The TEXACO STAR

Merry Christmas

Vol. XV DECEMBER 1928 No. 12

Peace to Men of Good Will

When Yule logs are burning
There comes the old yearning,
Which "world, flesh, and devil" never quite kill,
For goodness, for beauty,
For neighborly duty,
For "Peace upon earth to men of good will."

I picture in vision
That Christmas Elysian,
O'er Babe and His mother I have the old thrill,
And comforting, tender,
The Word in its splendor
Says, "Peace upon earth to men of good will."

For love crowns the season,
All else is but treason,
The right law of life's the Golden Rule still;
And some bright tomorrow
Will heal the world's sorrow
With "Peace upon earth to men of good will."

—John Dickinson Sherman.

The TEXACO STAR

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"All for Each—Each for All"

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The Proposed Code of Ethics

By C. B. Ames

The Board of Directors of the American Petroleum Institute at the recent meeting in Chicago voted unanimously in favor of the Code of Ethics. After this recommendation of the Board of Directors, and after a full discussion of the Code, section by section, it was approved at a general meeting by a vote of 106 to 8. The next step is to present the Code to the Federal Trade Commission and the Department of Justice with the request that the Federal Trade Commission give public notice and hold an open meeting at which the matter may be considered. It is the hope of the industry that the Federal Trade Commission will approve the Code and promulgate it as a statement of what is fair and what is unfair competition in the marketing of petroleum products.

This Code is the composite result of much study and many compromises by numerous representative men in the petroleum industry. Several months ago the President of the American Petroleum Institute appointed six committees representing six different sections of the country to study the subject. These committees were composed of presidents of companies, and the six committees contained approximately 60 members. The six committees met at different times and places throughout the country, and each committee made a tentative draft of a Code. Each committee studied the question carefully, and working both through sub-committees and as a whole, each finally prepared its draft of a proposed Code. The President of the American Petroleum Institute appointed the six chairmen of these six regional committees as a General Committee to receive the six drafts prepared by the regional committees, and from them to draft a Code for general application throughout the United States. This General Committee devoted several days to a study of the six regional proposals, and finally recommended a unified draft based on these six regional drafts. This last draft was submitted to the Directors of the Institute at the Chicago meeting, and during the week of that meeting the Board of Directors devoted much time to a careful consideration of the proposed draft. It was regarded as highly important that the final draft should be one which the entire industry could support, and which could receive the unanimous approval of the Directors. After much study and a number of compromises, changes were made in the draft submitted by the General Committee with the resultant unanimous vote.

The Code as adopted is not a perfect instrument. It has dealt with a very confused and imperfect marketing situation. This situation, bad as it is, must be taken as the basis of progress. It cannot be uprooted overnight, but it can be greatly improved, and the unanimity

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Edwin Benjamin Reeser

(President of The Barnsdall Corporation)

Newly Elected President of the American Petroleum Institute

In view of the career which has come to him, Edwin Benjamin Reeser could not have chosen a better town in which to be born. Oil City, Pennsylvania, was the town and 1873 the year.

In 1891 he was already a practical man with a job, a small job but nevertheless a job, in a gas company. He made his first mark collecting monthly gas bills from customers. He traveled throughout the then oil and gas country, getting as far from Oil City as Sistersville, West Virginia, where he continued to study oil and gas.

In 1903 the late Theodore N. Barnsdall ran across young Eddie Reeser. Mr. Barnsdall prided himself on a keen eye for bright young men. He took on the promising candidate. Years passed; Mr. Reeser became Vice President, Director and President. Despite his heavy company duties he has always shown an interest in outside activities. He has been a member of the Board of Directors of the American Petroleum Institute; he is a member of the Board of the Mid-Continent Oil & Gas Association; and was recently placed on the National Advisory Board Committee on Natural Resources of the United States Chamber of Commerce.

Mr. Reeser lives at Tulsa, Oklahoma, and comes to his New York offices in the great Equitable Building on lower Broadway once a month. Like Mr. Reeser, the New York offices are characteristically modest.

At fifty-five the new President of the American Petroleum Institute is vigorous and young looking. He married in 1897 and has two grown sons. He belongs to clubs which he sees seldom. Of yachts and horses he has none; he may have avocations or hobbies but they are not known to his friends. One of them was asked, immediately after his election, what was Mr. Reeser's chief side-interest in life, and he replied: "He is very much interested in petroleum."

Christmas Over Centuries and Lands

Customs, Legends, Superstitions of the Day

By BLANCHE NANCY GALLAGHER

Many and strange are the ancient practices of Christmas. In them we see that pagan rites were continued centuries after idolaters accepted Christianity. The Saturnalia of the Romans was a mid-winter festival of Saturn, and the mummeries indulged in during the Saturnalia continued down through the ages, becoming associated with Christmas, until suppressed by State and Church because of the scandalous abuses often resulting from the exuberant license of the participants.

The Scandinavian worship of "Yule" was originally in honor of the sun, mistletoe and the hog sharing honors as decoration and delicacy. The burning of the Yule log was a cheerful custom of the pagan Celt, Scandinavian, and Teuton. In the middle ages Yule logs were given to the priest, who in turn shared them with the poor so that they too might enjoy the cheerful warmth. It was also then a custom for a landlord to give a wheelbarrow or cartload of wood to a tenant upon the birth of a child. In the 14th and 15th centuries Christ was regarded as a universal little baby brother, and one can easily perceive the link between the Yule log on Christmas and the landlord's gift of wood upon the birth of a tenant's child. The Scandinavian "Yule Log" later became the Teuton's "Christmas Block." In swinging meter Herrick describes the bringing in of the Yule log:

> "Come, bring with a noise,
> My merry, merry boys,
> The Christmas log to the firing;
> While my good dame she
> Bids ye all be free,
> And drink to your heart's desiring;
> With the last year's brand
> Light the new block, and
> For good success in his spending,
> On your psalteries play
> That sweet hock may
> Come while the log is a-trending."

The servants were entitled to ale as long as the log burned—no stretch of the imagination is needed to believe that they procured one of goodly size. In some sections the people sprinkled it with salt and water before it was set on fire. In Provence a libation of wine was poured upon it as if in consecration. The Albanians did the same and scattered its ashes over their vineyards. When it was first brought into the house the family and guests stood up hailing it with: "Welcome, precious log!"

The boar's head, still a feature of the Christmas entertainment at Queens College, Oxford, was revered in pagan Germany and Scandinavia as belonging to the favorite animal of Freir and Freia. In the double Grecian ceremony of mourning and rejoicing the boar's head was also conspicuous.

In England Christmas mummeries were very popular down through the centuries. The chief functionary, or master of ceremonies, was known as the "Lord of Misrule" or "Christmas Prince." In Scotland he was "The Abbot of Unreason." The "Lord of Misrule" was, on occasion, played by men of high station who took advantage of the opportunity to indulge in escapades only permissible under this mask. The antics of George Ferrers, poet, were said to have delighted Edward VI, and in Scotland James V is suspected of having shed the dignity of his high state disguised as the merry madcap.

In both England and Scotland these revels were shared by the mightiest of the land. The Scots appear to have tolerated a wilder abandon than the English, more nearly equaling the freedom of the Roman Saturnalia. While the Scotchmen were less extravagant in the expensiveness of their fantastic costumes, they were, nevertheless, just as gaudy in color. They bedecked themselves with gold and silver laces, embroidery, silken scarfs, and gold chains sparkling with paste jewels. Their legs were encased in links of bright metal tinkling with many bells. Every hand waved a silk kerchief.

Their costumes were always of a bright hue, chosen to attract the eye of ladies watching from their bowers, or of serving wenches at the washing-green. They played on various instruments of the period, making much noise and confusion. Crowds followed their course, some to have their fortunes told—others merely for the fun of watching the wild capers.

That there were some who frowned with

bitter wrath upon the mummers is evident in Stubbs "Lord of Misrule" appearing immediately after this article. In vigorous old English Master Stubbs flays them roundly. They were eventually subdued to the milder pantomime, made so popular in the 18th century by the famous Grimaldi family.

The chiming of bells has long been associated with Christmas, although where this custom originated it is difficult to say. The sound of Christmas bells was believed to frighten off evil spirits. At Dewsbury, England, one of the great bells was tolled as for a funeral, called the "Devil's Knell," the inference being that Satan died at the birth of Christ. In Northern Germany it was the custom for a choir to gather beneath the church steeple to sing psalms. This probably led to the strolling carol singers of later years.

In Saxony, on Christmas night a rope was fastened from the high church tower to the ground. A boy dressed as an angel climbed aloft, then slid gently down the rope, bearing a cross, while singing "From Heaven my home, to you I come." A serious accident caused the discontinuance of this ceremony.

The hour preceding the commencement of Christmas Day was considered the hour in which the devil had more than his customary powers. This was the hour when folks who wished to know the future resorted to absurd and unhallowed expedients. The superstitious believed if a girl knocked at the hennery door, and the cock crowed, she would be married; if not, she was doomed to a life of celibacy. Another superstition was for a maiden to take four onions and some salt, place them in the four corners of her room on Christmas Eve, giving to each onion the name of a man she admired; if any of the onions sprouted before the sixth of January she would marry that person. A more courageous damsel would brave the midnight darkness to gaze down into the well, believing its calm surface would reflect the features of her destined spouse. Men lingered on the roads on Christmas night to hear the neighing of horses, and, according to the noise they made, it was judged whether there would be peace or war in the district the following spring. The power of animals to indicate future events on Christmas night has been firmly believed in many places and with curious and ludicrous results. The head of a family took a pig out of the stye, brought it into the house, pinched it until it squeaked, addressing it with the conjuration:

"Witch thing, witch thing,
Tell me what is new,
Tell me what is true,
Or I'll pinch and switch thee, witch thing."

In many countries it has been the custom to exchange gifts of food on Christmas, supernatural powers being attributed to food during this period. A notion prevailed in England that bread baked on Christmas night would remain good for two years. It was supposed in Germany that crumbs of bread gathered on the Holy Night could be employed, by those who so wished, to discern evil spirits and banish wicked thoughts. Another superstition was that a herb called "motherwort" would grow wherever these crumbs fell.

Among the Albanians it has been the custom to give the first meal-cake to the house dog because of the supposed sympathy of animals for the nativity. In Denmark many virtues were attributed to Christmas food. A bit of bread blessed at Christmas prevented tempests and hydrophobia.

Sweet cakes and delicacies have been associated with festivities as far back as one can trace. In some countries honey was a popular gift, while pats of butter were also prized.

be most effective in cattle diseases. In Poland portions of Christmas food were given to the cattle to preserve them against witchcraft for the ensuing year. Straw which had covered the floor of house or church was regarded as a cure for sick animals and a protection against pestilence. In Sweden, this littered straw if given to the cattle when just sent out to pasture protected them from sickness, was a superior fertilizer, and assured a bountiful harvest if scattered on the land. It is still believed in Germany that grains of oat saturated with Christmas dew make the best seed, and that cattle are benefited by feeding in the open air on Christmas Day. It was also believed that if a bundle of hay were carried around a church on Christmas night it would fatten cattle if mixed with their regular rations.

Folklore of many countries gives evidence of the belief that cattle were endowed with the power of speech on Christmas night. Numerous stories are told by the credulous peasantry to substantiate this miracle. In Germany it was believed that only persons free from mortal sin could understand the speech of the cattle, while in France the cattle were

In Styria the favorite dainties were honey and poppies; in Moravia, poppies were made into dumplings to tickle the palate.

Christmas in Armenia, which has been celebrated there since 300 A. D., occurs after the New Year, their calendar being about thirteen days behind ours. Titbits are stored up in harvest time and put away in a large family chest until Christmas. The celebration and ritual last three days. On New Year's Eve, after the evening meal, the trunk is opened to the great joy of the eager children who impatiently clamor for their share of the sweetmeats. This corresponds to the surprise element in our Christmas. On Christmas Eve beggar boys congregate in groups, go the rounds of the village, serenading the inhabitants, soliciting sweets and gifts. The refusal of a present brings forth their malediction that the white chickens will lay no more eggs. On Christmas Day, after church, social visits are exchanged, called hand-kissing visits, because the children kiss the hands of their elders. On these visits men greet each other with the gift of a lemon, but to ladies they present oranges.

