AN ARMY still travels on its stomach but the stomaching of the modern mechanized army consists of gasoline and more gasoline.

Canada's army, rolling along on 23,500 motor vehicles, estimates its gasoline requirements for an average day of normal employment in the field at 100,000 gallons.

Each one of the five infantry divisions has a fleet of some 4,000 motor vehicles which army statisticians say will require 14,000 gallons for each day's operation in the field, and that means every day whether a push is on or not. To continue statistically, the armored division, with an establishment of around 5,600 vehicles, will burn 30,000 gallons a day.

Since it is a purely army figure the 100,000 gallons a day does not tell the whole story. For instance, it does not take into consideration the gasoline and oil consumption of the air force which is prodigious. The figures are startling enough to show why the Canadian petroleum industry was called into conference with the Department of National Defence immediately war broke out and has been gearing its output to war demands ever since.

For very excellent reasons figures on gasoline consumption have been "hush hush" but sometime ago the Department of Munitions and Supply announced that there was a year's supply of aviation gasoline in store in Canada, with the oil companies providing the storage at their own expense.

On the motor front, comparisons with the last war are meaningless. The Canadian army in training is using more gasoline and oil now than the Canadians of the last war used in active service.

The Canadian army is motor-minded in a degree to shake confidence in Nazi panzer efficiency. They are going now and it's a case of let her out! Each battalion has just about as many motors as a division used to have. "The Financial Post" has estimated that the motor establishment of an ordinary infantry division generates 248,000 horse power or just about twice as much power as is used by the industries in Hamilton. The armored division, with its tanks and armored cars, has a horse power total of 387,000 which is more than the peak power-light load of Toronto.

With Canada's motor industry turning out armored vehicles at the rate of 600 a day, there is no shortage of mechanized transport. Tanks and armored cars are being added much more slowly but production has started and is being built up. The estimate of 100,000 gallons of gasoline a day covers field operations when the six Canadian divisions are up to full strength of machines.

The Canadian public is beginning to appreciate the fact that this is a gasoline war; gasoline is of supreme importance. The Canadian force, for its size, is the most fully mechanized army in the world today. In the armored division now in Britain one unit out of four is a "panzer" unit. The proportion in the German army is one out of thirteen.
THE BATTLE AGAINST WASTE

Unending Vigilance and Technical Ingenuity Have Played a Large Part in Continued Reduction of Costs of Petroleum Products.

In the face of continuous development to keep pace with technical progress the appearance of Imperial refineries is continuously changing. At the left is one of the latest processing units, installed this year at Sarnia.

Below: At the well head. The spectacular but highly efficient "grazer" is a thing of the past. Today, intricate valve arrangements, "Christmas Trees" in the oil man's language, control the flow from the moment an oil well is brought in.

Recently a party of business and professional men from Lima, Peru, visited the International Petroleum Company's producing camps at Talara and Negritos. They spent several days in the field during which they inspected wells, gathering stations, pipe lines, absorption plants and the refinery. As they were embarking on the boat for their return home, one of them remarked: "It just occurred to me that in all this time I have not seen a drop of oil!"

Not long ago delegates to a chemical convention were guests of their brother chemists at Imperial Oil's Sarnia Refinery. It was summer, and the Imperial chemists who acted as guides for an inspection of the plant were dressed entirely in white. When the day ended one was shocked to find a spot of oil on one of his white shoes. However investigation revealed that it had come from a door hinge of his motor car.

Although at its inception and for years after the oil industry worked, figuratively speaking, ankle-deep in oil, operations in a well-managed producing field or refinery today are carried out so that, almost literally, one will never see a drop of oil except where it may be deliberately offered for inspection. Efficiency, with which waste is incompatible, accounts for this.

