Commission of Conservation
CANADA

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CONSERVATION is published the first of each month. Its object is the dissemination of information relative to the natural resources of Canada, their development and proper conservation, and the publication of timely articles on town-planning and public health.

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CLOVER AS SOIL IMPROVER

Common red clover seed is very high in price this spring. This means that many farmers will be tempted to seed down less of their farms to clover or to skimp the seeding where it is being done. A farmer cannot afford to skimp his clover seeding.

Twenty-two years ago a very interesting experiment was conducted at the Central Experimental Farm, Ottawa, to determine the value of clover as a soil-improving crop. Plots were sown with wheat, barley and oats. Some plots were seeded to mammoth clover and some were left unseeded. On the plots seeded, the clover grew well and was ploughed down in the fall. The following spring, 1898, the plots were sown with oats.

The following table shows the increase on the clover seeded plots:

YIELD PER ACRE IN BUSHELS OF OATS, 1898

Crop followed	Without clover	With clover	Gain
Wheat	37	56	19
Barley	37	44	7
Oats	44	55	10

In 1899, these plots were sown to barley. The effects of the clover were still evident both in the appearance of the crop and in the yield.

YIELD PER ACRE IN BUSHELS OF BARLEY, 1899

Crop followed	Without clover	With clover	Gain
Wheat and oats	25	40	15
Barley and oats	28½	33	4½
Oats and oats	33½	44½	11

Tests conducted at two experiment stations in the United States extending over periods of 25 years or more show that crop yields were maintained in four-year and five-year rotation where clover formed a part of the rotation and acid phosphate and muriate of potash only were used. No nitrates or manure were applied, and all the crops were removed from the land.

Every farmer should carefully consider these remarkable results before he decides to materially reduce the amount of clover seed sown this spring.—*F. C. N.*

POWER TRANSMISSION LINES

Transmission lines in Canada operate under many different voltages up to 110,000 volts, says the report on *Electric Generation and Distribution* soon to be published by the Commission of Conservation. There are only three systems using over 100,000 volts, the Niagara system of the Ontario Hydro-Electric Power Commission, the Shawinigan Water and Power Co., and the Montreal Light, Heat and Power Consolidated on the line from its Cedars plant to Massena, N.Y. Lines of various voltages from 10,000 upward aggregate 5,490 miles and are as follows:

10,000 to 30,000 volts aggregate	2,428 miles
30,000 to 99,000 volts aggregate	2,485 "
100,000 volts and upwards aggregate	577 "
	5,490 "

The cost per mile of the different lines naturally varies with the mode of construction, size and number of conductors and voltage for which constructed. For voltages of from 10,000 to 50,000 volts, the figures given show a wide variation of from $600 to $11,000 per mile, while on 100,000-volt lines and over, we have from $7,500 to $14,000 per mile.

Iron wire transmission lines have been used in many instances lately, owing to the very high prices of copper and aluminium. The use of iron wire seems well adapted for short extensions and rural distribution, but in some cases, it has also been used on fairly long lines. In a recent article in *The Electrical World*, Mr. M. D. Leslie gives examples of 22,000-volt iron transmission lines, one of them 31 miles long, for relatively light loads. Although the design and operation of these lines involve certain principles different from lines of other materials, they are most satisfactory where light loads are to be carried comparatively long distances and have been found to return a fair rate on the investment, whereas copper, at present prices, would have debarred construction.

CENTRAL COKING PLANTS

Where a coking coal is obtainable at a reasonable price, the establishment of central coking plants near large centres of population seems to offer the maximum of advantage. Such a plant would produce a coke or artificial anthracite, gas for cooking or heating, coal tar which contains the elements entering into the manufacture of a whole series of valuable substances, benzol, toluol and other raw materials for explosives, aniline oil whence aniline dyes are manufactured, and ammonia liquor from which is produced sulphate of ammonia, a valuable fertilizer. The coke thus produced can be used for all purposes for which anthracite is used. It requires a little more care in firing. Furnaces burning coke require a somewhat larger fire-box than for hard coal.

Mr. W. J. Dick estimates that: "Such a plant established in the city of Toronto to supply 300,000 tons of artificial anthracite per annum would not only provide such fuel cheaper than anthracite, but would supply 1,500,000 M. cubic feet of gas at a cost of 10 cents per M. at the plant; again, based on pre-war prices for cost of plant and bituminous coal, the profit on the undertaking would be considerably more than 50 per cent per annum."