There was an ancient British superstition which averred that if corn or oats were placed in the open air upon Christmas night for the dew to moisten it, the grain thereafter would

supposedly deprived of the faculty if their caretakers were in a state of mortal sin. It would be interesting to know of what the cattle talked, but those "without mortal sin" have left no enlightening record.

In Northern Europe it is still a custom for peasants to erect a perch before their doors and fasten to it a sheaf of oats that the birds may enjoy the benefits of Christmas.

A legend of the Franche-Comté in France concerning the robin tells us how this little bird struggled to pull away one of the prongs from Christ's crown of thorns, and received a stain of the Precious Blood, which has marked the breast of robins ever since.

The Christmas tree, so beloved by children of many lands, is of Germanic origin. When associated with Christianity it symbolizes the Tree of Paradise bearing the forbidden fruit, or the Tree of Life.

Our United States, too young for such ancient folklore, yet had its mummers too. There appeared in Wilmington, N. C., in the early eighties, a family of negroes named Kuners. Their little band ranged in number from ten to twenty men. They appeared in the streets on Christmas morning dressed in tatters, this appearance being obtained by sewing strips of vari-colored rags to their regular costume. They wore masks of buckram, called Kuner faces, with features distorted, elongated noses, wide grinning mouths. A few of the men were dressed as women. The leader of the band carried a long rawhide whip to prevent heckling by children; a very effective measure, too, for all children feared that whip. In hilarious manner they paraded through the streets, rattling "bones" (made of beef ribs), and making much noise with cowhorns, jews'-harps, etc. They stopped wherever they could gather a sufficient audience of both children and adults. There the leader stepped to the front of his band and sang verses of his songs, the others joining in the chorus. They added to their entertainment with a good natured sort of rowdyism, and then solicited donations. After the collection, they passed on to the next stopping place. They seem to have died out after 1880. It is mere speculation to try to place them—one explanation is that they were the last remnant of the British mummers, coming to us through the medium of Bahamans or Jamaicans.

Education has banished these queer old superstitions, and very few of the ancient customs are now observed. Santa Claus is still doing duty for the Department Store and the Salvation Army. The pretzel or bretzeln was a product of ancient Germany, peculiar to that region known as the Black Forest. Its twisted shape was intended to represent the ropes which bound the hands of Christ; it was eaten during Holy Week. However, its salty flavor made it too popular to be confined to one week's consumption, and gradually it was eaten during the whole year, thus losing its Christmas interest. It was introduced to America by the Pennsylvania Dutch; from Pennsylvania it traveled along our eastern coast, never acquiring much popularity in the west. Its thirst-producing tang linked it with beer —alas, for its original dignity!

My Lorde of Missrule

By MASTER PHILIP STUBBS (1561)

In which is told how the Mad-caps and Wildeheads of olden times disported on Christmas Daye

First, all the wilde heades of the parishe, conventynge together chuse them a grand capitaine (of mischeef) whome they innoble with the title, Lord of Missrule, and hym they crown with great solemnities, and adopt for their kyng.

This kyng anoynted, chuseth forthe twentye, fourtie, three score, or a hundred lustie guttes like to hymself, to waite upon his lordely magestie, and to guarde his noble persone. Then every one of these men he investeth with his liveries, of greene, yellowe or some other light and wanton colour. And as though they were not gaudie enough I should saie, they bedecke themselves with scarfs, ribons and laces, hanged all over with golde rynges, precious stones, and other jewelles; this doen, they tye about either legge twentye or fourtie belles, with rich handeker-cheefs in their hands, and sometimes laied acrosse over their shoulders and neckes, borrowed for the moste parte from their pretty Mopsies and loving Bessies for kyssing them in the dark. Thus, thinges

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The Power Equation

Labor and the Machine

By JAMES TERRY DUCE, Consulting Geologist

The most remarkable economic phenomenon of the age is the increasing efficiency of human labor brought about by the use of power. It affects all of us and is working vast changes in the economic structure of the world. Because of it we are, indeed, living in a time of economic revolution, a time when we discard day by day the tried rules of economics which governed the commerce of the peoples of yesterday. This change is not often apparent to us any more than the remarkable changes at the time of the Renaissance were visible to the Florentine of the time of the Medici.

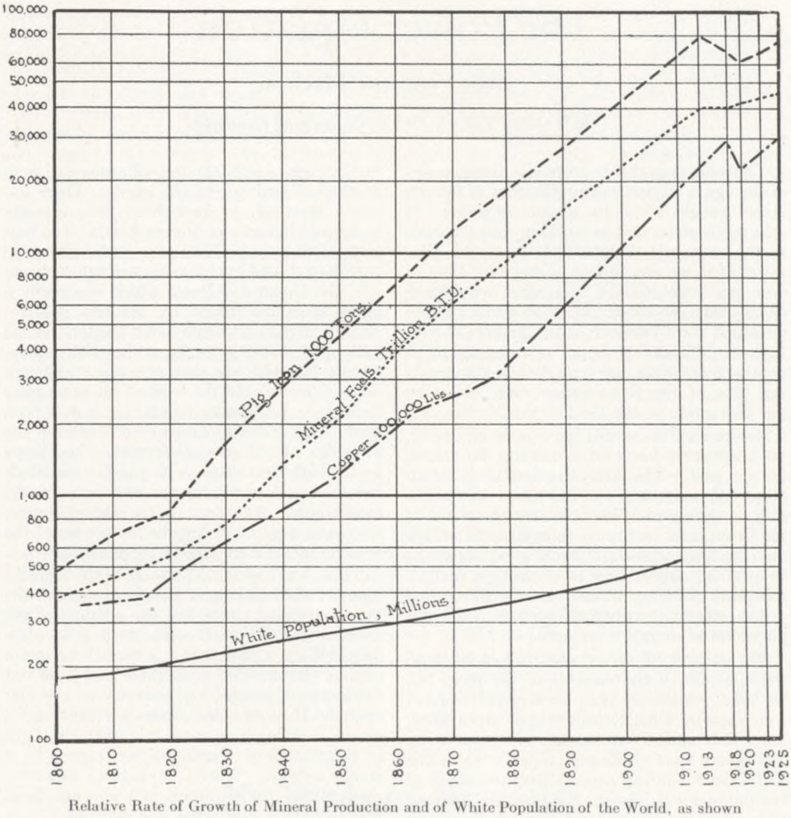
Before we discuss this increase in efficiency, we might turn back for a moment for a look at the past. The first mention of labor in history is perhaps in Genesis where Adam was told he should earn his bread by the sweat of his brow, and to us, he represents primitive man, toiling for enough in the good season to keep alive. His labor was at the best ineffectual and grinding, while the only mitigation of his toil was the gradual increase in the employment of domestic animals.

We are, indeed, accustomed to look back on the splendor of the empires of the past, but we must remember that these great empires were founded almost entirely upon slave labor, labor that needed just enough to keep it alive. The great wars of Roman times were in the main slave hunting expeditions, and most of the plunder was human. For instance, we read that after the victories of Emilius Paulus in Epirus 150,000 captives were sold into slavery, and that after one of Caesar's victories 63,000 were sold. These slaves supported the Roman Empire. The work of the day was done by them; and any illusions regarding their status are dispelled by Ferrero in the "Greatness and Decline of the Roman Empire." Athens, in the height of its glory, boasted but 50,000 free men, the great mass of its population being slaves. This was because labor, unaided by the machine, had but little margin above bare existence.

In medieval nations there was very little change since the days of Rome. Slavery as such had passed, but in the Middle Ages the institutions of serfdom and villenage tied man to the soil and not to the master. There appears, however, to have been little increase in actual efficiency of human hands. The best view of the composition of a medieval nation is perhaps found in that curious English chronicle, the Doomsday Book, which was really a great inventory taken by William of Normandy after he had conquered England in the year 1066. From it we learn that the population of England was then one and a half millions of people. All the work of life must have been done by human hands, for it has been stated that there were only 5,000 horses in the kingdom. Famines were frequent; bad years meant high mortality. A plague like the Black Death would sweep away over 25% of the inhabitants. Man lived on the edge of a precipice and a slight change in the course of the seasons might hurl him into the abyss.

There was a gradual increase in the employment of wind and water power throughout the latter medieval times, but the opening of the modern age did not come until 1767 when James Watt, a Scotchman, invented the steam engine. Before that time there had been but crude steam pumps, and as early as the first century Hero of Alexandria had invented a steam turbine; it is even said that the light of the Pharos of Alexandria was turned by a steam engine. Watt's invention, however, marked the true beginning of a new age. Man was to have a new slave, the machine.

After Watt we find a host of inventors who amplified and extended the use of the machine. Joel Harvey, ingenious Connecticut Yankee, invented gears so that more than one machine could be run by a single engine. Oliver Evans invented the high pressure steam engine; Diesel and Lenoir invented the internal combustion engine; Edison and Graemme invented the motor and dynamo; Faraday and Tesla developed the theory of transformers and transmission lines. These men, with a host of others, have enabled us to tap the energy stored away by nature. The use of the machine also brought to man something new in method. Articles manufactured by hand are all different in



Relative Rate of Growth of Mineral Production and of White Population of the World, as shown on semi-logarithmic chart.

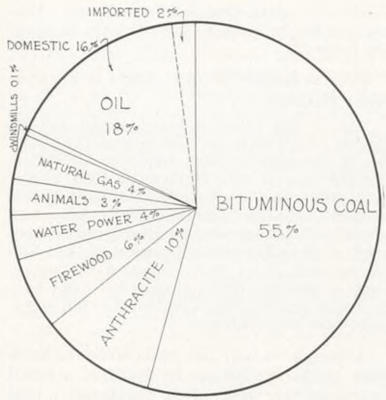
varying degree, but those turned out by a single machine are all alike. This fact suggested to an American that it would be possible to make interchangeable parts in quantity, one of the bases of modern mass production. The idea was developed by Eli Whitney, inventor of the cotton gin, although it was in connection with the manufacture of fire arms that he first used the principle.

As a result of these inventions the burden of the world's work has been lifted from the backs of men and placed on machines driven by power generated from the burning of fuels or from the falling of water, greatly increasing man's capacity to accomplish material results. One engineer states that every person in the United States has at the present time the equivalent of sixty servants in constant attendance, surrounding him with luxuries not even dreamed of a hundred years ago. Our homes, as a result of this process, are filled with articles which a century ago would have been the envy of kings; and famine, the spectre which has always stalked in the background of man's mind, has been exiled from the civilized world.

Much of the possibility of future development rests upon our ability to make and use power, while the economic rank of a nation can be gauged by the quantity of horsepower used per inhabitant. In the manufacturing industries of the United States at the present time each worker is supported by over three H.P., and for this reason there is a continuous increase in the output per worker in all industries. Pin making is the classical example. The output per worker is now 3,000 times what it was a century and a half ago. The progress in recent years has been even more surprising. As pointed out by John Hayes Hammond, from 1919 to 1923 the volume of manufactured goods increased 19% while the number of employes actually decreased; and in the manufacture of pig iron the product per worker has increased sevenfold since 1900. We at present have machines in the United States which rate over 700,000,000 H.P. Dr. T. T. Read gives figures showing that 10,000 men in the bituminous mines produce as much energy as is developed by the 41,000,000 wage earners in the United States alone.

Authoritative tables show that in 1923 the installed H.P. in the United States had increased from 10,000,000 in 1849 to 864,000,000 in 1923, and that it has increased three and one-half times since 1899. Another table shows the index numbers of the H.P. of prime movers, the number of wage earners and the volume of production for ten year periods up to 1919. From 1899 to 1919 the number of wage earners increased from 100% to 133%, while the volume of production increased from 100% to 190%, and the production per wage earner increased from 100% to 143%. The tables are from Water Supply Paper No. 579, United States Geological Survey, entitled Power Capacity and Production in the United States, by Daugherty and others.

