April 16, 1946. C. B. F. YOUNG 2,398,571

FUEL UNIT FOR PRODUCING COLORED FLAMES

Filed Nov. 26, 1941

Fig. 1.

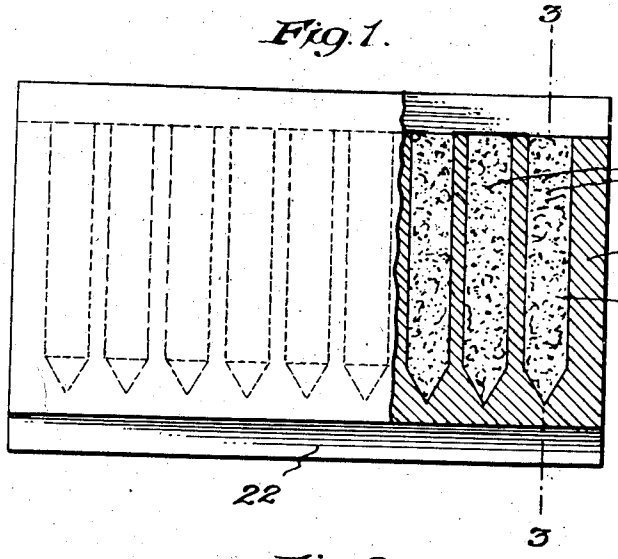


Fig. 3.

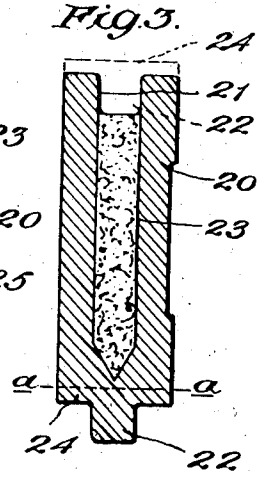


Fig. 2.

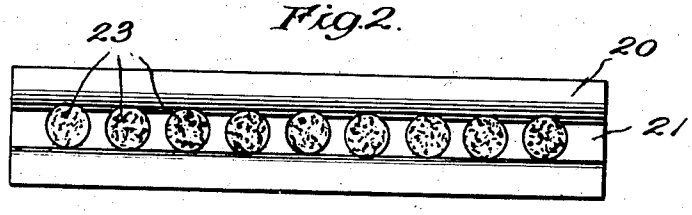


Fig. 4.

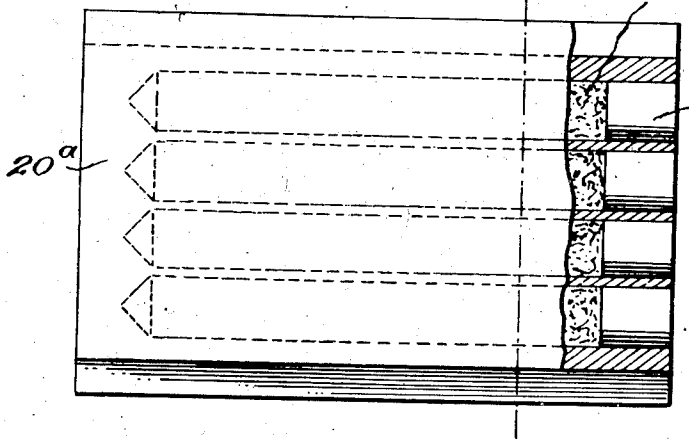
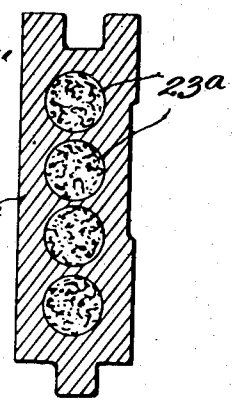


Fig. 5.



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FUEL UNIT FOR PRODUCING COLORED FLAMES

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4 Claims. (Cl. 44—1)

The invention relates to fuel units which when burning will produce flames of various colors.

It is well-known that many chemical salts when burned will produce flames of various colors and it has heretofore been proposed to impregnate combustible materials with solutions of the desired salts so that in the act of burning the combustible materials the chemical salts with which the latter were previously impregnated will impart distinctive colors to the flames.

