The REVIEW is published by Imperial Oil Limited in the interests of shareholders and employees. Material of interest to the public at large may be reprinted without special permission unless otherwise indicated. Correspondence should be addressed to The Imperial Oil Review, 56 Church St., Toronto, Ontario.

IN THIS ISSUE:

Oil Allied.................................................. 2
"An Outstanding Job".................................. 10
The Veteran Comes Home............................... 12
It's Good to be Home.................................. 16
Basing the Windmill................................. 18
New Servants for Mankind.............................. 22
Air Gate of the Atlantic.............................. 27
Gas for Whale Blope.................................. 30
Packages for Petroleum............................... 34
Men of Oil............................................. 36
Assistant Secretary Retires............................ 40

IN THE Great Lakes shipping strike early this summer Imperial Oil Ltd. was in the position of the bystander who is hit when a fist in which he is not involved flares up at a street corner.

The Company's lake tanker fleet was tied up for approximately two weeks although there was no dispute between Imperial Oil seamen and the management of Imperial Oil's marine department. The Company's seamen already had the three-watch (8-hour) day system which was the main point at issue between seamen who were on strike and the operators of the ships that were struck. This three-watch system went into effect on Imperial Oil tankers in May, immediately after the National War Labour Board approved the Company's application, made in November last, to give these seamen the benefits of the system. However, although the Company's seamen had no dispute and consequently were not engaged in strike-breaking, they and the ships they manned were subjected to violence at Montreal and Sarnia and threatened with violence at other points.

Because adequate protection against these unlawful acts was not forthcoming, and because the Company did not feel justified in exposing the personnel to injury and the ships to damage, crews were sent ashore on full pay until the federal government ended the tie-up by taking over the operation of lake shipping regardless of whether it was tied up by strike or by unlawful picketing.

The choice of a bargaining agent to represent Imperial Oil men was not an issue so far as the Company's seamen were concerned. They, like all other Imperial Oil personnel, are free at all times to choose their own bargaining agent and the Company will deal with any agent freely chosen by them.

The Canadian Seamen's Union demanded however that it be designated as the agent of Imperial Oil's unlicensed seamen but the management maintained its position for free choice by insisting that the workers and not the management must make the decision.

A secret ballot of the Company's unlicensed lake seamen to decide whether they wish to be represented by the Canadian Seamen's Union, will be taken under government supervision, perhaps before these words appear in print. The men will in this way continue to enjoy what the Company regards as their inalienable right—free choice of their own representatives to deal with management.
lake and ocean services transported crude and refined products amounting to 259,323,050 bulk barrels or 8,074,396,000 Imperial gallons.

In delivering this huge wartime gallonage the fleet suffered heavily. Four large Company-owned tankers were lost through enemy action and three other ships chartered or operated by the marine department shared their fate. On the remaining vessels fell the task of delivering oil for ever-expanding war needs and essential civilian services. Tankers were hard-driven, for their cargoes were vital.

Ships built for the Great Lakes were pressed into service on salt water. Depth charges added their battering to hulls and machinery already strained by the relentless battle with the sea. The ships suffered, but kept going through day and night, in fair weather and foul, in convoy and alone.

The crews suffered with their ships. Life on a tanker, arduous if peaceful, became "active service" with the fourth fighting arm. Ordinary perils paled before the menace of attack from the air, the sea and from under the sea.

Company tanker captains, in addition to their regular duties, served as commodores of convoys and several now wear the Order of the British Empire ribbon, in recognition of this service.

The tankers knew their ships had a high priority on the enemy's destruction list. They knew, too, how quickly a torpedo, shell or bomb could turn a tanker into a hell-brew of flame. They knew that rescue from a burning tanker was often little short of a miracle. They became familiar with the operation of convoys and learned how friendly ships and escort vessels, banded together to defeat the enemy, became menace to their safety through danger of collision in fog or thick weather.

Winter gales at sea meant ice on the ship's upper works and a loggy vessel. Night meant a strict blackout. Silence replaced the free chatter of radio operators. And in the background, insistent as a toothache, was the ever-present menace of the tanker's highly inflammable cargo.

The fleet's first World War II victim was the Canadolite, which was captured by a German raider 600 miles west of Freetown, South Africa, early in 1941. Captain Thomas Fern and his crew were taken to Bordeaux and later to a prisoner-of-war camp so lonely that even the Germans called it "Siberia." Here they waited until the end of the war brought their release and repatriation. The Canadolite was destroyed in an Allied bombing raid on Bordeaux.

The Victolite was torpedoed in February, 1943, off the eastern United States coast and slipped to death with 43 of her crew. In the same month the Montrolite and half her crew became victims of the undersea war off the same coast. The Culpallite was torpedoed in the Caribbean Sea later that year, but the crew made land safely in the ship's lifeboats.

As a war measure, while the United States neutrality act was still operative, the marine department (Concluded on page 4)

AUGUST • 1946
OIL ON THE WATERS

Routes mapped here are important to Canadians who use petroleum products—every one of us. Canada produces only 15 per cent. of her crude oil requirements and the balance must be imported. It comes in by tank car, pipe line, and 40 per cent. of the amount Imperial Oil brings in by tanker. The western hemisphere map shows "crude oil" routes Company ships follow from United States and South America to the west coast; Montreal East, Imperoyal and Portland, terminus of the Montreal-Portland pipe line, on the east coast. "Product" routes which coastal tankers follow on the Atlantic and Pacific are not shown. The larger map shows routes lake tankers follow to transport crude oil and its refined products, and the industries along the lakes and rivers which consume these products.
operated with Canadian crews 18 vessels owned by the Panama Transport Company. Two of these vessels were lost—both by magnetic mines. The Joseph Searp was lost at Le Havre just before France capitulated and the James McGee was mined in the Bristol Channel. The crews of both ships were saved.

In 1942 the Canadian government built its first emergency tanker, a 10,000-ton ship designed as a dry cargo vessel but converted to an oil tanker during construction. At the end of the war the marine department was operating, on behalf of the government, eight of these ships and the smallest diesel-powered tankers. One of the three, the Niagara Park, was torpedoed off Halifax in December, 1944. The forward half sunk but the after half was salvaged.

This was not the first ship the Company lost off Halifax. In 1918, the Lus Bianca was only 35 miles from the port when a torpedo ripped into her hull. The ship survived the torpedo explosion and her master, Captain Thomas, ordered the 12-pounder maned and called for full speed ahead. The U-boat surfaced and exchanged shells with the wounded tanker until, with the propeller shot away and the ship afire, the crew took to the lifeboats. There were two casualties in this engagement.

When World War II ended, Imperial’s ocean fleet consisted of five vessels, a total deadweight tonnage of 60,755 and the fleet of 13 ships had a tonnage of 31,858. In addition, the Company employed a number of chartered tankers on ocean and lake runs. In 1945 the vessels on ocean service moved 34,765,800 barrels of crude oil—about 25 per cent. in Company-owned tonnage and 75 per cent. in chartered ships. On inland waters the movement totalled 13,267,000 barrels and more than three-quarters of it was moved in Company-owned ships.

At the first of July 1946 only four ocean-going tankers were in service—the Albertolite, Trionolite, Reginaldite and Olympalite. On the east coast the Imperial Halifair, a new British-built tanker of 5,168 deadweight tons, was added in May, as the first ship to join the post-war fleet. She went into service on the Maritimes-Newfoundland run. Also, on the east coast are the Logonia and Barque No. 6. The largest is the oldest vessel in the fleet, so that the oldest and the newest vessels now are serving the eastern seaboard.

On the Great Lakes the Arudalite, Imperoyal, Inoolette, Simoolite, Sarnolette, Talaralite and Windolite are carrying Company products to important industrial centres in Quebec and Ontario while two smaller tankers, the Ottawalite and Riedalite, operate on the Ottawa River.

The Imperial service Pacific coast ports and the Beecolelette and Marvalite, operated by the marketing department, are in similar service. The Peruvian coastal trade is served by the Royallite, Limalite, Perulite and Petrolite. The tug Stoie is assisting wildlife on the Ecubandian coast.

Four of the seven new ships to be added to the fleet are ocean-going tankers and three are lake-type ships. The Company plans to acquire this year four “T-3” type tankers, built in the United States during the war. They are 325 feet overall, with a beam of 68 feet. Their capacity is 145,000 barrels and their deadweight tonnage is 18,615. Turbo-electric drive gives them a speed of 14 1/2 knots.

A contract for construction of two canal-sized oil tankers has been let by Imperial Oil to the Collingwood Shipyards. Each of the ships, the first in the Company’s post-war building program, will be 2,500 deadweight tons. They will have an overall length of 258 feet, a beam of 42 feet 6 inches, 18 feet depth and be capable of carrying about 22,000 barrels on a 14-foot draught. They will be driven by steam. Deliveries will be made next April and May. A third and larger lake-type tanker, with a 55,000-barrel capacity, will also be built in Canada, but no contract has yet been awarded. This tanker will operate in the upper lakes.

The present fleet employs some 550 men in its operation and to keep the vessels moving a staff of 70 is busy at the head office of the marine department in Toronto. The head office supervises the building, operation and maintenance of fleet ships, as well as ordering and arranging for the transportation of petroleum and its products in chartered vessels. Former captains or chief engineers of Company ships are stationed at various Canadian ports as departmental representatives to supervise the coming and going of the tankers and branches are maintained in Colombia, Peru and Ecuador.

