

No. 760,191.

PATENTED MAY 17, 1904.

E. L. GAYLORD.

METHOD OF MOLDING ARTICLES FROM AMBER OR AMBROID.

APPLICATION FILED DEC. 1, 1903.

NO MODEL.

Fig. 1

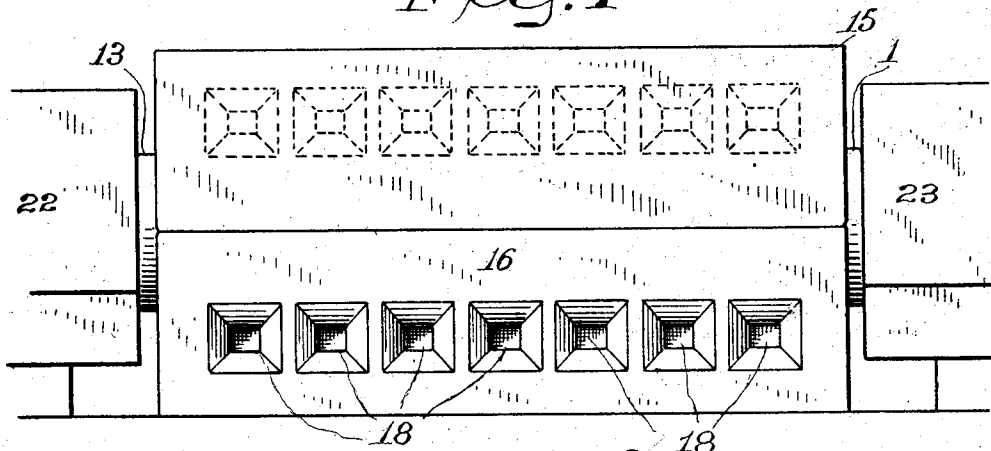


Fig. 2

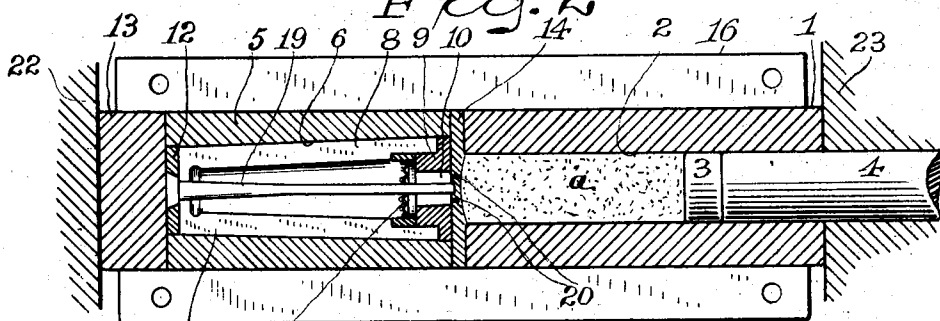


Fig. 3.

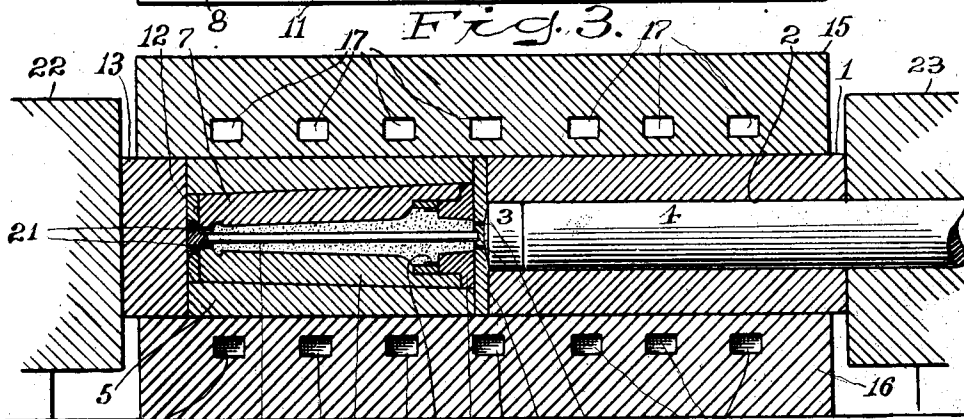
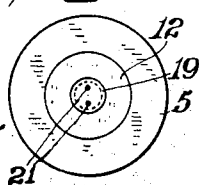
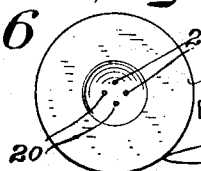


