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APPARATUS FOR THE CONTINUOUS MANUFACTURE OF FILAMENTS.

APPLICATION FILED SEPT. 30, 1908.

962,910. **Patented June 28, 1910.**

Fig. 2

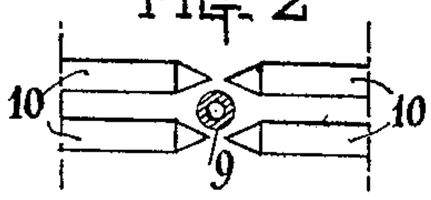

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

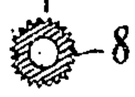

Fig. 11

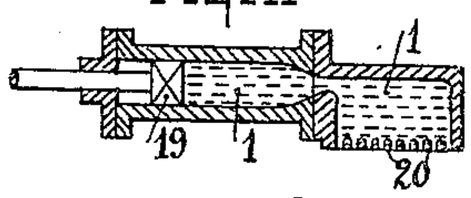

Fig. 12

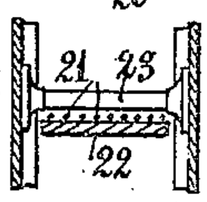

Fig. 13

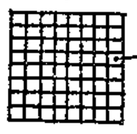

Fig. 10

Witnesses:-

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APPARATUS FOR THE CONTINUOUS MANUFACTURE OF FILAMENTS.

962,910. Specification of Letters Patent. **Patented June 28, 1910.**

Original application filed October 30, 1907, Serial No. 399,963. Divided and this application filed September 30, 1908. Serial No. 455,526.

To all whom it may concern:

Be it known that we, GEORGES MICHAUD and EUGÉNE DELASSON, both citizens of the Republic of France, and residents of Montreuil-sous-Bois, Seine, France, have invented Apparatus for the Continuous Manufacture of Filaments Forming the Object of the Application Serial No. 399,963, of which the following is a specification.

The invention relates to apparatus for continuously manufacturing filaments, the composition of which is described in our application Serial No. 399,963, of which the present application is a division.

The present invention has for its object to provide an improved apparatus for the manufacture of filaments for illuminating and heating purposes.

According to this invention, a filament may be obtained which consists of a non-conducting portion, capable of incandescence and forming an envelop about a central core of conducting material when it is desired to produce filaments for purposes of electrical incandescence; but for purposes of incandescent gas lighting, the filament may be obtained so that it consists of the non-conducting, radiant or incandescent material.

The apparatus consists essentially of a press which receives the material for forming the filaments, special nozzles through which the material from the press is passed and by which the material is formed into a filament, an electric furnace arranged either vertically or horizontally in such a manner that the filaments may be maintained in a condition of pasty fusion, and knives by means of which the filaments may be cut into the desired lengths.

The apparatus is shown in the accompanying drawings, in which:—

Figure 1 shows in sectional elevation a preferred embodiment of apparatus including all of the above named features. Fig. 2 is a plan view of the infusible tube arranged between two electric arcs. Fig. 3 is a section of a nozzle for manufacturing a tubular filament with a solid core. Fig. 4 is a transverse section through the filament obtained by means of the nozzle shown in Fig. 3 magnified 10 times. Fig. 5 is a section of a nozzle for forming a serrated filament with solid core. Fig. 6 is a transverse section of the filament (magnified ten times) obtained by means of the nozzle shown in Fig. 5. Fig. 7 shows a nozzle by which a serrated hollow tubular filament may be manufactured. Fig. 8 is a plan view of the partition of the nozzle in Fig. 7. Fig. 9 is a transverse section through a filament obtained by means of the nozzle shown in Fig. 7 magnified 10 times. Fig. 10 is a general sectional elevation of an arrangement of apparatus forming a modification of that illustrated in Fig. 1. Fig. 11 is a longitudinal section of a multiple nozzle with its press. Fig. 12 is a front elevation of the knife. Fig. 13 is a plan view of a grid obtained by the double passage beneath the nozzle.

