

Evening Shadows at Moak Lake



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Story of the Gas Turbine and Nimonic Blading

The following article was written by Geoffrey Waller of the publicity department of Mond Nickel Co., Inco's subsidiary in the British Isles, and appeared originally in "The Times Survey of British Aviation." In publishing it we hope that non-technical members of the Company will obtain a clear idea of the importance of the Nimonic alloys in the development of jet engines and gas turbines.

Young engineers with an inventive turn of mind must often wonder with a trace of bitterness whether there is anything new under the sun. Too often the brightest of ideas takes on a sudden and depressing tarnish in the face of evidence unearthed from the Patent Office library or some other repository of engineering history. One is liable to find one's schemes anticipated — not by a contemporary inventor, which is disappointing enough, but by some visionary of a previous century.

Such is certainly the case with the gas turbine. This prime mover, so widely regarded as new, is described in all its essentials in a British patent dated 1791 which even includes a reference to jet propulsion. Throughout the nineteenth century the gas turbine attracted the attention of many eminent engineers and much work of a fundamental nature was done, thus paving the way for the first self-sustained run by a working example. This notable event took place in France in 1905.

During the following 30 years, striking progress was made with steam turbines and internal combustion piston engines, but development of the gas turbine languished. The explanation lies in the particular nature of the gas turbine's operating cycle, which calls for precise knowledge of airflow phenomena together with high running temperatures. Not until the late 1930s was it possible to design a satisfactory compressor and also obtain turbine constructional materials capable of withstanding the necessary operating temperatures.

A point of interest is that no gas turbine engine can develop enough power even to drive itself around until the gas temperature at the turbine nozzles is about 450 deg. C. (842 deg. F.), and considerably higher temperatures are needed to achieve any useful level of performance. This is particularly true of aircraft turbines, where the need for compactness and light weight limits the number of blade rows that can be adopted.

In a gas turbine the moving blades of the turbine operate under conditions more severe than those met by the components of any other heat engine. These blades rotate at high speeds and are hence subjected to centrifugal loads amounting sometimes to 12 tons/ sq. in or more. They are continu-ously immersed in a stream of combustion gases at a temperature in the range from 650 deg. C. (1,202 deg. F.) to 950 deg. C. (1,742 deg. F.) and are thus permanently glowing red or orange in colour. Because the gas stream is moving at many hundreds of miles an hour and being deflected by the blades, gas bending stresses are created which may rise to more than 6 tons, sq. in. In addition, the blades have to withstand vibrational stresses and variable temperature gradients which cannot be estimated with accuracy.

When metals are stressed at high temperatures they undergo a continuous and permanent deformation known as "creep." This phenomenon causes gas turbine rotor blades gradually to extend, a process which will eventually lead to failure either through fracture

of the metal or because the blade fouls the turbine casing. High resistance to creep and consistent creep behaviour are thus essential attributes of a good blade material. Another important feature is the ability to resist oxidation, which can cause rapid scaling and loss of metal - as anyone who has left an iron poker in a household fire will know. Thermal shock is a further hazard which must be withstood, particularly during starting up and shutting down, when the blades are subjected to rapid temperature changes. Also of significance is fatigue resistance because of the various fluctuating stresses that cannot be avoided in turbine blading.

The View of Onaping Falls from the Levack Highway

Work on the early Whittle jet engine emphasised the need for materials having much greater heat- and creep-resisting capacity than the stainless steels then available. A promising line of research was the well-known alloy of 80 per cent. nickel and 20 per cent. chromium, as used for the heating elements of electric fires and industrial furnaces. This alloy was noted for outstanding resistance to high-temperature oxidation and seemed a logical starting point for the development of a gas turbine blade material. Accordingly, in 1939 the Government asked the Mond Nickel Co. to investigate the possibilities in their Birmingham research laboratories.

More than 1,000 experimental alloys were produced during the ensuing year, of which two showed interesting possibilities. Both were basically of the 80/20 nickel-chromium type with titanium added for stiffening purposes. The first, known as Nimonic 75, never became established for rotor blading but proved invaluable for high-temperature duties where stresses were relatively low. It remains in widespread use to-day. The second alloy. Nimonic 80, was introduced commercially in 1941, and soon became the standard material for the rotor blades of British gas turbines. In the years after the war, an improved version, called Nimonic 30A, was developed by closer control of composition and melting conditions.

To meet the demand for still more advanced materials capable of serving at temperatures of 900 (Continued on Page 11)





LEFT: Mr. and Mrs. Donald Armstrong (he's a copper refinery man) with Susan, 5, Jay, 11 months, and Shella, 11; they live in Sudbury. RIGHT: Monopoly is the favorite family game of the Gus Whites of Lively (Cheryl, 6, Terry, 13); Gus works at the smelter.



LEFT: Stoble time office's Arnold Langille with his wife and their two fine sons, Brent, 7, and Scott, 15 months; they live in the Burmac subdivision, down past the CKSO towers. RIGHT: In this attractive group are Mr. and Mrs. Grant Beange (Garson mine) with Cynthia, 1, Douglas, 8, Shirley Ann, 9, Nancy, 5, Terry, 7, and Christine, 3; their home is in the Sanfrancisco subdivision.



LEFT: Here we have Joe Byng of the nickel refinery at Port Colborne with his wife and David, 11, Gary, 5, Sharon, 1 month, and Michael, 3. RIGHT: Creighton mine's Jimmy Waram and his wife with their three kiddles, Cathy, 9, Debra, 6, Robert 1. They live in Lively.

Rube Leaves, Trout Relax

Attention all local speckled trout (large size)! On and after August 1 special precautionary measures may be discontinued and normal activities resumed. Reason: Rube Cook is leaving town!

While such a notice is a flight of fancy there is a good deal of fact inferred in it, for Rube is a fisherman almost without peer. Scores of streams, lakes and potholes within a 100-mile radius of Sudbury have over the years yielded their choicest denizens to the patience and skill of this truly ardent angler.

