CHRISTMAS MEMORIES

THE Eve of Christmas is perhaps the recurring milestone in the journey of life which offers to harried humanity the greatest opportunity for quiet retrospection; for an examination of the ledgers written throughout the year and the striking of a balance which will show how we stand in relation to our Maker, our neighbour and ourselves.

LET us imagine then that the last Christmas card has been posted; the final frantastic exchange made at the department store; the vexed question of “what to give who; and who to give what” settled irreversibly; and, we fear, with a minimum of good taste; the finishing touches given to the Christmas tree; the litter of tinsel paper, ribbons and boxes swept out of sight for the moment, although we have a guilty feeling that they will appear against us as mute witnesses on a future day of retaliatory house-cleaning.

TIRED, but happy in the knowledge of “something attempted, something done,” we sink into our favorite easy chair, and, having lighted our pipe or powdered our nose according to sex and inclination, we allow our thoughts to wander subconsciously in the dim fields of the past, picking out for us, in kaleidoscopic variety, those clinks from our former days which we call memories.

PERHAPS we love best to linger with our childish memories; those unsophisticated days when Santa Claus was at once our hope and despair, for was he not keeping a monitoring eye upon us and was not our every action likely to be reflected in the quality and quantity of his gifts to us?

BUT indeed is the man or woman who cannot recall the sleep-eyed wonder and awakening delight of a youthful Christmas morning.

MEMORIES of our adolescent years present themselves when we first realized the truth of the scriptural injunction that it is more blessed to give than to receive.

DAD’S pocket was not so easy of access in those “old-fashioned” days as the shillings and flappers of to-day are wont to find it, and we had to cut down on our cigarette money and practice a rather pathetic economy so that our gifts might be laid on the parental altar; or, more often, lavished upon the momentarily presiding goddess of our affection.

We were learning our early lessons in the school of self-sacrifice, and, even though our gifts may have been of little intrinsic value, we like to think that the recipients of our circumscribed bounty were akin to the young curate, who, in acknowledging a jar of breaided cherries sent him by a dear spinner, wrote that, whilst delighted with the gift, he appreciated still more the “spirit” in which it was sent.

OUR most joyous memories are surely associated with the years when we, in our turn, stepped into the role of Santa Claus and tiptoped through the home filling the little stockings or decorating the Christmas tree.

It was then we appreciated, perhaps somewhat belatedly, the love and care which had surrounded our own childhood days and tried to repay the debt by spreading sunshine and happiness in the path of the rising generation.

SOME of us may have reached the stage when our Christmas is a rather lonesome festival. The young people have gone from the home and are scattered far and wide, but their messages of love
and goodwill still reach us and our fancy can picture them, perhaps in strange surroundings and under forlorn skies, celebrating this season with a kindly thought for the Old Folks at home.

OTHER Christmases may rise before us, when the world was at the door and unemployment or sickness had taken their toll; the grim Christmases of World War with their tragedy of denuded homes and the fifth and sixth month of Flanders; the Christmases when we had to mark a vacant chair and miss the gracious presence of one who was the center of our affections. Memories, even Christmas memories, are not always cheerful.

Unity is Strength

J] has long been the ambition of the more gregarious among the Toronto employees of our Company that the fellowship of the working day should extend into the hours of relaxation and recreation.

These visions looked for a time when the Imperial Lion and the International Lambs would be found gathering together; when the many social and athletic activities which engage us as individuals might be placed on a community basis, and inspiration or guidance given to the groups which, in a manner of speaking, were already imbued with the "get together" spirit and had their separate associations for the pursuit of one or the other of the time honored winter pastimes.

It was recognized that it was a succession of mishaps—provoking incidents, and even the Scotmen in the party saw no reason for demanding a refund of the Tax on the grounds that "they weren't used." Having demonstrated the benefit of community enjoyment the Executive should be encouraged to hope that the 36 Church Street Club will soon play a vital part in the leisure hours of its adherents.

The Review believes that need is for such an organization in Toronto and, whilst appreciating the difficulties which will be met with, it is convinced that the venture will prove successful, a conclusion in which we believe all our readers will heartily join.
Group Assurance in Industry

By E. P. Higgins—San Life Assurance Co.

Continuing our brief sketches of important factors in our daily industrial life, the Review is fortunate in being able to present the evidence of an expert witness on the benefits of group insurance.

Our own Annuities and Benefits department can unhesitatingly confirm the conclusions of Mr. Higgins and his article may serve to remind us of an "uncounted blessing."

Every day finds widows and orphans left with no provision for the days that lie ahead. For Life Assurance costs money, and certainly one of the greatest factors in such a deplorable condition is the absolute inability of the average wage-earner to do duty by the present needs of his family and at the same time make adequate provision for safeguarding their future. The margin between his earnings and the expenditure occasioned by his simplest requirements is pitifully small and the possibility of death or total disability is a "constant nightmare" to the thoughtless husband and father.

But here Group Assurance steps in. To meet this situation, it had its inception. This is its real function in the community. It makes Protection in its simplest and most elemental form: POSSIBLE. That it is an expression of the gap; that it does meet the need; that it is functioning with an ever widening sphere of benefit, is the great joy and pride of all who have any share in its activities.