In 1912 the S.S. Minosa was acquired as the first self-propelled vessel owned by the Company. The 938-ton ship was renamed Imperial and plied the lakes towing the larger which was the Company’s first craft. In 1921 the Imperial was transferred to the west coast and supplied British Columbia ports from Looe refinery. It was scrapped in 1939 but her bell still hangs in the head office.

Two of the men who sailed on the old ship are still with the Company. Captain George Fendall is port captain at Sarnia and Captain Alex Gedden holds a similar post at Looe.

Until the outbreak of the First Great War marine operations were directed by the late C. O. Stillman and the late W. B. Elwood, respectively managing and superintendent of the Sarnia refinery. They initiated the shipbuilding program in 1913, when construction of the Logonia, Imperoyal and Impoco was commenced. The first two are still in service, but the Impoco stranded on Blende Bank, off Cape Sable, in 1929. She was refloated but a survey disclosed she was a total loss and she was beached off Imperial refinery where her hulk still lies. The Impoco saw service as a supply vessel for British warships. She was stationed at the Falkland Islands when the battle of the Falklands was fought.

A further building program was proposed in 1915 and Captain R. W. Honec was appointed as the

Tanks are reusable ships, spending hours instead of days in port. Soon after arrival the oil is unloaded, the chain hoist unwound and the ship’s bow put water several times again.

The wireless officer has a highly important position on any ship. Here John B. Bynum, of Schenley, Ont., tunes his set.

When the bridge rings down "Finished with engine", it means Second Engineer M. C. Holmes can have some shore leave.
first marine superintendent. Later he was called up by the United States navy and was succeeded by Captain John W. Wille, who held the post until 1929, when he was killed in an accident in Colombia.

The year 1916 brought the addition of three lake-class vessels, the Iocotie, Royalite and Barolite. They were built at Collingwood, Ont., and were the first vessels constructed for the Company in a Canadian shipyard. All three still are in lake service.

In the same year the department also branched into the operation of ocean-going vessels. The International Petroleum Co. Ltd., had bought Peruvian oilfields from the London and Pacific Petroleum Co. Ltd., and later acquired the firm’s four tankers, the Luc Blanca, Mina Brea, Avox and Caracas Prince. During the First World War the Red and the Palace were bought. They were not tankers, but carried their petroleum cargoes in five-gallon cans packed in wooden cases. Both became war casualties.

No ships of the first ocean fleet are now afloat. The Caracas Prince in 1922 had reached an age when economical operation became impossible and she was scuttled off Talara, Peru. The Avox was sold about the same time for scrapping. The story of the Luc Blanca’s fate has already been told. The Mina Brea, however, had one of the most chequered careers of any Company ship.

Shortly after the First Great War commenced, she stranded on the Chilian coast. Temporary repairs enabled her to proceed to England, but when fit for sea again she was requisitioned by the British Admiralty and became “Oil Transport 80.” The Mina Brea was attached to the Grand Fleet at Scapa Flow and while the battle of Jutland was being fought she refueled British warships.

Later she was based at Dover, Portsmouth, and Queenstown, Ireland. When the war ended she returned to civilian service, first on the Peruvian coast and then on both the east and west coasts of Canada.

The Mina Brea was one of the first vessels to use oil fuel and several fires broke out in her stokehold. The last and most serious was in 1929, off Casso, N.S., when flames gutted the engine room and stokehold and damaged the superstructure. She was found to be beyond repair and was sold for scrap. At the time of the fire she was loaded with gasoline, but only a small portion was lost. She was then stranded on Matane Shoal in the Gulf of St. Lawrence, ripping the entire bottom, but she was able to proceed under her own power to Montreal and again only a little of her gasoline was lost.

The Maritime department was re-organized in 1921 by Mr. Elsworth and took the form in which it exists today. He became manager and the work which had previously been carried on in a varying degree by the International Petroleum and Imperial Oil staffs at Toronto and Bains was merged. Now self-contained, the department had its own accounting, operating, traffic, construction and maintenance divisions.

The first ships to bear the names Albertolite, Calgaroite, Vancolite and Vitrolite were bought in 1921 and all were sold later, when the Company became interested in diesel-powered ships. The G. Harrison Smith, then the largest combination ore and oil carrier afloat, was bought in the same year. She was sold in 1926 and her career ended a few years ago when she was torpedoed and sunk.

In 1922 the Montrolite and Tronolite joined the fleet. The former vessel was sold three years later but the latter was fitted with diesel engines in 1924, and is still in service.

The first motor ship built for the Company, the Ontarolite, was commissioned in 1925 and is still in service. The following year saw the Canadolite, Montrolite and Regiololite built and commissioned. The first two ships were war casualties and only the Regiololite is still running.

The 34,000-dwight ton C. O. Stillman, then the largest tanker existing, was built in 1928. She was sold in 1936 and later was torpedoed and lost. In the same year the Vancolite and Vitrolite were built in Scotland. The Vitrolite was another torpedo victim, but the Vancolite survived the war only to be scrapped last May.

More ocean-going tonnage was acquired in 1929, when the Calgaroite was added. sunk by a torpedo in the Caribbean in 1942, the ship had a previous close call. In 1940, the tanker was at Le Havre under orders to evacuate British troops fighting around the port perimeter. The German breakthrough came so fast, however, that the ship was ordered to sea. She left in such a rush that Captain G. P. Elliott, who was ashore arranging for troop evacuation, was left behind. He managed to find a motor launch and get back aboard his command.

The Company also bought the Caddo in 1929 and renamed her the Albertolite. War service took its toll, but the ship is still on Pacific ocean runs.

The Regiololite and Vancolite, built in 1930, are still in lake service, as are the Otawalite and Edenzolite, built the same year for the Ottawa River trade. Another addition was the Beestolite, built for marketing department use on the B.C. coast.

In 1933 W. B. Elsworth retired from active service and was succeeded by H. J. Rahives as manager of the marine department. Mr. Rahives retired in 1945 and was succeeded by the present manager, T. S. Johnston.

Many other ships came under the Imperial Oil house flag and served for varying periods. They included the Lady Sybilla, Monmouth and Glen Allen; the Furtile, now trading on the Peruvian coast as the Limaitie; the Marvolite, built in 1926 for marketing department use in Pacific coast trade; the Nanaimolite, a former British naval monitors converted to a tanker, which was scrapped in 1939; the Windsorite, still in lake service, built in England in 1927.

The tankers Columbianite and Inezolite were purchased in 1929 for special uses and the former sold the same year. The Inezolite was scrapped in 1933. In 1939 new building added the Imperial and Petrolite, which are still in service.

The fleet in Colombia started in 1921, when the first stern-wheel towboats and barges were built for the Magdalena River fleet. The towboats were the Carana, El Tigre and Guayabito. Four years later the Colorado was added and in 1928 came the stern-wheelers Infantes, Zapatera and Barranera Bermeja.

The towboat Opon joined the river fleet in 1937. Other additions to South American craft were the tug Lomitas, for Talara harbor, Peru; a 600-ton floating drydock for the Colombian River fleet in 1928; the 350-ton ship Pram, added in 1929 and wrecked at Lomas, Peru, in 1938; the diesel-driven Peralite, purchased in 1940 and still in Peruvian coastal service and the tug Stoe, bought in 1944 for Ecuadorian operations. In addition the marine department operates a fleet of barges, launches and other small craft in Canada, Colombia, Peru and Ecuador.

Truly, in the widespread operations of a fully integrated oil Company such as Imperial, the sailor and his ships play a vital part.

Company ships operate from the Arctic to the tropics. Here a floating drydock lifts a shallow-draught Colombia river boat.
A N IMPORTANT chapter of Canada's wartime industrial history ended when Polymer Corporation Ltd., the government-owned synthetic rubber company, absorbed St. Clair Processing Corp. Ltd., which had operated eight of the ten units of the Polymer plant at Sarnia.

The story of St. Clair and of Polymer is the story of Canada's contribution to victory through the production of synthetic rubber for the United Nations. It is an outstanding example of how private industry cooperated with the government to produce an essential war material.

When the Japanese overran the Pacific they shut off the Allies' main source of natural rubber. The governments of Canada and U.S. realized a rubber famine could lead to a disastrous break-down of the war effort. They turned to research for rubber substitutes which had been conducted, largely by the oil industry, for many years.

Scientists were ready for the problem. Great factories were built and synthetic rubber production jumped from pounds to tons almost overnight. By the war's end, North America produced annually more synthetic rubber than all the natural rubber the world had used in 1939. Two thirds of the synthetic rubber supplies were derived from petroleum gas.

Canada's share in this achievement took form with the creation of the crown company, Polymer Corporation, on March 27th, 1942. The government plan was that it would furnish money to build a plant and ask private industry for help in its operation.

Polymer faced many complex engineering and construction problems. Experts in processing petroleum were needed and the government appealed to Imperial Oil Ltd.

Although Imperial was engaged in vital war work of its own, the Company agreed to incorporate a subsidiary, St. Clair Processing, and supplied personnel to operate Polymer units. Dow Chemical Co. of Canada, and Canadian Synthetic Rubber Ltd., formed by four rubber companies, completed the cooperative arrangement. The agreement was that Polymer would own the plant and equipment and the other three companies would work on a management-free basis.

