

March 10, 1970

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3,499,239

FIREPLACE FLAME SIMULATING DEVICE

Filed March 22, 1968

2 Sheets-Sheet 1

Fig. 1.

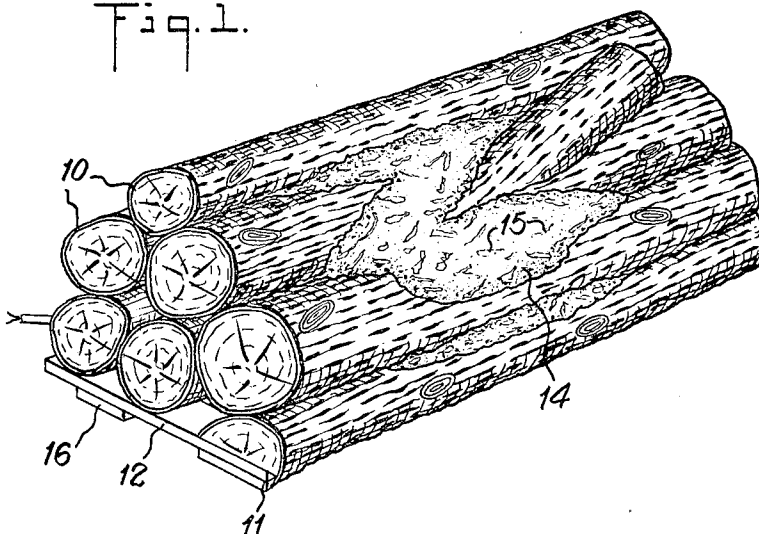
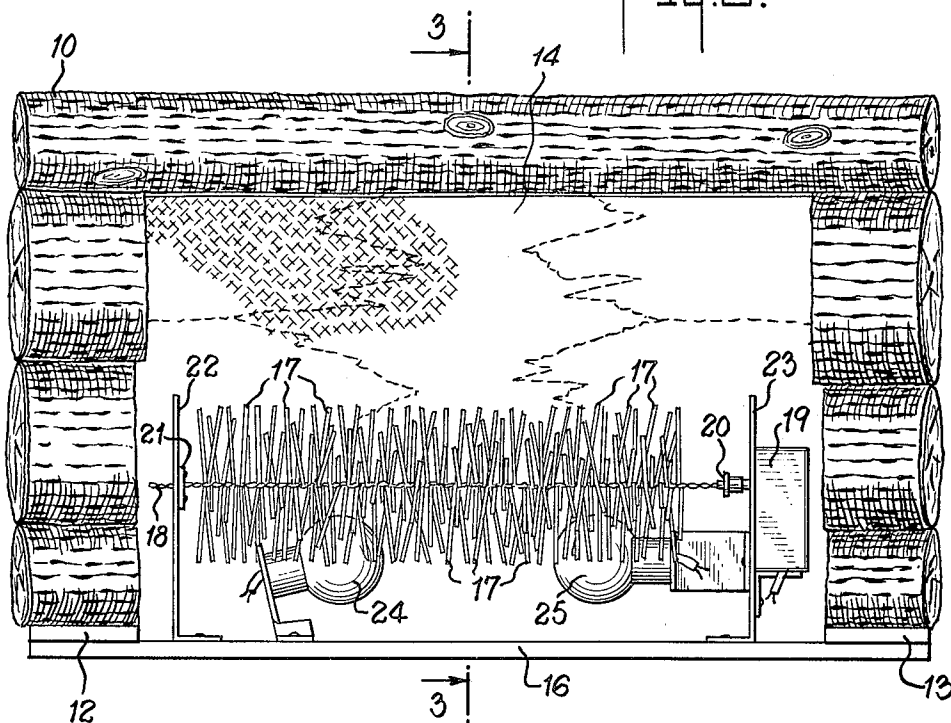


Fig. 2.