Whether such coke plant be municipal or private-owned, it offers what is, at the present time, the most promising solution of the fuel question for Saskatchewan, Manitoba, Ontario and Quebec.—*James White in "Fuels of Western Canada", published by the Commission of Conservation.*

ESSENTIALS OF GOOD ROAD-MAKING

Road-makers are forerunners of civilization. It is important, therefore, that we should know where, when and how roads should be constructed. Men who possess all of these qualifications have never been very numerous in Canada. The greater proportion of our existing rural road systems have been designed and constructed by farmers who had no special training for such work. Fortunately, these conditions are rapidly changing. The counties, the provinces and even the Dominion are assuming responsibility for many of the more important highways. But no matter what authority is responsible for road construction and maintenance it is of first importance that the work should be done intelligently as to design and materials used.

The first and prime essential of any good road is surface drainage, subsurface drainage and side drainage. When finished, the road must shed water. To do this, it must be crowned from ⅜ to ¾ of an inch to the foot depending on the wearing surface, and must have an impervious or waterproof covering. There must be an unimpeded slope from the crown to the gutter or to the side ditch. The gutters or side ditches should have a fall of at least 5 inches per 100 feet, and, if they are earthen ditches, they should have 6 inches per 100 feet, and free drainage at frequent intervals into natural creeks, channels or, in the case of a city with a sewerage system, into the sewers.

To drain away the sub-surface water and prevent it softening the foundation, it is well to lay two lines of tiles.

The second essential is a good foundation, and this is especially necessary for roads where the loads are concentrated on small areas.

Because macadam roads are more expensive in first cost than gravel roads, they should be built very carefully. The materials in the order of their excellence are—trap rock, tough granite, chert, tough limestone, ordinary limestone, tough sandstone.

Paving brick, concrete, crushed stone of various kinds, limestone, trap rock, granite, sandstone, chert, crushed gravel, bank gravel, sand and loam mixed with various bitumens such as crude oils, coal tar and asphalts, are used to make good roads or to improve them to some extent at least.

The choice of the material for any particular stretch of road will depend upon, first, the character of traffic it must sustain, second, the taxable valuation of the assessable property, third, the available suitable material. Where auto and horse vehicle traffic is heavy, as it usually is around larger cities, creosoted wooden block, brick block, concrete and bituminous bound macadams are the pavements to be selected. Property values will nearly always warrant the expenses under such circumstances.

The building of good roads requires intelligent use of the construction materials. To use them carelessly or ignorantly is worse than wasting them, because the taxpayers are defrauded, the road will not wear nor give satisfaction, and the materials out of which the road was constructed are discredited.—*W. J. D.*

Incandescent Lamps for Street Lighting

Careful Handling Adds to Life of Lamps —Cost of Lighting

Incandescent lamps, particularly since the advent of gas-filled lamps, have been replacing enclosed arc lamps for street lighting, says the report on *Electric Generation and Distribution* soon to be published by the Commission of Conservation. According to the report, enclosed arc lamps are still used in 73 places. The prevalent size of incandescent lamps is 100-w., while lamps from 25 watts to 1,000 candle power, both tungsten and gas-filled, cover the range found in use. In a series of articles in *The Electrical World*, Mr. James A. Cravatt gives very good data on street lighting, taking up the general principles, lamp ratings, relative cost, etc. He proves that, for street lighting, only two illuminants are to be considered at present, namely, the gas-filled incandescent and the magnetite arc lamps. The operators of certain small plants have indicated their prejudice against gas-filled lamps for street lighting, the reason given being that of short life. A study of the situation seems to indicate that, as this complaint only comes from the smaller plants, the cause of this short life is, in all probability, improper regulation, *i.e.*, too high amperage or voltage, the operator not being provided with proper station instruments to govern operation. As against this prejudice, may be cited the case of a small town in British Columbia provided with proper instruments, where rough tests of gas-filled lamps demonstrated that a very long life could be obtained by running them slightly under voltage.

The rates or charges for street lighting show much variation in different places. Some of the higher rates per lamp per year, are: luminous or magnetite arc, $95; enclosed arc, $90 to $125; 100-w. lamp, $48; 300-w. lamp, $75. Some of the lower rates per lamp per year, are: luminous or magnetite arc, $46.51; enclosed arc, $40; 100-w. lamp, $3.30; 400-c.p. lamp, $8.40; 1,000-c.p. lamp, $50. In a number of places, the street lighting service is charged on the meter rate at so much per k.w.h.

Six trawlers are operating in Canada, four on the Atlantic and two on the Pacific.

Birds make agriculture possible. Protect them.