

(No Model.)

2 Sheets—Sheet 1.

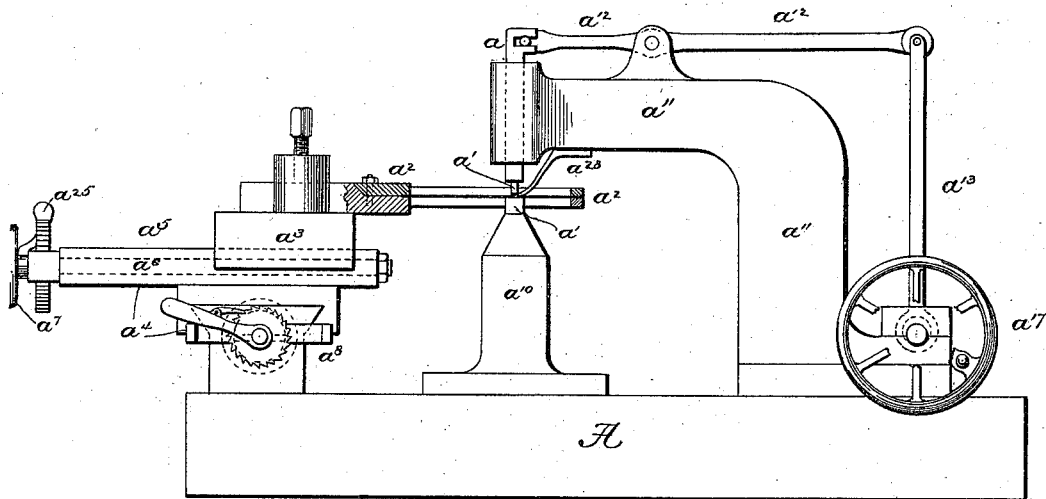
E. MOREAU.

STOCK FOR SKELETON BURNERS FOR INCANDESCENT LIGHTING AND  
THE ART OF MAKING THE SAME.

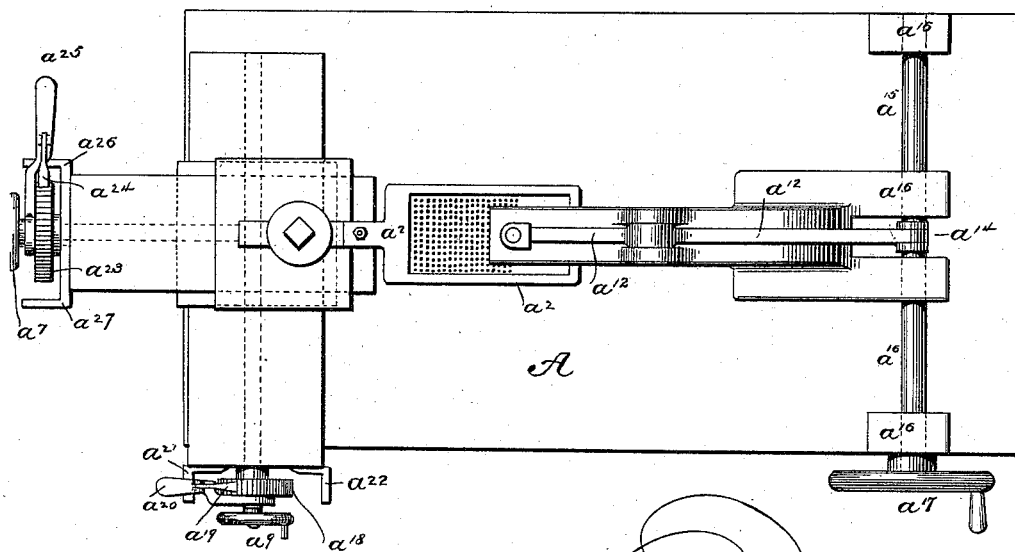
No. 383,898.

Patented June 5, 1888.

Fig. 1.



—Fig. 2.



*Witnesses:*

M. W. Mortimer  
R. W. Elliott.

*Inventor* :

*Eugene Moreau,*  
*A. G. Wyrenforth,*  
*his Attorney.*

(No Model.)

2 Sheets—Sheet 2.

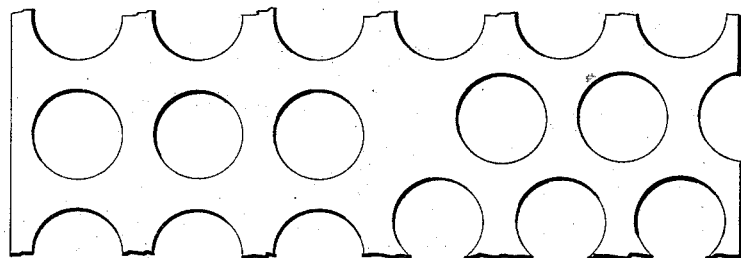
E. MOREAU.

STOCK FOR SKELETON BURNERS FOR INCANDESCENT LIGHTING AND  
THE ART OF MAKING THE SAME.