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2 Sheets-Sheet 2

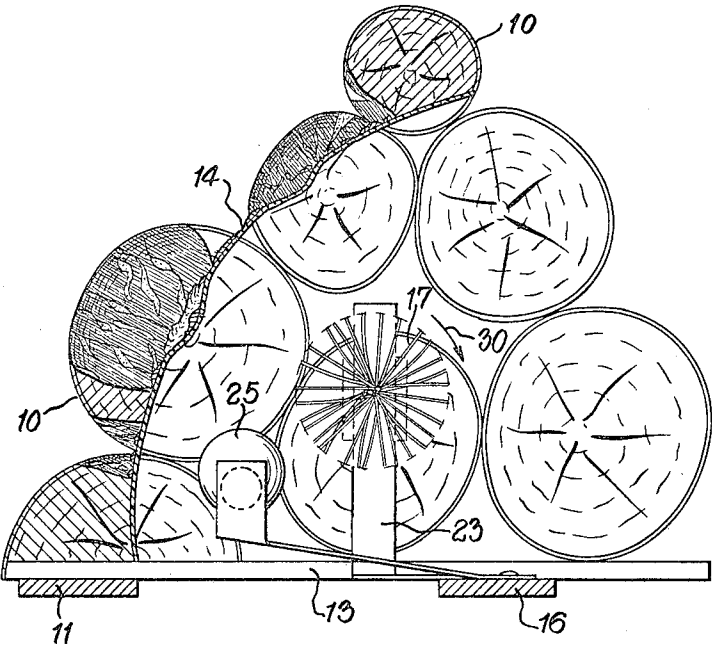


Fig. 3.

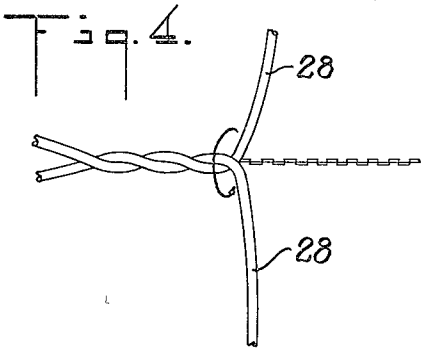
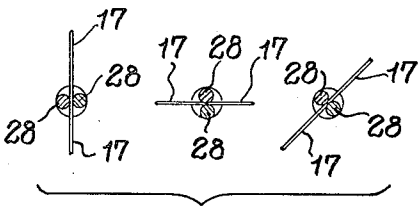


Fig. 5.

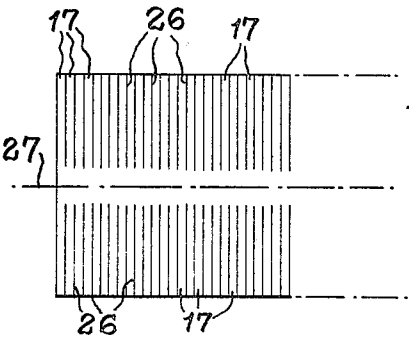


Fig. 6.

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FIREPLACE FLAME SIMULATING DEVICE

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U.S. Cl. 40—106.53

11 Claims

ABSTRACT OF THE DISCLOSURE

A fireplace fire simulating device comprising a member simulating combustible material and having a translucent portion, a motor-driven, rotatable member mounted behind the translucent portion and having a multiplicity of radially extending fingers with mirror-like faces, the fingers being arranged so that they extend in a multiplicity of directions and the rotatable member is brush-like, and a light source arranged to direct light so that it is reflected from the fingers onto the rear face of the translucent portion.

This invention relates to a fireplace device and particularly to a device which simulates a fire of wood or other combustible material.

There are various devices in the prior art for simulating fires of wood, coal, etc., so as to provide means which may be placed in fireplaces or other places to provide a fire simulating effect without actually providing flames or causing combustion. One commercially successful device which provides realistic flames is disclosed in United States Patent No. Re. 24,399, but in its preferred form, using an irregular cylinder, there are certain manufacturing difficulties, such as, being able to produce the indentations uniformly and properly mounting the cylinder, which increase the cost thereof. In addition, the hollow cylinder amplifies any noises, such as the drive motor gear noises, and if it is unbalanced, causes the drive train to produce undesirable noises. Attempts have been made to overcome such problems and cost by replacing the cylinder with a plurality of intersecting blades mounted on a shaft, such a device being shown in United States Patent No. 2,984,032. While the latter device is easier and less expensive to make, it does not provide the more realistic effects of the device in Patent No. Re. 24,399, and it must be obscured by a translucent member. In addition, only leaping flames, regularly occurring at a rate dependent upon the number of blades and the speed of rotation, are produced. The present invention provides a flame simulator which is less expensive to manufacture than either of the aforementioned devices, but which provides an improved flame effect as compared to the device disclosed in Patent No. 2,984,032 and a flame effect more nearly approaching that of the device in Patent No. Re. 24,399.

