To the Reader:

In this Golden Jubilee Number of the Imperial Oil Review we do not so much celebrate a sum of years which is yet uncommon among Canadian industrial organizations as record thanks for the opportunity to serve and for the talents and faithful work of those men and women who have kept our Company abreast of the times. As it was our Company's privilege to establish itself in a young country of enormous possibilities, it is our duty to serve that country as well as such opportunities demand. This we have tried to do by the creation of a distributing system that has marched along with our pioneers to the outposts, by the establishment of industrial plants in Canada to afford employment to Canadian labour and by extending in every way possible the ownership of our Company in the country it serves.

In looking back over the fifty years that have elapsed since our Company was founded we find many reasons to be thankful, some cause for satisfaction, and every incentive to carry on the work so well begun by the men who laid down the policies and principles that have, from the outset, governed the conduct of our business.

To the public for its patronage, to the shareholders for their confidence, to our employees for their devoted work is due gratitude for the development of our industry in Canada.

President

Toronto, September 8th, 1930

The Canada of 1880

In 1880 the Dominion of Canada was thirteen years old. The enthusiasm of the Confederation period had given place to a determination to save the Union and to bind it together. The provinces were not yet quite used to living, as it were, under one roof. Nova Scotia was still half-hearted and doubtful; Ontario and Quebec were apt to fly at each other's throats; British Columbia had just been saved to the Dominion by the persuasive eloquence of the recent Governor-General, Lord Dufferin, who with his Countess had made a tour in 1876, and by the assurance two years later from the Federal Government that it would redeem its promise of 1871 and provide a transcontinental railway. The memory of Louis Riel and of the Red River troubles of 1870 was still alive—and Quebec had sympathized with Riel. In the main, however, the cables were holding, for the Fathers of Confederation had well and truly done their work, and there was a canny navigator at the helm.

Sir John A. Macdonald's intention had been in 1867 that the "residue of power" should rest with the Dominion Government. That is to say that everything that was undefined in the British North America Act, and all matters that should arise later, should...
come under the administration of the Parliament at Ottawa. Already in 1880 the strength of the provin-
cial position was becoming clear. The flight
between Sir Oliver Mowat, Prime Minister of Ont-
tario, and Sir John Macdonald over Ontario's western
boundaries was a foretaste on the horizon. Ontario was
to win that case before the Privy Council, and also
that of a quarrel with the Governor-General about
the administration of the Crown lands in the disputed
area. Sir John had taken the United States as the example
to avoid: if the rights and powers of the
“sovereign states” had been asserted, the
detention of the central
colony. He hoped to ensure the
opposite tendency in Canada. By the in-
of the two pos-
tions, that of the
United States
and that of
Canada, have
re-
pelled, themselves.
Since the time of
the Civil War in the
United States the
The tendency has been decisive, has been
and surely toward a strengthen-
ing of the Federal
Government. Since the early 1800's in Canada
the tendency has been slowly but undeniable
stirring of the provincial
governments at the
expense of the Federal Government. Most
Canadians are unaware
of this tendency, but it is revealed to thoughtful
inspec-
tion, and in the watersheds. On the other
hand, to offset this there has arisen an increasingly
intense national spirit. Most of us are proud of
this spirit, and we are not ashamed of it. We should never
think of going about shouting “I am an Ontario man”, or
“I am a Saskatchewan man”, but we do not mind
shouting “I am a Canadian”.

1880 was a prosperous year in Canada, the first in seven or eight. Of course, many gave the credit to the
confidence engendered by the newly
instituted
“National Policy”. This policy, a system of cus-
toms duties to protect Canadian manufacturers from unfair competition with United States manufacturers,
had been advocated for some time, but especially by
the Conservative Party from 1876 onward. Because
the industry had been in financial depression through-
out the middle seventies, which the average voter did
not know was almost world-wide, the National
Policy brought Sir John Macdonald into power again
in the election of 1878. In 1879 the Policy was
embraced by Sir John and Sir Tilley's Budget. There is no
doubt that it stimulated industrial activity almost
immediately, and it has remained the steady policy of
Canada ever since, whether the Cabinet has been
Conservative or Liberal. But it is interesting to
turn up the reports of world conditions of trade,

Now the canoe was master of the wilderness,
while today, only a few years after, both fur-trader
and prospector have taken to the aeroplane. Soo-
ers, sitters, "birdjambers" circled the inland
waters with interesting sail. They are gone, and we
scan the long lists of the Great Lakes for weeks in
summer without a glimpse of canvas, save perhaps
the white of a racing yacht. Crowds of steamers plied
the lakes and rivers---old-fashioned side-wheelers for
the most part, with some stern-wheelers for variety.
Most of them are gone. A few of the more palatial
twin-screw ships linger on, as it were on sufferance,
to smudge the horizon along with the grain carriers.
Oil, gasoline, the internal-combustion engine, have
done this thing; but the water is not entirely forsaken,
as one may gather from the roar of the speed-boats
any summer afternoon.

The Canada of 1880 was turning from absorption
in politics to intense application to material
development. But politics were not yet seriously neglected,
though the "old guard" were passing from the scene.
William Lyon Mackenzie was dead nearly twenty
years, Bishop Strachan was dead thirteen; Dr. Eger-
von Kray, his last opponent, was on the brink of
the grave; Sir John Beverley Robinson, chief orna-
mant of the old Family Compact, had gone some
years before. Of the Fathers of Confederation John
Sandfield Macdonald, George Brown, Sir George
Carrej, D'Arcy McGee were gone. Joseph Howe,
the great opponent in Nova Scotia of Confederation,
was also gone. Most of the others were in retirement,
although Sir John Macdonald still dominated the

Perry landing at Grand Marais, in 1880
Winnipeg lies across the river.
政治舞台，和 Sir Charles Tupper 和 Sir Leonard Tilley 亦受到他的支持。The Hon. Ed.

during the height of his powers, and his successor, Laurier, was a young member who had
come once in the Cabinet for a moment, but who was not the time being a disappointment to those who had built high hopes on the earlier promise he had shown. He was to get his opportunity in a later

【The Industrial Growth of Canada Since 1880】
By Alexander Brady

In 1880 Canada was industrially an infant. Thirteen years previously the Dominion had come to the end of the long series of wars which had extorted from the Parliament of the Fatherland and the colonies, and whom the Dominion was still in the long struggle. The forest fashioned the industry for the needs of the Dominion, and beech, and sycamore, and the growth of the discovery, which had opened the virgin forest north and west of the Mississippi in 1830, created the raw materials for manufacture. The steam engine, growth of a young industrial giant, the pulp and paper
to-day, and in the most respects the largest of Canada. Settlers no longer repelled by the rocky uplands of northern Ontario passed over to the treeless plains, where climatic and soil conditions were ideal for the growth of the best hard wood. Scarcely was the last spike driven on the railway before immi-

Pulp and paper were the raw material for the growth of the Dominion. The Dominion was in the elementary and domestic stage of development, very different from the concentration of highly capitalized industries in the towns and cities of to-day. The purpose of this article is to illustrate briefly the industrial growth of Canada, industrial growth from 1880 to the relative maturity of 1930.

First in time and importance was the completion in 1885 of the Canadian Pacific Railway. It knitted together the vast distances of the Dominion, and opened the way for the exploitation of the natural resources of the Dominion. The railway itself reflected in its growth the development of the Dominion. The demand for the natural resources of the Dominion was growing and the Dominion was growing.

The steam engine was the main source of power. The cross roads sprouted up. The railroads of the Canadian Pacific Railway were laid. The steam engine was the main source of power. The cross roads sprouted up. The railroads of the Canadian Pacific Railway were laid.

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and volume of production. But in agriculture it made no extensive advance, except in such processes as the ploughing and sowing of the farm by men and horses continued jointly to till without other power. Although the steam engine was tried in a few tasks, it was found on the whole too cumbersome, costly, and wasteful for ordinary farm use. The fuel source of power on the farm remained substantially what it had been for centuries till the arrival of the internal combustion engine, using light fuel. Gasoline engines were used in modern tractors. The early tractors for various reasons were not eminently successful for about ten years after the Great War the improved tractors began to revolutionize the agriculture of North America, particularly the agriculture of the Canadian prairies where topographical features facilitated the use of machines.

A few facts indicate how oil power is helping to till the soil and reap the harvest. The census of 1921 reports about 47,000 tractors within Canada, the majority being in the West where conditions on the level wheat lands are most favourable for their use. The census of 1926, which includes only the three prairie provinces, gives the number in these provinces alone as 50,000. The census of 1931 will undoubtedly show a great increase in the number throughout the Dominion. Their adoption is due to decisive economics. Under normal conditions a modern tractor reduces the cost of plowing one-half and quickens the whole performance. Where a man with four horses may plough three acres a day, a man with a threepower plough will do twice as much. Moreover the tractor is the usual power for the combine, a machine that cuts and threshes the grain in one process, saving labour and speeding up the entire harvesting task. Previous to 1921 there were practically no combines in western Canada, although they had long been used in the dry wheat belts of the United States and Australia. Since then combines suitable to Canadian conditions have come into wide use; at least 3,000 are now in the possession of western farmers. Their economy is effectively illustrated by the fact that two men with a combine will reap and thresh from thirty to fifty acres of wheat a day, cutting the normal cost by one half.

In other diverse ways oil power is helping to change agricultural production. The automobile itself plays a part. To the average dweller in the city the automobile is chiefly an instrument of healthy recreation and convenience. To the farmer it has proved pre-eminently a labour-saving device. He can go to town for groceries in less than half the time formerly required in the ancient buggy, and the saved time can be valuably devoted to other tasks. The motor truck can in a few days transport a grain-grower's crop from farm to line elevator, eliminating the drudgery of winter hauling by horses. Oil power is hurrying the pace of agricultural mechanisation, and the broad result is to reduce the need of population on the land and to accentuate the tendency already evident towards larger cities. It has already removed the need of "harvesters' excursions", and on Canada's immigration needs it must in the course of time have a profound effect. The new lands of the Peace River valley require thousands of settlers, but not half the number as lands similarly extensive would have required thirty years ago. The tractor and the combine will reduce much of the labour formerly necessary. No less inevitably will there be the ultimate organisation of agriculture. The capitalist farmer is on the way; in fact he has already arrived. In grain lands the large farm cultivated by machine is emerging, precisely as the large manufacturing establishment of the eighteenth century. Already the census reports show a continuing tendency of the average farm in the prairie provinces. The census of 1926 showed farms of 160 acres or more which were increased in size by some 22 acres over the average in the census of 1921, and in Alberta the increase was 17. Oil-driven machines have thus increased the farm size. On the Atlantic and Pacific coasts and the inland waters of the Dominion, the gasoline motor has come into fairly general use, replacing or supplementing sails and the more laborious oars. It reduces the cost of operations, and measurably adds to the security of the fisherman's task by enabling him to escape more quickly from storms.

Coal, water, and oil have been therefore the powerful trinity in Canada's industrial expansion. Oil may justly receive sp cial tribute, because of the far-reaching changes that it is introducing to the basic industry of the Dominion, agriculture. Moreover in the north oil is the act in the pioneer, providing power in remote areas where for the time being the utilization of other power resources, especially for transportation, is difficult. Each of the three sources of power however leaves its own peculiar impress on development, an impress that the others cannot leave. The industrial life of modern Canada is indebted, not to one alone, but to all three. In the future we can only expect that the same trinity will continue to shape the course of the country's industrial evolution.

Temporary air harbour, Port of Toronto.
IN PRAISE OF PETROLEUM
BY STEPHEN LEACOCK

"Praise God from Whom all blessings flow."

—SHAKESPEARE.

LET others talk of the blessings that have accrued to humanity from the advance of our civilisation in such things as morality, medicine, mathematics, music and the manufacture of moonshine.

I wish, on this pleasant anniversary occasion to get down to rock bottom and talk about petroleum.

—

Man has been called by Aristotle a reasoning animal; by others a laughing animal; and by others again distinguished as a tool-using animal or as a fire-making animal. But in our day the true distinction between humanity and all the rest of the animal kingdom is that man is the animal that uses oil. The others don’t. They can’t. They don’t know how. As a result, Man, the oil-user, can beat them at their own game. The swallow is excelled in its flight. The horse has lost its speed. Unless it can make its legs rotate with gasoline its future is gone.

After the age of Iron came the Boose Age, or the Age of Alcohol. This was brought about by the invention of wine and the finding of the wheat plant and the discovery of Scotland. This age lasted all through the centuries of Rome and Greece and Medieval and Modern World until Man learned to distill his own wine. It had in its other features beside the use of alcohol—such as the invention of writing and printing and casting and building and ship-building. But its leading feature was that Man became a Boose-using animal.

This last age, as its speed increased, broke all of a sudden into the Age of Oil. All of a sudden, as it seems now, Man learned the use of Petroleum. How long it had had to wait. Primitive Man slopped round in the marshes in pools of petroleum and never knew it was there. The ancient Britons mixed it up with a blue weed that they called "woad" and then stained themselves blue with it, looking pretty saucy and smelling like a gasline station.

The Chinese knew of petroleum as far back as the Ming Dynasty, but they used it only as hair oil.

The Persians knew of it and used it for making chest plasters. The North American Indians, the

Senequas, found petroleum oozing out of the ground in the valley of the Alleghany River, but only used it to make Senequa oil for rheumatism. Thus their childish pride in their own name prevented them from the great discovery still to come.

Then came into the world an American settler called Ker, who barrelled up old barrels and drained the mud out of it, and soaked an old shirt in it and made a torch. But even then the other settlers didn’t catch on; they only saw that Ker had burned up a good shirt. Such is always the difficulty upward path of progress: there is many a fall on the way. The telegraph, when first invented, was called “a fascinating toy.” No one would buy it. The telephone was, for its earliest years, only an amusing curiosity, the despair of its inventors and patentees. Something of the topid mind of the ice age still chilled the warmth of Ker’s aspirations. Ker’s "Kerosteine" wouldn’t sell. It was used for burning stumps, for making bonfires, and for lighting up the creeks for sucker fishing in the spring and fall seasons. But that was all. Colled up in each of Ker’s barrels of Kerosteine, infinitely compressed, was the expanding power of gasless oil. Ker’s idea was like the Arabian genie imprisoned in a bottle. In the barrel there was locked the potential explosive engine that made possible the motor car, the airplane, the submarine—in it there was a thousand great things.

