ference of 25,000 to 35,000 volts was required for effective precipitation. On account of the difficulty of maintaining proper insulation under these potentials and on account of the great danger of serious injury to an unskilled operator in manipulating apparatus of this kind, this method was not considered practical. It was noted, however, that by decreasing the distance between the electrodes a very marked decrease in potential was observed. Accordingly another experiment was devised which will perhaps throw still further light on the method of operation of the process under consideration.

A series of electrodes was prepared with exceedingly small intervening spaces, and placed in connection with a source of direct electro motive force, the potential difference between the plates being much below that required to produce any ionizing discharge. It was found that at these small distances distinct cleaning effects could be obtained without ionization. Maintenance of the electric charge from external sources was troublesome owing to electrolytic short circuits occurring between the electrodes through deposits of tar and moisture from the gas. The fact, however, that there is a distinct attraction exerted by electrified plates at comparatively low potentials (which is sufficient to cause a precipitation of tar particles from gases) leads to the conclusion that if the distance between the electrodes could be reduced sufficiently the potential differences required for effective electrical action would be very small.

It would seem possible, therefore, that in addition to the effects of mechanical collision there might be a distinct electrical attraction exerted by the glass fibres constituting the porous diaphragm which are located at microscopic distances from each other and which are undoubtedly subjected to some electrification from friction with the gas currents. If the possibility of such electrical action is considered, the increased effectiveness of glass as compared with steel for the construction of the porous diaphragm is satisfactorily explained. That friction of this nature is capable of producing electrical disturbances of considerable magnitude is well established.

It might be interesting in this connection to refer to recent experimental determinations by Professor Dolezalek of Charlottenberg, Germany, who showed that the friction of liquid benzol against the sides of containing pipes may set up potential differences of as much as 3,000 volts. As a very small fraction of this potential would be sufficient to account for the observed effects, it would seem only reasonable to presume that in addition to the effects of mechanical collision which undoubtedly exist, there is some electrical action which is of material aid in causing the coalescence of the particles of tar fog.

Whatever may be the correct explanation of the phenomenon, its effectiveness and practical importance are beyond question. The first commercial equipment of this kind has now been in continuous operation for approximately 18 months. This outfit is handling gas for a producer gas power plant of approximately 1,000 h.p. capacity. The second commercial equipment is handling approximately 900 h.p. producer gas, and has been in daily service for approximately ten months. The largest single installation is an equipment for cleaning 200,000 cu. ft. of gas per hour. This installation is operated in connection with a single producer unit which is of interest because it is one of the largest single unit plants ever installed in the United States. This producer has an effective grate surface of 250 sq. ft. and is rated to gasify 3,000 lb. of Illinois bituminous coal per hour.

SUCTION CONVEYERS.

By Reginald Trautschold, M.E., New York City.

THE economical handling of ashes from the furnace in power stations, etc., has always presented one of the most difficult of conveying problems, for the hot ashes cause rapid deterioration of any apparatus that they come in contact with, and the fine dust is detrimental to bearings, links and all pivoted connections as well as any surfaces of contact as it works into or lands on surfaces and produces destructive abrasive wear of the moving parts. Quenched ashes may be even more destructive owing to chemical properties of the ashes, so that the handling of ashes, either as they drop from the grates or after being sprayed with water to lower their temperature, cannot be performed with maximum economy by any of the continuous conveying or elevating systems of mechanical handling. Systems of the intermittent type are usually more satisfactory, owing to the fact that the ashes may be thoroughly cooled before delivery to the conveying apparatus, but ordinarily some car system or even more manual system of handling the ashes proves the most satisfactory in the long run—at any rate, in installations where but a relatively small quantity of ashes have to be disposed of. In a power house developing less than 2,000 h.p., the skip-hoist, a heavy bucket elevator or some car system is generally the most economical equipment for the handling of the ashes, but for larger plants —from 10 to 15 per cent. of the coal consumed being converted into ashes that have to be removed from the ash-pits—the suction conveyer proves an economical system to install.

The suction conveyer may also be employed for the handling of cement clinkers, comparatively fine materials of any description, etc., which, on account of their heat, chemical properties, fineness, etc., prove unsuitable for conveyance or difficult to handle by the ordinary mechanical types of conveyers. Even fine coal and similar materials have been economically and efficiently handled by the suction conveyer, but as the logical field for its operation is the handling of ashes, cement, lime, wood chips, etc., and the progress made in the development of this comparatively new method has been largely limited to ash handling installations, a description of a typical installation of such character will serve to show the advantages and convenience of the system.

Primarily, a suction conveyer consists of a heavy steel or cast iron duct in which the material to be handled is carried; an overhead storage tank of steel or concrete, in which a partial vacuum is maintained by an exhaust fan, to which the conveyer duct discharges; and a water spray in the storage tank for cooling the ashes, precipitating the fine dust, etc. In an ash-handling installation, the duct, consisting of an ordinary pipe, runs directly in front of or under the boilers below the boiler room floor, and is provided with a small intake in front of or under each grate. These intakes are each provided with an easily removable but tight-fitting cover which is kept closed except when the conveyer is being charged at that particular intake. On leaving the boiler room, the conveyer duct rises to the top of the elevated storage tank to which it discharges downward, the discharge pipe or conveyer duct extending downward in the storage tank for some little distance. From the storage tank, usually also from the top, an exhaust pipe extends to an exhaust fan which sucks the air from the storage tank, creating a partial vacuum throughout the conveying system. Below the ex-