It is to be noted also that among the groups using power, manufacturers and transportation have increased in relative importance while agriculture has decreased. This is due to the fact that the country is changing from an agricultural country to a manufacturing country, and, possibly, it is also due to the fact that agriculture still remains an individual occupation and has not, up to the present, become mechanized to the extent of other industries. Even at that, we learn that with mechanical equipment on some of the large farms in the Western United States it is now possible to farm an acre of ground on the basis



Sources of energy supply in U. S., 1928
Taken from "National Supplies of Power," by Hammond and Tryon

of two man hours per year; in other words, an acre of crop can be raised by the use of one man's labor for two hours per year with the aid of mechanical devices. To those who have toiled in a garden, this is an extraordinary statement. Perhaps the trouble with agriculture is the mechanization of other industries, the increase in productivity of the non-agricultural worker, with a corresponding increase in his wage, without a corresponding increase in the efficiency and wages of the agricultural worker. The facts given above have led to two very interesting statements. In 1925 De Baufre declared:

"In the 50 years from 1869 to 1919 the population of the United States increased 2.76 times. In spite of the shift in population from the country to the city, so that only one-quarter of those in gainful occupations were employed in agriculture in 1919, while nearly one-half were so engaged in 1869, the agricultural production increased 4.94 times, or 80% more rapidly than the population. During the same 50 years the products of mines increased 18.81 times, or nearly seven times more rapidly than the population. The manufactured products increased 9.61 times, or about 3.5 times more rapidly than the population. While many factors contributed to these increased outputs, the most important factor is undoubtedly the increased production and utilization of mechanical power by machinery. Today the drudgery of the struggle for existence has largely been transferred to machinery vitalized by mechanical power, thus making universal education possible by sparing youth from the farm and the factory."

In 1926 Herbert Hoover stated in *The Nation's Business*:

"All of this power increases output and decreases sweat. While we have increased the number of our manufacturing employes by 65% in the last quarter of a century, we have swelled productivity on a quantity basis in the neighborhood of 170%. Our farms produce 37% more with about 20% more farmers; our railways carry about 170% more traffic with 61% more men. And with all we have in 25 years decreased the weekly hours of labor by about 9%, while real wages have increased 40% or 50%. The terrors of unemployment have been lessened."

Although we may feel with William Morris that mechanization is the death of art and initiative, we must admit the benefits that have been secured from it. Man has been emancipated from grinding labor and from the fear of famine, and we in the United States have been the foremost exponents of this mechanization.

A diagram from a book by John Hays Hammond and F. G. Tryon, entitled "National Supplies of Power," shows the increased consumption of mineral fuels, pig iron, and copper, three of the great staples of modern industry, in comparison with the growth of the white population of the world. A second diagram, from the same book, shows by percentages the sources of the energy used in the United States in 1923. In it we see that approximately 65% of the power generated in the country is derived from coal, 18% from oil, 4% from natural gas, and an additional 4% from water power.

Having become wholly dependent upon power, we must have it in increasing quantities in order to grow and progress. This brings us to several questions: In the first place, what are the stores of power upon which we can draw in the future? A good census of these has been taken in the last few years. We must assume, however, that the power of the future will be derived from the same sources for many years to come. We may predict that atomic energy will be tapped, that the internal heat of the earth will be utilized, that the tides and the winds will be harnessed, that the heat of the sun will be used to generate power; but at present these things are dreams, not possible of rational development and practical application.

The general public labors under the delusion that the water powers of the world are very much more extensive than they really are. Steinmetz has said in one of his speeches that if every drop of rain which fell on the United States developed the full amount of power of which it was capable before it reached the sea, the amount of energy developed would not be as great as that developed annually from coal. The last census of water power available is contained in a compilation made in 1921 by the United States Geological Survey and shows that, from the streams of the world (if water power were developed) on the known commercial sites, there could be generated 443,000,000 H.P.

The coal resources of the world are shown in tables at hand and amount to 7,581,000,000,000 tons. A rough calculation indicates that there is enough coal to last the world approximately 5,000 years at the present rate of consumption.

Of the resources of oil we can give rather less definite figures. The last figure for the world was given by Eugene Stebinger in 1921 who calculated at that time that there were 43 billion barrels of oil available. The writer believes this to be probably one-third of the truth. Oil at best is difficult to estimate and all estimates up to the present have been found to be very low. This estimate does not include the amount of oil in oil shales which will probably run into figures reaching trillions of barrels.

One of the points that we must mention here is the growing efficiency in the use of fuels. Watt's engine consumed 30 lbs. of coal per H.P. hour, while a modern steam engine burns as low as one and 4/10ths lbs. per H.P. hour. The consumption of coal per kilowatt hour produced in electric plants has been reduced since 1919 from 3 and 2/10ths. lbs. per kilowatt hour to 2 and 1/10th lbs. per kilowatt hour. This consumption may be reduced even further by the use of the new mercury vapor boiler which is used to operate turbines. A plant of this type has been in operation since 1923 at Hartford, Connecticut.

So much for the quantities of energy available. They should be sufficient to carry on developments at their present rate for thousands of years to come, and research at the present time is being directed in such a way as to make interchangeable the various forms of stored energy. Scientists are at work developing methods of changing coal into oil, and both coal and oil into gas, so that one form of fuel may be changed into another. We do not believe, therefore, that we need concern ourselves over the possible failure of future sources of energy which are used to aid labor. It would be well, however, to consider certain problems which arise as a result of this huge utilization of energy in increasing the production of labor, and to ask ourselves several questions concerning them. Figures available indicate that there has been an enormous increase in the manufacture of goods as a result of the application of power to industry. What becomes of them?

One of the first replies to that question is: These goods have been exported. Another will be that they have been increasingly consumed, due to the increase in the standard of living, by the workers themselves. This to a large measure is true; one of the wonders of the modern age has been the increase in consuming capacity of the American workman. He has produced more, used more. As a result of this, we have had a constant and quickening cycle of over and under production which has been described graphically by Foster and Catchings in an article in the *Atlantic Monthly* about a year ago called "The Dilemma of Thrift," and more recently in the September number of the same magazine, by W. H. Grimes in a paper called "The Curse of Leisure." We might also ask: What is the limit to which we can press the continuous increase in the productivity of labor due to the application of power? The only limit is that implied by the limit to the material resources from which power can be generated, and these limits will be extended by more efficient use and the use of lower grade materials. One of the most important results of the employment of power has been the gradual shortening of the hours of labor. The average hours of labor seventy-five years ago were twelve or more. This has been reduced to eight. The seven-day week is being replaced by the five and a half, in some cases, by the five day-week. Though we may rail at the machine age, this has been a great gain for the worker. Further conquest of Nature waits but new sources of power. If we find these in the course of scientific investigations there is no reasonable limit we can put upon our future achievements. The larger margin above mere subsistence we are able to produce from our labor the brighter the future of the world.

(*Continued from page 6*)

sette in order, they have their hobbie-horses, dragons, and other antiques, together with their ribald pipers, and thonderyng drommers, to strike up the Devilles daunce withall; then marche these heathen companie towardes the church and churchyards, their pipers pipying, drommers thonderyng, their stumppes dauncying, then bells jynglyng, their handekercheefs swyngyng about their heades like madmen, their hobbye horses and other monster skyrmishyng amongest the throng and in this sorte they goe to the church (though the minister bee at praier or preachyng) dauncyng and swngyng their handekercheefs over their heades in the churche like devilles incarnate, with suche a confused noise, that no man can hear his own voice.

Then the foolishe people, they looke, they stare, they laugh, they fleere, and mount up on forms and pewes, to see these goodly pageauntes solemized in this sort. Then after this, aboute the churche they goe againe and againe, and so forthe into the churcheyarde, where they have commonly their sommer haules, their bowers, arbours, and banquettyng houses set up, wherein they feaste, banquet and daunce all that daie and (fer adventure) all that night too. And thus these terrestual furies spend their Sabbaoth daie. Then for the further unrobyng of this honorable lurdane (lorde, I should saye) they have also certaine papers, wherein is paynted some babblerie or other of imagerie worke and these they call my Lorde of Missrules badges: these thei give to every one that will gieve money for them to maintaine them in this their divelrie and what not and who will not shewe himselfe buxome to them, and gieve them money for these the Develles cognizaunces, they shall be mocked and flouted at shamefully.

And so are some, that they not onely give them money, but also weare their badges and cognizaunces in their hattes, or cappes openly. Another sorte bring to these (the Lord of Missrule and his complyces) some bread, some good ale, some newe cheese, some olde cheese, some custardes, some cakes, some flaunes, some tortes, some creame, some meate, some one thing, some another; but if they knewe that, as often as they bring any to the maintenance of these pastymes, they offer sacrafices to the Deville and Sathanas they would repent, and withdrawe their hands, which God grant they maie.

Movement of Funds

Dollars in Transit

By C. E. WOODBRIDGE, Treasurer of The Texas Company

This is an age of speed. We have seen it in our express trains, our ocean liners, our automobiles, and now we have the airplane.

This desire for speed is felt throughout our commercial activities; in the increased use of telephone, telegraph, and air mail, in the more rapid conversion of raw materials into marketable products, in quicker deliveries—and finally in the speeding up of the turnover from product delivered to funds concentrated in banks of deposit.

The men on the firing line of our marketing organization, the truck drivers, the agents, and the salesmen and selling representatives are playing such a large part in the speed of turnover from product to cash, that I speak particularly to them.

The dollars we are spending are disbursed for:

Investment, crude oil and disbursements of the producing organizations;

Transportation, including pipe line, marine and rail freights;

Refining;

Marketing, including advertising and truck deliveries;

Gasoline and other taxes;

Miscellaneous items.

The dollar which is resting is loafing and there is no place for loafers in our business. The dollar has no feelings but if he had he would only be happy when in motion, and those who direct him must see that he is kept constantly on the move.

With the first dollar spent for the payroll of the drilling crew, cash capital becomes imprisoned. It is released only when the sale is made, the collection secured, and the money banked.

It is with this last phase of the conversion of product sold into dollars banked that the Treasury Department is particularly concerned.

Let us follow through a delivery of gasoline. The quickest turnover results from cash upon delivery, but even here currency will flow more quickly than a check, for a check will have to travel to the bank on which it is drawn and the credit travel back to our local bank before the dollar can join the stream flowing towards the main reservoirs at our home offices.

If, however, the sale is made on credit the dollar has not even started yet. If the terms are payment for the last load when the next one is delivered, there will be a delay of from three days to a week, and the longer the terms of payment the longer the time to the date of the theoretical start. "Theoretical" is used advisedly for even when the dollar is due to start it frequently gets its feet stuck in the mud and has to be pried loose. At this stage it is known as a receivable and while it is quite fresh it has only an "X" mark, but as it gets older it acquires a second and third "X" and finally if it gets to be four months past the starting stage and does not move it gets a very bad mark known as "B." It further appears that the longer the dollar waits to start the harder it is for it to start at all.

Now, all this means that if we are going to speed the dollar we must in the first place make the terms of payment as short as shall be consistent with the reasonable needs of our customers and in the second place we must collect our accounts receivable punctually when they become due.

We must become firmly imbued with the idea that we have not done the job until the gallon of oil is converted into the dollar in hand and that just as we speed the oil in the pipe line, through the refinery, on the ships, through the terminal on to the tank cars, and in and out of the tank trucks to the place where the consumer can get it, so we must speed the dollar back again to where it can be used in repeating the process.