A great factory costing $51,000,000 mushroomed beside the St. Clair River at Sarnia, covering 185 acres. Indicating the size of the undertaking, the steam power plant which St. Clair operated, is the largest in Canada, and one of the world's largest producers of process steam. The pumping station with six steam driven units pumps more than 86,000 gallons of water each minute, consuming as much water each day as does the city of Toronto.

Choice of the location was logical for it is beside the big Imperial Oil Sarnia refinery, largest in the British Empire. Petroleum is essential for the economical production of synthetic rubber and Sarnia is the point of intake for the most reliable supply of oil coming into Canada.

The new plant grew to have a payroll of 1,800 of which 1,200 were employees of St. Clair Processing, 100 of Dow Chemical, 200 of Canadian Synthetic Rubber, and 200 of the parent Polymer Corporation. St. Clair gathered engineers, chemists, and operators from Imperial Oil and trained men for the new operations. Imperial's Sarnia refinery made another great contribution in developing supersuspended cracking. By this process the gases needed for synthetic rubber manufacture, ethylene, butylene and isobutylene, were obtained in large quantities.

Polymer produced two types of synthetic rubber: Buna S. for tires and other products, and Butyl rubber, used mainly for inner tubes but with special applications in many of which it is superior to natural rubber.

The Butyl section of the plant was the first of three on the North American continent to reach full production. Canadian synthetic in large quantities went out to war machines in Europe and the Pacific.

The agreement with Imperial Oil was that its personnel would assist operation of Polymer units for the duration of the war and "for a reasonable time thereafter." Early this year the contract was fulfilled and the government and Imperial jointly agreed upon dissolution and absorption of St. Clair.

A dinner was held by Polymer officials in honor of the 1,200 St. Clair employees and in particular for F. C. Lautz, first St. Clair manager, and Dr. J. L. Nuggett, first assistant manager, both of whom have returned to Imperial.

J. R. Nicholson, managing director and chief executive officer of Polymer, paid tribute to the part Imperial played in helping Canada set up and operate the synthetic rubber plant.

"Virtually every organization in the North American rubber industry at one time or another has praised the outstanding job done by St. Clair Processing Corp.," he said. "The normal functions of Imperial Oil do not include the business of operating plants for other people and the Company does not wish to engage in such a business. Imperial Oil has completed its war tasks, and it is only fair that it be permitted to concentrate on its own business of refining and selling petroleum products."

Mr. Nicholson declared that former Imperial employees have been given the choice of remaining with Polymer or of returning to the oil company. "It is no exaggeration to say that without their devotion, their loyalty, their unflagging application to the task at hand, and their contribution of long hours of overtime, the success of the plant would not have been possible. And we should never forget that the quick attainment of the Polymer production goal played an important part in shortening the war," he said.

Douglas Arbridge, president of Polymer, declared synthetic rubber production will remain at its present high level. "The operating techniques of St. Clair have been outstanding," he said.

G. L. Stewart, retiring president of St. Clair, and vice president of Imperial, emphasized the importance of the research which led to the production of synthetic rubber.

Polymer will continue as a government-owned enterprise making synthetic rubber, but now for peacetime uses. Petroleum will continue to be the basis of production. But the affairs of St. Clair Processing Corporation have been wound up, its war task completed: a job, by general agreement, well done for Canada.

Miles of complex pipes and many great storage spheres were installed at Sarnia for synthetic rubber production. Plant operations used the largest steam power house of its kind in Canada, shown extreme left in the accompanying picture.
THE VETERAN COMES HOME

THE ANNIVERSARY OF V-J DAY FINDS IMPERIAL'S VETERANS, AIDED BY THE COMPANY'S REINSTATEMENT PROGRAM, SETTING BACK INTO THE PEACE-TIME PATTERN OF THEIR MANY COMMUNITIES

NOW, one year after V-J day, Imperial Oil's reinstatement program for employees returning from service with the armed forces is approaching fulfillment. Statistics show Imperial has kept pace with demobilization and reconversion and that a large majority of Company veterans have returned to work and normal peacetime living.

Imperial has an employment roll of over 10,000 individuals across Canada and during the war 2,267 Company employees left for active service with the navy, army, or air force. Of these 74 men later were listed as killed, missing, or totally disabled.

By July this year, of the 2,183 employees eligible for reinstatement 83 per cent. had left the armed forces. Of this group, 92 per cent. have been reinstated and only 7 per cent. or 120 men, have not applied for reinstatement.

In addition, Imperial has employed 502 veterans who were not former employees. Of these 92 had partial war disabilities.

The reinstatement program is based on a policy of flexibility, and the principle that each returning veteran must be received as an individual with his own individual requirements. The program has five objectives: the reinstatement of all enlisted employees who desire to return; the suitable placement of employees who are physically handicapped through war service; training to assist veterans on their return to civilian work; the continued employment of persons engaged during the war; and where possible the employment of veterans who have not worked for the Company before.

Many men who now are reinstated, never had lost their direct connection with the Company. When the war broke out, Imperial created a Special Defence payroll. Each enlisting worker who had one or more year's employment with Imperial by Sept., 1939 received a bonus of a month's salary on enlistment. When service pay was less than what the individual earned with the Company at enlistment, Imperial made up the difference throughout military service.

Imperial's machinery for reinstatement is relatively simple. The returning veteran is welcomed at his former unit of employment, his situation is discussed.

War over; day's work done; wife getting supper; a couch, pipe, dog and no need even for slippers—Imperial Oil war veteran Ralph Burr dreamed of this overseas and now it's come true.
reduces the number of unemployment cases by providing work opportunities. It also helps to maintain the morale of workers by giving them a sense of purpose and accomplishment.

In conclusion, the "Good Samaritan" plan implemented by Imperial Oil is a positive step towards reducing unemployment and providing a stable income to its workers. It demonstrates the company's commitment to its employees and the community, which is reflected in the increase in job satisfaction and productivity observed in the company.

Overall, the "Good Samaritan" plan has been successful in reducing unemployment and increasing job satisfaction at Imperial Oil. It is a good example of how companies can contribute to the community and support their employees in times of need.
One of Ralph's first purchases after his return was a pup for his daughter. He says, "Joy is a 'hard dog and kind.'"

Mrs. Burr kept the garden while Ralph was overseas and she is very proud of her work. She had the picket fence built and "I heard about it in letters and found it in snapshots for months," Burr says. Now it's his job to cut the lawn.

"I hope the fish bite well this year," Ralph remarks as he examines his tackle. He promised to share his first post-war fishing with 10-year-old daughter Valerie, shown here.

Staytia people are good neighbors. Burr borrows tools for a home improvement project from George Maynard next door. In his spare time Burr is building an addition to the home he owns in Staytia. Here, nephew Ray Diddle is helping him.

Even dish-drying isn't such a bad chore after you've been away a long time, Ralph declares. But his wife says the ex-sergeant major needs more practice—he isn't as fast at drying as he was before he enlisted.

A game of bridge with the family can be a lot of fun for a returned serviceman. Here Ralph and his wife, as partners, have just scored against their daughter, Deblast, and young husband, Wesley Johnson. Little Valerie is the knitter, taking a very keen interest in the game.

Ralph missed his eldest daughter's wedding while he was overseas. His other daughter, Valerie, was her sister's flower girl. Here for her father's approval, she models the dress she wore at the ceremony. "She's grown since then," Mrs. Burr remarks.
REAPING THE WHIRLWIND

WITH THE GAS TURBINE ENGINE MAN CREATES AND HARNESSES A WHIRLWIND WHICH OPENS NEW HORIZONS OF POWER FOR HIS USE; ONCE AGAIN PETROLEUM PRODUCTS ARE A VITAL PART IN THIS MARCH OF SCIENCE

DROWN through the ages, man has dreamed of making heated air work for him. Today that dream has been triumphantly realized and the jet-propelled aircraft hurters through space at more than 600 miles an hour driven by the hurricane blast from a gas turbine engine.

Two thousand years ago, Hero of Alexandria was a pioneer in harnessing the power of hot air. In 130 B.C. he built a toy platform bearing tiny figures and made it revolve, around and around, driven by a current of air from a fire. The toy, and the modern gas turbine, both developed from the same idea: that hot air is a force which can operate machinery.

Combustion gas turbines, more simply gas turbines, are used in the air and on the ground, and soon will be employed at sea. In London recently, John Wilmot, Minister of Supply, announced that the traditional piston and cylinder engines for aircraft now are considered outdated. All British military and commercial planes will be equipped with jet propulsion, using a form of the gas turbine engine. The American "Shooting Star," the British "Vampire" and other new aircraft, including the flying wing "Swallow", have jet engines. As an experiment, older models such as the "Lancetairian"—civil version of the Lancaster bomber—are being fitted with turbines.

With the air speed record firmly established, the jet engine soon may lead to new speeds on water. Sir Malcolm Campbell, holder of the world's water record of 141 miles an hour, has tested jets in his Blue Bird II. His experiments may enable him this year to surpass the world's record he set in 1935.

Meanwhile in Switzerland an engineering firm is building a 15,000 horsepower gas turbine engine for a standing electric generator. This land-use of the gas turbine will be the most powerful of its kind yet developed. A 2,500 horsepower engine, operated by hot air, already has been built to drive ships.

All the world will benefit because man has learned not only how to harness the whirlwind, but also to create a whirlwind to harness.

Probably the first practical use of hot air power came when men installed a sort of windmill in a chimney and geared it to a spit on which meat was to be roasted in the fireplace. Hot air rising up the chimney made the windmill revolve. The windmill turned the spit and the meat cooked evenly.