Mr. George Grant was for thirty years in the employ of a Toronto firm, a man of fine character, steady and saving. Always ready to grumble, he knew all the "wage-earners" homes of Canada were unprotected, while his family. Not only had his family the comfort of being able to give him the proper burial, but he knew that after his death there would be something remaining for his wife and children until they could find positions and means to take his place as bread-winders for the home. On his death, she was able to meet her debts, get a small start in life and earn enough along with the small earnings of her son and daughter to keep the home afloat. Preserving the home is just about the finest thing in the world.

"A stranger in a strange land," Miroux was killed one night on his way home from work. High anticipations had led him and his family to this new land across the sea. Great hopes had buoyed them in their struggle with new conditions and strange environment. They could enter into something of their desire when "father" was so suddenly taken from them. Group Assurance had been in force one month at his firm. The Thousand Dollars paid by the Life Assurance Company is a payment made on behalf of the widow and her children. They are being given their opportunity to gather strength and face their future.

The best test of the efficacy of any kind of assurance is to pause and consider when it will be paid. In the great majority of cases it is paid in time of distress, calamity and need, but in the case of Group Assurance the bulk of the payments will go to families whose need is greatest because the assurance is transacted in a no class of assurance do claim pay. Nor do they translate themselves so directly and unnecessarily into terms of food, clothing and shelter. Always reasonable, more than any other—that is the test. The Life Assurance Grant took consumption and became a total and permanent disability claim. The Group Assurance evidence checks every month were a godsend to this man and his family.

All employees of, Imperial Oil, Ltd., know that this Company has a very considerable interest in tank car equipment. If all these tank cars were bunched in one place, it might be thought that little could be sacrificed for the convenience of the Company's interests. But of course there has to be the question of cost. If the writing is on the wall against the purchase of the equipment, it must be taken into consideration that in addition to carrying the supply of crude oil to some of our refineries, our tank cars are required to maintain the Company's storage facilities. Keeping track of its different products is a part of its responsibility and each tank car service to the Atlantic Seaboard or to the Pacific Coast, and from the most southern to the most northern point in Ontario to the railroad terminals in the Northwest. Therefore, it is really a matter of far the greater part of our product has to be distributed by means of tank cars, it can't be appreciated how much tank car equipment must be properly located at our different loading points so that the interests of the whole company be served, and that no station may run short of stock. It will also be noted that the supply of tank cars is necessarily limited to a minimum in order that during our busy season, with proper handling of equipment by all parties, there may be no shortage, and that during slack seasons when there is not so much demand, cars need not be idle.

With the proper distributing and operating of such tank cars, the Traffic Department is charged but, to a great extent, they are assisted or handicapped, either by our agents at substations giving prompt handling in the unloading of tank cars, or, on the other hand, in some instances, by such agents delaying cars unduly. During our busy season, when a car is delayed, such delay tends to create a shortage all around, and necessitates pressure being applied in one direction or another, in order to maintain stocks. It is, therefore, very gratifying to the Traffic Department to keep "Em Rolling."

These are instances of exceptional handling, and are due to the cooperation of the drivers and the efforts of the agents and employees of this Company. The Traffic Department is especially grateful to the attention of all interested employees as an incentive to greater efforts in the handling of the cars. It may be of interest to point out that the Company's promptness in handling the cars has never been before equalled. Credit for this achievement is not due only to the Company's agents and employees but the thanks of the Company and its customers is due to the Police and other Operating Officials for their unremitting efforts to assist us. Prompt handling of equipment is a matter of the first importance to this Company, and the Police of the Edmonton Division "Keep 'Em Rolling" is recommended to all.
Imperial Personalities

ANY Scots, and numerous Scots, have blazoned their names on the pages of fame. In literature, science, sport and even crime it has been a name to conjure with. The Review makes no apology for inaugurating a series of brief sketches of men worth knowing in the Imperial service, by introducing its readers to a son of the Scott clan.

Everyone at the head office, every employee from other jurisdictions who has occasion to call there, and every visitor to the offices of the “8th Floor” has met “Scott”. No one ever puts a handle to his name, he is Scott pure and simple, and even those who met him oftenest may be surprised to learn that his baptismal name consisted of more than one syllable and that, in reality, he is Samuel Stewart Scott, very much at everybody’s service.

The youngest son of Robert and Lea Scott, he was born near Sylvania, Georgia, in 1875, and spent his early years in that vicinity, his father being employed by Mr. G. R. Black, a Congregational representative.

Young Sam grew up with “work” as his chief recreation, helping his parents with the chores and eventually hiring out to other families in the neighborhood.

At the age of sixteen he heard the call of the bright lights and moneymaking business, where he was employed with the Steam Laundry Co. as a soap cleaner and, by a conscientious discharge of his humble duties, being Gradually advanced to the important post of head oven-tender.

Avoiding the pitfalls that proved the undoing of King Alfred, Scott hustled early and late to keep the cakes from burning. He tells us that he never had time to loaf.

Scott is a well-known figure in downtown Toronto, where he may be seen progressing on his appointed tasks with a dignity which arises from the conviction that whilst carrying the messages and commands of his Director, the business and financial world cannot ignore his passing.

In private life Scott is never weary in well doing. His sole ambition is to “serve the Lord with gladness” and he is a pillar in the Full Gospel Pentecostal Church, where his basso profondo and his oratorical gifts are highly appreciated.

Scott was married when quite a young man and his two sons are now in New York. Left a widower in 1912, Scott found Savannah becoming too small for him and moved to New York where he worked first as coachman and then as a porter. His wanderlust not yet satisfied he crossed the line into Canada in 1912 and for three years ran out of Montreal on the C.P.R. trains.