Thus, the rotatable member of the flame simulator of the present invention may be produced relatively inexpensively by machines known in the art for manufacturing brushes and is simple to mount and rotate with fractional horsepower motors, the weight of the rotatable member being small and uniformly distributed and the center thereof being close to the axis of rotation. Also, the rotatable member provides dispersed, irregular, dancing flame effects as well as the effect of sparks as distinguished from a regular, leaping flame effect.

In the preferred form of the invention, the flame simulating device of the invention is incorporated in a fireplace device which comprises a first member simulating combustible material, such as sticks or logs of wood, having an opening or openings therebetween which are

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at least partially obscured by a translucent member which may have transparent openings therein, a flame simulating device comprising a plurality of relatively narrow fingers of polished aluminum foil extending radially from a horizontally extending shaft mounted behind the first member, the fingers extending in a multiplicity of directions so as to form a brush-like member, means for rotating the shaft at a rate of at least 20 revolutions per minute and preferably between 40 and 60 revolutions per minute, and a colored lamp, e.g. an orange- or red-colored lamp mounted behind the first member in a position such that it is obscured from direct view from in front of the first member either by the sticks or logs or by a relatively opaque portion of the transparent member and between the first member and the rotatable brush-like member in a position such that light from the lamp is reflected from the multiplicity of fingers onto the rear surface of the translucent member.

One object of the invention is to provide a fireplace device similar in effect to the fireplace device disclosed in United States Patent No. Re. 24,399, but which is less expensive and easier to manufacture.

Other objects and advantages will be apparent from the following detailed description of a preferred embodiment thereof, which description should be considered in conjunction with the accompanying drawings in which:

FIG. 1 is a front perspective view of a fireplace device of the invention incorporating the flame simulating device of the invention;

FIG. 2 is a rear elevation view of the fireplace device shown in FIG. 1;

FIG. 3 is a cross-sectional side elevation view of the fireplace device shown in FIG. 1 and is taken along the line 3—3 indicated in FIG. 2;

FIG. 4 is an enlarged fragmentary side elevation view of a portion of the flame simulating device, such view being used to illustrate the manufacture thereof;

FIG. 5 shows sectional end elevation views of portions of the flame simulating device; and

FIG. 6 is a fragmentary side elevation view of a portion of the flame simulating device prior to mounting thereof on the rotatable axis of the flame simulating device.

As illustrated in the perspective view of FIG. 1, the preferred embodiment of the invention comprises a plurality of logs or sticks 10, either natural or artificial, which are secured together in any conventional manner such as by nails, an adhesive, or by being molded on an integral frame of wire lath. The logs or sticks 10 represent combustible material and it will be understood by those skilled in the art that instead of logs or sticks the combustible material may be in the form of other well-known combustible materials such as coal or coke.

Preferably, the logs 10 are mounted on a cross strip 11 and a pair of rearwardly extending strips 12 and 13 which strips 11—13 may be made of wood such as plywood.

The sticks 10 are cut so as to provide an opening substantially centrally thereof which opening is covered by a translucent member 14 which may have a plurality of openings 15 cut therethrough. As used herein, the term "translucent" means that light reflected from a flame simulating member described hereinafter can be observed therethrough, but the light is diffused so that it is difficult if not impossible to determine the shape of the light-reflecting member.

The flame simulating member is mounted behind the translucent member 14 and preferably is mounted on a cross strip 16, such as a strip of plywood, secured to the rearwardly extending strips 12 and 13 by any conventional means, such as wood screws. The flame simulating mem-

ber comprises a multiplicity of fingers 17 extending radially outwardly in a multiplicity of directions from a rotatable shaft 18 which is rotatable by a motor 19 coupled thereto by flexible coupling 20. The rotatable shaft 18 is supported near one end thereof by a bearing 21 mounted on a bracket 22 which in turn is mounted on the strip 16. The motor 19 is also supported on a bracket 23 mounted on the strip 16, and a pair of lamps 24 and 25 are also mounted by suitable brackets on the strip 16. Although in the preferred embodiment the light source comprises a pair of lamps 24 and 25, one of the lamps may be omitted or a greater number of lamps may be employed. Preferably, the lamps 24 and 25 are colored so as to provide light of the desired color, e.g. red, orange, yellow, etc.