During the 18th and 19th centuries scientists made a more determined effort. Many devices were designed to compress air, heat it in a closed chamber, and then allow it to expand against a piston or turbine wheel which was to operate machinery. Unfortunately, very few of the devices worked. Great advances were made in the development of steam engines, steam turbines, and then internal combustion engines, but hot-air designs lagged behind.

Men did learn to use the "lift force", but not the "driving power" of hot air. The story goes that an early inventor, sitting at a fireside, noticed that his wife's crinoline skirt drying before the fire was lifted by a current of hot air, and from that observation came the balloon.

Thus hot air lifted men from the earth at a comparatively early date but true directed flight did not take place for many further generations. When it became possible, it was through the development of the gas turbine engine. The "push and pull" type of engine, shown below, promises to open a new era in aircraft design. A gas turbine drives the propeller and the exhaust gas jet aids in thrust.

The "push and pull" type of engine, shown below, promises to open a new era in aircraft design. A gas turbine drives the propeller and the exhaust gas jet aids in thrust. The compressor takes ordinary air and whips it into a hurricane; the heat in the combustion chamber turns the hurricane into a tornado, and the turbine converts the tornado into controlled power.

All these activities take place within the engine casing which houses the three parts of the machine. The engine casing is essentially a tube with the compressor at one end, the turbine at the other and in between. The compressor and turbine fans are both fastened to the same shaft which runs down the center of the engine casing.

The engine is started by a small motor which spins the shaft, running the compressor to gulp in air. The air is heated in the central section and then blasted against the turbine. The turbine goes to work—half or more of the power is expended in keeping the compressor spinning after the starting motor is shut off. The remainder is the power that has given the gas turbine engine its fame.

The axial compressor is not as simple as any means in an electric fan. The shaft at the compressor end of the engine is lined with rows of fan-like blades which rotate when the shaft revolves. These blades alternately push against fixed blades fastened to the walls of the compressor shell. In operation the air...
sucked in from outside is pushed and bounces from blade to blade through the full length of the compressor until it becomes highly compressed and has hurricane force. Other efficient compressors are the rotary and centrifugal types.

Compressed air itself is powerful but unfortunately we never get as much work out of it as we use up in the compression process. Heating the air will produce the real dividend of power. In the combustion chamber the hurricane is brought to temperatures as high as 1,500 °F. It is burned to combustion gases by the flame of a liquid fuel and becomes the "tornado".

The red-hot tornado rushes on to expand in the turbine which, like the compressor, consists of rows of fixed and moving blades. To escape, the heated compressed gases push against the blades which rotate the shaft, thus generating the power that will drive planes, locomotives and other machines.

The jet-propelled aircraft has made the most monumental change of the turbine. The action of the jet engine is rather like the effect when the neck of a child's inflated balloon is released suddenly. Air in the balloon pushes to get out and the balloon rushes about in space until all the air is exhausted. If the air in the balloon were heated, it would expand and the pressure inside would increase. Then the balloon would fly farther when released.

Essentially this is what happens in a jet turbine engine. Power develops in the turbine, and a powerful push results as the gases expand through a specially designed jet nozzle at the rear. The thrust of the jet pushes the aircraft forward just as a sky rocket.

The rotary compressor, being assembled here, gurgles in air and squashes it between these finely machined spiral gears.

The jet "knocks" the plane forward. Jet propulsion took a new turn in 1925 when a 21-year-old English flight student at the R.A.F. College at Cranwell wrote an essay on "Future Development in Aircraft Design." Under "Turbinettes", Frank Whittle said: "It seems that, as the turbine is the most efficient prime mover known, it is possible that it will be developed for aircraft, especially if some means of driving a turbine by petrol could be devised."

The essay, in its blue-covered note-book, not only drew attention to Whittle but also started him on personal experiments. His first patents in 1930 were considered impractical but the R.A.F. encouraged him; the Ministry of Aircraft Research became interested; and in 1937 the first successful propulsion gas turbine was built.

The war drew a veil of secrecy over jet propulsion developments but the work continued. In 1941 an experimental Gloster plane made a propellerless but power-driven flight. Through reverse landing, Britain sent a sample turbine and all the Whittle designs to the United States.

The Gloster "Meteor", a jet-propelled fighter, was the first and only Allied jet aircraft used on operations during the European war. Meteors helped defeat the flying bombs off the south coast of England in 1944, and then were flown by the R.A.F. 2nd Tactical Air Force on the continent.

Canada quickly became interested in jet propulsion and in 1944 formed a research company, "Turbo Research Ltd.", affiliated with Research Enterprises Ltd., of Leaside, Ontario.

With the exception of those driven by waste gases from chemical processes, practically all gas turbines use petroleum fuels. Jet-propelled aircraft fly on specially blended fuel chiefly composed of kerosene, and when the Gloster Meteor jet fighter came to Canada it used fuel produced by Imperial Oil Ltd.

At speeds up to 450 miles per hour, the jet turbine engine is not as economical as the propeller. To overcome this for speeds of less than 450 miles the engine is redesigned to drive a propeller fitted to the front end of the shaft, using most of the energy from the hot gases passing through the turbine. Any energy remaining in the gases is available to produce additional push in a jet.

"It's like floating about on a cloud," fliers say about the performance of the jet. The turbine on the plane is noiseless and vibrationless as far as the passengers and crew are concerned. It runs without lubricators, without complex lubricating systems, or involved electrical equipment. Where the reciprocating engine produces one horsepower for every pound of its weight, the gas turbine can produce 1-1/2 horsepower. In short, the turbine is simpler in almost every respect than the piston engine; lighter, far more easily serviced.

All turbine construction has faced the same problems. When the hot cherry-red turbine blades whirl past each other at speeds of 10 miles a minute they

must be of precision construction because their clearance is only a matter of thousandths of an inch. And the metal must not weaken under enormous temperatures. Fuel consumption, too, always has been high in the turbines.

Modern designers are overcoming these difficulties. British scientists have developed a new nickel-steel alloy capable of withstandng much higher temperatures than ever before. Variations in the design have been made for turbines that operate with diesel engines, modern electric generating plants, and marine and locomotive engines.

Turbines also have a special use in driving superchargers to increase engine power. In military aircraft they were used to amplify the power of the reciprocating engine. Applied to diesel engines they increase the power output by as much as 50 per cent. It is doubtful if the gas turbine can be adapted to the motor car, bus, or truck in the near future. To produce enough power for such purposes turbine engines operating at today's maximum temperatures (1,000-1,300°F) would be too large for an automobile chassis. However, if we can develop metals strong enough to stand the white hot temperature of 2,000°F then we may see small turbine engines practical for road vehicles.

But the turbine soon will be King of the Air. The British Government-owned airline has on order jet transport airliners that will weigh 38 tons and carry 40 passengers across the Atlantic.

Science has taken the principle of Hero's toy, and, helped by the petroleum industry, has developed one of man's most efficient sources of power. The day of the gas turbine engine has just begun and as it advances we soon may see great numbers of trains, planes, and ships powered by a man-made whirlwind of hot air.

---

Pictured here is an artist's conception of the streamlined locomotive of the future. Gas turbines drive the generator, which supplies power to electric motors on the wheel axles.
NEW SERVANTS FOR MANKIND
THE AMAZING DEVELOPMENTS IN THE PETROLEUM INDUSTRY DURING THE WAR YEARS ARE NOW BEING COUPLED WITH THE ADVANCES OF THE PAST TWO DECADES, RESULTING IN A HOST OF NEW PRODUCTS TO SERVE HUMANITY

IN the old story of "Jack and the Beanstalk" the magic bean sprouted overnight but that was in a fairy tale where anything can happen. In real life men have sought for centuries some substance to regulate the growth of food for a hungry world.

Today part of the answer has been found through use of the oil that lies hidden in the earth. Some oil products help to hasten the ripening of fruits; others, creating artificial fogs, retard budding and reduce harm done by late frosts. Oil sprays kill insects that blight orchard trees; others delay the fall of ripe fruit that would bruise and lie rotting on the ground.

These uses of oil in agriculture is a measure control nature, but they are only part of the new wonders of petroleum.

In our time oil products have revolutionised man's standards of health, beauty, speed, and comfort. Already they have wrought sweeping changes throughout the world and now the oil industry is moving towards new developments that would have startled our grandparents and their parents. And yet, because the changes are coming gradually and to some extent unawares, we accept them almost as a matter of course.

In many respects World War II was a fight for oil. German synthetic oil plants were major war targets although the much vaunted Nazi discoveries have had little new technical significance for our scientists. The greatest oil reserves were on the side of the United Nations and helped to shape history's course and our victory.

The war interrupted the introduction of new products that would have been ready for civilians; in other fields it speeded scientific oil research and the emergency discoveries to meet war demands can now be adapted to the better life of peace.

Even the deadly flame thrower has been modified as a machine for farmers who want to burn oil seed fields. Its fuel will be butane gas from petroleum instead of the jelled gasoline of the Pacific war days.

Petroleum-derived ammonia, important for munitions, now finds another use in fertilizers. And the chemical toluene, the second "T" in "TNT," also is back in civies. During the war toluene was produced from oil in the U.S. in great quantities for explosives. It is an excellent solvent and now is employed in making paints, varnishes, and lacquers.

In the U.S. a non-flammable gasoline has been developed—an gasoline in which you can "butt" your cigarette without starting a fire.

