May 2, 1939. C. G. HARFORD ET AL 2,156,982

METHOD FOR SPINNING GLASS

Original Filed March 9, 1934 2 Sheets-Sheet 1

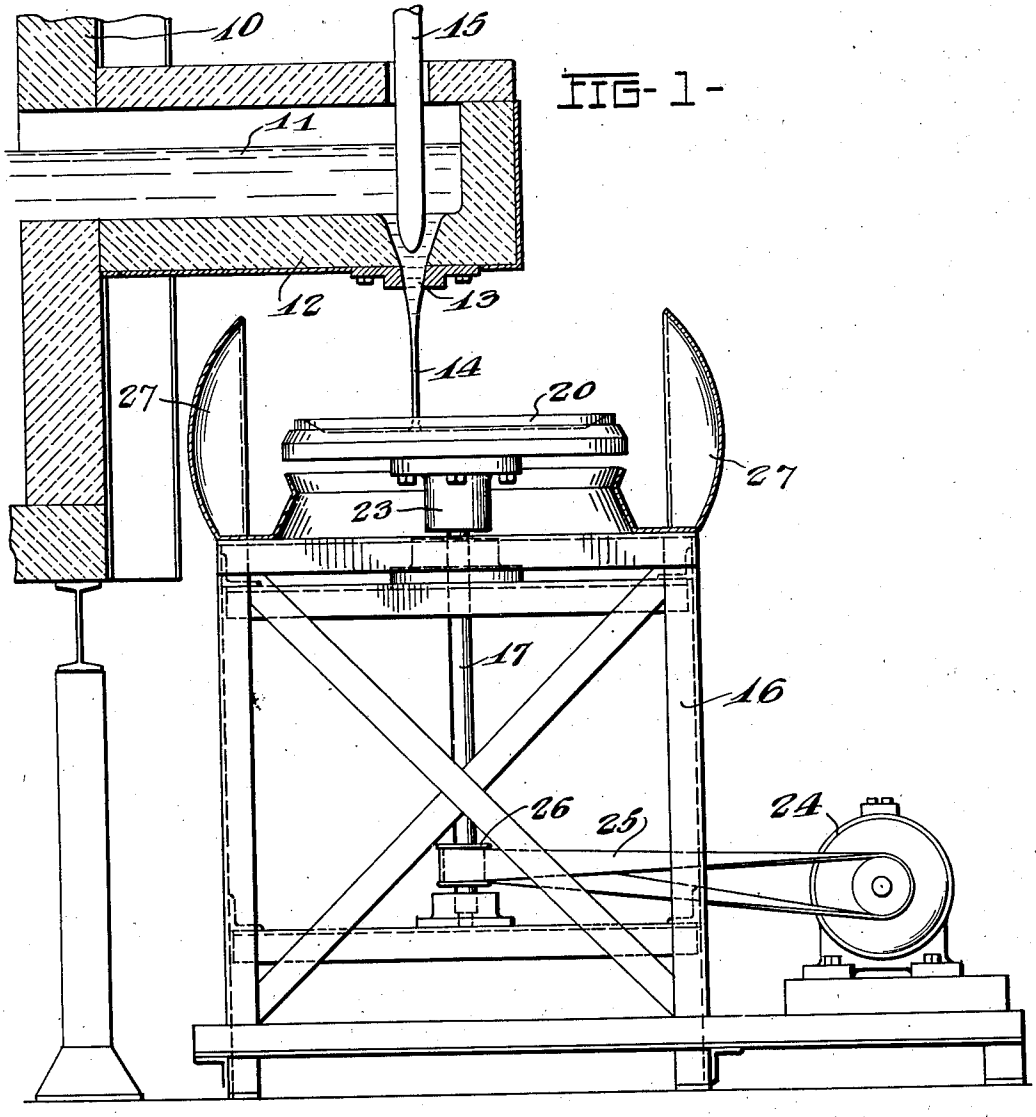


FIG-1-

Inventors
Charles G. Harford
