

No. 625,985.

Patented May 30, 1899.

J. PEARCE.
METHOD OF MAKING LAMP CHIMNEYS.

(Application filed Dec. 29, 1898.)

(No Model.)

2 Sheets—Sheet 1.

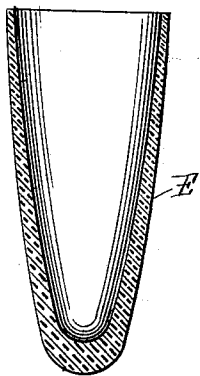


Fig 2

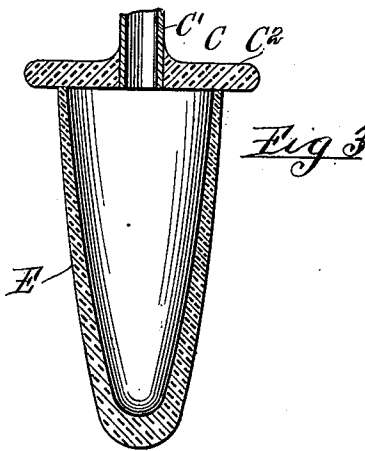


Fig 3

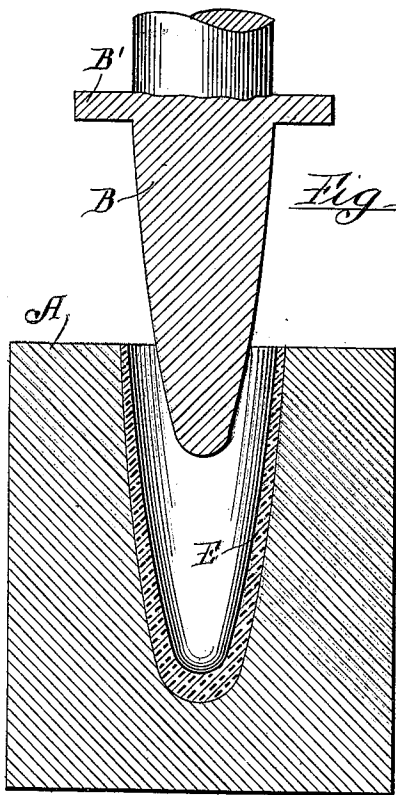


Fig 1

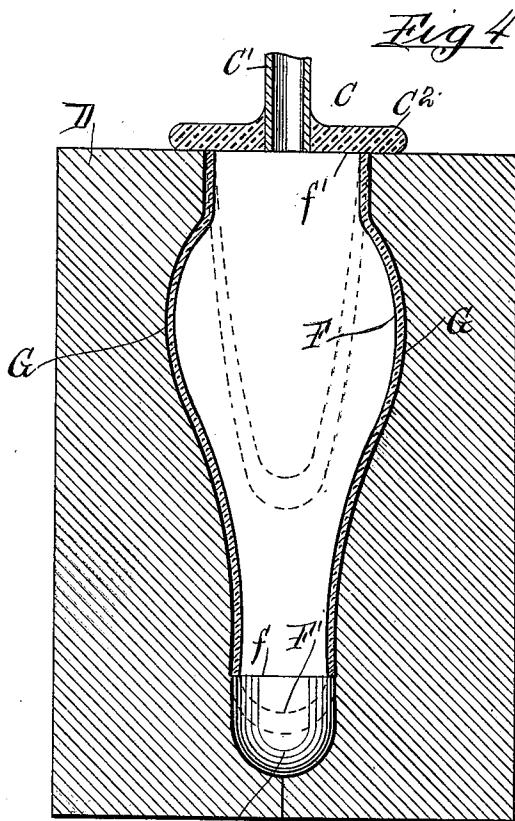


Fig 4

Witnesses:-

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Fig. 5

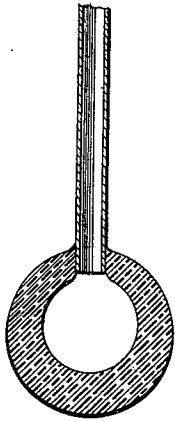


Fig. 6.