The speed of collections in the domestic field is indicated by the following approximate percentage figures applying to total sales revenue:

Received upon delivery	45.18%
Received before the end of the month	16.46%
Total received during the month	61.64%
Outstanding at the end of the month	38.36%
	100.00%

The status of the outstanding receivable accounts at the end of a typical month was as follows:

From sales made in the current month	74.7 %
From sales made prior to the current month but not yet delinquent	18.3 %
Notes and accounts past due more than four months	7.0 %
	100.0 %

Much attention is being given to speed in the transmission of funds.

An example of maximum speed would be currency deposited on the day of receipt against the delivery of a bank draft payable at district headquarters which is mailed same day; receipt of deposit and clearance of this draft on the record day, transfer by wire through the

(Continued on page 25)

Impressions of a Texaco Delegate

By FRANK J. SHIPMAN

Superintendent Fuel and Government Sales of The Texas Company, and Chairman of the Fuel and Lubrication Section of The Aeronautical Chamber of Commerce.

The first exhibit of the International Aëronautical Exhibition at Chicago, held in the Coliseum, was worthy of the attention of air-minded people, as well as those who still believe in keeping one foot on the ground.

The sturdy lines of the small ships exhibited are an indication that the designing engineering personnel of the aircraft industry have in mind safety in flying.

The Leviathans of the air, and by these I refer to the large tri-motored ships, speak for themselves.

Among the exhibits were a number of low-winged ships; that is, the wings are suspended below the fuselage, similar to the Junker type, and I would say they created more than passing attention.

It would seem by careful observation that the landing gear of the various ships received much attention, in that they are sturdier and have a broader tread than heretofore.

In the small commercial planes, night flying is likewise provided for by landing lights. It would be unnecessary to use these when landing at modern illuminated airports, but they would prove indispensable for emergency or landing at airports having no lighting facilities.

The Department of Commerce had a most interesting exhibit of lights and beacons, showing a large revolving beacon of the type recommended by this Department, to be installed on regular airways. Other manufacturers of lighting apparatus exhibited flood lights, landing lights, and varied lighting apparatus.

To my mind, one of the most interesting exhibits was that of the ice detector, which is designed to advise the pilot as to whether ice was forming on the wings of his ship while in flight, as it is very dangerous to have this added weight without the operator being aware of this condition. The indicator on the instrument board of the ship if ice were forming on the wings would point "danger" and would give the pilot an opportunity to take his ship into altitudes and a temperature where no ice would be formed.

One of the most striking exhibits was that of a two-place ship for the use of a rear admiral of the United States Navy. Inspection of the rear cockpit disclosed a folding desk for the use of this officer. In other words, it is an office in the air. This ship may be converted from a land to a marine craft by the substitution of pontoons.

I was deeply impressed by the furnishings of the various ships, particularly the larger craft accommodating 10 to 12 passengers, and one could not deny that travel by air in such craft would be as comfortable as riding in a pullman chair.

The 17th of December will be the 25th Anniversary of the first flight of heavier-than-air machines by the Wright Brothers at Kitty Hawk, North Carolina, and this event, together with ceremonies at Dayton, Ohio, and the International Conference on Civil Aëronautics at Washington, should make people who have been following the progress made in aviation realize that a large group of men are engaged in the problems of giving us fast and safe transportation.

Aviation's Silver Anniversary

Chicago's International Aëronautical Exposition

Aviation's silver anniversary was celebrated in Chicago with an International Aëronautical Exposition which filled the big Coliseum and overflowed into two near-by buildings. It was at once a review of the past twenty-five years' achievements and a glimpse into what the future holds for commercial and private flying enterprises.

The show was thronged early and late with visitors, many of whom became "air-minded" for the first time. They peered into cabins, poked about huge motors, fiddled with "doo dads," rapped on propellers with a knowing look, marveled at how some of the larger planes could possibly leave the ground. They were initiated into the jargon of aviation, and began to speak of propellers as "props," to understand the difference between the fuselage and the struts, and to realize that "two-spot" in aëronautical language means a two-seated plane, not a playing card. As a crowning touch of familiarity, they learned very soon to refer to individual planes as "ships" of "jobs."

© *Photograph from Wide World Photos.*

The celebrated aircraftsman Anthony G. H. Fokker and Mrs. Fokker.

The show was in many ways as matter-of-fact and unemotional as an automobile show. Only the crowds were different. There were many army aviators present, serious and dignified in their well-kept uniforms. On the whole, fewer women attended the aviation show than would have been seen at an automobile show, and elderly visitors were conspicuous by their absence. As one of Chicago's leading citizens put it, an elderly man—whose son, by the way, had attended and bought a plane—when asked if he had been to the show: "No, I'm not going. That sort of thing belongs to a different generation from mine."

More than 55 makes of planes were to be seen, as well as innumerable accessory exhibits. The latter ranged from various types of engines to the latest in flying clothes, and included an interesting display by The Texas Company.

The visitor who was just beginning to become "air-minded" was impressed at first by the great number of plane manufacturers, most of whom he had seldom or never heard of. The big ones and the prominent ones were there, of course--such as Bellanca, Boeing, Curtiss, Ford, Lockheed, Mahoney-Ryan, Sikorsky, Stinson, and others—planes which for one reason or another had achieved considerable newspaper publicity in recent years. These planes, in the main, were expensive and out of the reach of the average man's pocket book. The bulk of the planes shown, however, were made by less well known, although equally reliable, makers whose products were designed to fit the purse of the average man with less strain.

Prices of the planes on exhibition showed a wide and interesting spread. Probably the most expensive ship was the Keystone "Patrician," a huge biplane with a 90-ft. wing spread and 60-ft. length. It required a crew of two, could accommodate 20 passengers, was powered with three Wright Cyclone engines which gave it a cruising speed of 130 m.p.h. Its cost was listed as $80,000.

The least expensive model was a Heath "Super-Parasol," built in Chicago, the flyaway price of which was listed as $975. It was announced that this plane would give 43 miles on a gallon of gasoline, 1,000 miles per gallon of oil, had a cruising speed of 70 m.p.h., and a landing speed of 28 m.p.h.

A development of modern transportation ideas was shown by the exhibit of a big Ford tri-motored plane of a type to be placed in service next spring by the Transcontinental Air Transport, usually called the T. A. T. These ships will be used in conjunction with trains to make it possible to go from New York to Los Angeles or San Francisco in 48 hours. Passengers will leave New York City at 6 p.m. on a train, arrive in Columbus, Ohio, next morning, transfer there to the waiting plane, fly to some point in Kansas by evening, there board another sleeper en route, and get on another plane next morning for their destination.

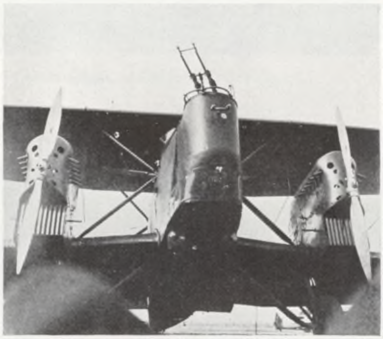
Plans are also being made to build a huge plane equipped with sleeping and dining facilities which will carry passengers from New York to the Pacific Coast in thirty-six hours time.

One of the most interesting planes on exhibition, from a historical standpoint, was that in which two of the world's foremost feminine pilots made record-breaking flights. It was the little G-EBUG, a Moth plane. Lady Mary Heath made the longest solo flight ever undertaken by a woman when she flew it from London to Capetown, South Africa, last spring. The ship was purchased by Amelia Earhart, who recently flew it from New York to Los Angeles and return, the longest solo flight made by a woman in this country.

Peculiar to most American eyes was the design of the big Fokker amphibian which could land either on the ground or on water. It will be seen in the illustration that it is equipped with both wheels and pontoons. When it is desired to alight on water, the wheels can be raised, becoming part of the short lower wing, thus permitting the use of the pontoons. The propeller, a three-blade affair, is mounted in a position that seems "backward" to the uninitiated; it is a "pusher" type, where the ship is "pushed" through the air; the usual propeller mounting is a "puller," and faces forward. The cabin will accommodate six or eight people, is luxuriously fitted, even to a small galley.

Another luxurious ship on display was the Sikorsky "air yacht." It had a completely fitted cabin to accommodate several people, and before the show was over was sold to John Hertz, Chicago taxicab king, for $56,000.

Many sales were reported in addition to the sale of some of the high priced, rich man's type. The usual prices ranged from $2,500 up



© *International Newsreel Photo.*
Army bombing plane

for open models to $10,000 or $15,000 or so for cabin type planes. One exhibitor reported actual sales of some 300 ships during the show, while two others announced that they had sold 500 each.

The personal plane of Admiral Wm. A. Moffett, U.S.N., Chief of the Bureau of Aëronautics, was also on display. It was a Vought "Corsair." Uninformed persons referred to it as the plane of the Secretary of the Navy.

Critics who complain because this country lags so far behind Europe in aëronautical matters were silenced by the announcement of the Boeing Airplane Co. of Seattle that their ships and those of the Pacific Air Transport have just recently completed 3,200,000 miles of travel since July 1927, when they were awarded an important air mail contract. Forty-six per cent of this astonishing total was flown at night.

Many notable visitors attended the show, including Lady Mary Heath, Lieutenants Wade, Nelson, and Harding of the U. S. round-the-world flight, and others.

The Command-Aire ship in flight

Inside the great Fokker. Ash trays and luggage racks complete.

© *Pacific & Atlantic Photo.*

Admiral Moffett's flying office

Air Models

From the Gall

Fokker Amphibian with pon

els of 1929

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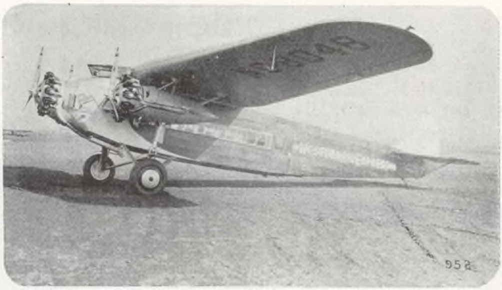
© *International Newsreel Photo*

vith pontoons and wheels



Three blade propellers on the Western Air Express

A trim instrument board

© *Pacific & Atlantic Photo.*

The Super-Parasol—43 miles to the gallon

Hand-Painted Stars

Herbert McMullen has painted signs and created trade-marks for many years. His father did it before him, founded the business in 1870. The present McMullen is about fifty-five years old, looks younger. He is small of stature, has bright blue eyes and strong, artistic hands. All his life has been spent in the Wall Street section of New York. There is little he doesn't know about the vicinity and its history—nothing he doesn't remember. He has lettered names of every kind, fly-by-nights, shipping concerns, shyster lawyers, world-wide oil companies. With most of the wealthy owners of the skyscrapers of the Street, he has had polite disputes over the price of office door lettering. He tells of an old millionaire who owned two businesses and three office buildings where McMullen worked. One day McMullen while walking in Whitehall Street heard a senile voice behind him piping: "Painter, painter, I want you, painter." It was the old man who came panting up the street.

Painter McMullen
of Whitehall

"I have a little job for you," he said. He explained that he wanted a small number painted on the gate of his house up in the forties. It must be white, he said.

"Oh, no, Mr. C—, beggin' your pardon," said the painter, "white would look cheap. Have it gold."

"No, no, painter," whined the old millionaire, "I said it must be *white*. Gold's too dear."

"But, I wouldn't charge you nothing for it, Mr. C—," said McMullen. "Not for a little job like that."

"Oh, well," chirped the old gentleman, highly pleased, "go ahead and have it gold, then."

McMullen remembers New York harbor front when it was more than a business section. He saw the immortal John L. Sullivan surge out of Cusach's Saloon at closing time to hire a tally-ho and careen uptown. He remembers the mighty Muldoon, champion wrestler, later Czar of New York boxing, as a policeman on the Whitehall Street beat.

In the early part of 1902, McMullen was called on the telephone by a Mr. Beale, employed by the H. G. Lapham & Co. offices at 8-10 Bridge Street, and told that there was a small job of lettering to be done. Arrived there, Mr. Beale told him to letter the legend, "The Texas Fuel Company," in the lower right-hand corner of the door, "not too big." Since then McMullen has lettered for The Texas Company on countless doors. He has watched the boys in the hall and clerks become officers of the company. He knows them all today, is fond of stopping in the hall and reminiscing of the old days.

