

UNITED STATES PATENT OFFICE.

OTTO SCHALLER, OF SÜDENDE, NEAR BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

METHOD OF EVACUATING VACUUM APPARATUS.

1,010,456.

Specification of Letters Patent.

Patented Dec. 5, 1911.

No Drawing.

Application filed December 10, 1909. Serial No. 532,494.

To all whom it may concern:

Be it known that I, OTTO SCHALLER, a citizen of the German Empire, and residing at Süden, near Berlin, German Empire, have invented certain new and useful Improvements in the Methods of Evacuating Vacuum Apparatus, of which the following is a description.

My invention relates to the exhaustion of vacuum apparatus, and more particularly to a method of rendering such apparatus free from the vapors of the fluid employed in the exhaustion pump.

While my invention is applicable to the exhaustion of vacuum apparatus of a great variety of kinds, I have for purposes of concrete illustration described its use in connection with the exhaustion of incandescent lamp globes, a use in which it has proved valuable.

One of the conditions most essential to the production of incandescent lamps of good quality is the removal of all gas and vapor from the lamp globes, so that the most perfect possible vacuum shall exist therein. This is especially important in the manufacture of metal filament lamps. Numerous methods of removing the last traces of gas and vapor, particularly air and water vapor, are in use; and these methods commonly give satisfactory results. There sometimes arise, however, difficulties which hitherto have not been satisfactorily explained. Even when the methods above referred to have been employed with the utmost care, it has happened that metal filament lamps would burn black after being used a short time. Searching investigations have now revealed the previously unobserved fact that vapors from the fluid employed in the evacuating pumps have something to do with these difficulties, and that the quality of incandescent lamps deteriorates in proportion as the temperature of the oil, quicksilver, or other liquid in the vacuum pumps rises during the exhaustion of the lamp, regardless of what particular method of exhaustion may be employed. This explanation is confirmed by the well-known fact that the difficulties under discussion are more troublesome in summer than in winter. Final confirmation of it is afforded by the

further discovery that the quality of the lamps is materially improved when the entrance of vapors from the exhaustion pumps into the lamp globe is prevented.

In accordance with my present invention, entrance of vapors from the exhaust pump into the lamp globe is prevented by keeping the temperature of the quicksilver or other liquid in the exhaustion system as low as practicable. For this purpose either the pump or the pipes and passages of the exhaustion system, or both may be refrigerated over a part or over the whole of their surface. In general, refrigeration of the exhaustion system to a temperature between 1° C. and 2° C. will render the formation of detrimental vapors well nigh impossible without giving rise to the disadvantages incident to cooling below 0° C., such as the freezing or the condensation of the water in the exhaust system, etc. In this manner blackening of the lamps in use is almost entirely prevented.

Any suitable method of refrigeration, such as subjecting the exhaustion system to a blast of cold air, with or without simultaneous spraying with water, or circulating a cold liquid over the walls of the spaces to be cooled, etc., may be employed. As, however, such methods of refrigeration are well known and in themselves form no part of my present invention, I have not deemed it necessary to describe them.

I claim as my invention:—

1. The method of securing high vacua in vacuum apparatus, which consists in preventing the presence therein of vapors of the liquid employed in the exhaust pump used in evacuating it by refrigerating the exhaustion system.

2. The method of improving the quality of metal filament lamps evacuated by means of an exhaustion system in which a liquid is employed, which consists in keeping such liquid at a low temperature.

In testimony whereof I affix my signature in the presence of two witnesses.

OTTO SCHALLER.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.