Rube Cook, a name synonymous with Frood's no. 3 shaft rockhouse, has retired on early service pension after almost 29 Inco years. Coming to Creighton in 1928 from the McIntyre, Rube started in the mechanical department, and the next year transferred to the Frood when that mine started to hum. He remained in charge of the rockhouse there until his retirement. In later years the open pit crushing plant and Stobie no. 7 shaft rockhouse also came under Rube's wing.

Born in Grey county in 1893 Rube like many another farm-bred



Mrs. Cook helps Rube model his new whale-size fishing tackle.

boy soon went to work in the city. A furniture factory in nearby Chesley taught him the woodworking skill he still puts to good use.

He joined the army in 1915 and for a year after the armistice served as army postmaster in Arras, France. He recalls with delight the hectic day when one of the censors intercepted a letter sent by his true love back home to another soldier. When his blood simmered down to the boiling point the sizzling censor unburdened himself in an uncensored letter to his faithless flancee.

Rube headed west in 1919 but after one harvest he decided to try the north country and landed in Timmins at the Hollinger mill. After the great fire he moved to the McIntyre, and there first came to know R. D. Parker, Frank Learned and A. E. O'Brien. When



Sudbury Canoe Club Paddlers Score Great Victory

Sudbury Canoe Club paddlers won a convincing victory on their Lake Ramsey waterfront when they defended the City of Sudbury trophy against the challenge of three powerful clubs from Toronto and one from Ottawa. Aubrey Ireland, one of the judges, a former Nickel Belt paddler now living in Toronto, was much impressed and said Sudbury would be winning Canadian championships regularly within two or three years. The race pictured above is the senior kyak tandem.

they moved to Inco Rube thought he would give it a look too.

In 1922 Annie Stanley became Mrs. Rueben Cook, and a happier couple, then or now, would be hard to find. Another Cook distinction is the incidence of twins on both sides of the family. Rube has a twin brother, Mrs. Cook's niece has twins, and the Cooks themselves have twin daughters who each in turn had twins this year. Helen (Mrs. Charlie Nicholson), whose husband works in the accounting department at Copper Cliff, had twins in January and Marion (Mrs. Dave Cook of Matheson) duplicated the feat in May. Their son Jack, an electrician at Stobie, is content to go along one at a time, for the present at least. All told there are 10 grandchildren who make the Cooks very happy.

Recently making a trip to the country south and west of Owen Sound, where both were raised, Mr. and Mrs. Cook decided to return there to live. Come August they are to move into a home they have bought in the town of Southampton. Rube claims he knows plenty of trout streams nearby where he can wet a line and also make his regular blood donation to the nearest mosquito colony. Lake Huron is not too distant either for other fishing excursions.

At a bang-up farewell party Rube received a few fishing mementos from the boys in the form of a whale-size plug, spinner and fly. He was also presented with a power saw that will come in very handy in his workshop.

To their new home and surroundings Rube and Mrs. Cook take the best wishes of a host of friends.

Inco First Aider Saves Little Dog

An interesting offbeat example of the benefits of Inco's first aid training occurred recently, much to the joy of the Capstick family of Copper Cliff.

Taking a short drive after the violent rain storm of July 4, Angus Johnston and his wife noticed a group of boys gathered at the bank of a flood-swollen creek. Investigating they found the boys had



One of the best paddlers at Sudbury Canoe Club is Joe Sharp of the machine shop at Copper Cliff smelter. He and Doug McMorran, with whom he is shown (right) above, won the junior kyak tandem in the big Dominion Day regatta at Toronto, in which the Sudbury club scored the highest aggregate points.

just pulled an unconscious dog from the turbulent water, where it had somehow been partly pinned at a culvert. Angus quickly went



"It's a dog's life," said Scampy.

into action, applying artificial respiration much as one would to a human.

As in most resuscitation cases patience and perseverance were necessary, and it was a full 20 minutes before there was any sign of life in his patient. From then on, Angus said, the dog had a real cheering section. All the boys, who with relief and started chanting "Come on and live, Scampy!" and had been spellbound, broke loose Scampy did just that. Wrapped in a blanket and taken to the Capstick home on Granite Street, he later made a trip to see the veterinary. A couple of pills and a day's rest later he was as good as new and friskier than ever.

It is doubtful if Scampy, a 2-year old thoroughbred Welsh terrier, is aware of the debt he owes a braw smelter Scot named Johnston, but his young master Ronny will be forever grateful. And Angus has new cause to be glad of the training he was given long ago in Inco first aid classes.

Administering first aid is almost instinctive with Angus, who has been associated with this work, at least competitively, for the past 18 years. In 1949 he was captain of the reverb first aid team that won the R. D. Parker shield, for the Inco inter-plant championship.

His first big test occurred back in 1942, however, when a woman had both legs amputated by a street car in Sudbury. For his prompt and skilful action on that occasion he was awarded the St. John's Ambulance certificate of merit, one of the organization's highest awards. Signed by the then governer-general of Canada, the Earl of Athlone, it was one of only two or three that had been awarded up to that time.

Completing \$4,000,000 Smelter Improvement Blacksmith Shop Says Farewell to Ricardo



The new flue, approximately 725 feet long, runs north-easterly across the yard between the nickel and copper reverb buildings to the 500-foot concrete stack, connecting with the copper dust chamber which is being converted to a cottrell dust collector.

Nearing completion at Copper Cliff smelter is a new converter flue to improve draft conditions at the centre of the converter aisle.

Out of the planning stage late in 1955, the \$4,000,000 installation was held up by the difficulty in obtaining delivery of steel.

The flue will be approximately 725 feet long. It will be 16 feet wide and 23 feet high. A branch flue, 11_{22}^{12} feet wide by 8_{12}^{12} feet high and 115 feet long will bring roaster gas from the nickel reverberatory building to the new flue.

Steel required for the flues totals 1.850 tons. Insulation, 2 inches thick, will amount to 70,000 square feet.

As part of the new installation, the copper dust chamber is being converted to a cottrell dust collector. This has involved raising the roof by 17 feet, requiring 450 tons of steel and 20,000 square feet of 2-inch insulation.