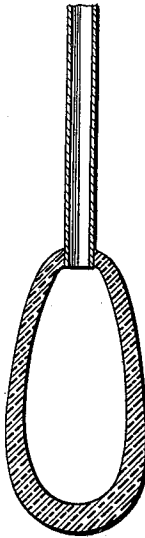


Fig. 7

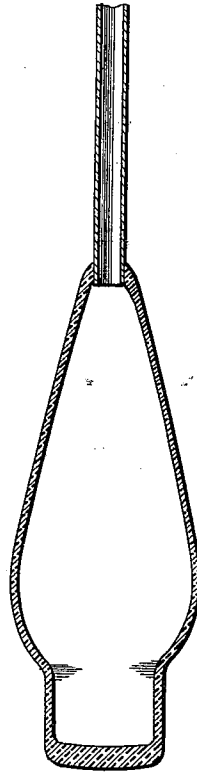


Fig. 8

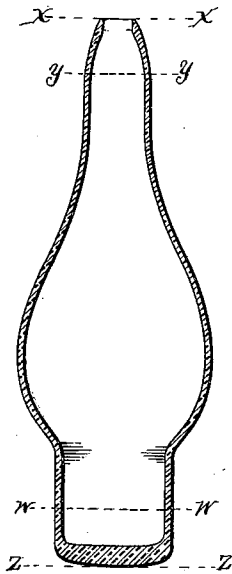
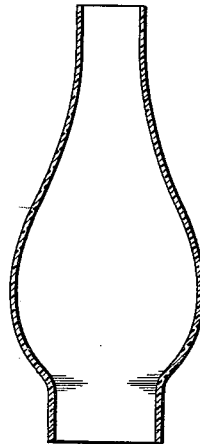


Fig. 9



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN PEARCE, OF OTTAWA, ILLINOIS.

METHOD OF MAKING LAMP-CHIMNEYS.

SPECIFICATION forming part of Letters Patent No. 625,985, dated May 30, 1899.

Application filed December 29, 1898. Serial No. 700,605. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN PEARCE, of Ottawa, in the county of La Salle and State of Illinois, have invented certain new and useful
5 Improvements in Methods of Making Lamp-Chimneys; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of
10 reference marked thereon, which form a part of this specification.

This invention relates to a new and useful improvement in the method of manufacturing glass chimneys, which consists in the making
15 of a blank by a suitable press-mold and then finishing immediately a chimney blown from such blank in a paste-mold.

The invention is designed to cheapen the cost of manufacture by reducing the length
20 of time required to produce the chimney, as well as to simplify the process of manufacture, so that a greater part of the work may be performed by unskilled labor.

The invention consists in the matters hereinafter set forth, and more particularly pointed
25 out in the appended claims.

Figure 1 is a vertical section of a press-mold employed in carrying out my invention. Fig. 2 shows a vertical section of an unfinished blank after it has been given shape in
30 the press-mold. Fig. 3 illustrates a blowpipe or punty attached to said blank. Fig. 4 is a vertical section of a blowing-mold, showing the chimney therein after the blowing operation and with the punty attached thereto.
35 Figs. 5, 6, 7, 8, and 9 illustrate a chimney and the various steps in its manufacture under the "old" process, as hereinafter more fully set forth.

In carrying out my improved method of manufacturing glass chimneys I employ a suitable press-mold A, which is provided in its upper side with a half-oval or other shaped
40 cavity or recess having smooth sides and a rounded bottom. Said recess is designed to receive a mass of molten glass after it has been taken from the furnace by the gatherer. B designates a plunger designed to cooperate with the said mold and which is of
45 the same exterior form as the recess therein, but is of less diameter than the said recess, thereby forming between the same when the

plunger is depressed into said recess a narrow annular space. The plunger is provided with a flange or shoulder B', which limits its
50 movements into the mold before the lower end of the same reaches the lower end of the recess therein, so that a thickness of glass will remain undisturbed in the bottom of the recess when the plunger is removed. Said flange
60 also serves to give finished form to the outer edge of the blank, which in the finished chimney constitutes the base thereof. Said plunger will also be desirably provided in the finished apparatus with a suitable guiding
65 means (not illustrated) adapted to center the same in said recess, so that the space between the sides of the plunger and the inner surface of the recess will be uniformly apportioned.
70