With the above proceeding the degree of impregnation of the combustible materials with the solutions of chemical salts is dependent for instance upon the density and other inherent qualities of said materials and upon the time period allowed for impregnation. The impregnation with the solutions of salts accordingly is time consuming and more or less haphazard with the result that the coloring of the flames is correspondingly variable when the impregnated combustible materials are burned.

Furthermore in many instances the impregnation of the combustible materials with the solution of chemical salts is more or less superficial so that the resultant coloring of the flames is ofttimes weak and of only short duration.

The invention has for its object to provide a fuel unit containing a definite amount of a predetermined chemical coloring agent and preferably comprising a chemical salt, combined with the unit in a novel manner to produce maximum coloring of the flames over prolonged periods of time.

The invention contemplates further a fuel unit containing a maximum amount of chemical coloring agents, for instance in the form of coloring salts and which in its composition and construction may utilize materials which commonly represent waste of little or no value.

In addition the invention proposes a fuel unit of the indicated type which may be readily commercialized and sold to the consumer in attractive packages or in other readily handled ways.

Other objects will appear from the description hereinafter and the features of novelty will be pointed out in the claims.

In the accompanying drawing, which illustrates examples of the invention without defining its limits,

Fig. 1 is a face view partly broken away of one form of the novel unit comprising a section of wood with tongue and groove;

Fig. 2 is an external view of the grooved edge of said unit;

Fig. 3 is a cross-section on the line 3—3 of Fig. 1;

Fig. 4 is a face view, partly broken away of another form of the novel unit;

Fig. 5 is a sectional view on the line 5—5 of Fig. 4;

Fig. 6 is a face view of an additional form of the novel unit; and

Fig. 7 is an end view thereof partly in section.

In the form shown in Figs. 1, 2 and 3, the unit comprises a body 20 of wood, preferably hard wood, as exemplified for instance by the conventional oak or other hard wood strips used for flooring in buildings. The body 20 may be produced from scrap flooring cut into suitable lengths and in the illustrated example may be 4⅛ inches long which is not to be considered as an arbitrary dimension as the length may be varied to suit individual purposes. The type of flooring from which the unit 20 is produced is provided along one longitudinal edge with a groove 21 and along its opposite longitudinal edge with a tongue 22, the grooves and tongues being dimensioned to co-operate with each other in interlocking adjacent strips in the construction of flooring.

The body 20 is provided with means for combining therewith a quantity of a predetermined chemical and preferably a chemical salt, whereby the flames resulting from the burning of the unit are colored in a predetermined and distinctive manner. In the forms shown in Figs. 1 to 3 inclusive, the means comprises a plurality of recesses or pockets 23 extending transversely into the body 20 from the bottom of the groove toward the opposite longitudinal edge thereof and located in spaced parallel relation lengthwise of said body 20 as shown in Figs. 1 and 2. The recesses or pockets 23 may be individually produced in any convenient manner as by means of a suitable drill or all of the recesses or pockets 23 of a given unit may be simultaneously produced by means of a group of concurrently operated drills or in any other convenient manner. After the recesses or pockets 23 have been produced or at any appropriate time previous thereto, the body is cut transversely in proximity to the tongued edge thereof, for instance, on the dotted line *a—a* in Fig. 3, to provide a separate strip 24 which includes the previously mentioned tongue 22. To complete the unit the recesses or pockets are filled with the previously mentioned chemical as shown at 25, which chemical, as previously stated, preferably is a chemical salt, after which the tongue 22 of the separated strip 24 is fitted into the groove 21 of the body with the

strip and in engagement with the groove edge of said body **20** as shown in Fig. 3. The strip **24** is firmly pressed into engagement with the edge of the body **20** to force the tongue **22** firmly into the groove **21**, and said tongue **22** and strip **24** may be fastened in place on the body **20** in any convenient manner as for instance by placing a small amount of glue into the groove **21** at each end thereof. With this arrangement the normally open ends of the recesses or pockets **23** are closed by the tongue **22** and strip **24** to seal the chemical **25** therein and a block of wood is provided which contains such chemical for coloring the flames of the fire resulting from the combustion of the particular unit.

