The Editors Say:

They feel it hardly necessary to draw attention to the new spring dress of the REVIEW. The improvements, they hope, will be apparent at once. Since the New Year, the REVIEW's editors have been busy experimenting with new type faces and new page make-up and they trust that the changes will meet with general appreciation. For one thing, the new type faces are more legible than the old, while the new page-up allows for greater variety, and after all variety is vital to the spirit of life.

The editors are indebted to staff members and others who so generously came forward with articles and contributions to make this one of the largest issues of the REVIEW in quite some time, running on pages and cover. Articles, news and suggestions for improving the REVIEW will be welcome at any time.

The cover shows the deck of MS. TRONOLITE swept by heavy seas as she makes her way northward through the Caribbean Sea. The photograph was taken by Mr. Bill Herrocks of Tropical Oil Company, El Centro, Colombia. Mr. Herrocks' earlier photographs have appeared in the REVIEW on a number of occasions before, but this is by far the best. Incidentally, Mr. Herrocks is a Torontonian, now stationed in Colombia.

MS. TRONOLITE, skippered by Capt. O. V. Thomas, covers about 65,000 miles a year. The TRONOLITE is a 500-foot long, 500,000-gallons-of-oil and was built in 1938. She is one of the Imperial Oil Shipping Company's fleet of nine ocean-going tankers.

Recently developments in the Turner Valley have caused eyes to be turned Valley-way once again. It seems fitting, therefore, that the first 6 pages of this issue of the REVIEW should be given over to a special article on the Turner Valley. This article deals with the third and most important stage in the economic cycle of the Alberta oil field.

The Imperial Oil Saturday Night Hockey Broadcasts, now concluded, marked a most successful winter "on the air" for the company. With the touring season still several months away, letters from all parts of the continent are beginning to pour into Touring Service office at 56 Church Street, requesting returns and other information relative to motor trips in Canada. As a result of the broadcasts, tremendous goodwill has been created for the Company among patrons to the South, many oil whom, in turn, are very anxious to become better acquainted with this fair country of ours during the coming summer.

A Million Dollars Worth of Pipelines, by J. R. Simpson...

A Page of Pictures...

How We Discovered Ethyl Gasoline, by Thomas Midgley, Jr.

Gas Buggies of the Hudson's Bay Railroad, by A. J. Dalrymple...

Imperial Personalities: D. J. Avison...

The Imperial Oil Review is published periodically by Imperial Oil Limited, in the interests of shareholders and employees. Articles, photographs and news items dealing with the petroleum industry in general are welcome. While The Review cannot assume responsibility for return of unsolicited material, every care will be taken of material while in our possession. Correspondence should be addressed to The Editor.
TURNER VALLEY — The Third Stage

- Turner Valley has entered the third and most important stage of its adventurous career. Recent developments are of economic importance and widespread interest. With orderly development, a profitable future may reasonably be expected.

- Four groups of people are keenly interested in the oil business.
  - First there are those who are engaged in the production, processing or marketing of petroleum and its derivatives. Their livelihood depends upon maintaining a dependable supply of products suited to the needs of the market.
  - Then there are the consumers whose interests are centered generally in the manufactured products and who are vitally interested in an adequate and dependable supply at reasonable prices.
  - A third group comprises the investing public who buy oil stocks with a full appreciation of what is involved. They know that the petroleum industry, to an even greater extent than many other industries, is at the mercy of that variable and remorseless equation "supply and demand". They realize that a wildcat well may herald a flood of oil which will flow unchecked at the most inopportune moment. They realize too that a prolific oil well may be surrounded by dry holes. They know something of the rational scope of the industry and understand that happenings in far-off places may have repercussions at home. They have their money in a legitimate enterprise with a full knowledge of the risks involved.
  - The fourth group may know little or nothing of what transpires before gasoline is extracted from a pump. For them the history and statistics of the industry are told largely by the ticker tape. Sometimes luck is with them. More often the law of probability prevails in line with the fact that through the years the American people have put more money into the ground seeking for oil than they have taken out of it in recovered oil.

- Canada has lagged in the production of crude oil although fifth among the nations as a consumer of petroleum products. From the time of the discovery of the Petrolia and Oil Springs fields until 1900, production increased to a total of 915,000 barrels a year; thereafter it declined and by 1924 totaled only 161,000 barrels. It has since increased, and production last year, approximately 1,500,000 barrels, was close to the peak established in 1930.

- Notwithstanding our insignificant contribution to the world's oil production, Canada has had three oil booms and has recently been on the verge of a fourth. There was a boom in the 1860's in the Petrolia and Oil Springs districts. There was the Calgary boom following Dringman's discovery of oil on Sheep Creek in the Turner Valley in 1914. This boom attained such dimensions that shopping space in downtown Calgary was bid for at high premiums by promoters seeking places in which to trade certificates for bank notes. So brisk was the business that some of these promoters standing at their counters would scoop up the bank notes and drop them into baskets at their feet. Not until a feverish public had retired for the night would they have time to sort and count their takings. There was another but less spectacular boom in Calgary in 1924 after the Royalite Company brought in its No. 4 well which was such a large producer of gas and naphtha.

- Though it has been a center of keen interest ever since 1914, the Turner Valley did not become Canada's premier petroleum field until 1923. For many years the Alberta oil fraternity encountered unique difficulties. They were intimately acquainted with adversity. Their persistence does honor to their courage and there is now greater reason than ever before to hope that the pioneering efforts in the area will be suitably rewarded.

- The Turner Valley in its earlier years was variously called the Sheep Creek or Black Diamond field. Scoops of gas on the banks of Sheep Creek first excited the interest of oil seekers in 1911 and led the late Mr. Horatio Horsley to bring in the first producing well. Horatio Horsley's team brought in the Einarm well.

- The famous Dringman No. 1, first well, was drilled on what is now popularly known as Turner Valley. The existence of gas on the banks of Sheep Creek excited interest in 1911 and led the late Mr. W. W. Dringman and associates to begin drilling operations in January, 1912. Oil was struck in May of the same year. (Right) Horatio Horsley, pioneer driller, who brought in the Dringman well.

Page Two
The Imperial Scrubbing Plant in Turner Valley, photographed at 40 degrees below zero.

Turner Valley as seen from the top of Longview Hill, looking south-west.

Another view of the Valley, looking north from Longview Hill.

The Royalite Scrubbing Plant in Turner Valley, photographed at 40 degrees below zero.

Dingman and his associates to acquire leases and begin drilling operations.

Their initial well, the Calgary Petroleum Products No. 1, was spudded in the 25th of January, 1913, and completed at a depth of 2,718 feet in the following May, with a production of a million and a half cubic feet of gas and a few barrels of oil daily. The second well was hardly so successful, making only half a million feet of gas at 3,100 feet depth.

Reference has already been made to the misguided enthusiasm which the drilling of these wells engendered. The return the investors received for their return were the high-pressure salesmanship which capitalized on Dingman's success was meagre. The net result was that by 1920 the Turner Valley had

nine wells scattered over an area three miles long and three miles wide, each with showings of oil and gas to a greater or lesser extent, and five partially drilled wells which had run into difficulty or lacked sufficient funds for completion.

Meanwhile the Calgary Petroleum Products had started a third well and at a cost of $50,000 had constructed an absorption plant capable of treating three million cubic feet of gas for the recovery of 500 to 600 gallons of casinghead crude. Misfortune dogged their efforts; in October 1920 this plant was destroyed by fire.

Lacking sufficient funds to make a new start, the C.P.P. sought outside assistance and the Royalite Oil Company was formed to take over their assets, consisting of 14,000 acres of leases, two completed wells and one drilling well. The latter was brought into production in August 1921 with a capacity of 375,000 cubic feet of gas daily.

During that year the absorption plant was rebuilt along with new lines and a contract was entered into with the Canadian Western Natural Gas, Light, Heat & Power Company which constructed a gas line from the Valley to Okotoks, to contact with its main line from the Bow Island field. On the last day of that year, Turner Valley gas, for the first time, passed through the Calgary mains.

The idea persisted that the wet gas and light crude oil, found in the Turner Valley wells, were derived from some major pool lying at greater depth, and in September 1922 the Royalite Company spudded in their No. 4 well, designed to be a deep test of the underlying strata.

The completion of this well, in October 1924, ushered in the second phase of Turner Valley development, albeit in a rather unexpected manner.

The well did not tap any ‘major pool’, but, penetrating the entire series of younger rocks, it encountered a limestone, generally conceded to be the Madison, in which it secured a tremendous flow of gas, saturated with 73° gravity naphtha. After a spectacular fire, No. 4 was put on production and yielded as much as 600 barrels of naphtha daily.

Unmindful of the lessons of 1914, the speculating public again poured money into Valley promotions, some of which had but the remotest connection with the area. Insufficient knowledge of the complicated geology of the field led to many disappointments; drilling difficulties increased with depth and wells were too closely spaced, resulting in alarming reductions of gas pressures in certain parts of the producive area.

The greatest tragedy was the wanton wastage of billions of feet of gas. This irreparable and valuable natural resource was burned after the naphtha had been somewhat inadequately extracted from it. Eventually restrictive measures were enforced and production was set on a quota basis, but the Turner Valley, in common with most oil-fields, has reason to regret the errors of a prodigal youth.

Needless to say there were many problems to be faced by the operators in adapting themselves to the new conditions, and the field saw some revolutionary changes.

Originally the naphtha was hauled to Okotoks for shipment to Calgary by rail, but as the volume of production increased this method was found to be entirely inadequate, especially when the roads were bad. So a 10-inch pipe line for gas and a 4-inch line for naphtha was laid from the field to Calgary and put into operation in November, 1925.

Unfortunately the gas had a high sulphur content which was objectionable to domestic users and in 1925 a scrubbing plant capable of purifying 60 million feet of gas daily was put into operation.

Latterly, by co-operation between the Gas Company and Royalite, a portion of the surplus gas has been piped to the Bow Island field and returned under pressure to the depleted gas sands there, thus building up a reserve for future years. Some 8/3 billion feet of gas has been stored in this way during the past six years.