Fig. 4.

Fig. 5.

WITNESSES:

H. A. Lamb.
M. J. Sargent



INVENTOR

E. L. Gaylord

BY

ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD L. GAYLORD, OF BRIDGEPORT, CONNECTICUT.

METHOD OF MOLDING ARTICLES FROM AMBER OR AMBROID.

SPECIFICATION forming part of Letters Patent No. 760,191, dated May 17, 1904.

Application filed December 1, 1903. Serial No. 183,376. (No specimens.)

To all whom it may concern:

Be it known that I, EDWARD L. GAYLORD, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Methods of Molding Articles from Amber or Ambroid; 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.

My invention relates to the method of molding articles from amber or ambroid; and it consists of certain novel methods or processes particularly pointed out in the claims concluding this specification.

The following is a description of my improved method in the form in which I now prefer to practice it and of the apparatus which I now prefer to employ in connection therewith; but it will be understood that my claims are not limited to the employment of any particular apparatus and that the process herein described may be modified in various ways without departing from the spirit of my invention and without exceeding the scope of my claims.

Certain features of the process hereinafter described are not essential to the several features of my invention separately and broadly considered, and this will be indicated where in any given claim the omission of reference to steps or features of the process described will be understood to be a specific declaration that the omitted steps or features are not essential to the invention therein covered.

In the accompanying drawings, Figure 1 illustrates a front elevation of an apparatus for carrying out my improvement. Fig. 2 is a horizontal sectional view taken through the primary heating-chamber and mold-case and with the top section of the heating-jacket removed; Fig. 3, a vertical sectional elevation of the apparatus shown at Fig. 1. Figs. 4 and 5 are respectively detail elevations of opposite ends of the mold-case with the core-supports in position, and Fig. 6 is a detail perspective showing a form of strengthening or reinforcing band.

Similar characters of reference denote like parts in the several figures of the drawings.

In carrying out my improvement I prefer to employ a primary heating-chamber 1, which has a longitudinal opening or chamber 2, circular in cross-section and highly polished, within which chamber is a plug 3, also highly polished and fitting the opening 2 with the greatest nicety, so as to be practically air and gas tight. 4 is a plunger which fits within the opening 2 and abuts against said plug.

In the accompanying drawings I have shown suitable molds whereby my process may be carried out for the purpose of producing a stem or mouthpiece for a pipe; but it will of course be readily understood that the manner in which the molds would be constructed and held in position would depend largely upon the nature of the article to be produced.

In the drawings I have shown a mold-case 5 which has a tapered longitudinal opening 6 therethrough, said opening being circular in cross-section and highly polished. The particular mold for the main portion of the stem is made in two halves 7 8, adapted to fit together with the greatest nicety, and the exterior surfaces of these halves when fitted together are circular in cross-section and are tapering, so that they may be forced within the mold-case 5, the action of the tapered surfaces of the molds and the case being to unite the halves of the mold together, so that I obtain the benefits that might arise from the use of a single mold and at the same time preserve all the advantages of a sectional mold.

9 is a third section of the mold, which is inserted snugly within the larger end of the opening in the mold-case and extends within the mold 7 8 and is formed with a central circular opening 10 of a diameter much less than that of the opening at the inner end of the molds 7 8, and this section 9 is utilized for the purpose of making the shouldered reduced end of the stem which serves as the plug to be inserted within the short stem of the pipe-bowl.

