N° 3257 A.D. 1898

Date of Application, 9th Feb., 1898

Complete Specification Left, 3rd Nov., 1898—Accepted, 3rd Dec., 1898

PROVISIONAL SPECIFICATION.

Smokeless Magnesium Powder for Photography, and Apparatus for Employing the same.

I, CHARLES HENRY, of 2, Rue Jean de Beauvais, Paris, France, Professor, do hereby declare the nature of this invention to be as follows:—

The present invention concerns a new composition of powder with magnesium, burning without smoke, also an apparatus intended to produce the complete combustion of this powder.

Hitherto magnesium powder used with an addition of chlorate of potash and serving principally for photography, is almost entirely transformed into magnesia smoke.

When no chlorate of potash enters into the composition of the powder, this latter burns badly and does not produce a sufficiently intense flame because the incandescent magnesia forms a crust on the surface of the burning apparatus, which prevents the complete combustion of the powder.

The object of the powder forming more specially the object of the present invention is to almost completely suppress the smoke by intimately mixing the magnesium powder well pulverized with a heavy body, such as peroxide of baryum which furnishes the magnesium with the oxygen necessary for its combustion, and which moreover, by becoming incandescent itself, adds to the brightness of the magnesium; moreover this body softens with the heat and forms a spongy mass, which fixes the magnesia produced, by agglutination and thus substitutes the smoke by grains which fall with a certain rapidity on the ground.

To fulfil these conditions, the peroxide of baryum must be brought to an incandescence in a disoxidating atmosphere as will be more completely described in course of the present description.

To obtain the disoxidating atmosphere necessary for a good combustion, we mix with 30 parts of pulverized magnesium and 25 parts of pulverized peroxide of baryum, 45 parts of normal collodion (solution of 2 parts of nitric cotton in 100 parts of Hoffmann's ether) then the mixture is worked up and dried.

At the moment of combustion, the powder-cotton is transformed into oxide of carbon, carbonic acid, hydrogen, nitrogen and steam of water and thus produces a reducing atmosphere.

The same result may be obtained by substituting the collodium by another body producing a reducing atmosphere, for instance well refined petroleum.

In lighting the mixture of magnesium, peroxide of baryum and collodium simply with a match, we have from 12 to 15% of smoke, that is to say, in weighing the residuum of a cartridge of 1 gramme, with a chemical balance, we find for this residuum 88 to 85 centigrammes.

We may reduce this percentage of smoke almost to zero by employing the apparatus described below for the combustion of the powder.

This apparatus is composed of an iron cupel heated red with a Bunsen burner

[*Price* 8*d*.]

and in which the magnesium powder contained in a small reservoir is projected by means of a rubber bottle.

The cupel and its reservoir are fixed in a screw socket moving vertically on a support rod which also bears a horizontal support upon which a truncated cone is arranged above the cupel. This truncated cone is formed of a special gauze which constitutes a strong drawing chimney and in which is an infinity of spires on the surface of which the traces of magnesia, which fall during the combustion stick.

This apparatus and the magnesium powder composed as already described, can evidently serve not only for photography but also for any other application with which very intense lighting power is necessary to be obtained.

Dated this 8th day of February 1898.

L. DUVINAGE,
Patent Agent, 8, Rue des Princes, Brussels, Belgium.

COMPLETE SPECIFICATION.

Smokeless Magnesium Powder for Photography, and Apparatus for Employing the same.

I, CHARLES HENRY, of 2, Rue Jean de Beauvais, Paris, France, Professor, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a new composition of magnesium-powder, burning without smoke, and also to an apparatus designed to produce a complete combustion of this powder.

At present the magnesium powder which is used, with the addition of chlorate of potash, mainly for photographic purposes, transforms itself almost entirely into magnesium smoke. If there is no chlorate of potash in the composition of the powder the latter burns badly and does not produce a light of sufficient intensity, owing to the fact that the incandescent magnesium forms a crust upon the surface of the lamp or other burning apparatus and thereby impedes the complete combustion of the powder.