Canada's first drilled oil well, brought in in 1862 near Oil Springs in southwestern Ontario, flowed for days at a rate of several thousand barrels a day and the oil drained into Bear Creek and down the Creek to Lake Erie. That happened because there was no tankage to take the oil and no equipment to shut the well in. Except in rare instances where mishap intervenes, oil wells today are brought in without loss of a drop of oil. In the efficient producing field as in the refinery, every drop of oil and every cubic centimeter of gas is jealously conserved and only in unusual circumstances does it go to waste.

Waste in the early days was due principally to a lack of technical knowledge although there were many cases where in the bitterness of competition that has characterized the industry since its inception, rival wells and stored crude oil and equipment were destroyed or damaged. Competition is just as keen now as in those early days but it follows more ethical trends and is constructive rather than destructive, expressing itself in efforts to improve better products and better producing, processing and distributing methods to achieve lower costs.

The early refiner had a demand substantially for only two products of crude oil—kerosene and lubricants. The other contents of the crude oil were not wanted. Gasoline, for instance, was a nuisance. The refiner was always tempted to let a little of the gasoline get into the kerosene and for that reason early kerosene was known as "domestic dynamite". A few barrels of gasoline could be sold for cleaning or other purposes but most of it had to be disposed of into ditches, ditches and rivers in a practice that resulted in many destructive fires. Also remaining after the kerosene and lubricating stocks had been distilled from the crude were the fractions that make gas oils and those that make asphalt. The early refiner did not know that the gas oil was potential gasoline, convertible into gasoline by the then undiscovered cracking method; but even if he had known that it would only have increased his contempt for it. As far as asphalt was concerned, to the early refiner it was just a sticky mess that had to be removed from the stills with considerable difficulty, and he could find nobody with much use for it. So he dumped the gas oils and asphalt too. Often he washed through them as he went about his primitive refinery. Also of great value today, although valueless and practically irrecoverable then, were the gasses that comprised the lightest ends of crude oil. Fortunately for the early refiner these escaped into the air and so gave him no trouble as far as their disposal was concerned.

Nowadays valuable fractions are recovered from those gasses. For instance they are an important source of the blending agent which is used to make 100 octane aviation gasoline, the "fighting fuel" which affords from 20% to 30% more speed or cruising range for an aeroplane. They also provide raw materials for many synthetic products, among which is artificial rubber.

Research and engineering development have cooperated in the petroleum industry's waste elimination campaign and have evolved hundreds of ingenious methods and devices in the form of new equipment and new processes.

The story of what has been accomplished in the oil fields by unit operation, pressure maintenance, natural gasoline recovery and other means is too long and involved to tell here but it may be noted in passing that by natural gasoline recovery alone,
improves the quality of motor oil but affords an efficient and increased recovery of marketable wax.

Technical developments have been so numerous that they cannot be summarized here. Organized flow of products now prevents line contamination that used to entail losses; automatic instrument control guards against overs or under-heating, against excessive or inadequate treating. All treating materials whenever possible are reclaimed and used over and over again. For instance a certain type of clay is used to give lubricating oils a final treatment because it has the property of absorbing certain undesirable fractions. After the clay is filtered out of the oils it is taken to the cracking coils where it goes into the huge furnaces together with the cracking stock. There it serves to raise the octane rating of the gasoline produced.

An example of the ingenuity and care employed against waste is afforded by tanks in which butane, one of the lightest fractions of petroleum, is stored. Butane vaporizes at ordinary temperatures. As it rises in the form of gas in the tank it is drawn off and put through a compressor which compresses it into a liquid. It is then flowed back into the tank where it expands and in expanding absorbs heat and thus lowers the temperature of the tank. In short the content of the tank is made to serve as its own refrigerating agent.

Other instances of the improvements resulting in greater economies and more efficient operation could be cited. Proper design, frequent inspection and constant meticulous upkeep of all equipment, together with exact laboratory and process control, are the bases of these. In its operations the industry bottles waste wherever possible and this unending battle results in continuous improvement of products and processes and in enormous savings to the consumers of the products.