In 1909 The Texas Company moved to the Whitehall Building. They had outgrown desk space and now took three offices. McMullen says he was astonished to see that in two years they occupied twenty offices, opening the Marine and Export Departments. W. A. Thompson was then Manager of the Marine Department and it was he who gave McMullen instructions to make a trade-mark. The painter, always adept at trade-marks, evolved the first emblem , a red star, a green T on it, and the word "Texaco" written across it. There was no "Petroleum Products" or "Reg. U. S. Patent Office" in those days.

McMullen says, "I asked him if he didn't mean a blue T instead of green, that would make red, white, and blue, you see. But, he said 'No.' I guess he had his heart set on green."

The first trade-mark remained on the corridor windows from 1911 to 1928, when McMullen was told to turpentine it off, because of its great age, and paint a new one in its place.

Oil Versus Coal in Relation to Safety at Sea

By ARTHUR M. TODE, Superintendent Technical Division, Marine Department

Lieutenant Commander Arthur M. Tode, U.S.N.R.

Vice President and a Director of The National Safety Council

Superintendent Tode of the Technical Division, Marine Department, is in charge of the safety work of The Texas Company's sea-going vessels and miscellaneous floating equipment. Mr. Tode is a graduate of the New York Nautical School and for a number of years prior to his present position was chief engineer of the U. S. S. "Newport" (Training Ship). He holds unlimited licenses for steam and for Diesel vessels, and during his naval and merchant marine experience has specialized in several subjects pertaining to the marine engineering profession.

The sea and its ships have always held the imagination of all as a subject of extreme fascination. Maritime accidents, especially those which have involved the total loss of a ship, have usually been of the spectacular type. When a ship puts forth to sea with its passengers and cargo and is never again reported, as in the case of the U. S. S. *Cyclops*, the S. S. *Silverbrook* and the M. S. *Asiatic Prince*, the mind of the public is filled with all sorts of conjectures. When a vessel is lost and survivors are rescued, there is usually a mass of conflicting testimony developed in relation to the catastrophe. One's memory need only be invited backward to the *Titanic* disaster, to the thrilling rescue of the entire crew of the sinking *Ignazio Floria* in mid-Atlantic by the S. S. *President Harding*, the foundering of the *Principessa Mafalda* off the coast of South America, the saving of the survivors of the *Antinoe* by the S. S. *President Roosevelt*, and the sinking of the submarines S-51 and S-4 to realize that marine catastrophes are spectacular accidents.

Statistics prove that accidents are much the same in all lines of human endeavor, although each industry has its own specific problems to face. Accidents to individuals, unless the person injured or killed is well known, attract the attention of few people. For this reason the general public does not realize nor is it vitally interested in the huge annual sum-total of accidents and loss of life in every community, in every city, and in every state of this and of other countries.

Accidents and loss of life by their very frequency become common-place. It is the unusual accident, the spectacular accident, which attracts attention of the general public; and when such an accident involves the loss of a large number of people, affecting in turn a still larger community, the hue and cry becomes more voluminous. In the early days of railroads and subways a serious collision or derailment involving a loss of life held the attention of the public for weeks, while at the present day such an accident is soon crowded off the front pages of the daily press. This is not because of too frequent accidents in this mode of transportation, nor lack of interest in those immediately concerned, but because such accidents can rarely be classified as spectacular.

After every great accident, or disaster, public attention is recalled to precautions that have been allowed to become disused. Constant vigilance is the price of safety, and when accidents have been avoided for a long period such vigilance becomes relaxed. Responsibility for this condition is partly that of the public authorities charged with the function of inspection, and partly that of the companies concerned.

Recently, the attention of the entire civilized world was again focused on ships and shipping because of that appalling disaster, the sinking of the S. S. *Vestris*. The press of this country and of other countries featured for many days the usual tales of death and heroism, of the rescue of survivors by the S. S. *American Shipper* and other vessels, especially since the several official inquiries which followed were unable to definitely determine the main reason for the sinking of this 11,500 tons steamship.

The vessel did not actually sink, using the word in its commonly accepted meaning; that is, she did not fill from the bottom, become more and more submerged, and at length go down. What actually happened was that the ship, due to loss of stability, fell over on her starboard side, and in this position finally filled and sank from openings above the normal water line. The complete disaster appears to have sprung from an almost inconceivable conjunction of many minor factors, no one of which would in itself have been impossible to meet.

Four possible sources of water entering into the ship prior to the ultimate foundering may be summarized:

1. By the port and starboard half-doors on the shelter deck.

2. By the fracture of one or more sea connections.

3. By any one of the seven coaling ports or side doors (leading directly into the bunkers), through heavy weather as the increasing list brought them into contact with the sea.

4. By the rupture of shell plating, or the shearing or parting of some seam riveting.

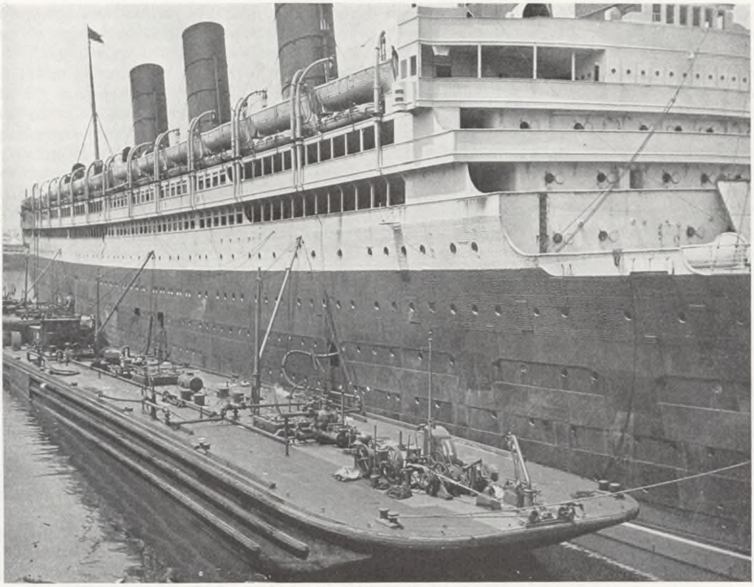
A number of contributing causes of the *Vestris* loss must be considered; causes which, beyond a doubt, definitely hastened the last hours of this vessel and some of which could not be prevented in her condition as a coal-fired steamer. A careful analysis leads to the belief that had the *Vestris* been an oil burning ship, these contributing causes would not have existed, and the vessel itself, if not finally saved, would at least have remained afloat for a longer period than in her condition as a coal-burning ship.

The lengthy investigations which were held upon the loss of the *Vestris* brought out several salient points. One of the most important of these was testimony showing that the water found its way into the ship's coal bunkers. The shifting of coal in bunkers has always been recognized as one of the disadvantages of this fuel, but its capacity to absorb moisture is, perhaps, not always fully realized. It suffices to say that the added weight of many tons of water continually entering coal bunkers will greatly increase the weight of the coal, and especially in the case of wing bunkers will readily cause a vessel to list. The absorption of any mass that has height on board ship will tend to raise the center of gravity of the vessel. When this is accompanied by the pumping out of ballast tanks (when water has already entered in great quantities high up in the ship), the stability of a vessel will be still more affected and it will be more likely to turn over.

This disadvantage does not exist with fuel oil; there can be no absorption of water by oil. Fuel oil is carried in the double bottoms of a ship where coal could not possibly be stored, and it has the great added advantage over coal of ease of transference for the purpose of trimming ship, or it may very readily be disposed overboard entirely should such a course be found necessary.

The very slow and laborious process of jettisoning a large amount of coal can readily be appreciated in contrast with the ease with which fuel oil may be pumped from the tanks on one side of a vessel to the other side or pumped overboard in order to insure the stability of a ship. Especially is this true in the case of what is known in nautical phraseology as a "tender" ship, one that rights herself slowly when rolling in a heavy sea (which, however, has nothing to do with her seaworthiness), and where the best distribution of fuel oil in the double bottoms or in other fuel tanks is readily accomplished on an oil fired job.

Another very important contributing cause in the case of the *Vestris* was the fact that the fireroom force refused to remain at their posts, which balked efforts to keep the ship afloat. Without entering into a controversy on this point, it is not difficult to realize that any group of men in the stokehold of a coal burning ship listing 25 degrees, more or less, would have a herculean task in attempting to maintain the required steam pressure on the boilers. Under such conditions, together with the rolling and pitching of a ship, the best efforts of a fireroom gang could hardly be successful. It would be impossible to properly care for the fires, with the result that they quickly become dirty and the steam pressure is lowered at the very time when the greatest amount is needed for pumping purposes, even though the main engines may be shut down. In the case referred to, it is very evident, disregarding any



Ewing Galloway, N.Y.

Noiseless, dustless, rapid bunkering. The "Aquitania" taking on a voyage-full of fuel oil.

fear on the part of the fireroom force for their own safety, that the lowering steam pressure on the boilers followed by their total abandonment, was the direct cause of the pumps being unable to keep abreast with the inflow of water. Testimony showed that in the case of the *Vestris* it took three men to fire one furnace of a boiler when the vessel had taken a permanent starboard list, that the stokers worked for a time waist-deep in water and eventually in water up to their shoulders.

By way of contrast, an oil burning steamer can keep up the required steam pressure although the vessel has a considerable list (provided the heating surfaces are always covered by water). Furthermore, the boilers can easily be forced to their greatest capacity in the hour of need. The great flexibility with which the amount of steam can be supplied by oil-fired boilers is one of their chief advantages. It ranges from the amount obtained with one burner fitted with the smallest atomizer (the function of which is to supply oil to the furnace in a fine spray) to the amount obtained using the full battery of boilers with all burners fitted with atomizers of the largest size. The generation of steam will continue unless water enters the fuel or the furnaces, extinguishing the fires. On an oil-fired vessel there is no coal to be brought out of the bunkers and heaped before the fire doors; there are no ashes to haul and dispose of; there is no danger of personal injury to the crew through coal and ash buckets, fire tools and miscellaneous gear being thrown about during the careening of the ship.

A condition under which a large volume of water finds its way into the fireroom bilges through the coal bunkers will result in considerable quantities of coal, together with ashes from the fireroom floor, entering the bilges. This material will quickly foul the strainers at the suction ends of the bilge pump lines and will seriously interfere with the pumps operating at capacity. Coal and ashes will also be drawn into the main or the secondary drainage pumps and may clog them to such an extent that they may be rendered useless. The fireroom bilges of an oil burning ship are easily kept scrupulously clean at all times and the pumps connected to these compartments are called upon to discharge only water or oil-leakage and are hence not likely to be interfered with on account of clogging by foreign matter.

Depending on the size and type of coal burning vessels, fuel is taken on board either through bunker openings on the main deck, or through coaling ports in the sides of the ship. Where coaling ports are fitted, especially in the case of large liners, the coal is carried in wing bunkers and in huge cross bunkers running the width of the vessel between the boiler rooms, under the passenger decks. The coal falls by gravity from the upper bunkers into lower bunkers where it is manually stowed by trimmers; certainly a dirty and laborious process, and in some cases a dangerous one. The size of the openings in a ship for bunkering purposes vary but they are usually of generous proportions to permit of loading the coal without loss of time.

The state of the weather, as well as darkness, interferes with rapid coaling of vessels. During rainstorms the coal becomes wetted which later tends to increase the danger of spontaneous combustion. After coaling is completed, the main deck openings are closed by bunker covers and the openings in the shell of the ship by heavy side doors equipped with gaskets or packing in order to render them water-tight. Such packing deteriorates quite rapidly and requires attention to insure of its not defeating the purpose for which intended.