The main feature of the invention is the smokeless powder which consists of an intimate mixture of magnesium powder, thoroughly pulverized, with a heavy substance, such as peroxide of baryum, which gives to the magnesium the oxygen necessary for its proper combustion, and, besides, by becoming itself incandescent, increases the brilliancy of the magnesium flame; further, this substance becomes soft, owing to the heat generated, and forms a spongy mass, which, by agglutination, fixes the produced magnesium and in this manner substitutes, for the smoke, numerous small grains which fall more or less rapidly to the ground.

It is necessary that the peroxide of baryum should be rendered incandescent in a reductive atmosphere as will be more completely set forth in the course of the present description.

The annexed drawing represents, by way of example, one mode of making the burning apparatus or lamp, which is shown in elevation.

In order to obtain the reductive atmosphere necessary for a good combustion, there is added to 30 parts of pulverized magnesium and 25 parts of pulverized peroxide of baryum, 45 parts of (normal) collodion (solution of 2 parts azotic cotton in 100 parts of ether of Hoffmann), and then the mixture is kneaded and dried. During the combustion the cotton-powder is transformed into oxide of carbon,

carbonic acid, hydrogen, nitrogen and water-vapour and thus produces a reductive atmosphere.

The same result can be obtained by substituting for the collodion another body capable of producing a reductive atmosphere, for example, well rectified petroleum.

When the mixture of magnesium, peroxide of baryum and collodion is lighted with a match there is given off about 12 to 15% of smoke; that is to say, that the residue of a 1 gramme cartridge, when weighed in a chemical balance, amounts to about 88 to 85 centigrammes. This per centage of smoke can be almost entirely done away with by using the apparatus for burning the powder illustrated in the annexed drawing.

This apparatus consists of an iron cupel A, which is made red-hot by means of a Bunsen burner B, and into which the magnesium powder, contained in the small reservoir D, is blown by means of an india rubber ball bellows C. The cupel A and its reservoir D are carried by a pipe K connected to an adjustable sleeve G provided with a clamping screw. This sleeve is fitted upon the pillar F and can be adjusted in any desired position thereon, and, when adjusted, clamped in place by the screw. The pillar F also carries an adjustable arm H to which is secured a truncated cone E made of a special kind of wire gauze called "a garde-feu" which constitutes a chimney of active draught, and in which there are a great number of spirals upon whose surfaces any traces of magnesium, disengaged during the combustion, adhere.

The apparatus, as well as the magnesium powder composed as hereinbefore described, can evidently be used not only for photographic purposes but also for other purposes where a very powerful light is required.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I consider novel and desire to claim is:—

1. A smokeless magnesium powder for photographic and other purposes composed of pulverized magnesium, pulverized peroxide of baryum and collodion (normal) or an equivalent substance, such as rectified petroleum, capable of producing a reductive atmosphere, thoroughly mixed together in or about the proportions given and then kneaded and dried, substantially as set forth.

2. In an apparatus for burning magnesium powder, the combination of an iron cupel, a Bunsen burner or other heat generator, a powder reservoir, an india rubber ball bellows, and a truncated cone made of wire gauze and arranged above the cupel, the apparatus being provided with suitable supports and the material of the cone having a number of spirals which serve to retain the magnesium given off by the combustion of the powder in the cupel which is heated to redness by the Bunsen burner, substantially as hereinbefore described with reference to the drawing annexed.