Another process that was developed at Imperial's Sarnia Refinery is solvent dewaxing. A solvent which has the property of mixing with the wax in the lubricating stock is added to the stock. The mixture of stock and solvent is then chilled and the wax and the solvent congeal together. The congealed mixture is then removed from the stock and by simple distillation the solvent is separated from the wax, to be used over again. This one process not only

in treating, as distinct from refining, great progress has been made: in fact the industry has become to an important degree a chemical industry. An instance of what can be done by treating is afforded by a process developed in Imperial Oil's research laboratories and now in almost universal use. For years the industry had to look to certain crude oils for production of lubricants of high quality. Imperial Oil researchers developed the idea of treating other stocks with solvents so as to remove the undesirable qualities that prejudiced their value as raw materials for high quality lubricants. After long research a suitable solvent was discovered. As a result superior lubricants were made available at lower prices and stocks that formerly would have to be disposed of for commonplace use were upgraded in quality and value.

Cracking. Since its discovery, the "cracking" process is estimated to have saved 131/2 billion barrels of crude oil in North America. Right--The cracking coils at Imperial Oil's Sarnia Refinery.
RECENTLY a party of artists from Lima visited Talara and Negritos, the International Petroleum Camps on the Peruvian coast. They recorded for display at the National Fair in Lima their impressions of the harbour, the fields, and the refinery. Most of the paintings, as will be noted, were in modernistic style. The paintings created considerable interest at the National Fair as it was the first time that Peruvian artists had interpreted for their people the operations in these Camps where some 25,000 people reside.
MODERN COLOSSUS...

New Refinery Unit at Sarnia Processes 26,000 Barrels of Crude Petroleum a Day.

A view of the coking unit fractionating tower and coking chambers.

LIKE a colossus in a land of giants, a new crude processing unit now towers above the largest refining units in the Sarnia Refinery of Imperial Oil Limited. In August, 1940, this new 26,000 barrel per day Combination Topping and Coking Unit existed only as a folio of blueprints. Eight months later, on April 12, 1941, completed in steel and concrete the colossus went to work.

Essentially a refinery in itself, the new unit combines the four separate operations of: 1. distillation of the crude into component products; 2. redistillation of the lighter products; 3. mild cracking of the heavier products; 4. continuous production of coke.

These processes, under automatic and centralized control, are operating at present to produce aviation gasoline, naphtha, kerosene, Diesel fuel, various gas oils, cracked motor gasoline and coke. The unit's ease of manipulation and flexibility readily permit the operator in his instrument-lined control room to change, as desired, from the production of kerosene to stove oil or from aviation to motor gasoline or from coke to bunker fuel.

As the name of the unit implies crude petroleum is "topped" in one section and the topped crude "coke'd" in the other. The topping section composed essentially of the 190 foot crude bubble tower and its satellite steam stills and strippers, continuously segregates the various products from the crude and from one another. The residue of this operation, "topped" or "reduced" crude, passes into the coking section which consists of the 85 foot coker bubble tower, cracking coils and the coke drums. Here the reduced crude is converted from a viscous liquid to a series of cracked products ranging from gas to coke. The volatile components are fractionated in the coke bubble tower into gas, gasoline and gas oils while the coke accumulates in one of the three 120-ton capacity coke drums.

The process of emptying a drum of its burden of coke begins by "spudding" into the top of the cooled and opened drum with a drill. This drill, suspended from a derrick rising from the top of the coke drum to a total height of 125 feet, has a boring head unique in that its blades are horizontal streams.

(Continued on Page 15)
FORT CLARENCE has fallen. Its underground passages, vaulted chambers and powder magazines are no more. Its walls are flat and its moats are filled. Its guns have gone to the scrap heap.

On the site where once stood an important unit of the ancient defenses of Halifax Harbour stand now more important units of modern defense against Nazidom—great tanks storing indispensable munitions of modern warfare.

