first to support the drive for peace. We must back moves to take the profits out of war and to allow only our Federal government to manufacture armaments. By giving evidence of our will for peace in our various contacts with those who by their jingoistic propaganda would drive the United States into another war, we can make sure that our engineering training will be used constructively for the benefit of mankind rather than for the dislocation of our civilization.

PLAYING THE GAME A serious situation has developed in our library. When about fifteen per cent of the volumes of magazines have to be held for replacement of missing numbers before they can be sent to the bindery, when as many as seven out of twenty-eight numbers of a single periodical are missing from the shelves at one time, when pages are clipped from both bound and unbound magazines, and some of our best books go permanently A. W. O. L., something is wrong. It is not so much the cost of the replacements, though that is considerable, as it is the inconvenience to library users we are thinking about. Many are unable to obtain information needed while the books or parts are being replaced, and in many cases replacement is impossible.

We appeal to the sense of fair play of those who have been guilty of these unfair practices to become good sports and play the game fairly. But that is not enough. The sense of fair play of some of these individuals may be so atrophied as to be practically non-existent. The ninety and nine who are honest must assume some responsibility for restraining the one predatory individual if we are to retain our privileges. We not only need to play fair ourselves but must help to detect the non-conformist.

« CAMPUS ORGANIZATIONS »

CHI EPSILON

Mr. Walter E. Jessup, Field Secretary for A. S. C. E. and formerly editor of *Civil Engineering* magazine, was initiated as an honorary member of the local chapter of Chi Epsilon at a banquet held on March 20 at Kennedy Manor. Mr. Jessup graduated from the University of Wisconsin in 1912 and is now living in New York. Mr. L. J. Markwardt of the Forest Products Laboratory, who is a classmate of Mr. Jessup and recently elected honorary member, acted as toastmaster. The initiation ceermony was conducted by William O. Ree, president of the chapter, and Laurence Bidwell.

ALPHA TAU SIGMA

Alpha chapter of Alpha Tau Sigma, national honorary engineering journalism fraternity, recently elected to membership six prominent engineers who have been actively interested in engineering journalism. All six men are staff members of the *Wisconsin Engineer*. They are: Leslie Janett, former editor; George Cook, present editor; Wilfred Tock, business manager; Reginald Price, LaVerne Poast, and Silvester Robisch.

Friday, March 29, these men were formally initiated into the fraternity by Prof. F. E. Volk, national secretary; F. T. Matthias, and G. E. Ward, all charter members of the fraternity.

After the initiation ceremonies, election of officers was held with Leslie Janett being elected president; Wilfred Tock, secretary, and Reginald Price, treasurer.

Prof. Volk gave a brief summary of the history of the national organization and spoke of tentative plans for a convention next fall in conjunction with the national convention of the Engineering College Magazines Association.

Co-operation means so to conduct yourself that others may be able to work with you.

PI TAU SIGMA

Pi Tau Sigma had its initiation banquet for this spring at the Memorial Union the evening of April 29, 1935.

Professor W. J. McNaul acted as toastmaster.

C. B. Kniskern, president of Pi Tau Sigma, welcomed the initiates, and J. Thomas gave the response.

The address of the evening was given by Mr. Max Kliefoth of the Burgess Company. He related some of his very interesting experiences during the World War.

Members of the Junior Class who were initiated are: Arnold J. Beyer, William F. Gother, Edward J. Rosecky, Herbert A. Stuewe, John P. Thomas.

To conclude the meeting, Herbert Stuewe read a humorous report which he had written.

The members of Pi Tau Sigma are now looking forward to their annual spring picnic.

A. S. C. E.

Well-planned meetings and active participation in engineering school affairs have marked the program of the Student Branch of the American Society of Civil Engineers. Walter E. Jessup, formerly editor of *Civil Engineering*, present Field Secretary of A. S. C. E., spoke to the society March 20 on the function of A. S. C. E. and membership requirements for graduating engineers. A talk on early land surveying in Wisconsin was given at a subsequent meeting by Lee Crandall, c'35. Attention was drawn to the failure of private incentive to provide decent housing conditions for masses of American people in a talk given before the group April 3 by Reggie Price, c'35.

Personal solicitation of all civil engineering students has resulted in a membership of 140 students for A. S. C. E., a record which outshines the attainment of all other student societies. Leslie J. Deno, c'37, has been elected sophomore representative to the Advisory Committee being set up to work with Dean Turneaure.