The testimony in the case of the *Vestris* showed that the caulking had three times been washed out of the starboard half-doors and three times replaced after the ship had put to sea on her last voyage. It is reasonable to suppose that the packing might have also worked out of the coaling ports under the action of the sea. This in itself would have been of little consequence at first as the side doors were above the water line, but later when the vessel developed a permanent list, due to other causes, the coaling ports on the starboard side were brought underneath the surface of the water which might permit an inflow of water into the coal bunkers.

The coal dust from which the entire ship suffers, the necessary large amount of labor to clean up the decks and compartments after coaling ship is completed, is in sharp contrast with the simpler, quicker, and cleaner method by which fuel for oil burning vessels is taken aboard day or night, in fair weather or foul. Fuel oil is pumped into steamships through flexible hose connections usually 4″, 6″, or 8″ diameter attached to the vessel's permanent filling lines. The ship's filling lines are generally located on either side of the main deck, and in the case of the larger passenger liners, where no possibility of oil being spilled on the decks is tolerated, the flexible hose is connected to a bulkhead flanged elbow through the side of the ship well above the water line. The fuel oil taken on board is piped to the ship's double bottoms previously referred to, or to cross bunkers, and is afterwards pumped into a direct supply tank known as a "settling tank." This tank is generally placed at some height above the boiler room floor plates and serves to allow any water which may have become mixed with the oil (all fuel oil contains some moisture) to settle to the bottom, leaving the pure oil on top. This oil, after being strained and heated, is then pumped under pressure to the boilers.

When fuel oil bunkering is completed on board ship, the filling lines are closed with 4″, 6″, or 8″ diameter blank flanges in contrast to the large coal bunker hatch covers or the ponderous side coaling doors. Valves are fitted on the fuel oil filling lines which are closed when bunkering is finished. Supposing that through neglect a filling line flange is not set tightly in place, or the filling line valve is carelessly left open, and the vessel upon putting to sea encounters heavy weather; the only result would be entry of water to the capacity of the particular bunker (oil is bunkered allowing 5% of the tank capacity for expansion of the oil); but oil not possessing any absorption qualities of water, as in the case of coal, the additional weight would be small, and, if necessary, this could easily be remedied by trimming ship with the pumps serving the particular bunker or tank.

It has been stated that coal is carried in bunkers located at or above the fireroom floors, in both cross bunkers and especially in upper and lower wing bunkers. There are numerous discharge pipes from bilges, sanitary system, fire lines, ash ejectors, condensers, etc., which must carry their products overboard and these pipe lines in many cases pass through the coal bunkers. Some of these lines discharge above the water line, while others discharge below the water line, depending on individual ships and also on the condition of a vessel being loaded or light. When coal bunkers are full these lines may not be accessible, and the rupture of a pipe or flange will, depending on the extent of the damage, precipitate the contents into the coal bunkers if pressure is on the pumps, or may permit the inflow of sea water from overboard. Some of these pipe lines are fitted with hinged clapper valves on the shell of the ship whose function is to prevent the sea water from entering the overboard discharge lines and backing up through the pipe lines.

According to reports, when the *Vestris* sailed on her fatal voyage she carried her full supply of coal for the round trip, most of which was carried in bunkers above the fireroom floor level, burying numerous of the overboard discharge lines passing through these bunkers, and making them inaccessible. Ash ejectors are used on board coal burning ships to dispose the ashes overboard by water under high pressure; the discharge is either through an opening in the side of the ship or through the bottom of the ship. Testimony was given tending to show that the ash ejector in the stokehold of the *Vestris*, whose discharge pipe passed through the coal bunkers, began to leak badly allowing water to enter in sufficient quantities to fill the starboard fireroom bilge. Also, that a scupper plate on one of the sanitary pipe lines was carried away, which permitted the sea to back up through the line into the ship. It was reported that men had to strip and plunge into the water to free scuppers in the ship and suction line strainers from coal.

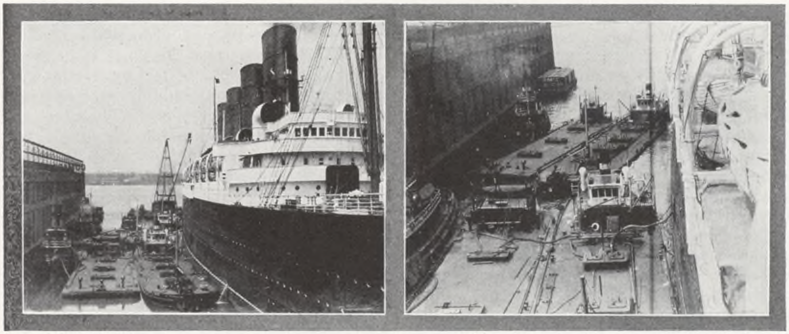
One of the chief advantages of oil, as previously stated, is the ease with which it is carried in the double bottoms of the ship. With the exception of the lines from the double bottoms to the suction side of the fuel transfer pump or of the fuel pump (none of which has a direct sea connection), pipe lines are not usually located in these double bottoms and hence the attendant disadvantages of this undesirable feature are eliminated. Witnesses in the *Vestris* case testified that the exact location of the leaks was not known. Where ruptured seams or rivets in the fuel tanks of oil burning ships occur, it is usually possible to at least approximately determine the location of such a leak by the seeping of oil into the sea. Fuel oil can also be pumped overboard for the purpose of smoothing the sea or quelling the force of the waves in case of emergency.

Every sea-going vessel, depending on its size, is required by law to have a number of water-tight cross-bulkheads, as well as fore and aft bulkhead compartments, sustained upon suitable framework and properly secured to the hull for the purpose of safety in the event of a collision. Many vessels have met with disaster through faulty bulkheads. Corrosion, aboard ship as elsewhere, is effected more rapidly under conditions where metals are not properly cared for and protected. It is promoted quickly under atmospheric conditions—heat and moisture—the very factors which are present in the firerooms of coal burning ships, as well as in their coal bunkers. The necessary practice of wetting down the clinkers and hot ashes when fires are cleaned and hauled causes the formation of sulphuric acid which rapidly attacks the floor plates, sections of bulkheads, etc., where this refuse is currently piled, rerequiring renewal of these parts at relatively frequent intervals.

The *Vestris*, of course, was fitted with water-tight bulkheads, and had all of these been in first class condition the vessel probably would have continued to float. Testimony was given to show that the final blow the ship sustained, which caused its ultimate loss, was due to the collapse of the coal bunker bulkheads. When these bulkheads gave way, large volumes of water spread to the adjacent compartments, and as the weight to starboard increased the vessel finally foundered.

Oil carried as fuel in the double bottoms or in tanks has none of the disadvantages previously referred to. It should be noted that much of the space contained within double bottoms exists between the floors of the ship which internally support the bottom plates of a vessel, and while this space exists between the ceiling of the ship's hold and the outer plating of the vessel's bottom, no use was made of this space prior to carrying fuel oil than as a receptacle for the accumulation of bilge water. It is customary and necessary to coat all surfaces of such spaces on coal burning vessels with cement to protect them against oxidization incident to their being bathed more or less continuously with bilge water, invariably impregnated with the impurities, common to the drip from every known variety of cargoes. Fuel oil does not have a detrimental effect on the plates and structural members of compartmentsand tanks used for carrying this product, and they are not painted to protect them against corrosion.

One of the most prolific dangers in the carrying of coal, whether as fuel or cargo, is spontaneous combustion. The reports of bunker



Bunkering the "Mauretania" with Texaco Fuel Oil

fires aboard ships have been without number, while direct loss of vessels on the high seas because of spontaneous combustion fires has been reported. A secondary effect of coal fires in bunkers (such fires at times burn for days before the digging out of coal will permit access to the seat of the fire), when these occur at or near the shell plating or bulkheads, will cause expansion and contraction of material and have an embrittling effect on the plates in the immediate vicinity. In fuel oil tanks, both bunker and cargo, there is insufficient air present to support combustion, and fuel oil in bulk is therefore not only incapable of spontaneous combustion, but also very difficult to ignite.

Before the advent of the oil burning steamships, the coal burning liners were heralded with acclaim over the sailing ships as introducing a new era of safety, comfort, and speed for water transportation. These factors, together with the important question of economy in operation, speak for themselves—the sailing ship has practically disappeared from the seas, due to the requirements of the present age, and during the past 15 years the oil burning steamer has in many cases superseded the coal burning ship.

As an example, Lloyd's Register in 1914 showed steamers of but 1,300,000 gross tons equipped to burn fuel oil, whereas in 1928 the gross tonnage of vessels either originally fitted to burn fuel oil, or subsequently converted for that purpose, had risen to well over 19,000,000 gross tons. Few major ships, especially passenger ships, are now constructed as coal burners. Many enterprising ship owners, or operators, ever alert for the safety of their vessels, passengers, and cargoes, and appreciative of the economies of operation, have converted older vessels to fuel oil burners. The crack Atlantic liners, such as the *Leviathan*, *Mauretania*, *Olympic*, *Aquitania*, etc., were all originally coal burning vessels, but were subsequently fitted to burn oil as fuel.

The fuel oil burned by the modern Diesel-engined motorships has the same advantages of increased safety to ships' passengers and cargoes, of cleanliness and dispatch in bunkering and working, elimination of clinkers and smoke, reduced size of machinery spaces and crews, etc., as has the oil burning steamer. This type of ship propulsion is the growing brother of the oil-fired steam vessel, and motorships have increased in tonnage from 230,000 gross tons in 1914 to over 5,400,000 gross tons in 1928.

The economic side of steamship operation is, of course, of paramount importance and in certain instances owners may feel that too many restrictions shall not be placed on commercial shipping in the zeal to emphasize safety of passengers. The latter, however, justly demand that every necessary precaution be taken to insure their safety while at sea.

Many comments are heard concerning the deterioration in sea personnel and the era of incompetence in the handling of ships. It is undoubtedly true that there is today more hurried and scrambled assembling of ships' crews between voyages than ever in the past. With such a condition, it is of the greatest importance to the safety of ships that they be propelled with modern machinery together with its subsequently smaller crews of high calibre personnel. From the viewpoint of safety, as well as economy, the many advantages in the use of oil over coal make it the logical choice of ship owners and operators in their progress to insure maritime safety.

Walter Nelson Capen

Walter Nelson Capen, Special Vice President of The Texas Company, died suddenly on November 9, at the age of seventy-two.

The loss of Mr. Capen is deeply felt by his many friends throughout the Company. He was a scholarly gentleman of the old school, who gained the affection of the people with whom he came in contact by his geniality and kindness. He is survived by his wife, and his daughter, Mrs. John H. Lapham.

Notice

Rumors current that The Texas Corporation has been negotiating for, or contemplates a consolidation with, the Marland Oil Company are hereby denied.

R. C. Holmes,
President.

(*Continued from page 1*)

with which the Code has been approved indicates that great improvement has been made.

It is not the purpose here to discuss the Code in detail. Its general purpose is to preserve competition within the industry, but to place this competition on a basis which is alike fair to the industry and to the consuming public, and to substitute open competition for secret price-cutting, and to prescribe fair practices as a basis for this competition.

The law on this subject is not precise. It prohibits unfair methods of competition, but does not define them. The power of defining them rests in the first instance with the Federal Trade Commission, and the Commission has shown a marked disposition to coöperate with the industry in reaching such a definition. It is believed that if the Commission approves this Code, marked progress will be made in the marketing problem. During the past few years the industry has made remarkable progress in the discovery and production of crude oil, in pipe line transportation, and in refining, but has made little or no progress in marketing. This is the first step in what is hoped will be a distinct improvement in marketing practices, and one which will be beneficial to all classes engaged in the distribution of petroleum products, and which at the same time will safeguard the interests of the consuming public.

(*Continued from page 13*)

Federal Reserve system or correspondent bank credit on the third day to New York or Houston. This process will be slowed down in several factors—among them being payment by check instead of currency; transmission of funds to the district office by means of a local bank draft payable at the local bank instead of at district headquarters; transmission to New York or Houston by check instead of by wire.

