maintain its wires across the track of the C.P.R. at two different points in the Province of Saskatchewan.

5190 to 5192, inclusive—August 18—Granting leave to the Bell Telephone Company to erect, place, and maintain its underground wires across the tracks of the G.T.R. at three different points in the Province of Ontario.

5193—August 18—Approving of revised location of the G.T.P. Railway from Prince Rupert easterly, mile 0.00 to mile 10.64, coast district, Province of British Columbia.

UTILIZATION OF RESIDUALS FROM REFUSE DESTRUCTORS.*

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In submitting a few notes to this conference on ut'lizing the residuals of the process of burning the refuse from a town, the author ventures to digress from the specific subject by shortly examining the methods at present usually followed in refuse disposal. These may be described as:—

(1) Filling low-lying land with the crude refuse, such land being temporarily designated a tip or shoot.

(2) Discharging the crude refuse into the sea at a convenient distance from the shore.

(3) Stacking the crude refuse on waste land more or less remote from a town, and firing it.

(4) Burning at a refuse destructor.

(5) Pulverizing the crude refuse by machinery and using the product for manure, or in the manufacture of fuel by an admixture of tar.

(6) Separating the crude refuse by hand or machinery and using the constituents in such trades as can profitably employ them.

No. 1 is perhaps the simplest and cheapest method in those towns not too remote from suitable land. It has very considerably enhanced the value of the land in some instances, and under favorable conditions is not to be entirely ignored. As, however, it undoubtedly causes discomfort and inconvenience to any inhabitants near a "tip," if not a source of danger to their health, it can only be adopted under the exceptional conditions where sufficient land is available within a reasonable distance of the point of collection.

No. 2 is only possible in seaports, and even then is in expensive, and, on economic grounds, wasteful procedure.

No. 3 is similar, and subject to the same advantages and disadvantages as No. 1, except that any organic matter is destroyed more quickly.

No. 4 is undoubtedly the most effectual in fulfilling the condition that all organic matter liable to become a danger to the public health shall be immediately rendered innocuous. In some towns, however, such a large volume of harmless material has to be burnt in order to destroy a comparatively small quantity of organic matter, that it is a question for consideration whether some other method than the installation and working of somewhat costly plant such as " refuse destructors" cannot be adopted.

Nos. 5 and 6 are on their trial, and will be carefully watched by those responsible for that section of local government controlling refuse disposal, as they have many possibilities in districts where a ready market can be found for the products.

In the utilization of residuals from a destructor much must depend upon the power of the particular locality to absorb them, and in selecting a site for the works this fact should have consideration.

Heat.—Heat may be classed as a residual of the destruction of refuse by burning, and, in fact, is occasionally placed in the foreground by some manufacturers of plant as a reason for installing a destructor; but, in the author's opinion, the only justifiable reason is the immediate destruction of matter injurious to the public health, the generation of steam being only one of the means employed in reducing the cost of the process.

* Paper read before the Conference of Engineers and Surveyors.

The amount of energy created, of course, varies in different towns, and at the several seasons of the year in the same town; but assuming a town in the United Kingdom of 50,000 inhabitants with refuse of an average character, at least 150 indicated horse-power can be obtained during most periods of the year, or sufficient to generate about 800,000 units of electricity per annum. Where this energy is utilized in pumping plant for sewage or water supply, or in assisting electricity generating stations, a considerable credit may be placed against the cost of burning.

In the town with which the author is connected, if the total energy used in cutting timber for wood paving, depot cranes, fodder machinery, concrete slab machinery, mortar mills and general workshops was obtained from the destructor, about 110 horse-power would be required for 2,600 hours per annum; but although only about one-third of the total quantity of refuse is treated at the destructor, sufficient energy to supply 400 horse-power during any part of the above-named period might be obtained if steam raising was all-important. The only use now made of the heat is to drive mortar mills and clinker-crushing plant, but the further utilization is under consideration.

In the discussion on an able paper on "Municipal Refuse Disposal," read by Mr. J. T. Fetherston, Assoc.M.Am. Inst.C.E., before the American Society of Civil Engineers (" Transactions," vol. lx.), it was suggested that ice might be manufactured by installing an absorption ice machine and utilizing the steam from a destructor plant, a 50-ton destructor being estimated to produce 50 tons of ice per day. The market price for ice in England is a short one, and it is very doubtful if this means of using the steam would recoup the extra cost of installing and working the ice plant, although it may be justified in the United States. Another suggestion made during the same discussion was the adoption of electric collecting wagons driven by storage batteries charged at the destructor, so that the saving in cost on the present methods of collecting the refuse by horse haulage might be set against the expenditure in running the destructor. This seems feasible provided a satisfactory wagon can be evolved.

The disposal of the 'solid residue of the treated material is, after all, the most difficult part of the subject under consideration, and this opens up the larger question of only burning that portion of the refuse likely to contain organic matter-viz., everything, except ashes, metals, bottles and material of a like nature. Organic waste (garbage) is separated from the ashes and rubbish in the large cities of the United States, and is known as the reduction system, but for a new installation in the borough of Richmond, N.Y., a' " mixed refuse " destructor was recommended, on the ground that not only was "mixed refuse " destruction more sanitary than the separate disposal of ashes, garbage and rubbish, but it would avoid the annoyance caused to the householder by the system of having two bins, and, further, a collecting wagon containing garbage only was offensive while on the streets.

The general practice in England of burning the whole of the refuse except metals, bottles, etc., is costly, inasmuch as not only has a larger volume of material to be treated than by the separation system, but the percentage of resulting clinker is very much higher on account of ashes forming such a large proportion of the crude refuse; however, it has the great advantage of forming better combustion in the destruction of the garbage.

Glass, Metals, Pottery, Etc.—The average amount of refuse collected from towns in the United Kingdom is about 570 lb. per head per annum, and in this quantity there are about 25 lb. of glass, metals, potery and material of a like nature. In a town of 50,000 inhabitants such material will amount to about 560 tons per annum. Some method of intercepting most of these materials from the bulk of the refuse before burning is adopted at most destructors, the attention paid to it depending upon the marketable value of the recovered material in the particular locality, and it is conceivable that in some cases a proper mechanical or hand system might profitably be installed, but as the author has had no