Amongst the many new companies to enter the field was the Dalhousie Oil Company which was formed in November, 1923, to take over the assets of the Southern Alberta Oil & Gas Company, the Alberta Southern, and Southern Alberta Refineries, Ltd., companies which had assisted in pioneering the Valley. One of the existing
wells on their property was deepened and produced from the time.

The Foothills Oil & Gas Company drilled in the north end of the Valley with moderate success. The wells of the Home Oil Company were prolific producers, both of naphtha and light crude oil. Spooner, McLenn (the deepest well in the field), Okita, Calgary, British Columbia, Lower; and Sterling Pacific were, more or less, household names.

Eventually certain portions of the field began to show a decline in gas pressures and the prevailing method of separating the naphtha from the gas consequently lost some of its efficacy. Recourse was had to absorption plants, the first being completed by Royalite in 1933. This company has now two such plants in operation. They are capable of handling 175 million cubic feet daily. Other interests have recently built absorption plants.

As time went on, the productive limits of the field were gradually extended, particularly to the south. The Merland well was the first to bring the south end of the valley into prominence and the Highwood-Savur section in 1934, added considerably to the proven acreage, which comprised an area approximately 14 miles long by one mile in width.

The year 1930 saw a record number of wells completed and in the same year production passed the million barrel mark.

Just as Royalite No. 4 in 1924 ushered in a new era in Turner Valley development, so the Turner Valley Royalties well, completed in the summer of 1936, began what might be termed the third chapter in the story of the field, and suggested startling possibilities as to its future.

Drilled on the west flank of the structure, and to reach its southern extremity, Turner Valley Royalties entered the limestone at 6,096 feet and, after drilling some 400 feet in that formation, encountered a 700-barrel daily flow of high gravity crude oil.

Last December the Foundation well, located about a mile north of Turner Valley, produced gas. The producing well was at 6,020 feet and secured substantial production, the actual extent of which is not yet determined because of a bailing being lost in the bore.

The next well to come in was Sterling Pacific No. 3, about a mile north from Turner Valley, and here the production was slightly over 100 barrels.

About a quarter of a mile south of T. V. Royalties, in T.S.D. 4, Sec. 24, Tp. 15, R. 2, the B & B Royalties well entered the limestone at 6,193 feet and made oil history by reaching into production with over 2,000 barrels daily, and in March Sterling Pacific No. 4 was brought in at 1,300 barrels daily. Undoubtedly these are the greatest developments in the checking career of the Turner Valley and will rank with the important economic events in Canadian history.

Here is the statistical record of the Turner Valley's developments up to last fall. Is it to be completely eclipsed by the new era ushered in by recent events on the west flank?

<table>
<thead>
<tr>
<th>Year</th>
<th>Oil Wells Complete Gas*</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to 1927</td>
<td>115,190</td>
<td>3,016,250,00</td>
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<tr>
<td>1927</td>
<td>38,260</td>
<td>14,870,000,00</td>
</tr>
<tr>
<td>1928</td>
<td>11,160</td>
<td>1,9,000,000,00</td>
</tr>
<tr>
<td>1929</td>
<td>260,020</td>
<td>1,01,000,000,00</td>
</tr>
<tr>
<td>1930</td>
<td>115,583</td>
<td>1,114,000,000,00</td>
</tr>
<tr>
<td>1931</td>
<td>40,709</td>
<td>2,09,300,000,00</td>
</tr>
<tr>
<td>1932</td>
<td>15,092</td>
<td>1,10,000,000,00</td>
</tr>
<tr>
<td>1933</td>
<td>8,695</td>
<td>9,9,000,000,00</td>
</tr>
<tr>
<td>1934</td>
<td>7,078</td>
<td>8,40,000,000,00</td>
</tr>
<tr>
<td>1935</td>
<td>7,462</td>
<td>8,75,000,000,00</td>
</tr>
<tr>
<td>1936</td>
<td>52,000</td>
<td>80,000,000,00</td>
</tr>
</tbody>
</table>

- Thousands of cubic feet.
- Including naphtha, discolored naphtha, crude oil and plant products.
JOHANSEE BUILDS HIMSELF A "KYAK"

By M. H. HAYCOCK, A.M., Ph.D.
Ottawa.

Some ten years ago I was privileged to spend a year among the eskimos of Cumberland Sound, that large arm of the sea extending into Baffin Island from the east and immediately north of Frobisher Bay. It was an experience which I wouldn’t have missed for a great deal.

At that time white men were well known to the natives, for whalers had frequented those waters for more than fifty years and for some years officers of the Hudson’s Bay Company and the Royal Canadian Mounted Police had been among them. The arrival of two ships during the summer months, that of the Hudson’s Bay Company and that bearing the Canadian Arctic Expedition, were occasions for every native for many miles around to gather together his family and journey to the post at Pangnirtung to take part in the business of loading and unloading freight and, more important, to enjoy the festivities attending the yearly visit of the “umikyuk”, or “great boat”.

In spite of his contact with white men the eskoa has progressed remarkably little in the ways of civilization, a fact probably due to the simplicity of his character and existence. He still builds his snow houses in the same way he has used for centuries; frozen mud is still to be seen on his sleds as runners; fashions in clothing are unchanged and the skins are still sewn with caribou sinew; and the skin boat, or “kyak”, is still built in the same way, except that wood and nails are now used in the frame in place of whale-bone secured with seal skin thongs. I was particularly interested in following from the beginning the construction of a “kyak”. The “kyak” typical of Cumberland Sound is somewhat more than twenty feet in length and very narrow. The cross-section is angular with sides tapering slightly downward and with bottom and top almost flat but for the slight rise formed in the bottom by the keel. Except for a small opening amidships where the occupant sits, it is entirely covered by seal skin.

Construction begins with the bending of four longitudinal strips of wood around two central cross-pieces which eventually form the frame of the “hatch”. The ends of these strips are brought together to form the sharp bow and stern of the craft. Rods and cross-pieces are then put in place until there are enough to support the covering.

Seal skins are prepared by allowing them to rot until the hair can be easily scraped from them. After such treatment the odours which they give off with only slight diminution during the remainder of their existence have caused me much speculation and many otherwise dull hours have been occupied in attempts to devise some alternative method for accomplishing the same result. There seems to be no solution, however, skins thus prepared are cut into angular shapes and sewn together into a single strip. This business of cutting them correctly, and presumably most economically, calls for great skill. Usually one woman in a district gains a wide reputation as an expert and when all is in readiness for covering a new “kyak” her services are enlisted. In addition to her reputation as a “cuter-of-skins”, the old lady shown in the accompanying photograph has one of the keenest senses of humor I have ever encountered in an eskoa, and as a race they are an exceptionally happy and humorous people in their simple way.

After the skins are sewn together with caribou sinew, they are stretched over the frame. This is accomplished by bringing the last seam on top and laying it with seal-skin thongs. The skin is stretched as tight as a drum-head by a rather unique method, which I have no hesitation in saying I prefer to leave to the natives. One man will seize the edge of the skin in his teeth and pull as hard as he can while another takes up the slack of the lacing. The procedure cannot be pleasant even though they seem to care not at all, but it is necessary because the skins are not allowed to dry until the sewing is completed. The women now attack the business of sewign up the top, using caribou sinew and steel needles, after which the “kyak” is allowed to dry. No further waterproofing is necessary, and while a slight moisture on the inside of the skin is tolerable when the craft is first placed in the water, the skin immediately swells and becomes watertight.

The complete outfit of the hunter when hunting seals or walrus in his “kyak” consists of a long knife, a harpoon and an inflated seal bladder. One end of the seal-blain harpoon line is attached to the back of the harpoon while the other is attached to the bladder. The blad of the harpoon is so arranged that it slips from the shaft as soon as it becomes embedded in the animal, and its frantie efforts to escape only serve to tire it so that it may be finished with the knife. In addition to acting as a buoy in preventing the prey from escaping, the bladder keeps the animal from sinking after it is killed, for at certain times of year when the coast

(Continued on Page 28)

MARCH-APRIL, 1937
A BILLION DOLLARS WORTH OF PIPE LINES

● In the oil-bearing States of Texas, Oklahoma, Kansas and California, more than 2,500,000 barrels of crude oil are moved daily through a vast network of underground lines.

By J. B. SIMPSON, Imperial Oil Limited.

The chief problem of the oil industry from its inception has been transportation. In the early days petroleum was transported in barrels by horse and wagon. Some 60 years ago the oil pipe line was introduced, and soon demonstrated its superiority as a means of carrying crude oil from the well to the refinery. Pipe line transportation of crude oil has largely superseded all other overland methods. It has made it possible for the industry to build refineries in or near large consuming centers rather than at or near the wells which are largely remote from centers of population.

Today the petroleum industry operates more than 115,000 miles of pipe line which was built at a cost exceeding one billion dollars.

In the oil-bearing States of Texas, Oklahoma, Kansas and California are networks of this underground transport system, and they move more than 2,500,000 barrels of crude oil each day.

Pipe lines are sometimes laid on the surface of the earth, but usually they are buried at depths varying from eighteen inches to four feet. The main lines, known as trunk lines, are mostly eight inches in diameter. The average cost of an eight inch line is from $5,500 to $6,750 per mile.

The oil is forced through the pipes by means of pumps operated either by steam, electricity, diesel or gas engines. The pump stations are located from 15 to 50 miles apart depending, of course, upon the condition of the country through which pipe lines extend and the viscosity of the oil to be handled. The cost of the average pumping station is from $125,000 to $750,000.

In the construction of oil trunk lines various steps are necessary. First, a reconnaissance survey is made of the route for the line. Rough country, swamps, rivers, etc., are avoided wherever possible and pumping stations must be located near a water supply. Where possible lines are routed along, or near, the railway's right-of-way. When the route is definitely determined careful surveys are made, maps prepared showing exact locations, grades and contours. In some cases rights-of-way for pipe lines are purchased outright; in other cases they are leased.

