

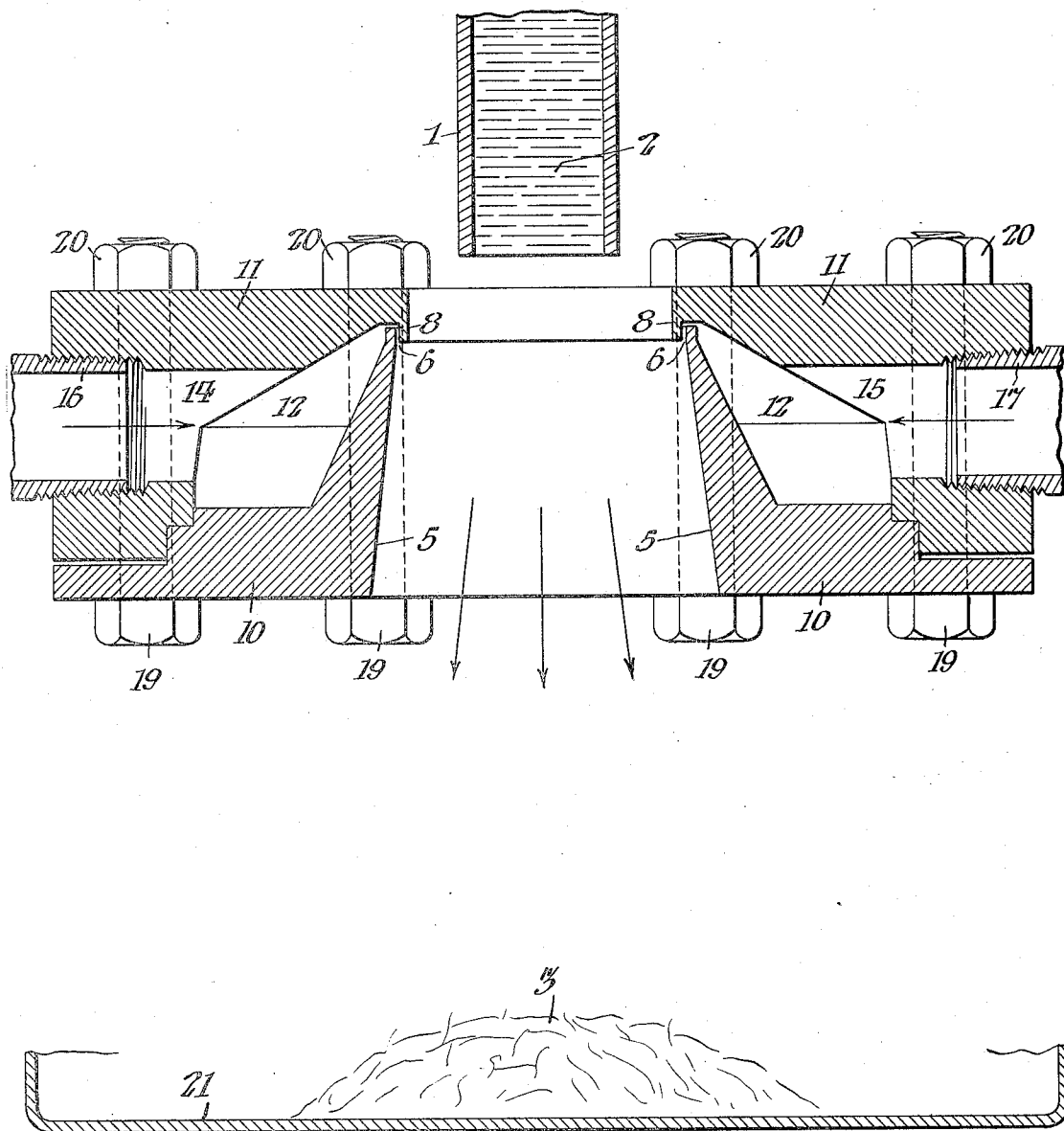
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METHOD OF AND MEANS FOR MAKING SYNTHETIC AMPHIBOLIC PRODUCTS

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METHOD OF AND MEANS FOR MAKING SYNTHETIC AMPHIBOLIC PRODUCTS

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This invention relates to methods and means of the general character described and claimed in my application Serial No. 99,077 filed April 1, 1926, for Letters Patent of the United States for improvement in methods of subdividing material, which are characterized by the subjection of the material in a liquid form to the action of a vacuum which disrupts it; such vacuum being formed within an annular stream of gas which is directed parallel with the flow of the stream of the liquid to be disrupted, at the region of disruption, as distinguished from methods and means of the prior art wherein a stream of gas is directed to a focus at the axis of the stream at such region of disruption. The effect of the latter arrangement, of the prior art, is to create a back pressure upon the material which it is desired to comminute, and thus retard the operation of disruption, whereas, the effect of my invention is to produce a high degree of vacuum at the region of disruption, for instance, a vacuum which will sustain a column of mercury eighteen inches in height, and to consequently greatly facilitate and expedite the comminution of the material; so that apparatus of the character herein claimed has a much larger capacity for production of comminuted material than devices of the same size constructed in accordance with the prior art. The effect of the creation of such a vacuum in the zone at the orifice through which the material to be comminuted is delivered, is that said material ceases to exist as a homogeneous stream when it reaches that orifice; the material composing the stream being torn into a multitude of fine particles which are instantly drawn into the surrounding annular gas stream, wherein they are rapidly chilled. The disruptive effect is such that no stream of said material is visible at the mouth of the orifice; the material being disintegrated before it passes beyond the orifice.

