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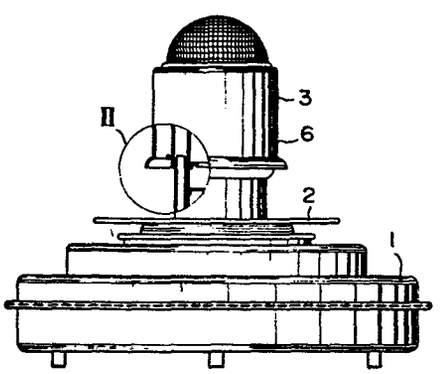
(54) **A wick for combustion of liquid fuel.**

(57) A wick for use with combustion apparatus of the draw-up and vaporization type comprises a primary wick (13) for drawing up and vaporizing liquid fuel, an auxiliary wick (14) provided laterally of the primary wick for lighting and fire spreading, and isolation bodies (17, 18) for separating the primary wick from the auxiliary wick to prevent transfer of liquid fuel there-between. The top end of the auxiliary wick (14) extends above the top end of the primary wick (13), and the lower end of the auxiliary wick is adapted to be positioned above the liquid fuel surface during normal combustion and to be dipped into the liquid fuel only after fire is put out, thereby enabling eliminating deposition of tar-like substances on the auxiliary wick and attaining rapid fire spreading. The primary wick (13) comprises an upper vaporization section (15) and a lower, draw-up member (16) which section and member are detachably connected to each other.

FIG. I



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A WICK FOR COMBUSTION OF LIQUID FUEL

BACKGROUND OF THE INVENTION

This invention relates to a wick for combustion of a liquid fuel in combustion apparatus of the draw-up and vaporization type in which the liquid fuel is drawn up by a capillary action and is vaporized from the surface of a vaporization section extending into a combustion chamber to be burned.

In this type of combustion apparatus, a vaporization section of the wick extends into a combustion chamber which is high in temperature and contains therein oxygen, so that a part of fuel contained in the vaporization section is changed into tar-like substances by oxidation or polymerization to be deposited on the vaporization section. In particular, when fuel is mixed with a very small amount of components of high boiling points such as machine oil, light oil and salad oil or a part of fuel components changes in quality (for example, oxides, dioxides, resins produced when kerosene is stored under the direct rays of the sun for a long time), the production and deposition of the tar-like substances become excessive. Conventional wicks for use with oil combustion apparatus such as oilstoves each comprise a vaporization section which is formed by knitting threads consisting mainly of noncombustible or

flame-resisting fibres such as glass fibres mixed with staple fibres. In such wicks, the diameter of a fibre is large and gaps defined between the threads is also relatively large to enlarge capillary tubes, so that the higher those areas where kerosene is drawn up the less an amount of kerosence contained in the top end portion of the vaporization section to raise the temperature thereof, thereby producing tar-like substances. It has been proposed to thin the top end portion of the vaporization section as compared with the lower portion thereof as well as to form the top end portion of the vaporization section in a diverging configuration for enlargement of the surface area of vaporization and promotion of rapid fire spreading. In this case, the wick exhibits an exceedingly superior fire spreading characteristics at the start, but the areas where fire spreading occurs are supplied with fuel at all times, so that tar-like substances are deposited on such areas after a long use to increase the heat capacity of the vaporization section and to impede the supplying of fuel, thereby reducing the rate of combustion and considerably decreasing the fire spreading speed while producing a large amount of soot, odor and carbon monoxide. Furthermore, in extreme cases, although fire spreads after lighting, fuel burns out at the top end portion of the vaporization section to go out without spreading to other portions of the vaporization section.

In addition, such phenomenon is liable to occur in an early stage when kerosene is mixed with other kinds of oil or changes in quality. With conventional wicks, the vaporization section is united to the draw-up section, so that when a wick becomes unfit for use and needs to be replaced by a new one, several parts constituting the combustion apparatus must be removed to put users to trouble. In this case, it is unavoidable to scrap the entire wick containing the draw-up section which is free of deterioration, thus imposing a costly load on users.

SUMMARY OF THE INVENTION

It is an object of the invention to eliminate reduction in an amount of vaporized fuel due to tar-like substances being deposited on a vaporization section, to effect rapid fire spreading at all times for suppression of odor, soot and carbon monoxide at the time of lighting, and to enable users to cheaply replace a wick by a new one without any special skill when the wick is rendered unfit for use after a long time use.

To eliminate the above problems of the prior art and to attain the desired end, this invention provides a wick which comprises a primary wick, an auxiliary wick provided laterally of said primary wick, and isolation means interposed between said primary wick and said auxiliary wick for interrupting transfer of fuel therebetween, said primary wick comprising an upper vaporiza-

tion section a draw-up section provided below said vaporization section and detachably joined thereto.

With the arrangement described above, the auxiliary wick is not supplied with any fuel from the primary wick during normal combustion, so that fuel contained in the auxiliary wick burns out within a short period of time after lighting and fire spreading to thereby eliminate any deposition of tar-like substances on the auxiliary wick, thus attaining rapid fire spreading at all times. The vaporization section comprises a paper-like sheet made of heat-resisting inorganic fibres which contain large amount of fuel per unit volume to preclude production and deposition of tar-like substances, thereby greatly improving the durability to inferior kerosene. In addition, only the vaporization section can be cheaply replaced by a new one in a simple operation since it is detachably joined to the draw-up section.