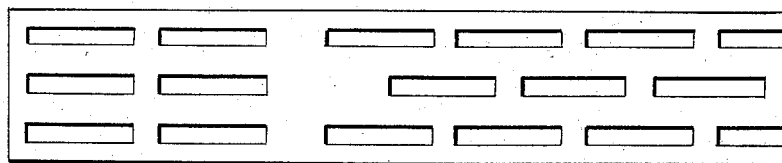
No. 383,898.

Patented June 5, 1888.

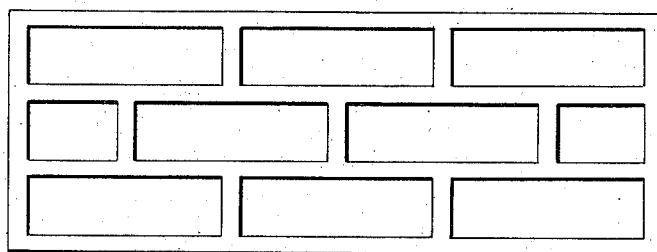
—fig. 3.



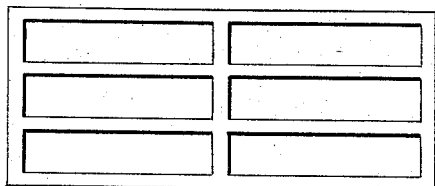
—fig. 4.



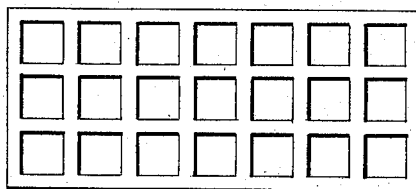
—fig. 5.



—fig. 6.



—fig. 7.



Witnesses:

*N. H. Mortimer*  
*R. W. Elliott*

Inventor :

*Eugene Moreau*  
*C. S. Newcomb*  
his Attorney.

# UNITED STATES PATENT OFFICE.

EUGÈNE MOREAU, OF PHILADELPHIA, PENNSYLVANIA.

STOCK FOR SKELETON BURNERS FOR INCANDESCENT LIGHTING AND THE ART OF MAKING THE SAME.

SPECIFICATION forming part of Letters Patent No. 383,898, dated June 5, 1888.

Application filed February 20, 1888. Serial No. 261,571. (No model.)

*To all whom it may concern:*

Be it known that I, EUGÈNE MOREAU, a citizen of the Republic of France, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Punching Metal; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to metal-punching.

The object of the invention is to produce perforated reticulated metal or other suitable hard substance with connected portions of metal or suitable hard substance, of practically uniform size, in the nature of wire-net, but without the defect of the want of uniformity and stability existing in woven wire.

With this object in view the invention consists in a method of producing stock for incandescent lights in the nature of a reticulated structure of thin metal or other suitable hard substance—that is, a structure resembling network—by punching in contradistinction to weaving. Furthermore, in stock to be used in the making of skeleton incandescents, the same being a reticulated structure of thin metal or other suitable hard fabric—that is, a structure resembling net-work—made integral—that is, of a single piece or solid body of metal, or the like, or metallic web or substance—presenting at proper intervals and at proper distances apart angular perforations, making the plate into a net-like structure composed of an integral and continuous web surrounding the meshes and of substantially uniform breadth.

In the accompanying drawings, forming part of this specification, and in which like letters of reference indicate corresponding parts in all the drawings, I show an ordinary punching-machine by which my method can be carried into effect, and also the result or product of the method; but it is to be understood that the method can be carried into effect and the product be produced by various mechanism, only so that a reticulated metallic fabric be produced by punching.

In the drawings, Figure 1 is a side elevation of a machine by which my method can be carried into effect and the product be produced.

Fig. 2 is a plan view thereof. Fig. 3 is a view of a piece of sheet metal punched with round holes, showing the defects of this procedure, so far as my purposes are implied, in that the connecting-web must necessarily be formed of unequal portions of metal. Fig. 4 is a view of another piece of metal punched with rectangular holes or slots, showing similar defects. Fig. 5 is a view of one form of my completed and perfect product. Fig. 6 is a view of another form of the same. Fig. 7 is a view of still another form of the same, the last being my preferred form, and in all three of these last forms the web being practically uniform in size.

Heretofore reticulated metal in the nature of metallic net, gauze, or fabric has been prepared by weaving such gauze or fabric from wire, or an equivalent thereof for some purposes has been made by simply perforating a sheet of metal, providing it with numerous holes; but where the reticulated metal fabric has been made by weaving wire it has been impossible to make the product of practically equal thickness throughout, since where the wires cross it is of course at least twice as thick as where the wires are single, whereby not only will the fabric suffer from strain incident to the movement of the wires one upon another, but this very movement will destroy the uniformity of the structure, since any strain will tend to open some portions more than others; while, when the metal has been perforated to take the place of woven fabric, as the perforations have been circular, or without any definite arrangement, the product has failed to be of regular construction with portions of metal of substantially uniform dimensions left between the perforations—that is, with a practically uniform and homogeneous web.