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supplies of crude for the Dominion. Its first move was to go to the Republic of Peru where oil was known to be available in considerable quantities; its second to organize a systematic search for oil-bearing structures in Canada. Within a short time the spearheads of its efforts were aimed at two points thousands of miles apart: Peru near the Equator, Fort Norman near the Arctic Circle. This was only the beginning. Colombia, Ecuador, Alaska, have been trekked over by the Imperial oil seekers. In British Columbia, Alberta, Saskatchewan and Ontario, Imperial drills have bitten down to petroleum on disappointing, but promising, possibilities. Only in Peru and Colombia, and in a lesser degree in Turner Valley, have results been compatible with the effort and expenditure involved.

At the risk of serving up warmed-over cabbage — for the story may be familiar to many readers of the Review—the motive that prompted Imperial Oil to embrace production of oil in its activities, which therefore had been directed principally to refining and marketing of petroleum, may be reviewed. Just before, during and immediately after the World War, the bogy of a petroleum famine stalked through the land. With the then available data there were some who feared that the next ten years would witness the exhaustion of all known petroleum resources. The alarmists were active principally in the United States and as Canada was dependent upon the United States for almost her entire supply the possibility of an industrial and sanitary situation readily suggested itself as a menace to the Canadian industry, and in mind the driller’s saying that “oil is found where it is” accordingly went first to Peru. There was a supply to draw upon, pending development of Canadian production. Oil had been produced in Peru ever since 1869—seepages of it were worked even in the days of the Incas—and two English companies were operating in the field when their interests were acquired by Imperial.

During the period between 1889 and 1913, 1,203 wells had been drilled, bringing production up to 1,405,786 barrels for the year 1913. With the advent of Imperial’s subsidiary, International Petroleum, a much more aggressive policy of development was inaugurated. Last year production reached nearly 11,000,000 barrels.

The International men who took over the development of the Peruvian oil fields went into a desert, for the fields lie along a barren strip of coast. Figures relating to the increase effected in production suggest nothing of the risks and hardships endured, of the romance of achievement, of the building of railways, highways, pipelines, docks, tankage, housing for employees, hospitals, churches, water systems, clubs, golf courses and all the other paraphernalia of life as we live it in the average Canadian town. This development is an epic in the history of oil production and the Peruvian field has become one of the most up-to-date and efficiently operated fields in the world.

While the big development was going on in Peru the quest for a petroleum supply was being carried on in Canada. The drilling was proceeding in the Turner Valley but a great interest was not to attach to that field until 1924 when Royalite No. 4 well was brought in. In 1919 the Fort Norman expedition was organized and a party of drillers went down the Mackenzie River to that remote point where they win- tered and proved their ability to withstand all the rigors of Arctic exploration. They set out from Ed- monto in early July and reached their destination early in September. They went by rail to Peace River Landing and by boat to Fort Smith, where began a sixteen mile portage. Late in August this portage was completed and the drilling equipment and supplies were loaded on boats for the last leg of the journey. The test well at Fort Norman proved that Imperial geologists had been right in predicting existence of oil there but, again the driller’s maxim, “oil is found where it is” was applicable. In this case the oil was found too far away from a market and development of the field must await the day of transportation facilities that will make its oil available where there is a demand for it.

While the pioneers were busy at Fort Norman another great development was inaugurated. It was in 1920 when the International Petroleum Company, Limited acquired control of the Tropical Oil Company, which owned the De Mares concession in Colombia, where considerable oil was believed to be. Again there was a greatly accelerated expansion and if any one thought that the gamut of all possible difficulties had been run on the desert in Peru, and in the Arctic wastes about Fort Norman, a surprise was in store for him. In Colombia, Imperial’s oil men went into a jungle — a dense, almost impenetrable, steaming jungle, so dense that one would not venture into it without a market with which to back a way through.

When Imperial Oil interests took over the De Mares Concession, there was only a small camp where the busy modern town of El Centro, centre of producing activities, now is. In 1921, the first year of Imperial operations, the De Mares field produced 66,750 barrels of oil. The following year production increased five-fold. Production for 1924 totalled 444-744 barrels. El Centro lies roughly 300 miles up the Magdalenia river from the seacoast. A means of transport to the world's oil markets was necessary. This, the Magdalenia River, shallow, tortuous and with its treacherous, shifting sand banks could not afford. A pipe line was the only recourse. Construction of a pipe line was therefore undertaken and even now, after it has been successfully operating for four years and has set enviable records for efficiency, those who were there in the days of its building proudly recall the unprecedented difficulties encountered and the splendid resolution, resourcefulness and ability with which they were overcome.

While Colombia is a country of various climates, ranging from the tropical in its lowlands to the frigid in its towering mountain ranges, the oil fields are situated in the basin of the Magdalenas and along this mighty river tropical weather conditions prevail. Without the great advances of the last twenty-five years in the actual science of the petroleum industry, the pipe line would have been impossible. With the cooperation of the police precautions were taken to protect the workers from the menace of disease and at every stage of the pipe line's
building the engineering staffs were dependent upon the medical departments with their floating dispensatories and clinics along the river and their sanitary staffs working shoulder to shoulder with them to protect them from the malaria-carrying mosquitoes, the hookworm and numerous other parasites. Between July, 1926, and September 8, 1930, Imperial’s fifty-sixth birthday, the pipe line has carried 70,274,496 barrels of crude oil, much of which has been taken into the hands of Imperial tankers for carriage to Imperial’s seaboard refineries in Canada.

Operations in Colombia are very efficiently conducted. The terrain being somewhat hilly and broken, steam shovels are used to make the well sites ready for the rig builders. All rig building is now done by native workmen. The drilling crews are composed largely of Colombians, who have proved quite adept at this work. The De Mares property is now in process of electrification and electrically driven rotary rigs are in operation. Transformers are moved on wagons from one drilling location to another. Power lines have been constructed all over the field and it is the work of only a few minutes to plug in a transformer and connect up the motors to drive the drills.

Among Canadian oil fields the Turner Valley has commanded most interest. Strictly speaking it has proved to be a naphtha field rather than a crude oil field. The existence of petroleum deposits in the Turner Valley was first suggested by a seepage of gas on the banks of Sheep Creek. The first well was drilled in the Valley by the Calgary Petroleum Products Company which was organized in 1912. Gas was found in several horizons between 884 feet and 3,580 feet. Oil was encountered at 1,527,274 and 3,809 feet. It was a light, straw colored oil of 60° gravity and was accompanied by three to four million feet of gas, which contained considerable hydrogen sulphide. This strike started the Turner Valley “boom” in the course of which 800 producing companies sprang into existence. It was then that crowds rolled in the streets of Calgary, elbowing their way into offices to exchange their money for certificates most of which

Top: Magnesia No. 2 Well, in Colombia. Below: is shown some of the highway construction work carried on in the Colombian field. Lower left: Drilling equipment being made ready to do its work.

One of the Company’s Magnesia River steamers.

Above is some of the equipment used for making carthage. gasoline at Talcara, Peru. To the right is a distant view of Talara, and below is part of the harbour.

PHOTOGRAPHERS BY

EMERSON GALLOWAY

would have been dear at any price above what they would command as waste paper.

At first the oil, or naphtha, from the first well was sold direct to consumers. Cars would drive to the well and their tanks would be filled with this product which, on account of its high sulphur content, was by no means a healthful diet for motors. In due course, partial refinement of this oil was undertaken and while drilling was carried on to a considerable extent but until 1916, by which time the
Turner Valley "boom" had definitely collapsed, only four additional producing wells were brought in. The history of the Valley as a real producer dates back only to 1921, when the Royalite Oil Company was formed as an Imperial subsidiary. It began drilling with the object of obtaining natural gas in quantities sufficient to warrant construction of a pipe line to Calgary. On October 14th, 1924, the drill at Turner Valley hit the Turner field at 3,470 feet, and after penetrating the lime for nearly 500 feet un- covered a pressure of natural gas that lifted the casing in the hole and drove it up to the crown block in the derrick. As so often happens in cases like this, the equipment was damaged by the biggest fire-fighting job in their experience. The well burned for days, and the equipment was brought up with which to smother the flames. Its initial production was 21,000,000 cubic feet of gas, and 500 barrels of naphtha daily, and production held at these figures or better for a surprisingly long period. For nearly three years production varied from time to time and the picture of the clerks in the geological department trying to plot a "decline curve" for a well so unconventional in performance was often a source of amusement. Only within the past year has production of this well begun to decline. Royalite No. 4 was still producing at the end of 1926. Imperial believes that there are reserves of more than one quarter of 500 barrels of oil. 

In the year 1914, 501 oil burners of 1,721,747 tonnage included 441 vessels with steam engines, and only sixty vessels of 194,019 tonnage, with oil engines. In 1926, there were 3,558 vessels with steam engines, burning oil as fuel, while there were 1,093 vessels, in addition to 5,247 of the former total of 4,572,171. This, however, made 4,567 oil-burning vessels with an average tonnage exceeding 1,000,000 tons. Great as the consuming power of these vessels is, these figures are characteristic of the trend to oil.
THE COMING of the AUTOMOBILE

P. E. DOOLITTLE, M.D.

WE ARE sitting in a delightfully roomy rustic retreat some six hundred and nine miles north of Vancouver. We are a member by invitation of Premier Tolmie's tour to Alaska "Golden Twilight Caravan" and have traveled from Vancouver to Hazelton, which latter place is "Journey's End", and the northern end of the present B. C. highway system. The object of this Caravan is to stimulate interest in pushing on a highway to the northern boundary of British Columbia and across the Yukon territory to join up with a highway at the Alaska boundary to lead right up to the land of the Midnight Sun.

Nineteen years ago there was a dream of a highway from the U.S. Boundary way up to Hazelton on the Skeena River, and a Mr. Sands of Seattle, Washington, undertook to blaze a motor trail there. The seven weeks it took him and his two assistants to make the journey is an epic of the resourcefulness and endurance of the party and in one section where no road had ever existed it took twenty Cayuses to tote it and their luggage over one hundred and fifteen miles of wilderness.

Mr. Sands is with us on this modern trek and so is the Flander's car he drove nineteen years ago. He is not driving that old crock himself, however, but is seated behind the wheel of a modern eight and yesterday we rode with him nearly three hundred miles, which included the one hundred and fifteen mile stretch alluded to. We bawled along comfortably at forty miles an hour over a smooth highway through the wilderness of nineteen years ago.

Nineteen years ago the skeptics said there would never be a highway way up to Hazelton and today they are confronted with the completed road. Today there are skeptics who say Premier Tolmie's dream will not come true in his lifetime, but they do not live along any of the eight hundred and thirty-five miles already built and our prediction is that very shortly the scoffers' voice will be drowned by the sound of the steam shovel, the grader and the dynamite blast building it.

And what a country has been opened up thus far! What a delight for the tourist! Beautiful fertile valleys, luxuriant foliage on every hand and nearly always somewhere on the horizon the gigantic snow capped head of some mighty mountain. Near Smithers the present highway runs for many miles around the base of mighty Hudson Bay mountains, which rises nine thousand feet above the valley, and whose mammoth glacier is in full view at many turns in the road.

But as this article is on "The Coming of the Automobile", and not on the glories of Northern British Columbia, as the coming of the automobile in Northern British Columbia was as late as 1911, we turn our thoughts to our home city in Old Ontario, and also our cars southward after enjoying this beautiful retreat.

We had our first contact with the motor car in England in eighteen ninety-nine, when we were fortunate enough to participate in the emancipation ride from London to Brighton, when for the first time a horseless vehicle was allowed to travel faster than four miles an hour, and did not require a man to walk ahead waving a red flag. Some two or three years later Alexander Winton in Cleveland, Ohio built the first commercial cars in the United States, and of those one was bought by Mr. John Moodie, Jr., of Hamilton, only a day after the first commercial sale had been made.

About this time we became the proud possessor of a motorcycle which we purchased the motor parts abroad, and had a specially strong bicycle to assemble them on. This was the first motorcycle in Canada, and it served us well with its one and a half horsepower engine till we got the opportunity to buy Mr. Moodie's car, as he was going to Europe and intended buying one of the finest cars in a country that was foremost in car development at that period; and so we became the possessor of the first automobile in Canada.

The advances in automobile construction have been illustrated on this Caravan by the PH car chugging steadily if slowly along, and catching up from time to time to its modern fleet companions, but the improvements from 1911 to date are far less radical than those from 1898 to 1911. For instance gas in those early days was not only cheap, but was also of great volatility, and the efficient carburetor on that old Winton was a steel barrel like a small beer keg fastened on behind the engine. It had a hole in its top side, into which gasoline was squirted whenever the intake valve opened and that was suction controlled. A pipe from its side led to the engine and a hole in the bottom permitted the fluid, which had not been vaporized on perforated plates inside the barrel, to dribble on the ground. The body of the car was a conventional phaeton with the usual leather dash, but lacking the whip socket, and the steering was by means of a lever which, coming up through the floor near the dash, was hinged in such a way that it could be raised or lowered to any position. And that same hinged arrangement came in handy for when both hands were needed elsewhere the handle dropped between the knees and was easily controlled by them. The tires were of the single tube variety and could not be repaired, and when they began to leak we tried the expedient of putting some molasses in one and in another one we put a pint of milk. The
I M P E R I A L  O I L  R E V I E W

leak was stopped in each case for some weeks, and then the mollases began to oozee the casing, and finally the slick-fed one burrt and filled the air with an odour that is indescribable. We then had the rings changed to the detachable variety. The ignition was by a make-and-break mechanism inside the engine, and as there was no advance or retard to it, it had to be set to fire before the piston reached dead centre. This necessitated starting the engine, first getting the piston just on dead centre past the sparking point and then giving the one hundred and seventy-five pound flywheel two quick, powerful turns so that the flywheel would carry over dead centre against the force of the explosion. When we tried to start it under Mr. Moodie’s instructions he said to give it a quick turn but he did not say two quick turns, so we gave it one quick turn and let it go at that with the result that the flywheel carried it to compression and explosion, sending the piston backward and carrying the crank and us with it and we found ourselves knocked down and under the machine with a sprained wrist. We improved a few of the many detachments of that old car, for besides putting on detachable tires we fitted an ignition that permitted retarding and advancing the spark, and also a suction jet carburetor that stopped the waste of gas. Jack, later Sir John, Eaton, hearing that Moodie had bought a car made in Cleveland, purchased the mate to it, so that of the first four commercially built cars built by Winton two came to Canada. One incident regarding that Moodie car may be of interest. We drove it for a year or more, then sold it to a doctor friend who drove it a year and in turn sold it to a man in Belleville, who had it shipped there by rail, and after he had struggled with it for three weeks, got it on the long distance telephone and offered to pay our railway fare to Belleville (110 miles) and return pays any price we charged if we would go down and start the engine for him. Instead we wrote out some instructions and sent them to him and he got it going, and some years later, when we met him, he told us that he drove it for two years and then sold it for twice the amount he paid for it. (Note, please, second- and third-hand car dealer!)

