(No Model.)

C. L. MARSHALL.

WICK FOR LAMPS.

No. 582,581. Patented May 11, 1897.

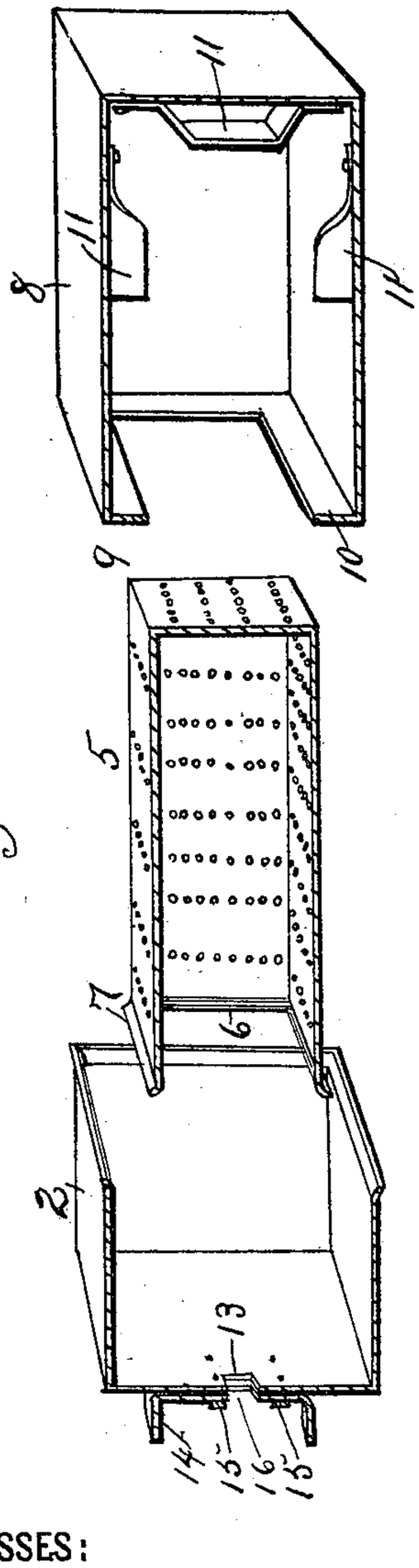

Fig. 3.

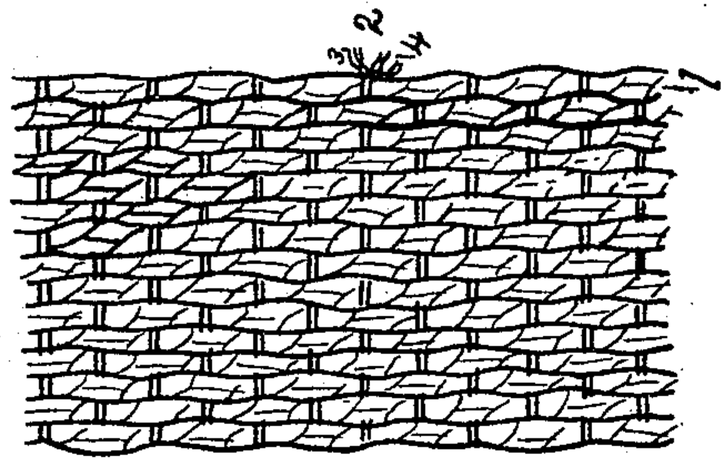

Fig. 1.

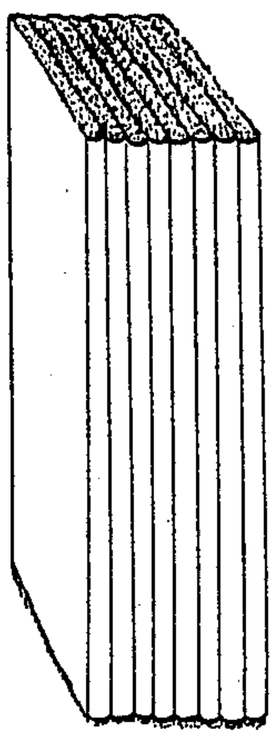

Fig. 2.

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CHARLES L. MARSHALL, OF CEDAR GROVE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NEW JERSEY WICK COMPANY.

WICK FOR LAMPS.

SPECIFICATION forming part of Letters Patent No. 582,581, dated May 11, 1897.

Application filed February 20, 1896. Serial No. 580,101. (No specimens.)