His connection with Imperial Oil dates from 1916, so that he wears, in addition to his ever-present smile, the long service button of our organization.

He has served under three Presidents, Mr. W. C. Teagle, the late Mr. W. J. Hanna, and Mr. C. G. Stillman, so we feel at liberty to quote Tennessee and say “Presidents may come and Presidents may go, but Scott goes on forever.”

A Pearl StudDED Anticline

WHEN we attend a banquet where the cover charge assumes the dimensions of a mortgage, and if the menu includes a plate of Molluscs in its natural environment, there is always present someone wit, or with, who opines that the bally oysters must have pearls in them.

For fairly obvious reasons, geologists, even Imperial Oil geologists, are not very frequent attenders at functions such as these, nor do they expect, as they pursue the course of their prosaic toil, to pick up such a knick-knack as the lustrious pearl, but, in the less serious inti-
mately, there are certain things which are not dreamed of, even in the philosophy of a geologist.

During the past field season an Imperial field party were deeply interested in “structure contours” and “key beds” in Southern Alberta, and, being in the course of their investigations, lost no opportunity of collecting, identifying and labeling the fossils which rewarded their search.

The result of their labour is that our Company now has a reasonably complete list of the fauna of the Upper Cretaceous strata in Southern Alberta, and, incidentally, is in possession of a pearl, if not of great price at least of great interest.

To those who may be worried by the “too old at forty” cry, it will be encouraging to know that this pearl can be no less than 60,000,000 years old, for that figure is generally accepted as the age of the Cretaceous sediments in which it was found.

Strangely enough the good pearls of commerce are obtained in the East Indies from a mollusc which is not an oyster at all, but belongs to the “Pteroid” family, its genus and species being “Mel-
Eagrina margaritifera”, whilst the edible oyster of this continent is known amongst its estimates as “Ostrea virginica.”

The three or four species of oysters (Ostreaeidae) known in the Alberta rocks all bear a family resemblance to their modern cousins and the particular species which was “caught with the goods” is a specimen of “Ostrea subtrigoni-
als” (as may be seen from our picture).

The prosaic rock-bound, however, takes no stock of the pearl and merely looks upon our fish as an indication that the strata in which it is found belongs to basal Fox Hills time in this region, which brings to our minds again Biblical references to pearls being strung where they were not appreciated.

The formation of a pearl is an act of self-defence on the part of the oyster. When any irri-
tation (usually a parasite such as the larva of certain boring worms) is felt by the mantle, or soft fleshy body covering of the mollusc, the offended glands secrete a pearly covering about the in-
truder, which operation, if success-
ful, smothers the parasite. It is a moot point whether this process first proceeding is beneficial to the oyster or not as it leaves the pearl as a foreign sub-
stance which is likely to wax and g row fat and prove quite a burden as time goes on.

The subject of our sketch has a family tree which many a monarch might envy and, so that our read-
ers may be in a position to recog-
nize him socially, we append his gene-

The interior view of the shell, with the pearl, is on the left.
Montreal Cracking Coils

By FRED C. MECKIN—Superintendent, Montreal East

The Cracking Coils constructed this year at Montreal Refinery are a forward step in the design of modern equipment for the thermal decomposition of heavier oils for maximum yields of gasoline. It is a part of the world-wide overproduction of crude oil and its products, but this can not be allowed to militate against the importance of continued advance in the technique of petroleum refining. Motor fuel is a prime essential to the progress of civilization and the requirements of the future are of more importance than those of to-day, in fact it has been largely due to the development of cracking processes that the petroleum industry has been able to supply the rapidly increased demand for gasoline at a low price to the consumer and build up the present surplus.

Maximum yield, however, is not the sole object of the Montreal installation, for the coils will not only crack more gasoline from the same amount of crude but at the same time will produce a superior commodity. This policy of keeping abreast, if not in advance, of the times in the design of efficient refinery equipment has always been the aim of our Company. Soon after cracking under pressure was developed the practically way, pressure stills were installed at Sarnia Refinery and became standard equipment in the layout of the Imperial Refineries that were later constructed. The original horizontal Shell Type Still, which was directly fired, was soon displaced by the Tube Still, somewhat similar in design to the Water Tube Steam Boilers, and it was from these plants that the Canadian motorist obtained the major part of his fuel for the last fifteen years.

The cracking coils under construction are of the Type Pressure Stills, equipped with air controlled rotors for revolving back to the Still fractions that had been insufficiently processed, were for a time looked upon as being highly efficient, but, in the light of new and more exact information on the Process of Cracking, this type of plant had to give way to the new Tube and Tank Process, known generally as "Cracking Coils." Realizing the value of this new equipment our Company installed four Cracking Coil Units, as an integral part of our last built refinery at Calgary.

In this process the oil is heated in a coil and then discharged into a soaking drum considerably removed from the heating furnaces of the apparatus. In this way a comparatively small quantity of oil is maintained in the heating zone and it can be removed entirely from the system within a few moments through several safe channels. This safety in operation has been greatly improved with the increased pressures that are utilized.

Most of the decomposition of the heavier oils to lighter products takes place in the Soaking Drums from which the distillates are released as produced in the form of vapors closely fractionated in Bubble-Towers and then condensed and delivered to storage for further processing to finished gasoline.