The specifications for the pipe require that it be of uniform quality of steel, that the threads be carefully made so as to ensure a perfect union between joints and that it be capable of withstanding an internal pressure which in some cases runs as high as 2,000 pounds per square inch, and which is normally about 1,000 pounds.

The actual construction work is commenced by the right-of-way gang who prepare the difficult places of the route selected. They remove the trees where these will interfere with the construction work, dig ditches and place casings at railroad crossings, build bridges across rivers and, where necessary, build roads to facilitate the handling and handling of the pipe.

Behind this right-of-way gang comes the stringing gang who distribute the pipe.

Following the stringing gang comes what is known as the pipe-laying gang. Where the work is done by hand, that is, using ordinary pipe tongs, this gang consists of about forty men. In this group are shakers, tongmen, rope men, etc., each having his special work to do in joining one length of pipe to another. In many instances the pipes are joined by a pipe machine. One pipe machine operated by a gang of 20 to 30 men can lay as much as 8,700 feet of eight inch pipe in one day of approximately eight to nine hours. In the old days the usual accomplishment of an ordinary gang of about 40 men was to lay from 2,500 to 4,000 feet per day.

Following the pipe gang comes the ditching gang. Their duty is to dig the ditch and bury the pipe. Where the route is through comparatively level country free from rock, ditching machines can be used to good advantage. Where the country is hilly, plowing the ditch with teams and shoveling the dirt out by hand is often advisable, but where rocky country is encountered it is often necessary to dig the ditch entirely by hand, blasting much of the material to be removed. In some cases the ditch is dug feet and the pipe joints resting on skids or sleepers are screwed into place over the open ditch. Where rivers or large bodies of water are encountered it is necessary to join the pipe on a flat boat or raft, which is moved along as the work proceeds. Sometimes a pipe line is not buried. This may be because the cost of digging ditches is excessive, or because of corrosive agents in the soil. It is usual in such cases to paint the pipe with asphalt preparation, then before the asphalt has had an opportunity to dry, to wrap the pipe with a good grade of butyl or rubber paper, and to apply to this covering another coat of asphalt.

The viscosity of the oil to be transported and the topography of the country through which the pipe lines pass determine the distance between pumping stations. The average distance between stations in Ohio and Oklahoma is 55 to 40 miles, while in California where a relatively thick viscous oil is handled, it is about 12 to 15 miles. Stations are sometimes not more than a mile and a half apart, and in extreme cases are placed as much as 50 miles apart.

The operating equipment at these pumping stations consists of a pump house, boiler house, tool house, garage or barn, an office, oil tanks ranging in size from 20,000 to 60,000 barrels capacity each, water tower, fuel oil tanks and feed water tanks.

LAVING THE SARNIA PIPE LINE

The first important pipe line development in Canada was undertaken in 1863, when two eight-inch lines were laid under the St. Clair river to connect Imperial Oil Ltd. and Sarnia refinery with the various lines to the Mid-Continent field.2,500 miles away. A horse hood was dragged in nealy every one of these lines and almost cutting off Sarnia refinery's supply of crude. The photograph shows the laying of the line back to 1863.

MARCH-APRIL, 1937
Equipment, such as engines and pumps, is usually provided in excess of ordinary needs. A station is ordinarily equipped with five engines and five pumps. One engine and one pump are always held in reserve to meet emergencies or unusual demands. The pumps are designed to deliver through an eight inch pipe line approximately 28,000 to 30,000 barrels of oil each 24 hours.

In addition to their trunk lines, practically all of the pipe line companies engaged in the transportation of crude oil have extensive systems of gathering lines. These are provided for the purpose of collecting the oil from the producers' tanks and running it to a tank farm, where it can conveniently enter the main trunk lines. Generally gathering systems are owned by the producing companies, and not by the pipe line companies who operate the trunk lines. The pipe used in gathering systems usually is smaller than the trunk line pipe, ranging in size from four to six inches in diameter.

As in railroad operations, it is necessary to provide pipe lines with means for instant communication between different parts of the system. For this reason it is usual for the pipe line companies to own and operate their own telegraph and telephone systems. The telephone lines usually parallel the pipe lines, and are constructed along the same right of way, so that the line walker who patrols the pipe lines can also look after the condition of the telephone and telegraph system.

A pipe line system is administered from a general office, and from branch offices or stations located at convenient points in the territory served. The system is divided into divisions, each division being under the supervision of a general superintendent. The division is in turn divided into districts, each district being in charge of a chief engineer, and under him four engineers, four telegraph operators, and a line walker. The chief engineer reports directly to the superintendent, and the superintendent in turn to the general manager.

Oil pipe lines are considered to be part of the plant facilities in the integrated oil industry. They are different from railways in that railways carry all manner of freight, whereas oil pipe lines are limited to one product, petroleum carried in one direction from a diminishing source of supply. The risk and hazard in this game is clear when it is realized that oil companies invest huge sums of money in pipe lines and risk their all in running these lines to newly discovered oil fields that may become depleted in a few years. There is, therefore, nobody to whom the oil companies can sell pipe lines for any other use. It should be understood that the quantity of oil pipe lines can transport is regulated by the amount that the consumers at the different points require, rather than by the capacity of the lines. (Continued on Page 52)

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**When the “ALBERTOLITE'S” STEERING GEAR BROKE**

- On the night of January 3rd, the Imperial Oil tanker S.S. "ALBERTOLITE" was bucking her way up the west coast of Vancouver Island and early on the morning of the 4th, her steering gear was swept away by a giant wave. While her gallant crew, under Captain A. A. Mosher, fought to repair the damage, the wind screamed and the sea pounded as the helpless ship drifted closer and closer toward the perilous reef.

The "ALBERTOLITE", manned by a crew of west coast seamen, was proceeding to Port Alice, Quatsino Sound, with oil, and making fair progress in a screaming gale, with high seas running, when an unusually heavy and massive greyhead piled up with a hissing of breaking foam, and dropped hundreds of tons of solid water on her deck. In that instant the steam steering gear was hopelessly wrecked, and the ship rendered helpless before wind and seas that began to drive her toward the rocks, about thirty miles distant.

Captain Mosher immediately gave orders to rig the hand-steering gear. This is on the open deck, and in order to get it into operation it was necessary to line it up so that the chains could be made fast to the rudder quadrant by pin connections. It was necessary (Continued on Page 22)
FIRST STEPS TO OTTAWA

The Imperial Players Guild, as it was formerly called, The 56 Church Street Players Guild, has been in existence for just two years and in that short time has secured a membership of close on a hundred. During the 1936/7 season two three-act plays were presented at the Margaret Eaton Hall, Toronto—"Outward Bound," by Sutton Vane, and "Dear Brutus," by Sir J. M. Barrie. During the 1936/7 season, just terminating, were presented "And So to Bed," by B. J. Fagan, and "Kind Lady," by Edward Chodower. These four plays proved to be excellent entertainment and were much enjoyed by the audiences. The fact that none of them can be called in any way easy for amateurs to tackle must be a source of satisfaction to all concerned.

The Club Room or Play Shop, where plays are rehearsed, also houses a Little Theatre with a seating capacity of 60 and affords every facility for the presentation of plays on a small scale. It is through initiation in the many plays which are presented there by and for members that material for the bigger works is secured.

Having satisfactorily gained a footing in the amateur dramatic field it was decided to apply for participation in the Dominion Drama Festival, not with any misconceived notions of the Guild's prowess, but in due humility as a young aspirant. It was with much enthusiasm that the invitation was received. Little time was afforded for the selection of a play and that fact coupled with the fact that rehearsals for Chodower's "Kind Lady" were already in progress, determined the advisability of entering in the Festival an act from that play. On Thursday, 25th February last, the great moment arrived and Act II was presented at the Hart House Theatre before M. George de Wartafz, the adjudicator for the Central Ontario Region. The cast taking part comprised the Misses Louise Brown, Dorothy McParsiquay, Joan Bogus, and Messrs. A. LeRoy, Bob Sutton, and David Thompson.

M. de Wartafz, in his final report, commented on the low voices which made audibility difficult; a failing which was rectified at the Margaret Eaton Hall the following week when "Kind Lady" was presented in its entirety. The play itself did not particularly appeal to the adjudicator but, nevertheless, it drew from him the admission that it gave the players a good chance for some difficult acting. In conclusion he stated that "this company could do some very good things indeed and they have plenty of talent."

The Guild did not reach Ottawa this time but a lot has been learned. Much experience has been gained, which will be invaluable in the future. And further attempts will most assuredly be made. A goal has been set and whether or not it seems a long way off does not alter the fact that the enthusiasm and the will are there.

Louise Brown as Mary Herries, Athol Mitchell as Lucy Westen.

CANADA'S FASTEST-GROWING INDUSTRY

Mining is rapidly forging to the forefront of Canadian Industry—oil and is smoothing the way.

By JOHN W. DOHERTY
Advertising Department, Imperial Oil Limited.

No industry is less prosaic than the mining industry yet in no industry perhaps are prosaic statistics so helpful in conveying an adequate idea of progress and achievement. Thus, we are told that "mining in Canada has arrived"—or that "1936 was a momentous one in the history of Canadian mining" but we do not fully grasp the meaning of these conventionalized statements until we are also told that "in the last four years Canada has more than doubled the value of its output of metals"—that "Canada ranks first in the world as a producer of nickel, platinum and asbestos, second as a producer of radium and zinc, third of gold, silver and copper, fourth of lead"—that "in 1936 new gold mines started to produce on 55 different properties scattered between the Atlantic and the Pacific and Canada today has at least three times as many gold mines steadily grinding out ore as the had three years ago"—or that "about 500,000 Canadians are directly dependent upon the mining industry for a livelihood and hundreds of thousands more are indirectly benefited by its development."

