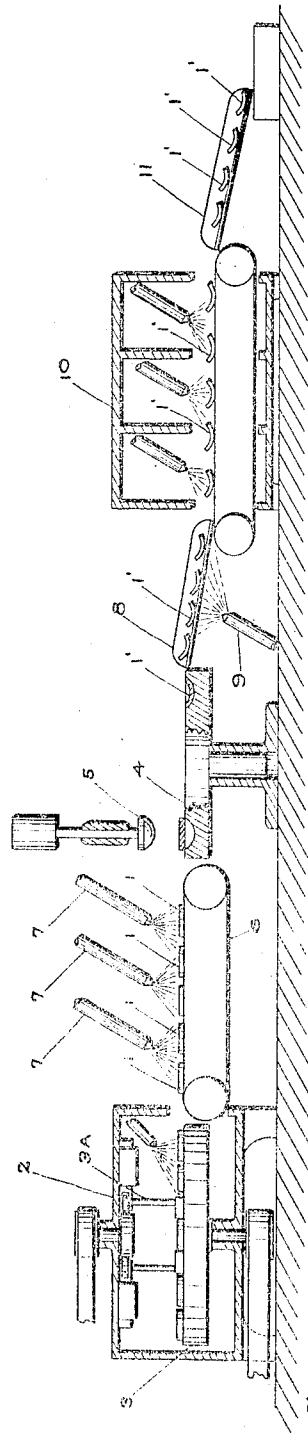


H. W. HILL.
PROCESS OF FORMING LENSES.
APPLICATION FILED SEPT. 13, 1917.

1,332,724.

Patented Mar. 2, 1920.



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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HARRY W. HILL, a citizen of the United States, residing at Southbridge, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Processes of Forming Lenses, of which the following is a specification.

My invention relates to improvements in processes for forming lenses and has particular reference to the formation of a rough finished or shaped lens blank from the rough glass stock.

One of the leading objects of the present invention is the provision of an improved process by which the rough piece of material may be quickly and satisfactorily brought from its rough condition into a semi-finished form and which process will further serve to eliminate to a very great extent bubbles, striae or other weaknesses or defects in the glass, and will relieve the blanks of the strains present in ordinarily molded lenses, such as have been known in the prior art.

A further object of the present invention is the provision of an improved process embodying a continuous series of steps preferably performed in immediate sequence, whereby the glass from the time it is started in rough condition until it reaches finished annealed form is not allowed to become cold but is maintained in a greater or less heated state, conserving the number of heat units necessary to complete the process, and eliminating strains and defects which might be present in the glass were the same chilled or allowed to chill between the several major operations thereon.

Other objects and advantages of my improved process should be readily apparent by reference to the following specifications taken in connection with the accompanying diagrammatic drawing, and it will be understood that I may make any modifications or variations in the performance of the steps of the process within the scope of the appended claims without departing from or exceeding the spirit of my invention.

In the drawings I have diagrammatically illustrated an arrangement of apparatus for carrying out of several steps of my process, but it will be understood that the process is capable of accomplishment by many dif-

ferent forms of apparatus or of performance partially through the use of apparatus and partially manually.

In the carrying out of my improved process the steps are preferably as follows: In first place the rough piece of glass 1 of approximately the right size or weight to produce the desired finished article within a suitable heating member, such as the oven 2 shown in the drawings. For convenience I have illustrated the stock 1 as placed upon a rotating table 3, the essential being, however, that it is placed within a source of heat and is there gradually heated, preferably by movement through an oven having a number of heating portions or the like so it is subjected to a gradually increasing heat until it is brought to the desired temperature, it being, however, at all times maintained at a temperature below its melting point so that it will be in a softened but not in a molten condition. The stock having been thus suitably heated I preferably puddle it, as by the puddles 3A, to eliminate bubbles, striae and other defects of a similar nature frequently present in the rough stock, roughly shaping it during the puddling and then convey it into the mold 4 where it will be operated on by the plunger 5 to cause it to assume the shape of the mold and plunger. It is to be understood that the shape of the glass up to the time of reaching the mold is immaterial and in the accompanying drawings the material is shown diagrammatic merely for the purpose of illustration. In this transferring operation, however, I subject it to a continued heat, which while not increasing the temperature of the stock as it is shifted from the furnace, will maintain it at the desired temperature and prevent any chilling during the shifting operation. For convenience in understanding this I have illustrated the automatic carrier 6 and certain gas or other heating burners 7 directing their heat against the stock 1 as it is shifted along the conveyer, although it will be understood that any other suitable means for maintaining the parts at the right temperature during the shifting operation may be employed without in anywise varying the process.

It will be understood that at the time of the puddling operation the glass is in a semi-

fluid or plastic condition, such that while its natural viscosity will tend to keep it from appreciably spreading it will at the same time readily respond to any molding or pressing action so that as it is engaged by the puddling members 3^a these will push up into substantially desired form the stock in question and in this stirring or shifting of the molecules or parts of the glass will tend to force out any bubbles which may be formed in the body thereof rendering the same in compact shape, the heating action subsequent to this point being insufficient to materially affect the shape of the blank as produced during the puddling operation.

My process further contemplates the retaining of the molded stock 1' within the mold 4 for a certain period after the actual pressing so that it may have a chance to become somewhat cooled and less liable to change of shape or distortion when it is removed from the mold, after which in the carrying out of my process I remove the shaped blank 1' from the mold, place it in a second suitable chute or conveyer 8 where it may be again subjected to a slight heat, as from the heating nozzle or other source of heat 9, after which and as the final step in the carrying out of my process I anneal the heated blank as by placing it within an annealing chamber 10, the chamber being so constructed that it will receive the warm blank from the transfer member 8, will gradually raise the temperature of the blank to the required point to anneal the same, will maintain it for the necessary period at an annealing temperature, and eventually discharge the blank in substantially cold condition, having allowed it to gradually cool while within or passing through the annealing chamber, the cold blank emerging or being brought out and placed in a suitable container at 11.

From the foregoing description the essen-

tials of my improved process should be apparent, and it will be seen that my process contemplates gradually increasing the temperature, preferably of a rough piece of glass stock to a plastic condition, puddling and shaping the stock while plastic, maintaining it in this plastic condition while transferring it from the main heating member to a mold, pressing it within the mold to assume the desired shape, retaining it in the mold till it has substantially set to this shape, removing it from the mold, initially heating it subsequent to its removal to the mold, annealing the blank by gradually raising and cooling its temperature and removing the cooled blank from the annealer.

I claim:

1. The process of forming lens blanks, including heating stock to a plastic condition, puddling the plastic stock, molding the puddled stock and annealing the shaped blank.

2. The process of forming a lens including heating the stock to a plastic condition, puddling the stock during the heating operation, pressing the stock into form after puddling and while plastic and annealing the formed lens, before it has entirely cooled from the initial heating.

3. The process of forming a lens including subjecting the stock to an intermittent series of heating actions to prevent cooling of the lens during the process, one of the initial heatings being sufficient to render the lens plastic, puddling and subsequently molding the lens while plastic, and subsequently annealing the lens by the subsequent heating actions.

In testimony whereof I have affixed my signature, in presence of two witnesses.

HARRY WILLIAM HILL.

Witnesses:

EDITH M. HALVORSEN,
ESTHER M. LAFLEK.