The coils at Calgary proved a success in a practical way and from their operation, valuable data was obtained for the development of new plants. Larger coils were then constructed at Sarnia and at Leduc, in the design of which many improvements were incorporated. These coils gave extraordinary results, especially as to capacity, and definitely proved that cracking under pressure could be handled as a continuous operation instead of on a batch basis.

The coils installed this year at Montreal and at Regina refineries will be a further advance in the process of cracking. The capacity of each coil will be increased, the fuel consumption lowered and the production of fixed gases and coke, inherent to all cracking processes, will be greatly decreased. The formation of coke in the tubes of the old type pressure stills was one of its limiting factors. The removal of this coke from the heated tubes to the soaking drum has been largely attained in the tube and tank system. The coke eliminated to a great extent trouble from overheated tubes and consequent shut-downs for repairs. The percentage yield of gasoline from heavier oils will be improved and the motor fuel finally produced will contain a greater proportion of those desirable compounds which result in smoother running and more efficient operation of the gasoline engine.

In planning and carrying out these installations safety of operation has ever been given first and foremost consideration. From extensive research more definite knowledge on the tensile strength of steels and alloys under high temperatures and pressures has been obtained resulting in the design of more reliable equipment. Experience on the operation of the cracking coils has led to a simplified but complete system of control throughout the system by means of recording and indicating instruments. When the Inspectors from the Provincial Department of Inspection of Boilers and Containers passed the plant for these coils they considered them as representing the best and most up-to-date design both in fundamental principles and in detail.

A Scots customer writes us complaining of the price of crude oil. He does not own a car, he isn't a large consumer of fuel oil, but he has a patent cigarette lighter operating on gasoline.

In Passing

The harassed-looking man was being shown over the factory. "That machine," said the guide, "does the work of thirty men."

The man smiled grimly. "At last," he said, "I have seen what my wife should have married."
The subject of domestic heating with oil is one that is of absorbing interest to a great many householders at this season of the year when the long cold winter is upon us and those unfortunate enough to be without the convenience and comfort of an automatic oil heating plant in their basement have to shoveling coal, clean out ashes and perform those irksome tasks which soil things about the house generally and create additional work for those whose particular pleasure lies in keeping the home spick and span.

The domestic oil heating plant is now an established fact, it having come into its own in the past few years, during which time it has grown from comparatively small dimensions to what it is to-day. It would appear, from the number of homes in which oil burning equipment is being installed, that it is here to stay and that the public are convinced of its merits and the economy of its operation in comparison with other fuels.

There are three grades of oil most generally used for domestic heating—Kerosene Oil, Kerosene Distillates and Fuel Oils. The first two are used principally in burners of the oil vapour type, while fuel oils are the oils most commonly used in household burners of the atomizing type; although a few of this latter type can only be operated successfully on Kerosene Distillates, these are the exceptions rather than the rule.

I might say, in passing, that I know of no limitations to the use of oil as a fuel for house heating purposes, as it can be applied in any kind of furnace in which solid fuels are ordinarily used. The only exception there might be would be in hot air furnaces having weaved sheets exposed to the fire that might warp due to the more intense heat of an oil fire and allow the gases of combustion to escape.

For “Home” Service

The Editor of the Review and the author of this article have much in common, but, whilst the former is a slave to the snow and ash-heap and sends most of his hard earned cash “across the line” to purchase Ambrosia, Bob Caldwell is carefree and happy during the winter months.

And the secret is “Oil”.

The way of keeping the apparatus clean and properly lubricated.

One would also desire in an oil burner for the home, quietness of operation, as well as economy in the combustion of fuel, so that the family will not be unduly disturbed by unnecessary noise in the living rooms.

The only function of a burner is to supply the fuel oil to the combustion chamber in finely atomized form for admission with the proper proportion of air for combustion. In other words, the burner is merely the means of introducing the fuel into the combustion chamber, and while it is necessary that it function as noiselessly as possible and continue when it is started by hand, or in the case of an automatically controlled burner by the automatic devices for starting and stopping, and be economical in the use of power to operate it, this is about all one can reasonably expect of it. This or that burner will only be as economical in the consumption of fuel as the arrangement of the combustion chamber and the design of the furnace will permit, assuming, of course, that the burner is doing its part in supplying properly atomized fuel to the right place in the combustion chamber.

Manufacturers of oil burning equipment are obtaining and is the principal reason why oil burners cannot be sold like hardware over the counter for anyone to install, but require an organization that knows the principles of oil combustion and can install them properly to give the most economical results and good service.

Page Ten
IMPERIAL OIL REVIEW

Typical installation for a moderately sized home

It could only be operated successfully in many cases with kerosene distillate or kerosene oil. This resulted in unsatisfactory operation from the formation of carbon and soot. I have seen sidewalks and lawns about some houses where they were trying to use a light fuel oil, in burners in which the heaviest oil that should have been used would be a 3/40 kerosene distillate, literally covered with soot that came from the chimney through incomplete combustion. The burners referred to were of the oil vapour type in which oil is first formed into gas by the heat of the burner itself and then burned in admixture with the proper portion of air.

