G. MICHAUD & E. DELASSON.

PROCESS OF MANUFACTURING FILAMENTS AND THE FILAMENT PRODUCED THEREBY.

APPLICATION FILED OCT. 30, 1907.

973,535. Patented Oct. 25, 1910.

Fig. 2.

Fig. 1.

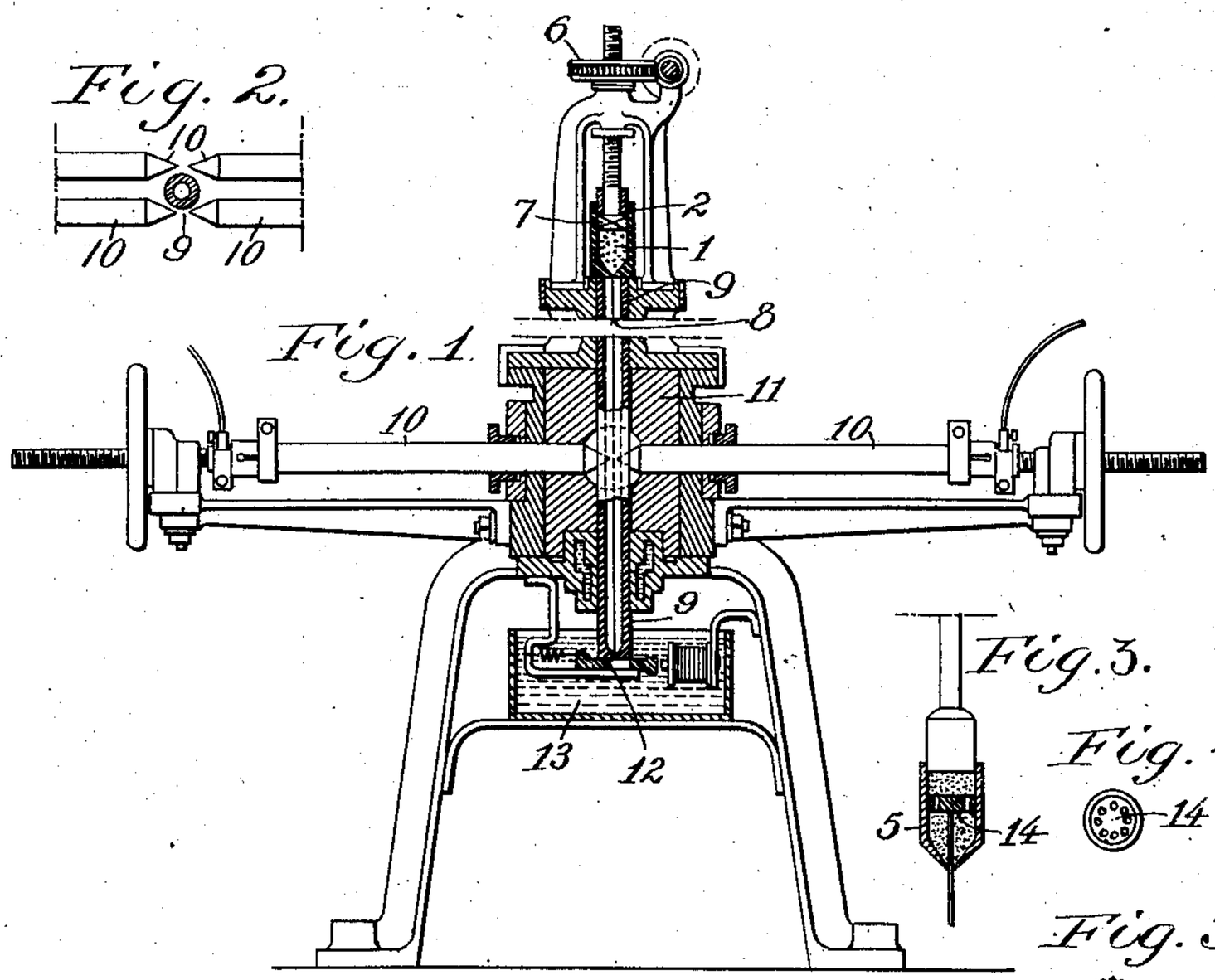

Fig. 3.

Fig. 4.