We could go on for pages telling of the experiences of those early days, but will only cite one other case where a doctor friend bought a car from the Thomas Company of Buffalo and waited three months for delivery after the promised date. We accompanied the doctor on the final delivery date, and waited from early morning till late afternoon, when it came down from the factory, and was handed over to us. First it punctured a tire—with no repair kit available. Next it broke the driving chain and finally blew the gasket out of the cylinder head and flooded the engine—all in less than fifteen miles! Completely worsted, we pushed the machine into a friendly farmer’s barn and spent the night with him, and next morning the doctor’s facelifted friend, who accompanied us, wished to his families that we were walking home, and were carrying the machine on our backs.

Those events were only a quarter of a century ago, and what marvellous improvements have since taken place! In motoring to Vancouver to join Premier T liet’s “Golden Twilight Caravan”, we drove our car comfortably from Winnipeg to Swift Current, five hundred and seventy-four miles, in one day, and that in daylight with stops for three meals.

The great necessity for the modern automobile is roads and more roads, and we confidently predict that in a few short years we will be able to get in our car in Toronto and through Canadian territory motor comfortably westward and northward to the Alaska boundary, and then still on comfort to the land of the Midnight Sun.

P E T R O L I A, C R A D L E O F O I L - D R I L L E R S

By Selwyn P. Griffin

PETROLIA has shrunk, and its neighboring towns of Oil Springs and Wyoming, so closely associated with it, have shrunk proportionately; the surrounding country is as flat as a billiard-table and quite lacking in those inequalities of the land surface which go to make romantic scenery; nevertheless, romance hangs about many a neglected fence-corner or derrick-forested field, and the whole area breathes the romance of human excitement, human effort, of tragic failure and of dramatic success. There is the larger romance, too, which touches the nation, and, indeed, the whole world, for in this neighborhood was sunk the first well on this continent, and in its day the Petrolia field was one of the greatest of the world’s oil-fields. Moreover, methods and equipment, devised and perfected here, have gone with drillers, trained in these wells, to every oil-producing field on earth.

In 1857, J. H. Williams of Hamilton became interested in the gum-beds of Emskillo Township, near the present Oil Springs, and in 1858 had a well dug by pick and spade till he found considerable quantities of crude oil. This was the year before Colonel Drake drilled his famous well in Pennsylvania, the first in the United States. Williams set up retorts and boiled the heavy substance he had found, as he had previously boiled the surface gum, till he had a much lighter and more usable liquid. He drilled for water in 1860, and a real oil-well was the unexpected result. His well was not deep, and reached only through the blue clay, which underlies this whole region, to the rock. In 1864, however, James Shaw drilled through the rock at a depth of 165 feet to a depth of 240 feet, and his well a was a "gusher". It spouted oil into the air at the rate of many thousand gallons an hour. He had made no preparations for storage and did not know how to stop the well and capture its oil. So millions of gallons of it covered the countryside and ran away down Black Creek to the Sulpianum River, Lake St. Clair, the Detroit River and Lake Erie. Inexperienced as he was, and as everyone else was, it is hardly to be wondered at that he refused an offer of $25,000 for his property. He had no idea that his well would give out. It did, however, and some time later it yielded only a few barrels a day, and that with pumping. He died in poverty, but his experience greatly to the sum of the oil-drillers' knowledge.

It was Shaw's great strike which started the boom at Oil Springs. For three years the trek to Oil Springs was something like the trek of 1898 to the Yukon. A large population assembled as though overnight, and, in spite of comings and goings, became a permanent four thousand. They came from the end of the oil-fields of Pennsylvania, already producing richly. The country was a wilderness—muddy wilderness, with mud like that of Flanders' fields—possessing not a single road even

Fire on August 4, 1930, at the cargo pier of the Andian National Corporation at Cartaya, Colombia.

P a g e  N i n t e e n
remotely worthy of the name. A mushroom shanty-town sprung up and prices of wild wood lots soared to $100,000 in the heart of the Toronto of that day. More "gushers" were struck, which shot up, some 2,000, 3,000, 4,000, even 6,000 a day for months. A plank road was built over the twelve miles to Wyoming, then the railroad into Wyoming Railway. There were 300 teams drawing the barrels of oil at a fee of a dollar a barrel to the small refineries which were then installed in that little town. It was regarded as a metropolitan improvement, for previously, the oil had been drawn on stone-bottom boats, one or two barrels at a time, because wagons could not safely negotiate the execrable tracks that were the only avenues of communication. There had been an oil refinery at Oil Springs, the first in Canada, but it was more or less superseded by those at the railroad.

Oil Springs, during this period of the boom, developed the equipment of civilization. The main street was planked for a mile and a half with a double thickness of white oak. Trolley lines ran from one end to the other every five minutes. The streets were exquisitely lighted at night with lamps on ornamented posts. There were twelve general stores besides other specialist shops, and several hotels with suitable bars attached. A frame hotel, standing in half an acre of ground, was refused to an American who offered $9,000 for it. A plank road was begun in 1864 to Sarnia, and carried a continuous stream of traffic every day. Six stages ran daily. That road was built by those who sped lightly over it today in motor cars, few know that beneath the hard gravel surface lie the old white oak planks, which are soon to be lifted and taken away by the Provincial Highways Department to construct a pavement.

By this time, however, the Oil Springs boom was over. The flowing wells were fading, and as pumping became necessary, the oil-gamblers returned to nearer, fuller fields. In 1865 twenty-five wells stopped flowing in one week. Over-production, too, was beginning to glut the market, for there were few known uses of oil. Coal oil was the main product; lubricating oils and by-products. Gasoline was got rid of as a useless and undesirable commodity. Strange how the stone that the builders rejected has become the head of the corner! For while, however, the town held its own in a much smaller or under-developed condition. And that is it.

In 1865, when the Fenian Raid occurred, there was a hurried American exodus. A native of Chicago, who was employed by a Chicago company, was finished by the plasterers on June 2nd, the very day the raid was. It was never swept out. A little later for 21,233,000, bought by an American company for $60,000, was sold for $1,200. From 4,000 the population gradually shrunk to 200.

Meanwhile, the feverish activity of the drillers had been transferred to Pennsylvania, five miles north on the Adrian muskeg which extended for miles. It had been named in 1861 by the first postmaster, Patrick Barclay, and three others, from the petroleum which oozed out of the banks of Bear Creek and often covered its waters. George D. Poley, the first settler, had a house at the depth of forty feet, much like Williams' first well at Oil Springs, and found oil which they refined sufficient to make a half barrel. In 1865, the American Civil War came to an end. New markets had been found for oil, and the price of the barrel went as high as $100. The field was developing, and the excitement was building.

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Oil Tanks at Petrolia in the early days

The oil covered the countryside—the fields, the ditches, the roads. An American had long-handled ladies made at once, hired men, and scopped up hundreds of barrels from everywhere. It was days before that well was controlled. Finally John Scott went in and dug a well under the densest of oil with a log and chain. In a second he was drenched. However, he managed to fasten the log as a lever, and chained down the pump, which had been joyously jumping about in mid-air, and the well behaved itself. The cleaning of the log was an exhausting day’s work.

On one occasion Mr. McGaverty visited the oilfield, dressed very nattily in a fine new suit. He was wearing a white vest, and he had driven out to a beautiful new carriage with leather cushions. John Scott and another man, who were just about to knock the spit out of an oil tank to fill the waiting barrels, were both seized with the same impish spirit of mischief at the same moment. They asked Mr. McGaverty to step up and see what they were doing, but instead of doing it right and in line. Unsuspecting, Mr. McGaverty directed the process as he was asked. Suddenly the spit got out and a spurious sort of oil hit him square in the face, and soaked him from head to foot. He was a good sport and laughed it off, but very much enjoyed the leather decorations of his new carriage. McGaverty had a refinery in partnership with Woodward, and when in 1879 he went abroad, he knew the oil business inside out. Burghelm, a Jew, of London, England, got into touch with him through a friend. Burghelm supplied a great deal of the capital, and they formed an association. McGaverty went to Oel- helm, near Hanover in Germany, and opened his own workshops from Petrolia. He used to drive his own oil field, and he turned out their own oil. He used to pay very little, but did not get oil in paying quantities. Then, in the autumn of 1882, he sent a “rig” and four men to Uebera in Galicia, then under the Austrian domain. He was doing in a few years, now under the same conditions, but the night beside his horse a tear well off. The roar was terrific. In a few minutes it was all over. McGaverty’s first thought was of a crowd of Chinese. He met a frantic effort managed to get the gaslights extinguished and the fire put out. Then he found that in the excitement of the moment he had been working his own field of his own oil. The company expanded operations, and opened a large oil field in the field of the company, which flowed 50,000 barrels a day and baffled the staff for four days before it could stop itself. It produced for fifteen years. Mr. McCallum became manager of the field, and remained for fourteen years, until he entered a Hungarian company as a member. He managed his fields for fourteen years. Then the oil from the Galician field McGaverty became a multi-millionaire.

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Whole families go out, such as the Josh family. John Josh and his four sons have all been in the foreign fields. They are all retired now, living near Petrolia, except Blos Josh, who is home on leave from Pertas, and will go back.

As one lies in bed in Petrolia on a still moonlit night, one can hear a strange, low click-clack in the distance, slowly repeating till it gets on one's nerves. Then it suddenly dawns upon one's imagination that it is the noise of a walking-beam pump of an oil-well, pumping yet after all these years the dregs of one of the world's great fields—and it is not one's nerves that keep one awake; it is one's imagination.

Talking to the old-timers that are left—play that there are so few—one feels a cosmopolitan air about them. They are not provincial, even those who have never been abroad. Oil has made Petrolia one of the most cosmopolitan of Canadian towns.

It was great epoch, that discovery and development of oil in Canada. No matter what aesthetic pedants say, petroleum has changed—rather blasted—forward the course of civilization. Petrolia is the centre of the magic oil area in Canada. Its intimate history is of vital interest to Canadians. It should be gathered before it is too late.

In the gathering of as much of that history as appears in this incomplete record, the aid of Mr. A.W. Ellis of Petrolia has been indispensable. His local knowledge and his genial co-operation have been most generous extended. The “old-timers” whose memories are so valuable to be invaluable are Mr. John Paul, Mr. William Mctichean, Mr. John Scott, Mr. James Peat, Mr. John Dain. There are others, too. May they tell their reminiscences often, not only in the stories who remember those days as they do, but to the younger generation who can and should record them.

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REQUESTS for Imperial Oil's 1930 farm handbook “Weed Control” have been received from Burma, Germany, Greece, Holland, England, Scotland, the librarians of many leading universities, as well as from seed houses and golf clubs, to say nothing of thousands of farmers and students of agriculture.

The envelope reproduced here attests to the Company's fame, having reached the Regina division offices as quickly as others more specifically addressed.

In 1880, Winnipeg was more difficult to reach from Toronto than it is today. But in all that vast area which is Canada, in 1880, we had no transcontinental railroad, and the adventurous traveller who might attempt an all Canadian trip from the Queen City to the Gateway of the Prairies, would proceed by boat to the head of the lake where, at Fort William, began the steers to Lake Eastern and Western Canada. How long it would take to make the journey by boat and how long to batter a way through the wilderness between Fort William and Winnipeg, for the steel there was not yet completed, may be left to the imagination. It would be a weary travel.

Today, thanks to the aeroplane and the supplies of petroleum which hold it aloft, the traveller may start from almost any point in our settled territories and within a few hours, comfortably, easily and safely, penetrate even into the Arctic. Every day our prospectors, forest rangers and fishery patrol men are flying over country that even ten years ago was almost inaccessible.

The aeroplane has unlocked the treasures of this country. It has brought settled and unsettled territories closer together. It has effectuated a rapid improvement of our larger centres by air mail. There are, we may say, the wonders of the day and only within the past four or five years have been made possible.

The War gave - An early demonstration of carrying mail at Ralcklose Airport in 1923.

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that embraces all the principal centres of population. It operates with the efficiency and dependability of the modern railway and, of course, at much greater speed. Canada, with her vast territory and thinly spread population cannot hope to develop passenger transport as it has been developed in Europe, but she has applied aircraft to her own particular needs in a manner that justifies our pride and deserves to be more widely known.

As the War developed aircraft far ahead of its time, so aircraft has accelerated development of our national resources, and has almost immeasurably extended our knowledge of millions of miles of territory within our borders. This is one of the great services that have been rendered although we in the settled territories are for the most part conscious only of the essential small plane, military craft or civilian ship which paves our routes.

Air transport of mail is one of the less notable of our flying achievements, and yet figures relating to it are striking. There are now 1,064 miles of air mail and transport routes under operation and organization. They extend from the Atlantic seaboard to

in mineral exploration. Figures relating to flying of this nature exceed perhaps the most sanguine expectations, for last year 327,008 miles, equivalent to nearly twenty-two times around the world, were flown in the course of mineral exploration. Ease and speed of transport is, however, only one aspect of the service rendered by flying to our mining industry. The prospectors of five years ago saw, as it were, only the land immediately beneath his feet. Today from the air he surveys great stretches of land and his experience leads him directly to those points where he is most likely to find the precious metals that he seeks.

Lumbering is a basic industry that has been well served by the aeroplane, notably in fire protection work. Prompt information as to outbreak of fires and the ready access given by air to fire fighters and fire fighting equipment has saved millions of dollars worth of timber. Every mile of Ontario’s enormous timber limits is regularly patrolled. In the West, Federal Government fliers kept watch over nearly 100,000,000 acres of forest.

The aeroplane has revolutionized mapping and that is an important consideration for Canada, which as yet has accurately mapped only a relatively small part of her territory. Mapping is done photographically and the photographs not only depict the contour of the country but are rich in details of interest to the geologist, the lumberman, the waterpower engineer and all those who are concerned with the development of our natural resources. Last year the Civil Government Air Operations Branch photographed 75,000 square miles, which brings the total area photographically mapped by the Department to a figure in excess of 300,000 square miles.

Figures relating to aircraft mileage in Canada and transport of passengers and freight portray vividly the development of the past four years. Aircraft mileage in Canada for 1926 totalled 395,103 miles. In 1927, 829,010 miles were flown. In 1928, 1,723,814 miles were travelled by aircraft and in 1929 we achieved the gigantic total of 6,284,079 miles. In 1926, 724,721 pounds of freight were carried by aircraft; in 1927, 1,988,584 pounds; in 1928, 2,404,682 pounds. Last year the total of freight carried by air was 3,903,908 pounds. In 1926, Canadian aircraft transported 6,434 passengers. In 1927, passenger transport was almost exactly trebled. In 1928, 74,669 passengers were carried and in 1929, 124,751.