Oil burners of the atomizing type that are being marketed today should not cause trouble with carbon forming in the furnace. Carbon forms in a combustion chamber from one cause only, and that is incomplete atomization of the fuel oil which causes small globules of oil to be projected on to the heated furnace walls and consumed by surface combustion which does not allow of the proper amount of air being supplied around the oil to completely burn it, leaving a carbon that continually builds up. It is able kind to have, but such is never the case, as a smokeless fire frequently means that an excess amount of air is being used with resultant uneconomical operation, and while it is possible to have a fire without smoke and still have economical operation, it is hard to tell with a clear stack at what point economy ceases, and waste begins, whereas, if a slight haze of smoke is coming from the chimney, it is a sure sign that one is getting about the best economy that can be had, so that a slight smoke haze is rather an advantage than otherwise and is a good guide for economical operation, assuming that the combustion chamber is properly designed to supply the air at the proper point for the complete combustion of the fuel, and the fire is burning well down in the fire box and not up in the sections in the case of a hot water or steam furnace.

The cost of house heating apparatus varies to a considerable extent, the fully automatic device being, of course, more expensive to install than one that is hand-operated. For a small house of, say, seven or eight rooms, one could be had on the surface for a very good, dependable, fully automatic fuel oil burner with 200 gallons oil capacity, at from about $500.00 up; larger storage would run into a little more money. A hand-operated apparatus which will function quite well and give good results, although requiring more attention in the way of adjustments of fire, starting, stopping, etc., than the automatic burner, can be purchased for a difference in the cost of the automatic device and that installation which would probably be around $150.00. Inference to the economy of fuel oil heating, this depends so much upon different conditions that no two installations would show exactly the same result, and is something that no person could tell anything about unless they knew definitely what results were being obtained from the fuel that was used in the furnace previous to installing fuel oil as the heating agent. What can be said, however, is this, that in household furnaces properly installed oil-burning apparatus will show an efficiency of around seventy-five per cent. No very definite data can be given on the quantity of fuel oil required for any particular sized house, as houses vary so much in construction and exposed area that what would be comfortable would be quite different in each individual case.

I have, however, received from a fellow employee in the Company, a letter, fully describing the operation of a burner of the air atomizing type with a fully automatic control which applies to his first winter's experience. His house, shown in our diagrams, is a detached house in North Toronto, brick on hollow tile; with neither weather-stripping — storm door, or roof insulation, or humidifiers.

The inside contents heated approximately 13,000 cubic feet, and the temperature was controlled by thermostat at several points from 6.00 a.m. to 10 p.m., and sixty-seven degrees during the night.

One graph shows a relation of one ship between outside temperature and daily fuel costs, and another shows delivery, fortuity expenses, and total costs.

The point brought out strongly is that there is no large amount of money tied up in fuel as is in a case with a household who burns in a winter's supply of coal. As wages are required to heat the two weeks, the fortnightly summation of expenses shows the proportion of income which is absorbed by heating expenses.

The various figures are maximums and, through the experience gained in the first winter's operation, costs will be appreciably cut in the future. Coal being the fuel most generally used in cities in recent years, all other fuels are usually spoken of, as far as consumption is concerned, in terms of so much to equal one ton, and from what I have been able to gather it would seem as though 100 to 110 gal. of content. Working this out to 2,000 lbs. (one ton) for the solid fuels, the equivalent consumption of fuel oil was 109.63 Imperial gallons. To this would be added the cost of gas, if a gas pilot is used, which would run about 18.15 per month with the pilot in constant operation; if intermittent the cost would be proportionately less, and of the electric current to operate the motor which in the case of a small house of seven or eight rooms would run about 75c. per month. This, of course, would be proportionately more for larger homes where the oil burning equipment would be in more frequent operation.

As far as the future for oil burning in homes is concerned, I can see no reason to anything but optimism, but there is one thing I would like to point out, and that is, as methods of refining crude are improved, as they have been in the past, and as they undoubtedly will be in the future, the tendency will be towards heavier fuel oils, and those who have fuel-oil burners installed that can, should occasion arise, use or be adapted to use heavier fuel oil than the light oil that is being sold at present for domestic heating, will be able to enjoy the increased use of their oil-heating plant.
The refining of crude oil
By C. D. Dean—Technical Engineer on Processors, Imperial Oil, Limited, Toronto.

Practically everything, including waxes and asphalts—but of course not coke—is stored in tankage and handled by pumping. The tankage is all steel and varies in size from 5 feet diam. by 10 feet high, having a capacity of 35 bbls, to 120 feet diameter by 42 ft. high, having a capacity of 80,000 barrels.

The tanks are designed for a stress of 20,000 pounds per square inch on the net area of the shell, when full of oil, but no plate in the shell or bottom is less than 1/2 inch thick. Generally speaking, the bottom is made of 5/8 inch steel and the roof plates of 3/16 inch material. The roof is designed to carry a wind and snow load of 20 pounds per square foot, and while the practice of a few years ago was to install true roofs quite extensively, the present practice is to use I beam supports, bolted at one end and free to slide on the other to take care of tank distortion, due to settlement of the foundation or varying elongation of the materials with differing temperatures.

The space occupied per tank is quite variable, but very roughly follows the plan of allowing one square foot of ground per bbl.

Storage tanks and tank cars.

The third installment of Mr. Dean’s able exposition of the complete art of oil refining deals with the problems of storage, transportation and fire prevention in the refinery. This concludes the series.

The oil lines are connected through the shell either at the top or the bottom. The top connection is favored by some people, as line breakage does not involve the loss of the contents. It does, however, mean a continuous maximum pumping head and the bottom connection on this account is generally used. To safeguard as much as possible against loss from line breakage, the line inside the tank is on a swing either by using a specially constructed valve or by using two cells so that in the event of the entrance of the pipe can be raised above the oil level.