In a pipe mouthpiece or stem the part most likely to chip or become broken is the shouldered portion which is intended to abut against

the short stem of the pipe-bowl, and I therefore frequently strengthen or reinforce this portion by means of a ring or band 11 of metal, which is placed snugly within the main mold adjacent to the section 9. This ring or band may be plain, or it may be ornamental, as shown, and with an open-work pattern.

12 is a disk snugly contained within the smaller end of the opening in the mold-case. The ends of the mold-case are finished very accurately and are highly polished, and I employ closure-caps 13 14, whose surfaces are likewise highly polished, which caps are abutted against the ends of the mold-case, so as to make the latter perfectly air-tight.

The mold-case, the closure-caps, and the primary heating-chamber are all contained snugly within a heating-jacket composed of two sections 15 16, provided with series of openings 17 18 for the introduction of the heating agent, and these sections of the heating-jacket are held firmly together in any suitable manner.

19 is the core-pin, which is supported at its ends by the closure-caps 13 14. The closure-cap 14 is provided with minute perforations 20, which establish communication between the primary heating-chamber and the interior of the mold, while at the other end of the mold small ducts 21 lead from the interior of the mold to the outside of the disk 12.

As will be hereinafter set forth, the amber is forced within the mold through the perforations 20, while a slight releasing of the closure-cap 13 will permit the escape of gases from the interior of the mold to the outside air.

When the parts heretofore mentioned are contained within the heating-jacket, the end of the primary chamber 1 abuts snugly against the closure-cap 14, so as to make an air-tight joint, and the closure-cap 13 and the primary heating-chamber will project slightly beyond the heating-case, as shown, so that when the pressure-blocks 22 23 are brought to bear against said closure-cap and chamber the various parts of the molding apparatus will be held together.

Amber, preferably in comminuted form, as denoted by *a*, is packed within the opening of the primary chamber 1, and the plug 3 is then inserted within said opening and the plunger 4 introduced behind the plug. I prefer to place the exact amount of amber which will fill the mold within this opening, which amount may be ascertained by careful experiment. The heating agent is now introduced within the openings in the heating-jacket that are in proximity to the primary chamber 1; but no heat is applied directly to the mold as yet. The heat is continued until the amber has become reduced to the state in which it may be forced into the mold through the perforations 20. The plunger 4 is operated by any suitable mechanism, and the proper consistency of the amber may be ascertained by carefully

noting the temperature and by attempting to operate the plunger. When the amber is forced through the perforations 20 into the cooler-mold, it disintegrates and fills the mold in the form of a very fine powder, and after the plunger has been operated to deliver the amber from the primary chamber to the molds and to thereby compress the amber atoms into a dense mass the heating agent may be removed from the primary chamber and applied to the openings in the heating-jacket that are in proximity to the molds.

I have ascertained that the amber can be forced from the primary heating-chamber into the molds in atomized form at a temperature of from 160° to 190° centigrade, and I prefer to force the amber into the molds at the lowest possible temperature. After the amber has been forced within the molds and rendered sufficiently dense by the action of the plunger it is desirable that no further mechanical or external pressure should be applied, since a pressure applied to the amber at this stage appears to set the amber in mechanical motion and to seriously interfere with the natural expansion of the amber and the production of a homogeneous article.

I prefer to apply to the molds heat varying from 220° to 270° centigrade, and during this heating the amber atoms become unified and converted into a homogeneous state. Furthermore, during this heating the amber expands, conforming to the most delicate details of the molds and yielding a uniform highly-polished surface.

The variations in temperature above noted are due to the nature of the amber itself and also to the article to be produced. Some amber gums require less heating than others, and articles of a delicate and thin pattern, like cups and saucers, are more likely to show discoloration, owing to carbonization, if subjected to the same heat as might safely be applied in the instance of more bulky and less delicate articles, such as buttons or cigar-mouthpieces.