Fig. 5

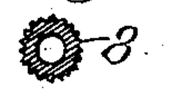

Fig. 7.

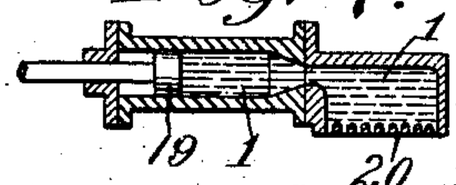

Fig. 8.

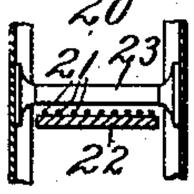

Fig. 9.

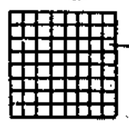

Fig. 6.

Witnesses
M. Hefling
D. C. Burdine.

Inventors
Georges Michaud,
Eugène Delasson,
By B. Singer,
Attorney

UNITED STATES PATENT OFFICE.

GEORGES MICHAUD AND EUGÈNE DELASSON, OF MONTREUIL-SOUS-BOIS, FRANCE.

PROCESS OF MANUFACTURING FILAMENTS AND THE FILAMENT PRODUCED THEREBY.

973,535. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed October 30, 1907. Serial No. 399,963.

To all whom it may concern:

Be it known that we, GEORGES MICHAUD and EUGÈNE DELASSON, both citizens of the Republic of France, and residents of Montreuil-sous-Bois, Seine, France, have invented certain new and useful Improvements in Processes of Manufacturing Filaments and to the Filament Produced Thereby, of which the following is a specification.

The present invention has for its object to provide an improved process of manufacturing filaments for illuminating purposes.

According to this invention, a filament may be obtained for purposes of incandescent gas lighting, consisting of a non-conducting material, capable of incandescence.

The filament is formed of alumina, magnesia, silica or of lime, these bodies being fused and employed either separately or together after they have received an addition of oxid of thorium, oxid of cerium, or some other oxid of the rare earths; the substances selected are agglomerated with black soap.

The following composition of a filament is given by way of example:—The following mixture is first of all prepared:—

Oxid of thorium	99 parts
Oxid of cerium	1 part
Oxid of chromium (traces.)	
	100 parts.

Then take:

The above mixture	80 parts	by weight
Pure alumina	20 parts	by weight
	100 parts,	

and to this final mixture black soap is added as an agglomerant.

As already stated the substances cited by way of example in the proportions given above may be replaced by any of the bodies therebefore enumerated.

The process of manufacture consists broadly in placing the mixture of the constituent materials in presses which force it through special nozzles which it leaves in the form of filaments, which are passed through an electric furnace, either vertically or horizontally, to bring the filaments to a state of pasty fusion. These filaments are cut of the required length by automatic knives either after or prior to the action of the electric furnace, as hereinafter explained.

The process forming the subject of the present invention may be carried out by the employment of any one of several arrangements of apparatus but in the accompanying drawing we have shown two preferred forms of apparatus, the second form hereinafter described being in reality only a modification of the form to be first described.

In the accompanying drawing: Figure 1 represents partly in elevation and partly in section the first arrangement as a whole. Fig. 2 is a plan view of the infusible tube arranged between two electric arcs. Fig. 3 shows a nozzle adapted to form a hollow tubular notched filament. Fig. 4 is a plan view of the partition of the nozzle shown in Fig. 3. Fig. 5 represents a section through the filament obtained with the nozzle shown in Fig. 3 (magnified 10 times). Fig. 6 represents a sectional elevation of the second arrangement, complete. Fig. 7 is a longitudinal section through a multiple nozzle with its press. Fig. 8 is a front elevation of the knife. Fig. 9 is a plan view of a grating obtained as hereinafter described.