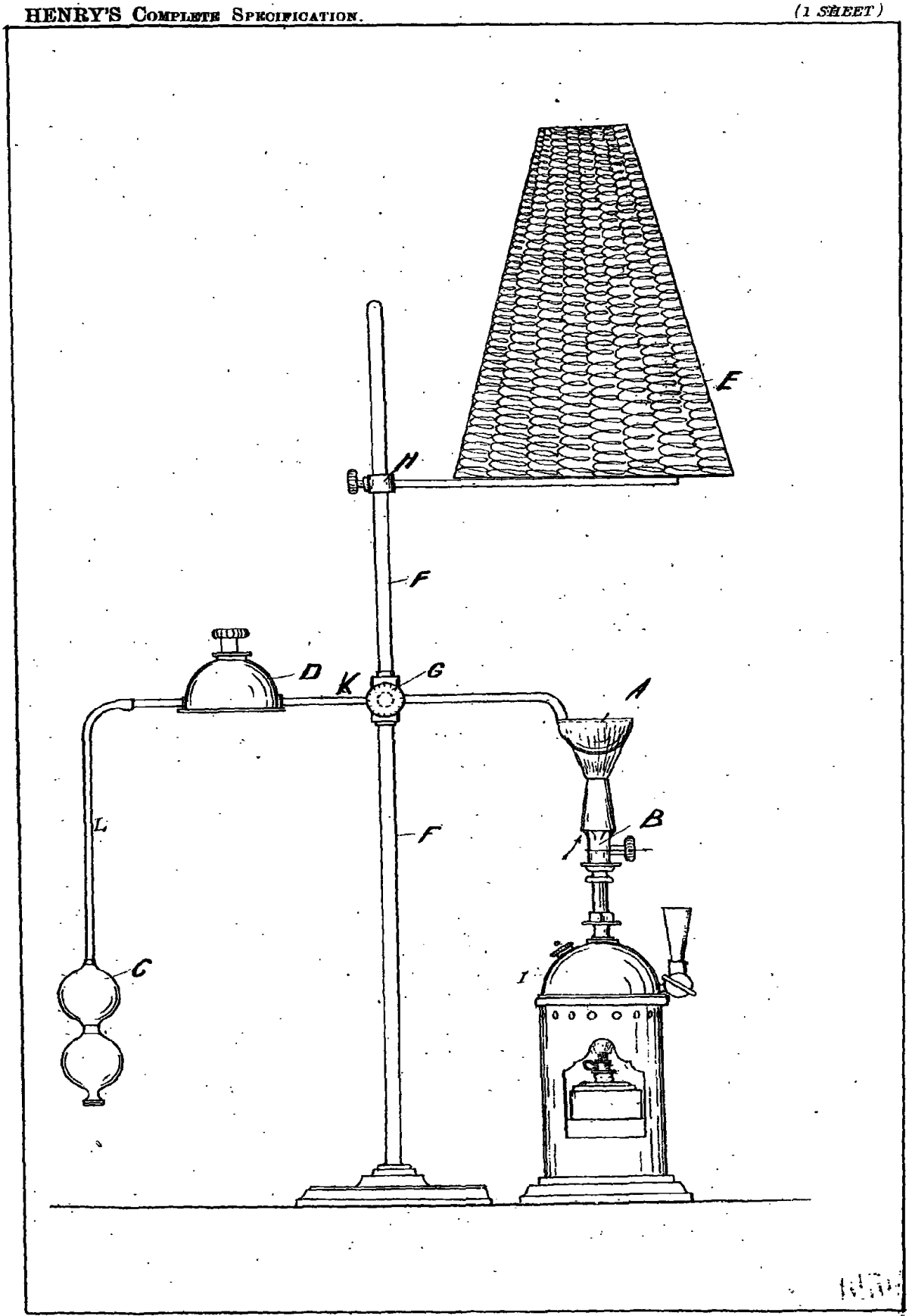
Dated this 2nd day of November 1898.

H. D. FITZPATRICK,
100, Wellington Street, Glasgow, Agent.

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.—1898.

A.D. 1898. FEB. 9. N° 3257.

HENRY'S COMPLETE SPECIFICATION. *(1 SHEET)*



[This Drawing is a reproduction of the Original on a reduced scale.]

Malby & Sons, Photo-Litho.