Canadians don't need to have figures like these quoted to them to realize that agricultural products are of major importance in their national life. But mining in Canada is different. It is conducted for the most part in isolated sections of the country that few people ever visit unless on business bent, and its products are rarely seen by the public eye until they have been
metamorphosed into finished articles which give little
inkling of the great industry that made them possible.
All the minerals that come out of Canada's mines seem
to defy publicity but gold is the key of them all.
No sooner is it blasted out of its subterranean home
than it assumes the disguise of a brick and rides off
to the Canadian mint in a sealed compartment to hide for
the rest of its life in the musty vaults of a financial
institution here or in some other country. A compar-
tively small amount of gold every day above ground
is used for ornamental purposes.

To understand properly what mining is doing for
Canada it is necessary to visit actual properties and
catch the spirit of the industry. It is also necessary
to pretend that one is a genius with ability to see the whole
vast mining panorama as it spreads from coast to coast
and purses its way further and farther north. A keen-
eyed genius would not fail to notice the invaluable
pioneering work that is being done by Canadian min-
ing. He would see the old frontiers bounding the
agricultural 15% of Canada's territory being literally
shoved back into the hinterland and a new 2,460 mile
frontier of mining development taking its place. He
would see a chain of mining camps binding together
Eastern and Western Canada in a new community of
interest.

In addition to its pioneering work and development of
previously neglected country, mining is contributing
in numerous other ways to the building up of Canada.
Many of these ways are invisible to the human eye but
one keen-eyed genius would be able to perceive them.
He would see mining assisting Canada through a period
of depression and reduced foreign markets by provid-
ing a new major source of foreign trade. 90% of the
merchandise produced in Canada see for foreign consumption
and the value of these exports during 1936 was more
than $200,000,000. He would see mining providing a stimulus to all Canadian industry, opening up new
markets for farmers and manufacturers, creating new
traffic for railroads and aviation, making new jobs for
thousands of Canadians. A list of purchases made
recently by a large Canadian mine for purposes of ex-
pansion gives a good idea of the appetite of mining for
the many different products of industry. These
purchases, when translated into carload lots, make the
following staggering list:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>202 cars of cement</td>
<td></td>
</tr>
<tr>
<td>47 cars of railway equipment</td>
<td></td>
</tr>
<tr>
<td>93 cars of lumber</td>
<td></td>
</tr>
<tr>
<td>184 cars of machinery</td>
<td></td>
</tr>
<tr>
<td>40 cars of fuel</td>
<td></td>
</tr>
<tr>
<td>36 cars of reinforcing steel</td>
<td></td>
</tr>
<tr>
<td>263 cars of brick, tile, lath, etc.</td>
<td></td>
</tr>
<tr>
<td>176 cars of firebrick and magnesite brick</td>
<td></td>
</tr>
<tr>
<td>93 cars of gravel</td>
<td></td>
</tr>
<tr>
<td>50 cars of piping</td>
<td></td>
</tr>
<tr>
<td>302 cars of structural steel</td>
<td></td>
</tr>
<tr>
<td>106 cars of material for the stack</td>
<td></td>
</tr>
<tr>
<td>18 cars of miscellaneous supplies</td>
<td></td>
</tr>
</tbody>
</table>

Total shipments for this one mine filled 1,700 rail-
road cars, or approximately 55 average trains

One of the most necessary products in the operation of a mine is an adequate supply of oil in its various
forms—gasoline, fuel oil, lubricants, etc., and Imperial
Oil Limited with its refining and distributing facilities
throughout the length and breadth of Canada has
served the mining industry since its early days by mak-
ing these products available wherever they might be
required.

In the case of a mine which is isolated from
electric power, fuel oil and gasoline to

- Imperial Oil products play an important part in
keeping mining machinery operating smoothly. (Right)

- Above and below ground in mines of Canadian mines,
metal is handled by machinery fabri-
cated with Imperial Oil prod-
ucts. Here ore is being moved
by corrugated ball from the
workings to the skull, to
be hoisted to the surface.

- Imperial Oil’s Fort Norman oil wells were not far distant—a mere matter
of 225 miles or so. These wells had been discovered back in 1921 but there was little demand then for oil
products in the surrounding undeveloped country and it
was of course impossible to ship the crude to civiliza-
tion. The discovery at Great Bear changed the situation
overnight. Oil products were needed to make this
“find” commercially practical so, piece by piece, Imperial
Oil shipped a small refinery to Fort Norman, assembled
it there and began to refine fuel oil and gasoline. Re-
cently the announcement was made that the Company
would co-operate with Eldorado Mines to build a pipe-
line along an 85 mile stretch of rapids in the Great
Bear River to facilitate delivery of its products to the
mining field.

Imperial Oil’s first contact with the mining industry
was about thirty years ago when the Company built a
warehouse at Cobalt to supply the fast-growing silver
mines of the district with petroleum products. In those
ear days of the industry’s candle was much in demand
because each miner working underground depended for
light upon a candle stick in the front of his hat. The
only trouble was that unless the miner was slow and
deliberate in his movements his candle had an annoy-
ing habit of blowing out from a sudden draught, and
the difficulty of being slow and deliberate while wield-
ing a pickaxe or shovel can readily be understood. Many
a credence of Imperial Oil candles was sold in those
days by simply burning a sample alongside another
in a draughty place.

Later on, of course, candles gave way to carbide
lamps and then, in turn, to electricity. Where blasting
prevents a permanent electrical installation, the miner
today usually carries a small storage battery strapped
to his back and works by the light of an electric lamp
fastened to his "hard-bossed" hat. This advance is but
typical of the progress that has made possible produc-
tion at its present rate. Hoists which were thought to
be fast when they travelled at the rate of three or four
hundred feet per minute now travel up from the four
thousand foot level in a little over a minute.

Possibly one of the greatest developments that have
taken place in mining concerns the machines that are
used for drilling. Formerly these were heavy sluggish
affairs and normally it required two men to handle
them properly. They penetrated rock at the rate of
one foot in about six minutes and raised such a dust
that it was hard for the operator to see his helpers.
Contrast this with present-day machines which drill a
foot and a half a minute!

A great deal of pioneering work on the part of
steel manufacturers, drill designers, mining men and
lubrication engineers was necessary to effect such an improvement. The old machines were lubricated with a straight mineral oil which was supplied by hand if, as and when the operator happened to think of it. Harder, tougher steel permitted the construction of lighter, faster machines, and through hollow steel bits water was forced to the cutting face so that debris could be washed away and drilling speeded up. To ensure regular and positive lubrication atomized oil was fed into the air line and thus carried to the working surface. But even with all these improvements the cost of repairs was so high that Imperial Oil was appealed to, by both drill manufacturers and users, for a lubricant which would save on maintenance expense. It was also felt that it would be well to find out if the presence of oil in the air exhausted from the rock drills had any effect upon the formation of fog. Fog in the underground workings of a mine usually carries very finely divided particles of rock dust in the form of crystals and is injurious to the health of mine workers.

The only place to conduct an investigation of this sort was naturally in a mine so an Imperial Oil lubrication engineer spent a couple of weeks underground examining actual operations, making tests with a variety of oils and fluids, and checking the humidity and temperature of the air under different conditions. The information collected was sent to the Imperial Research Laboratories at Sarnia where it was deduced that a compounded oil was needed. But what compounds to use? Arrangements were made with practice and tests were made under actual working conditions. After the final choice was made the Research Laboratories were entrusted with the task of preparing specifications for an oil of the desired characteristics. It had to be an oil that would not separate out its compounds during storage, for many of our mines must take summer supplies into the property during winter, or winter supplies in during the summer, depending upon the type of transportation that is available. The final product had to be so stabilized that it would remain a homogeneous mixture in spite of heat or cold. Such a product was eventually marketed under the trade name of Imperial L.5 Drill Oil and is now used widely in Canadian mining operations, permitting a great increase in the speed, efficiency and economy of rock drilling. It was found during the investigations that the presence of oil in the drill exhaust had no effect upon the actual formation of fog but that the more oil there was mixed with the air in the exhaust, the larger the fog would hang. The new Imperial Drill Oils permit minimum consumption of oil and closed adjustment of the control valve, thus combating fog formation.

Of course, there are scores of other ways in which oil products make themselves very useful in a mine. The rock drill is merely the first step in the long mining process and oil is to be found playing its part at each stage. In primary crushers, gyratory crushers, ball mills, air compressors, hoists and all the mechanical equipment above and below ground oil is in its various forms smooths the way or provides power. An interesting application of petroleum is its use as a dressing on the cables which lower the miners down below the ground. Imperial Oil supplied the mines with a special cable dressing which combats rust and wear and greatly prolongs the life of cables.

Oil plays its part, too, in getting machinery and materials to mines which are located many miles from the end of steel. Every day tractors powered and lubricated by Imperial Oil products carry thousands of tons of freight to Canadian mines. These tractors usually pull trains of sleighs. These sleighs have wide heavy runners from four to six inches in width and about four feet apart so that they can travel over very rough ground. Sometimes there are four sleighs and there is usually a little caboose at the tail end which is well insulated from the cold and equipped with a small stove and beds and tools in case of breakdowns. Ordinarily the crew of a tractor train consists of two drivers and two helpers. Usually a tractor with a heavy load can make from four to five miles per hour but there are many delays which cut down its average speed. For instance, the trip into Red Lake which is about 125 miles, takes four days. Enough fuel is carried in exceptionally large tanks to last for an all day run and cached fuel is picked up at different points along the route. Tractor trains follow the rivers or lakes wherever they can but sometimes they must travel overland, and if it is the first time that the trip has been made and there is no road the tractor may have to be unhitched and sent ahead to pull trees and stumps out of the way. Then it goes back and picks up its load and carries on. Instances have been known of tractors going through the ice. A year ago last fall a tractor which was parked on a lake suddenly dropped into 18 feet of water. The crew was at lunch in the caboose at the time so no one was hurt. Another tractor was sent for and when the ice had frozen solidly enough a couple of derricks were built out of logs and with block and tackle the submerged tractor was recovered. It's all in the day's work to a tractor crew.