The oil lines are all screwed steel pipe and are made large enough to give a total head for a refinery on level ground of from 5 to 75 feet, when centrifugal pumps are used, but for asphalts, waxes, etc., the pumping head can be increased by using pipings greater than 100 pounds per sq. in. are not favored. In general all hot oil lines for refinery processing pumps, no line is made less than 6 inches. Process pumps, driven by steam or centrifugal driven by constant speed motors, are usually used.

For certain purposes, such as pumping waxes and asphaltics, etc., no motor driven apparatus can be used, because the power required at starting is several times that required after the volume of oil in the line gets moving, and it is usual to put in a high ratio duplex steam pump for this work, as the exhaust steam need not be wasted.

Fire protection in an oil refinery and large expenditures are made to provide fire fighting facilities on an unusually large scale. All tanks are equipped with two inch steam fire lines, which enter in two places on a diameter near the top and which during thunder storms are opened. If steam enters a tank and displaces the air, the risk of fire is nil, but after an explosion, if the roof blows off, and it nearly always does, steam is comparatively useless. During recent years a new system of lighting oil fires has been developed, known as chemical foam, and there are three commercial foam formulas in use now.

These foams are mixed right at the tank in a mixing chamber, either within or without, and when discharged on the surface of burning oil, act as a blanket. The protection required per tank is difficult to estimate and usually is based on judgment. A conservative figure is that about six feet of foam per tank will be needed, added to the acid solution. The first two are not used much for new installations, as the bubble materials deteriorate rapidly. In all cases, the expansion by mixing fresh solutions is used, but ordinarily refinery storage solutions will give an increase of about 63 to 1.

To cover a refinery risk means a costly external network of lines, as well as powerful pumping equipment, and it may be noted that foam hydrants are located at strategic points to permit the use of foam on other risks besides tanks.

Probably the most expensive fire fighting apparatus consists of the usual water protection. This consists of the well known hydrant and pumptype, where the fire fighting equipment is out of reach. The fire fighting is simply an extension of the main tankage, which can be raised above the oil level.

For certain purposes, such as pumping waxes and asphaltics, etc., no motor driven apparatus can be used, because the power required at starting is several times that required after the volume of oil in the line gets moving, and it is usual to put in a high ratio duplex steam pump for this work, as the exhaust steam need not be wasted.

Fire protection in an oil refinery and large expenditures are made to provide fire fighting facilities on an unusually large scale. All tanks are equipped with two inch steam fire lines, which enter in two places on a diameter near the top and which during thunder storms are opened. If steam enters a tank and displaces the air, the risk of fire is nil, but after an explosion, if the roof blows off, and it nearly always does, steam is comparatively useless. During recent years a new system of lighting oil fires has been developed, known as which is equivalent to about six gallons of solutions per square foot. Current practice does not call for the installation of foam storage, totalling the whole risk, and it is customary to provide storage—larger in size and number of tankage than is required for this purpose. The actual foam making solution is kept in a separate tank until required, in all the foam making formulas, the acid solution consists of 10% to 12 per cent. by weight of aluminum sulphate and 83% to 89% per cent. of water. The soda solution consists of about 8 per cent. of sodium bicarbonate and 89% to 91% per cent. of water. These produce the carbon dioxide and the other ingredients to produce the bubble for containing the gas, differ.

In the first one—glue, glucose and arsenious oxide is added to the soda solution. In the second—foam, powdered extract of lauric

"Le dernier cri" in tank cars.

Provided for at least 12 standard 2½ inch hose at the farthest point in the line. Water in oil fires is simply to keep surrounding apparatus and tanks, buildings, etc. Fire to prevent in so far as this means will, the widening of the fire area.

Wherever necessary, it is the aim to provide for at least 12 standard 2½ inch hose at the farthest point in the line. The use of water in oil fires is simply to keep surrounding apparatus and tanks, buildings, etc. The aim is to prevent in so far as this means will, the widening of the fire area.

The amount of trackage required at a refinery varies considerably and depends on the percentage of the crude and finished products that will be moved by rail, as well as the amount of tank car storage space desired for seasonal variations in the movement of finished products. A rough figure of trackage requirements is about a half mile per 1,000 barrels of crude daily, but for products located on water it will be much less than this.

Tank cars for use in the transportation of oil are built in accordance with the American Railway.
ASSOCIATION'S SPECIFICATIONS FOR CLASS III SERVICE, i.e., for carrying inflammable liquids, where vapor pressure does not exceed 10 lb. gauge at 100 degrees F. If, however, gasoline and naphtha is to be moved, Class IV tank cars must be used.

Wharfage facilities for plants erected on navigable waters are, as far as possible, pier structures with deep water face, approximately 400 feet long and arranged for a boat draft of 40 feet in place, with waters and 30 feet at low tide in sea waters.

The deck loading is figured at about 800 pounds per square foot. For certain sea locations, particularly in South America, loading and discharge of steamer is done through andesine lines, which sometimes are laid a mile out before sufficient depth of water for boat draft is reached. The end of the pipe line is either a hose supported on an anchored float or a small dock protected by pile dolphins. Such lines have a life of about four years.

As mentioned previously, a very large part of the expense of refinery operation is due to the excessive work necessitated by the severe punishment that distilling and treating apparatus receives in service. On this account, mechanical shops having carpenter, machine, boiler, blacksmith and pipe departments are a regular installation.