and Earl Stafford

By J. F. Rule, Attorney

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FIG-2-

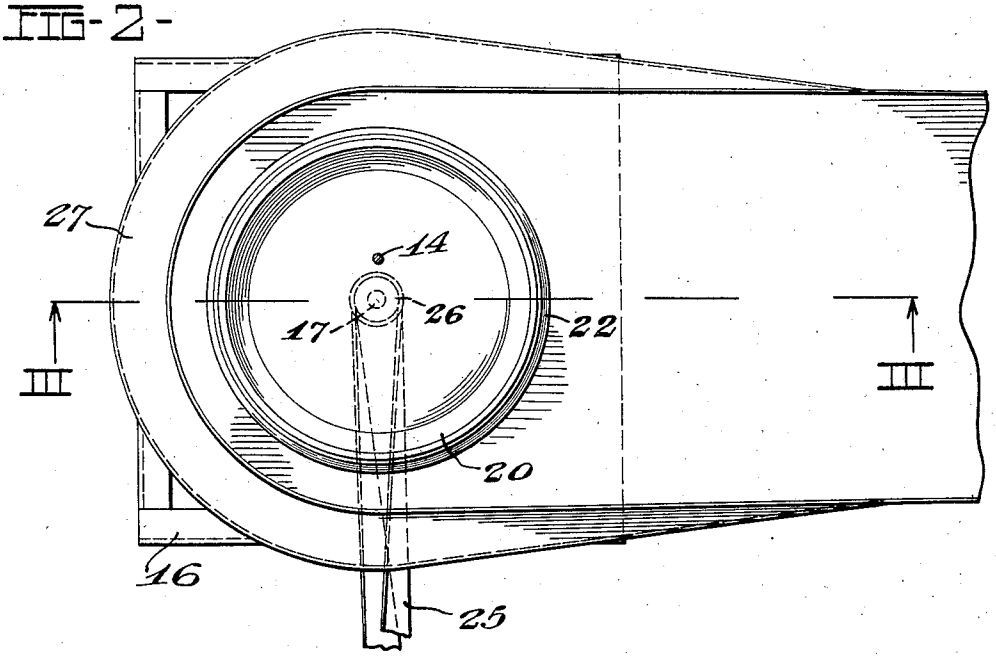
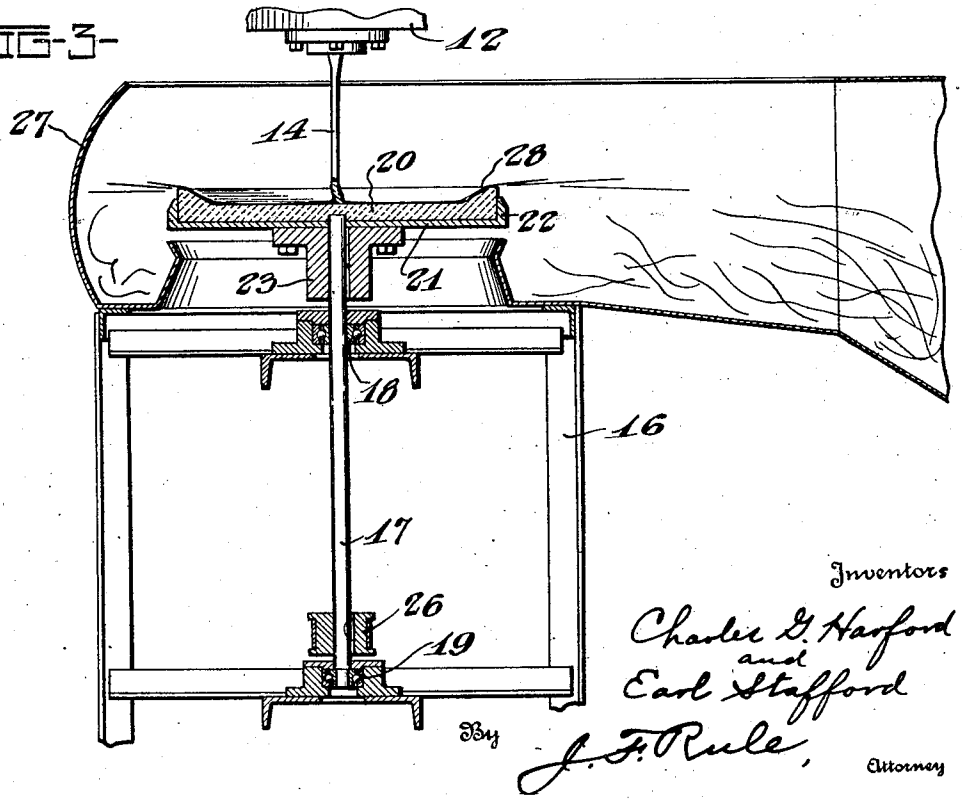