The speed of rotation of the shaft 18 is chosen so as to provide the desired flame effect. For example, at relatively low speeds such as 20 revolutions per minute, the effect is one of slow-moving or "lazy" flames and slow-rising sparks, whereas if the shaft 18 is rotated at a higher speed, say 60 revolutions per minute, the flames and sparks move rapidly. Preferably the shaft 18 is rotated at a speed of at least 20 revolutions per minute and may be operated with satisfactory effects at as high as 100 revolutions per minute. With the motor positioned as illustrated in FIG. 2, the direction of rotation of the shaft 18 is counter-clockwise when viewed from the end at which the motor 19 is positioned. Thus, the direction of rotation is in the direction of the arrow 30 (FIG. 3) and is such that when the shaft 18 is rotated, the flames or sparks appear to be moving upwardly when the device is viewed from the front thereof.

As mentioned above, the rotatable member comprising the fingers 17 and the shaft 18 is constructed so that it has a brush-like appearance, and it may be manufactured by techniques well known in the brush-making industry and employed for making circular or cylindrical brushes and for the branches of an artificial Christmas tree. Although the fingers 17 may have a mirror-like reflecting surface on only one side thereof, i.e. the side of the fingers above the shaft 18 which is seen from the front, it is simpler to make the fingers 17 of aluminum foil which is highly polished on at least one side thereof. For example, the fingers 17 may be made of aluminum foil $\frac{1}{1000}$ of an inch thick and may be approximately $\frac{3}{32}$ of an inch wide and $2\frac{1}{2}$ inches long. The hardness of the foil is such that the fingers are self-sustaining, i.e., will remain substantially erect although otherwise unsupported. Heavier foil or other materials may be used to form the fingers 17 and the fingers 17 may have a width greater than $\frac{3}{32}$ of an inch, but preferably there are at least ten, and advantageously at least twenty, radially extending fingers along each inch of the shaft 18 in the axial direction thereof. Wider fingers and a fewer number thereof per inch cause a loss of the desired effect and produce an effect similar to occasionally leaping flames. Although as many as 100 fingers per inch may be used, not more than 50 per inch are normally used.

Although the dimensions of the fingers 17 and the material from which they are made may be such as to make the fingers 17 stiff and relatively inflexible, preferably the dimensions and material are chosen so that the fingers 17 can flex as the shaft 18 is rotated not only for the purpose of providing certain flame or spark effects as the fingers 17 flex but also for the purpose of providing a crackling or fire noise effect as described in the co-pending application of Herman Nielsen and Stephen S. Valliant, Ser. No. 715,416 filed concurrently herewith and entitled Fire Noise Simulator.

Preferably, the rotatable member comprising the fingers 17 and the shaft 18 is made by slitting a sheet or a pair of sheets, one such sheet being shown in FIG. 6, of aluminum foil approximately $\frac{1}{1000}$ of an inch thick and highly polished on at least one side thereof. The sheet is slit along the lines 26 to provide a plurality of fingers 17, and in one preferred embodiment of the invention there

are eleven such fingers per lineal inch. The slit sheet shown in FIG. 6 may be employed as shown or it may be further cut along the line 27 to provide two sets of fingers 17 secured together at their bases. The single sheet or the two sets provided by cutting along the line 27 may be employed by themselves or a pair of similar sets of fingers 17 may be combined therewith and fed in between a pair of relatively stiff wires 28, such as steel wires, as such wires 28 are twisted together in a manner which is well known to those skilled in the brush-making art. Thus, one or more sets of fingers 17 may be superimposed upon each other or may be held so that they extend oppositely to each other and fed in between the wires 28 as they are twisted upon each other. The fingers of each set may be held in alignment with each other, but preferably they are slightly displaced from each other in the direction longitudinally of the axis about which the wires 28 are twisted.