It will thus be understood that the heat is preferably applied to the molds at a much higher temperature than in the instance of the primary heating-chamber, even in many instances beyond the point where the amber atoms have come together by cohesion and have expanded so as to completely fill the molds at the required density.

Subsequent to the application of heat to the primary heating-chamber the amber begins to yield up its gases, and this releasing of gases may continue more or less until the final expansion of the amber within the molds, and in order to release these gases I slightly relax the pressure on the closure-cap 13, so that the gases will escape through the ducts 21 to the outside air. It may be that these gases will all escape during the initial action of the plunger to force the amber within the

molds, or it may be necessary to provide for the escaping of these gases until the final expansion of the amber. This depends entirely upon the nature of the amber and upon the article to be produced; but my process is not limited to the releasing of the gases at any particular time, and therefore such gases may be allowed to escape at any time, according to the judgment and experience of any one who practices my process.

If it is desired that the article to be produced shall be clear and not cloudy, the gases should be allowed to escape; but if the cloudy effect is to be retained in the amber article more or less of these gases should be kept confined in the molds.

If the amber that is comminuted and packed within the primary heating-chamber be naturally clear, a cloudy effect in the article to be produced may be brought about by introducing water within this primary heating-chamber when the comminuted amber is packed therein. I can also introduce within this primary heating-chamber any suitable coloring-matter that may be desired, which will be intimately mixed with the powdered material when introduced into the mold, thus giving a uniform tint or color to the completed article.

During the heating of the amber within the molds, whereby said amber from a powdered condition becomes an integral mass, there is preferably no pressure that is directly applied by the action of the plunger or other mechanical means to said amber.

It is owing to the peculiarity of amber that it will expand when it passes from the atomized state to the moldable state, and this expansion, together with the final heating, will cause the amber to conform to the most delicate lines of the molds, and the article thereby produced will be exceedingly dense and highly polished. When the heating agent is withdrawn, the cooling of the molds will cause the amber article to contract slightly.

In my process I can utilize small pieces or chips of amber, and I am likewise enabled to effect a great saving of the amber, owing to the fact that I am enabled to mold the article complete in all its details without carbonization or waste.

From the foregoing it will be clearly understood that the amber is preferably subjected to two separate heats, a relatively lower heat while in the primary heating-chamber and a relatively higher heat while in the molds, the former heat being merely sufficient to enable the amber to be atomized within the molds, while the latter heat is much greater.

I have heretofore referred to certain metallic portions which are preferably contained within the mold, so that they will be embedded in the completed article so as to reinforce and ornament the same; but I do not wish to be understood as claiming any such reinforcement or ornamentation in this present appli-

cation, since I have fully described and claimed this reinforcement and ornamentation of amber articles in another application for Letters Patent now pending in the United States Patent Office.

I am aware that it is not new to soften amber by heat and mold it under pressure, as described in Davis patent, No. 234,756, dated November 23, 1880; and that it is not new to melt amber and force it into a die, as described in Thurfelder patent, No. 461,722, dated October 20, 1891, and I therefore disclaim said processes; but

What I claim is—

1. The process of molding amber or ambroid, which consists in reducing the gum to a powdered state and heating the powdered gum in a suitable mold.

2. The process of molding amber or ambroid, which consists in reducing the gum to a powdered state and heating the powdered gum in a suitable mold without the application of mechanical or external pressure thereto.

3. The process of molding amber or ambroid, which consists in reducing the gum to a powdered state and heating the powdered gum mixed with coloring-matter in a suitable mold.

4. The process of molding amber or ambroid, which consists in reducing the gum to a powdered state by the combined action of heat and pressure and subsequently reheating the powdered gum in a suitable mold.

5. The process of molding amber or ambroid, which consists in reducing the gum to a powdered state by the action of heat and pressure, forcing the gum from a heated chamber into a comparatively cool space, and subsequently reheating the powdered gum in a suitable mold.