All of the total aircraft mileage for 1929, 6,284,079 miles, 490,640 miles were flown in air mail service so it will be apparent that great as has been the progress made in air transport of mails it represents but a relatively small part of all flying done in Canada.

Since January 1st, 1925, all aviation in Canada has been subject to regulation by the Department of National Defence and before that by the Air Board. Four branches of this Department have been organized to direct air operations. First of these is the Royal Canadian Air Force, which controls all military flying operations and training work. All Government flying of a non-military character is carried out by the Civil Government Air Operations Branch, while the Controller of Civil Aviation regulates all civilian and commercial flying. The Aeronautical Engineering Branch acts in the capacity of a consultant on technical matters with any or all of the foregoing three services. It also carries our research work and is the branch through which certificates of airworthiness are issued to machines licensed for flight in Canada. It also has charge of inspection of all machines flying in Canada which is made periodically. It has rendered valuable service to the aeronautical industry by compiling and disseminating aeronautical engineering data.

With all her enormous development in flying, Canada has maintained a splendid record for safety. This is attributed to the efficiency with which aircraft are operated in this country, and to the efficacy of Governmental supervision of all flying which has been enforced since 1920.
The Development of Farm Machinery

By Hon. Duncan Marshall

The greatest single contribution to the improvement of farm machinery, and the reduction in cost of crop production, has been made by the gasoline motor. Whether it be in the breaking of prairie land, in seeding operations, in harvesting and threshing, or in the preparation of the soil for a succeeding crop, the gasoline engine, perfected as it now is, speeds up these operations, performs them at a minimum of toil and effort upon the part of the farmer, and then, like the bear, hibernates for the winter, months at no cost for feed or care.

Up-to-date farm machinery has been made possible only by improved gasoline power; and tasks on the farm that once meant almost incessant labour for considerable periods of time, have become lighter and more congenial. The washing machine in the kitchen, the miking machine in the dairy stable, the tractor, the combine harvester, the United, and the motor car, all gasoline propelled, have relieved farming of many of its burdens and helped to make conditions in the rural districts far more liveable. Farm machinery and its development to present day perfection have been the result of the past century. Primitive methods of tilling the soil and harvesting crops are still used in some countries. In 1914 people were cutting grain with reaping hooks in Belgium, when war broke out, and as the men marched from the fields to join the army, the work was left to women, old men, and youths. In driving through Belgium in the last week of July 1914, I saw crops being laboriously harvested in this way. They were cutting rye, with long straw, and it seemed a very slow method of reaping.

The farmers who pioneered the eastern parts of Canada had to grow their first crops among the stumps of a "new frontier," as a newly cleared piece of land was called. The greater part of this land was heavily timbered and as the wood was unsalable it was piled into log-heaps and burned. The fires killed any vegetation that might be growing in these woods and left ash-heaps that made a good seed bed. A light plow was used to root up any sod covered portions of the ground, the grain was sown by hand, and was covered by harrowing with a butterfly harrow. A harrow of this shape was adapted to working among stumps and usually covered the seed fairly well. Frequently a hoe was used to cover the grain close to the stumps. Fall wheat was usually the first crop grown on new land in Ontario. This was a good cash crop and generally gave a fair yield so that it paid the cost of clearing the land.

In the very early years a reaping hook was used to harvest this crop but the inventive genius of the North American continent, soon produced the "grain cradle," and it was rather astonishing how skillfully this implement could be used by a competent man in a new field. In an open field fairly free from stumps, a good cradler could cut five acres in a day. I have known men who could hold a cradler and cut an acre, and as they had to rake the straw into sheaves, as well as tie them it was no light task.

Seventy years ago the late John S. McDonald, one time M.P.P. for Centre Bruce, then a pioneer farmer in Huron Township, Bruce County, used to shoulder his cradle in the early autumn and walk eighty miles to Middlesex County where he cut grain until the latter part of the home district was ripe, and during two seasons he remained south for the entire harvest because a killing frost had destroyed the crop in Huron Township. This is the way in which land was brought under cultivation in the wooded wilderness of Ontario.

Some years ago I heard Opie Read, sometime author and poet, deliver a short address at a meeting of the Chicago Puff Club. He was following a few remarks I had made upon agricultural topics, and he conveyed to his audience, by the opening sentence of his address, the information that he had had some farming experience. He said, "I've cradled log oats on a hillside." This was his only reference to the matter but it was eloquently convincing. It was a sentence that I well understood, and it was one that gave me an idea of what one of the most provokingly difficult a farmer could undertake.

Farming in the United States was begun earlier than in Canada and made very rapid progress. Large areas were brought under cultivation by the influx of new settlers, and as a field became moderately free from stumps a farmer would have his method of cutting the grain was sought. The scythe superseded the reaping hook and about 1776 the grain cradle came into use and for the next half century it was the best known implement for cutting grain.

Elder John Harris, Evening Traveller, a hundred years ago was not as convenient as it is today and so people on the continent of America were not very conversant with what was going on in England.

In the British Isles there were areas of land completely clear of stumps and roots, but labour was cheap and harvesting with reaping hooks was inexpensive. English farmers considered their grain fields very carefully and with a book almost every straw could be saved. Machinery for reaping was developed in this country, and by 1853, reaping machines did not come into very keen demand in Britain until many years later. In the United States Cyrus McCormick built a reaper in his father's blacksmith shop in Virginia in 1831. It cut grain very satisfactorily. This, the first machine on the American continent had several of the essential features of the grain cutting machines of today, namely, a sickle edged knife that worked back and forward, fingers, or for the knife to work through, a platform for the grain to fall on, and a reel to hold it in place as the knife came down. A man with a hand rake had to remove the sheaves. The self-reaper that delivered its own sheaf followed in 1858. Marsh Bros. of Delph, Illinois, built the Marsh Harvester in that year. Two men stood on a platform on this machine and tied the grain by hand as the machine cut it. The single reaper followed this implement and is still in use in some farming districts where small areas of grain are grown.

It was in 1869 that J. P. Appleby took out the first patent for a self-binding machine. This machine tied the grain with wire which did not find favour with farmers, but in 1875 he completed a binder that would tie with a cord. This machine was perfected about 1880 and since that time self-binders have "cut a wide swath" in the harvesting of grain crops.

One of the earliest efforts in the building of farm machinery in Canada was made by Daniel Massey in a little shop near the old mill. Mr. Massey was a pioneer farmer who cleared his own land. In 1847 he built the original Massey factory in Newcastle and in 1851 his son Hart A. Massey became a partner and "manager" of the business, taking it over as sole proprietor in 1857. This year that he built the "Manny" combined hand-reaper and mower. This machine carried the grain table, upon which a man stood and gathered the sheaves, setting them off with a fork. Men followed to bind these sheaves, and, like Daniel Massey, was a pioneer farmer with a bent
for machinery, and about the same year he began making plows and a wooden revolving rake, in a little shop in the County of Brant, Ontario. His son Alanson Harris joined hisfather in the business in 1857. It was John Harris, a son of this young man, whose inventive genius improved the Harris machinery and popularized it over Ontario. In 1872 the business was moved to Brantford where the firm operated, as A. Harris & Sons, until the merger of Massey-Harris in 1891.

The Massey-Harris Company took out the first Canadian patent for a self-binder in 1876. They moved to Thorold, Ontario in 1880 and built the Massey Low Down Binder. This was one of the first Canadian self-binders and was supposed to be a simpler machine, because it did not elevate the grain to be bound. It was abandoned in a short time, however, as the sheaves were much easier to tie and handle, and a scythe carrier was more easily attached and operated when the grain was elevated.

The style of binder then in use at the factory was afterwards changed, except for the substitution of steel for wood, and minor improvements in parts. The greatest difficulty the grain binder had to contend with was in harvesting large fields, where eight foot cutting bars were used, when the operation of the machine became too great a load on the drive wheel. This main wheel was the only operating power for the knife, canvases, and knotter of the binder, and if there was much wet weather and the crop was too heavy, the drive wheel would drag in the mud and the machinery would fall to work.

Combine harvesters and headers that cut and thresh in one, and in one, are used now for the same difficulty. The Massey-Harris marketed a header, or as they called it, a harvester, twenty years ago, but they never became popular due to the same difficulty. The Massey-Harris worked in the States of Washington and Oregon since 1900, but they never became either eastern or western, largely because they had to be operated through the drive wheel by the pulling power of a horse or, mules, that drew them. Frequently sixteen or twenty horses, or mules, would be hitched to one of these machines which greatly handicapped its convenience or successful operation. The perfecting of the internal combustion engine has made possible the economical and satisfactory work of the combine.

The first combined harvester and reaper made by the Massey Company. Two men were required for its operation and it did not itself drop the sheaves, which had to be tied by hand.

THE IMPERIAL OIL REVIEW

Two sections of the floating dredge, installed to serve the Company's Magdalena River steamers at Barranca-Dermojo, en route to Colonia.

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THE EVOLUTION OF OIL REFINING

By L. C. McCloskey, Assistant General Manager, Imperial Oil Refineries, Limited

MAN'S interest in petroleum and its utilization is a blend of romance and progress extending back to antiquity. Traditions indicate that its value and importance were recognized beyond recorded times and several outstanding references later made to its early and various uses are significant of the refining it had been subjected to by Nature in those remote times and the recognition of and necessity for particular characteristics for certain uses.

Noah, we are told, used goffer wood in the construction of his ark which was waterproofed within and without with "pitch", or weathered "bitumen," obtained from petroleum seepages prevalent in the locality where the ark was built.

Later, in the valley of the Shinar, in the futile attempt to construct the tower of Babel, bricks were used instead of stone, and "slime" (bitumen) was placed in mortar. Incidentally, the failure of this undertaking is attributed to the human element entering into such a gigantic task, and as far as we know not to any deficiency in the quality of the petroleum bitumen selected.

Still later in the migration of fire-worshiping nomadic tribes, from the cradle of humanity in Asia to the area now known as Eastern Europe, their courses were principally decided by deposits of flaking oil and suitable outcroppings or springs of petroleum or fires for their ceremonial activities. Into these they would dip torches for lighting in some of the earliest efforts at artificial illumination.

Even in those days, diversified uses necessitated selection of particular qualities for particular purposes. Some outstanding characteristics made certain petroleum deposits or springs partially refined by Nature, preferable to others.

In selecting pitch for the ark, Noah was guided by its ability to penetrate and stick. In the language of the petroleum technologist of today, it possessed a good "resistance factor." Change in body was slight at reasonable variations in temperature. Its "ductility" or stringiness was high to insure against brittleness.

Pitch of a different quality was required in construction of the tower, where its builders demanded a harder bitumen or, in our present scientific term, a grade of "lower penetration." Therefore, seepages of greater age were chosen which had hardened as a result of longer and consequently greater evaporation of the lighter portions by the hot rays of the sun, and "outfielded" due to long exposure to the air.

Neither of these grades was suitable for the fire worshippers. They sought a substance easily ignited, and selected seepages not subjected to Nature's refining for such long periods. Their requirements were not for waterproofing or construction, but for fire and light. Consequently we know today as "volatility" was important and determined the selection of freshier seepages from which these light portions had not been evaporated by nature to such a large extent.

Up to this time man did not attempt to refine or sort out the various fractions of petroleum for different purposes. Nature was the only refiner relied upon and her methods were extremely slow and wasteful.

Discoveries by archaeologists in more recent times reveal that in the valleys of the Tigris and Euphrates rivers in the country formerly named as Shinar and now known as Mesopotamia, bitumen was used extensively in construction and for various other purposes, and there is reason to assume some early refining methods may have been pursued there.

Approaching closer to the present there is definite proof at La Brea, on the deserts of Peru, that immediately preceding the conquest of that country by Pizarro and his Spaniards, about 1531 A.D., refining of petroleum was accomplished in a primitive way. At La Brea the Inca thus far known in the Incas or their predecessors in which seepages of petroleum were located on the flat surface of the desert.

The purpose of these holes was to collect oil oozing from the earth and prevent the seepage from spreading. In dabbling with petroleum seepages some observer Inca no doubt noted as did the early inhabitants of Asia that the older seepages were harder than the fresh petroleum exudations. Probably he saw vapor rising from the newer seepages during extremely hot days, vapors not being visible from the older deposits, and concluded the important factors were time and heat. The Inca, having previously learned to produce fire at will, now realized he had one of Nature's most powerful allies to assist him in speeding up refining. The Inca's interest in petroleum was to obtain a pitch for embalming or mummifying their dead by using it as a preservative. They used it also as a waterproof coating for beautifully designed earthenware jars or drinking vessels known as huacos (pronounced o coax) some of which, with other articles of the potter's art and ornaments of gold, were placed in the tombs of their dead.

Gathering of petroleum was accomplished by placing in the pot holes blankets made from the wool of the llama, a domesticated beast of burden. When saturated with this semi-natural refined crude oil the blankets were placed in clay kettles or horno, over a fire to speed up and assist Nature in driving off into the atmosphere the remaining fractions not required and not evaporated by the heat of the sun or oxidized by the air. When the petroleum was brought to a heat to make it sufficiently fluid the blankets were "wring out" and the distillation or boiling down continued in these open top clay kettles until pitch of the proper consistency remained, the blankets being used again as sponges for collection purposes. Thus nature was assisted by human effort in one of man's original attempts to refine petroleum.

The time element of refining was thereby shortened from a period of ages to a period of days, and quality was vastly improved, having been made available not longer only by approximate selection but by some what definite control. The early Spaniards in Peru later substituted open top cast iron kettles for the clay horno, but the method of distilling remained unchanged.

It is interesting to observe that the first uses of petroleum favored the heavier fractions such as pitch or heavy bitumens. As time progressed, man discovered that the lighter fractions formerly wasted were more valuable than the heavier fractions so far utilized.

Early important references to findings of petroleum in North America date back to about 1635. They relate to oil pits in the area now covered by the
States of New York, Pennsylvania and West Virginia. Black and dark green oil rose in abundance from the bottoms of creeks principally in Pennsylvania, and flowed from springs with water. In 1830 Indians in Canada discovered petroleum flowing on the waters of Bear Creek and Black Creek (later called Oil Springs) in Lambton County, Ontario. It was described in depression in the ground from which the Indians skimmed it off the water and used it as an ointment. Refining was not attempted other than by "boiling down" in open kettles to settle the water out more thoroughly and then filtering through woollen clothing or paper. The Indians had some commercial education from dealings with the white man, the Indians capitalized their discovery by selling the petroleum to him under the brand of "Rock Oil," "Magic Oil" and "Medicamentum," as a medicine to be applied externally as a cure for burns, sprains, headaches and rheumatism.