In conclusion, it may be said that the knowledge of the characteristics of the constituents of oil is consistently increasing and is having its effect on the greater refinement of apparatus continually taking place. The physical laws controlling behaviour under varying conditions are of such wide ramifications that nothing startling can reasonably be expected, but as the years go by and a retrospect of the changing practice is taken it will be found that what has been considered an art has definitely entered the field of science and the progress will continue as man widens the range of his uses of petroleum products and learns how to get what he wants by a more definite insight into the limitations imposed by nature.

“SO THIS IS IOCO”

By H. Brockington

If our Ioco confrere had a choral society or a male quartette, the favorite number in their repertoire would be “Come around any old time and make yourself at home.”

The record of hospitality unfurled by Mr. Brockington is sufficient to make every Scotman on the Pacific Coast hit the trail.

HALL when they sat down to luncheon, and the unfortunate corps of appointed guides were compelled to remain in the porch of the building desperately chewing blotting paper. Luncheons being over, Mr. Grant, the Assistant Superintendent, fed the visitors with facts and figures and after they had been given a brief outline of refinery operations, they were divided into small groups such as a guide, and left for a tour of the refinery.

From the waters of Burrard Inlet and from the road and railway on the south shore only a small portion of the refinery is visible; therefore it was not surprising that our guests on reaching the brow of the hill (and on regaining their breath) expressed their amazement at the extent of the plant. Questions were numerous and pointed, and the previous rehearsal of the guides in such facts as would appeal to an outside business man proved its value.

A tour of inspection by such a large number required careful organization. It was necessary, to be successful, that the visitors should not only get a broad view of the refinery but should be able to follow with the minimum of walking the course of the oil from the crude oil tank car to the gasoline tank car. A time schedule was important. If it had chanced that the whole of this particular party had not simultaneously reached the laboratory, even the vast space set aside for our chemists would have been taxed.

Following the B. of T. came a delegation from the Municipality of North Vancouver and, the habit having apparently been formed, we look forward to a constant stream of seekers for knowledge, and maybe chicken, in the future.
"Think Imperially!"

By the Editor

The naked negro, panting at the line," may have little in common with the fur-cloaked Eskimo, but, whilst the first thinks his gods for all the good they gave and the latter is inclined to shudder, both find a place in the 'Imperial' family, where race and creed are forgotten and we are a 'Jock Tam o' Shaws'.

There is a crying need that we should apply, to our own particular advantage, the advice of the British statesman and 'think Imperially'.

The office-worker at headquarters, circumscribed within four walls, not only marks his limits of his daily activity, but far-spread interests, or those whose avocations call for their going to all four corners of the world, will find that the 'Imperial' Oil Limited, in the large trade lines of commerce and enterprise. In direct contrast to the few who are thus enabled to envisage what 'Imperial' Oil Limited really stands for, are the multitude who, no less loyal to their duty, are nevertheless lacking in certain essentials which ought to characterize all of our number, from office-boy to President.

We could fill a volume of the Review detailing facts about Imperial Oil Limited which are not known to more than a fraction of its employees, but which should be, and must be made common property before we can hope to install that 'esprit de corps' which is a vital necessity in any large organization such as ours.

That it should be made possible for everyone enlisted under the 'Imperial' flag to become a walking encyclopedia regarding petroleum in general and 'Imperial' Oil in particular is the function of the Review and unless we find a growing interest and understanding on the part of our fellow-workers along these lines, the Review must be written down as a failure.

There is always the danger that a company magazine develop into a medium for retailing gossip and thus fall short of the high ideals which led to its inception. To illustrate this we quote from a contemporary from over the Jax.

"Irene—our of our fair stenos, is again with us, after being confined to her home for some time with the big head (mumps)." Now 'mumps' is (or are) a very annoying and painful complaint, and, when applied to a fair steno must not be minimized, but what is the relative importance of this for general consumption.

The Review must strive to follow the 'Ela media' by being instructive without becoming pedantic, interesting to all and not merely locally, building up a knowledge of our own wide-spread diversified operations and of the fundamental facts relating to the petroleum industry, and, at the same time, give such attention to domestic affairs as will bind the employees together into one vast community no matter in what country or under what conditions they may be working out the joint destinies of the company and themselves.

What does 'Imperial Oil Limited' mean to you? Is it merely the source of your pay-envelope, is it simply a refining concern with rather large works at Sarnia and elsewhere; is it no more than a distributing company with service-stations and tank-wagons, or an exploring company who are trying, with varying success, to find a domestic supply of crude in Canada? Do you know that whilst the darkness of the long Arctic nights enthralled the pioneer drillers in the icy wastes of far-northern Canada, the Southern Cross looked down on our derricks below the Equator? Do you realize that when the inland waterways of our Dominion were locked fast in the grip of winter and our Great Lakes Fleet lay laid up safely in their harbours, the 'Imperial' flag was still flying o'er the waters of the Pacific and Atlantic Oceans?

Do you ever pause to think that, whilst a tank wagon driver may be fighting his way through snow-drifts on the Western Prairies, geologists, engineers, drillers and construction men are slumbering in the swamps of Colombia, fighting malaria and every form of tropical disease, bosting a gang of peons and in hourly hazard of the terror that flies by night and the pestilence that walks at morn?