The site at Fort Clarence is on the Dartmouth shore of Halifax Harbour. It was sold by His Majesty to Imperial Oil Limited in 1927 so that the Company could use its surrounding 84 acres of land for expansion of Imperial Refinery. In its long history Fort Clarence was never attacked although undoubtedly its existence played a part in discouraging a French attempt at invasion of Halifax during the struggle between Britain and France for mastery of North America. After the Company acquired the property the Fort was left as it was but recently the ruthless needs of modern war propelled its destruction. And so it was blitzkrieged. Dynamite, great cranes and bulldozers and other implements of high-speed war effort levelled it in a few days. The land was needed for storage tanks and so the ancient fortress fell.

Fort Clarence was first built in 1752 as an earthwork battery, a nameless part of the defences on the eastern shore of Halifax Harbour. War with France began in 1755 and the fortifications were strengthened to some extent but with the Treaty of Paris in 1763 work on fortifications stopped and in the following 12 years the battery fell into a ruinous condition. In 1778, with the outbreak of the American War of Independence there was a period of renewed military activity but again in 1784 there was peace which lasted for nine years, ending with the War of the French Revolution from 1791 to 1802 and its sequel, the Napoleonic War of 1803 to 1815. The Duke of Kent was in command and a majority of the military buildings around Halifax date from his regime. A great amount of work was done about the fortress which in 1798, by order of Prince Edward, had been named “Fort Clarence” and its new tower designated “The Duke of Clarence Tower” in honour of Prince William Henry, afterwards King William IV.

After the close of the Napoleonic War the great citadel of Halifax was built to serve as the heart of the entire composite fortifications but most of the other units remained as they were. With the spurn-making application of rifling to the artillery in 1889 all important fortifications had to be reconstructed with permanent materials of unsurpassed strength and along a new system. The Trent Affair of 1861 aroused fear of invasion from the United States and accordingly Fort Clarence was modified and modernized and emerged as a mass of durable masonry, armed with rifled muzzle-loaders lodged in bomb-proof casemates. With its eight 7-inch, thirty-eight 9-inch and fifteen 10-inch guns it was in a position to offer strong resistance to any ships attempting to enter the harbour. However it never fired a shot and subsequently with the construction of powerful batteries on sites further seaward its usefulness passed. In 1906 Fort Clarence and all the other works comprising the Halifax fortresses were transferred from Imperial control to the Department of National Defence.

During the World War the deserted Fort was used after the catastrophic Halifax explosion of 1917 for the storage of explosives which had to be removed for safety from the damaged naval magazine. The Fort was used as a depository of munitions until early in 1927 when a new naval magazine was built.

Left to right: 1—Pump which supplied fresh water to the garrison from a well in the heart of the fort. 2—Guard patrol chamber. When war threatened a reinforced guard watched through the gun ports for signs of the enemy. 3—Entrance to centre area of the fort from the moat. Note the date, 1904, on the door.
FLYING FREIGHTERS

Since 1927, 'Planes of Canadian Airways Have Carried More than Fifty Million Pounds of Freight.'

**Routes Flown by Canadian Airways Limited**

SCHEDULED ROUTES

OCASIONAL CHARTER SERVICES

FISHERY PATROLS

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FALL AND WINTER • 1941

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If it was the day after Christmas, the year 1926, when a blunt-nosed freighter of the air pulled itself from the ice at Sioux Lookout, in Northern Ontario, circled for altitude, then headed north in the wake of Santa Claus and his reindeer.

At the time, it was an inapropos event. But when it is looked back on from the experience of fifteen years, it was not just the first commercial flight to the northern Canadian mining fields of a newly-formed flying company. It was a flight which heralded great things which have now come to pass, and it proved the feasibility of operating aircraft into remote areas of the wilderness.

The plane that roared over the Christmas solitudes fifteen years ago has long since gone to the Valhalla where all good aircraft eventually go. But its place has been filled by scores of others that every day now ply the air lanes from Newfoundland on the east to Akavik, just inside the Arctic circle in the far north. The flight of December 26, 1926 was the first for what is now Canadian Airways.