The dust will be collected by 25 screw conveyors to a central hopper from which it will be pumped through a 5-inch pipe line 900 feet long to a bin at the commencement of the reduction operations. There it will be fed back into the process at a controlled rate

The new converter flue connects to the header flue between No. 11 and No. 12 converters. The con-

nection rises through the converter building roof and is about 50 feet high. The flue runs north across the converter building, then north-easterly across the yard between the nickel and copper reverb buildings, and finally easterly to connect with the east cross flue at the south wall of the copper dust chamber.

HOW TRUE, HOW TRUE !

Definition of a conscience: something that hurts when everything else feels so good.

If it wasn't for marriage husbands and wives would have to fight with strangers.

Farewell to Ricardo

Looking and feeling in excellent health, Ricardo Antoniazzi has retired from the blacksmith shop at Copper Cliff happy in the knowledge that he always tried to give an honest day's work for a day's pav.

Born in Italy in 1888, Ricardo did not hook up with Inco permanently until 1936. Last spring he attained the 20 years of credited service necessary for a service pension and took to the life of leisure.

His first association with the nickel industry dates back more than 50 years when he arrived in Canada fresh from Italy. He worked at the old Copper Cliff smelter and then at Creighton mine for a year before joining the CPR at Cartier. Next came work as a mason following which he spent 10 years as a tile setter in Winnipeg. In 1936 he returned to the Nickel Belt and soon landed a job with Inco. Starting with the bricklayers he moved to the blacksmith shop where as a buck welder



A picture of their granddaughter gets a fond smile.

for the past 15 years he enjoyed his work and did it faithfully and well.

In 1939 Ricardo married Mrs. Emma Fiori in Montreal. They have one daughter Alba, married to Rocco Cocchiola of Frood, and a two year old grandson of whom they are very proud.

Having lived in the same house in Gatchell for over 17 years Ricardo does not intend moving now. He has a part-time job in the offing since he is too energetic just to stay put, and this coupled with a little more time spent with old friends adds up to a pleasant prospect for the future.

THE HINT

Tired of being a widower, Farmer Smith went into town, picked out a wife, married her, turned Dobbin around and drove homeward. Dob-bin stumbled: "That's once," said the farmer. A little later, the horse "That's twice," stumbled again. said the farmer. When Dobbin stumbled again he said, "that's three times," pulled out a gun and shot the horse dead.

"You heartless brute," screamed his bride, slapping him hard in the face

He looked at her for a moment, then said, "That's once."

Snapshots Here and There on Dr. Thompson's Manitoba Trip



LEFT. A hearty welcome to Manitoba was extended to Inco's chairman at a dinner at the Manitoba Club. In this picture, clockwise from the left, are Dr. H. H. Saunderson, president of the University of Manitoba; Premier Douglas Campbell, Dr. J. F. Thompson, Isaac Pitblado, Q.C., R. L. Bailey of the Bank of Montreal; D. M. Stephens, chairman of the Manitoba Hydro Board; Errick Willis, MLA for Turtle Mountain. RIGHT: At Moak Lake members of the staff caught pickerel for the chairman's dinner; Ross Hawkins, accountant, got a bite on his first cast.



LEFT: Manitoba's newest town and the man in whose honor it was named "meet up" in this picture of Dr. Thompson at the aircraft dock on Thompson Lake; on the left is Don Mackinnon, project manager of the Foundation Co. of Canada, Ltd., and on the right S. A. Crandall, assistant manager of Inco's Manitoba division. RIGHT: A link with the past is this old trapper-prospector's cabin near the Thompson camp.



LEFT: At the controls of a helicopter on the landing pad in front of the Hudson's Bay Co. store at Thompson, Dr. Thompson chats with the pilot, Mac Gordon. RIGHT: Back in Winnipeg the chairman visited the Inco office, and is shown talking with Bill Thorpe, purchasing agent.

Dr. Thompson Inspects New Inco Project

The 30,000 tons of equipment and supplies freighted into northern Manitoba last winter by day-and-night cat train in a race against the spring thaw has already wrought a startling transformation at Inco's great Thompson-Moak Lake project, Dr. John F. Thompson, chairman of the Company, found on a visit to the scene in July.

With activity at a steadily increasing tempo, following a brief lag during the break-up, there is now a working force of 750 men engaged on various phases of the undertaking. Inco's share of the \$175,000,000 initial investment will be \$115,000,000. The Company will open two new mines, build a mill and reduction plant, and establish a complete new town for 8,000 people in the heart of the wilderness 400 miles north of Winnipeg.

Wherever he went in the course of his thorough inspection Dr. Thompson found substantial progress. He expressed surprise that so much had been accomplished in the short time since the project was launched, particularly, as he said, in view of the formidable difficulties confronting it from the start.

While much that has been done to date is necessarily of a temporary nature, the chairman made the point that this in no way detracts from its "achievement rating" or importance but instead serves to "bring into perspective the tremendous size of the undertaking."

As has been his custom throughout his half century in Inco, Dr. Thompson took care to get the human side of the story. He chatted with the men on the job at every opportunity. Later, when asked what had impressed him most, he said. "The fine spirit and enthusiasm of our people".

At his namesake, Thompson, the chairman found sinking operations in high gear in both shafts of the new mine. At the production shaft, designated as T-1, the concrete collar has been installed and the temporary headframe built. At T-2, the development shaft, sinking has progressed beyond 300 feet and is expected to reach the 1600 level by the end of this year. From T-2 drilling crews working on seven levels will drive development drifts to tie in with the T-1 shaft stations some 2,900 feet distant.

The permanent headframe at T-1 will be a concrete structure about 250 feet high, approximately twice the height of the Murray mine headframe for example. It will be of the Koepe type, in which the hoist is installed at the sheave deck and directly connected to the sheaves instead of being established in a separate hoisthouse.

Near T-1 ground has been cleared for the processing plants, and construction of the shops is underway. Surveying the scene where the production shaft and surface plant of Inco's new Moak Lake mine in northern Manitoba will be located are, left to right, E. Smith, project superintendent; F. F. Todd, assistant manager, Manitoba division; G. W. Thrall, geologist in charge of Canadian Nickel Company operations in Manitoba; Dr. John F. Thompson, chairman of Inco; Ralph D. Parker, vice-president and general manager of Canadian operations; James C. Parlee, manager of the Manitoba division.