As time passed important developments took place in the United States, and a later in further mechanical improvements with consequent demands for petroleum. In 1870 Thomas Newcomen made one of the first steam engines to pump water out of mines. Four years later James Watt invented a stronger and less wasteful engine for the same purpose. In 1801 Richard Trevithick constructed a steam engine that travelled along the country roads in one of the first successful efforts to speed up transportation. Finally, on September 27, 1825, George Stephenson made history by a successful run on rails from Stockton to Darlington, England, in a steam locomotive of his own invention. This was followed in 1830 by the first run of a passenger train.

Spreading up of marine transportation had in the meantime received attention. In 1817 Robert Fulton completed construction of a steamboat "Clément" and was the first person to run one successfully when the initial trip was made that year on the Hudson River between New York and Albany. Such was the beginning of the steamship of today. While it was not apparent at that time, the invention of steam transportation and petroleum were destined to proceed into the future. In the second half of the 19th century, an ocean-going steamer was destined for a greater and still greater speed and comfort in various modes of travel.

About 1830 petroleum was collected systematically from brine wells worked for the production of salt in West Virginia and in many other instances the wells had to be discontinued as salt producers on account of contamination with petroleum. By this time machinery of various types had permanently entered into the picture and petroleum (even in its crude state) began to replace animal fats such as tallow and lard oil, also fish oils and vegetable oils. Petroleum, being less sticky and more fluid over a broad range of temperatures, reduced friction and gave greater protection to moving parts of metal machinery. Also, when in full operation it was safe in operation and thereby definitely establishing its reputation as a lubricant. Considerable improvements were made in its color and odor by filtering it through charcoal and other substances, but this was at best only a temporary expedient. A progressive development of a means to divide it into various parts and select those fractions best adapted to certain uses. In an endeavor to supplement petroleum supplies to balance the constantly increasing demand, the drilling of a well was undertaken by Edwin L. Drake at Titusville, Pennsylvania, and after reaching a depth of 69 feet, "rock oil" was struck, in August 1859. About the same time the first well was drilled in Canada by the old "kicking" process, and oil was discovered at a depth of about 25 feet at Oil Springs, Ontario, a short distance from Petrolia and approximately 25 miles from Imperial's present refinery at Sarnia.

Science, engineering and chemistry, although only to a very meager degree, began to enter into the refining of petroleum. Science had given considerable attention over the years to methods of distilling various substances, but the technique for separating vapors or "boiling" them out of petroleum, just as nature and the Incas had done, conversely cooling should convert such vapors back to liquid if they could be condensed, and thereby permit separation by gravity. In those days, nothing in respect to quality, was the method by which standards were afterwards judged for a long period. In those days, the crude gasoline was used as a measuring stick by those not familiar with improved methods, or inexperienced. Therefore, while crude gasoline was esteemed a definite asset in the still. The method of selecting each grade was determined not so much by the product coming from the condenser until a certain maximum weight or gravity was reached, when the line would be shifted from a lower grade to a higher grade. This made a further shift, or "cut", to a heavier grade. This was a demerit, which today means nothing in respect to quality, was the method by which crude gasoline was measured.

At this time, a distinct step in the direction of imposing the word "inca" were the Inca's wasteful methods of discharging the most valuable portions into the atmosphere and at last been superceded and whereas the Incas had shortened the time of refining from ages to days it was now further shortened from a period of days to hours.

As light fractions of gasoline were not in demand and the lubricating oil fractions were in excess of requirements possible was made to produce the maximum quantity of oil or kerosine. In some localities where early refining was conducted can be seen today traces of petroleum tar that was discharged on the ground account of the limited oil, but for the production of the desired gasoline fractions. The crude gasoline due to the small demand was also a common practice. At this time, further improve quality there was inaugurated about this time a chemical treatment whereby the impurities in the distillates were removed or extracted in the manufacturing of gasoline and these chemical treated oil and to effect a better separation of the two fractions were developed consisting of closed brick.
rooms filled with layers of perforated pans in which the wax was placed. As the temperature of the rooms was controlled by means of steam heaters to a point slightly under the melting point of the wax, the oil content gradually oozed out until only wax remained in the deposit, an agent known today as "absorption." A purified refined wax for manufacture of candles and other numerous uses was obtained.

With the introduction of kerosene stoves and heating apparatus, the demand for oil for production of artificial gas, and with a demand for asphalt for paving and other uses, refined asphalt and asphaltum gradually expanded to a well balanced, self-contained organization of various branches including 800 railroad cars of coal, and for construction of stills and tanks. Thus it was placed in a position to expand quickly and freely and, to render service not otherwise possible.

About 1900 considerable quantities of stave gasoline were used in lamps, stoves, and motor boat engines, and this demand was to be supplemented by requirements for a new development in transportation receiving recognition in the form of the "horsedrawn carriage," the forerunner of automobile, trucks and tractors. About 1905 sales of gasoline reflected the overthrow of skepticism aimed by the less progressive at any new development; the new motor of transportation had come to stay, and from then on the oil industry advanced by leaps and bounds for automobile and motor boat use was "70 Gravity Stove Gasoline" as supplied to motor boats, and "70 Gravity" as gasoline for automobiles. The gasoline was a "70 Gravity Stove Gasoline" as supplied to motor boats, and "70 Gravity" as automobile gasoline, and from that time on the 70 gravity standard of quality was established and quality of other grades measured by comparison at a long period.

Constantly increasing demand now made it possible to divert the power-making fractions from kerosene to combine with the formal "70 gravity" product for improved quality and increased volume. This resulted in a gradual lowering of the gasoline gravity. This sifting out or separation of gasoline fractions from kerosene with the consequent improvement in quality of both products was a further step in the march of progress. As a result of scientific and technical development the industry by this time had concluded definitely that the quality of products was directly comparable with the time element in refining, the shorter the time element for equivalent separations the better the quality of the product. A program of terrific expansion and economies, including, wherever possible, standardization of materials used in manufacture, and the possible use was made to speed up processes, thereby further improving quality, and getting out of equipment high capacity, thus reducing unit investment per barrel of throughput. Fractional distillation was utilized to its utmost capacity, developing the new "goose neck" and the simple piece of pipe for condensing purposes had now disappeared and been replaced by a system of jet coolers. Gasolines were separated into various units of equipment through which vapors passed and were divided or fractionated by air-cooling and sent to more efficient condensers from numerous fractionating columns. The by-products from these column included chemicals in treatment. This fractionating equipment was first placed on stills of an entirely new type. In this operation the individual stills or units were combined into one operation or "terminals" and were made to the first still and gradually flowing through to the last still. Whence what remained was pumped out for further processing for use. On each of the terms in the unit the overhead equipment for fractionating siphoned out and combined various stocks of like nature before condensing with still further economies and improved quality resulting. This was developed as the development of the oil industry had been purely confined to times, places, and events of interest for the purpose of using them as milestones to indicate progress, and outlines the reason for the industry's development rather than the development itself.

While the progress during the long periods of years between the Iroquois' early refining activities and the simple methods of 1905 was a great advance, it could not be compared to the strides made in oil refining between 1905 and today. The latter period of amazing progress in refining equipment and technique of manufacture brings up the question of the quality of oil. It is logical to expect that during the coming quarter century the progress of oil refining will be as outstanding and rapid as during the past quarter century. This question gives rise to another: Are the leaders in petroleum refining in a better position today to improve the petroleum industry in the next fifty years than in the beginning of the present century? That the answer to both questions is definitely in the affirmative, is apparent to careful study of the increasing efficiency and new developments of the past twenty-five years. Our constant endeavor must be improvement in quality of products, correlated with economy in production, which also pertains to more economic use of petroleum products by consumers. Our attitude to the consumer must be one of service backed by an organization equipped and anxious to cooperate in the way of research in solving the consumer's problems of requirement and service. The importance and benefit of scientific, engineering and chemical skill must not be underestimated and the organization must be expanded to the extent necessary by employment of the highest type of professionally trained men. As times progresses consumer of petroleum products will continue to receive advantages from our further efforts of research and development now being conducted. The problem of great magnitude must be met with far seeing vision and our work developed along orderly and well defined lines by those capable of efficiently undertaking it. It requires the expenditures of large sums far in advance of the time when any financial will be derived. It is a constant and highly important service but unfortunately of somewhat invisible character to the consumer.
IMPERIAL OIL REFINERIES

At upper left is Calgary Refinery, below it the Imperial Oil Refinery at Montreal East. On the upper right is the Regina Refinery with the Dartmouth Refinery below it. Toyo Refinery, which nestles in the Rockies on Burrard Inlet, is shown directly beneath, with Loco terminal to the right of it. At the bottom of these pages is part of the skyline of Sarnia, Imperial's first and largest Refinery, which because of its extent defies all efforts to embrace it in one aero-plane view.
AERIAL PHOTOGRAPHY APPLIED TO GEOLOGY

By Theo. A. Link

AERIAL photography is a science which received its greatest impetus during the World War and has since made rapid strides toward becoming an indispensable asset to many ventures in which maps are used. There are few oil companies without aerial photography maps of all important and many of the numerous potential oil fields. When aerial photography assumed something like its present state of development the petroleum geologist was not long in recognizing its value as a decidedly useful asset for extremely rapid and accurate mapping. To a geologist an aerial photographic map of an oil field is of great importance. On it he can see things of whose existence or interpretation an unaided observer could not have the slightest conception. In many cases the geologist is also able to detect things on the photographs of whose presence
he was entirely ignorant, in spite of the fact that he had already covered the area in question on foot.

Truly aerial photographs are used by the geologist what x-ray photographs are to the medical doctors. It would take pages trying to explain the many ways in which aerial photographs are being used by the geologist, and therefore, no attempt will be made to do so. The readers of the Review may possibly be interested in how these aerial photographs are made and assembled to be of use in prospecting for new oil structures.

Aerial photography is a science of its own. It is not upon the closest cooperation between petroleum independent departments, namely—the surveying branches, the aviation branches, the photographic department and the map-making department. If one of these falls down on the job, unsatisfactory results are to be expected. If the pilot of the plane is unable to fly his machine along a true course at a reasonably constant altitude the best photographic work will be of little use. On the other hand, if the pilot has completed his work in a perfect manner, poor photography will ruin all his painstaking efforts.

The following will be brought out more clearly as we go on with relief in its true proportions can also be observed on vertical photographs. The principles involved in this method are exactly identical and give the same result as those employed in the hand stereotypes which used to adorn the table with the family album in our grandmother's 'cabinet-sacramentum'—the parlor.

In mapping by means of aerial photographs the usual routine procedure is the same for any area but each locality requires originality on the part of the pilot as well as the photographer to cope with local problems and cover the average ground level at altitude, abundance or absence of lakes, wooded or open country etc. Let us assume that an area which has previously been surveyed in the usual fashion is to be mapped aerially. The available maps are studied, land marks are spotted such as lakes, villages, prominent hills, river courses, etc., a map outlining the proposed flights running north to south or east to west, as the case may be, is drawn on the model. The pilot then makes one or more test flights (reconnaissance trips) to acquaint himself thoroughly with the country. He actually rises to the height from which the photographs are to be taken and makes trial flights up and down the outlined course and thus gets himself thoroughly acquainted with the landmarks which he must use as guides for direction and he also studies the ground for possible forcing landing fields. Obviously the scale of the photographs is dependent upon the focal length of the lens and the height from which they are taken. The vertical photographs illustrated in this article were taken from an average altitude of 16,000 feet above sea level and resulted in a scale of about 4.3 inches to the mile. They have been reduced for illustration in the Review.

After the reconnaissance flight has been made the aerial camera is mounted in the cabin of the plane and photographing begins. A large view finder made of ground glass is also installed pointing through the cabin floor. The aerial camera is much more likely to be mounted in an ordinary camera but it is much larger and stronger, and adapted primarily for aerial photographic work. The Fairchild K-3 camera is the most popular in use today. It is loaded with roll films of one hundred exposures and mounted so that it will remain horizontal even though the plane may be slightly tilted. The camera can be operated by means of a crank or electrically so that after each click of the shutter the film is turned for the next exposure. In order to make a complete aerial map of a region, it is necessary to take the pictures so that they adjourn one another. Usually the time between each exposure is so arranged that the adjoining photographs overlap.

If this is done the pictures may be jointed nearer their centers where there is less distortion, and the overlapping parts of two adjoining pictures may be studied with the stereoscope. Thus the actual relief of the country is brought out and may be examined in true proportions. The usual practice is to effect a 60 per cent overlap so that all parts of the area may be observed and studied stereoscopically. By means of plane models or an electrically operated signal system the pilot and photographer are in constant communication during the process of photographing vertically from the plane. After flying and photographing along one of the lines of the grid the plane is swung around over onto the next line a mile or so distant (depending upon the scale used) and thus the process is repeated. This goes on until every part of the entire area outlined has been photographed. (See figure 5). The photographer is constantly observing through the view finder and must regulate the time between exposures, change film rolls, etc.

After the first photographic mission has been completed the prints are developed and contact prints are made. If for any reason the results are poor the work has to be done all over again. For this reason it is important to have the developing of the film and prints done immediately after the first flight so that

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The films used are also very expensive things to waste on incorrect exposures. While taking the pictures exposures are made in many cases every 25 seconds or even less. At that rate a great deal of the high-priced film is consumed during the course of an hour. Atmospheric conditions such as intensity of haze etc. determine what strength of colour filter to use on the camera. During cloudy or foggy days, or when distant forest fires cast their veil of smoke over an area, no work can be done. Delays caused by such conditions add materially to the cost of aerial mapping. It may be of passing interest to note that recently Captain A. W. Stevens of the U.S. Air Corps photographed Mount Rainier which lay at a distance of 227 miles in southern Washington. ("Aerial Photography by Infra-Red Rays", Scientific Monthly, August 1930, pp. 183-7.) This was done from a plane at an altitude of 17,000 feet in south central Oregon. Due to the ever present haze which prevents the naked eye, or one aided by telescopes, seeing such a great distance, it was necessary to make the exposure on a specially treated film through a yellow and red filter.

This remarkable feat in photography (taking a picture of an object not visible to the eye) is only one of the many recent developments in aviation as well as photography—"Aerial Photography". During the process of mapping, each roll of one hundred films is marked and after development each negative receives a number. In this way no mix-ups will occur.

To the point

The Canadian Bucking Championship contest was one of the features of the recent Calgary Stampede. Competition, always keen, was if possible even keener than usual this year in view of the handsome prize offered by Imperial Oil, Limited. Pete Knight, of Crossfield, won the event, and in the following brief note records his thanks:

"I would rather ride a "Bucking Horse" than compose a letter, but I wish to convey to you my heartiest thanks for the prize of $1,000.00 donated by your Company for the Canadian Bucking Championship Prize won by me at the Calgary Stampede. Thanking you once again, I am,

"Yours very truly,

(Signed) Pete Knight."