FIG-3-



Inventors

Charles G. Harford

and

Earl Stafford

By J. F. Rule,

Attorney

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METHOD FOR SPINNING GLASS

Charles G. Harford, Wollaston, Mass., and Earl Stafford, Philadelphia, Pa., assignors to Arthur D. Little, Inc., a corporation of Massachusetts

Application March 9, 1934, Serial No. 714,776
Renewed May 12, 1938

9 Claims. (Cl. 83—91)

Our invention relates to a method and apparatus for flowing a stream of molten glass or other material and spinning it into fine threads which may be collected into a loose mass known in the trade as wool. The invention in its preferred form comprises means for flowing a small stream of molten glass onto a horizontally disposed disk or spinning element which is rotated at a high speed and thereby draws the molten stream out into a fine thread or filament.

Referring to the accompanying drawings:

Fig. 1 is a part sectional side elevation of apparatus constructed in accordance with our invention.

Fig. 2 is a plan view, the feeder being omitted.

Fig. 3 is a sectional elevation at the line III—III on Fig. 2.

Referring to Fig. 1, a furnace tank 10 provides a continuous supply of molten glass 11 which flows into the forehearth extension or boot 12, the latter provided with a bottom outlet opening 13 through which the glass issues and flows downward continuously in a small stream 14. The size of the stream may be regulated by a vertically adjustable plug 15.

The spinning machine comprises a framework 16 in which is rotatively mounted a vertical shaft 17 having upper and lower bearings 18 and 19 in the framework. A horizontally disposed spinning element, which may be in the form of a cupped disk 20, is mounted on the upper end of the shaft 17. The disk, when molten glass is being treated, is made of sillimanite, steel, or other suitable material capable of withstanding the high temperatures to which it is subjected. The disk 20 if made, for example, of sillimanite, is preferably mounted in a steel holder or carrier 21 designed to prevent cracking or other damage due to the high speed of rotation. The holder 21 is in the form of a circular disk or plate having a circumferential flange 22 surrounding the disk 20. A hub 23 attached to the plate 21 is splined or keyed on the shaft 17. The shaft 17 and spinning disk 20 are rotated at a high speed by means of an electric motor 24 having a driving connection with the shaft through a belt 25 running over a pulley 26 on the shaft. Mounted on the frame 16 is a casing 27 which may surround the spinning disk to receive and prevent scattering of the glass wool as it is thrown from the spinning disk.

In operation, the stream 14 of molten glass flows continuously onto the spinning disk 20 at a point which is preferably adjacent the center of the disk. The stream of molten or plastic glass as it is brought progressively into contact with the rapidly rotating disk, is drawn out into a comparatively fine thread or filament which is carried or thrown by centrifugal force toward the periphery of the disk. The latter is formed with an upwardly and outwardly inclined peripheral surface 28 which prevents the glass from being thrown off the disk before it has been drawn out to the desired fineness. The surface 28 may be inclined or curved upwardly to any desired extent, depending on the specific results desired. The glass as it is thus spun into a fine filament is immediately cooled and solidified by its exposure to the atmosphere and accumulates in a loose mass within the casing 27 from which it may be removed manually or automatically. The fineness of the fiber may be adjustably regulated by adjusting the size of the stream 14, by regulating its temperature, by adjustably varying the speed of the disk, and by adjusting the position of the spinning disk beneath the stream so that the latter falls on the disk at a greater or less distance from the center thereof. The upper surface of the disk 20 may be roughened to provide the desired frictional contact with the glass and prevent it from being thrown too rapidly or prematurely from the disk.