In some cases the slower method of transmission is deliberately taken as the most convenient way of creating at the banks balances sufficient to compensate them for services rendered.

It must be realized a certain percentage of collected funds will not be available for the general purposes of the company because not concentrated, and that this failure to concentrate is incidental to operations covering the whole of the United States and most foreign countries. To illustrate, the following distribution of total cash at the end of a recent month is typical:

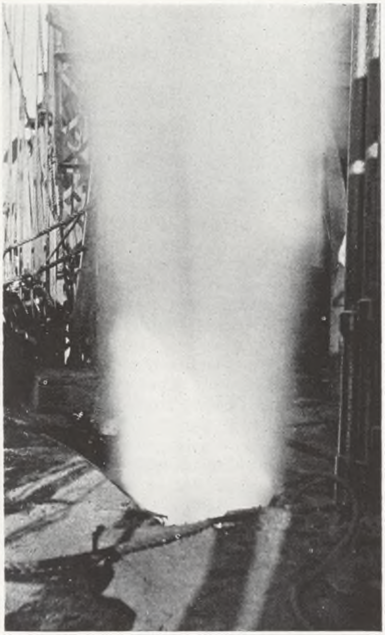
In main banks of deposit		
Domestic	$ 9,111,356.03	55.6 %
Foreign	872,600.61	5.3 %
	9,983,956.64	
Departmental and Subsidiary Accounts		
Domestic	2,922,807.91	17.8 %
Foreign	864,413.25	5.3 %
	3,787,221.16	
Funds in transit	1,988,422.02	12.2 %
Working Funds	615,435.95	3.8 %
TOTAL	$16,375,035.77	100.0 %

It is only the 60.9% which is in the general accounts which is really available for use in completing the cycle referred to in an earlier paragraph, and this very fact emphasizes the

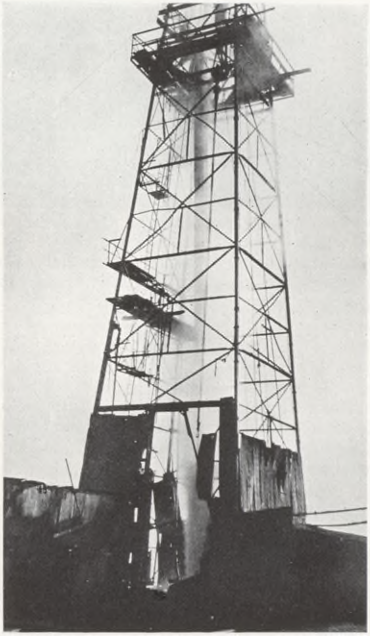
(*Concluded on page 32*)

The Great Kettleman Gasser

Geology's Delayed Victory



Scene in rig of Milham well, Kettleman Hills, before it was brought under control.



Milham well blowing out of control

At a luncheon some years ago, several geologists were discussing the places where oil ought to occur and had not yet been found. The most prominent example quoted was Kettleman Hills. It lay between two rich producing oil fields; and yet after the drilling of no less than six wells along the crest of the great Kettleman anticline, no oil or gas in commercial quantities had been found. Wells had been drilled to over 6,000 feet, but the man who commented on this situation said in closing: "Well, if there is no oil in Kettleman Hills, there is something fundamentally wrong with the theories of petroleum geology." It was no surprise, therefore, to geologists who had followed the course of development in the San Joaquin Valley, when the Milham Exploration Company's new gas well came in on October 6, 1928. A description of this well and the Kettleman Hills follows.

There is a certain romance about this well, in that a smaller company was successful in bringing in a new field where the large California companies had failed. The reasons for the previous failure were many. One of the great difficulties was the heaving shale in the Santa Margarita formation, which filled up the holes as fast as they were drilled below 4500 feet. The drillers' logs in this formation are a continuous story of a fight against adverse conditions at the end of a mile of drilled hole. The technical difficulties involved in such drilling are tremendous, and perhaps the real reasons for the success of the Milham Company are the recent improvements in drilling technique and drilling material. New and stronger casing is used for such great depths, while heavier drilling machinery and larger and more strongly constructed derricks helped.

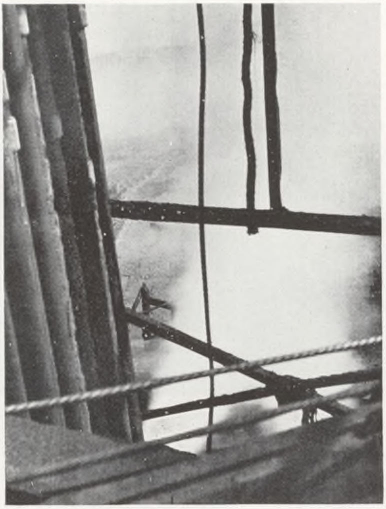
But, even when we have the ability to drill wells to such depth, the very cost of the gamble must force us to pause and think. To drill such a well will cost between $200,000 and $300,000. There was no guarantee at Kettleman Hills that wells drilled to this depth would yield paying quantities of oil. It was quite possible that the sands of the Vaqueros, buried so far below the surface, might be so tight that they would not yield their oil rapidly enough, and then the company which risked its $200,000 or more might find itself with a 50-barrel well, and no hope of even paying the interest charges on the amount it had spent, let alone recovery of its capital investment.

To the man on the street, the discovery of oil seems to carry with it the idea of boundless riches, but it is well for us to remember that it is only the richest of oil fields which will repay the vast expenditures of money necessary to drill wells to such a tremendous depth as those of Kettleman Hills. Such wells as the Milham well cannot be drilled on the basis of from 4,000 to 5,000 barrels an acre, ultimate yield, which is the average yield of the larger part of the oil fields of the country, and it is doubtful if it would be justified in cases where the yields reached 20,000 to 25,000 barrels an acre. It is only where huge recoveries of light oil can be made that such tremendous drilling costs are justified.

The complete story of Kettleman Hills remains to be told. The opening act has already seen the failure of a number of costly experiments, and the success of the last one. It will be interesting to watch the future. Will Kettleman Hills be a tremendous reserve of light oil for California, or will it be another failure?

* * *

After twenty-two years of unsuccessful drilling activity, the great Kettleman Hills anticline was proved to be commercially productive by the blowing in of the Milham Exploration Company's Elliott No. 1 on October 6, 1928. This well came in out of control, while the crew was running drill pipe, and was reported to be making about 4,000 barrels of

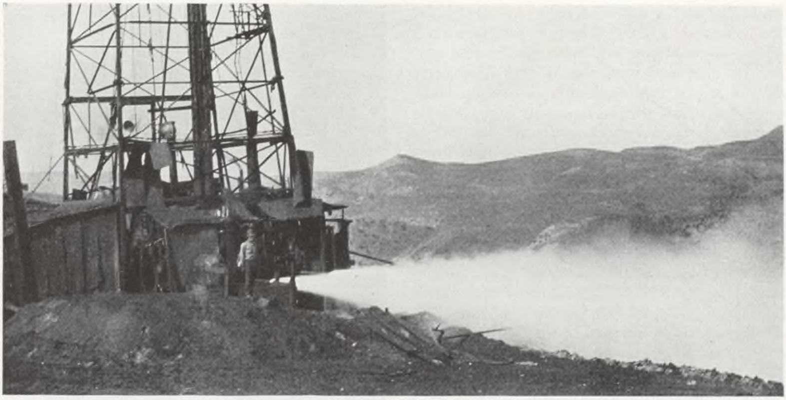


Milham well under control. Blowing from two chokes.

61 gravity oil and 38,000,000 cu. ft. of gas daily, which gas carries a gasoline content of over two gallons per thousand cubic feet. The well is said to be the most valuable one in the State of California. On October 25, 1928, it was brought under control and is now reported as making 3,800 barrels of 60.6 gravity oil and 45,000,000 cu. ft. of gas. The casing pressure is 1200 lbs. per square inch and the flow is coming through two 84-64″ beans with trap pressure of 440 lbs. per square inch.

The Texas Company is at present completing a gasoline plant to treat this gas. It is designed for a capacity of 37,000,000 cu. ft. of gas daily at 150 lbs. pressure, but it can also be operated to treat 12,500,000 cu. ft. at 40 lbs. pressure.

The Kettleman Hills structure is an anticline, thirty miles long and four to five miles wide, although the probable productive area will not be over two miles in width. This structure covers, in its topographic relief, about one hundred and fifteen square miles. The "Hills" consist of three anticlinal domes, called the "North," "Middle," and "South" domes. The Milham well is on the "North" dome, 1200 feet east of the surface axis. Kettleman Hills is a prolongation of the Coalinga anticline



Milham well—Kettleman Hills under control. Gas and oil blowing through two 84/64ths chokes.

and there is actual proof of oil on three sides of the structure; that is, in the Coalinga East Side field to the north, in Tar Canyon along Reef Ridge to the west, and in the Lost Hills field to the south.

The formations penetrated in wells drilled on top of the Kettleman Hills structure are as follows:

TULARE FORMATION
(*Upper Pliocene*)

This formation forms steep escarpments on the flanks of the "Hills" and is eroded along the axis of the structure. There are 4,000 feet of measured Tulare beds on the north end of the Kettleman Hills, and as a result, wells starting in the Tulare formations cannot possibly reach the productive horizons in Kettleman Hills.

ETCHEGOIN—JACALITOS
(*Lower Pliocene*)

The discovery well penetrated 1800 feet of hard shale of Santa Margarita age. These shales contained considerable gas and slight showings of oil. Drilling in this formation is very difficult, as the shale is broken and brittle, and tends to heave in the hole. Since the year 1923, the Marland Oil Company drilled one well and the General Petroleum Corporation drilled two wells which failed to reach the productive sands because of the difficulties of drilling through this broken shale.

VAQUEROS
(*Lower Miocene*)

The discovery well encountered the top of the Vaqueros at a depth of 6320 feet, where casing was set. The formation from 6320 to 7000 feet consisted mostly of hard gray sands, showing no oil; but the core recovery was very poor. Black shale bodies were drilled through from 7000 to 7200 feet, which shale bodies were separated by hard gray sands. The only oil sand cored in the well was at 7236 feet, but the lower portion of the hole was lost and the well was redrilling at a depth of 7108 feet when it blew in. The lower portion of the hole is in the lower Vaqueros formation, as the black shale separates the upper and lower Vaqueros in the Coalinga field.

The Santa Margarita shale thickens considerably to the south and east, therefore productive horizons will be over 8000 feet in depth on most of the Kettleman Hills structure.

The acreage in these hills is held in large tracts by major oil companies so that the structure constitutes a reserve of oil, which may be drawn upon only when market conditions are favorable.

Previous history indicates that wells drilled in this area will cost between $200,000 and $300,000 and will take at least six months to complete. It would seem, therefore, that the field will be developed in an orderly manner and should not materially affect market conditions in the industry.

Radio Seeks Oil

Waves Under and Over the Earth

The Federal Radio Commission, consisting of five members, is given authority under the Radio Act of 1927 to assign bands of frequencies, or wave lengths, to the various classes of radio stations and to prescribe the nature of the services to be rendered by each class of licensed stations and each station within any class. For the purpose of regulating radio communication the United States is divided into five zones. The intent of Congress in so dividing the United States, as expressed in the Radio Act, is that the people of all the zones are entitled to equality of radio broadcasting service both of transmission and reception. In order to provide this equality in service the licensing authority, which, at the present time is the Federal Radio Commission, is directed to maintain as nearly as possible an equal allocation of licenses, of wave lengths, of period of operation and of station power to each of the zones insofar as there are applications therefor. To that end the Federal Radio Commission can, whenever it is necessary or proper, grant or refuse any applications for station licenses or renewals of licenses.