C designates a punty by means of which the blank formed in the press-mold is removed and inserted into the blowing-mold and thereafter given form by forcing air under
75 pressure into the same. Said punty consists of a hollow blowpipe C', through which air is forced into the interior of the blank, and a plate or disk C², provided with a central aperture by which it is fitted over the end of the blowpipe. Said disk is of considerably
80 greater diameter than the open end of the blank. The disk is made of glass or like material and when applied to the heated material of the blank it will adhere thereto, thereby enabling the blank to be removed
85 from the press-mold and to be held on the punty during the succeeding steps in the finishing of the chimney. The punty-disk will be made of glass or metal covered with glass which is of different character, being either
90 harder or softer than the glass being used for the chimneys, so that the chimney may be easily detached therefrom when finished.

D designates a blowing and finishing mold which is provided in its upper side with a cavity or recess of greater depth than the length
95 of the chimney when finished and of such diameter and configuration as will correspond with the exterior form of the chimney to be made therein. The upper end of this recess or mold is practically the same as the diameter of the upper end of the recess or cavity of the mold A, so that the material at the extreme edge of the blank E, which is attached
100

to the punty, is not expanded in the mold D; but all other parts, including that which forms the cylindric bore of the chimney, are both circumferentially expanded and stretched endwise or elongated in the act of blowing. When the blank E is inserted in the recess or cavity of the mold D, the workman expands the same into the desired shape by blowing through the hollow blowpipe C' of the punty, revolving the punty all the while, whereby a highly-finished surface is imparted to the exterior finish of the lamp-chimney by its contact with the interior surface of the mold.

The first step in the process of making a lamp-chimney according to my invention consists of placing a lump of molten glass in the press-mold A and depressing the plunger B therein, thereby forming the glass into a blank E, having thin walls and conforming on its inner and outer surfaces to the shape of the plunger and mold. The upper end of the recess in the mold A is made of a diameter approximately equal to the outer diameter of the base of the lamp-chimney to be made, and the upper end of the plunger is made of a diameter approximately equal to the interior diameter of said base of the chimney. Both the mold and plunger are tapered or reduced in diameter from this point, the plunger to a greater extent than the mold, so that the molded blank is gradually increased in thickness from its extreme edge downwardly. This enables the blank to be afterward both expanded circumferentially and elongated in all its parts except where attached to the punty, with the result of making the chimney of uniform thickness throughout, as hereinafter explained. Said plunger is made of such length below the flange or shoulder B' as to be limited at the proper time in the descent thereof by said flange, so that a portion of the glass at the bottom of the mold will remain undisturbed. With this construction and arrangement the upper end of the blank which forms the edge of the base of the chimney and which is in contact with the punty is properly finished in the pressing-mold, the wall of the said blank being of the same thickness as the walls of the chimney at this point and the end edge thereof being properly finished by the flange B' of the plunger pressing upon the same. I am thereby enabled to avoid the necessity of subsequently submitting the edge of the base of the chimney to a finishing process, as has heretofore been common. The said plunger and mold will be maintained at such a temperature as will prevent the glass which comes in contact therewith from becoming chilled. The plunger B forms a relatively large air space within the blank E, and thereby greatly hastens the expanding process, which is afterward completed by blowing. The next step of my process or method is to remove the blank from the press-mold and insert it into a two-part mold preparatory to blowing the same to a finished form. Said blank is re-