To all whom it may concern:

Be it known that I, CHARLES L. MARSHALL, a citizen of the United States, residing at Cedar Grove, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Lamp-Wicks, of which the following is a description, reference being had to the drawings accompanying this specification.

My invention relates to improvements in wicks for use in lamps, oil-stoves, and heaters designed for burning animal and vegetable oils, kerosene, petroleum, or other suitable hydrocarbons either for heating or lighting purposes and to the improvements in the methods for making such wicks. The wicks may also be adapted for use in candles of wax, paraffin, or other suitable materials.

The object of my invention is to produce a fibrous carbon wick of superior capillary properties and giving perfect odorless combustion of the oil, together with the quality of being a non-conductor of heat and allowing slow combustibility of the materials of the wick, in carbonizing by a distilling process to such an extent as to retain the flexibility of the ordinary woven wick of commerce, together with sufficient strength and durability to permit the use of the carbonized wick in all classes of burners. I accomplish this object by a method of distillation and carbonization which results in the removal from the wick of the oleaginous and gummy substances therein contained and in a uniform partial carbonization of the material of which the wick is composed.

In the drawings, Figure 1 shows the wick. Fig. 2 shows a pack of wicks ready for the new process of distillation and carbonization. Fig. 3 shows the apparatus by means of which my treatment may be effected.

In Fig. 1 is the wick. 1 is the warp. 2 is the weft. The capillary powers depend mainly upon the warp, which consists of interwoven fibers of cotton or other suitable material.

I prefer the weave ordinarily found in cotton wicks, though any weave may be used. Wicks may be woven with previously-prepared fibers, or the wick may be woven first and prepared afterward. In fact, I find it most desirable to use the ordinary cotton wicks of commerce and by suitable subsequent treatment produce my new and improved article.

My wick differs from those heretofore invented in several respects. First, it is deprived of oleaginous and gummy matters. If wicks are subjected to heat in an oven to 400° or 500° Fahrenheit, a vapor of certain liquids, oleaginous, and gummy matters is formed. If the oven is again cooled, these vapors are again absorbed by the wicks. The wick suffers by this treatment, for its capillary powers are reduced. This is an incident to the complete carbonization of wicks in a sealed oven. A wick subjected to this process retains its gummy and oleaginous properties, while my wick is deprived of them, so that even without carbonization my wick is superior to those heretofore proposed in its capillary powers. Wicks have been washed with acids to remove these oleaginous matters, but such treatment rots the fibers and destroys them for lamp use. The removal of these matters by heat does not injure the fibers.

The complete carbonization of wicks has been attempted, but the fibers become brittle, and the web drops to pieces. Partial carbonization does not make the fibers brittle and does not impair the strength necessary to a wick for use in lamps or stoves.

Some wicks have been dipped into powdered carbon suspended in liquid. This treatment closes the pores of the wicks, seriously retarding their capillary properties. Other wicks have been made of block-carbon, but owing to their rigidity and lack of capillary attraction have been found useless for the lamp trade. It is by carbonizing the fibers themselves partially, enough to retain the strength of the fiber and enough to give sufficient carbon to whiten the flame, that I have been able to produce a wick of use to the trade.

It is obvious that the partial carbonization of my wick may be used without the removal of the oleaginous matters and the wick still be superior to those used in the trade. It is also obvious that the removal of the oleaginous matters without the partial carboniza-

tion will produce a wick having greater capillary properties than the wicks of commerce, and it is my intention to cover the use of such products in this patent.

The method and apparatus which I employ in producing my wick are simple and inexpensive. In Fig. 3 is shown one form of apparatus which may be used. An inner casing 5, made of wire-netting or of perforated sheet metal, is provided with an open end 6, having flared edges 7. The wicks are packed closely in this casing, and the casing should therefore have the same length and breadth as the wicks. This inner casing 5 is put in an oven having an open end 9, with edges 10 to fit against the flared edges 7 of the inner casing. Raised metal portions 11 inside the oven prevent any contact between its walls and the casing, thus providing for the free expulsion of the vapors. The cover 12 slips over the open end 9 of the oven. This cover is provided with the vent 13, adapted to be closed by a sliding valve 14, mounted in staples 15. This valve 14 has an opening 16. When the valve is raised, the hole registers with the vent 13, and when down the vent is closed.

Fig. 2 shows a pack of wicks ready for the oven. They are placed in the casing 5, the casing is put into the oven 8, the cover 12 is put on, the valve 14 raised to its upper position, and the apparatus put into the furnace-oven.