Men of vision—particularly one man, the late James A. Richardson—foretold aviation’s possibilities in Canada almost a decade and a half ago. These were men of action, too. The result is the huge company of to-day whose total flying hours from 1927 to the end of 1940 reach the fantastic figure of 256,000. Canadian Airways planes in that time have flown over twenty-two million miles, have carried well over fifty-eight million pounds of air freight and air mail into the wildest hinterlands, have transported in a matter of hours, instead of days and weeks, trappers and prospectors and mining executives, the sick and injured, Indians and Eskimos, all to the number of well over 224,000.

From the fjords and rugged coast of British Columbia's fishery patrol to the Maritimes and foggy Newfoundland, the Canada Goose in a circle—Canadian Airways' emblem—is a familiar sight on the fuselage of the freighting airplane. Among the north shore of the St. Lawrence the French-Canadian descendants of the old coureurs-de-bois, busy at their

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Planes of Canadian Airways have carried more than fifty million pounds of freight.

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Natives with dogs meet a Canadian Airways plane at Chipewayan. Note the canoes lashed to the underside of the wings.

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Two-way radio between planes and dispatchers helps maintain service over the wide area served by Canadian Airways.

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Eskimos watching file of furs being loaded into a plane at Cambridge Bay, Victoria Island.

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Planes of Canadian Airways have carried more than fifty million pounds of freight.
trapping, their lumbering, their fishing, look up and smile as the swift wings roar overhead or glide in for a landing. They know the mail is in; that little Jeanne’s pink boots have arrived; that perhaps Jacques, who had the misfortune to split his foot with an axe three weeks ago and flew “outside” to hospital, would be coming home again; that, of a certainty, Father Pierre would be here by Sunday to celebrate mass in the little parish church.

Greatest development in airfreight in Canada, of course, has come from the mines. How else, during the development of a mine, between discovery and production stage, while it is yet to be ascertained whether the mine will turn out to be a paying proposition, could supplies for men and machinery for development, to say nothing of contact with the outside world, be supplied and maintained? Their portages would be prohibitive and, in most cases, unjustified. It is during this stage that the potentiality of air transportation as well suits the mining conditions of the north. If after thorough investigation the property should prove to be non-productive, the aircraft can be immediately withdrawn to serve other fields. On the other hand, should the mine come up to expectations, air transportation maintains a supply system for all immediate needs until such time as a permanent road or railway can be built into the area.

Towne, Bowron, and others mean nothing to Canadian Airways. Full grown horses for work in the woods have been flown hundreds of miles from civilization. Oxen plaidly mule their slow, thunderous thousands of feet aloft. Huge smelter pots, weighing 2,400 pounds each, have been carried hundreds of miles from railroad to mines and going into production. Canoes to the number of seven at a time have been flown in Canadian Airways’ largest freighter. On another trip, a seaplane was dropped fore and aft to the under side of the wings, and the work-horse sky-freighters waddle off into the air.

It’s not thought that Canadian Airways does nothing but haul freight of all kinds into the wilds. Far from it. For instance, at Vancouver, Canadian Airways twin-engined passenger planes fly from the western terminus of Trans-Canada Air Lines, Vancouver, across to Victoria on Vancouver Island. Until Trans-Canada Air Lines was organized by the Canadian government, Canadian Airways carried a successful service between Vancouver and Seattle, in the U.S.A. and in the East, from Moncton to Halifax, Charlottetown and St. John, N.B.

There is variety in Canadian Airways’ air transport—so much variety that unless one has a comprehensive view of Canada’s northland it is bewildering. Take, for instance, the bags and bags of mail and air express piled high on the dock at Kenora, Ontario. All of it is for transport by air into points in the Red Lake mining area—points which depend, year-round, on aircraft for mail, food and mining supplies.