moved by means of the punty C, the disk C² thereof being applied centrally to the upper end of the blank, to which the disk adheres, in a manner well known in the art of glass-blowing. The blank is then lowered into the mold until the punty comes in contact with the top of the mold. The disk C² of the punty being of greater diameter than the recess of the mold acts as a stop or shoulder to limit the movement of the blank when inserted in the mold, the position of the blank at this time being indicated in dotted lines in Fig. 4. Air under pressure is then forced into the blank, which causes the same to expand both circumferentially and endwise in all its parts, except the edge thereof which is adherent to the punty, into contact with the inner walls of the recess of the mold and to thereby give the desired form thereto, while at the same time making the thickness of the chimney uniform throughout. The material in said blank in excess of that required for the finished chimney is forced into the lower end of the cavity in the mold D in the form of a knob, (shown in dotted lines F' in Fig. 4,) and which after the chimney is removed from the mold D is cut from the chimney along the line *f* by the usual hand implements, and the upper end of the chimney (indicated by the line at *f*) may then be finished in the usual manner. The two-part mold, of any ordinary type, is then opened to permit the chimney to be removed therefrom by the punty, which is still attached thereto. The blank being tapered from its edge which is affixed to the punty will freely enter the mold, and being gradually increased in thickness from such edge may expand both circumferentially and lengthwise, as before stated, thereby enabling all parts of the blank to be extended equally in blowing and insuring a uniform thickness in the finished product. The blank is not intended to have the form of a finished chimney in any part except at its extreme edge, which is attached to the punty, final form being given to the entire article except said extreme edge by being expanded both endwise and circumferentially into contact with the mold, as above stated. The blank does not come from the pressing-mold with a polished surface, but same is produced by the act of expanding and turning in the finishing or paste mold, no pressing-mold being adapted to give a perfectly smooth or polished surface.

The construction of the mold A and plunger B is such that the edge of the base of the chimney is finished in the pressing operation, as before set forth, so that the chimney may be removed from the punty and be ready for use when the smaller or upper end thereof is finished.

One process of making lamp-chimneys at present practiced is substantially as follows: The glass is first gathered in a lump from the furnace at the end of the blow-iron by the person called the "gatherer," who rolls it on a slab or table of cast-iron or other suitable

polished surface, called a "marble" in the trade, to give it an oval or pear-like shape. The gatherer blows into the lump of molten glass from time to time to form a small air-space therein. He then passes it to another person, called the "gaffer," who after heating the lump of glass, manipulates the same to bring it to the proper form and distribute the glass evenly about the end of the blowpipe, blowing into it from time to time to expand the glass into a form somewhat like the blank shown in Fig. 2 of the drawings herein. After the glass has been given such form it will again be heated and then blown into a finished form either by inserting it into a suitable mold, which is of such configuration interiorly as to give proper shape to the glass when it is expanded against the same, or by further blowing in connection with the usual hand-tools. The chimney is then separated from the blow-iron, reheated, and passed to another person, who finishes the top and base thereof. In the practice of such operation considerable time is required in giving the proper shape to the blank before the same is subjected to the finishing process, and as the glass cools very rapidly it becomes necessary to reheat the same a number of times. In order to produce a chimney having uniform thickness throughout and of the proper shape, the gatherer, the gaffer, and the finisher must each be skilled in manipulating the glass, so that the mass of glass will be equally divided on all sides of the center of the blow-iron and the walls of the blank of uniform or approximately uniform thickness.

Another process of making molded lamp-chimneys is substantially as follows: The gatherer gathers a lump of molten glass with a blow-iron pipe, rolls the lump on a polished cast-iron table or marble, blows air into it, and obtains a hollow form, substantially as shown in Fig. 5 of the drawings. Then another person, called the "blocker," takes hold of the blow-iron with the lump of glass still attached to it, and by introducing air from time to time into the lump of glass and by proper manipulation brings the lump of glass to another form, substantially as shown in Fig. 6. Another person, called the "blower," then takes hold of the blow-iron with the lump of glass attached, introduces more air into the lump, and manipulates the same in order to obtain a uniform and even thickness of the glass through the walls or other parts of the intended chimney. When the lump of glass approximates the proper shape, the blower inserts it into a mold and introduces more air into it by blowing through the blowpipe until it assumes the general shape of the chimney, as shown by Fig. 7. Then with the use of the ordinary glass-blower's tools he separates the glass-chimney blank, in the form illustrated by Fig. 8, from the blowpipe. In order to bring the chimney to the final shape and finish, the surplus of glass at both ends between lines *xx yy* and between the lines *ww zz* must

