

UNITED STATES PATENT OFFICE.

JOHN GREAVES HAWKINS, OF WIGAN, COUNTY OF LANCASTER, ENGLAND.

PROCESS OF PURIFYING COAL-GAS.

SPECIFICATION forming part of Letters Patent No. 328,309, dated October 13, 1885.

Application filed August 3, 1885. Serial No. 173,438. (No specimens.) Patented in England June 29, 1881, No. 2,849.

To all whom it may concern:

Be it known that I, JOHN GREAVES HAWKINS, of Wigan, in the county of Lancaster, England, have invented new and useful Improvements in Processes of Purifying Coal-Gas, (for which I have obtained a Patent in Great Britain, No. 2,849, bearing date June 29, 1881,) of which the following is a specification.

10 In the ordinary method of purifying coal-gas by means of oxide of iron, it is well known that the oxide has at frequent intervals to be removed from the purifiers and exposed to the air, so as to "revivify," it as it is called, or
15 render it capable of acting again in the purifiers, and this entails great labor and expense, together with loss of gas, and sometimes considerable nuisance. To reduce these results, atmospheric air has at times been drawn or
20 forced in along with the gas through the purifying material, so as to effect the revivification in the purifiers; but atmospheric air alone so drawn in dilutes the gas, lowers its illuminating-power, and becomes dangerous.

25 The object of this invention is to produce a continuous revivification of the oxide in the purifiers, and so reduce the trouble and cost of purification without injuriously affecting the quality of the gas.

30 The invention consists in causing a carefully-regulated quantity of atmospheric air to enter an apparatus, chamber, or vessel wherein the tar or the light portions thereof resulting from the carbonization of coal is subjected to a temperature of about 170° Fahrenheit, so as to
35 eliminate the volatile hydrocarbons. The air thus introduced may be taken in at the ordinary atmospheric temperature; or it may be heated to any degree below which the heavy hydrocarbons from the tar would be volatilized. The air in passing through the apparatus becomes charged with some of the lighter hydrocarbons, and this mixture is delivered into the main conveying the gas from
45 the retorts immediately after the outlet of the scrubbers, so as to insure the carbureted air mixing uniformly with the gas before entering the oxide-purifiers.

50 It is to be understood that to carry out this arrangement it is necessary to force the air into the gas by means of a suitable machine—such

as an exhauster, for instance—by which the quantity of air may be also regulated at will. The minimum quantity of air to be introduced is that absolutely required to revivify the oxide
55 of iron. I find that in order that the process may be carried out in such a manner as to prevent the presence of free oxygen in the purified gas, there must be a sufficiently large area of oxide-purifiers to allow the gas to pass
60 slowly through them, and so insure the revivification of the oxide going on gradually and continuously, as where this is not the case the revivification is not complete, and the oxygen of the air is not completely removed, but goes
65 on with the gas and diminishes its illuminating-power; but, when the process is carried on as I have described the oxygen combines with the iron, the revivification goes on continuously, and the heat never rises in the purifiers sufficiently to fuse or partly fuse the sulphur. There is therefore no clogging of the material in the purifiers and consequent increase of pressure, and the process of revivification may be continued without the removal of the oxide from the purifiers until the
75 oxide is practically saturated with sulphur.

When lime purifiers are used to eliminate sulphur compounds other than sulphureted hydrogen, I prefer to introduce the carbureted
80 air immediately after the outlet of such lime purifiers and before the oxide-of-iron purifiers; and to insure the uniform mixing of the carbureted air with the gas before entering the oxide-purifiers it is advisable to have a
85 considerable length of main between the two sets of purifiers; or the gas may be caused to flow through a suitable vessel in which the mixture may take place.

The drawing or forcing of atmospheric
90 air through oxide of iron while in the purifiers in order to revivify it is old; but the drawing or forcing of carbureted air either at the ordinary atmospheric temperature or artificially heated for this purpose is new, and is
95 such an improvement that the gas is increased in bulk, the illuminating-power is not diminished, the trouble and expense of the frequent removal of the oxide from the purifiers are reduced, and the danger arising from the oxide becoming unduly heated is reduced to a
100 minimum.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I claim—

- 5 In the purification of coal-gas, the process herein described of revivifying the oxide of iron in the purifying-boxes, said process consisting in passing carbureted atmospheric air mingled with the coal-gas through the oxide
10 of iron in said boxes, the air being either at the normal temperature or heated to a degree below that at which the heavy hydrocarbons

of the tar are volatilized, substantially as described.

In testimony whereof I have hereunto signed 15 my name in the presence of two subscribing witnesses.

JOHN GREAVES HAWKINS.

Witnesses:

JOHN S. HOPWOOD,

Solicitor, Wigan, Lancashire,

C. RUDDICK,

Clerk to the said John S. Hopwood.