In the Thompson camp Dr. Thompson visited the bunkhouses, cafeteria, staff house, laundry, hospital. post office and administration buildings. In the remarkedly well-stocked Hudson's Bay Co. store he bought a beaded Indian belt as a souvenir for his 6-yearold grandson. He posed for a picture standing in front of an old log cabin used as an overnight stopping place by a trapper as he travelled his lonely trap line through the long northern winters. It is an ironical twist typical of the mining game that he built his little cabin at this particular spot, never suspecting the wealth that lay directly below him. The Thompson orebody remained nature's closely guarded secret until last year when Inco's intensive exploration program searched it out.

Travelling by helicopter Dr. Thompson set down near the Bailey bridge already installed over the Burntwood River. It is at the midway point on the 4-mile road built over the muskeg by the Company from the Thompson camp to the source of gravel supply, a ridge providentially left close by when the glaciers retreated long ago. Before continuing by truck to the area on both sides of the river at the bridge to be prepared for the townsite of Thompson. Here is a picturesque setting for what will be Manitoba's fifth largest city, its initial 8,000 population exceeded only by Greater Winnipeg, Brandon, Portage la Prairie and Flin Flon. About five miles up the Burntwood from the Thompson townsite are the scenic Manason Falls (Manason is the Cree Indian word for good, or beautiful), and 25 miles further up river are the spectacular Wuskwatim (Cree for beaver dam) Falls.

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The Triangle Camera Takes a Look at Progress on In-



THE THOMPSON DEVELOPMENT: In this view, looking east, the Thompson camp and administration offices are seen on the right and the temporary headframes of the two Thompson mine shafts, T-1 (production) and T-2 (development) are on the left with Thompson Lake in the background. The area in the left foreground is the site for the new mill and smelter and shops. Angling out of the picture toward the top right can be seen glimpses of the route travelled over the frozen muskeg last winter by the "snowball express" tractor trains with their cargoes of freight.



BRIDGE OVER GRASS RIVER: A stiff-leg c at Mile 13 on the right-of-way of the CNR'S H Thompson, scheduled for operation in November cuts on both sides of the site, dumping it into th abutments. Inspecting the project are Inco's cha: Parker, vice-president and general manager of Ca: of the Manitoba division.



THOMPSON MINE DEVELOPMENT SHAFT: This neat surface plant will service the underground development program to tie in with openings and installations at the Thompson mine's production shaft. Each of the four fuel oil tanks has a capacity of 175,000 gallons; they were freighted in from Thicket Portage by tractor train and assembled under great difficulties during the depth of winter. In the distance can be seen the ridge. 4 miles away, to which a road has been built to bring gravel for construction of the permanent mine plants and the mill and smelter buildings.



MOAK LAKE EXPLORATION CAMP: In this exploration camp at Moak Lake, the building in 1 was from this base that Inco conducted the inter of its great northern Manitoba development. Our assay lab, garage, and accommodations for diama are 25 diamond drills operating in the area on Int them underground.

's Great Development Program in Northern Manitoba



points to the sky in this construction scene n Bay Railway spur between Sipiwesk and ngineers made good use of blasted rock from ass River to provide a firm base for the bridge .n, Dr. John F. Thompson (centre), Ralph D. an operations, and James C. Parlee, manager



MANITOBA HYDRO PLANT SITE: Power for Inco's northern Manitoba operations will be generated in a new plant at Grand Rapid, on the Nelson River, shown above. Second largest of the Manitoba Hydro Board chain, the \$35,000,000 plant will be built in the area already readied on the far side of the river. At the foot of the point on this side of the rapid a power shovel can be seen working on excavation for the spillway. In the foreground is the terminus of the 12-mile spur built last winter from the Hudson Bay Railway, and three H-buts in various stages of



w of part of the Canadian Nickel Co. main ight foreground is the new staff house. It search for ore that resulted in the launching muldings include offices, sample house and trilling and mine development crews. There xploration and development program, six of



FIRST UNDERGROUND OPERATION: The shaft sunk by Inco in 1955 at Moak Lake for diamond drilling exploration at depth is now also the hub of development work in the Moak Lake mine. 22 miles north-east of the Thompson development. A hoisthouse and timber yard are among recent additions to the layout. From development drifts on the 700 and 1300 levels raises will be driven to open the mine's production shaft (M-2). Edge of the clearing for the surface buildings and installations at M-2 can be seen on the right of this picture, just beyond the firebrake encircling the M-1 plant.

Dr. Thompson Inspects New Inco Project

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At the Canadian Nickel Company camp at Moak Lake, 22 miles north-east of Thompson, where he made his headquarters during his visit. Dr. Thompson inspected the comfortable new staff house. A special treat in his honor was a dinner of Moak Lake pickerel caught the evening before by Ross Hawkins, Bill Taylor, Neil Boyes, "Kipper" Read, and other expert fly casters, and cooked to the oueen's taste under the eagle eye of the master chef, Bob Brown.

The Moak Lake exploration shaft, M-1, sunk by Inco in 1955 for exploration drilling at depth after diamond drilling of the Moak orebody from surface gave inconclusive results, is now being utilized for development operations also. Dr. Thompson studied the plans showing how drifts are being driven on the 700 and 1,300 foot levels toward the site of the Moak Lake mine production shaft, M-2, 1,850 feet distant, where raises will be driven from each level. In the meantime on surface the shaft will be collared and preparations made for widening and timbering the raises to the full dimensions of the shaft, and then continuing sinking below the 1,300 level.

Like the production shaft at Thompson mine, M-2 will be equipped with a Koepe hoisting system. And, also as at Thompson, M-1 will become part of the mine ventilation system when it has completed its usefulness in development work.

Flying over Grand Rapid, on the Nelson River. 50 miles or so northeast of Moak Lake, Inco's chairman noted the preparation work completed by the Manitoba Hydro Board toward construction of its \$35,000,000 power plant. During the winter a 12-mile spur was built to the site from the C.N.R.'s Hudson Bay line. The plant, second largest in the present Manitoba Hydro chain, is scheduled for initial generation early in 1960. It will have a head of 50 feet and an average flow of water of 50,000 feet per second, about three times that of the Ottawa River.