In short, this year is beginning to show results both of investigations started by the first oil chemists 25 years ago and of the present and vital work of the past seven-year war period.

The average man still thinks of oil chiefly in terms of the power that drives the automobile—for gasoline remains the great primary product of the refineries—and secondly in terms of lubrication. But the industry as a whole is involved in the manufacture of over 1,200 individual products, all using petroleum derivatives. They range from the miracles of the plastics and synthetic rubber to medicines, perfumes, cosmetics, chewing gum, anesthetics, soap, paint, ink, and many other varied articles. Each year adds new products to this list.

The medieval alchemists who searched for the "philosopher's stone" to turn base metals into gold might better have spent their time investigating pets grow to the sky overnight but that was a product, but it is the source of countless wonderful things that are more useful.

The molecular structure of oil has made petroleum almost a philosopher's stone in itself. Oil is not made up of molecules of one kind and size, like water or salt; instead, it is a mixture of molecules, all composed of hydrogen combined with carbon in many ways. These molecules can be taken apart and put together again in what seems to be an infinite variety of combinations, adding to the new substances.

Because of this, oil products are everywhere in evidence. Nevertheless, the purchasing housewife often fails to suspect she is buying oil derivatives.

Perhaps the greatest single new wonder of petroleum is a process. It is catalytic cracking, in which the use of heat, pressure, and a "catalyst," high octane gasoline and many specialized products are obtained on a scale never dreamed of until a few years ago.

The war stimulated the birth of "cat" cracking. It had been conceived before hostilities broke out, but war demands hastened its growth when more and more quantities of high hexane gasoline were needed for aviation.

The first catalytic cracking process in Canada was developed by Imperial Oil and put in operation at its Sarnia refinery in 1940. This process is known as "suspended catalytic cracking." During the war this process produced not only cracked gasoline for motor cars but the cracked gases that eventually became Canada's total production of synthetic rubber.

In war years other catalytic cracking processes were developed in the U.S. to produce high octane gasoline for aircraft and cracked gases for synthetic rubber and other synthetic chemicals. Among these was the newly widely know "fluid catalytic cracking" process. Canada's first fluid catalytic cracking plant will be constructed for Imperial Oil Ltd. at Montreal East, and the Dominion soon will have this new supply for its increasing oil needs.

High octane gasoline itself tops the list of the new wonder products of oil. Its evolution opens up a whole new horizon of speed and power. It is obtained by mixing a gasoline base stock with blending agents and tetra-ethyl lead. Early in the war 100-octane gasoline was obtained for fighter planes and bombers.

Later, fuels were produced with an even higher octane rating.

The oil industry is almost ahead of itself in high octane gasoline production at present, and must wait for engine design to catch up. The big transport planes of today, preceded by the bombers of yesterday, are ready for the high octane fuels. But the automobilists and others engines must be improved for the new use, and the average motor gasoline stands now at about 75-octane.

When ready for the higher octane fuel, engines will be more flexible, more economical in operation, and...
OUT OF EVERY GASOLINE DOLLAR SPENT IN CANADA

B.C. ALTA. MAN. ONT. QUE. P.E.I. N. S. N.B.

SASK.

29¢ OR MORE (DEPENDING ON LOCATION) GOES FOR TAX

more powerful. There will be a marked increase in horsepower without a change in engine weight. For example, the Rolls Royce aviation engine was 1,100 horsepower before the war, but now develops 3,500 horsepower for the same weight.

Even the average gasoline of today is a much improved product. It is of a far higher quality, but the cost without taxes is far lower than 10 years ago.

The gases of petroleum rapidly are becoming the wonder-workers of the industry. Considered nothing but a waste and nuisance 80 years ago, they are sorted and slit to produce chemicals that lead to synthetic rubber, plastics, and blending agents for high octane fuels.

Synthetic rubber and plastics each are a book of new wonders in themselves. Each field grips the imagination because it seems to lead to the dream-world of the future.

During the war, when the Japanese captured the main supplies of natural rubber, they gave a tremendous stimulus to our development of rubber substitutes. The result was that by VJ Day, North America was producing synthetic rubber on a greater scale than it had ever used the natural substance.

The main ingredients of synthetic rubber are petroleum products. Imperial Oil supplied ethylene, butylene, and isobutylene during the war for the Polymer Corp., the Canadian crown rubber company at Sarnia.

Largest in volume production of the synthetic rubbers is Buna S, used in tire castings and treads. It is finding new uses in rubber springs for smoother automobile rides; as foam rubber for mattresses, car seats, and furniture; and as a noise-reducer.

Butyl rubber, used for inner tubes, holds air about 10 times as well as natural rubber. The synthetic tubes also are better in resisting rips and thus reduce the danger of blowouts.

Perbunan, another synthetic, does not go to pieces like natural rubber when in contact with acids and oils. It is being used for gasoline hose, for floorings, shoes, gloves, and other articles needed where there is an acid-hazard in laboratories, industry or the home, and it is appearing in brake linings and gaskets. Vistanex, too, proved itself better than natural rubber for the insulation of radar equipment and is suited for electrical insulation, adhesive on surgical tape, and many special applications.

The synthetic rubbers are themselves a branch of the plastics group but usually aren’t included in the popular meaning of the word “plastics.” Most people think of the plastics as light, colorful solids, now appearing more and more frequently to make life attractive and comfortable.

For the ordinary man the all plastic home or automobile will be rather distant in the future, but already he can hardly spend a day without touching some plastic article.

Plastics derived from oil now range from supremely rigid to completely flexible substances and all their uses just can’t be listed in a short space. Some are more transparent than glass and make aircraft windows, canopies, optical lenses, and other products where light is a prime factor. Others make impregnated cloth, fabrics, and serve as wood substitute and as water-tight and fireproof clothing.

The vinyl plastics can be so hard and tough that one of them is used for chemically resistant piping. The piping can be threaded like ordinary steel pipe or welded by melting the ends and pressing them together. But other vinyls are used for draperies, belts, and suspenders, with still others as weather-resistant screening and fireproof upholstery.

Plastics have entered every room of the home; they appear in the office, the automobile, the train, and the aeroplane; and they affect every department of life, “from teething ring to coffin” as one writer has said.

Perhaps most impressive wonder for the womanfolk is that certain chemical compounds from the petroleum gases which produce plastics may be used in the manufacture of nylons.

Paraffin wax is one of the early products of the refining process. It is one of the purest petroleum materials and one of the cheapest. Colorless, odorless,
AIR GATE OF THE ATLANTIC

NEWFOUNDLAND, AN ESSENTIAL BASE TO PIONEER AIRMEN, STILL IS IMPORTANT TO MODERN COMMERCIAL AIRLINES.

A S PEACETIME aviation gathers momentum, that centre support of the two-span air bridge of the North Atlantic, the island of Newfoundland, is again making air history.

For pioneer aviators, attempting trans-Atlantic flights, Newfoundland was a natural take-off or landing spot, because the island is the nearest land in North America to Europe. Its capital, St. John's, lies some 1,100 miles from New York and 2,300 miles from London.

Commercial airlines began to use the island for trans-ocean flying before World War II. During the war it became one of the world's most important air bases, a staging point for the aircraft which flew in ever-increasing numbers to Britain.

The island's airports also sheltered Canadian fighting planes and their crews. Big, busy flying boats patrolled the sea routes and did battle with lurking submarines, and twin fighters guarded the air approaches to St. John's.

Now, with the return of peace, the huge airport at Gander is an important commercial field. Although modern land-based aircraft can and do make non-stop flights from continental North America to continental Europe, commercial airlines still use Newfoundland and indications are that they will continue to do so for some time. The reason is payload, for the longer a non-stop flight, the more fuel an aircraft must carry and consequently the less payload.

By breaking the flight at Newfoundland, airlines can carry more freight and more passengers across the Atlantic—one of the most important air routes in the world.

The development of Newfoundland as a trans-Atlantic base began in 1919. Aircraft which could cross the ocean were developed during the First Great War, and aviators were spurred to make the attempt when the London Daily Mail offered £10,000 for the first continuous trans-Atlantic crossing by air. Winners of the award were Capt. John Alcock and Lieut. Arthur W. Brown, who took off from Lester's Field, near St. John's, on June 15, 1919 and landed...
at Clifden, Ireland, 16 hours and 12 minutes later. Knighthoods, acclam, and a lasting place in history were earned by the fliers.

The first actual aerial crossing of the ocean, however, was neither non-stop nor were the aviators competing for the $10,000. One month before Abel and Brown made their flight the United States navy seaplane NC-4 flew from Trepassey, south of St. John's, to Horta, in the Azores, and finally reached Plymouth, England, via Lisbon. The NC-4 was one of three navy seaplanes that left Newfoundland on May 16, 1919. They were two flown before reaching the Azores.

Two days after the U.S. planes took off, Harry Hawker and MaxKenie Grieve made the first British attempt, but were forced into the sea after 13 hours flight. They were picked up by a freighter. Another British airship, with Capt. F. P. Raynham and Maj. C. W. F. Morgan aboard, attempted to follow Hawker and Grieve, but the aircraft crashed on the tablelands.

It was not until April 1929 that the first non-stop flight from east to west was made by Baron von Hoensfeld, Capt. Koohi and Maj. Fritz Maurine, who flew from Ireland to Greenly Island off Newfoundland's northwest coast. In May 1932 Amelia Earhart Putnam flew from Harbor Grace to Londonderry, Ireland, to become the first woman trans-Atlantic solo flier.