In order to operate broadcasting stations applications for licenses must be made to the licensing authority. These applications shall set forth, among other things, the wave lengths and power desired to be used, the hours or other periods of proposed operation, and the purpose for which the stations are to be used. These facts furnish aid to the Federal Radio Commission in determining whether any particular application meets the tests prescribed by the Radio Act of 1927. It is therein provided that the licensing authority shall grant to any applicant a station license if public convenience, interest, or necessity will be served thereby.

The Texas Company, pursuant to the provisions of the Radio Act, has now pending before the Federal Radio Commission fifteen applications, twelve for licenses to be used in connection with geophysical exploration work and three for permits to operate point to point broadcasting stations. On November 13, 1928, a hearing was held at Washington, D. C., before the Federal Radio Commission upon the application of The Texas Company and other oil companies for licenses to use radio in connection with geophysical work. The companies represented at the hearing presented their cases as a unit and the proof introduced was directed to showing that the public interest, convenience, or necessity would be served by granting the licenses for which applications had been made.

The interest which is being manifested by both the National and State Governments in the production, refining, and distribution of petroleum and its products clearly demonstrates their importance. On December 19, 1924, the President of the United States, in creating the Federal Oil Conservation Board, stated in a letter to the Secretaries of War, Navy, Interior, and Commerce that he was advised it was necessary to drill many thousands of new wells each year to keep up our current oil supply and that a failure to bring in producing wells for a two year period would be followed by a serious industrial depression. The oil industry has recognized this condition for sometime and has been searching for methods which are as accurate and economical as possible to locate the oil reserves necessary to meet the continuing and increasing demands of the consuming public.

Prospecting for oil has not yet reached the point where the results can be foretold with exactness and certainty. The hit or miss method of exploration, however, is no longer the rule but has been supplanted by methods which have their justification not only in the fact that they are founded upon a scientific basis but also in the results obtained by their use.

Heretofore, oil producers have had to rely upon surface geology, supplemented by such information as they could gain from cores of drilled wells in forming their conclusions as to the existence or non-existence of oil bearing structures under areas in which they were interested. No longer does that condition obtain. Geophysics has given them a look under the surface of the ground to a depth of 5,000 feet, and this interior look has been sufficient to determine whether the expenditure of money necessary to drill for oil would be justified or not. New pools have been discovered and salt domes located, the existence of which would not have been suspected if the old random methods of exploration had been used.

Salt domes have been and are being located by the seismic method of geophysical exploration even though the tops of the domes, in some cases, are several thousand feet below the surface of the earth. It is known that sound travels through the earth at the rate of 1100 feet per second and through ordinary rock near the earth's surface at the rate of about 6,000 feet per second. Tests have shown that the velocity of sound through salt will at times be as high as 16,000 feet per second. The difference in the rate of speed of sound through salt and through ordinary rock forms the basis of the geophysical exploration methods used today in the location of salt domes.

If the velocity of sound through a given structure can be established and proves to be greater than 6,000 feet per second, the rate through ordinary rock, it is not rash to assume that the sound has travelled in part through a salt formation. To determine this velocity it is necessary that explosives be discharged and instruments set up to record the time of discharge and the time when the sound wave reaches the point of reception. Seismographs in geophysical exploration work are set up at known distances from a discharge point and from each other. Thereon are recorded the time when the explosive is discharged and the rate of speed at which the sound wave travels through the earth from the point of discharge to the various reception points. By discharging explosives at various points within the same area and recording the rate at which the sound wave travels, one can obtain a fairly accurate picture of the geological structure that can be expected to be encountered. As has already been stated, the results from the use of geophysical methods up to the present time have justified their use and have been a vast improvement over the results obtained from methods previously used.

Radio has performed an important function in the development of this method of exploration. It is essential that the exact time of discharge be known at the receiving point so that the interval during which the sound wave is traveling to that point can be accurately and definitely measured. By the use of a radio transmitter at the discharge point and a receiving set at the reception point, the exact time of the explosion is recorded. A short time later the wave traveling through the earth will arrive at the reception point and record will be made thereof upon the seismograph. With these two factors known, namely, the time of discharge and the time of arrival of the wave, a calculation can then be made of the interval of time necessary for the wave to travel from the discharge point to the reception point. In the vast majority of cases information of this nature could not be obtained without the use of radio.

There are a small number of cases where wire can be used for the transmission of information and signals. The making of necessary surveys, the finding of bearings, the measuring of distances, the stringing of miles of wire, the delays incident to the setting up of a number of separate and independent stations and the obstacles offered by the terrain and other difficulties all argue, however, against the use of wire. From a cost standpoint the one method is so much more expensive than the other that to use the more expensive method is an economic waste which ultimately must be reflected in the price of the commodities to the consuming public. In marshy districts and where the land is covered by water, conditions which are not uncommon in the Gulf Coast region in Texas and Louisiana, the use of wire is impractical. In mountainous and wooded districts, experience has demonstrated the inadvisability of using wire. In these areas radio must be used in connection with geophysical exploration work, and, if not, the obsolete methods of hit or miss and trial and error, must be resorted to with their attendant waste in both time and money and consequent increase in the cost of the commodity.

In the Gulf Coast region today, very few, if any, efforts are being made to drill for oil without first using geophysical instruments to ascertain whether or not there is evidence of a salt dome. The Texas Company is using radio in connection with its exploration work and the results of such use are probably more satisfactory than they would have been without radio. Radio has not only been helpful but necessary in the further development of methods of exploration. It is true that the methods now used are not yet perfected, but it is equally true that if the use of radio in connection therewith is checked the development will not be as fast as it otherwise would be. It is in the interest and for the convenience of the public that radio be permitted to be used in furtherance of the methods of exploration for oil.

Petroleum and its products are used universally for light, fuel, and power. They constitute one of the greatest sources of power yet found by man. Because of the universality of their usefulness it is important that the cost of producing the commodity be kept upon as low a level as possible. Without the use of radio in connection with geophysics many oil reserves will be longer in being undiscovered and many other reserves will never be disclosed. The hiding of so much wealth is an economic waste. In addition, considerable wealth is wasted by reason of the fact that methods much more expensive, with results less satisfactory, must be used in order to discover reserves necessary to meet the constant demand of consumption.

An economic advantage which flows from geophysical exploration work is the possibility of securing unit control of individual oil pools. Heretofore, oil pools have been developed by many parties, who, in the desire to extract all the oil as rapidly as possible and to secure as much as they could themselves, have at times resorted to wasteful methods of operation. If the existence of salt domes can be discovered by geophysical methods without the necessity of drilling holes and of expending money other than that necessary for exploration work, it is possible for the company making the discovery to obtain complete control over the entire area under which the salt dome is located. It may be that other companies will be interested in the salt dome, but in any event, the number of parties interested will be fewer than they have been in the past when domes were discovered through surface indications and by the drilling of wells. The fact that the properties under which salt domes have been discovered are owned by a few interests will make the control and operation of the properties a comparatively easy matter. The operations would be conducted from the standpoint of developing the reserves and for the purpose of conserving and protecting the interests of each one of the parties. The wasteful method following from speed in operation would be avoided.

On December 18, 1928, a hearing will be held before the Federal Radio Commission at Washington, D. C., upon the applications made by various oil companies for permits to operate point-to-point broadcasting stations. The Texas Company, as has been before stated, has three applications for such permits and will be represented at this hearing.

Since its beginning, the Petroleum Industry has provided its own communication facilities to insure prompt, dependable service at all times and avoidance of interrupted operations.

In Texas, during the early part of 1927, the operations of The Texas Corporation and The Texas Pipe Line Company required dependable communication from existing circuits at Wichita Falls to the newly developing oil pools in West Texas, and also in the Texas Panhandle. Commercial communication was entirely inadequate and not dependable. Certain areas were without any communication; others were served in an unsatisfactory manner by a combination hook-up of various commercial companies, which naturally await a certain degree of development before installing facilities. It has been found necessary, therefore, to effect communication quickly and satisfactorily and this has been done by erecting three radio-telegraph stations, namely:

Wichita Falls, Wichita County, Texas;
Kingsmill, Gray County, (the Texas Panhandle);
McCamey, Upton County, (West Texas).

Local telephone circuits were then erected from the various pools in the above areas to the two last mentioned radio stations, which gave a general hook-up with existing wire circuits terminating at Wichita Falls and made entire communication general.

Very recently the Texas Panhandle was hooked up by telephone for 175 miles to Wichita Falls, over a line where a trunk pipe line is being built; also by erecting, at a cost of $160,000.00, 466 miles of telephone circuit from Houston to McCamey, via Junction and Sonora, which parallels the trunk pipe line now under construction from Houston to the West Texas oil pools. It would have been unwise to have erected a telephone circuit at an earlier date, or until it was definitely decided on a route for the pipe lines, inasmuch as the telephone should parallel very closely the pipe line so that various pumping stations could be hooked up for general communication. The major portion of the telephone line is through very rough and somewhat inaccessible country; material in many cases is being hauled a distance of 75 miles from the railroad; right-of-way for a distance of approximately 280 miles is crossed by one railroad only, and 8,000 holes for poles and guys will be rock drilled and blasted in the section from San Marcos west to Pecos River. The expense of erecting wire communications in this case demonstrates the economic necessity of utilizing more modern and more scientific equipment, namely, radio.

Twenty-five Years Ago

The Texas Club, Calder Avenue, Beaumont, 1902-'05

Twenty-five years ago in Texas bashful people were decidedly at a disadvantage; it was a country for men who knew what they wanted and went after it. This spirit had a social counterpart in a custom of the Texas Club, the living quarters for the Company officials and a general club and guest house for visiting executives and prominent oil men.

At meal times the Club members gathered as one great family, and J. S. Cullinan, President of the Company, presided over the serving end of the table. On an occasion when there was a guest present and fried chicken was the *piece de resistance* of the meal, Mr. Cullinan would politely ask the guest which part of the chicken he preferred. The usual thing was for the guest to say that just any part would suit him. To the accompanying smiles of the members of the Club, his plate would be passed to him and on it—the neck of the chicken.

The members of the Texas Club enjoyed a very merry Christmas. Each man in the Club received for a present a silver shaving mug engraved with his name. During the Christmas season many members of the Club went to see a comedy entitled "The Burgomaster."

The Texas Company had completed its pipe lines and telegraph lines to Sour Lake and planned to complete its line to Batson in a few days. The Company was erecting at Sour Lake a large pumping station and three 37,000 barrel steel tanks, and a cottage was also being built for its employes.

The total shipment of oil from Port Arthur up to December 28, 1903, had been 10,262,518 barrels. In the period from December 12 to 28, 1903, a total of 379,645 barrels was loaded. The Texas Company shipped 70,331 barrels of that amount. The Company also shipped 11,900 barrels from Sabine Pass during that same period.

John Calvin McCullough entered the Pipe Line Department of The Texas Company twenty-five years ago. At the time of his death on June 5, 1924, Mr. McCullough was Superintendent of the Equipment and Construction Division, Sales Dept., Southern Territory.

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importance of speeding the turnover from delivery to collection.

In an earlier paragraph I have spoken in terms of a single dollar or a few dollars.

Let us look at the actual outstanding accounts receivable in domestic territory at the end of October 1928:

The total was $8,122,000.

Of this total $6,069,000 was from revenue created in October; $2,053,000 was from revenue created prior to October. Of this latter amount $569,000 was in notes and accounts more than four months past due.

It is evident that if, through a combination of shorter terms and a nearer approach to collection at due date, 10% of this total had been received prior to October 31 instead of being then outstanding, our cash available for productive use in our operations would have been increased by $812,000.

During the recent presidential campaign some jibes were cast at some of the small economies of the present administration. But small things become big things when multiplied by a sufficiently large factor, and so it comes to this, that if every one who comes in contact with the situation can turn just a few dollars from a credit sale to a cash sale, and just a few more from a longer term to a shorter term idea, and just a few more from a slow collection to a prompt collection, several hundred thousand dollars—and perhaps an even million—might be melted off from the snow pile of accounts receivable and led over into the reservoir of liquid cash.


HAPPY
NEW YEAR