Tractors are the land freighters of the mining country—slow, ponderous, strong as many oxen. High above them soar the freighters of the air, quick and dexterous, also powered and lubricated by oil products. No story of Canadian mining would be complete without a tribute to Canadian aviation and the indispensable services it has rendered in "cracking open" the treacherous house of the north. Nowhere else has aviation played such a vital part in the development of a basic industry. In supplying aviation gasoline and lubricants of the highest quality and making them available throughout the vast mining hinterland, Imperial Oil has helped to make flying a practical and safe auxiliary in mining operations. As a matter of fact, the Company was one of the first to use airplanes on a prospecting expedition, only this time it was oil that was being sought. In the winter of 1920-21 two Junkers planes were chartered by the Company to make the 1,200 mile flight to the oil field near Fort Norman, now the source of oil supplies for the Great Bear district.

It was not until 1926 that the first important use of aviation in mining took place. This was the year of the Red Lake gold strike and aviation won its spurs in getting prospectors into this isolated district quickly. Since then the number of miles flown by planes in the service of mining has rocketed to astronomical figures and Canada leads the world in the volume of freight carried by its airplanes.

Today, big freight and passenger planes maintain regular schedules in and out of the mining areas, carrying everything from diamond drills, boilers, ore buckets and other mining materials to teams of oxen, hockey sticks and masquerade costumes! Whole towns of seveal thousand population have sprung up in the wilderness because of aviation, and depend upon aviation for their continued existence. Prospectors are enabled to cover as much ground in one day as they would in a month by dog team or canoe, and when they reach their destination accomplish in one hour by cruising up and down in the air what would have taken them five weeks to do on foot. Mines in underdeveloped country nowadays are brought into operation nearly twice as quickly because of wings over the north.

- Night Scene—refueling a General Airways plane with Imperial Oil products from the booth at Daisy, P.Q.

IMPERIAL OIL REVIEW

MARCH-APRIL, 1937

Page Nineteen
Where the World's Oil Came from in 1936...

- World production of petroleum reached a new all-time peak in 1936. Combined output of the world reached 1,800 million barrels in round figures—an increase of ten per cent over the 1,650 million barrels produced the year before. More than five million barrels of oil were taken from the ground every 24 hours during 1936!

Although oil is produced in about 26 countries, only 12 are relatively important. From this latter group comes 90 per cent of the world's annual supply of petroleum. The largest producing country is, of course, the United States which has accounted for 64 per cent of all crude oil taken from the ground since the beginning of the petroleum industry about 80 years ago. But for the past seven years our neighbour to the south has been falling under that all-time average, and last year its share was less than 61 per cent. Intensive development of petroleum in foreign countries has materially increased crude oil output outside the United States during the past few years.

Russia, world's second largest petroleum producing country, set a new all-time record for countries outside the United States, in producing 215,578,060 barrels of crude oil during the past year. Although one-eighth of the world total, this was less than one-fifth as much oil as was produced in the United States. For several years, Venezuela, in South America, has occupied third place in the list of world producing nations, currently supplying 9 per cent of the annual figure of 1,800 million barrels. In 1936 these three nations combined produced roughly 80 per cent of the total output.

Trailers for behind are Roumania, Iran (Persia), Dutch East Indies, Mexico, Iraq, Colombia, Peru, Argentina, and Trinidad, all very important in the world picture, although collectively producing less than 17 per cent of the annual supply. The remaining 2 per cent of the world's crude supply in 1936 came from a group of 14 countries, British India, British Borneo, Poland, Bahrein Island, Germany, St. Katherine, Japan, Ecuador, Egypt and Canada being the most important of these minor producers.

The figures in the panel to the left show the ranking of the various countries in the production of crude petroleum during 1936.
When "ALBERTOLITE'S" Steering Gear Broke
(Continued from Page 13)

...to face the chains exactly in place over holes in the quadrant, a ticklish job at any time, and now rendered most difficult by the rolling and pitching ship and the rush of breaking water. One pin was safely fitted when a sea struck the rudder and tore everything loose, putting the hand-steering gear out of commission.

Then commenced the stubborn struggle to rig a jury gear, with tackles rigged from three winches to the constantly fightimg quadrant. Captain Mosher had hove-to, and for the next four to five hours the men and officers on deck toiled in the freezing wind and spray before they obtained control of the rudder and the ship. Then, with three men on the windlass, and the rudder again under control, the ship was given power and was headed into the gale and home for repairs, without completing the voyage into Quitoano. She surved through the gale for nearly 200 miles, at a speed of about 5 knots and finally rounded into the Straits and berthed at Esquimalt under her own power.

Thrilling though the rescue, to Captain Mosher it was all in the day's work. In marked contrast to the newspaper stories which filled the Vancouver papers, is his report of the incident to Mr. H. J. Ralston, of the Imperial Oil Shipping Company Limited, Toronto—

Vessel No. "ALBERTOLITE":
Port Esquimalt, B.C.
Date January 9th, 1937.

Dear Sir:

I am very sorry to report that the steering gear on the S.S. "ALBERTOLITE" carried away while on voyage from Vancouver to Fort Alice. The following is a copy of deck log.

We were steering against a strong westerly gale with rough confused seas all night, and at 4.17 a.m. Jan. 4th, the quartermaster reported something wrong with the steering gear. Upon examination it was found the steam gear was broken. 4.25 a.m. the vessel began to swing towards shore. The engines were then stopped and an effort made to ship the hand gear. This carried away immediately. Our position was then approximately 5 miles southeast of Sealander Island and wind slightly on shore. The rudder was thrashing heavily but we succeeded in getting a tackle shackle to the quadrant and standing it to starboard before any damage occurred to it. Extra lashings were put on to keep it in this position, and engines started to get vessel headed off shore and have to under slow speed. This accomplished, we were in a safe position as long as we could hold the rudder, but were unable to make any headway until the wind and sea moderated on the morning of the 5th when we were able to wear ship and proceed towards Esquimalt under various speeds, arriving there and docking at 2.45 p.m. Jan. 6th.

Mr. A. Stewart was at Esquimalt on our arrival. Is superintending the repairs and will keep you fully advised of the progress made.

Yours very truly,
(Signed) A. A. Mosher, Master.

TUNER VALLEY - The Third Stage
(Continued from Page 7)

...period long enough for it to "pay out". The enormous cost of constructing such a line for such a distance over such a terrain will be apparent. Furthermore, the demand on the Pacific coast is for crude with a large fuel oil content and a small gasoline content; Turner Valley crude is rich in gasoline and poor in fuel oil.

The heavy cost of drilling in the Valley and the limits of the local market for crude oil are considerations which in the best interest of the area should constantly be kept in mind.

Production from the western field is not yet sufficiently large to glut the Alberta market which can absorb approximately 5,000 barrels of crude oil daily. As soon as production exceeds this amount a wider distribution of the crude oil will be necessary. The price at the well in Turner Valley is established by the cost of laying down crude at Calgary from the next nearest adequate source—Edmonton. In the event of production in the Valley exceeding the requirements of the Alberta market it will be necessary to transport the surplus crude to distant refineries where it will have to sell in competition with crude from other sources. Consequently the return to the producer for such crude oil as may be transported out of the Alberta area will be smaller.

Undoubtedly the recent developments in the Turner Valley are of great economic importance and everyone in the Canadian oil industry rejoices that at last, after so many years of expecting effort, a valuable pool of oil has been discovered. Everyone will be in agreement as to the importance of an orderly development so as to conserve a precious national resource and to promote the best interest of producer and consumer. The development should be pursued systematically and cautiously until the limits of the pool have been determined and its potentials established.

The Turner Valley has entered the third and most important stage of its development—production. Steadily and systematically, the output has increased, and today it approaches the 1,000,000 barrel mark. With the advent of the new Turner Valley tank farm, the valley has become a major producing area, the location of which has been so carefully chosen that production can flow directly to the coast without delay. The tank farm is located on the coast and is equipped with a modern pipeline system which will efficiently handle the output of the Turner Valley.

To the explorer the dark field spotting drywells here and there the appearance of being oil. Actually it is mud. The photograph was taken a few miles below Stettler on the Red Deer River. The Turner Valley is known to be a pocket of oil directly under the surface. The flows are of water which have penetrated the oil and today they are equaled, if not exceeded, by the oil. The water is produced by the Turner Valley, and the oil flows out of the formation and into the water. The gas is produced by the Turner Valley, and the oil flows into the gas. The Turner Valley is a truly great field, and the oil flows out of the formation and into the gas.
How We Found ETHYL Gasoline

One evening about twelve years ago the chairman of the New York Service Association announced to an audience of interested technical men that the evening's subject would be ethyl gas, and that it would be discussed by Thomas Midgley, Jr., vice-president and general manager of the Ethyl Gasoline Corporation. Mr. Midgley started off with a scientific camouflage and then went into the most interesting presentation the service men had ever heard of a technical subject.

By THOMAS MIDGLEY, JR.,
Vice-President and General Manager,
Ethyl Gasoline Corporation.

My text for this evening, perhaps not in real seriousness, is taken from Peter. Not the Peter of the well-known firm of Peter, James and John, but Peter the Great of Russia. Peter had the right idea. Beginning at the mature age of sixteen, whenever somebody said, "It can't be done," he toppled off his head, while the can-be-doers were allowed to wear theirs as a mark of special distinction.

In winter the heads were carefully mounted on pole poles in public places but when the warm spring days arrived it was necessary to discontinue the display. Unfortunately, Peter did not get them all—there are a lot of them left, as we found out when we began working on the development of an anti-knock compound.

You all know that when a spark occurs in a cylinder a wall of flame spreads out from this point, progressing to the farthest points of the combustion chamber, and burning the charge as it goes. This, of course, is perfectly simple.

You also know that when any gas is heated either it must expand or its pressure must rise.

The layer of gas just in front of the flame wall is so intensely heated that it rises to a very high pressure, and in some cases, as when the compression ratio is too high, or the cylinder is filled with carbon, the gas in front of the flame wall is subjected to such a high pressure that it goes off with a bang—that is detonation.

