GRANULATED FOAMED GLASS AND 
PROCESS FOR THE PRODUCTION 
THEREOF

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References Cited
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ABSTRACT
An expanded glass aggregate has a granulometry of 0.2 
to 3 mm and 10⁶ to 10⁷ cavities filled with gas per cm³. 
The diameter of the larger cavities is substantially 
smaller than 0.1 mm. All or a majority of the cavities are 
closed cells having a similar size. The expanded glass 
aggregate may contain in addition up to 85% of con-
crete, lava and/or tuff. For the preparation, the raw 
material is ground into a flour, mixed with a blowing 
organic and/or inorganic material appropriate to hot 
release gas, and a semi-finished aggregate is formed 
with a diameter of the granules of 0.1 to 1.5 mm. This 
aggregate is heated in a vibrating or suspended furnace 
during 5 to 180 seconds at a temperature of 600° to 900° C. 
The expanded glass aggregate is removed away from 
the furnace before a significant number of small cavities 
formed during the blowing gather to form larger cavi-
ties.

4 Claims, No Drawings
GRANULATED FOAMED GLASS AND PROCESS FOR THE PRODUCTION THEREOF

CROSS REFERENCE TO RELATED CASE

This application is related to the commonly assigned, copending United States application Ser. No. 196,552, filed June 2, 1980, entitled "BLOWING AGENT FOR PRODUCING GLASS FOAM FROM PULVERIZED GLASS AND MANUFACTURING PROCESS THEREOF," and listing as the inventor OTTO ANTON VIELLI.

The invention relates to a granulated foamed glass, produced by furnace blowing, as well as to a process for the production thereof.

Some processes are already known (cf. Swiss Patent Specifications Nos. 426,601 and 473,741; U.S. Pat. No. 3,321,414) for producing granulated foamed glass from glass powder by addition of a blowing agent which is releasing gas at higher temperatures. Such granulated material is mainly used as a component in lightweight concrete.

Further, a process for producing foamed products from silica gel is known (cf. French Published Application No. 2,242,561), wherein silica gel, without any blowing agent, is pre-baked at 500° to 900° C., whereafter baking is completed at 1000° to 1450° C. Depending on the raw material used and the more costly production, the products obtained are considerably more expensive than granulated foamed glass, so that their use is restricted.

By the so far known processes, upon blowing natural or artificial silicates, particularly glasses as well as clays, which preferably was done in rotary kilns with a low rate of temperature increase, granulated material was obtained in which the small cavities primarily formed, and regularly distributed, in the further course of blowing combined into larger cavities, whereby cavities survived in the remaining walls. This kind of cavity formation may also be found in nature in volcanic earths originating from cooled magmas.

During blowing, the blowing mixture which is in liquid or pasty state, and is composed of cavities and homogeneous material, at least partially rearranges itself into a homogeneous polymeric foam having thin cell walls, whereas in the further course of blowing entire zones of polymeric foam combine into large cavities delimited by thick walls containing microcavities.

In the process according to the invention, blowing is stopped once a homogenous cavity formation was reached in the initial phase, in which a polymeric cell structure which at least essentially is homogenous was built as well, so that the formation of larger cavities, which would considerably lower strength, is avoided.

By this, the ideal equilibrium structure in which three lamellas congregate along one edge, whereby two of them include an angle of 120°, at least for the most part survives.

In particular, this state can be obtained by blowing the raw granules by means of a relatively short heat blast, and thereafter slowly cooling down the blown granules.

It is indicated to effect blowing with increasing size of the raw granules, within the given time/temperature range, using longer durations and lower temperatures.

EXAMPLE

A. GLASS POWDER

Glass wastes are melted. The melt is blown into glass fibers which are ground into a fine glass powder.

B. ADJUVANT

The paste described below is prepared. It serves on the one hand as a binding agent for the glass powder in the subsequent granulating, and on the other hand as a flux and a blowing agent in the later blowing.

100 parts by weight water
32 parts by weight water glass
4 parts by weight glycerol
15 parts by weight sodium bentonite

are stirred together to form a fluid paste.

C. RAW GRANULES

The paste obtained according to B. is added to and thoroughly mixed with 500 parts by weight of the glass powder obtained according to A.

The so obtained composition is formed in a granulator into raw granules having a diameter of about 1 mm. Thereafter, the humid granulated material is dried on a drying belt at about 600°C. Any blowing does not yet take place, and the blowing power of the blowing agent if not affected.

By the pre-heating associated with the drying at the said high temperature, the throughput of the blowing furnace during subsequent blowing is increased.

D. BLOWING

Blowing of the pre-heated raw granules obtained according to C. is effected in a vibrating rotary kiln at about 700°C, using finely powdered aluminium oxide as a parting agent, whereby the furnace walls and the parting agent have a temperature which is about 50°C higher.

In order to increase the efficiency of the furnace, the hot parting agent is recycled to the feeding side of the furnace.

The emerging blown granulated foam glass, having a granulometry of about 2 mm, is slowly cooled down on a cooling belt.

What is claimed is:

1. Granulated foamed glass, produced by furnace blowing, characterized in that it has a granulometry of 0.2 to 3 mm, $10^6$ to $10^7$ cavities per cm$^3$, a compressive strength of at least about 120 kg/cm$^2$, a bulk density of 100 to 500 g/liter, and that the diameter of the largest cavities essentially is smaller than 0.1 mm.

2. Granulated foamed glass as claimed in claim 1, characterized in that it contains as cavities by the majority closed cells of the same order of magnitude.

3. Granulated foamed glass as claimed in claim 2, characterized in that it contains as cavities essentially exclusively closed cells of the same order of magnitude.

4. Granulated glass foamed glass as claimed in any one of claims 1 to 3, made from material which contains, besides glass, in addition up to 85% by weight of pumice, lava and/or tuff.