By aircraft, Dr. Thompson also inspected the right-of-way of the 30-mile C.N.R. spur from Sipiwesk to Thompson, noting that a large part of the road bed was ready for rail. This line is scheduled for operation next fall. He landed at Mile 13, where a bridge is being constructed over the Grass River. Some 42.000 cubic yards of rock blasted from 30-foot cuts on either side of the river was used to consolidate the silt in the river bottom to provide a firm foundation for the bridge abutments.

Stopping in Winnipeg on his return trip. Dr. Thompson visited the Company's Manitoba division office. In chatting with the purchasing agent, W. J. Thorpe, he learned that the Inco mines and plants, scheduled for nickel production in 1960, will require about



First houses at the new Manitoba townsite of Thompson will be built in the area behind the diamond drill camp, shown above, on a picturesque bend in the Burntwood River. Another part of the town will be constructed on the opposite bank of the river. Inco's Thompson mine and the mill and smelter will be 2 miles distant, Moak Lake mine 20 miles to the north-east.

375,000 tons a year of operating supplies, considerable of which will be produced right in the province. As specific examples of how Inco will benefit the Manitoba economy, it will require an estimated 8 million board feet of local timber a year, which will provide steady employment for about 125 men, and its power requirements will amount to almost 20% of the present total production of Manitoba Hydro.

NOW HOW ABOUT THAT? A six-year-old watching a repairman trying to locate trouble in a television set said: "I'll bet if you'd clean out the dead cowboys in the bottom of the set it would work."

NEAR MISSUS

"Will your wife hit the ceiling when you go in this late?" "Probably—she's a rotten shot."



High School Science Teachers Visit Inco An outstanding group of visitors recently welcomed to Inco operations were 100 Ontario high school science teachers who made a field trip to the Sudbury district as part of a summer course at the University of Toronto. In the centre of the above group is their leader, professor J. T. Wilson of the geophysics department at the university, and on the right are Inco hosts H. F. Zurbigg, chief geologist, and H. J. Mutz, manager of mines.

Joe Slows Down

Retired recently on disability pension Joe Stiblak of Frood is heeding his doctor's advice and really taking things easy. Reading, resting, listening to the radio, with the odd short walk thrown in for



with the odd short walk thrown in for variety, constitute his daily activities at present.

Joe came to Canada from Jugoslavia in

1928 and worked first at logging and then at mining in British Columbia. Coming to Sudbury in 1935 he was hired at Frood and worked underground until 1947 when he was transferred to the mechanical department, working in the rockhouse until his retirement.

Joe's wife, Anna Frederick, whom he married in 1920, has remained in Jugoslavia. They have a son and daughter, both married in that country, and two grandchildren Joe has never seen. At present he doesn't feel up to a trip back but hopes to make one later on.

For the present he is depending on his old friends to keep him posted on activities at the Frood which still has first claim on his interest.

A good child is one who will wash up when asked and shut up when told.

Picturesque Setting for Manitoba's Newest Townsite



By gosh a fellow couldn't have it much better than this, with a fine horse to ride and a Highland cadet for a groom! No wonder he sat straight and proud in the saddle when the Triangle camera caught him at Lively's Dominion Day celebration. Proud as punch too was Jimmy Dixon, the young man in the second of the above pictures, for his was one of the two best-decorated boy's bikes in the big parade. Picture on the right shows part of the crowd deeply engrossed in the perennial favorite, bingo; the stalwart attendants are Jim Oliver and Ken Johnson, two of the many volunteers who worked hard to make the celebration a success.

Lively Likes Its Children

It looked as if the boys might have been sharper to plan for a swim instead of a celebration but at the 11th hour the wind changed, the day broke bright and clear, and success was in the bag for Lively's big annual Dominion Day doings.

A whopping parade got the program going, with cleverly costumed kiddies and beautifully decorated bikes and trikes following proudly in the wake of the town's fire engine. Then came races, the pony ride, games and other attractions. And through it all ran a pleasant, neighborly atmosphere typical of this friendly little Inco community.

Lively's hustling athletic association staged the celebration, chiefly as entertainment for the kiddies. Appropriately enough the substantial proceeds will be spent on such citizen-building projects as paying two full-time playground supervisors for the summer months, and providing a full variety of games equipment.

Chairman of the association is Jim Dewey, who said he'd like to see mention made of the fellows who pitched in and worked like beavers all day, manning the booths and concessions and helping run off the various events.

TAKE IT EASY

Slow down at the first glimpse of children playing in the street. Slow down at intersections, traffic circles, and railway and cattle

crossings. Slow down before entering city and town limits and any other crowded area.

Slow down for coffee breaks every 100 miles.

Slow down after dark and under bad weather or road conditions.

Slow down to give the other fellow a chance, even if he is only a pedestrian.

Slow down for greater comfort and less strain. You'll enjoy your trip more, and will survive it!



Mrs. M. T. Harkin was also busy with her camera, and took this snap of a very ferocious-looking Indian who turned over to be only Billy Rawson, 5; his sister Jo-Anne, dressed as Aunt Jemima, won a prize for her costume. In the second picture is Janice Mulligan (centre) with her two cousins from Detroit. Roxanne and Ronalda Cuthbertson. The fellow in the background wants it clearly understood he has nothing to do with all these girls.

Story of the Gas Turbine and Nimonic Blading

(Continued from Page 2)

deg. C. (1,652 deg. F.) and above. the D. & R. laboratories next produced Nimonic 90. This alloy nominally comprises 60 per cent. nickel, 20 per cent. chromium, and 20 per cent. cobalt, with additions of aluminium and titanium for stiffening. In due course, Nimonic 90 was followed by Nimonic 95, which has an increased content of hardening elements and offers superior loadcarrying ability at elevated temperatures.

Now coming into use in advanced engines is Nimonic 100, a development of Nimonic 90 and 95 with a proportion of the chromium replaced by molybdenum. The aluminium addition is greater and the titanium smaller. Nimonic 100 can support a load of 4.2 tons/sq. in. for 100 hours at a temperature of 980 deg. C. (1.796 deg. F.) before rupturing, and is among the most advanced materials of its type in existence.