You can see also that it is perfectly easy to calculate the pressures in front and behind the flame wall. You take a simple little expression like

\[ P = \frac{V_1}{g(V-V)} \]

Then you go to a physical chemist and he tells you you ought to have a new value for \( W \), namely 1.0. Then you jump it around for a few hours when you discover that whether you get detonation or not all depends on the value of \( v \). If \( W \) is high you get detonation and if \( W \) is low you don't. Therefore we in order to prevent detonation all you have to do is look around until you find some compound which may be put into the fuel to limit the value of \( W \).

Now I ask you, if some remarkable human intellect had gone through the above scientific hedge-podge and had come to the conclusion just stated above and then gone forth into the world and discovered the material that reduced the value of \( K \), and consequently eliminated detonation, I ask you again, would this not have been the outstanding scientific achievement of the age?

I can positively answer that it would have been. And I can say this without any fear of being considered egotistical, because the discovery of such a material was NOT accomplished as outlined above. The above work was executed in the spirit of attempting to explain in a high-brow way the action of these materials that we call anti-knock materials and was done several years after the materials themselves were discovered.

The discovery of ethyl gas was due in part to luck and religion, as well as to the application of science. One day in order to test the validity of a beautiful theory that we had employed to explain what causes the knock in the automobile engine we wanted to dye some gasoline a dark color. So we went to the stockroom where we have a large number of chemicals, and asked the stock man for some oil soluble aniline dyes.

He regretted that all he had was water soluble ani-
line dyes, and these wouldn't do at all. So we said, "What have you?" Whereupon he reached up and pulled down a bottle of iodine. "Try this," he said. We did, and by asking enough iodine we obtained a deep brownish black fluid. Much to our surprise we found the detection or knock from which our test engine had been suffering had disappeared. In this somewhat accidental way we had discovered an anti-knock compound.

But iodine had a few slight drawbacks. It added over a dollar to the cost of a gallon of fuel and we were flatly told that it would be considered a traffic nuisance by most motorists. Then too, it had the delightful habit of making iodides out of the car metals with which it came into contact. Carburetor and gasoline piping gradually changed into copper and zinc iodides, the cylinders were transformed to iron iodide and so on. It was clear that our car could not be an iodide factory and a good automobile at the same time.

But the discovery of iodine was important. It showed us that an anti-knock compound was possible. And remember that we would not have stumbled upon this discovery so easily if we hadn't been out of oil soluble aniline dyes.

We tried various other chemicals in the stockroom—months passed until eventually we had experimented with a very great number. Not one of them proved to have any anti-knock ability except iodine. The solution of iodine in the first place had been a lucky shot.

As the weeks became months and the months rolled into years, we were still hard at it but without finding a suitable compound. Finally we were called into the office and asked if we did not think further search futile, and that our time might be spent more profitably on some less difficult quest. On inquiry we answered that we were sure that the Creator never made a substance with certain properties that he did not make another with the same properties in greater degree—iodine was an anti-knock compound and therefore there must be something else that was better. All we had to do was to find it. That was where religion came in. So we were given a week to prove it.

We thought we had worked hard up to this day, but our work was mere silliness compared to the feverish activity that we crowded into the next seven days, and before the time was up we had found another compound—aniline yellow. Aniline worked much better than iodine, cost less per gallon of fuel treated but it had a few slight disadvantages. It gave the exhaust a peculiarly disagreeable smell, and it had some appetite for engine parts. Still, we were making progress.

Sometime previously a standing order had been issued by the laboratory that whenever a new chemical substance was purchased for any purpose whatever, it should first be examined by us to determine whether or not it might turn out to be the long sought anti-knock compound. In this way we obtained selenium oxychloride, the famous universal chemical solvent invented by Dr. Leeper. Of course it would not dissolve everything as is proved by the fact that it was delivered to us in a glass bottle. Strangely it proved to be a wonderful anti-knock liquid compared to the others, but then again it had some disadvantages, not the least of which was its tendency to turn the engine into a chemical solution. But this was progress, nevertheless.

We tried various substitutions, and eventually arrived at a compound called diethyl sulfolene. This had good anti-knock qualities. It did have a bad smell but no appetite for engine parts.

Eventually we substituted tellurium for selenium, thus greatly increasing the anti-knock qualities. Then we wondered what might be wrong with it—surely there was a catch somewhere, and there was, although we discovered it in a roundabout way.

By this time we were so rested that we had smeltles that we did not fully appreciate its odor. After the first day's experiment I attended a little dinner at the country club but no remarks were Passed. On arriving home, Mrs. Milgley sniffed and asked: "Where have you been?"

"Out to the country club."

"Sniff! Sniff! What did you do?"

"Nothing out of the ordinary."

"Sniff! Sniff! What did you eat?"

"Nothing special."

"Sniff-f-i-e-t: What did you drink?"

"Coffee and water."

Evidently I had brought home a disagreeable odor.

The next morning the children stopped short within about six feet of me. "No! Dad! No!" they chorused and refused to come any closer.

When I reached the laboratory, everybody had a similar tale to relate. Evidently it was the tellurium. It was a saturated garlic odor, although we in the laboratory could not realize this as we quickly became accustomed to it, as you will to any odor. After smelling it you could go out into the country, and feel refreshed if you creased a skunk trail.

The peculiar thing about it was that a single exposure to the stuff would cling to you for weeks. A specialists called it tellurium poisoning but the poison was all in the smell. There was no getting rid of it. It was so powerful that a change of clothes and a bath at the end of the day did not reduce your ability as a tellurium breathing mechanism. Nor did the odor grow much weaker when several days were passed in absence from the laboratory.

However, my family quickly became accustomed to it, and those at the laboratory were likewise immune. Going out at night, however, was a problem, although I found one neat solution. When we went to the movies, I would look around until I found a man of Mediterranean extraction, and we would sit down beside him. Presently people would smell at him from all directions as they got my perfume, but we were secure and comfortable.

One day I went to Columbus and dropped into a barber shop to be shaved. The barber said: "I notice you are very fond of garlic and so am I, but alas I cannot eat it; it would hurt my business!"

I didn't like his insinuation, and I replied warmly: "Like garlic? So far as I know I have never had any, and never intend to."

Then I realized that tellurium had come with me. I explained to him that the super-garlic smell was a chemical smell. He went into raptures and hailed me as a benefactor of the same degree. "Would you do anything to save our lives?" he said. "Would you not sell him some, so that he could spray it around the shop, infecting all his customers, so that he could get garlic to his heart's content?"

Here at last was a market for tellurium but more mature deliberation cast some doubt on whether the barber customers would want the venture, and so the whole matter was dropped.

We decided to try tin instead of tellurium, since the two belong to the same family. Tin proved to have no odor but it had other disadvantages, including high cost. But this was real progress.

If tetra-ethyl tin was good, perhaps tetra-ethyl lead would be better. We made some and found it to be several times as strong as the tin compound and many times as strong as iodine. It is a water white liquid made from lead and alcohol.

Then we asked ourselves, 'What's wrong with it?' Surely there must be some drawback—perhaps there was. While it had no smell, and did not eat the fuel system parts, it left a slight deposit of greyish yellow oxide of lead in the cylinders. This material was ejected by the internal heat in the combustion chamber and then became a film which very slowly fouled away the spark plug electrodes.

We had to introduce an antideposit and the simplest method was to mix the tetra-ethyl lead with the tetra-ethyl lead which would change the yellow oxide of lead into something else.

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At the Imperial Oil Limited permanent exhibit at the Motor Building at the Canadian National Exhibition, Toronto, more than 300,000 people crowded around to see this scientifically accurate demonstration of the difference between ordinary gasoline and 3-Star Imperial gasoline and fuel.
Gas Buggies of the Hudson's Bay Railroad

By A. J. DALRYMPLE

- Gasoline speeders, descendants of the lowly handcar, shuttle to and fro over the 510 mile ribbon of steel that connects The Pas with Churchill on the Hudson's Bay.

- Last spring, when I left the Prairies bound for Hudson's Bay, public spirited citizens of the larger centres were discussing plans for sprinkling oil on marathons adjacent to the cities with a view to combating plagues of mosquitoes. When I reached the Barren Lands, I found Prof. Victor E. Sheffield, Ph.D., of the Department of Zoology, University of Illinois, who had received special permission, in the interests of science, to travel by gas car on the Hudson Bay railroad in order to study mosquitoes as they flourish in the sub-Arctic.

- Locking roads of any description, the railroad affords the only means of travel for the men and women who sporadically settle along the 510 miles of steel connecting The Pas with Hudson's Bay. Supplementing the weekly train into the Hudson Bay region during the brief three-month shipping season, in a Canadian National Railways truck equipped with flanged wheels which carries His Majesty's mails between The Pas and Churchill, Readmeons, telegraph linemen and, in times of emergency, firemen, doctors and others of the R.C.M.P., make frequent use of the sixty-odd gas cars maintained by the railroad.

- These "gas buggies" of the North play an important part in the lives of the railroad workers, and a most welcome sight is the arrival of the "Pay Car." The "Pay Car" is a gasoline speeder upon which a superstructure has been constructed to protect the paymaster from the elements as he drives into Lonesome Land to distribute cheques to section hands, pump men, and others employed along the line. Many a lonesome lad has heard the distant purr of a machine, and looking up from his work has joyfully beheld the red car with the magic letters approaching.

- Gas cars also play a part in protecting the road from forest fires. Where fire is reported along the right-of-way, fire-fighting equipment, men and provisions are loaded into the machines and dispatched to the threatened area. Officers of the Royal Canadian Mounted Police occasionally use gas speeders when duty calls them to remote settlements.

The world is familiar with the stories of "mercy trips" by aircraft, but the pilots of the gas cars, the section foremen of the Far Away, are also called upon to serve those who require aid, and need it quickly.

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Johonese Builds a "Kyak"

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of blubber is thin sea animals sink immediately. Some hunters equip their "kyak" with a hood fastened about the child in which they sit. It is tied about their waists to exclude the water should they capsize. This frequently happens in rough seas or when they are struggling with walrus which are in a fighting mood. I have seen Greenland eskimos turn over and several times without apparently shipping any water, the feat being performed through the skillful use of the double-bladed paddle.

