Aug. 13, 1935. J. P. HORNE 2,011,245

AGGLOMERATED FUEL PACKAGE

Filed Oct. 31, 1931

Fig. 1.

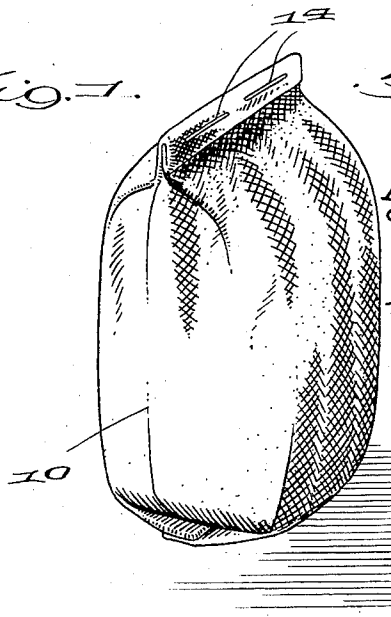


Fig. 2.

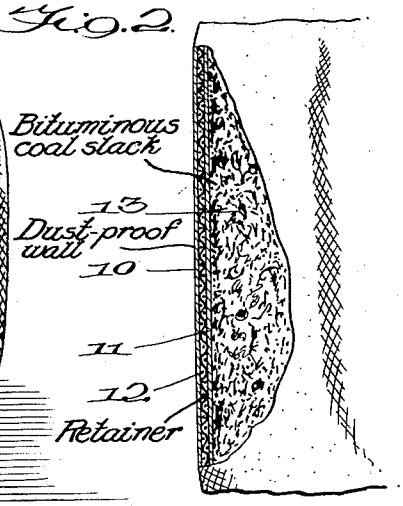
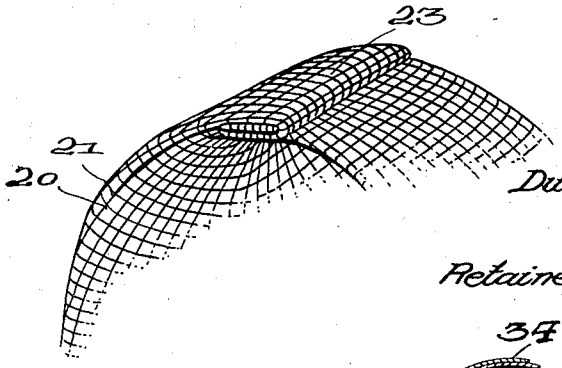


Fig. 4.

Fig. 3.



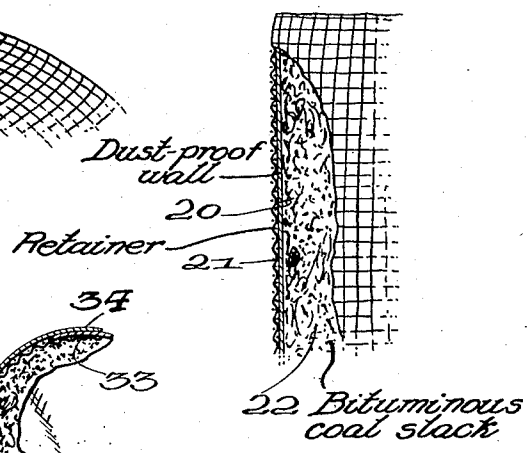
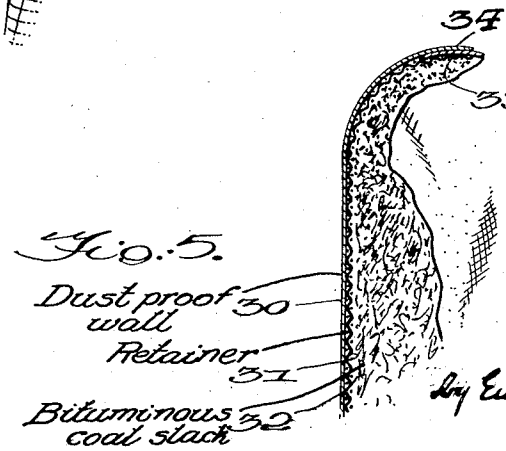


Fig. 5.



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AGGLOMERATED FUEL PACKAGE

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Application October 31, 1931, Serial No. 572,406

2 Claims. (Cl. 44—40)

This invention relates to the utilization of coal slack, coal fines, or like materials, and aims to provide an improved method and means for the agglomeration and combustion thereof.

Attempts have been made to utilize slack materials for combustion in agglomerated form by briquetting the same with binder materials such as clay, oils, tars and the like, but great difficulty has been experienced in obtaining a product capable of withstanding the effects of handling or exposure to the weather and which will undergo combustion without disintegration accompanied by blanketing of the draft and loss of large quantities of combustible material in the ash. Furthermore, it has been found that in many instances briquetting with binders has increased the smokiness of the fuel, and that the cost of binder materials and briquette forming and treating equipment has rendered briquetting processes uneconomical.