First arrangement (Figs. 1 to 5).—The constituents are mixed in the proportions indicated with a certain quantity of black soap in such a manner as to form a pasty mass 1 which is introduced into the nozzle 2 (which may be the nozzle 5, represented separately), and by means of an endless screw and a toothed wheel 6, the piston 7 is lowered causing it to press upon the mass 1 and causing the latter to leave the nozzle in the form of a filament 8. The filament is made to enter a vertical tube 9 of carborundum or other infusible material, such as magnesia, thorium oxid or some other oxids of the rare earths. As shown in Figs. 1 and 2, the tube 9 is arranged between the two electric arcs formed by the carbons 10 10 regulated in such a manner that the temperature remains constant in the electric furnace 11. As soon as it enters the tube 9 the filament 8 begins to dry progressively, and, when it reaches the level of the arcs where the heat attains approximately 3000° C., it acquires by fusion a pasty state while causing its constituent molecules to agglomerate, prevents it from breaking or becoming deformed. Constantly pressed forward by the mass behind it the filament 8 continues to pass through the tube 9 and gradually solidifies as it passes away from the heating center; it reaches the lower extremity of the tube 9 which is restricted at this part and

on leaving the tube the fused filament encounters a knife 12 which automatically cuts it to the desired length. The lower part of the tube 9 enters a tank 13 for the reception of the divided filaments. Assuming that the filament is obtained by the nozzle represented in Fig. 1, or by that represented in Fig. 3, it is obvious that it will be a hollow or tubular filament for purposes of application to incandescent gas lighting or its equivalents. The part 14 (Fig. 4) represents a perforated partition for the passage of the material and serves to support the central rod which causes the filament to assume a tubular form. The orifice of the nozzle may be smooth or serrated which will impart a corresponding surface to the filament formed; such a filament is shown in cross section for example in Fig. 5. By modifying the form of the orifice of the nozzle and that of the central rod attached to partition 14, the section of the filament obtained may be given any desired form and dimensions.

In the second arrangement (Figs. 6 to 9), the press employed is preferably fitted to a nozzle having a plurality of orifices and the filaments issuing from it become arranged horizontally and parallel one with the other upon a series of plates of carborundum which first of all conduct them through a drying chamber, then through a muffle likewise of carborundum and forming part of an electric furnace. The filaments instead of being cut off on leaving the furnace, as in the arrangement first described, are preferably cut off before they enter the drying chamber, which renders it possible, among other things, to replace beneath the draw plate the plates first charged with parallel filaments, which plates after having been given a quarter turn, receive fresh filaments at right angles to the first, the whole forming a grating 18, such as represented in Fig. 9, the filaments of which are welded together after their passage through the furnace. In this second arrangement, the primary material is introduced into the press 19, from which after compression it escapes through the multiple nozzle 20 in the form of filaments 21, which rest upon carborundum plates 22, where they are cut to the desired length by an electrically actuated knife 23. These plates 22 are then pushed into the drying chamber 24 by the tappets 25 on the endless chain 26. From the chamber 24 the plates pass into the muffle 27 of the electric furnace 28 where the pasty fusion is effected. The muffle 27 is embedded in a mass 29 of pounded carbon forming the resistance. 30 are the electrodes. A coating 31 of carborundum serves as an insulating medium. 32 is a discharge flue for the hot air and 33 is a discharge flue for the products of combustion. On leaving the muffle, the plates are removed and the filaments are ready for use. By causing the carborundum plates 22 to pass beneath nozzle 20 in the two directions, a combination of filaments in the form of a grating 18 is obtained; to do this of course the charged plates are again taken before they pass to the furnace.

We claim:—

1. The process of producing incandescing filaments which consists in mixing together substantially 99 parts of oxid of thorium, 1 part of oxid of cerium and traces of oxid of chromium, combining substantially 80 parts of said mixture with substantially 20 parts of alumina, adding to this final mixture black soap as agglomerant, forming the composition into a filament, subjecting said filament to an increasing temperature until a pasty fusion of the ingredients is obtained, and afterward gradually subjecting the filament to a decreasing temperature until it is hardened.

2. The process of producing incandescing filaments which consists in mixing together oxid of thorium, oxid of cerium and oxid of chromium, combining said mixture with alumina, adding to the final mixture a black soap agglomerant, forming the composition into a filament, carrying such filament gradually into the range of high temperature from an electric arc until a pasty fusion is obtained, and then gradually carrying said filament out of such range.

3. A filament comprising a mixture of substantially 99 parts of oxid of thorium, 1 part of oxid of cerium and traces of chromium and substantially 20 parts of alumina combined with substantially 80 parts of the above mixture.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGES MICHAUD.
EUGÈNE DELASSON.

Witnesses:
EMILE COUCHOUD,
H. C. COXE.