The successful conclusion of the St. Pat's parade was due in no small part to the energy of civil representatives. A. S. C. E. wishes to publicly acknowledge with thanks their appreciation for the use of Blied's printing shop. To Kneevers c'35, Villemonte c'35, and Berschens c'35 also go well-deserved thanks for their work on the float. The green snake, made by A. S. C. E., is to be given to Polygon for future parades.

Plans for future activities of A. S. C. E. include the proposal to have a joint outdoor gathering with the mining and metallurgical engineers; the great American sport of baseball would provide part of the entertainment while the rest will be provided by the drinking of milk (?), so they said.

SPEEDING ECONOMIC RECOVERY BY A CORRECTIVE CREDIT AWARD

Part II

(Continued from page 113)

omy, without itself engaging to operate any of the nation's productive activities.

Grounds for Awarding $100 to Each Adult

There exist a number of reasons for awarding $100 to *each and every citizen* rather than, say, $400 to members of unemployed families and nothing to those who have jobs.

The primary aim of the award is to restore the stream of purchase orders for goods and services to its predepression level within a very short time, say, one month after the enactment. To do this, each family should increase its present expenditures, *in the three months in which the award is received, by the amount of its award.* Now, the awards made to the unemployed will be used to some extent in meeting debts and will be available only to a limited extent for purchasing manufactured commodities. It is difficult to picture men who have been unemployed for a year or more buying automobiles, radio sets, refrigerators, etc., on the scale necessary to insure the return of men to the factories. The award of money if made to the unemployed alone, offers no promise of re-establishing private enterprise. It would be simply an increase in the size of the dole, and not much of a contribution to the rapid restoration of employment in private enterprise.

A second ground for making a uniform award of $100 to each adult citizen is, that with such a provision the Act requires no inquiry to determine whether the applicant is in need or distress, so that the making of the payment is greatly simplified and can be carried out very rapidly.

A third reason for making uniform awards to all citizens is that such a course does not single out and specify a paticular group (such as debtors, or farmers, or war veterans, or silver producers, or newspaper publishers, or marine or air transport corporations), and enact legislation for the benefit of that group, at the expense of the nation-at-large. The Act is not *special-interest legislation.* It will not have the depressing effect on the tone of individual effort, initiative, and civic integrity, that results from those measures (enacted or proposed) which the public-at-large views as racketeering measures.

A SLICE OF "PI"

CALL B. 3.1416

By

A. BROKIN
YEGG

A Biography

● It was in the year of 1931, that a sparsely feathered leghorn cackled the arrival of a potential offspring. This little egg which we shall call Rotan for short, was of a 'platinum blonde' type, thus differentiating it from the potential offspring of the Rhode Island Red. Great things were expected of Rotan. If he turned out a pullet, she'd spread the Leghorn race, or if she turned out a rooster, he'd grace someone's table. As stated before, great things were expected of little Rotan. With great pride, the sparsely feathered mother sat upon little Rotan. Days turned into weeks and soon it would be the time for Rotan's debut. The little, sparsely feathered mother sat in joyful expectation — then anxious expectation — then forlorn expectation and finally in despair. What had happened to little Rotan? Had he met bad companions and been led astray? Thus mused this little mother of few tail feathers. Hadn't she 'sat' him a good example?

When all hope of hearing a joyful peep and cheep had left — the slightly plumaged and saddened mater left little hard-shelled Rotan to make his own way in the vast world. All chances of a successful life were at a minimum for little Rotan. He had slipped off the long and narrow path and now must pay for his child-hood follies. For many months he laid in complete obscurity in the corner of a chicken coop, maturing and aging rapidly because of his early excapades.

Suddenly, things began to happen after Rotan had reached a ripe old age of four years. He was picked up by a group of odd-shaped creatures which he identified as mechanical engineers when they mentioned EE 7 in very questionable terms. He also noticed a White and Middleton Gas engine palpitating in the hip pocket of one of the fellows, thus establishing their identification as mechanical engineers.

Rotan was placed in a case full of other undeveloped and misguided eggs and rushed to a large city where they were secreted in a dark room. Some of Rotan's companions hadn't been so bad in their youth and so broke forth into feathered splendor and joyful cheeps.