In the preferred form of the invention, as herein shown, the spinning element 20 is horizontally disposed with the stream of molten glass falling upon its upper surface. The invention, however, is not limited to this particular position or arrangement of the spinning element. In whatever position it is placed, the high speed of the spinning element flings the material outwardly by centrifugal force so that it is drawn into fine threads or filaments.

Although molten glass is the material which is particularly described herein, the process is adapted for use with other materials which can be worked while in a viscous and molten condition. These materials should be run onto the spinning element while they are at such a temperature that as they are projected from the spinning element they are near enough to the solidifying temperature to string out into filaments and harden or set in that shape. The invention can be practiced with any materials which possess these required physical properties or characteristics. Glass, resin and various grades of hard asphalts are examples of materials which have been successfully used in practicing this method of making fibrous material.

Modifications may be resorted to within the spirit and scope of our invention.

We claim:

1. The method which comprises continually projecting from a supply body of molten material, an integral stream of said material in viscous condition, contacting said stream at a point remote from the supply body with a surface rotating at a high velocity about an axis, and continuously attenuating said stream to a fine filament after contact with said surface and throwing it continuously from said surface by the force applied thereto through contact with said surface, while maintaining the continuity of said supply body, stream and filament.

2. The method which comprises continually projecting from a supply body of molten material, an integral stream of said material in viscous condition, contacting said stream at a point remote from the supply body with a surface rotating at a high velocity about an axis parallel with the stream flow, and continuously attenuating said stream to a fine filament by the force applied thereto through contact with said surface, while maintaining the continuity of said supply body, stream and filament.

3. The method which comprises flowing an integral stream of heat-plastic material from a supply body of molten material onto a mechanical element rotating at a high speed and thereby arresting the stream, and causing said element continuously to draw out into a fine filament the arrested material and throw it off said element by centrifugal force while still integrally united with the supply body.

4. The method which comprises flowing an integral stream of heat-plastic material from a supply body of molten material onto a mechanical element rotating at a high speed and thereby arresting the stream, causing said element continuously to draw out into a fine filament the arrested material and throw it off said element by centrifugal force as it is formed, and causing said filament to solidify while still integrally united with the supply body and oncoming stream.

5. The method which comprises continually projecting from a supply body of molten glass, an integral stream of said material in viscous condition, contacting said stream at a point remote from the supply body with a surface rotating at high velocity about an axis, and continuously attenuating said stream to a fine filament after contact with said surface, and throwing it continually from said surface by the force applied thereto through contact with said surface, while maintaining the continuity of said supply body, stream, the glass on said surface, and filament.

6. The method which comprises flowing an integral stream of molten glass from a supply body of molten glass onto a mechanical element rotating at high speed and thereby arresting the stream, and causing said element continuously to draw out into a fine filament the arrested material and throwing it off said element by centrifugal force while still integrally united with the supply body.

7. The method which comprises flowing an integral stream of molten glass from a supply body of molten glass into a mechanical element rotating at high speed and thereby arresting the stream of glass, causing said rotating element continuously to draw out into a fine filament the arrested material and throw it off said element by centrifugal force as it is formed, and causing said filament to solidify while still integrally united with the supply body and oncoming stream.

8. The method which comprises establishing a supply body of molten glass, flowing an integral stream of molten glass from said supply body onto a mechanical element rotating at a high speed and thereby arresting the stream, causing said element to continuously draw out the arrested glass by centrifugal force while maintaining traction between the surface of said element and the glass thereon, causing said glass to be thrown off said element by centrifugal force in the form of a fine filament, and causing said filament to solidify while still integrally united with the supply body and oncoming stream.

9. The method which comprises establishing a supply body of molten glass, flowing an integral stream of molten glass from said supply body onto a mechanical element rotating at a high speed about a vertical axis substantially parallel to and spaced away from the line of said stream flow and thereby arresting the stream, causing said element to continuously draw out over the surface of said element the arrested glass by centrifugal force while maintaining traction between the surface of said element and the glass thereon, causing said glass to be thrown off said element by centrifugal force in the form of fine filaments each integrally united with the supply body and oncoming stream, and causing said filaments to solidify while still integrally united with the supply body and oncoming stream.

CHARLES G. HARFORD.
EARL STAFFORD.