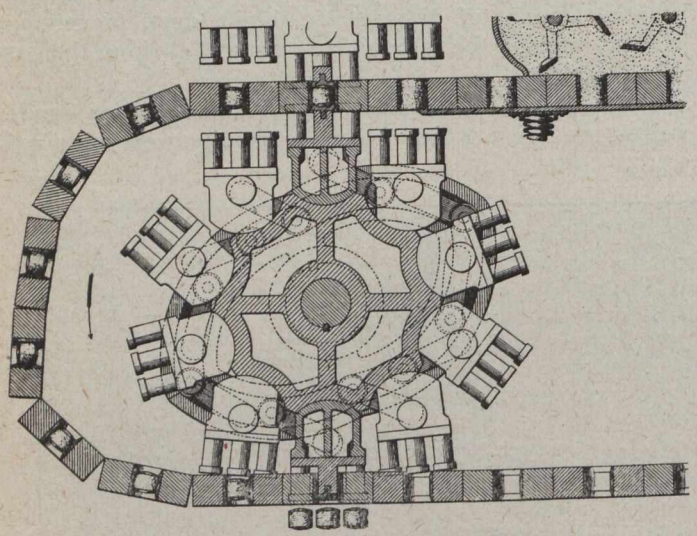
both from mechanical and chemical viewpoints, must be solved in a different way. The lignites lie in solid seams and are mined by the shaft and room and pillar system like ordinary coal.

As for carbonized lignite, the carbonizing process comprises the extraction, by means of destructive distillation of all the volatile matter in the lignite, and the utilization of the resulting gases, ammonia compounds, liquid hydro-carbons, and residual carbon or coke in the various ways for which they are best adapted.

The problem of an efficient lignite carbonizing oven has not been an easy one to solve. Elaborate and very efficient devices have been evolved to carbonize or coke bituminous coal. In all of these, hovever, the work is done at high temperatures, to get a large yield of gas, rather than at low temperatures, with a view to an increased amount of hydro-carbon by-products.

Then, too, because of the fact that bituminous coal cokes, very different apparatus is necessarily needed to handle it from that required for lignite, which has no



A Type of Lignite Briquette Press.

coking or intumescing quality whatever, but instead crumbles when carbonized.

The writer describes the early efforts to carbonize lignite and traces its development up to the present. He refers to the experimental carbonizing oven of the Saskatchewan government at Estevan, in which he has been in charge. This plant was established to treat the lignite on a sufficiently large scale as to be able to use the products in every-day commercial work. The carbonizing bench erected there is a vertical chamber oven similar in principle to the horizontal by-product chamber ovens which are termed the most efficient devices for the coking of bituminous coal. The Estevan oven is charged and discharged continuously instead of intermittently.

The heating value of the gas thus obtained averages about 400 B.t.u.'s, and it makes a good town gas for heating and cooking. It is very serviceable for industrial fuel and power in furnaces and gas engines.

The yield of oil and tar, on distillation is as follows:

1. Light oils, benzine, etc. ..... 11.5 per cent.
2. Carbolic oils, some naphthaline ..... 13.5 per cent.
3. Creosote oils ..... 34.1 per cent.
4. Anthracene oils, some paraffin ..... 16.4 per cent.
5. Pitch, hard ..... 24.5 per cent.

The simple distillation products of this oil can be put to many uses—fuel oil for furnaces and internal combustion engines, creosoting oils for the preservation of timber, waterproofing and preserving oils for leather and cotton and other fabrics, tar paper, roofing pitch, etc.

The ammonia is easily recovered by passing the gas, after tar extraction, through a sulphuric acid solution. The anhydrous ammonia has, of course, a limited market in that province, but its use as fertilizer is bound to develop.

When carbonized, the lignite is practically charcoal. It does not coke like bituminous coal. It is about the same, in analysis, as anthracite and has an equivalent heating value. It is not so dense in structure and therefore has more bulk per ton.

After passing through the carbonizing bench, it is screened into several sizes, the smaller sizes and dust being briquetted and the larger lumps being available for use in gas producers.

Carbonized lignite can be used to great advantage in the production of gas for power purposes, yielding in the producer a clean, practically tar-free gas. The amount of gas is equal to that from anthracite; it is richer; it has less tar and clinker, and it burns more freely. About two dozen gas producer plants now using anthracite coal in Saskatchewan are looking forward at an early date to a supply in sufficient quantities of carbonized lignite, as it will mean a reduction of at least 50% in their fuel bills.

The carbonized lignite screenings and that portion not marketed for gas producer purposes, will be briquetted. A binding material is required, particularly in the case of the carbonized product. The best available binders are coal tar pitch and lignite tar pitch. As in the case of the dried lignite, the briquette is improved by the addition of 7 per cent. of coking coal or 2 per cent. of flour, the binding ingredient of which, of course, is the starch which is turned into a form of dextrin by the heat employed in preparing the mixture for the press.

While the addition of the starch or coking coal may be necessary in a briquette which is burned in a large industrial furnace, because of the severe usage to which the fuel is subjected, it is not absolutely necessary in a briquette used in domestic service—house-heating furnaces, fireplaces and cooking ranges. When a briquette in which pitch alone is used is thrown onto the fire, it is quickly warmed to the melting point of the pitch and if it is poked at that particular time, it will go to pieces. But if it is not disturbed for a few minutes longer it becomes sufficiently hard to withstand rough handling, and may even be withdrawn red hot from the fire and dropped into water without disintegrating.

The results obtained with samples of carbonized lignite from Saskatchewan in the different types of coal briquetting presses on the market have been so satisfactory as to demonstrate conclusively the commercial feasibility of the process. The report observes that the tests were not made in a laboratory, but in commercial plants and the fuel came through the different processes at the rates of from 5 to 40 tons per hour. The report illustrates and describes the workings of the various machines upon which the tests were made.

The briquettes have 11,500 to 12,000 B.t.u.'s per lb. They burn with a short flame, no odor, no smoke (except a very little resulting from the volatilizing of some of the pitch binder when first thrown on the fire), and no clinker. They can be used wherever anthracite or bituminous coal is burned. They retain their structure in the fire until completely consumed. They do not disintegrate or lose value in the weather, and can therefore be stored for any length of time.