In the meantime, Rotan heard the odd-shaped creatures talking about lawyers, and shysters, parades and cops. One fellow, especially, with a black fuzz, whom the other funny-shaped creatures called Professor Louis Kessler, talked about the parade and floats. Another name—Bender—struck him because it was a bender that had caused him to age so rapidly.

Finally Rotan and his companions were spirited away to a motored vehicle where they were hidden in some sand. From his hideout, Rotan saw some big specks of material, which were flat on both ends, poking around—they seemed to answer to the name of cops. Then things began to move and Rotan had a faint feeling of an impending crash.

He heard angry shouts and then he was seized, whirled and let go — he seemed to float through the air with the greatest of ease, passing two sparrows in his flight, his big moment was coming — was he to land to waste his fragrance on State Street air or would he find a more foul landing place. He was slowly descending — he saw a peculiar landscape appear in his path — from previous remarks he recognized it as a shyster's face. He landed with a shell-rending crash on the stoop-shouldered, case-burdened creature and blithely ran in all directions. "Ah!" cried little Rotan, "if I can't be a feathered fowl I certainly can be a 'foul scent' from above."

Shades of Darkness

● Why does Harry McCauley love to eat figs in Camp Randall Stadium on moonlight nights?

Apples

● John Van Vleet will have to increase his polishing activities since he dropped to sleep and from there dropped to the floor during one of Professor Kelso's two-hour short quizzes. Also he was informed to use a different set of EE reports as those he used were out of date.

● Bill Hodgins, dreading a stay at the infirmary, left for Chicago with the measles, it is rumored.

Cyclone

● According to Domanik, people use cyclone separators to get the dust out of their flue gas.

Schnozzle

● Al West, winner of the one-man stunt in the St. Pat's parade needed few alterations in his make-up to appear as the schnozzler.

Blasted Hope

● Sylvester Robisch blushed mightily when Prof. Kowalke stated that he had been raised on pretzels.

OF NATIONAL ENGINEERING INTEREST

The American Engineering Council in a recent communication points out that the five billion dollar work relief bill, which has just received the president's signature, is in every phase essentially an engineering job. Highways, streets, grade crossing work, housing, rural electrification, sanitation, soil erosion control, and other items all have employed large numbers of engineers in earlier stages of the emergency program. The function of the engineer has become increasingly recognized in these works so that the expansion of technical staffs both in Washington and in the field is a certainty.

The Committee on Engineering and Allied Technical Professions is undertaking a survey of the engineering profession with upwards of 170,000 names compiled. The various engineering societies located throughout the United States are co-operating to an extent greater than expected. The card file of names has been sent to the Bureau of Labor Statistics to organize the information which will soon be released.

Accrediting of engineering colleges will be undertaken by the Engineers' Council for Professional Development with the purpose of "identifying those institutions which offer professional curricula in engineering worthy of recognition as such." Accrediting is to cover only the graduate and undergraduate curricula which lead to degrees. The ECPD will recognize the six major divisions of engineering — chemical, civil, electrical, mechanical, metallurgical, and mining — and such others as are warranted. Evidence will be based upon statistical material obtained from catalogs and questionnaires, and upon visits of inspection covering facilities and teaching staff.

RISING STANDARDS IN ENGINEERING EDUCATION

Harvard University's decision to admit hereafter only graduate students to the Engineering School beginning next September marks a significant step in professional education. For many reasons recognition of engineering as a profession has been slow in coming to pass in business and social life. Engineers are a modest lot. In training and practice their work has been so diversified that the sharp focus to popular understanding given such vocations as law, medicine and architecture has often lacked definition as to the underlying qualifications and duties of the engineer.

Engineers are being sought as master specialists in conquering the forces of nature for the larger good of men. Their training must be both broad and deep to serve the needs of a mechanistic age. Public affairs must rely increasingly upon engineering analyses, despite the fact that few engineers make successful politicians. Engineering standards are rising; curricula are being broadened and opportunities increased for graduate work both at technological colleges and in the universities. Such a step as Harvard's emphasizes anew the professional character of engineering on its highest levels.