Or sweep down to Quebec’s North Shore, where an employee of a paper company at Outardes Falls is suffering from an attack of advanced appendicitis. A Canadian Airways’ plane, a deHavilland Dragon, was at Trinity Bay far up the river when word came by radio from Outardes Falls for assistance. Fifteen minutes later the Dragon was off for Outardes, and landed there fifteen minutes later. Death rode the wings for two hundred miles, ready to strike at any moment, but the airplane, roaring over the great river, covered the distance between Outardes Falls and Quebec City in two hours five minutes. An ambulance was at the airport. The patient went immediately to the operating table. He is alive and well today. Chalk up another victory for the air-planes.

“When the fur flies” in the northland, it doesn’t mean that somebody is fighting. It does mean that the Indians and Eskimos, white trappers and half-breeds, now bring their seasonal “catch” to Hudson’s Bay Company posts, and Canadian Airways’ planes fly the fur to civilization. Time saved in transit, with furs arriving at the processing point at their prime instead of weeks later, makes the cost of flying a minor matter.

With a dose of as large as an empire and a parish-to-parish visitation involving journeys of as much as two and three hundred miles, it is little wonder that the Fathers of the Church accept cheerfully all mechanical facilities of the age. The airplane has supplemented the motorboat, steamship, canoe and dog-team for many of the clergymen who minister to the spiritual needs of the inhabitants of the north.

Of all its operations, of course, airfreight to the mines and to hydro-electric power sites remains as the “big job” of Canadian Airways. One such contract which was carried to a successful conclusion without incident had to do with the delivery of over 1500 tons of machinery and equipment to Manaus Lake, over a hundred miles from the nearest “hop-off” place at Beauchene, in the province of Quebec. In the past, many such smaller jobs have been undertaken. The Manaus project is typical of all.

MODERN COLOSSUS (Continued from Page 9)

of high pressure water. This water, at 1250 lbs. per square inch pressure, bores a hole through the 88 foot length of the coke drum. A cutting head with horizontal and angular water streams replaces the boring head and the coke is cut out in large pieces from the bottom up. The coke falls into the jaws of a crusader below the drum and, carried by a stream of water, is moved to a “hydro-bin” by a special rubber lined pump. At the hydro-bin, the coke and water just pour company, and the lamp coke is separated from the fines.

It was on August 1 that a party of construction officials and engineers flew to the Lake Manauk site of a huge, soon-to-be-constructed power dam. On August 7 the first load of Canadian Airways’ biggest machine arrived on the 10th from Western Canada as a general mobilization overviewer with Bossen. The 1600 tons had to be flown in before freez-up.

Some bad forest fires in the Lake St. John district made flying unusually difficult for better than a week after the start of the job. Occasional morning fog and low ceiling delayed cut-off operations, since no one, not even a Canadian “bush pilot,” is anxious to tangle with any of the really high hogs along the route. Parts of a big diesel shovel, a diesel bull-doser and several tractors began to clatter up the Beauchene shoreline and the crw of the Junkers . . . re-christened “The Goon” by the Quebeckers—started scratching their heads and wondering how such big pieces could be lifted into the Junkers. Loading through the big top hatch was out, for the local derrick did not inspire sufficient confidence for pieces weighing two tons and better. The answer was to take the machinery apart and fly it in piece-meal.

So when the last removable piece was finally separated from the biggest parts, the loading crew kidded the item down the ramp into the side loading hatch, the Goon was full, the flat-topped derrick struggled into the air. One of the diesel engines weighed 4,100 pounds and took two and a half hours to load and secure in the aircraft.

Probably the first full grown horses ever to have been transported by air in Canada went to Lake Manauk in the Goon. The loading staff more than had its hands full with the first one, having to tie securely on the side before loading it; it took two men to keep it quiet during the trip. After that, when other horses had to be flown in, there was little bother. A veterinary was secured. He gave them a shot of “dope” and they went to sleep “for the duration.”

Every minute 630 gallons of crude petroleum are processed. In this minute enough coke is produced to heat an average home for three days and enough aviation gasoline to fly three thousand planes more than an hour. In this minute corresponding amounts of the other products are produced. Every minute the unit’s furnaces produce enough heat to warm a house for half a week, but so efficiently is the heat utilized that fuel oil consumption is less than 3½% of the total oil processed.