The unit shown in Figs. 4 and 5 likewise comprises a body **20ª** corresponding to the previously mentioned body **20** and similarly consisting, for instance, of scraps of hard wood flooring such as described hereinbefore. In this form of the unit a plurality of recesses or pockets **23ª** extend in spaced parallel relation to each other lengthwise of the body **20ª** from one end face thereof and terminate interiorly of the body **20ª** for instance near the opposite end face thereof. The recesses or pockets **23ª** may be drilled individually or concurrently in a group or produced in any other convenient manner. The recesses or pockets **23ª** after being filled with a suitable chemical **25ª** which preferably also is a chemical salt, whereby the flames resulting from the burning unit will be colored, are sealed in any suitable way to confine the chemical therein. For instance, as shown in Fig. 4, the normally open ends of said recesses or pockets **25ª** may be closed by blocks or dowels of wood **24ª** which may be fastened in the recesses or pockets **23ª** simply by friction or by means of glue or in any other convenient manner. This arrangement also provides a block of wood which contains chemicals and preferably chemical salts, for coloring the fire resulting from the burning unit, with the chemicals or chemical salts whereby such coloring is produced hermetically sealed in the recesses or pockets **23ª**.

The unit shown in Figs. 6 and 7 comprises a body **20ᵈ** similar to the bodies of the units previously described and as shown in Fig. 11, may be provided with a shallow surface recess **26** such as is conventionally present in flooring of the type referred to hereinbefore. It will be understood that the surface recess **26** is not absolutely essential and is utilized only if it happens to be present in the scrap or other wood from which the unit under discussion is produced. The instant unit includes recesses or pockets **23ᵈ** extending transversely into the body **20ᵈ**, for instance, from the recessed surface thereof as shown in Fig. 7. The recesses or pockets **23** may be arranged in a plurality of groups in spaced relation to each other as shown in Fig. 6, or may be otherwise arranged in any suitable manner. The recesses or pockets **23ᵈ** are filled with a suitable chemical **25ᵈ** which preferably comprises a chemical salt, as in the forms previously described, and may be closed to seal the chemical or chemical salt **25ᵈ** therein in any convenient manner. For instance, a cover **27** of veneer, paper, or any other suitable material, may be glued to the body **20ᵈ** so as to cover the open ends of the recesses or pockets **23ᵈ** and thereby seal the chemical or chemical salt **25ᵈ** therein. If the surface recess **26** is present in the body **20ᵈ**, the cover **27** may be fitted into said recess and secured therein so as to lie approximately flush with the adjacent surface portions of said body **20ᵈ** as illustrated in Fig. 7.

In all of the forms of the novel unit so far described, the respective bodies comprise selected wood, preferably hard wood, and may be produced from scrap flooring or other material which normally constitutes a waste product.

The chemicals which are combined with the units by being placed in the recesses or pockets of the bodies thereof may be of varied type depending upon the colors which are to be produced in the flames and as set forth hereinbefore comprise chemical salts of different kinds. Among the salts which may be used for giving flames of different colors are the following:

Red flames

Strontium nitrate	Lithium chlorate
Strontium carbonate	Lithium acetate
Strontium chloride	Calcium chloride
Strontium chlorate	Calcium nitrate
Lithium nitrate	Calcium carbonate
Lithium carbonate	Calcium chlorate
Lithium chloride	Calcium acetate

Blue flames

Cupric chloride	Cupric chlorate
Cupric sulfate	Cupric nitrate
Cupric acetate	Paris green
Cupric carbonate	

Paris green plus barium nitrate and/or barium chloride

Green flames

Barium chlorate	Barium acetate
Barium nitrate	Barium chloride
Barium carbonate	

Violet flames

Potassium chlorate	Potassium acetate
Potassium chloride	Potassium sulfate
Potassium carbonate	Potassium nitrate

Yellow flames

Sodium chlorate	Sodium acetate
Sodium chloride	Sodium sulfate
Sodium carbonate	Sodium nitrate

It will of course be understood that mixtures of the aforesaid salts may be utilized to produce additional and different hues in the flames resulting from the burning units with which said mixtures of salts are combined.