The shape of the "kyak" varies considerably from place to place. In some localities, particularly in inland waters where comparatively calm seas are common, it is long and graceful; in others, where high seas have to be navigated at or where the "kyak" must be transported by dog-team, there is a marked tendency to build short chunky craft. There are many other less pronounced differences in characteristics, also, that most white men cannot distinguish. Very often natives can recognize another at considerable distances merely by the "kyak" and women often know by the sewing who the builder and owner is. They have an extraordinary faculty for spotting one another's sewing, and it is often the first thing they look for in each other's clothing and "kyak" alike.

One would think that with association of the natives with the whites these boats, which seem to us so oddly fashioned, would be replaced by those of more modern construction. However, "kyaks" are used almost entirely for hunting in summer, though an occasional "whaleky" or whale boat has managed to acquire a whale boat. In winter, when the boat must be transported for many miles by dog-team before open water is found, it is used exclusively. I have known natives to transport whole families over considerable distances in "kyaks." The wife and children wriggle into the space "below decks" and lie quietly there during the trip. It is surprising that they do not suffer crampedly, since I have never heard one of them complain nor have I seen one emerge with other than a very happy smile on his countenance. Possibly it was raised.

In passing, the word "kyak" is pronounced rather quickly with neither syllable stressed, as "Ka-jak." The J is a cross between a J and a Y; when the word is pronounced both the J and Y sounds are very elusive and I don't believe a white man can pronounce it correctly anyway.

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IMPERIAL PERSONALITIES

D. J. AVISON,
Manager, Regina Division

How interesting he must have found the future development of the organization may be visualized when you stop to consider that today Imperial Oil Limited manufactures and markets literally hundreds of various grades of lubricants in its Spring of 1914. Mr. Avison was appointed superintendent of the newly completed warehouse and the future looked very bright.

August, 1916—The Dominion at war—"Scotty" enlisted as a private in the 31st Alberta Battalion and for four years served with distinction, receiving a lieutenant's commission with the rank of captain in the 2nd D.C.M. and M.M.

Returning to the Company, Mr. Avison was appointed salesman and allotted the Peace River district, position he held for several years, later being transferred to Calgary as City Agent.

In the Spring of 1928, by virtue of his excellent record, he was made Assistant Manager of Edmonton Office, succeeding Mr. James McTavish who was retiring, and in 1934 became Manager of Regina Division.

Mr. Avison is a member of all branches of sport, at one time being actively associated with the Calgary Barbers and Brokers Cricket Club and a past president of the Independent Hockey Club. Hailing from the bonny banks and braes of Scotland we venture to say that he is also an enthusiastic golfer. His abundant supply of natural wit and good humour makes him a welcome guest at any gathering.

Moderately, Mr. Avison does not attribute his success solely to his own efforts but in a large measure to the co-operation of his many associates who, we feel, will undoubtedly join in extending to him every good wish for continued success in his new capacity.

IMPERIAL OIL REVIEW

• For the benefit of readers who drive 1937 cars with Hypoid Rear Axles, Mr. Sime has written this non-technical article on the lubrication of this special unit.

Modern Torture

By A. W. SIMS, Imperial Oil Limited

As everyone knows, the evolutionary period of automotive transport has been comparatively brief, but brilliant. Within easy memory, the car was transformed from a plodding, chugging "one-leveled," for which a ten-mile trip was an adventure, to the sleek, really beautiful and thoroughly reliable car of 1937. At the touch of the toe, it springs into life and, with effortless speed, transports its master in comfort three hundred miles and more in a day. Beneath its sleek, shining exterior, the modern car hides a multitude of ingenious parts—almost employing a high standard of reliability. It is said that as many as 15,000 individual pieces go to make up this modern marvel, and just as a chain is no stronger than its weakest link, so does modern automotive performance depend on the fitness of these numerous and varied units.

Springing from the mind of motor car design, Imperial Oil laboratories began intensive research work several years before hypoid units were commonly used. As a result, Imperial Oil has a special hypoid gear lubricant that has been tested in this laboratory and tried out under most severe road conditions—Malodies Expose Gear Oil. (Right) Cut-away view of hypoid crown gear and pinion.

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As every owner knows, the modern car differs chiefly from its predecessor, in point of faster acceleration, higher road speed, greater comfort, and of course in reliability. The first two qualities have been achieved by the use of more powerful engines, of which the average today has twice the horsepower of a 1927 model. This greatly increased power has necessitated a corresponding increase in the size or strength of all the parts which transform horsepower into road-speed. Climbing, compression (or "compression"-gears), universal joints, propeller shaft, rear axle gears, rear axle, wheels, spokes, and tires form the chain through which all this increased power must pass. Many of these links in the chain have been made larger and stronger, but the requirement of sufficient road-clearance placed a definite limit on the size of rear axle gears, which in consequence, have not increased in the same proportion as the engine. This has resulted in greater stress between the meshing teeth of the gears, for all this increased power must pass through the rear axle unit. Moreover, the high road speeds of modern times have necessitated a conformation of design, with a lower centre of gravity so that curves may be taken without danger of over-turning. Again, the smooth riding qualities of the modern car have in great measure been achieved by decreasing the "unsprung weight"—that is, that portion of the car's weight which is not carried on the springs, such as the wheels and rear axle. Very often, caused by an unsound design of moving parts, whether in engine, gears or wheels, or by actual clash of gear teeth, has been a formidable, many-headed giant, which has only been virtually eliminated after a tremendous amount of patient study and ingenious experiment.

Thus, as far as rear axle gears are concerned, the search in recent years has been for designs which would transmit more power with less weight and which would be immune from these old terrors. That this ideal has been achieved to a remarkable degree can be testified by any owner of a modern car, whose memory of the old-time creaking enablers him to make a comparison. It would be rash to attempt to explain fully within the space of this article just how the automotive engineer and gear designer have solved the problem. In brief, however, it may be said that they have succeeded in reducing the shock contacts between the gear teeth by better design and a better working of the lubricants.

Most readers are familiar with the simple "bevel" gear unit, in which the teeth roll over each other, engaged with more or less of a clash and metallic noise. This was the earliest form of rear axle gear. Then came the "spiral bevel" gear, which had curved teeth in continuous contact with each other. In such a unit, at least two teeth were always engaged, rolling over each other as the gears revolved. With the necessity for still quieter gears of smaller size but with greater capacity for transforming power, the "hypoid" gear has made its appearance. In the hypoid gear, the teeth of the opposing gears slide as well as roll over each other, and for a given size it can transmit more power safely. Provided the correct lubricant is used, this last provision is an absolutely necessary one, and as 1937 marks the greatly extended use of hypoid gears in many makes of popular cars, it is of real concern to the car owner. In plain language, it simply means that the lubricants which up to date have been perfectly satisfactory for ninety-five per cent of all cars, are unfit for use in the majority of 1937 cars.

Hidden under the rear of today's car is this vital gear cell—not much larger than a man's head. It contains several gears, some smaller than a child's fist. The small pinion gear teeth, rolling and sliding against the teeth of the larger ring gear, transfer to it all the horse-power of which the engine is capable. The pressures between these teeth may, on occasions, be terrific—and have been calculated as high as 350,000 pounds (175 tons) per square inch. Between these opposing teeth must at all times be interposed a sufficiently protective oil film, through which this pressure must pass on its way from pinion to rear.

In this, was the reason for the modern torque house—where chemists wrestled with the challenge of the necessity for an entirely new type of lubricant. The old-fashioned lubricantes, which gave good service until quite recently, were definitely acknowledged to be unable to prevent serious damage to the teeth under modern conditions of gear design, speed, shock, and increased horsepower. Ingenious machines were designed for this terrific "burning" film-disrupting action of modern gears. In these, lubricant after lubricant was tested. The scream of the tortured metal was heard. Actual trucks were set up in specially constricted rooms, their rear wheels running against the resistance of a dynamometer, for continuous days and until failure occurred. Tests of many makes of cars were carried out under the severest possible conditions. Volumes of experimental data were collected and from which specific formulae and lubricant manufacturing methods were decided.

Not all experimenters have been equally thorough, and it is unfortunately true that there are available some misleading extreme pretensions or hypoid lubricants, which are unable to meet today's driving requirements. It is, however, a source of satisfaction to Imperial chemists and engineers who understand of this difficult problem, that their efforts have been rewarded with extreme pressure lubricants worthy of the name.

A Billion Dollars Worth of Pipe Lines
(Continued from Page 12)

Although there is no extensive system of pipe lines in Canada, considerable Turner Valley crude is piped to the Imperial Oil refinery at Calgary, while practically all crude used in Sarnia travels through a through study for pipe lines by pipe line to the border, where it connects with the Imperial Oil pipe line to Sarnia refinery.

IMPERIAL OIL REVIEW

"D'Y ken JOHN PEEL?"
By NORMAN DAY,
WINNIPEG.

"Tis a long cry indeed from the green fields of Morrice England where John Peel held sway "With his hounds and his horns in the Morning", to the snow-covered barrel yard of Imperial Oil Limited at Winipeg, Manitoba.

We feel satisfied however, that he had been here on the morning of March 1st, Peel's view-his loo would have awakened the dead throughout Western Canada. He would have adored his coat so gay, collected his hounds around him and set off in the approved manner in pursuit of the beautiful Silver Fox which had so magically appeared.

John Peel wasn't here however, but Frank Chalmers—since named, "The Trapper" by some, and "Tarzan" by others—upheld the homage of the famous hero of song. About a 'clock on the morning of March 1st, Frank happened to be in the barrel yard when, lo and behold, a real live fox appeared before him. Frank yelled it to all the office of the warehouse staff, and they gave chase—with neither horns nor hounds. Reynard was very tired and had evidently travelled far from home, so it was tried to hide behind a Mobile Oil barrel, thinking it was a Vacuum and offered no resistance when Frank, the Trapper... a foxey Scotchman... picked him up in his arms and carried him triumphantly to the shipper's office where he was placed in a packing case. It was a lovely Silver Fox, in prime condition, being no mark of identification.

