purpose, and recently in Toronto, Mr. James Thomson announced that he had succeeded in making gas of very superior quality, and at a very low rate, by using the portable rosin oil gas works similar to those figured on the preceding page. No alteration in form is needed, and the petroleum is used quite in the crude state.

These improved portable gas works are manufactured by Mr. Thomson, at his establishment on King Street, Toronto, and are furnished by him complete, with gasometers, which govern the price of the works, of a capacity of one hundred cubic feet to that of one thousand or more. A gasometer of the first-named cubical contents requires one retort; of 600 cubic feet capacity, two retorts, and of 1000 cubic feet capacity, three retorts.

The apparatus is very simple and consists of retort, wash-box or condenser, gas-holder and tank, which are common to all gas-works; but one of the greatest difficulties encountered by inexperienced persons, has been freeing the retorts from an incrustation of carbon which accumulates during the operation of making gas. By the old process, this cleaning was done when the retorts were cold, and the scale adhered firmly to the bottom and sides, requiring the aid of a bar of iron to remove it. Mr. Thomson's improvement obviates this difficulty; for by simply raising the cover of the retort, which is set in a groove of fusible alloy, and admitting a current of atmospheric air, the carbonaceous matter is consumed and passess off through a pipe connected with the flue, carrying with it all the smell and smoke; this is done when the retort is hot, and the cleaning process occupies but a few minutes, leaving the retort in a condition to continue the operation of making gas if required.

The apparatus employed for the manufacture of gas from rosin, oil, &c., has been so successfully used for making it from crude petroleum, without the slightest change in the arrangement for supplying the retorts with the material, and without any difficulties arising from impurities as yet observed, that we have no doubt the application of this abundant material for illuminating and other purposes, is fraught with very important consequences to those parts of the country where petroleum abounds, and to all interests dependent upon the manufacture and use of the products which may be obtained from it.

The illuminating power of petroleum gas is much greater than that of common coal gas, and the expense of production amounts to about one-third, but with regard to this important question we shall have more to say in a future number.

All information with respect to price of the portable gas works, will be furnished by Mr. Jas. E. Thomson, 109 King Street West, Toronto.

NOTE ON THE FORMATION OF PETROLEUM AND ALLIED SUBSTANCES FROM WOODY FIBRE OR ANIMAL TISSUE.*

We have stated in the preceding paper that the different mineral combustibles have been derived from the transformations of vegetable matters, or in some cases of animal tissues analagous to these in composition. The composition of woody fibre or cellulose, in its purest state, may be represented by $C_{24}H_{20}O_{20}$, or as a compound of the elements of water with carbon: the incrusting matter of vegetable cells, to which the name of lignine has been given, contains however a less proportion of oxygen and more carbon and hydrogen than cellulose, so that the mean composition of recent woods, as deduced from numerous analyses of various kinds, may be represented by $C_{24}H_{18\cdot4}O_{16\cdot4}$. We may conceive of four different modes of transformation of woody fibre, all of which probably intervene to a greater or less degree in the production of mineral combustibles; and in considering these changes we shall for greater simplicity adopt for the composition of woody fibre the first named formula, $C_{24}H_{20}O_{20}$.

I. When wood is exposed to the action of moist air, oxygen is absorbed, and carbonic acid and water are evolved in the proportion of one equivalent of the first for two of the last. We may suppose that for H_2 which is oxydised by O_2 from the air, the wood loses CO_2, so that while the carbon increases in amount the proportions of oxygen and hydrogen are unchanged. In this way an equivalent of cellulose, by absorbing sixteen equivalents of oxygen and losing eight of carbonic acid, (8 CO_2) and sixteen of water, (16 HO) would leave $C_{16}H_4O_4$. Such is the nature of the decay of wood when exposed to the air, and the process, could it be carried out, would leave a residue of carbon only. If however the wood is deeply buried and excluded from the oxygen of the air two reactions are conceivable.

II. The whole of the oxygen of the wood may be given off in the form of carbonic acid, while the hydrogen remains with the residual carbon. The abstraction of ten equivalents of carbonic acid from one of woody fibre, would leave a hydrocarbon, $C_{14}H_{20}$.

III. Instead of combining exclusively with the carbon, a part of the oxygen of the wood may be set free as water, in combination of the hydrogen. The abstraction from an equivalent of woody fibre of four equivalents of carbonic acid and twelve of water would leave a hydrocarbon $C_{20}H_8$.

IV. These decompositions are however never so simple as we have supposed in II. and III., for a portion of hydrogen is at the same time evolved in combination with carbon, chiefly as marsh gas, C_2H_4. The amount of this gas evolved from decaying plants submerged in water, and the immense quantities of it condensed in coal beds and other rocky strata, (forming fire damp) shew the great extent to which this mode of decomposition prevails.

In nature these various modes of decomposition often go on together, or intervene at different stages in the decomposition of the same mass;

* By Dr. Sterry Hunt, in a paper communicated by that gentleman to the "Canadian Naturalist and Geologist."