In some instances the wood units may be made fireproof by impregnating with many materials so that the wood does not burn up or burns very slowly. The fireproofing may take place after the recesses or pockets have been produced in the bodies by placing the units in the following solution or similar fireproofing solutions:

Ammonium phosphate	kg	100
Boric acid	kg	10
Water	liters	1,000

After the desired impregnation has taken place, the wood is dried and then the chemical salt adapted to produce the desired colored flame is placed in the recesses or pockets and sealed therein in the manner described hereinbefore. It will be understood that the sealing means may be combustible to enable the flames to reach the chemical salts, if the body is so fireproofed as to be substantially incombustible. With this type of a unit the body will not burn up at all or will burn very slowly but in any case when placed

in the fire gives off a colored flame for a long time.

Instead of being combined with the bodies in granular, powdered or similar form, the chemical coloring agents or salts may be added to said bodies in the form of pellets, sheets, or the like.

For instance, the selected chemical salt powders may be dampened with water or other suitable bonding substance and compressed into pellets of definite shape. Alternatively the chemical salts may be made, in any convenient manner as by evaporating concentrated solutions of the salts, into sheets of predetermined dimensions, as for instance ⅛" x 3" x 1".

In either case the pellets or sheets may be combined with the bodies of wood or other carrying material in any suitable manner as for instance by being placed within the recesses or pockets of the bodies and sealed therein in any of the ways set forth hereinbefore.

In those forms of the novel unit in which the bodies are provided with a plurality of recesses, each recess may contain a maximum quantity of the same chemical coloring agent or chemical salt, or said recesses may each contain a different chemical coloring agent or chemical salt. In the latter case, the flames resulting from the burning units will exhibit a variety of colors or a blend of the colors of all of the different chemical salts contained in the different recesses.

In all of its forms the novel unit contains a maximum quantity of chemical coloring agents or chemical salts combined with the body in a novel manner to produce the intended colored flames for a maximum time period when the units are placed in the fire to burn. The construction of the units is such as to enable the chemical coloring agents or salts to be combined therewith in a simple and efficient manner, and in uniform definite quantities predetermined by the color effects and other results which it is desired to obtain. The novel units are easily produced from the wood or other materials constituting the bodies, and as previously stated herein may be made from materials which ordinarily are regarded simply as waste products.

Although the present invention has been described in conjunction with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention, as those skilled in the art will readily understand. For instance materials such as zinc, magnesium, aluminum, etc., may be used as the chemical coloring agents in the novel unit to produce flames of various colors. The chemical coloring agents may also be mechanically combined with the bodies of combustible material in any convenient manner. Such variations and modifications are considered to be within the purview and scope of the claims.

I claim:

1. A fuel unit for use as fuel in an open fireplace comprising a body of combustible material designed to burn in said fireplace and provided with a plurality of recesses, chemical salts in solid form introduced into and loosely contained in said recesses, said chemical salts being of the class which produce colored flames when burned, and means for closing said recesses to seal the chemical salts therein, as combustible parts of said unit.

2. A fuel unit for use as fuel in an open fireplace comprising a polygonal body of wood designed to burn in said fireplace and provided along one edge with a groove and having a plurality of recesses extending from said groove into the body of said unit, chemical salts of the class which produce colored flames when burned, introduced into and loosely contained in said recesses, a sealing strip extending lengthwise of the grooved edge of said body for closing said recesses to seal the chemical salts therein as combustible parts of said unit, and a tongue on said sealing strip fitted into said groove and secured therein whereby said sealing strip is fixed upon said body.

3. A fuel unit for use as fuel in an open fireplace comprising a polygonal body of wood designed to burn in said fireplace and provided along one edge with a groove and normally having a tongue projecting from its opposite edge, said body including a plurality of recesses extending from said groove into the body of said unit, chemical salts of the class which produce colored flames when burned, introduced into and loosely contained in said recesses, and a sealing strip cut from said opposite edge of said body and including said tongue, said strip extending lengthwise of said grooved edge and the tongue thereof fitting said groove to secure said strip in place to thereby close said recesses and seal the chemical salts therein, as combustible parts of said unit.

4. A fuel unit for use as fuel in an open fireplace comprising a body of wood designed to burn in said fireplace and provided with a plurality of spaced parallel recesses open at one edge of said body, chemical salts of the class which produce colored flames when burned, introduced into and loosely contained in said recesses, and dowels of wood fitted into the open ends of said recesses to close the same whereby the chemical salts are sealed in said recesses, as a combustible part of said unit.

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