The pumps of the new unit are electrically driven but if the electric power should fail there is an automatic shift to steam power. This safeguard against shut-downs.
She nailed a hooker—Miss Agnesie Cookman, famed United States aviator, is the first woman to have flown a hooker across the Atlantic to Britain. Taking off from a Canadian field she delivered the big ship at a British base and then spent some time observing the work of British women in the war. In private life Miss Cookman is Mrs. Floyd B. Cullum, wife of a prominent New York Navigator.

The result of five weeks' work was displayed recently by the ladies of the Imperial Oil Red Cross Group in the exhibition pictured above. There are five groups, each meeting one night a week at the Canadian Red Cross workrooms in Toronto. There the work is distributed to cutters, sewers, pressers and knitters.

After 26 years of service with Imperial Oil Limited, Wm. J. Harris, Manager of the Manufacturing Department at Fort William, retired August 1, to enjoy a well-earned rest and the benefits of the Company's annuity plan.

Mr. Harris comes from Nova Scotia. On graduating in law from Dalhousie University, he decided to try his fortune in the "West". He secured a position in the Company's office at Winnipeg in 1902 when Winnipeg was the head-quarters for the territory from the Lakeshore to the Pacific Coast. In 1908 he was put in charge of the Company's interests at Fort William.

At a banquet, given in honour of Mr. Harris on his retirement, 100 were present. Many letters and telegrams were read from Company officials and employees with whom Mr. Harris has been associated during his long service. In toasts of their esteem and of the happy relations which have existed, the employees presented Mr. Harris with a silver silver-chip dish, a silver mallet dish, and a travelling bag. Mrs. Harris received a cut glass vase and a bouquet.

Competing for the G. Harrison Smith Trophy, golfers from Colombo, Villa, and Centre, overcome their rivals from Barreto to carry off the trophy.


Winners of scholarships offered by the Tropical Oil Company in the schools of El Centro, Colombia, the girls and five of the boys pictured above are now carrying on higher studies at Zapaticos. The sixth boy is winner of a scholarship offered by Mr. Leo Boone of the Company’s Geographical Department, who is now serving with the British Army. First row, left to right: Gloria Arrunaga, Eugenia Ruiz Rebolo, Soledad Jarama Sierra, Silvia Mercado Navarro, Carmen Cecilia Davila. Standing, Antonio Politiare Barrero, Aristeida Angarita Rosso, Domingo Ardila Gomez, Benito Reyes G., Ernesto Rojas Suarez, see Antonio Padron Alvarado.


The building pictured at the left is to be the new home of Imperial Oil’s Ontario Marketing Division. Located in Leaside, a suburb of Toronto, it is the former Dominion Motors Building. At present the Ontario Division occupies the third floor of the Real Office building in Toronto.

For employees from the Toronto offices who are on active service, the ladies of Imperial Oil Limited in Toronto packed and shipped 130 Christmas boxes. Miss Irene Griffiths, who headed the committee, is pictured here with some of the bundles.

This diagram shows the effect of acid on oil-bearing limestone.

SQUEEZING OIL WELLS DRY...

Modern Oil Producing Practice Recovers Millions of Barrels of Oil that in Earlier Days Were Lost.

When you hear oil men talking in terms of millions and billions of barrels you may think of them as prodigal; when you listen to their technical discussions you will be more than likely to conclude that they are a niggardly lot. And so indeed they are in the production and treatment of the resource which is their basic raw material, crude oil.

Although since the first oil well was drilled in 1855, more than 25 billion barrels of oil have been recovered in North America alone, and although 20 billion barrels lie in known, proven reserves, the producing end of the industry is always at work trying to devise new and better ways to squeeze every well dry. Perhaps it calls up a picture of men burrowing under the earth, wringing the last drop of precious liquid from the primeval sand with cunningly contrived machines.

But actually the "squeezing" process is very simple. Neither men nor machines are sent below ground. It is all done by kindness, so to speak, with the help of an acid which performs a chemical conjuring trick down in the well, out of sight of human eyes.