It is an object and effect of my present invention to artificially produce filaments and other structural forms of the various minerals classed as amphibole and including the various forms of asbestos, from the finest va-

riety of white amiantus known as fossil flax and characterized by filaments resembling fine silk or cotton staple, to other forms of such minerals which are characterized by shorter and less elastic fibres and which may be colored gray, green, brown, red, or black, in semblance of the natural color of such minerals.

Such natural minerals are characterized by the association of silica with basic oxides in the form of silicates of calcium and magnesium in the lighter colored varieties and with the inclusion of oxides of aluminum and iron in the darker varieties, with manganese oxide in some varieties and, less commonly, oxides of sodium and potassium.

In other words, the purpose and effect of my invention are to form artificial filaments of silicate of calcium and magnesium with or without the addition of the other constituents of natural minerals of the amphibolic group. As hereinafter described, such raw materials are reduced to liquid form, for instance, by fusing them, and a stream of such liquid is educed by and with an annular stream of compressed air, or other gas, with the effect of diminishing the pressure at the discharge end of the stream of liquefied material, by the discharge of the high pressure gas at high velocity in said surrounding stream of gas; so that such high velocity is imparted to said stream of material, in that region of diminished pressure, that it is automatically shredded into filaments, which are immediately solidified. The dimensions of such filaments are variable in accordance with the relative volumes and velocities of said two streams. The flexibility, elasticity, color and other characteristics thereof are determined by the nature of the composition of the liquid from which they are formed.

My invention includes the various novel features of construction, arrangement and procedure hereinafter more definitely specified.

In said drawing; the pipe 1 forms a conduit for the liquid 2 from which the filaments 3 are to be formed, and has, at its discharge end, the outwardly flared ejector throat tube 5 and means forming a compressed air, steam,

or other gas port 6 leading to said conduit. Said gas port 6 is preferably annular and formed between the inner wall of said throat tube 5 and an annular flange 8 extending

5 within said throat.

Said throat tube 5 and flange 8 are carried by respective separable casing members 10 and 11, forming a gas pressure chamber 12 between them when assembled as shown. Said member 11 has means, including the screw threaded openings 14 and 15, conveniently at diametrically opposite edges thereof, for connection with respective pipes 16 and 17 which thus form conduits for compressed air or gas leading to said chamber 12.

15 Said separable casing members 10 and 11 are conveniently circular, in concentric relation with said conduit 1, and may be held in the assembled position shown by means of a circular series of bolts 19 extending through both of said members and provided with nuts 20.

The structure shown may be utilized to effect the process above contemplated by supplying the liquefied composition 2 for the filaments through the conduit 1; conveniently by gravitative flow from a crucible in which it has been fused. Atmospheric air, under suitable pressure, say, forty pounds per square inch, may be supplied through either or both of said conduits 16 and 17 forming a tubular stream of such air or gas flowing through said port 6 around, and parallel with the axis of, the stream of liquid 2 flowing through said throat 5. The effect of the pressure and expansion of said stream of air or other gas is to create a partial vacuum within it which primarily educes the flow of said liquid and thereafter shreds it to form the filaments 3, the dimensions of which are variable in accordance with the pressure of the fluid upon the liquid and the composition of the latter. Said filaments are immediately solidified upon their separation from the stream of the liquid 2 and may be caught in a suitable receptacle 21 set in spaced relation with the bottom of the structure shown.

The synthetic amphibolic products aforesaid may be used for any purpose for which the natural products are adapted, for instance, as ingredients of heat refractory or flame resistant compositions. However, my invention is applicable to any other material which may be liquefied and solidified; for instance, glass. It may be advantageously employed to comminute chemicals such as sodium silicate to such form as to increase the superficial area and consequent solubility thereof, as compared with the lump or granular forms in which such chemicals are ordinarily prepared for commerce.

Although I have found it convenient to supply the liquid material under atmospheric pressure only; it may be introduced to the stream of air under greater or lesser pressure,

by any suitable means; and although I have suggested forty pounds per square inch as a suitable pressure of the air, steam, or other gas which is to be used to comminute the liquid material aforesaid, the pressure of such fluid may be more or less, and in fact may be several hundred pounds per square inch in accordance with the viscosity of the liquid and the comminuted form desired for the product.