For the past 15 years, the turbine rotor blades of every British jet or turboprop engine have been made from one or other of the wrought Nimonic alloys produced by Wiggin at Birmingham, Hereford and Glasgow. The successful manufacture of these tough superalloys has required the utmost care in the control of purity, composition and melting procedure, together with a high degree of skill in the subsequent working process. With the introduction of each improved alloy, the forging temperature has more closely approached the melting temperature and increased still further the difficulty of hot-working with conventional equipment. This problem has been alleviated by adopting modern methods of extrusion, using molten glass as the die lubricant, for the breaking down of cast ingot to a wrought or partially wrought form.

While research continues in the laboratory to evolve further Nimonic alloys that will meet the ever more stringent requirements of the engine industry, new production techniques are being perfected to widen the usefulness of the existing alloys. A good example is the making of cooled blade sections by an extrusion process which pro-duces internal air passages of elongated shape positioned close to the heated surfaces. This is one of a number of blade - cooling schemes now being developed in connection with the Nimonic alloys, the aim being to raise turbine inlet temperatures well over the 1.000 deg. C. mark and thus achieve striking improvements in engine output and thermal efficiency.



Four Creighton stalwarts, Bert Beauchamp, Marle Paquette, Gene Bryan and John MacDonald keep a sharp eye on the play in this bench shot, as do the Copper Cliff fans in the picture on the right, Lynn Simmons, Anne Corless, Joan Stromberg, Doreen McPherson, and (back there in the corner) dapper Wally Urwin.

Newcomers Lead In Shift Softball At Copper Cliff

For the first time in its long history Copper Cliff Athletic Association's softball league this year allowed two outside teams to join the party. And what happens? That's right, those two lineups are right at the top of the mid-season standing.

Everyone seems quite happy about it however, the general feeling being that both Creighton and Lively have boosted the calibre of the league by fielding strong teams.

The general office entered a team this year but fell foul of player shortage and finally coachmanager George Syer reluctantly threw in the sponge. This reduced the league to six teams. The top four are closely bunched in the championship race, recent figures showing Creighton, Lively, Machine Shop and Reverbs in that order. The other entries are Concentrator and Plate Shop. Games are played at Naughton

Games are played at Naughton and Lively and at Nickel Park in Copper Cliff.

Over the past 10 and more years the league has been dominated by Orford. Shops and Reverb teams. This year it looks as if the outsiders may cop the laurels although Machine Shop coach Rusty Duberry figures that if Jack Adams' arm holds up and Bernie Leclair and Ronny Matte keep hitting, his team will be the one to reckon with come playoff time.

Ed Lacoste claims his Reverbs team will be the one to watch now that they have Yacker Flynn on the payroll. Don McKay has been a tower of strength at the plate and Ed himself is having a good season on the mound.

Lou Sartor's Plate Shop seem a well rounded team with Norm Rupoli making like Mantle and Kenny Glenn turning in some effective pitching performances. Ron MacDonald is sure his Concentrator team will do better than fifth before the season is over and is depending on Ray Campbell, Ray Frattini and Billy McKinnon among others, to bring that about. Concentrator admit they find



Here Teedy Leclair, Bill Yeo and Ray Smythe of Machine Shop are deep in gloom as their team absorbs an 11-1 lacing from Creighton. In the view on the right Concentrator's Ray Sandberg races for first base ahead of the catch by Clarence Gargol of the recent Office team.



Had Lively's Tooner McLaughlin connected on that mighty swing, the ball would probably be going yet. The eatcher is Jim Pelland of Reverbs, the ump Ray Smythe; not shown on the right is the man who threw the big curve, Ed Lacoste. This particular bit of evidence to the contrary, Lively won the game 9-0.

Lively the toughest team to beat. Gino Gonella is coaching Creighton's entry and Tooner McLaughlin is looking after Lively. Bob

McLaughlin's hitting and Bob Gideon's pitching are helping keep Lively at the top. Some potent hitting from Larry Gonella plus

Gerry Leblanc's pitching and some good glove work by fellows like Tom Stefanko make Creighton a tough nut to crack.



Members of the inaugural mining class in Inco's technician training program have completed the first year of their course. Three of them are seen on the job in the above pictures: left, Ron MacDonald, Garson mine, prepares to take a sight to his transit in an underground survey; centre, Ron Matte, Murray mine, is pulling up a roll of measuring cable after measuring drilling progress in a blasthole stope; right, Vernon Field, Frood, takes a measurement from timber to pillar wall to determine the tonnage broken in a blast in a square set stope.



Bob Seawright (Creighton) digs into his homework.

New Look to Old "School of Experience"

The technician training program conducted by The International Nickel Company at its mining and reduction plants is opening the way for advancement to young men with high school education.

On-the-job instruction in various phases of the operations, technical lectures by members of the Inco staff, and correspondence studies to fill in theoretical background, are features of the four-year course. From it Inco hopes to provide skilled technicians eligible to handle advanced types of work or progress to supervisory positions in the Company.

One group has completed the first year of the mines course, having received practical training in such engineering department assignments as surveying, sampling, and measurements of stoping and diamond drilling progress. The inaugural class at the re-

The inaugural class at the reduction plants has just embarked on a curriculum calling for broad training in milling, smelting, matte separation, iron ore recovery, and laboratory work. After completing their four years of training they may take over such duties as operations control, pilot plant research, or special projects.

The home studies, carefully planned by Inco engineers in cooperation with an established correspondence school, deal with engineering fundamentals. On successful completion of these lessons a portion of the school's fee is rebated to the student by the Company.

On graduating from the course the technicians will receive from Inco a certificate stating the special qualifications they have acquired.