be removed, to effect which the chimney, Fig. 8, is sent to a leer or oven, where it is gradually cooled off. After the unfinished chimney, Fig. 8, has been passed through the leer or the oven the cutting-machine is applied and the surplus of glass at both ends is removed, leaving the chimney in shape, as illustrated in Fig. 9. However, the edges of both ends of the chimney are unfinished and are too sharp and rough for use. The final step of smoothing these cut edges is called "glazing" or "grinding," and when this has been taken the chimney is finished and ready for use.

My improved process possesses important advantages over the processes heretofore employed for the reason that the blank is almost instantly given a definite shape in the press-mold by the plunger and is at once ready for the step by which the chimney is given its finished shape, which, as mentioned, in the old process is a tedious operation and requires considerable time by a skilled person. Moreover, by the use of the press-mold described or its equivalent the glass in the resulting blank is made of such graduated thickness from its edge which is attached to the punty that all parts will be stretched uniformly, both endwise and circumferentially, and the finished chimney will therefore be of uniform thickness throughout. A further and important advantage arising from the method set forth is that the time required for expanding the blank into the form shown in Fig. 2 is so shortened that said blank may be, if desired, at once inserted into the finishing-mold without the necessity of reheating, thereby decreasing the time required for forming the chimney and greatly lessening the cost of the same. The work of bringing the blank to the form shown in Fig. 4, which has heretofore required special skill, may obviously be done by any person having no special skill in the art of chimney-making or glass-working. The work, therefore, up to this point in the stage of manufacture is greatly cheapened, not only because the time is shortened, but because the work may be performed by unskilled labor. The only special skill required in making a lamp-chimney in accordance with my improved method is that necessary to give the finished form to the upper end of the chimney by hand-tools or by a crimping-machine after the blank has been removed from the blowing-mold and the knob *F'* detached therefrom.

The arrangement of the parts of the apparatus by which the base of the chimney is completely finished during the pressing and blowing operations is of great importance, as it enables me to completely finish the chimney while attached to the punty. Heretofore in the process of making glass lamp-chimneys it has been necessary to first finish the larger or lower end of the chimney and attach a punty thereto, by which it may be held while the top or upper end of the chimney is being finished. With my invention, however, the

first operation is dispensed with, thereby greatly lessening the time of manufacturing the chimney. The construction of the blow-mold D is of some importance, as the finished
 5 base of the chimney is not disturbed and accurate care need not be exercised to secure the deposit in the press-mold A of the exact quantity of molten glass required for a lamp-chimney, provided the recess or cavity in the
 10 mold D be of sufficient longitudinal dimension. In practice it will rarely happen that the workman will take a sufficient quantity of excess molten glass to form a knob F greater than that indicated in dotted lines on Fig. 4,
 15 so that a cavity end of the relative size indicated at *d* in the drawings will be amply sufficient.

Two kinds of molds are used in the manufacture of glass chimneys, the one generally
 20 known in the trade as the "iron mold." When the glass is introduced in this form of mold, the only thing that can be done by the blower is to expand the molten glass to the finished form without the possibility of giving
 25 any rotary motion thereto, and consequently without any possibility of giving to the surface of the glass the necessary polish. The second form of mold is known to the trade as a "paste-mold," in which an interior
 30 lining of charcoal or other suitable paste is used, such as is indicated in the drawings by the heavy black line G. When using a mold of this class, the blower imparts a rotary motion to the punty when blowing through the
 35 blowpipe and expands the glass, and this rotary motion produces a well-polished and necessary finish to the surface. It is a mold of the latter class that I desire to use in taking the second step in the practice of my invention.
 40