Newfoundland also knew such noted airmen as Charles Lindbergh, Charles Kingsford-Smith, Wiley Post and Harold Gatty, who landed and took off from its soil or passed over the island on their flights.

Commercial trans-Atlantic aviation started in July 1937, when the Pan American Clipper III flew from Botwood to Foyles, Ireland, and on the same day the Imperial Airways flying boat Caledonia landed at Botwood from Foyles on the first survey flight. Regular passenger service, however, did not start until 1939.

Meanwhile, the British Air Ministry decided to construct a modern airport at Gander 213 miles by rail northwest of St. John's. While workmen cleared the area, Royal Air Force personnel set up a radio station at Botwood, 40 miles further westward, for direct trans-Atlantic communication. Aircraft communication and direction-finding equipment was also installed. Communication between Botwood and Foyles was established in January 1937 and is still maintained, although the station was moved to Gander in 1938.

Gander was ready for trans-Atlantic flights in 1939 but suitable planes for trans-Atlantic service still were lacking. When war came in September, the airport staff waited, uncertain as to the future. During the following winter aircraft operations on wheels under cold weather conditions were tested. These proved valuable, for they were the basis of bomber deliveries to Britain in the next and succeeding winters.

The first plane to arrive at Gander was a Canco flying boat, which made a successful crossing in September 1939. More than a year later a flight of seven Hudsons took off from Gander as a test move- ment. The experiment was successful, and dozens, then hundreds and finally thousands of planes bound for the fighting fronts crossed this air bridge. As many as 200 planes a day have left Newfoundland.

The end of the war in Europe meant a reversed flow of traffic, as redeployment brought aircraft back for use against Japan. V-J day brought peace instead, and now, commercial airlines and open publicity have succeeded the tense silence of war.

At Botwood the Royal Canadian Air Force con- structed huge flying boat hangars and two marine airways. Imperial Oil facilities here, built for pre- war commercial flights, were turned over to the R.C.A.F., which later installed its own tankage but the Company continued to supply aviation fuel and lubricants.

Imperial men at Botwood led hectic lives during the war. In the rush of servicing big flying boats which landed at all hours they missed meals and sleep and rest. In one day 19 seaplanes took off or landed on the Bay of Exploits. Last year the Company serviced 786 over-seas planes. Botwood became inoperative last October and the hangar-based plane seems for the time to have superseded the seaplane.

Commercial airline activities at Gander, however, are expanding. Trans-Atlantic flights now are being made through the airport by Trans-World, American Overseas, Pan American and Air France Airlines, British Overseas Airways Corporation and Trans- Canada Trans-Atlantic Airlines. Less frequent crossings are flown by Sis (Swedish), Danish, Hibernia, Royal Dutch and Norwegian Airlines. Trans-Canada's local flight also include Gander.

Imperial Oil Ltd., serves all these airlines. The biggest post-war refueling done in one day saw the tanks of 16 trans-ocean aircraft and four T.C.A. local planes filled. As many as 98,000 gallons of aviation fuel a week have been used at Gander. The Company's refrigerating crew moved some 20 men and six tank wagons haul gasoline from tanks which hold 1,056,000 gallons.

An increase in the number of trans-Atlantic flights by the three United States airlines is forecast. Weekly landings at Gander, which numbered 71 in May are expected to rise to 119 by September. Other air- line operators are also expected to increase their flights and it is estimated that Gander will have 40 to 49 landings a day by September.

During the war, Gander was taken over by Canada and was transferred back to Newfoundland this year. The town is now also recognized as the seaplane bases at Botwood and Gander, but Canadiana in its fine simple the landings comprising today's airport, now the T.C.A. Newfoundland.

In War World II the R.C.A.F, anti-submarine patrols were flown from Gander, and Botwood and Gleenagles were used as seaplane bases of the home of fighter squadrons protecting St. John's, and anti-submarine aircraft were also based there. Today will be operated as a civil airport by the Canadian Department of Transport, but will be available for military use.

Other airports in Newfoundland have been se- established at Stephenville, a U.S. army installation known as Harmon Field. There Imperial Oil has a staff of 19 men who refuel commercial and Atlantic Transport Command aircraft. Another airport is the U.S. navy's field at Argentia, and there is an emer- gency landing strip at Burmarsh, operated by the Canadian Transport Department.

Trans-Atlantic flying has come a long way since the first plane took off in 1917. Radio control, radio compasses and even voice radio, the panels and control tower were unknown and weather forecasts non-existent. Now the aircraft flying the ocean is given charted half way by the airport from which it leaves, and the rest of the way by radio men at its destination. At Gander some $5,000,000 worth of radio equipment is used to ensure flight safety. This installation is considered one of the finest in the world.

Weather forecasts are vital to ocean flying and at Gander the meteorological section is under Can- daian control. The weather office has a staff of 32, including 18 foremen, whose job it is to supply flight forecasts for aircraft bound for the British Isles, France, Scandinavia, and on occasion, Arabia.

Squadron Leader H. A. L. Paton, Director of Civil Aviation for Newfoundland, was a pioneer in establishing Botwood and Gander air facilities. He came to Newfoundland as a liaison offer between Newfoundland, British and Canadian governments in 1936, when the first regular trans-Atlantic flights were proposed.

Now his principal task is running Gander airport as an international air crossroads. The big job now has a staff of 500—of whom 160 are engaged in radio and other technical duties and the others in catering, housing and other general duties. With the proposed expansion of air traffic, it is ex- pected that the staff will increase, giving added em- ployment to Newfoundlanders. At present the De- partment has estimated that it will take $3,000,000 a year to operate the airport.
A vital factor is that the cost of propane to the consumer compares favorably with that of manufactured gas. Under some conditions it will be slightly more expensive than ordinary "city" gas—under other conditions, slightly less costly.

Propane gas is an oil product, obtained by the distillation or cracking of crude oil and from some natural gas fields.

Propane must not be confused with other oil fuels that are liquid. It does come from crude oil but is essentially a gas, a product of a natural process or distillation. It is compressed into liquid form for transportation, but is a gas again when used for cooking or power purposes.

Propane has many advantages as a fuel. It is clean, contains no impurities and is easily controlled—properties of especial interest to metallurgical and glass industries. It is easily transported and easily stored under pressure, is non-poisonous, and has a high unvarying heating value.

For several years now, residents of Sarnia and surrounding districts have been using a fuel made up of a mixture of natural gas from the underground gas fields of southwestern Ontario, and petroleum gases piped to the Union Gas Co. from Imperial Oil's Sarnia refinery. Imperial now is installing facilities to supply petroleum gases more widely in some parts of Southern Ontario.

Though new to Canada, petroleum gases have been proved highly effective in U.S. through long usage. The special properties of propane and of another petroleum gas—butane, have given rise to a thriving liquefied petroleum gas industry there. The L.P. gas industry, as it is commonly known, has been in existence for over 20 years with ever-increasing sales. Last year nearly one billion gallons of L.P. gas were used in U.S. Over half was for domestic cooking and heating; the remainder was used as industrial fuel and in chemical manufacture.

Industrial and agricultural applications of L.P. gas include such diversified uses as heat treating of metals, glass manufacture, preparing pre-cooked foods, metal cutting, heating chicken brooders and protecting orchards against frosts. Industries using petroleum gas for fuel may locate close to sources of raw materials, thus effecting economies.

In the home, propane's main use will be for cooking. New housing projects in suburban areas not supplied with mains for the usual gas now can have gas service.

Left: liquefied petroleum gas must be kept under pressure until it is to be used. Several hundred thousand gallons are stored in these pressure tanks before shipment.

Below, left: an operator places a "carry-away" cylinder upon the weighing platform and measures it in pounds of gas. Two cylinders holding one hundred pounds await their turn.

Below: at the shipping warehouse the truck driver checks over his load of one hundred pound cylinders of liquefied propane before starting out on one of his delivery rounds.

"Any gas today, lady?" Rural consumers whose homes are beyond the end of the gas mains can have bottled gas for cooking.
The summer cottage, the farm, the hunting lodge, all can benefit from the development of propane delivery.

Propane in itself is not used in motor gasoline and is separated from gasoline in the refinery. Then, in combination with other petroleum gases, it is used as an excellent, easily controlled fuel for the refinery furnaces. Liquefied propane is also used as a solvent to remove undesirable compounds from oil in certain refining processes.

At ordinary pressure, propane can be turned to a liquid only by cooling to about 44 degrees Fahrenheit below zero. How, then, can we transport large quantities of it to a town or industry perhaps hundreds of miles away without installing an expensive pipe line or carting it around in the huge gas tanks we see at a city gas works?

The answer is found in the use of pressure. If we compress propane gas enough it will turn to a liquid and occupy only a fraction of the space it fills as a gas. For instance, 273 cubic feet of propane gas at ordinary room temperature can be compressed to one cubic foot of liquid propane. In this form we can transport large quantities of propane from the refinery to the consumers.

At the refinery, propane is separated and purified and then forced under pressure into large cylindrical storage drums. These drums, made of heavy steel plate, must be strong enough to withstand the pressure required to keep propane in liquid condition at any reasonable temperature. Cooled to 44 degrees below zero, the propane will liquify without any pressure, but on a hot sunny day the temperature of stored propane may rise to 100 degrees above zero. Pressure of 170 pounds per square inch is required in such conditions to keep the propane liquid. Engineers, accordingly, must design drums strong enough to resist any pressure required. Safety devices are installed for added protection.