Regular lectures by staff specialists are part of the Inco technician training program. In the picture on the left the mining class hears a talk on mine ventilation by James Rutherford, the mines ventilation engineer. Standing in the background is Ross Clarke, who is in charge of the mining course. Members of the class shown, from the left, are Colin Young (Levack), Ronald Bryan (Creighton), Robert Wallace (Stobie), Robert Seawright (Creighton). John Henderson (Levack), Ronald Matte (Murray), Ronald MacDonald, (Garson), James Stephens (Frood). Kenneth Miron (Creighton), Vernon Field (Frood). In the picture on the right are some of the members of the first technician training class in the reduction plants, having a preliminary discussion with their director, Hugh Garven (third from the left). On the left are Steve Oreskovich and Claire Bracken, and on the right Robert Hay, Lloyd Squires, and Frank Zanatta.



Scouter Phil Fletcher talks things over with an alert-looking patrol at the Windy Lake camp. Conservation is emphasized in this year's training program, also self-reliance and observation in the woods. In the picture on the right Scouts practice making a comfortable bivouac.



Cutting firewood is part of camp life for the boys. . . .

Permanent Camps Again Give Great Joy to Boy Scouts and Girl Guides

As it does for their elders, life in the Nickel Belt holds many special advantages for the younger generation.

As usual Windy Lake is playing host to Sudbury district boys attending the annual Boy Scout summer camp there. With Scouter Phil Fletcher as camp chief, this summer his session started on July 10 with Scouts from Waters, Lockerby, Minnow Lake, Neelon and several Sudbury troops on the roll.

While attendance at Scout camp does not show an increase, enthusiasm is high, Scouter Fletcher told the Triangle. In his second year as camp chief, a job he thoroughly enjoys, Phil is giving his charges a real taste of pioneer life. Part of this year's training consists of erecting a bivouac or temporary shelter in the woods and making it habitable — teaching the boys self-reliance.

At camp the Scouts are usually divided up into patrols of six to eight boys with a leader. Tenderfoot, first and second class Scouts are mixed, as are boys from various troops, to give balance and promote new friendships.

Each patrol leader is issued a tent and various supplies, then chooses a site in the nearby woods to pitch his camp. The boys brush out the area, erect their tent then build towel racks, wash stands, shelves, etc. to make things shipshape and homey. For at least a portion of their camp time they draw rations and cook their own meals in the great outdoors, enjoying such incomparable treats as the aroma of frying bacon wafted



... as is good housekeeping for the busy Girl Guides.



In addition to the "buddy" system, a check-in, check-out board is used to keep close tab on the swimmers at the Guide camp at McFarlane Lake. The second picture shows a group of Guides basking in the sunshine as they practise for proficiency badges.

on the fresh dew-laden morning air

The well-organized camp life consists of playing, learning and working, with special emphasis being placed on conservation. The boys are taught to appreciate and protect the beauty and value of the woods about them. Campsites retain as much of the natural growth as possible and when camp breaks every attempt is made to eliminate the scars of occupation. This year the planting of spruce trees in some areas is another phase of conservation training.

At camp this year also a start is being made on a nature trail, a highly popular feature of scouting. The trail is laid out, through the bush, usually for several miles. Trees, plants, insects, animals, fungi, weather, are all noted by the Scouts as they travel the trail, developing their powers of obser-vation and also their appreciation of the wonders of nature.

Scouts assemble twice daily in their familiar horseshoe formation on the parade square, at flag break in the morning and again when the flag is lowered at night. Pro-ficiency tests for badges, swimming and canoeing, and compass map/ reading, and other forms of woodcraft are part of the daily activities. A program of sports, routine duties and the big camp fire at night all make for a full but fleeting day.

Plenty of good food, rest, and outdoor activities, as provided at Scout Camp, combine to add stature to any boy. Scouter Fletcher, a nine-year veteran and at present district commissioner of E district, is firm in his belief that Scouting offers boys a very high calibre moral, mental and physical training program, not only at summer camp but all year long. There is always plenty of room for newcomers, he added, and leadership opportunities abound for men willing and interested in developing Canada's junior citizens.

Following the Scouts, the Wolf Cub camp commences this year on July 29 and will continue for 10 days. Jim Taylor, who will be in charge, estimates that upwards of 250 Cubs will attend. He has put in a bid for the finest weather possible.

Life With the Guides Hazelmere, that heavenly haven for Sudbury district Girl Guides and Brownies, is undoubtedly one of the prettiest locations in the nickel district.

In this idyllic setting on McFar-lane Lake, hundreds of Brownies and Guides gather each summer to enjoy a bustling session of camp life. The district is split into four divisions, each of which is allotted 13 days at camp, giving the Guides a 10-day stay and the Brownies three days, which for some of the younger ones is long enough to be away from Mom.

The day the Triangle paid the camp a call coincided with the regular inspection visit of divi-sional commander Mrs. B. M. Forsyth, so things were really humming. The camp "C.O.", Mrs. O'Shaughnessy and her assistant, Mrs. Hubert, had close to 50 girls and leaders on deck from the Minnow Lake and Lockerby groups. The permanent camp staff included a cook, a nurse and a swimming instructress.

As their theme this year the tents each took the name of a INCO TRIANGLE



When someone speaks of how fortunate Sudbury is to have lovely Lake Ramsey right at its doorstep, a scene that comes to mind is McNaughton Terrace on a sunny Sunday afternoon. For those who stroll along the lakeside, or others who come to relax on the lawn, a fine summer show is put on there by aircraft landing and taking off, sailboats dipping and darting in the breeze, and water sklers sending up sparkling spray as they speed in the wake of fast-paced power boats. It's a sight of great beauty, a pleasure to watch.



country and decorated accordingly. France, Italy, Holland, Mexico and China were all represented. One forlorn abandoned tent was even designated as Siberia and transgressors were warned of possible banishment there.

An average day Mrs. O'Shaughnessy said, starts with "sing up' at 7.15 a.m., followed by breakfast at 8. Morning duties such as dishfrom 8.30 to 9.30, and tent inspec-tion takes place from 9.30 to 10.

Next comes an hour of morning classes at which various aspects of Guiding are taught. At 11 it is time for a swim and swimming instruction. Full safety precautions are taken. Mrs. O'Shaughnessy, pointed out, including the "buddy" system and also a large check-in, check-out board. Instructor, nurse and leaders are always present at swimming sessions. Twelve noon brings lunch time and everyone is really ready for that event.