According to my invention the coal slack or other material which it is desired to agglomerate is enclosed within a casing adapted to retain the material in position until constituents of the material become sufficiently coked or plastic to retain the material in agglomerated form, after which the casing becomes reduced to such condition as to readily pass through the grate along with the fuel ash. Furthermore, particular embodiments of my invention provide for facilitating and rendering more cleanly the handling of the material, provide for reduction of soot in the flues and chimney and, for open grate use, provide for pleasing flame characteristics.

In the accompanying drawing showing preferred embodiments of my invention for the purpose of illustrating the same,

Fig. 1 is a perspective view of one form of agglomerate package according to my invention;

Fig. 2 is a somewhat diagrammatic partially sectional view of the same;

Fig. 3 is a partial perspective view of another embodiment;

Fig. 4 is a partial diagrammatic vertical sectional view of the same; and

Fig. 5 is a diagrammatic partial vertical sectional view of a further embodiment.

In practicing my invention I first determine the size and character of coal slack to be agglomerated. For best results the material should be of such character that constituents of it will be reduced to a plastic condition by heat. When agglomerating bituminous coal slack or similar material no special provisions need be made because such materials already have this desired characteristic.

In applying my invention with other materials such as anthracite slack, it is desirable to intermingle therewith a sufficient portion of bituminous coal or the like to impart to the material this desired property.

The material is then to be agglomerated in package form, taking into account the size of its particles and the rapidity with which the agglomerate will coke sufficiently to hold its shape.

Referring particularly to Figs. 1 and 2 of the drawing and assuming that the agglomerate consists of bituminous coal slack passing through a half inch mesh screen and containing all the smaller fines and dust, I provide a package which in the form shown consists of a paper bag having an outer paper wall 10 and inner paper wall 11 embracing a heat resistant mesh 12 therebetween. The filaments of the mesh are preferably spaced apart a distance somewhat less than the size of the largest particles in the agglomerated slack, in this instance a distance somewhat less than a half inch. It is advantageous from the standpoint of economy to use as large a mesh as possible within the limit of size which will retain material in agglomerated form after the desruction of the paper walls 10 and 11, but it is obvious that the size of the mesh may vary widely within this range without departure from my invention. The slack mixture 13 containing half inch and all smaller particles is packed tightly into the package, and because of the varying sizes of particles in the mixture voids are almost entirely eliminated. The package is then closed in any suitable manner to hold the material in agglomerated form, and in the form shown in Fig. 1 this is accomplished by gathering the top of the bag, folding it over tightly and securing it with staples 14.

The spacing of the mesh, as above mentioned, is so determined as to maintain the agglomeration of the filling 13 after burning away of the paper layers 10 and 11, and the size of filaments making up the mesh 12 should be so chosen that these filaments will resist the heat of combustion until substantial coking of the filling 13, but become capable of passing the grate with the ash after combustion of the agglomerate material. If wire is used for this mesh 12 it should be large enough, depending upon the metal from which it is made, to not burn out or melt before coking of the agglomerate, and fine enough or of such metallic composition as to burn out or melt at temperatures reached in the fire so as to reduce it to

a form capable of passing through a grate. Thus copper wire of suitable size will retain material until sufficiently coked and will thereafter melt into globular form, and iron wire will retain the filling until coked and afterwards be melted or partially, or even completely, burned in a hot fire. If non-metallic materials are used these may of course be such that they will retain the agglomerate until coked and then be crumpled in the ash and have such slight strength as to be torn away by the ash passing through the grates if perchance they should catch thereon. Numerous fire resisting materials may be used for this purpose.

In the form shown in Figs. 3 and 4 the external wall 10 of Figs. 1 and 2 is omitted and the package comprises only an internal wall 20 adapted to prevent the material 22 from sifting out of the package during handling and an external mesh 21 of characteristics similar to those of the mesh 12 of the preceding embodiment. As indicated at 23 in Fig. 3 if the wire mesh is inherently rigid, as may be the case with iron wire for example, the closure of the end or ends of the package may be effected by merely folding over the material and pressing it down tightly into place.

With this form of the invention, as well as the form in Figs. 1 and 2, the mesh to a degree protects the internal wall from puncturing during handling, and also tends to take strain off this wall by supporting it against the material.

In the form shown in Fig. 5 the internal wall of Figs. 1 and 2 is omitted and the package comprises only the external wall 30, which prevents sifting out of the smaller particles of material 32, and the mesh 31, which is similar to that of the preceding embodiments, is positioned within the outer wall 30. In the form shown in this embodiment the casing may be simply tubular in form and as indicated at 33 the wire 31 may be simply folded over on the filling 32 at the end of the package and the paper wrapper may be adhesively secured over the end as at 34.

This form will effect an economy of mesh 31 and is suitable for use where the mesh is fairly self-sustaining and where the commodity will not be subject to excessively rough handling.