Shipping the liquefied propane is simply a matter of pumping it from the refinery storage drums to specially built tank cars or tank trucks. At the delivery point it is transferred to storage drums like those at the refinery. To districts not served by gas mains the propane is dispatched in small portable cylinders which the consumer can install in a rack outside his house or working quarters. The cylinders can be connected to the stove or other appliance.

The cylinders to be used for propane by Imperial are the 100-pound size, holding about 20 gallons of the liquid gas. They are 14 inches in diameter and about four feet long. Small 20-pound "carry-away" cylinders may later be introduced here.

Liquid propane under pressure in storage drums or cylinders will turn immediately to a gas as soon as the pressure is relaxed. Special pressure regulating valves are used to release the propane as required from high pressure storage into the low pressure pipe lines where it changes to gas.

One Imperial gallon of liquid propane will expand to 43 cubic feet of gas. The average home will use about 450 cubic feet a month—only 10 or 11 gallons of liquid propane. Thus a month's supply of gas for homes would be one or two small cylinders.

Pure undiluted propane may be used in several ways. The portable cylinders may be required for individual installations, but houses in towns and cities can be served by pipe lines from a central point. Industries needing a high grade and exceptionally clean fuel can install their own propane storage drums and be served regularly by rail or truck.

Propane can be a valuable ally for communities where gas manufacturing plants already exist. At a relatively low cost, propane storage equipment can be installed to augment the supply of manufactured gas. In the past, gas plants had to be built to cope with peak demands such as Saturday "bath night." Now the plants only need to be equipped for average consumption, and propane installations can care for emergency maximum periods. This will eliminate costly standby plants which, until now, had to be provided but were seldom used.

When artificial gas is piped long distances through high pressure pipe lines large losses in heating value usually occur. These losses can be replaced by installing propane equipmen near the end of the line to enrich the gas.

A cubic foot of undiluted propane gas has about five times the heating value of manufactured gas. Thus the volume of propane used by a consumer would be only one-fifth that of the artificial product. Only comparatively small, inexpensive pipe lines will be required by communities installing a propane system. In fact, if a pressure system is used with individual regulators at each house, the pipe line may be as small as one-half inch in diameter.

Like soldiers on parade, the empty gas cylinders are lined along the roadside waiting their turn to be filled. Meanwhile a load of recharged bottles is prepared for delivery.
PACKAGES FOR PETROLEUM

CONTAINERS—something in which to keep or carry something else—were one of the earliest problems of mankind. There is evidence that prehistoric man used hollow stumps and tree trunks for storage and when he wanted to carry a liquid he made a rough sack by gathering up the edges of an untanned animal hide. To this day South American Indians carry water and various petroleum products in skin bags.

Gradually, crude bottles and jars made of sunbaked clay and baskets of woven grass and rushes became the forerunners of today’s containers. Gold, silver, alabaster and fíne porcelains were the materials used for the craftsman’s highest attainment in containers. In modern life, a package can mean almost anything from a crate in which to ship an airplane to a cellophone hat box.

The public has been made package conscious. Packaging of all types of products now is so important a part of modern industry that practically all large firms have packaging committees and departments. In fact, the design and manufacture of containers, generally known as packages, has really developed into a field in its own right. Conventions are held solely to consider packaging problems and magazines are published for the sole purpose of assisting package experts to exchange and develop new ideas.

The petroleum industry is no exception. In normal times Imperial Oil has an annual aggregate of all types of packages filled and handled amounting to 8,000,000. This figure includes outside containers for quantities of small packages and drums that are filled more than once during the year. The costs and expenses for these are more than $3,000,000 annually.

When it is realised that Imperial makes 570 individual packageable petroleum products; that 10 percent of its total sales volume is packaged; that these containers are distributed over more than 3,900,000 square miles of territory and handled under widely varying conditions, the magnitude of the packaging department’s task can be understood. Designers of every variety of container, from cardboard boxes for casks of paraffin or wax candles, to drums for high octane gasoline must bear in mind safety, tensile strength, ease of handling and consumer tastes.

Intelligent consumers are interested in far more than the shape and color of a package. The housewife wants to be sure the Paraffin she buys to seal her pickle and preserve jars has been kept scrupulously clean, that the candles for her dinner table have been protected from dust and from heat that will bend them. She likes to see what she buys through a little cellophane window in a carton but she does not want to see more for an elaborate package simply because it is pretty.

Retailers like packages to be attractive but they are interested also in whether products are put up in containers that are convenient to handle and store in the consumer’s home. Service station operators as well as all phases of the industry itself where large drums are handled are anxious that they should be designed for easy and safe handling. Thus the ridge in a gasoline drum is put there not so much for decoration as to make it easy to roll and protect the men who handle it from lifting strain. Fire protection also is a consideration.

Packages for the oil industry consist principally of drums, boxes, cartons and cans, with many sizes and varieties of each according to its purpose. Materials, size and shape and appearance are governed primarily by the accepted regulations and requirements of the trade. However, packages also are polished according to their contents by bureaus charged with safety, by transport regulations and by other public considerations. For instance, containers filled with any flammable product must be painted predominately a bright red.

Color plays an important part in the design and distribution of packages. Certain colors are accepted throughout the industry as designating certain types of product. In addition, drumheads are painted a certain color with a special stencil to indicate the product of a particular company to which the refinery ships the package or container. When a new product is placed on the market it has to be launched with a new and attractive package to distinguish it from others already there. At the same time, it has to meet all the demands of the purpose for which it is designed.

During the war years the government, in the national interest, required that all packages except priority types be standardized and drastically curtailed in number. Now, new packaging plans can be put into effect. From a minimum of 81 types during the restricted war years, the Imperial package program at the first of 1946 authorised a total of 145 types. It is estimated that 200 varieties will exist when raw material shortages for manufacturing disappear and all Wartime Prices and Trade Board restrictions finally are lifted.

Probably the best known container, not only to the oil industry but to the public, is the barrel or drum. In spite of the fact that its gross weight is more than 400 lbs. when filled with petroleum products, this container can be rolled, whirled, or trucked by one person; it probably is the best example of a heavy container which can be handled easily because of its design.

Some of the Company’s drums are required to stand strenuous handling. They are hauled through the northland on sledges; they are dragged over rough roads with chains; they are parceled from planes and of course they are most commonly handled by conveyor belts, boats, trains and trucks. Obviously, they have to be tough.

Barrels or drums are classified into two economic classes,returnable and non-returnable. Naturally, any company wants the returnables sent home to the filling point so that they may be reconditioned to obtain maximum trip frequency. Veritable miracles are wrought in the reconditioning sections of the Company’s refineries.

Five essentials are involved in selling packages or containers. First, they must fully protect the product and conveniently dispense the product. Second, they must have sales or eye appeal in accordance with the product and price. Third, they must proclaim the marketer and the identity and quality of the product. Fourth, they must be practical, production-planned and easy to fill or pack. Fifth, they must be easy to handle, stock and display.

Truly the humble and hard-working package plays a major, if often unnoticed, part in our daily lives.
MEN OF OIL
FEW INDUSTRIES OFFER SO MANY ENTIRELY DIFFERENT KINDS
OF EMPLOYMENT AS A FULLY INTEGRATED OIL COMPANY

In this fall of 1946, as at the beginning of every
school year, young people across Canada are
asking themselves: “What’s it to become of me? Where
shall I earn my living when I finish school? And
what should I study in this and the next few years
that really will be useful?”

The young people who find the right answers for
these questions will be the successful citizens of the
future. They will look at what can be done in
Canada, make their decisions about their aim in life,
and prepare for the jobs they will obtain perhaps
three, five, even 10 years from now. A substantial
number among them eventually will obtain employ-
ment in the oil industry.

For the oil industry offers many opportunities for
an interesting and profitable livelihood. It can
combine adventure with security, achievement with
ambition. Few fields require such a variety of
occupations, such a wide assortment of talents.

A fully integrated oil company, such as Imperial
Oil, searches for oil, produces it, transports it, and
refines and markets a multitude of products. Each
department includes a long list of occupations and
there are in all hundreds of different jobs. Most of
these call either for special skills or professional
training.

All departments contributed heavily in manpower
for the armed services, and the Company had a total
enlistment of 2,397 employees, 74 of whom were
later listed as killed, missing or totally disabled.

Imperial is engaged now in a five point post-war
employment program. It is reabsorbing employees
who have returned from service; continuing where
possible the employment of all men who were engaged
as substitutes during the war; and filling other
vacancies where possible with veterans who have not
worked for the Company before; as well as assisting
veterans who have partial disabilities and desiring
job training.

Thus at present, post-war readjustment to some
extent limits the new opportunities that normally
arise with the Company. But Imperial believes in
Canada’s future and has planned a broad program
of expansion and exploration which, as it is developed,
will provide opportunities for those with the right
training and capabilities.

There are two classifications for most jobs in the
oil industry above the level of apprenticeship or

Every man of the oil refineries are the process operators.
Usually starting as utility men they advance through vari-
ous jobs until as operators they take charge of process units.

Petroleum assures excellent product quality and points
the way to process improvements, to the new uses of petroleum
derivatives, and to the development of new oil products.
they scarcely can be counted. In his book "Thin Fascinating Oil Business," Max W. Hall declares: "The oil field is the biggest factory in the world, the driller on the derrick floor, the pumper on the pipe line, the stillman in the refinery, the filling station attendant — these are the real engineers in the oil field, the driller on the derrick floor, the pumper on the pipe line, the stillman in the refinery, the filling station attendant — these are the real engineers in the oil field.