Invisible Joints—Strong, Trim, Simple

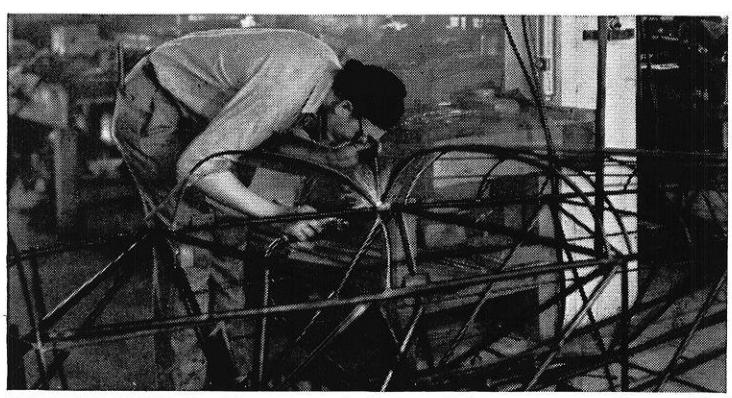
Oxy-acetylene Welding contributes these important advantages to the design and manufacture of metal products.

By **W. B. MILLER***

IN THE fabrication of metals it is not necessary to sacrifice appearance and simplicity for strength. Modern methods have changed that. Through the use of welding, it is now possible, with a minimum investment in equipment, to fabricate products with strength where it is wanted. Extra bulk throughout for reinforcing the weakest spot is not necessary.

Welded for Strength

The welded joint is as strong as or even stronger than the metal it joins. It is leak-proof and thus admirably suited for piping or containers of any sort, to resist pressure, temperature, or shock. Another way of making the product stronger is to weld it from one of the new alloy steels or strong non-ferrous alloys. In this way another desirable property is usually obtained — lighter weight. Welding can be used to make joints in any of the commercial metals.



STRONG JOINTS—95 per cent of all aircraft have oxy-acetylene welded fuselages, wings and other members.

In Aircraft Construction

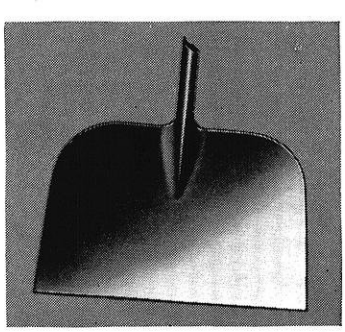
Outstanding as an example of the use of welded joints for their strength is in aircraft manufacture. In an airplane fuselage, every joint must be strong enough to withstand heavy stresses from all sides in flying. The joints must be tough also, for the shocks they undergo are sudden as well as powerful. They are made in a strong alloy—chrome-molybdenum steel. Welded joints are the standard of the aircraft industry because they fulfill faithfully these essential requirements on which so many human lives depend.

For Rigorous Use

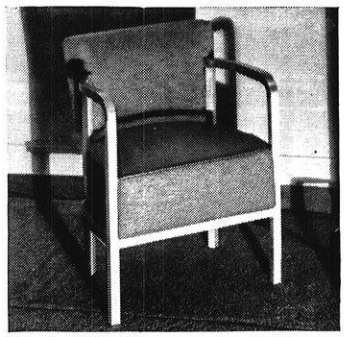
For years, field hoes were manufactured by a forging and rolling process involving a considerable investment in machinery. An enterprising hoe manufacturer found that he could eliminate inherent weaknesses by welding. He designed a bimetal job: the hoe blade of a steel made to hold its cutting edge longer, the sturdy shank of a steel selected for its ability to withstand shock and fatigue. These are then joined by welding with a bronze welding rod. In this way there is no compromise—materials are chosen for the job they are to do—and the manufacturer makes a better hoe at lower cost.

In Modern Furniture

In making metal chairs it is necessary to get a strong ductile joint and one smooth in contour to take the various special finishes which are applied to simulate wood. The strength of joints made with special high strength welding rod can support the weight of several stout men without any sign of giving way. The welded joints are rounded and curved so that but little grinding is necessary for a smooth surface.



SIMPLE—by adopting welding for these field hoes, the manufacturer produces a product with none of the disadvantages of older designs.



TRIM JOINTS—for metal furniture are made by welding. Chairs of welded metal easily support as many heavyweights as can hang on.

Welding Is Sound Design

To take advantage of all the features of oxy-acetylene welding, products should be designed or redesigned with the aid and advice of competent welding specialists. Engineers of The Linde Air Products Company are constantly perfecting details of ox-welded design which are of interest and assistance to manufacturers. Consultation on welded design can be had without charge from any Linde Sales Office. They are located in leading cities of the country: Atlanta, Baltimore, Birmingham, Boston, Buffalo, Butte, Chicago, Cleveland, Dallas, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Phoenix, Pittsburgh, Portland, Ore., St. Louis, Salt Lake City, San Francisco, Seattle, Spokane and Tulsa. Everything for oxy-acetylene welding and cutting—including Linde Oxygen, Prest-O-Lite Acetylene, Union Carbide and Oxweld Apparatus and Supplies—is available from Linde through producing plants and warehouse stocks in all industrial centers.