The constituent materials having been agglomerated with black soap form a pasty mass 1 which is placed in the nozzle 2 (which may be one of the nozzles 3, 4, 5 represented separately). By means of an endless screw, a toothed wheel 6 and piston 7 arranged in the manner shown pressure is exerted on the mass 1 which causes it to leave the nozzle in the form of a filament 8. A vertical tube 9 is arranged so that the filament 8 may enter it directly it leaves the nozzle, the said tube consisting of carborundum or other infusible material such as ferruginous magnesia, oxid of thorium or any other oxid of the rare earths. The tube 9 (as shown in Figs. 1 and 2) passes between two electric arcs formed by the carbons 10, 10 which may be 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 comes on a level with the arcs, where the heat reaches a temperature of about 3000°, it acquires by fusion a pasty state which, while causing its constituent molecules to agglomerate, does not permit of it becoming broken or deformed. Being always pressed forward by the mass of material which follows the filament 8 continues to travel through the tube 9 and becomes solidified little by little as it leaves the heating center; it thus reaches the lower extremity of the tube 9 which is restricted at this point. A knife 12 actuated by an electromagnet is arranged in close proximity to the restricted outlet of tube 9 so that the issuing filament will encounter the knife and by which it is automatically cut to the desired length. The lower part of filament 9

enters a tank 13 which serves for the reception of the divided filaments. If the filament is formed by means of the nozzle represented in Fig. 1 or by that represented in Fig. 7 the product will be a filament without a core, solid in Fig. 1 or tubular as in Fig. 7.

The part 14 (Fig. 8) represents a partition perforated to permit of the passage of the material and intended to support the central rod which causes the filament to assume a tubular form.

The nozzles represented in Figs. 3 and 5 comprise two concentric compartments in which two pistons 15 are arranged which are likewise concentric these nozzles being intended for the formation of electric filaments; the central compartment 16 receiving the conducting mass forming the core and the compartment 17 receiving the radiant mass forming the envelop. The orifice of the nozzle may be smooth or serrated a corresponding surface being imparted to the filament formed.

In the modification illustrated by Figs. 10 to 13 the press employed is preferably fitted to a multiple nozzle and the filaments issuing therefrom become arranged horizontally and parallel with each other upon a series of carborundum plates 22 which conduct them first of all through a drying chamber and then through a muffle likewise of carborundum, forming part of an electric furnace. The filaments, instead of being severed when they leave the furnace as in Fig. 1 are cut before they enter the drying chamber. Among other things this previous severing permits of replacing beneath the nozzles, the plates which have been charged once with parallel filaments; these plates having been given a quarter turn will receive fresh filaments at right angles to the first, the whole forming a grid 18 such as represented in Fig. 13 the filaments being welded together after their passage through the furnace. In this apparatus the raw material 1 is introduced into the press 19 from which after compression it escapes through the multiple nozzles 20 in the form of filaments 21 which rest upon plates of carborundum 22 where they are cut to the desired length by an electrically operated knife 23. These plates 22 are then pressed 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 takes place. The muffle 27 is embedded in a mass 29 of broken coal forming the resistance. 30 are the electrodes. A lining 31 of carborundum serves as an insulator. 32 is an outlet for the hot air. 33 is an outlet 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 the nozzles 20 in both directions, a combination of filaments is obtained in the form of a grid 18 with square rectangular or lozenge shaped meshes; in order to obtain this result the plates which have already been charged are presented to the nozzle for a second time before they pass through the furnace.

We claim—

1. Apparatus for the manufacture of filaments from oxids of the rare metals, comprising a press adapted to receive agglomerated raw material, a nozzle through which the material is caused to pass by said press for forming a filament, an electric furnace having an infusible tube through which the filament passes and electric carbons for producing an arc for heating said tube, and a knife arranged at the extremity of said infusible tube for severing the filament as it leaves said tube.

2. Apparatus for the manufacture of filaments from oxids of the rare metals, comprising a press adapted to receive agglomerated raw material, a multiple nozzle through which the material is caused to pass by said press for forming a plurality of filaments arranged in parallelism, an electric furnace having an infusible tube through which the filament passes and electric carbons for producing an arc for heating said tube, and a knife arranged at the extremity of said infusible tube for severing the filament as it leaves said tube.

3. Apparatus for the manufacture of filaments from oxids of the rare metals, comprising a press adapted to receive agglomerated raw material, a multiple nozzle through which the material is caused to pass by said press for forming a plurality of filaments arranged in parallelism, a knife arranged for severing the said filaments, an electric furnace having an infusible tube through which the filament passes and electric carbons for producing an arc for heating said tube, a series of movable infusible plates for conveying the said filaments through said infusible tube, and means for actuating said infusible plates.

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

GEORGES MICHAUD.
EUGÉNE DELASSON.

Witnesses:
HANSON C. COXE,
GRETOR MATRAY.