"On the bottom of the letterhead of the marketing department is this warning sign—"All quotations are subject to change without notice." This phrase somewhat adapted is the history of the petroleum industry and its marketing—"Subject to change without notice." And there have been changes so frequent and so violent as to be almost revolutionary. Fifty years seems not such a long while to look back upon, but fifty years in the forefront of its own department in Canadian industry is a very considerable period, and even those associated with the marketing department for half that time would have trouble in recognizing the company they made product by whose flickering and somewhat feeble light our grandparents read when there was time and material to read. Improvements in lamps and burners helped to make the oil a family necessity and one of the most prevailing products in every grocery store.
store. At first in Eastern Canada the dealer received his goods in barrels, as cheerfully as possible, stood any leakage and didn’t think of asking for a return. The barrels were shipped by rail, and it sometimes took two or three weeks for the delivery. The trainmen were instructed to deliver the oil in the morning, but the barrels were sometimes left sitting in the heat of the sun all day.

In the west, the oil was shipped in tank cars, and the dealer received his goods in a single tank car. The tank cars were pulled by a single locomotive, and the oil was delivered to the customer’s tank by the same locomotive.

In the middle of the 20th century, the oil industry began to develop a more sophisticated method of delivery. The tank cars were replaced by tank trucks, which were driven by experienced drivers. The trucks were equipped with a special valve system that allowed the oil to be unloaded without spilling.

The oil was then transported by pipeline, which was a more efficient and cost-effective method of delivery. The pipeline was constructed by drilling a narrow tunnel through the ground, and the oil was pumped through the pipeline at high pressure.

Today, the oil industry uses a combination of pipeline and truck delivery. The oil is transported by pipeline to the nearest major city, and then trucked to the customer’s location. This method of delivery is more efficient and cost-effective than any other method.

In summary, the oil industry has come a long way since the early days of barrel delivery. The industry has developed a more sophisticated method of delivery, which is more efficient and cost-effective. The future of the oil industry is bright, and we can look forward to even more advancements in delivery methods.
In making a profit for the Company and a livelihood for themselves, there is something to be said on both sides. There was a time when the oiler was hired to sell goods. If he couldn’t sell he paid the rent. He didn’t require, as sometimes seems needful today, a smattering of lax, a trick of the arch and architecture, a knowledge of real estate and what seems most important in these days of the “Gimme Club,” an apprenticeship under a gentleman whose signs consisted of three golden balls.

During those changes in modes of travel, changes in methods of handling came into being. With the growth of population and the growing demand for petroleum products, new supply depots were opened up all over the country. At first many of these were barrel warehouses, later replaced by tanks. The first sight some salesmen had of a 1 1/2 x 20 tank was when he arrived at a railway sidings to unload it. After a time experiences increased, but one salesman acquired an uncertain reputation because he hitched his horse to the side of the main line track. A runaway tank nearly removed about thirty yards of the right-of-way just before a passenger train, carrying the division superintendent of that railroad, arrived on the scene. The language that was used on that particular occasion became a classic. The general amateur method was to make a creak work of railroad ties, acquired when the section foreman was away, and a couple of telephone poles from the telephone construction gang during their absence. And let it be said of the trusty such lines roll the tank from the car to the ground. It stands to the credit of Sarnia refiner and the Company’s chief engineer that despite certain reactions that were bound at times to follow amateur methods of unloading the tank they remained tight. The first tank cars we had were combination box and tank. There is today a combination tank truck that is a stepdown of those old days. The tanks were something like pig boxes and some of them are giving deliveries today. These have been superseded by the all steel car of today with all its modern appliances, the horse-drawn by the motor tank truck, the tank wagon driven by the truck wagon salesman, and a whole volume could be written on that last evolution. Huge bulk storage plants on the Great Lakes, the inland waterways and canals, on the Pacific Coast, have brought into use the tremendous fleet of Imperial Oil tankers. One refinery has grown into six. Instead of three or four products, the salesman has now hundreds of articles to sell. All of the knowledge that skill and research can command are now at his disposal. A loosely knit company with some three or four organizations with perhaps different methods and different brands has now become one highly organized company operating under the same system and with the same general policies.

Farthest north in Manitoba—the Imperial warehouse at Sheridon was recently completed. Sheridon is a town laid out by the Sheridon-Caron Mines on their property. Warehouses, storage and a central heating plant have been installed. The property is held by the company and lots are being sold on a twenty year basis. The town is also the site of the first two hotels, a lumber yard, several retail stores, and the Imperial Oil Limited warehouse and tankage are among the principal buildings at this early stage of its development.
THE GROWTH OF THE FLEET

IMPERIAL OIL LIMITED has engaged in water transport of crude petroleum and refined products ever since 1899, two years after the removal of its then only, and now principal, refinery to Sarnia. It was not until 1921 that the Company engaged in ocean transport with its own ships, although previously considerable quantities of oil had been transported for it by chartered vessels. This development coincided with and was a consequence of Imperial's establishment, through International Petroleum Company, Limited, of sources of crude supply in South America. The ocean-going fleet was a necessary link between the Company's South American fields and its seaboard refineries.

How the operations of this ocean-going fleet have been expanded is suggested by the figures for 1929, when it transported nearly 14,000,000 barrels of crude and products, thirteen times as much oil as there was produced in Canada's oil fields during that year. It is now the largest privately-owned fleet under Canadian registry.

The Imperial fleet of 1899 consisted of three barges which were towed up and down the lakes and through the canals by chartered tugs. The fleet of 1930, Imperial's Golden Jubilee Year, comprises fifteen large ocean-going ships, nine of them motor driven vessels and six steam propelled, ten steamships for lake service and one barge, as well as river boats and numerous barges in Colombia. Last year the lake fleet carried 9,300,000 barrels of crude oil and refined products which brings the aggregate of oil transported during the year by Imperial's own vessels to 21,000,000 barrels.

Another indication of the progress made in the development of Imperial Oil's fleet is afforded by contrasting the Company's first tank ship, the steamer "Imperial", with the largest vessel now under the house-flag, the "C.O. Stillman", which has the further distinction of being the largest tankship in the world. The "Imperial", which is still in service on the Pacific Coast, carries 6,000 barrels. The "C. O. Stillman", which was commissioned in 1928, carries 163,145 barrels.

In 1921, when the Company decided to operate its own ocean-going fleet, it immediately launched into marine activities on a big scale. Six tank ships, all steam powered, were acquired. The total capacity of these was 562,852 barrels. The largest was the "C. Harrison Smith", named in honour of the Senior Vice-President of Imperial Oil, Limited. It had a capacity of 129,380 barrels and has since been sold. The smallest was the "Mina Brez" with a capacity of 47,650 barrels. The other ships of the original seagoing fleet were the "Calgarolite" and "Albertolite", each of 71,500 barrels capacity, and the "Vancolite" and the "Victoria", each of 119,410 barrels capacity. The original "Calgarolite" and "Albertolite", both have been disposed of. The "Albertolite" was replaced by another vessel, a tanker of 66,000 barrels capacity in 1929 and which took the name of its predecessor. The original "Calgarolite" was replaced in 1930 by a motor ship of the same name with a capacity of 125,000 barrels. The old "Vancolite" and the old "Victoria" also have been replaced by motor ships of the same names, each with a capacity of 121,000 barrels. These went into service in 1928.

In 1922 the two steam tankers "Montrolite" and "Trentolite" went into service. The former had a capacity of 69,600 barrels and the latter of 73,408 barrels. In 1925 the motor ship "Ontarioite", with a capacity of 104,428 barrels, was commissioned.

In 1926 the steam tanker "Montrolite" was disposed of and was replaced by a motor ship also named the "Montrolite" with nearly double the capacity of her predecessor. The "Canadolite", which also was launched and commissioned that year, has the same carrying capacity as the new "Montrolite", 135,000 barrels, and the motor ship "Reginaldite", with a capacity of 104,428 barrels also was acquired. A small steamer of 3,108 barrels, the "Puclite" was also purchased in 1926 for service along the Pacific Coast.
were producing engines with varied success. Many lasted but a short time, but history was being made. For example the use of hydrocarbons as liquid fuel in internal combustion engines was first really definitely attacked. We note in this connection an English patent taken out by William Barnett of Manchester early stated that the engine he referred to also worked with some easily volatilized base to protect the working parts from dust; and Barnett's engine as far as we know was never actually constructed. To Julius Hock of Vienna, is usually given the credit of building the first gasoline engine, which at that time was known as the "petroleum engine." This engine, built by the Maschinenfabrik Humboldt near Cologne worked on the Lenoir cycle, which, as was stated above, was low pressure. Petrol spray and air were drawn in to the cylinder through separate nozzles in the cylinder head for part of the piston suction stroke. Ignition was accomplished by means of a gasoline gas burner, directed against a flap in the cylinder head, which was opened automatically by the suction of the piston. The Hock engine was never greatly used, but is of interest to us today for the reasons that it was one of the first to drive the open ended cylinder with a truck piston which was directly connected with the crank by a connecting rod, instead of using a piston rod. All this is just as it is today, under the usual steam engine system. Both these features are in common practice today.

Mention should also be made of another pioneer, George Brayton, an Englishman resident in Philadelphia, U.S.A., who departed greatly from previous designs. In this engine, air was compressed in a separate cylinder, forced through a compartment filled with porous asbestos, kept saturated with gasoline. The inflammable gasoline-air mixture was ignited by a constantly burning flame, in a little chamber just outside the cylinder head, into which the gases passed to act upon the piston. Combustion did not take place instantaneously as was and is usual. The gases supplied to the piston at constant pressure for possibly ten percent of its stroke, whereupon cut off was effected and the gases took place during the remainder of the stroke. Because of this feature and of the fact that the engine was double acting, the Brayton engine was more like a steam engine. It was weighty for the power it developed and its complex mechanism led to its early abandonment.

The year 1876 is a memorable one, for it was then produced the real forerunner of the modern engine. Dr. Niemann, an English engineer, adopted the principle set forth by de Rochas, and developed the first Otto cycle internal combustion engine, and within a few years following its debut at the Paris Exhibition, in 1878, hundreds were put into industrial plants in Europe. The success of this particular engine provides the reason why the principles it embodied gave rise to the term 'Otto Cycle', although as intimated to Beau de Rochas really belongs the credit. The success, however, of the Otto cycle proved its portability inspiration and it is not to be wondered at that since its inception the record has been one of rapid improvement and constant refinement.

Up to about the early eighties, the speed of explosion engines had not been more than 200 R.P.M.

In 1883, however, G. Daimler brought out a new engine to which present day automobile engines with their high speeds and hydrocarbons as liquid fuel in internal combustion engines was first really definitely attacked. We note in this connection an English patent taken out by William Barnett of Manchester early stated that the engine he referred to also worked with some easily volatilized base to protect the working parts from dust; and Barnett's engine as far as we know was never actually constructed. To Julius Hock of Vienna, is usually given the credit of building the first gasoline engine, which at that time was known as the "petroleum engine." This engine, built by the Maschinenfabrik Humboldt near Cologne worked on the Lenoir cycle, which, as was stated above, was low pressure. Petrol spray and air were drawn in to the cylinder through separate nozzles in the cylinder head for part of the piston suction stroke. Ignition was accomplished by means of a gasoline gas burner, directed against a flap in the cylinder head, which was opened automatically by the suction of the piston. The Hock engine was never greatly used, but is of interest to us today for the reasons that it was one of the first to drive the open ended cylinder with a truck piston which was directly connected with the crank by a connecting rod, instead of using a piston rod. All this is just as it is today, under the usual steam engine system. Both these features are in common practice today.

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lamp or by hot exhaust gases. Into this device, oil was sprayed, gasified and mixed with a suitable volatilizer. The results of "charging" was fed to the power cylinder ignited by a "hot-tube" and burned out prior to fuel. And when this type was carried on in England by Hornby & Company, resulting in the type "H.A. Type." Later, in 1882, the DeLorean Machine Company secured the rights and produced the "H.A. Type." The original cycle principle with mechanically operated valves. In the cylinder head was placed a vaporizer or bulb shaped chamber, unjacketed by cooling water, hence the term "hot bulb." In this, the oil, at that time of a kerosene nature, was injected and vaporized while at the height of compression, the heat developed was sufficient to ignite it. Compression pressures were kept low, and the result was low power and danger of pre-ignition, were higher pressures used. Later modifications due to those who operated resulted in higher pressures and efficiencies, but the so-called semi-thermos or hot bulb engines of today have their prototype in the Hornby-Ackroyd, although the two cycle principle is adopted and the enclosed crank case is used as a scavenging air compressor.

The name to which heavy oil engines of today owe their chief inspiration is that of Rudolph Diesel—a doctor of a German university. The record of persistent striving of seemingly insurmountable difficulties to translate his theories into practice is one of the most interesting in the engineering achievements. In 1892, Dr. Diesel proposed an internal combustion engine which would burn coal dust, instead of oil, and whose design was based on fundamental thermodynamic principles the realization of which would lead to the highest efficiency. In other words heat was to be created at the highest temperature, and thrown away at the lowest, so that the difference in heat would be converted into useful work. A full discussion of such principles is not within the scope of this article, but what has been said is sufficient to indicate that engineers and scientists such as Dr. Diesel are particularly interested in extracting the utmost usefulness out of the products which nature bestows on us so bountifully, and which less earnest men would use wastefully.

Dr. Diesel proposed to compress air in the cylinder to such a degree that the resultant high temperature would ignite the solid fuel. The fuel was to be added at such a rate that the work performed by the advancing piston would just be equal to the heat energy liberated by combustion. In other words, during part of the stroke, during combustion, there was to be no direct use of heat, and after injection the gases were to be allowed to expand, without either absorbing heat or giving it up except in the form of useful work. The original experimental engine constructed by the co-operation of two German firms, M.A.N. and Krupp, had a very slight life, owing to the experimental nature of the work. New engines were built with various modifications of the original Diesel idea, chiefly the replacement of "constant temperature" burning by "constant pressure" burning. The idea of prolonged and controlled combustion was maintained, and the use of coal dust was replaced by heavy liquid fuel. In this way, the heat was to be spread over a longer period, in which the designer, metallurgist and machinist played their part for the high temperatures and pressures were extremely high on the materials available at the time, and failures of pistons and cylinders would encourage obstacles in the path towards reliability.