The initial activity of a big oil company is the search for oil. Here the geologist, with specialized university training, begins the work. He appraises the oil potential deep in the earth and recommends areas where drilling may be profitable.

The search for oil is unending, and Imperial has undertaken a great program of exploration in Canada. The Company will need geologists in the future. As used here, the term is broad, including geophysicists, subsurface geologists, geochemists, and other specialists. Here is a field for young Canadians with a scientific interest who are interested in working in years of patient study.

Those years of study can have their own particular rewards. What greater satisfaction can there be than to point the way to new resources in this great Canada of ours? The life of many geologists, too, is an out-of-doors life, with a wide appeal.

In the industry geologists are known as "rock-hounds" or "pebble-pickers." When the rock-hounds and the pebble-pickers may say they can be found in a certain area, the "practical" men get to work to prove him right — or wrong.

First comes the lease man, or land man; with the "scout" not far behind. And then the rig builders and the drilling crews, "the smartest men in the oil business.

All these are men who know their phase of the industry and who possess the right that will permit drilling to be conducted. The scout keeps track of all such activities, acting perhaps for a rival company, for the oil industry is highly competitive.

Drilling is on the way when the rig builders erect the derricks. And when the drilling crew step in, the operation is moving to success or failure. All drillers require long experience, whether they be cable tool drillers or rotary tool drillers. With them are their own crews working in perfect cooperation; the "toole" with the cable tool driller; the "Preacher and dancer" with the rotary drill man, and boiler man, with the rotary crew. "Roughneck" is the name for these men, an honored title, and they require help from the "rotaboots" who do the odd jobs about the derricks.

The tool pusher has authority over rig builders and over all derricks. There are specialists, too, like the well-shooter who explodes nitro-glycerin in wells to remove tightness: a dangerous occupation. The acidizer, who has a related function, now usually is a chemist or engineer or both, and uses chemical methods to clear the way for the hoped-for oil.

These are the men, when, who they are fortunate, discover the oil. Once petroleum has been found, the production men take over. They, too, have had long experience and are a colorful crew.

Production is the second phase of the industry. It is in the hands of "specialists through practice," beginning with the rotaboots and including the bull gang, connection gang, clean-out crews, and pumps, with foremen and field superintendents above those for the larger planning, and above that the production engineers.

The bull gang and rotaboots dig ditches, wrestle pipe and lumber, and perform the other less skilled jobs about the oil fields. The connection gang connects pipes and valves and installs much of the equipment. The clean-out crew has a light drilling rig and cleans out wells when they accumulate mud, sand or paraffin. The pumps pump out wells when gas pressure no longer produces flow.

Education is particularly important to the production engineers who must prevent waste of oil or gas, of materials or labor. Acting in an advisory capacity, their job has almost become a science.

When a well has established flow, the petroleum must be transported to the nearest pipe-line or refinery. In this third phase, the pipeline crews take charge — another long-experienced group. They lay the pipe; the tank strappers measure the oil in the tanks; and the line-riders or line watchers inspect the line.

The oil exporters, the production crews, and the pipeline men give character to the oil fields and towns of Turner Valley, the Northwest Territories, and other petroleum areas of Canada. They are a seasoned, healthy, adventurous lot, proud that their part in the industry is an element of pioneering.

Canada produces only a fraction of her oil needs and the larger portion must come from outside the Dominion. Crude from the United States finds its way north through great pipelines, tended by still other specialists.

To bring in petroleum from abroad, Imperial maintains its own ocean and lake tankers, the largest tanker fleet operating under Canadian registry. Here oil men who like a taste of the sea, their place as captains, chief officers, marine engineers, radio and wireless operators, able-seamens, and the inevitable cooks.

All the earlier activities lead to the refinery, the fourth and most complex phase of the industry. Here crude petroleum is broken down into gasoline, kerosene, fuel oil, bunker oil, lubricants, the waxes, asphalt, and the gases that lead to synthetic rubber, plastics and many other modern wonders. The refinery and the men who work there have helped to raise living standards all over the world.

Tank truck drivers play an important part in the marketing operation of the industry. Final phase of the petroleum operation, marketing provides many different occupations.

Each refinery department requires its own specialists: the pipe gangs, the still men, the lube-house men, the wax-house men, the rotaboots, and many others. Highly important are the scientists in the laboratories, whose job it is to maintain the quality of existing products and to point the way to new improvements, to the countless new uses of petroleum derivatives and to the development of new products.

Imperial's Sarnia refinery, largest in the British Empire, employs close to 2,000 men, of whom approximately 500 are engaged in refining, and 700 in mechanical maintenance. Every operation in refinery processing is carried on in the plants on the banks of the St. Clair River. The laboratories have a working personnel of 140, of whom 60 at least are university graduates. Other key jobs elsewhere in the plant such as development, process control, and engineering, also employ many university trained men.

An ordinary refinery worker, starting with a company for the first time, can be assigned either to the processing plant or to a trade. In process he can proceed, if he is capable, from utility man, to cleaner, fireman, second assistant, assistant, and operator. It may take 15 years to become an efficient operator.

The traffic manager and his assistants are a linking medium between production, the refinery, and marketing. They handle all rail transportation from refinery to marketing terminal and despatch the finished products.

Marketing is the final phase of petroleum activities, and the second largest department in the industry. It is a highly specialized field and many of the men in it have graduated from other phases in which they are experts. An oil company may distribute through its own service stations, through outside wholesalers or jobbers, or may sell to outlets owned by the operator. Imperial Oil sells to the public chiefly through dealers who are independent businessmen.

The personnel at head office co-ordinate all the branches of a fully integrated oil company. Here the top-level executive, men with long experience in the business, plan and execute all the broad activities that must be related to each other to be successful.

All departments of the industry have representation at head office. Expectations must be arranged details of land purchases, leases, taxes, building administration, and other legal problems. The legal department performs associated and specialized work. Employee relations specialists are concerned with the general welfare of company employees, arranging pension plans, insurance protection, thrift schedules, and the like. Advertising, special sales research, marine matters, and many other varied essentials, become a life's employment for men at head office.

(Continued on page 49)

The transportation of oil, both to the refineries as crude and from refineries as products, is achieved by pipe line, tanker and tank car. Here workers are filling a back car.
ASSISTANT SECRETARY RETIRES

ON THURSDAY, May 30, Agnes Marie Simpson stood beside a handsomely appointed dinner table in the Granite Club Toronto. Surrounding her were 31 women associated with her in her 32 years of continuous service with Imperial Oil Limited.

In her hand was a letter from the president of the Company, Henry H. Hewetson, paying tribute to her splendid work. Beside her was a sheaf of crimson roses, from a former president, G. Harrison Smith. On the table was a small mantel radio, wrapped gaily in the red, white and blue colors of the Company, gift of the assembled guests.

Miss Simpson is the only woman ever to become assistant secretary of the Company and three of its affiliates, and one of the few women in Canada to attain such eminence in business. She retired a year ago but because she was ill her friends postponed their tribute until her return to health.

Two outstanding talents have marked Miss Simpson's success. One is a remarkable grasp of business and finance, a field usually considered exclusively masculine. The other is a gift of making warm and lasting friendships.

Both her Toronto home and her roomy summer place at Thunder Bay Beach are always filled with guests. The gift radio was intended by her business associates as an addition to the beach cottage where many of them have visited both winter and summer. Miss Simpson loves to cook and the flowers, magazines and ornaments in her small rooms bear witness to her flair for home-making.

She was born in Sarnia and her father died when she was quite small. Her career began as a file clerk in the office of the Company secretary-treasurer, W. T. McKee in Sarnia.

Miss Simpson says she "grew up with the company." So when the office of the secretary was moved to Toronto in 1919 she moved too as assistant to J. H. Archbold, Mr. McKee continuing in the office of treasurer.

Later as the Company expanded still further, it was decided to divide the work of the department into two sections. Miss Simpson then worked in close collaboration with Mr. Smith, who later became president of the Company. He handled corporation investments and she was in charge of capital stock records, in the new office.

In March, 1926 when E. V. A. Kennedy, who had succeeded Mr. Archbold, died, Miss Simpson was appointed assistant secretary.

Through the years her interest in business and finance grew steadily and looking back she finds the growth of Canadian business and industry during the last quarter century a thrilling recollection. In February of 1943 she was presented with her 30 year service pin by the Company.

Some of the associates of her early days with Imperial have retired, others are still with the Company, many of the women have left to marry and establish families, but the old bonds are strong.

In the gracious, welcoming atmosphere of her home Miss Simpson still is surrounded by friends and affection although her busy office days are over.

MEN OF OIL (Continued from page 32)

The nature of most employment in the oil business makes it largely a "man's world", but in Imperial there is no discrimination, and the woman who can prove she is able to compete with men will have her chance with the Company. All departments, of course, require a quota of skilled stenographers. In other fields, several highly responsible positions have been filled by women.

This, in an over-all survey, is the employment offered by a large oil concern. Technological developments in the industry have made necessary the employment of increasing numbers of highly skilled men in all its branches. Undoubtedly this is the trend of the future.
THE "PETROLEUM TREE"

IMPERIAL OIL MANUFACTURES SOME 570 INDIVIDUAL PETROLEUM PRODUCTS