The clerk in a well-appointed office, the salesman in the country, the pullman is blood - brother to the rack packed prospector floating down some turbid equatorial river in a dug-out, the engineer looking a path through the jungle or building a flimsy bamboo bridge over a torrent, the geologist heading a pack-train in the foothills of the Canadian Rockies or bestriding a burro in the Peruvian desert, and the husky-voiced greasy stoker in peril on the sea.

All are employees of 'Imperial Oil Limited' and each of these, as well as every branch of the service, must do their bit before the owner of a divisor can hope to fill his tank at the service-stations.

This is the aim of 'Imperial Service', and it is the aim of the Review to tell the story of our efforts in every branch of the petroleum field, so that Imperial Oil employees, conversant with the magnitude of our undertakings, may become fired with a new enthusiasm for their work and a new pride in their associations, and acquire that spirit into gloom that erst Paul when he published 'I am an citizen of no mean city.'
"Marvelubes"

By WALTER H. DEER

A LITTLE less than a year ago, Imperial Oil, Limited, was forced to part with a hockey team in the Mercantile Hockey League, Toronto, a league which has been in existence since 1929, and which has been playing during the past eighteen years for a cup presented by Mr. T.B. Aikenhead, of the Aikenhead Hardware, Limited, Toronto. During that time, there have been quite a number of the larger industrial firms in the City of Toronto represented in the league, the shields on the cup showing that it has been won by the Ford Motor Company, the Aikenhead Ironside, A. R. Clarke & Co., the Canada Cycle and Motor, Massey-Harris, W. R. Brock, Limited, Canadian General Electric, Stock Yards and Packers, and Gunns, Limited, several of the teams representing these industrial firms having won the cup twice. One of the stipulations Mr. Aikenhead has made is that the team winning the cup three times retains it permanently.

The writer was asked to manage the team, and Jack Doré was asked to coach the team, and it is largely through the latter's efforts that we were successful not only in winning the Aikenhead Trophy but also the Daily Star Trophy, emblematic of the City of Toronto industrial championship. The players, however, must be given great credit also for their efforts, as they practiced and trained faithfully during the season. Perhaps few of us realize that they were in and out of their uniforms and on the ice fifty-one times at the Ravina Rink last season, and each time they were on the ice, they were on for a full hour's time at least.

A schedule of twelve games was played in the Mercantile Hockey League, and our team was in quite a number of over-time games, and also quite a number of tie games, which would indicate the closeness of the play and the strength of the opposition. The close of the League schedule found the "Marvelubes" tied with the Wilson Stock Yards team, which necessitated a playoff. We defeated the Stock Yards and then played the A. R. Clarke team, winners of the Toronto and York Industrial League for the right to play the Bell Telephone team, winners of the Toronto Amateur Hockey League, for the City championship. We defeated the A. R. Clarke team in a series of two games, and great credit must be given to the Imperial Oil team for their efforts in this series, because they beat one of the best industrial hockey teams ever brought together. Imperial Oil then beat the Bell Telephone team in a two-game series, winning both games, the total goals being: Imperial nine, Bell Telephone five.

The very successful season of last year was brought to a close by a joint banquet for the presentation of Bowling and Hockey Trophies, at the Carls-Rite Hotel on Wednesday, April 20th, 1927. Among those who were present and extended congratulations to the team on the position won by them were: Mr. A. M. McQueen, our Vice-President, Mr. J. F. Wolfe, General Sales Manager and Director, and Colonel A. B. Oliver, Manager of the Toronto Division. Mr. T. B. Aikenhead personally presented the Aikenhead Trophy on that occasion, and Mr. N. Albert represented the Daily Star in connection with the presentation of their trophy.

Due to the fact that the Kodak team dropped out of the Mercantile Hockey League, and the A. R. Clarke from the Toronto and York Industrial Hockey League, an amalgamation of the two leagues was formed for this season, the new name adopted being "The Toronto and York Mercantile Hockey League." This League will be a sixteen-team league, comprising the following: Union Stock Yards, City Hall, Canada Cycle & Motor, Godfrey Tice, Canadian National Railways and Imperial Oil. Imperial Oil "Marvelubes" will have practically the same team as last year with the addition of one or two new men, and, as all of the other teams have strengthened considerably, we expect that the excellent calibre of the hockey of last season will be maintained, if not bettered, as all of our players appear to be in excellent, and even better shape than they were at the beginning of last season. A lot of credit is due to Tom Wickett for his able assistance in training the players last year, and we were also ably assisted by Bill Camp who handled the tickets for us. We have helping us this year a professional trainer, Ed Wilder, who has handled St. Andrew's Club teams and Parkdale Canoe Club teams for the past several years.

The season opened Saturday night, December 3rd, with some special features, such as fancy skating by the three girls selected to represent Canada at the Olympics. Our opening game, on the date mentioned, will be with Canada Cycle and Motor team, and the other game of the double-header will be between the Good year Tire and City Hall teams. This will be followed by doubleheaders each Wednesday and Saturday night, meaning that our team will play two games one week and one game the following week, to allow a schedule of fifteen games for each team. Apart from the games lined up for the opening night, the schedule of games has not yet been completely drawn up, but will be announced at an early date.

On behalf of the management and players of the team, I want to take this opportunity of thanking all the Imperial Oil employees in Toronto for their fine support throughout our schedule last year. Nothing gives the players more encouragement than to have the feeling that they are well backed by their fellow employees, and we hope and trust that the same support will not be lacking this year, but rather that last year's effort will be exceeded.
Christmas Greetings

and

Best Wishes

for the

New Year

from

The President

and

Board of Directors