In the process of manufacturing lamp-chimneys by the use of molds the unfinished chimney is passed through a leer or annealing-oven, as above stated, to toughen the glass preparatory to the cutting operation, which consists in
 45 subjecting first one and then the other end of the chimney-blank to the action of a gas-flame at the line of the proposed cuts and then applying the cold cutting-knife. The chimney-worker usually has to reheat the chimney
 50 first at one end and then at the other before smoothing or glazing the cut edges of the glass. The annealing operation is necessary in this process in order to avoid breakage and
 55 constant loss, which is liable to occur in the cutting operation if the chimney has not been previously annealed. In my process, as above described, the unfinished chimney or blank is removed from the mold while still hot and so
 60 soft that the knob at the top end of the chimney can be readily severed by the ordinary cutting-tool used by glass-blowers and the said top end then finished either with a plain or smooth edge or with a crimped edge, as desired.
 65 By this method I save, obviously, the trouble and expense of passing the chimneys through the leer as an intermediate step in

the process of cutting off the ends of the blank and of reheating and glazing. Each of the three steps referred to is rendered unnecessary in my process, and by the latter I am not
 70 only saved the trouble and expense involved in the steps themselves, but also the large loss by breakage, which inevitably occurs in tempering, in cutting, and in reheating.
 75

My improved process differs from prior processes in which a blank is first pressed in a pressing-mold and then expanded into a blow-mold in the following particulars: First, the pressing-mold is adapted to give shape to the
 80 entire outer surface of the blank and the diameter of said pressing-mold is not greater at any point than at its opening, so that the pressed blank may be withdrawn from the mold, as by the use of a punty applied to the
 85 upper edge of the blank, as hereinbefore described; second, the blank is expanded longitudinally and circumferentially in a paste-lined mold, which gives form to the entire article, and the blank is rotated therein to
 90 polish the outer surface of the same, the surface of the mold being paste-lined or similarly adapted for polishing the glass and acting on the entire outer surface of the blank as the latter is rotated, with the result of
 95 smoothing or polishing the same and giving to the chimney the additional strength and durability by which polished glass is distinguished from molded glass or glass which is finished by being merely expanded into contact with an iron mold.
 100

I claim as my invention—

1. The process of making polished-glass lamp-chimneys which consists in first forming a hollow blank from a mass of molten
 105 glass said blank being closed at one end and open at the other and the edge of the open end constituting the finished edge of the base of the chimney, then expanding the blank longitudinally and circumferentially into contact with a paste-lined surface and rotating the blank with its entire surface in contact with the paste-lined surface to polish the same, removing the surplus glass from the top of the expanded blank and finally finishing the top.
 115

2. The process of making polished-glass lamp-chimneys which consists in first forming a hollow blank from a mass of molten glass by pressing it into contact with a surface giving form to the entire outer surface of the blank, said blank being closed at one end and open at the other and the edge of its open end constituting the finished edge of the base of the chimney, then expanding the blank longitudinally and circumferentially into contact with a paste-lined surface and rotating the blank with its entire surface in contact with said paste-lined surface to polish the same, then removing the surplus glass from the top of the expanded blank and finally finishing the top.
 120
 125
 130

3. The process of making polished-glass lamp-chimneys which consists in first form-

ing a hollow blank of tapered form from a
mass of molten glass by pressing it into con-
tact with a surface which gives form to the
entire outer surface of the blank, said blank
5 being closed at one end and open at the other
and the edge of its open end constituting the
finished edge of the base of the chimney,
then expanding the blank longitudinally and
circumferentially against a surface which
10 reaches to the edge of the blank and gives
form to its entire outer surface, except at
such finished edge, while simultaneously ro-

tating the blank in contact with said surface,
then removing the surplus glass from the top
of the expanded blank and finally finishing 15
the top.

In testimony that I claim the foregoing as
my invention I affix my signature, in pres-
ence of two witnesses, this 26th day of De-
cember, A. D. 1898.

JOHN PEARCE.

Witnesses:

L. W. BREWER,

E. T. LA CHAPELLE.