The furnace-oven is provided with dampers for admitting air and for expelling the vapors and gases generated from the wicks. The temperature of the oven is then slowly increased. When it reaches about 250° Fahrenheit, the water in the wicks is converted into steam, which loosens the fibers of the entire mass of the body of wicks. At about the same time the solvents or oleaginous substances in the wicks are volatilized and the vapors pass out from the wicks into the space between the inner casing and the oven or box in which it is placed. As the pressure increases the excess gases are forced through the vent-opening into the outer oven and from there escape through the dampers. As the heat increases the heavy and more solid oleaginous matters are volatilized, and by the time the temperature reaches about 500° Fahrenheit these matters are driven out of the vent in the form of vapor or gas. After all the gases have escaped I close the sliding valve and continue to raise the temperature until it reaches 700° or 800° Fahrenheit. The wicks then assume an even color of brown, and the fibers have a silken appearance. The hirsute projections of fibers are not injured, and their capillary powers are retained. The furnace-oven is now opened, and the oven containing the wicks is cooled off. When their temperature is sufficiently low to prevent combustion in the air, the wicks are taken out and are ready for use.

The advantages of this process over others are that a large number of wicks can be treated at one time and in an inexpensive manner with absolute safety from loss or damage by ignition.

The vapors or gases improve the condition of the wick in their capillary properties, probably on account of the swelling of the fibers. They give another peculiar property—that of being receptive to oils for burning, but unreceptive of water or other liquids which will not burn, so that if a lamp is filled partly with water and partly with oil the oil only will be carried to the flame. This renders the wicks valuable for lamps used on railroads. Railroad-lamps are subjected to all kinds of weather, and their light is often extinguished by rain-water reaching the wick and being carried to the flame. My wick prevents any such occurrence, for it will not absorb water. Again, there is no loss from lateral shrinkage and only a trifling of longitudinal shrinkage. When round wicks are used, this is of particular value, as shrinkage would render them incapable of being used with the lamp for which they are made. Complete carbonization causes great lateral shrinkage as well as great longitudinal loss.

The method of packing the wicks one above the other in a solid and compact mass prevents lateral distortion and acts as a form to maintain an evenness that could not be obtained if the wicks were loosely thrown into the oven or distributed singly over a tray.

Although twenty-five per cent. of the original weight of the wicks is removed by this process, yet the fibers of the wicks retain their full size and are perhaps even enlarged. This is of the greatest value for increasing the capillary powers of the wicks.

Wicks prepared by my process will hold in capillary suspension five times their own weight of oil, while the same wick before being treated holds in suspension only three times its own weight of oil.

The carbonization of the wick assists the consumption of carbon in the flame, giving a whiter flame. The greater ease with which the flame consumes carbon renders it less liable to smoke.

In this patent I do not claim a carbonized wick—like that, for example, in the patent of Halvorson, No. 157,685, dated December 15, 1874—for such a wick is useless for commercial uses. A temperature of 500° Fahrenheit in an oven such as Halvorson describes will cause the wicks to char and become "brittle." By my process I do not char the wick or make it brittle. It is the very reverse. It is a soft and silken body with its particles sufficiently heated to become pure carbon in the flame of a lamp.

In preparing wicks for candles I proceed in the manner described above except that I make them very small and often with hollow centers in order that they may be consumed as rapidly as the body of the candle.

What I claim is—

1. A wick for oil-lamps having fibers partially carbonized, and devoid of oleaginous substances.

2. The method of treating wicks which consists in driving off by the application of heat, and permanently separating, the oleaginous or gummy substances from said wicks.

3. The method of treating wicks which consists in raising said wicks to a temperature sufficient to partially and not completely carbonize their fibers in a chamber substantially free from oxygen.

4. The method of treating wicks which consists of raising them to a temperature adapted to vaporize oleaginous and gummy matters in a receptacle having an escape-vent, and then raising said wicks to a partially-carbonizing temperature in a receptacle from which oxygen is excluded.

5. The method of treating wicks which consists of packing them close in a receptacle, shutting off access of oxygen and raising them to a partially-carbonizing temperature.

6. The method of treating wicks which consists of packing them closely in a receptacle, driving out the vapor through an escape-vent by heat and raising them to a partially-carbonizing temperature.

Signed at Newark, in the county of Essex and State of New Jersey, this 18th day of February, A. D. 1896.

CHARLES L. MARSHALL.

Witnesses:

RALPH W. HYATT,

R. ARTHUR HELLER.