A court of honour is held between 1 and 1.30, at which leaders and staff meet to plan and decide on programs and also to hear any complaints or other reports from the campers. The tuck shop is also open at 1 p.m. Then from 1.30 to 3 is the siesta, after which further class work and tests occupy the next hour, and then it is swim time from 4 until the 5 o'clock supper.

With supper duties completed planned games are on the agenda followed by the nightly grand finale, the campfire, from 8 till 9. A snack of cocoa and cookies winds up the day, and lights out is at 9.30. When everyone is abed the camp "c.o." makes a final check of each tent. And so off to dreamland.

After 10 wonderful days in such a lovely setting most girls are loath to leave. A consolation, however, is that there is always next year.

A FUNDAMENTALIST

The teacher at the little backwoods school was at the blackboard explaining arithmetic problems and was delighted to see that her dullest pupil was giving his complete attention. "At last he's beginning to understand." she thought. So when she had finished she said to him, "You were so interested, Johnny, that I'm positive that you want to ask some question.

"Yes'm," drawled Johnny. "I got one to ask — where do them figures go when you rub 'em out?"

Microfilm Inco Records for Easy Reference, Space Saving



Marlene O'Connor is shown preparing to feed documents to the continuous microfilm camera; in a fraction of a second they are photographed and returned to the rack above the feed rolls. A maximum of 7,000 documents an hour is possible by automatic feeding, but unless the sheets are perfectly dry they must be hand-fed at about 2,500 an hour.



L. G. Dougherty compares a 100-foot reel of microfilm with the stack of documents recorded on it, indicating the tremendous saving in space made by the filming project. Stacks of old records are seen awaiting their film debut, which in this case is also their swan song since they are then to be destroyed.

Storing away on film a portion of Inco's filed records at Copper Cliff is the biggest single microfilming job yet done for industry in Canada, according to L. G. Dougherty, president of the film handling the contract.

Payroll records, earning cards and purchase orders totalling an estimated 3.000.000 documents and dating back as far as 50 years, are in the process of being microfilmed. These records occupied a storage space roughly 50 feet square but when microfilmed will be tucked away in a metal cabinet measuring $20 \times 34 \times 28$ inches, classified for ready reference. The way it works out, say the microfilm people, is that one ton of documents equals 10 rolls of film weighing 20 ounces. As the records are microfilmed they are taken away to be consigned to the blast furnaces.

Outstanding features of this method of filing are elimination of the possibility of loss or misplacement, and the ease and speed with which documents may be produced for reference. A special scanner or reader is used for studying the filmed records.

The continuous microfilm camera will take any length of document up to 11 inches wide, and has a maximum 40 to 1 reduction. For larger documents a flatbed camera is used in which the reduction is somewhat less and the rate of production slower.

The key to microfilming is the high reduction lens that does the shrinking act. Documents are fed to the camera through a set of rollers and glass plates, to keep them flat, and simultaneously the film travels at the same speed in the opposite direction. This is not a motion picture camera. Through a series of mirrors the brightly illuminated image is reflected on the lens which reduces it to 8 mm. size before passing it through to the film. Standard microfilm is 16 mm. wide and modern cameras permit the filming of both sides of a sheet together on the film in one operation. When only one side of a sheet is to be photographed only half the film width is used, and the film is rerun to use the other half

Light is a most important factor in microfilming. It must be constant to ensure uniform exposures, the operator checking his volt meter frequently to determine this. Dust is another menace that must be watched carefully. For those shutter bugs who may be interested the speed of the film used is ASA 2.5.

The current weekly payroll record for Inco's mining and smelting divisions consists of some 1.500 11 x 11 inch sheets which make a pile 6 inches high. That amount of paper soon adds up to quite a stack in the file room. When microfilmed, eight of these payrolls will fit on one reel. Other divisions of the Company's operations are considering the use of microfilming.

QUICK QUIZ

1. Does Canada's population increase more in a year from immigration or from natural increase?

2. What is, and where would you find, a beluga?

3. In 1946 Canada's mineral output was valued at just over \$500 million. What is its current value? 4. Of the 10 provincial capitals, what three are located on islands? 5. Canada is the largest country in the Western Hemisphere. Name

the second largest.

ANSWERS: 3. More than \$2 billion. 1. Natural increase adds about 300.000 new Canadians a year, about double the average increase from immigration. 4. St. John's, Newfoundland; Charlottetown, Prince Edward Island; Victoria, British Columbia. 2. The beluga is the white whale, found in Hudson Bay. 5. Brazil, which is larger than continental United States and has nearly four times Canada's population.

(Material prepared by the editors of Quick Canadian Facts.)

Self-respect is the basis of all true happiness; a treasure to be retained at all costs, and worthy of the utmost effort.

Nice Little Farm Ideal Spot for Retirement

It was a brother working at Frood who induced Waino Luoma to come to the Sudbury district. That was back in 1927 and he has never regretted the move. By the following year he had steady work on the old reverb furnaces at Copper Cliff, and he stuck with the reverberatory department until his retirement.

Born in Bessemer, Michigan at the turn of the century Waino was taken to Finland by his parents in 1907. In 1923 he returned to the States for a couple of years. then spent the following two years back in Finland.

When a heart condition indicated recently he'd be wise to retire. Waino had just the place to retire to, his farm at Azilda. Many years



The Luomas enjoy coffee break.

ago he purchased those 80 acres and today, with an assist from his wife and youngest son, is fully enjoying the life of a landed squire. The 400 chickens now occupying the vice-regal suite in the barn will soon be paying guests, Waino hopes. Another project on the go is a new house he is having built near the farmhouse; which he intends to rent when it is completed.

Waino married Elli Loukko in 1923 and they have three sons. Tauno works in Sudbury, Aatto is following his father as a furnaceman at Copper Cliff, and Ray the youngest, is at home. There are two grandchildren.

Presentation to Frank



Frank Tomassini, who retired after almost 28 years of service on the blast furnaces at Copper Cliff, got a pleasant surprise at the Italian Club when a group of his friends presented him with a new rod and spinning reel. Shown making the presentation is Shorty Poirier, who organized the party.