Ideals of economy of performance, dependability and simplicity were uppermost in the minds of the many workers, and to many of us, it is a monument to those early pioneers. In the air we have the combustion of fuel, and in the water, the power of the machine. Here, the most modern engine, offered by the new gas engine company, whose comparatively recent diesel aero engine has created much interest, particularly because of the extraordinary low ratio between the weight of the engine and the horse-power it develops. Since the original Diesel patents expired in 1935, the activity of designing dealing with all manner of applications of oil burning internal combustion engines has been so great that their reliability and long life has been abundant proof, for of the many units built a quarter of a century ago a very great proportion are still in operation.

In the foregoing paragraphs, we have merely outlined the general progress from the days of Huygens, on through the contributions of men like Lenoir, de Rochas, Otto, Ackroyd and Diesel. Properly to appreciate the efforts of the early pioneers, we must remember that they were greatly handicapped by the lack of suitable metals and precision equipment for fitting their engines. It is a far cry from the age of Wilkinson, contemporary of James Watt, whose stress, "Steam has hitherto enabled a cylinder to be so made that it was "not worse from absolute truth in the worst part of less than a thin expanse"—to the present day when high speed machines turn out cylinders whose walls are like glass, and which are true to within one ten thousandth of an inch. Understanding design and precision of manufacture have given us today the engine which at high speed takes us for hour after hour on the highways or in the air. In the design of every engine, there is a definite engineer, whose skill and judgment must be repeated, since power and weight of every part. Whole treatises are devoted to the mathematics relating to the solution of vibration problems of crank shafts, and the smooth operation of today's engine depends upon the very many small but very essential details in its size and perseverance on the long road between Huygens' machine and its modern descendant. Constant experimental work is used, to output some of the advantages included have given us today's smooth running engine. We cannot but hope that contrast that has come with the work of James Watt, who with his fine appreciation of what should and might be, lamented the "violence and horrible noise"

of a certain engine, which gave "universal satisfac tion to all beholders". "And, by the bye" he said, "the noise serves to convey great ideas of the power to the ignorant who seem to be no more taken with modest merit in an engine than in a man." While the investigation of thermodynamic and mechanical principles involved led to fresh discoveries year after year, the study of the phenomena of combustion that contributed greatly to the present day efficiency, and will not doubt in future play an even greater part. Mention has been made above of the great step forward in compressing the charge before ignition. The more violent the compression the hotter will be the temperature, and the fact that the charge is hot before ignition means that it will be hotter after ignition than it would be without compression. In other words, the higher the compression the more efficient the engine—and the more potential heat energy in the fuel will be turned into work. Moreover, the greater the compression the greater is the expansion for the same small area of the surface of the cooler cylinder walls, thus lessening the loss of valuable heat. The realization of high efficiency resulting from high compression has greatly influenced design and has also led to notable advances in the study of fuels and their behavior on combustion. It was early found out that compression ratios were limited by the strength of cylinder walls, pistons and connecting rods, but even when mechanical design and metallurgy had improved, thermal stresses were faced with the disturbing factor of "fuel knock". The engine is subjected to high compression pressures and then ignited "went off" in such a way, as to produce an instantaneous high pressure, instead of burning smoothly and rapidly. The results were many, and all prejudicial to engine efficiency, and for long it was felt that efficient high compression gasoline engines could not be attained. To the aid of the mechanical engineer came quickly the fuel injection. Study was made of flame propagation under various conditions. It was discovered that certain substances when added to the fuel increased its tendency to knock, while others had the very desirable opposite effect. On this side of the Atlantic, the discovery by Kettering and Midgley of tetra ethyl lead, and by E. F. W. L. Battey, of additives to提高 the octane number may rightly be considered as another major advance in the development of the efficient internal combustion engine.

The good work is still going on, for we are speaking now of comparatively recent days, and today with the co-operation of chemist, physicist, metallurgist and mechanical engineer, the hope for realization of higher efficiencies even for small engines is very bright, although the difficulties that would be encountered are very consistent with the problems appreciate their difficulty of solution most fully. Quoting McAndrew, the old Scottish marine engineer of Kipling's poetic insight, "We're creepin' on wi' each new rig—less weight and larger power". And then again "What I ha' seen since ocean steam began, leaves nae doot for the machine, but it doo' the man!" In the end, we must suppose that the principles which old McAndrew saw fulfilled in the machine—"Law, Order, Duty as the outer man, all the to the end of the ages"—are the characteristics of man happiness as they have produced efficiency in the steam and internal combustion engines.
On Sunday evening, October 5th, Imperial Oil, Limited, commenced its third consecutive season of radio concerts. Since their inception, these broadcasts have been known as the "Imperial Oil Hour of Fine Music", and have been classed with the other oblong broadcasts of the last season. The last season also made successful appearances in Italy and France in such orchestras as Tosca, Ernani, Pagliacci, Othello, Faust, The Magic Flute, and Carmen.

The first of the series was given by Jeanne Dusevaux, Canada's leading sopranos. Jeanne Dusevaux, known as the "Imperial Oil Hour of Fine Music", has been classed with the other oblong broadcasts of the last season. The last season also made successful appearances in Italy and France in such orchestras as Tosca, Ernani, Pagliacci, Othello, Faust, The Magic Flute, and Carmen.

Rene Mason, who is scheduled to appear on October 19th, is Belgium's leading tenor and principal tenor of the Grand Opera of Belgium. The National Opera of Belgium, and is given as the "Imperial Oil Hour of Fine Music". When Rene Mason, with whom the series has been classed, the other oblong broadcasts of the last season, has been classed with the other oblong broadcasts of the last season. The last season also made successful appearances in Italy and France in such orchestras as Tosca, Ernani, Pagliacci, Othello, Faust, The Magic Flute, and Carmen.

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EARLY DAYS OF CANADA'S OIL INDUSTRY

It was not until 1859 that production of oil on a larger scale began. In that year about 2,000 barrels were produced in Pennsylvania, which was sold at the staggering price of $20.00 per barrel. Like many good things, a twenty dollar oil could not last. Production increased rapidly that four years later it totalled 1,791,712 barrels, and the price dropped from $20.00 per barrel to ten cents per barrel. This holds all records in price deduction of crude oil.

It was at this inopportune time that James Shaw made his big strike at Oil Springs in Western Ontario. The well flowed 2,000 barrels per day, but owing to the lack of storage facilities most of the oil ran away into the creeks and ditches. Enterprising parties saw the opportunity to benefit through salvage, offering forty five cents per barrel for any of the lost oil they could save. However, Mr. Shaw was not at all interested in their offers and told them so in the sulphur vernacular of the early oil producers.

A start was made to refine oil in Canada for local lighting purposes as early as 1862. William Spencer built a refinery at Woodstock, known as the Cedar Creek Oil Works, while J. H. Williams built another refinery at Hamilton. Mr. Spencer purchased lots 15 and 16, Second Concession, Plymouth, surveyed them and founded the town of Wyoming. He later joined forces with Mr. Williams of Hamilton and built a road to Oil Springs. The crude oil was transported in barrels by wagons from Oil Springs to Wyoming and thence shipped via the Great Western Railway to Woodstock and Hamilton for refining. The process of refining crude petroleum was at

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Moncrieff & Co. These firms eventually amalgamated and operated under the name of The Oil Refining Co.

In 1870, an European export business developed and many more refineries were built. The Silver Star Works was built in London by Englehart, Glummer & Co. at the cost of $200,000. This was regarded as an immense plant at that time and they carried on a large export business. Affairs, however, took a downward turn. Exports diminished and general business declined. The Silver Star Works were bought by the London One Oil Refinery Company, together with many others. The principal ones were: J. L. Englehart & Co., John McMillan, John McDonald, Petrolia; Frank Ward, Wyoming; Woodward & Co., J. H. Fairbanks, Home Oil, Perkins & Gleson, McCullum, Mather & Co., Petrolia; Millar Bros., London; Sir Melville Parker, Oakville; J. W. Sifton, Paris; W. C. Oil Lands & Works, Producers Oil Company, A. M. Depper, Marchaville; Mutual Oil Company, Black Star Oil, Sarnia; Geo. Taylor; McKenzie & Sons, London; John Davis, Port Edward; John Baily, J. Robinson, Winento Bros., London; Baltic Ref. Co., Hamilton; Petrolia Crude Oil, Consumers Oil Co., Ont. Carbon Oil Co., Petrolia.

With the development of refining, production of crude oil increased to such an extent that the crude oil supply greatly exceeded the market requirements. In 1886, the production of Canadian crude oil reached the million barrel mark. This surplus necessitated stern measures. A syndicate was formed to protect the refining interests. The refineries were leased, closed or given a fixed quota of oil to supply the market. Though this measure was successful in curbing the output for a time, other refineries were built and other interests demanded recognition. Dissolution of the syndicate followed and over sixty leases were terminated.

The inevitable result was an upward shoot of production of refined oil similar to that of the production of crude and an over-supply of refined oil was created. The prices of refined oil dropped from 35 cents per gallon to twelve cents and from then on it was an open field. Business settled down to a sort of the street.

On September 8th, 1880, the Imperial Oil Company was formed, composed of the following firms: J. S. Englehart & Co., W. A. Fitzgerald & Co., W. Spencer & Sons, Waterman Bros., Geary, Minnicken & Co., T. D. & E. Hodgins, Walker & Smallman. The paid up capital was $800,000.00 and the officers were F. A. Fitzgerald, President, J. S. Englehart, Vice-President, W. M. Spencer, Secretary.

With the formation of Imperial Oil, Limited, came greater improvements in manufacturing as well as marketing petroleum products. Herman Frasch was engaged as chemist for the Company and fractional distillation was introduced. The introduction of fractionalization brought greater economy in production. Fractionation eliminated the great waste by recovering more products from petroleum. The advent of the internal combustion engine created a market for naphtha which had heretofore been a waste product. Likewise lubricants came more into prominence and as lubrication grew into a science, a greater variety of oil was demanded, thus enabling the refiners to utilize still more products from petroleum.

The demand for petroleum products grew apace until the Canadian refineries handled far more crude petroleum than the Canadian producers could supply. Crude oil had to be imported from the producers in the United States.

The Imperial Oil Company continued extending and increasing its business until 1898 it was already the largest oil refining firm in Canada.

Since then the development of the Company has continued.

From refineries covering from two to five acres and representing an investment of from $10,000 to $25,000 each, the oil industry in Canada has expanded until today it is represented by refineries which in some cases cover 400 acres or more and require an investment of millions of dollars. Where only one product was manufactured—kerosene or lamp oil, 291 different products are now recovered in the Imperial Oil Refineries.

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A CONTRAST

1930

Imperial Oil refineries receive 75,500 barrels of crude oil each day. This is delivered by pipe lines, by railway tank cars and by tank ships. Ninety-eight per cent. of it is refined into gasoline, oils, waxes, greases and more than 250 other products of petroleum.
The Industrial Relationship Plan of Imperial Oil was introduced on the 1st of July, 1978, as a form of endowment for employees. The plan was designed to provide benefits to employees, with the hope of encouraging this continuity and loyalty.

In 1918, the company, through W. J. Hannon, announced that the company was introducing a plan to its employees. The plan was to be a part of the making of the world, to instill the notion of the brotherhood of the battlefield. The inauguration of the plan at Sarnia, it was stated that the company was not "just feeling its way" as is presently being done. It was not the fault of the company, and it was not a response to the economic situation. After twelve years experience, it may be reasonably asked, what is the result, and what has happened since then? It may be noted that the results of the plan have been most satisfactory. While the company has learned to measure the results, they are more or less intangible, the sober conclusion is that the company has stood the test of time and the test of war.

The meetings of the joint councils are held in business hours and are called to discuss matters affecting the employees or officers, if necessary. At these meetings the council and the select delegates gather around the same table and discuss all matters relating to the company and its employees. During the twelve years the employees have been active and have signed over 2,000,000 working hours. They have been dealt with and 2,050,000 have been dealt with.

The plan makes a provision for the employment of an employee to vote in the election of delegates who will exercise their franchise. This, however, has been the case both in the plan and in the industrial world. It is true, in the plan, that the workers have the right of the interests taken by employees in the plan and of the success which has attended it in operation.

A Plan of Death Benefits whereby all employees, with twelve months or more of service would be insured without any cost whatsoever, with an insurance ranging from $500,000 to $2,000,000, according to length of service, was inaugurated in June, 1918. An Annuities Scheme was also inaugurated. Both these plans have been extended since their inception with some amendments which have made their provisions more liberal than as at first set down. By virtue of these plans, the financial benefit to which each employee with five years or more of service is entitled is calculated on the basis of $5,000.00. The death benefit for an employee with ten years or more of service is one year's full pay without any allowance. The financial benefit for employees with less than five years of service remains as originally set down. The provision made that the benefits were a great boon to dependents of employees. Experience over a period of eleven years showed that in many cases the Company Death Benefit was the only insurance accruing to deceased employees. In early 1978, the plan had been adopted whereby all employees with more than one year of service are eligible to purchase insurance without medical examination and at exceptionally low rates. Under this latter scheme an employee is entitled to insurance to the total of the nearest $500.00 above his annual wage or salary. The premium is paid monthly at the Treasurer's Department and deducted from the employee's pay cheque. Participation in this plan is not required of the employee. It was very well established by the fact that over ninety per cent of those eligible have subscribed to it.

Sickness Disability Benefits constitute another important part of the general plan governing relations between the Company and its employees. A scheme is laid down for payment of sickness benefits to wage earners, the schedule being based upon length of service. The maximum benefit of $60 per week for a period of two weeks for an employee whose term of service has been ten years or more. Salaried employees are covered from the beginning, equally generous, according to their terms of service. There is a special Tuberculosis Programme which the Company instituted some nine years ago. It is applicable both to the wage earner and the salaried employee. Each employee is considered under its merits and such arrangements are made as will be in the judgment of the Benefit Committee, best take care of each case and best assist the employee to combat the disease. Many expressions of appreciation of the services rendered by the Sickness Benefits and the Special Tuberculosis Programme are received every year. A quotation from one letter illustrates the spirit of the great majority of them:

"... said that we were more than ever before we had expected, in fact it never occurred to us that we would have taken such an interest in him as he was most generous in his charity."
treasury of the Company up to ten per cent. of his wage or salary. This treasury contributes fifty cents for every dollar so deposited by the employee. The money then is turned over to the Trustees of the Co-Operative Investment Trust. With it they purchase stock from the treasury at a price which is fixed semi-annually by the Board of Directors and which is ten per cent. less than the average market price of the stock during the preceding six months. More than 5,000 employees of Imperial Oil, Limited, have become shareholders in the Company through the First and Second Co-Operative Investment Trusts and this number will be substantially increased when the Third Trust terminates. The Co-Operative Investment Trust has proven not only a simple savings scheme but, because of the substantial contribution which is made by the Company, because of the advantages of price at which the stock is purchased and because of the appreciation in the value of stock over a period of time, a uniquely profitable investment plan.