As the sets of fingers are fed between the wires 28 and the wires 28 are twisted, the fingers assume a series of different radially extending positions as illustrated in the sectional views of FIG. 5. If the sets of fingers are fed uniformly between the wires 28 and the wires 28 are twisted uniformly, the fingers 17 will lie substantially in imaginary surfaces extending spirally about the axis of twisting of the wires 28. The resulting structure is brush-like and comprises a multiplicity of radially extending fingers extending in a multiplicity of radial directions from the axis of the shaft 18 formed by the twisted wires 28. In one preferred embodiment of the invention, four sets of fingers 17 described above were fed between a pair of .045 inch steel wires 28 twisted at about $2\frac{1}{2}$ turns per inch for each wire so that there were forty-five radially extending fingers 17 for each inch of length of the shaft 18. With such a density of fingers 17, the rotatable member acts similarly to a light impervious member having a multiplicity of variously oriented, mirror-like, light-reflecting areas and hence provides pleasing flame and spark effect similar to, although not the same as, that of the device shown in United States Patent No. Re. 24,399. However, because of the manner in which the rotatable member is made the cost thereof is less and manufacturing problems of the type heretofore described are avoided.

While the invention has been described with reference to the preferred forms thereof, it will be understood by those skilled in the art, after understanding the invention, that modifications and changes may be made therein without departing from the spirit and scope of the invention as defined by the claims appended hereto.

What is claimed as new and what I desire to secure by Letters Patent of the United States is:

1. A fireplace device comprising a first member having the appearance of combustible material and having a translucent portion, a rotatable second member mounted behind said first member, said second member having an axis of rotation and a multiplicity of fingers extending radially outwardly from said axis, said fingers being closely spaced circumferentially and longitudinally of said axis so as to form a generally cylindrical brush-like member, any given portion of whose area presents a generally uniform array of said fingers, each of said fingers having at least one mirror-like face which faces toward said translucent portion during a portion of the rotation of said second member, means for rotating said second member, and means for projecting light on the mirror-like faces of said fingers in a direction causing reflection of said light from said faces and toward said translucent portion.

2. A fireplace device as set forth in claim 1 wherein said second member comprises at least ten fingers per inch in the axial direction thereof and said second member is rotated in a direction which causes the fingers to move upwardly at the side of the shaft nearer said first member.

3. A fireplace device as set forth in claim 2 wherein said fingers are held by a pair of spirally wound wires which form a shaft for rotating said second member.

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4. A flame simulator comprising a translucent first member, a rotatable second member mounted behind said first member, said second member having an axis of rotation and a multiplicity of fingers extending radially outwardly from said axis, said fingers being closely spaced circumferentially and longitudinally of said axis so as to form a generally cylindrical brush-like member, any given portion of whose area presents a generally uniform array of said fingers, each of said fingers having at least one mirror-like face which faces toward said first member during a portion of the rotation of said second member, means for rotating said second member, and means for projecting light on the mirror-like faces of said fingers in a direction causing reflection of said light from said faces and toward said first member.

5. A simulator as set forth in claim 4 wherein said means for projecting light comprises a light source mounted in a plane intermediate said first and second members and mounted to one side of a plane intersecting and parallel to said axis and intersecting said first member and comprising means shielding said light source from direct observation from in front of said first member.

6. A simulator as set forth in claim 4 wherein said fingers lie in imaginary surfaces extending radially outwardly from and spirally around said axis.

7. A simulator as set forth in claim 4 wherein said second member comprises at least ten fingers per inch in the axial direction of said second member.

8. A simulator as set forth in claim 4 wherein said second member comprises at least ten fingers per inch in the axial direction of said second member and the fingers are made of a size and material which permits said fingers to flex.

9. A simulator as set forth in claim 4 wherein said second member comprises a plurality of fingers gripped between a pair of spirally wound wires extending along said axis.

10. A simulator as set forth in claim 4 wherein said second member comprises a plurality of sets of fingers gripped between a pair of spirally wound wires extending along said axis.

11. A simulator as set forth in claim 4 wherein said translucent member has a plurality of transparent areas.

References Cited

UNITED STATES PATENTS

Re. 24,399	12/1957	Brooks	40—106.53
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