Before we give the trick away, however, you should have a picture of what kind of "sponge" it is that we are talking about squeezing.
Sand and limestone formations, in which oil is frequently found, resemble sponges at least to the extent that they are porous. The oil seeps through thousands of small pores or fissures, and either flows according to gravity, or is "pushed" by the force of the subterranean gas which is found in combination with oil in this type of rock strata.

When a well is sunk, the oil flows through the rock into the drilled hole and reaches the surface by means of the pressure of the accompanying natural gas or by pumping.

The speed of the flow is governed by two things. First, by the pressure of the gas, and second, by the size of the pores or fissures, which men have now discovered a means of enlarging.

Unless this discovery had been made, many wells that are still producing would have had to be abandoned, because the slow trickle would have meant unprofitable operation.

Just as a sponge with large pores sheds water faster than one of finer texture, so a limestone field will shed oil more quickly if the naturally small fissures are artificially enlarged, or cleared of obstructions.

How to enlarge them, without some complicated method of boring, was the problem which research chemists tackled and finally solved with an acid which does its invisible work while oil men sleep.

Everybody knows how certain acids will eat into cloth or even metals. The holes an acid makes are not unlike those a moth leaves in your clothes after a good meal. Well, the acid that oil men use does the same thing to the limestone, only it already has holes to work on. It cuts into these holes and makes them bigger. The bigger they are, the bigger and faster the flow. And the bigger the flow, the better the well.

This acid with an appetite for limestone is known to chemists as Hydrochloric Acid. You are probably quite prepared to accept the principle on which it works, but no doubt you are wondering how this greedy corrosive element is brought into contact with the rock at the bottom of the well.

To prepare for the acidizing process the well is first filled with oil, and then a heavy jelly-like substance called "blanket" is allowed to sink through the oil to the bottom of the well, where it spreads out and "corks" the bottom of the tube, so that the acid, when later introduced, cannot eat down below the producing area.

Once this "cork" is in place, the acid is pumped down the tubing, and being heavier than oil it sinks to the bottom of the tube and rises upward in the hollow casing. When it has been forced up to the desired height in the casing, the casinghead valve is closed so that no more oil can escape. More only what the engineers on the surface want it to feed on.

The acid treatment, in combination with an inhibitor, has been used in recent years to increase the production of thousands of wells, thus reducing waste and raising the efficiency of slow producers. Many wells which formerly would have been regarded as exhausted, have been virtually brought to life again through the cutting habits of Hydrochloric Acid. Reserves have been conserved and the cost of production lowered. In Canada's Turner Valley alone, 94% of the wells have been acidized, and the average production increased by 81%.

Photos and charts courtesy Dowell Inc.
IMPERIAL OIL REVIEW FALL AND WINTER • 1941
Canada's Largest Airport

(Ccontinued from Page 61)

the hot asphalt to the crushed stone. When the stone had been sprayed with this penetration asphalt a layer of hot-mix asphalt consisting of fine-crushed stone mixed with hot asphalt was laid upon it and finally a surface of sheet asphalt completed the paving job. In this way runways more than capable of handling the heaviest type of aircraft were quickly constructed.

A constant flow of asphalt was maintained at a rate of two 16,000-gallon tank cars per day and there was no hitch in the operation.

The new field has been developed not only for the present heavy traffic of passenger and military machines but also to accommodate developments of the future. Its rapid, economic construction is another instance of the part that petroleum plays in furthuring the war effort.

In the recovery of petroleum from the earth, the chemist plays an increasingly important role. Here, a laboratory technician examines cores of oil-bearing limestone to determine the effect of acid treatment, for a more complete description of the acid-treating process, see "How Oil Wells Are Squeezed Dry" in this issue.
Built in the record time of less than five months, the new Portland-Montreal pipe line delivered its first oil to the Montreal refineries in mid-November. The oil requires approximately ten days to travel the 236 miles.