6. The process of molding amber or ambroid, which consists in reducing the gum to a powdered state by the combined action of heat and pressure, forcing the gum from the heating-chamber into a mold, and subsequently reheating the gum while contained in said mold.

7. The process of molding amber or ambroid, which consists in heating the gum to about the temperature at which it becomes mobile, then forcing it under pressure into a cooler space and then subjecting it to a temperature substantially higher than that at which it becomes mobile.

8. In the process of preparing amber or ambroid, for molding, heating the gum to render it a mobile mass and removing from said mass gases generated during the heating process.

9. The process of molding articles from amber or ambroid, which consists in molding the gum without mechanical pressure while confined in a dense state by the application of a heat sufficient to reduce the gum to an integral mass and to cause it to expand whereby the required density is obtained, and then cooling said mass.

10. The process of molding articles from

amber or ambroid, which consists in molding the gum without mechanical pressure while confined in a dense powdered state by the application of a heat sufficient to cause the powdered particles to unite by cohesion and expand, and then cooling the mass.

11. The process of molding articles from amber or ambroid, which consists in primarily heating the gum while confined in comminuted form until it has been brought to a mobile state, then forcing the gum into a relatively cool mold, then subjecting the gum to an increased heat but without the application of mechanical pressure until said gum has become an integral mass and has expanded to give the required density, and finally cooling the gum.

12. The process of molding articles from amber or ambroid, which consists in confining the gum in comminuted state, heating the gum at a relatively low temperature, then atomizing the gum and confining it in a densely-packed state, subjecting the gum while thus confined to an increased heat until it has become an integral mass and has expanded to give the required density, and finally cooling the gum.

13. The process of molding articles from amber or ambroid, which consists in confining the gum in comminuted form, then heating the gum at a relatively low temperature, then atomizing the gum and confining it in a densely-packed state, then subjecting the gum while in said state to an increased heat until it has become an integral mass of the required density, releasing the gas or gases from the gum subsequent to the first heating, and finally allowing the gum to cool.

14. The process of molding articles from amber or ambroid, which consists in heating the gum in comminuted form at the minimum temperature required to reduce the gum to a mobile state, atomizing the gum and confining it in a densely-packed state, and finally subjecting the densely-packed atomized gum to an increased temperature carried beyond the limit of expansion of said gum.

15. The process of molding articles from amber or ambroid, which consists in primarily heating the gum in comminuted state to a rela-

tively low temperature, atomizing the gum thus heated and confining it in densely-packed form, and then heating the gum beyond the limit of its expansion and without the application of mechanical pressure.

16. The process of molding amber or ambroid, which consists in introducing water into a mass of amber particles and heating said mass and subsequently molding it into the desired form.

17. The process of molding articles from amber or ambroid, which consists in introducing water within the amber while confined in comminuted form, heating the amber thus confined until it has been brought to a mobile state, then forcing the amber into a relatively cool mold and subjecting the same to an increased heat.

18. The process of molding amber or ambroid, which consists in introducing water into the particles of amber, primarily heating the amber and water until the mass becomes mobile, atomizing the amber and confining it in densely-packed condition, and finally heating the amber while in this condition and molding it into the desired form.

19. The process of molding articles from amber or ambroid, which consists in primarily heating the gum until it becomes mobile, atomizing the gum and confining it in densely-packed condition, and finally heating the gum while in this condition and molding it into the desired form.

20. The process of molding articles from amber or ambroid, which consists in primarily heating the gum until it becomes mobile, atomizing the gum and confining it in densely-packed condition, and finally heating the gum while in this condition and in a passive state, and molding said gum into the desired form by the aid of the expansion of the gum after it has been reduced to a moldable state by the action of the heat.

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

EDWARD L. GAYLORD.

Witnesses:

F. W. SMITH, Jr.,

M. T. LONGDEN.