It will be apparent from the foregoing summary of industrial relations that the Company’s efforts cover the four stages of a man’s industrial life. The years of health and earning power have their place in the Plan as well as the years of sickness and of old age. As an employee’s industrial life develops from stage to stage, constructive practical thought has pioneered his road and made the necessary provisions for all his requirements. During the time that he is able-bodied and competent to lay the foundation of the independent Co-Operative Investment Trust serves him. When illness comes the Sickness Benefit provides for him. When old age comes the Annuities Plan eases his load and finally, when he dies, the Death Benefits and Group Insurance give assurance that his dependants will be tended over the reconstruction period.

During the ten years from 1920 to 1929 Imperial Oil, Limited has paid out the following sums, which total $2,565,751.73:

- Annuities $732,507.15
- Death Benefits $630,800.85
- Sickness Benefit $639,191.47

The following is a list of Imperial Oil employees who are now enjoying the fruits of long and loyal service made possible under the provisions of the Annuities and Benefit Plan.
**IMPERIAL OIL REVIEW**

**THE JOINT AGREEMENT**

**FOLLOWING** is the text of the joint agreement which was introduced when the Industrial Relations Plan of Imperial Oil, Limited, was inaugurated. It is significant that this agreement which is annually approved by representatives of the men and the Company has undergone no revision during the twelve years since its inception.

**I. EMPLOYMENT DEPARTMENT**

This department will be organized at each of the Works, the official in charge to be responsible to the Superintendent of the works, and to have the following duties.

1. To Enlist All New Employees:
   (a) This will involve keeping in touch with the Foreman and Superintendents and being fully advised as to the employment needs in each department.
   (b) Applicant's should be helped from the following standpoint:
      (1) Follow such instructions as are set by the Board of Directors time to time.
      (2) No discrimination to be made on account of membership or non-membership in any church, society, fraternity or union.
      (3) Assist all personal interview whether applicant is qualified intellectually, and by experience, for the particular work under consideration. The result of such interview to be recorded in regular blanks and kept for the purpose of future reference.

2. To Act As Carrier for transfer of employees from departments where work is due to other departments needing it.

3. Employees Should Be Enquired of in the Employment Department by friendly counsel in personal meetings, or in writing, to retain their services if it is in the interest of both parties, subject to the conditions of the agreement.

**II. OFFENCES FOR WHICH AN EMPLOYEE MAY BE SUSPENDED OR DISMISSED WITHOUT FURTHER NOTICE**

The following is a list of offenses for which an employee may be suspended or dismissed without further notice; this list to be posted conspicuously in each department.

1. VIOLATION OF ANY LAW
   Special attention is called to the following:
   (a) Carrying concealed weapons; fighting or attempting to commit robbery or assault, to avoid arrest or to escape punishment, conduct which violates the common decency of the community.
   (b) Any act that will result in the injury or destruction of property of others or of the Company.

2. VIOLATION OF THE FOLLOWING SAFETY RULES:
   (a)违反 or not using safety equipment.
   (b) Riding on standard or narrow gauge equipment or on any other equipment unless rendered safe.
   (c) Running blocks on curves.
   (d) Trespassing on government property or in repairing or oiling of machinery.
   (e) Failing to use gloves that have been provided.
   (f) Smoking or carrying matches other than safety matches or having open flames while working in such practice is forbidden.

3. FAILURE TO REPORT DEATHS ACCIDENTS ON PERSONAL INJURIES TO THE DELEGATED AUTHORITY WHEREVER POSSIBLE.

4. MISINFORMATION (Including Return or Failure to Perform Work Assigned) or Failure to Follow Instructions, Made to Employees on behalf of the Company.

5. Absence from Duty Without Notice and Permission.

6. Disobeying a Direct Order on Account of His Own Carelessness Will Exclude Fellow Workers.

7. Changing Work Place Without Orders or Permitting the Work Away From Assigned Place.

8. Fainting or Refusing To Civil Treatment When Accidents are Being Investigated, or For False Information Under False Pretenses of a purchaser's name is being made.

9. Violating or Disobeying Respect to Damage to Railroad Equipment or Removal of Car Dropped to Cause Damage to Railroad Equip in the Challenge.

10. Working Not In or In Use of Company's Property.

11. Damaging Material or Taking Off Under Valuable Commissions in Exchange for a Job Better Working Place or any Change in Working Conditions.

12. Sleeping While on Duty.

13. Overruling or Receiving Money From Other Valuable Commissions in Exchange for a Job Better Working Place or any Change in Working Conditions.


15. Habitual Use of Harmful Drugs or Drugs on Introduction to Possession on the Property of the Company.

Any person found guilty of any of the offenses set out above shall not be discharged without first having been notified that a penalty of not less than three days' wages will be made to them liable to dismissal. Such notice may be given by the Foreman, who shall forthwith send a copy of such notification to the Employment Department.

**III. RIGHT OF APPEAL**

Any employee who finds himself in a position that has been subject to treatment or subjected to any unfair conditions, has the right of appeal to the General Superintendent and the higher officials of the Company, provided he shall first have to seek the matter adjusted by conference, in pursuit of any complaint, he has been given, shall report the case fully to his Department Superintendent. This appeal, after the excess is removed, he will be suspended, or, if for any reason, it is disapproved by the Company, an appeal may be made to the Executive Council of the Company, such a Council has never organized, it to a conference composed of all the workmen in the Works together with an equal number of Company Representatives.

**IV. WAGE ADJUSTMENTS**

Future wage adjustments shall be made in joint conference between the Employees' Representatives in the Division affected and Representatives of the Company, adjustments to be submitted to the approval of the Board of Directors.

**V. JOINT CONFERENCES**

Joint Conference of Employees' Representatives and Company Representatives shall be held at each of the Works at least monthly, to discuss any matter of internal interest, to maintain the general interests of all Employees' Representatives, and the number of such conferences shall be fixed annually at the call of the President. At all joint conferences the number of the Company Representatives shall not exceed the number of the Employees' Representatives.

**“The Law” in the Western Arctic. Royal Canadian Mounted Police auxiliary skinner St. Bath in the ice floe.**

**TRADING IN THE ARCTIC**

By R. T. LEAH, Faro North Division, Imperial Oil, Limited

A SERIES OF advertisements running in the newspapers across Canada give the public an idea of the part Imperial Oil, Limited is playing in the development and exploration of Canada's Arctic region. "Wings of the North," 'The Pilot Doesn't Worry,' and "Canada's Spreading Wings" were particularly interesting and were the inspiration of this article.

These advertisements very clearly describe the methods of transportation used to deliver Imperial products to Arctic posts, but no mention is made of the gallant little vessels which each year leave Vancouver and brave the dangers of the Point Barrow ice packs to deliver supplies to the Hudson Bay Company posts in the western Arctic.

Early in June the schooner "Old Maid No. 2" of the Hudson Bay Company's fleet, left Vancouver under the command of Capt. Fred Coe, virtually loaded to the gunwales with a cargo of which Imperial Gasoline, Aeroplane Spirits and Marine Oils formed the greater part. On July 8th the steamship "Bacchinos" under Capt. S. A. Cornwall, also headed for the north, and Imperial products also formed a large part of her cargo.

The "Old Maid" is a small two masted schooner with auxiliary power. Formerly she was owned by Capt. Klenkken, who for many years was an independent trader in the western Arctic, and who recently disposed of his interest to the Hudson Bay Company. The past adventures of this vessel and her famous skipper are now being written, and will soon be published. They will undoubtedly be excellent reading.

"The Bacchinos" is a steam vessel, especially designed for this work, and has withstood the battle with the Arctic ice for a number of years. The "Old Maid" laid her course for Dutch Harbour in the Aleutian Islands, where fresh water, meat, etc., was taken aboard. From there she sailed for the Bering Straits.

Old Maid coming alongside Imperial Oil dock, North Vancouver, B.C.
and followed the coast of Alaska to Point Barrow, where the real battle commences. The "Baychimo" follows a similar course, and being a faster vessel overtake the "Old Maid" at Point Barrow. Point Barrow is the most northerly tip of Alaska, and here the ice packs from the north pile up on its shores, and only open for a very limited period. The ship has to lie among the ice and continually keep a lookout to follow every movement of it. A gigantic game of checkers is played, where the ships are kept constantly on the move, trying to find an opening through the ice. Herschell Island, near the mouth of the Mackenzie River, is the first port of call. Here part of the cargo is discharged and passengers for points east, who have been in the Mackenzie River, are taken on. The vessel then again heads for a certain point, as Cambridge Bay, Coppermine River, Bernard Harbour, Coronation Gulf and as far east as King William's Land.

When one thinks of this vast expanse of uncharted water, the hazards of working ice and the battles with the extremes of the elements, that these ships have to go through, one will realize that it requires skill and nerve far above the average, and the Hudson's Bay Company is certainly very fortunate in having such capable men as Capt. Cornwall and Capt. Coe in command of their ships.

Once the cargo is discharged, the vessel about turns and heads back for Vancouver, via Herschell Island, Point Barrow and the Bering Straits. Considerable risk has been taken in getting out as well as getting in to the Arctic. To be a few days late might probably mean having to winter in the north, which, besides being a considerable expense to the owners of the boat would mean no end of discomfort for the crew. Once out of the Bering Strait, the vessel usually runs into the worst weather that the north Pacific is capable of sending out. The full storms of the north are respected by every mariner.

The return of the vessel to Vancouver is looked upon as quite an event to the waterfront crowd. Many strange tales are to be heard and many new photographs and curios are to be seen. The "Old Maid" usually winters in Vancouver. The "Baychimo" on several occasions has taken a cargo to the Old Country, where she is overhauled. The crew of the "Old Maid" are practically all Vancouver boys, while the crew of the "Baychimo" is signed on in the Old Country.

The writer of this article has had the pleasure of making good friends of the officers and engineers of both vessels, and the more one gets to know them, the greater the admiration one has for these men who are performing feats of exploration which no doubt will be very valuable to our country in the future, and they are doing this and taking it just as part of their daily work.
IMPERIAL OIL REVIEW

SARNIA OFFICE

Montreal, P. E.

Mississauga, Ont.

GALENA-SIGNAL OIL COMPANY OF CANADA

Keddy, Henry L.

MISCELLANEOUS

Hart, Plummer M.

DECEASED

Laidlaw, J. Ross

SARNIA

Hart, W. J.


decennial, A. W.

Manitoba, Hon.

20 Years Service

MANUFACTURING DEPARTMENT

Caladon, D. D.

San Francisco, C. A.

Lethbridge, C. L.


LONDON:


california, Fred

HARFORD:

Hart, W. J.

MANUFACTURING DEPARTMENT

MARKETING DIVISIONS

Montreal, P. E.

Boston, Mass.

New York, N. Y.

San Francisco, C. A.

Lethbridge, C. L.


HAMILTON:

Hamilton, A. R.


CALGARY:

Calgary, C.


EDMONTON:

Edmonton, H. W.

VANCOUVER:

Vancouver, B. C.

BRANDON:

Brandon, J. A.


56 CHURCH STREET, TORONTO

Coats, Fred H.


SARNIA OFFICE

Mississauga, Ont.

IMPERIAL PIPE LINE

Taylor, Floyd E.

FORT WILLIAM

North, E. A.

Pope, Secretary


DECEASED

Manitoba, Hon.

10 Years Service

MANUFACTURING DEPARTMENT

HARFORD:

Hart, W. J.

MANUFACTURING DEPARTMENT

MARKETING DIVISIONS

Hart, W. J.

Hart, W. J.

56 CHURCH STREET, TORONTO

Coats, Fred H.

SARNIA OFFICE

Mississauga, Ont.

IMPERIAL PIPE LINE

Taylor, Floyd E.

FORT WILLIAM

North, E. A.

Pope, Secretary
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**SARNA OFFICE**

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**MARINE DEPARTMENT**

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**GALENA-SIGNAL OIL COMPANY OF CANADA LIMITED**

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**MISCELLANEOUS**

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COLOMBIA CELEBRATES NATIONAL FIESTA

Brilliantly costumed toreros often elusively evading the mad crushes of angry bulls, "cowboys" in wild-west costumes that were hurriedly assembled for the occasion, rodeos including everything from steer riding and bronco busting contests to mule races, and athletic contests of every description were all included in the greatest celebration ever staged at El Centro and Barranca Borracha, on the Colombian national holidays, July 19th, 20th and 21st.

The celebration opened with a dance at El Centro Club on the evening of July 19th. On the 20th a golf tournament and hot hamburger endurance contest were held at El Centro golf club, followed by a noon buffet luncheon and dance at Barranca. A football match was also held in the morning between the "Obrero" and "Americas" teams, the Colombian employees afterward participating in various athletic contests.

In the afternoon more than 4,000 attended the annual bullfight and cheered the matadors as they nimbly and gracefully dodged the charges of snorting bulls. There were many moments when the crowd, tense with excitement watched the daring torero step carelessly aside as the bull's horns grazed his colorful costume. The climax came, however, when the torero, after apparently exhausting one of the most ferocious bulls, turned and made a sweeping bow to the grandstand. The crowd applauded wildly, and the bull, evidently inspired by the noise, turned bell pepperwise and charged the unsuspecting bullfighter. The torero was unhurt, but the bull played havoc with his braided pantaloons, seriously depreciating that section which usually gets shiny first in a blue serge suit. The torero, when he had recovered his breath, declared that this mishap was not an accident, as he was confident that the bull had done it "on purpose".

The regular Colombian Independence Day celebrations were held, with appropriate ceremonies, playing of the national anthem by a twelve piece band, and raising of the flag, and moving pictures were shown at night.

On the 21st the big annual rodeo was held, starting with a parade led by the "Buzzard Ranch" cook wagon and "Tropical Cow Pancake". Male and horse racing for ladies was one of the feature events, and the cowboys demonstrated their ability at bronco-busting, steer riding and roping, and horse racing.

The Colombian Troco Championship team "Transandino" contested the "Maraton" team from Bucaramanga and lost after a hard struggle.

The celebration closed with the annual "Veinte de Julio" dance at the club "Troco" and movies were offered at El Centro Club for those who were unable to dance, due to the strenuous activities of the rodeo.

Watching the bull fight. The derrick is fastened with excited humanity.

The R-100 at Montreals Above: the big British dirigible is seen at her mooring mast. Below is an aeroplane view of the Imperial Oil station at Saint Hubert airport, with three railway tank cars of Imperial Gasoline for the R-100 on the siding in the foreground.
Well No. 2706 at Negritos, Peru, blowing in on July 13th.
The photograph was taken as the tools were being removed from the hole and shows the well spouting oil at the rate of 2797 barrels a day.