It is highly desirable for certain purposes in the arts to have a metallic fabric presenting absolute uniformity and homogeneity under all ordinary conditions of strain—that is to say, stability—as, for example, for incandescents.

To carry my invention into effect, I take a piece of sheet metal—such as platinum—and place it upon an even surface between the punch *a* and die *a'* of a perforating-machine. The sheet of metal is held at its edges by a

clamp,  $a^2$ , fastened to the top plate,  $a^3$ , of a slide-rest,  $a^4$ . This top plate is mounted and is made to slide upon a table,  $a^5$ , by means of a screw,  $a^6$ , and hand-wheel  $a^7$ . The table is in its turn guided upon a slide,  $a^8$ , fastened to the bed A of the machine, and its movement upon that slide is effected by means of another hand-wheel,  $a^9$ , and its screw. (Shown in dotted lines.) The movements of the top plate and the table are at right angles with each other. The die is held upon the bed of the machine by means of a pedestal,  $a^{10}$ , and the punch corresponding to said die is guided vertically at the end of an arm,  $a^{11}$ , also fastened to the bed of the machine. Pivoted on the top of this arm is a lever,  $a^{12}$ , connected at one end with the punch and at the other end with an eccentric-bar,  $a^{13}$ . This eccentric-bar is actuated by an eccentric,  $a^{14}$ , fastened to the shaft  $a^{15}$ , held at the lower and rear part of the arm and on the bed by means of boxes  $a^{16}$ . A further hand-wheel,  $a^{17}$ , is fastened to the end of the shaft.

The movement of the top plate and table of the slide-rest is effected by means of the respective screws and hand-wheels. In order to cause the table to advance at each stroke of the punch, and also to advance the given distance, the end of the lower screw is provided with a ratchet-wheel,  $a^{18}$ , pawl  $a^{19}$ , lever  $a^{20}$ , and stops  $a^{21}$   $a^{22}$ , and to shift to another line at the end of a line of perforations the end of the upper screw is provided with a ratchet-wheel,  $a^{23}$ , pawl  $a^{24}$ , lever  $a^{25}$ , and stops  $a^{26}$   $a^{27}$ . The position of the stops regulates the angular movement of their screw, and consequently also the resulting longitudinal motion of the table or plate. A stripper,  $a^{28}$ , attached to the arm  $a^{11}$ , prevents the metal sheet from rising with the punch.

The operation of the machine is as follows: The sheet of metal being held immediately under the punch and at the desired point of the sheet, the hand-wheel  $a^{17}$  is turned through one revolution, and by means of the eccentric bar and lever drives the punch through the sheet and returns it to its original position. Next, the lever  $a^{20}$  is made to oscillate from stop to stop and return again, thus causing the table which it actuates, and with it the clamp and the sheet of metal, to advance to a distance set as the proper distance between two successive perforations. The hand-wheel  $a^{17}$  is then again turned through one revolution, the punch is again made to perforate the sheet, and then again is the lever operated, and the successive intermittent motions of the punch and the sheet are caused to take place until a line of perfo-

rations is completed. At this point the ratchet  $a^{19}$  is disengaged, and by means of the hand-wheel  $a^9$  the sheet of metal is made again to occupy the position it had when the first perforation of the line just finished was to be made. The lever  $a^{20}$  is now made to oscillate from stop to stop, thus bringing the sheet under the punch at the proper position for a new line of perforations. Thus line after line of perforations is added until the sheet of metal presents the appearance of a reticulated fabric or structure made of a single body of metal.

It is obvious that the ratchet wheels and pawls could be replaced, if so desired, by friction wheels and pawls, or that any other suitable punching-machine will perform the work, if my novel conditions be established and the operations be carried out under my new method to make my novel product.

It is evident that the distance between two consecutive perforations from center to center is equal to the surface or area of the punch plus the dimensions of the metal, which is to be the web of the reticulated structure.

It will at once be obvious that any other suitable hard substance or combination of substances may be punched for my purposes the same as metal.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The improvement in the art of forming stock for incandescent lights out of plates of thin metal or other suitable material—to wit, by subjecting the plate to the action of an angular punch, which, at regular intervals and at proper distances apart, perforates the plate and produces angular meshes, leaving a skeleton of the plate in one piece, composed of a series—in continuity—of straight bars of substantially uniform breadth.

2. As a new article of manufacture, stock to be used in the making of skeleton burners for incandescent lighting, a plate of thin metal or other suitable material, offering at proper intervals and at proper distances apart angular perforations by which the substance of the plate or sheet is made to present a reticulated or net-like structure composed of an integral and continuous substance surrounding the meshes and of substantially uniform breadth.

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

EUGÈNE MOREAU.

Witnesses:

R. G. DYRENFORTH,  
W. W. MORTIMER.