With Engineering Cooperation

Users of oxy-acetylene welding and cutting, and other products and processes developed by Units of Union Carbide and Carbon Corporation benefit from a most unique coordination of scientific research with manufacturing, sales and service facilities. These combined resources of a vast organization assure a full measure of satisfactory performance.

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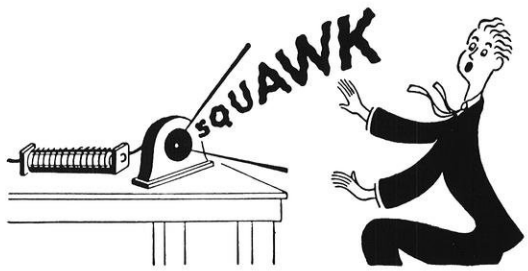
*Engineer, Union Carbide and Carbon Research Laboratories, Inc. Unit of Union Carbide and Carbon Corporation.

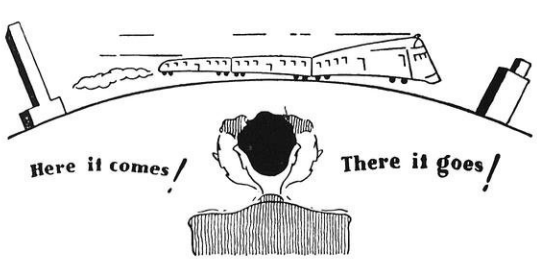
G-E *Campus News*



MAKING FLAWS SQUAWK

A VALVE used in a General Electric refrigerator unit requires a small steel spring, which, during the time that a refrigerator is in operation, is used several hundred times per minute. A small defect, even a microscopic scratch, would be sufficient to cause the spring to fail after a relatively small number of operations. Consequently a fast, certain means of inspection for the steel ribbon of which the springs are made was necessary.

It is generally known that, if a secondary coil is placed around a core of iron and the iron is placed in a magnetic field, there is a definite relation between the chemical and physical properties of the iron and the resultant electrical wave induced in the secondary coil. Using this knowledge as a base, a General Electric laboratory built an inspection device. The spring material is run through a magnetic field, and the induced current is fed through an amplifier to a loudspeaker. A hum peculiar to the magnetic properties of the material sounds in the loudspeaker as long as the quality of the material is uniform. Any flaw, however, changes the magnetic properties, the magnetic field then becomes unbalanced, and the loudspeaker emits a shrill squawk.



STREAMLINE COMMUTING

PORTLAND-BOSTON commuters will shortly receive a taste of real speed. Fairly before they have a chance to swallow their breakfasts, they will be whisked into North Station by the "Flying Yankee." In the morning, the train will streak the 115 miles from Portland, Maine, to Boston in 110 minutes. Then during the day, it will make a round trip to Bangor, Maine, making the 250-mile trip each way in 265 minutes. When the business day closes, it will streak back up Portland way with the commuters it brought down in the morning.

The "Flying Yankee" is a 200-foot articulated train, of lightweight, stainless-steel construction. Its three sections are carried on four trucks. Power originates in a 600-horsepower Diesel engine, directly connected with a General Electric generator. Two General Electric traction motors are mounted in the first truck. An auxiliary generator and the control equipment are also built by General Electric.

HOT DOG

PEG is an elderly English setter, who can trace her family back to some of the very best nobility in her breed. When she was younger, she enjoyed nothing more than romping about in the snow. But in the last few years, American winters, with all their sub-zero weather, have not agreed with her too well.

So last year, her owner, H. C. Ward, U. of Wisconsin, '05, of the General Electric office in Rochester, N. Y., decided to heat her kennel. Quite appropriately, he decided to do the job electrically. He installed a length of G-E soil-heating cable, plugged it into an outlet, and turned on the juice.

He did not stop there, however. Such a fine old dog deserved a polished job. He also installed a G-E thermostat in Peg's quarters to keep the temperature constant through all kinds of weather. Now while other dogs cower in frosty kennels, she disposes herself in luxury. She wags her thanks to General Electric.

96-138DH

GENERAL ELECTRIC