The packaged agglomerates may be of any desired size suitable for combustion under the conditions of use for which they are intended. Convenient sizes for domestic use will be one to five pound packages; for other uses ten pound, or even larger, packages may prove desirable. As the paper walls 10, 11, 20 and 30 or the like prevent the finer particles from sifting out of the package during handling, even bituminous materials prepared in agglomerate form according to my invention are rendered a cleanly commodity, suitable for domestic use.

As above mentioned, the improved fuel package is particularly adaptable for modification to prevent the accumulation of soot in stoves and chimneys or the like or to produce a pleasingly colored flame. For these purposes the paper walls of the container may be impregnated or coated with various salts or materials which will tend to prevent accumulations of soot or to color the flame, or such materials may simply be inserted in the package. These ends may also be attained by incorporating zinc or other soot reducing or flame coloring metals in the mesh or by utilizing impregnated mesh of non-metallic fire resisting materials, such as asbestos or the like.

In the event that the commodity is to be so excessively exposed to the action of the elements that an ordinary paper wall might be injured by the exposure, the packaged agglomerates may be either constructed with water-proof walls corresponding to the walls 10, 11, 20 or 30 or have their paper walls coated or impregnated with water-proofing material after the package is formed to provide additional protection.

Thus my invention provides for an improved fuel package which holds the slack in agglomerate form and actually provides a new method of handling bituminous slack or like arenaceous, friable or disintegrable material rendered cohesive by heat which may be summarized as separating such material into lots of individual bulks predetermined by the use to which the commodity is to be put; encasing such lots in substantially dust-proof packages comprising a substantially continuous layer of combustible material to prevent loss of material from the lots and render the packages clean to handle, and further comprising a mesh of material at least temporarily fire resistant; and applying said packaged lots to the fire with draft voids therebetween that the combustible package material may be burned away to admit air to the package for combustion of the friable material, and that the friable material may be rendered cohesive as an initial step of the combustion thereof to hold it in place and maintain the draft voids during combustion. It is apparent that the provision of a mesh of material only temporarily fire resistant, or a material which will be converted into globules or ash, or which will in any other way be rendered incapable of clogging the grate after complete combustion of the commodity, all contribute to the success of the combustion of friable material rendered cohesive by heat according to my invention, as do also the provision of flame coloring or soot minimizing constituents as elements of the individual agglomerated packages used according to my invention.

I find that much more complete and satisfactory combustion is attained in the burning of such fuels in accordance with my invention than is attained by briquetting the same and that in addition the commodity is much more cleanly handled and much less subject to shrinkage due to disintegration in handling than are commercial forms of briquettes. Furthermore, particularly in the larger size packages, the cost of preparing package fuel for combustion according to my invention is less than the cost of preparing similar quantities of fuel by briquetting processes which are rendered expensive by the quantity of binder required and the extensive equipment necessary to successful briquetting. Moreover, the filling of the voids in the agglomerates made according to my invention, either by the inclusion of fine particles of slack therein or the production of such fine particles by breaking down of larger particles on the application of heat, provides for good coking of the agglomerates and eliminates blanketing of the draft and high carbon loss of the ash. The extremely complete combustion thus attained by maintenance of free draft reduces the ash to a minimum, and because of the even burning attained it is unnecessary to force portions of the fire whereby clinkering is minimized, particularly if a slack is chosen, the ash of which is non-fusing at the temperatures to which it will be subjected during combustion.

My invention is not limited to the specific

forms disclosed, and improved features of my method and commodity for combustion may be employed in other embodiments than those disclosed for purpose of illustrating my invention, and having disclosed preferred embodiments of the invention what I claim to secure by Letters Patent is:

1. A fuel package encasing an agglomerate of bituminous coal slack, which is a friable material rendered cohesive by heat, said agglomerate consisting of a mixture of relatively non-cohesive particles of various sizes equal to or less than a predetermined maximum size, said particles being closely packed together and thus substantially without voids, said agglomerate being surrounded by a substantially dust-proof combustible casing which avoids sifting out of the finer particles in handling, and said casing comprising means, such as a mesh of at least temporarily fire resistant material of a spacing less than or approximately equal to the predetermined maximum size of particles, which retains the agglomerate after burning of the combustible dust-proof casing until the agglomerate is rendered cohesive by the heat of combustion, and which then becomes reduced to a condition for ready removal with the residues of combustion.

2. An agglomerated fuel package, comprising a casing packed with an agglomerate of bituminous coal slack, which is a friable material initially relatively non-cohesive but rendered cohesive by heat, said casing being tightly packed with said material so as to reduce voids to a minimum, and said casing comprising a substantially dust-proof continuous combustible wall and a mesh-like retainer of temporarily fire resistant material of such size relative to the particles of friable material as to hold the agglomerate together after burning away of the combustible wall until the agglomerate is rendered cohesive by heat.

JOHN PAUL HORNE.