Moreover, it is to be understood that apparatus for ejecting concentric streams of liquid and gas at high velocity in a direction which is initially substantially parallel to the axis of the liquid stream may be otherwise formed and arranged, and such means are broadly claimed in my copending application Serial No. 99,077 filed April 1, 1926, for Letters Patent of the United States for an improvement in methods of subdividing material; although the specific form of such apparatus shown herein is not disclosed in said prior application.

It is characteristic of my invention that the conduit 1 for the molten material is separated from the ejector casing members by a tubular column of air which, by its low thermal conductivity, inhibits the transfer of heat from the molten material to the ejector elements, and the progress of the molten material into the apparatus is not only effected by the force of gravity, but accelerated by the diminished pressure in the region of the annular orifice 6. The present form is advantageous in that the liquid cannot clog the discharge throat, because the area thereof increases in the direction of the flow of the material.

Therefore, I do not desire to limit myself to the precise details of construction, arrangement or procedure herein contemplated, as it is obvious that various modifications may be made therein without departing from the essential features of my invention, as defined in the appended claims.

I claim:

1. The method of making synthetic amphibolic filaments, resembling cotton staple, in form, which consists in progressing a stream of molten liquid calcium and magnesium silicate within and by a tubular stream of compressed gas released to the atmosphere and moving, with accelerated velocity, in coaxial relation with said stream of liquid, and at such greater velocity than said liquid as to create a partial vacuum within said stream of gas, and impart such accelerated velocity to the liquid stream as to immediately shred it into filaments; said stream of liquid being initially in spaced relation with said stream of gas and surrounded by a zone of atmospheric air, serving to heat insulate it from the means for directing said stream of gas, and inducing, by the accelerated velocity of said gas stream, the flow of said atmospheric air around and with said liquid into the region of said partial vacuum, and

contemporaneously cooling and discharging said filaments in solid form by the combined action of said streams of compressed gas and atmospheric air.

2. A method as in claim 1; wherein the size and form of the filaments, of a given composition, is variable by and in accordance with variations in the gas pressure.

3. Means for effecting the method specified; including a conduit for the liquid; an ejector throat tube at the discharge end of said conduit, longitudinally spaced from said conduit within the range of its vacuum producing effect and in radially spaced relation therewith, affording a passageway for treated gases between said conduit and said tube parallel with the axis thereof; said ejector throat tube being parallel with the axis of said conduit at its end adjoining said conduit and outwardly flared at its end remote from said conduit.

4. Means as in claim 3; forming an annular gas passageway in concentric relation with the axis of said conduit and throat, and opening into the flared portion of the latter.

5. Means as in claim 3, including concentric rigidly connected but axially separable casing members in axial and radial spaced relation with said conduit; said casing member axially remote from said conduit including said outwardly flaring throat tube having a hollow conical wall with a cylindrical portion at its end nearest said conduit; said other casing member, nearest said conduit, having a cylindrical flange concentric and parallel with the axis of said conduit and extending outwardly from the latter into said throat, in radially spaced relation therewith and forming an annular passage for the compressed gas; said casing members forming between them an annular chamber for said compressed gas; and a compressed gas supply conduit rigidly connected with said casing member adjoining said conduit and in communication with said gas chamber.

6. Means as in claim 3; including concentric rigidly connected but axially separable casing members in axial and radial spaced relation with said conduit; said casing member axially remote from said conduit including said outwardly flaring throat tube having a hollow conical wall with a cylindrical portion at its end nearest said conduit; said other casing member, nearest said conduit, having a cylindrical flange concentric and parallel with the axis of said conduit and extending outwardly from the latter into said throat, in radially spaced relation therewith and forming an annular passage for the compressed gas; said casing members forming between them an annular chamber for said compressed gas; and a compressed gas supply conduit rigidly connected with said casing member adjoining said conduit and in communication with said gas chamber; said

casing members being circular in concentric relation with said conduit, and having a series of bolt openings therethrough; and a series of bolts extending through said holes and provided with nuts adapted to clamp said casing members in rigid relation.

7. Means as in claim 3, including two circular casing members in coaxial relation; one of said casing members having a circular recess in coaxial relation with said conduit forming a gas chamber; the other of said casing members having a circular projecting fitting into said recess; whereby said casing members are positioned in concentric relation; and a series of bolts extending through said casing members and provided with nuts adapted to rigidly connect said casing members.

8. Means as in claim 3, including two casing members in coaxial relation with said conduit; one of said casing members having a recess forming a gas chamber with a circular outlet in coaxial relation with said conduit; the other of said casing members having a circular projection fitting into said circular outlet, in concentric spaced relation therewith; and means securing said casing members in relatively stationary position; whereby gas is directed from said chamber in a circular tubular stream parallel with the axis of the liquid stream from said conduit.

In testimony whereof, I have hereunto signed my name at Plymouth Meeting, Pennsylvania, this twenty-second day of March, 1930.

GILBERT E. SEIL.

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