At noon he was transferred to the boiler house and during this recess for lunch a steady stream of admiring stenographers, and other office employees kept poor Reynard in a state of collapse and apprehension.

A photographer arrived from the "Winnipeg Tribune" and photographed the "Trapper" (with hat on) and the trapped.

Then unto Frank Chalmers came a problem. What to do with it now he had it? He telephoned the police... no one had reported a loss. Finally he decided to take it home and await developments after the

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SARNIA REFINERY


SARNIA WORKS

HALIFAX REFINERY


THE BENEFITS DEPARTMENT

By John R. Simpson
Chairman of the Benefit Committee, Imperial Oil Limited, Toronto.

Back in the horse and buggy days of Canadian pioneer life, the petroleum industry had its birth in Western Ontario, when a Hamilton man by the name of Williams undertook the distillation of a black liquid that oozed from the earth along Bear Creek, in the village now known as Oil Springs, about eight miles south of the town of Petrolia and about thirty miles from Sarnia. After some experience, Williams discovered that by going deeper into the earth (about 60 feet) he could obtain a lighter fluid that was easier to distill.

News of the drilling of the Danke well into the rock in Pennsylvania in 1859 spurred on the natives of Oil Springs, so that in 1861, a photographer by the name of Shaw, drilled a well through rock to a depth of about 160 feet and an oil gusher flowed uncontrollably for days. Tanks and facilities for handling crude oil were unknown at that time and most of the oil was lost down the creeks. Great drilling activity followed in this locality and Oil Springs became a prosperous town. Some of the wells yielded from 2,000 to 5,000 barrels of crude daily and it is estimated that on the initial flow the flush production of this field gave forth several million barrels.

It didn't take long for this news to spread, for in 1862 exploratory work was undertaken in the Petrolia field with great success and there was a large influx of oil men from the United States. Englishmen, Germans and many more names became widely known as those of pioneers in a new industry. The local Petrolia boys became expert drillers and production men, and today men from Petrolia are to be found drilling wells in almost every oil field in the world. Success in the Petrolia Field eventually spread.

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Early in February, 1899, construction commenced on the present site of Sasin Refinery which has grown to such a size now that it is considered the largest integrated refinery in the British Empire. The late Hon. W. J. Hasna, a struggling young lawyer, was given the task of incorporating Imperial Oil Limited, of which he afterwards became President.

Eventually the uses for petroleum products expanded so rapidly that it was necessary for Imperial Oil to build refineries in British Columbia, Alberta, Saskatchewan, Quebec and Nova Scotia.

In the building and operation of a refinery, expensive machinery and equipment housed in permanent buildings, it is necessary to maintain the highest state of efficiency, and great care is exercised in the maintenance of such equipment. In the financial statements we refer to these items as "invaluable assets," but it has been customary until the early part of the Twentieth Century, to overlook an important "intangible asset" of any business. By this we mean the spirit of the men and women who make up the personnel and who keep the wheels of industry operating. In January, 1912, at a meeting in Starnia, the management of Imperial Oil set up the machinery to provide that full consideration be given to the human side of industry. From this gathering developed what is known today as our Industrial Welfare, Annuities and Benefits Plan, which provides for the care of our sick, injured, pensioners, widows and orphans.

Since 1912 many facets have disappeared from our organization and new ones came along. In reviewing the year just closed we find that 69 deaths, including 16 annuitants, have occurred, all of which were provided for in our Death Benefits and with satisfaction we observe that when the broad winter is taken, the widow and children receive an income which permits them to carry on life in a normal way without undue cares or worries. During the past year 786 cases of sickness were taken care of. The total personnel on our payroll for 1936 amounted to 7,165 employees, of whom 7,031 are participants in our Group Insurance, Pension and more than 50% are contributors to our Pension Plan Society.

Our Safety Inspection Department, which supervises the installation of safety equipment and educates our employees in Safety First practice, reports only 153 accidents in 1936. We are not ashamed of this record but will not be satisfied unless we reach the point where accidents are completely eliminated.

During the year, approximately 60 employees were placed on pension.

**OBITUARIES**

**JAMES MCTAVISH**

James McTavish, for many years a valued employee of Imperial Oil Limited and since 1929 one of the Company's pensioners, passed away recently at Vancouver, B.C.

Mr. McTavish was born on a farm at Pamelia, Ont., and early decided upon a business career. For several years he was with an electric railway at Thornold, Ont., and later became a partner in an oil business at Kitchener, Ont. In 1908 he sold his interest in that business and went to Brandon, Man., where he entered the employ of Imperial Oil Limited as a salesman under the Winnipeg office in January, 1908. The following year he was promoted to the post of divisional manager for the northern Saskatchewan. In 1917 he was transferred to Saint John, N.B., as manager for New Brunswick and the eastern part of the Province of Quebec. In 1923, in line with his desire to return to the prairies, he was transferred to Edmonton as assistant manager. He retired on June 1st, 1928, and in 1930 removed to Vancouver.

Mr. McTavish was an able and steadfast business man with a great capacity for accomplishing his duties and making friends simultaneously. He is survived by his wife and one son, Russell, who are resident in Vancouver and to whom the REVIEW extends its sympathy in their bereavement.

**H. L. PAUL**

The sudden death of Mr. H. L. Paul of the Toronto Sales Staff came as a distinct shock to his many friends and fellow-workers. He had been ailing for some time but was not thought to be seriously ill.

Harry Paul was a splendid fellow, of pleasant personality and cheerful disposition. Although he was with the Company a comparatively short time, his ability as a Salesman was recognized, and he had been promoted from a Toronto city territory to the very important district of Oshawa just a short time before his death.

We feel that Harry Paul would have gone far with this Company, had he been spared to continue his work.

To his widow and young son we extend our sincere sympathy.

**CAPTAIN GEORGE T. CROSS**

After being on pension for a period of 10 years Captain George T. Cross passed away in Starnia at the age of 68 years, after a prolonged illness. The late Captain Cross was a sailor all his life, both on salt water and the Great Lakes. He was employed by a number of years on Imperial Oil boats. Our heartfelt sympathy goes out to the widow, Mrs. Caroline Cross, in her bereavement.

**EDWARD E. STEVENS**

After a service of 19 years with Imperial Oil at Sasin Refinery Mr. Edward E. Stevens passed away on January 30th following an operation. Mr. Stevens was 56 years of age and had resided in Sasin for the past 30 years. Our deepest sympathy is extended to his family.
OTTAWA MARKETING DIVISION

WINNIPEG MARKETING DIVISION (Below)

(Right) HAMILTON MARKETING DIVISION

MONTREAL MARKETING DIVISION (Below)

(Left) EDMONTON MARKETING DIVISION

(Below) VANCOUVER MARKETING DIVISION

(Left) QUEBEC MARKETING DIVISION

(Below) TORONTO MARKETING DIVISION
Retiring from Active Service

R. H. Spurr,
Newfoundland Division

At noon on Wednesday, March 3rd, the employees of the Newfoundland Division of Imperial Oil Limited, gathered in the main office to say farewell to the retiring manager, Mr. R. H. Spurr, and to welcome the incoming manager, Mr. D. S. L. Patterson.

Mr. A. R. Evans opened the proceedings and referred to the pleasant associations which have existed between manager and staff during Mr. Spurr's five years as manager of St. John's division. Talking over the division in 1932, Mr. Spurr's term of office had very largely coincided with one of the most difficult periods in Newfoundland's commercial history. Mr. Evans then, on behalf of the staff in St. John's and the sub-agents throughout the Island, asked Mr. Spurr to accept as a token of esteem a steamer trunk and an engraved walking stick, and wished him bon voyage and many years of good health to enjoy his well-earned leisure. He also offered a hearty welcome to Mr. Patterson and assured him of the best co-operation of all the staff in this division.

In accepting the presentation Mr. Spurr thanked the staff for their support and co-operation and spoke regretfully of the severance of so many friendships made during his five years in Newfoundland. In handing over to Mr. Patterson he assured him of the loyalties he had always received from his staff and bespoke on Mr. Patterson's behalf a continuance of that support and co-operation.

Mr. Spurr has been associated with the Imperial Oil family for the past twenty-one years, coming to us from the Vacuum Oil Company and commencing his service as General Salesman in charge of the Lubricating Department in St. John's.

He was transferred to Western Ontario Division and in 1921 was made Assistant Manager of the Toronto Division, later being appointed to the Brandon office in the same capacity. In February, 1932, he moved East to assume the duties of Manager of the St. John's, Newfoundland, office.

He and Mrs. Spurr plan an extended tour embracing the South and Europe.

Mr. Spurr retires under the provisions of the Company's Annuity Plan. The best wishes of the Company go forward to him and Mrs. Spurr for many happy and carefree years of well-earned leisure.

Gas Buggies of the H. B. Railroad

(Continued from Page 39)

Many a time those rough-shod gas machines, descendants of the lowly hand car, rattling over the line, have signalled a message of hope to the victim of accident or sudden seizure; and only those who have been thus stricken in the darkness of the forest may realize to the full the meaning of the arrival of aid from the outside world.

The gas cars are also used for another and entirely different type of service. Early one spring morning I watched two young men speed northward from Mile 42 with a small wicker basket which one of the men handled with extreme care. When seven mile posts had been counted the speeder was brought to a stop, and the man with the basket raised the lid to liberate two carrier pigeons. Upon their release the birds fluttered momentarily, then swiftly gained altitude, soon to be lost from sight. A few minutes later they entered their home loft at the Coeurnant Lake base of the Royal Canadian Air Force, at Mile 42. The man with the basket was a pioineer in the service of the Dominion. His work is to train imported birds for service to aviation in the Northern wilderness. In the early days of flying the hinterland, all R.C.A.F. machines carried pigeons, so that in event of emergency the birds might be released with messages for the commanding officer of the home base.

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