The invention will be more fully described hereinafter with reference to the accompanying drawing.

DESCRIPTION OF THE DRAWING

Figure 1 is a vertical elevational view of a combustion apparatus incorporating a wick according to an embodiment of the invention;

Figure 2 is a fragmentary sectional view of a combustion cylinder incorporated into the apparatus of

Figure 1;

Figures 3 and 4 are vertical sectional views of the wick of Figure 1;

Figure 5 is a perspective view of first and second isolation bodies;

Figure 6 is a perspective view of the first and second isolation bodies mounted on the wick;

Figure 7 is a graph of rates of combustion in percentage plotted against combustion hours;

Figure 8 is a graph showing changes in rates of combustion after lighting;

Figure 9 is a graph showing peak values of amounts of carbon monoxide plotted against heights of an auxiliary wick;

Figure 10 is a graph showing fire spreading time plotted against the heights of the auxiliary wick; and

Figures 11,12A, 12B, 13 and 14 are perspective views of arrangements used for replacement of a vaporization section.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figure 1, there is shown a combustion apparatus, into which an embodiment of the invention is incorporated. The combustion apparatus comprises a fuel tank 1, a heat insulation plate 2 mounted on the fuel tank 1 and a combustion cylinder 3

disposed above the heat insulatin plate 2 which is in the form of a triple cylinder.

Referring now to Figure 2, the combustion cylinder 3 is partly shown in section, and comprises cylindrical-shaped inner and outer flame tubes 4 and 5, a cylindrical-shaped outer tube 6 surrounding the outer side of the outer flame tube 5 and cylindrical-shaped inner and outer wick guide tubes 7 and 8 which respectively include fire grates 9 and 10 for supporting the lower ends of the inner and outer flame tubes 7 and 8, respectively. Reference numeral 11 designates a wick which is movable between the inner and outer wick guide tubes 7 and 8 and is adapted to have its upper end extend into a combustion chamber 12 defined between the inner and outer flame tubes 4 and 5 for vaporization and combustion of fuel.

Referring to Figures 3 and 4, the wick 11 is shown in vertical section, and comprises a primary cylindrical-shaped wick 13, an auxiliary cylindrical-shaped wick 14 and a vaporization section 15 which includes a sylindrical vaporizing portion 15a and a second vaporizing portion 15b connected to the lower end portion of the portion 15a. The vaporizing portion 15a consists of a paper-like sheet made of heat resistant inorganic fibres and may be here manufactured from silica-alumina ceramic fibres (silica: alumina = 50 : 50 weight ratio) in paper-like manner and be formed by

adding an amount of binder. The second vaporizing portion 15b consists of woven fabrics of glass fibres. Reference numeral 16 designates a cylindrical-shaped draw-up member made of fabrics such as of cotton, staple fibres or polypropylene, and numeral 17 designates a second cylindrical isolation body which is formed of stainless steel sheet having a thickness of 0.2 mm in this embodiment and serves also as metal fitting for securement of the wick. The auxiliary wick 14 is supported on the inner peripheral surface of the second isolation body 17 and is constructed such that the lower end thereof is positioned above the fuel surface, as shown by broken line L1 - L1', during combustion and is dipped in the fuel when fire is extinguished by lowering the wick from the position as shown in Figure 2 (and is dipped to the position as shown by broken line L2 - L2' upon extinguishment of the fire) and such that the upper end thereof extends upward beyond the upper end of the vaporizing portion 15a upon extinguishment of the fire. The draw-up member 16 is supported on lower, outer peripheral surface of the second isolation body 17. Reference numeral 18 designates a first cylindrical isolation body, on the outer peripheral surface of which is supported the vaporization section 15. The first and second isolaiton bodies 18 and 17 are detachably connected to each other as by bayonet joint, so that the vaporization section 15 is releasably connected to the

upper portion of the draw-up member 16. Reference numeral 19 designates an adhesive tape in the form of sheet. The first and second isolation bodies 18 and 17 constitutes a cylinder as shown in Figure 5 which is secured to the wick to form a releasable unit. The second isolation body 17 is formed at its upper peripheral side surface with projections 20 which passes through guides 21 formed on the lower peripheral side surface of the first isolation body 18 to be positioned in apertures 22 formed in the first isolation body 18 in the circumferential direction. In this position, the lower end surface of the vaporizing portion 15b abuts against the top end surface of the draw-up member 16 whereupon the first isolation body 18 is rotated to displace the projections 20 along the apertures 22, thereby enabling securement of the second isolation body 17 to the first isolation body 18 when the projections 20 reach the rightward ends of the apertures 22. For detachment of the both isolation bodies form each other, the reverse procedures will suffice. In this manner, the vaporization section 15 and the draw-up member 16 are detachably united.

As described above, the vaporizing portion 15a is formed of a paper-like sheet (hereinafter, referred to as ceramic wick) of silica-alumina heat resistant inorganic fibres, so that its durability against inferior kerosene is greatly improved as compared with a

wick (hereinafter, referred to as glass wick) made of a knitted braid of glass fibres which has been conventionally used.

Figure 7 shows a result of measurements in which changes in amounts of burned fuel were measured when kerosene mixed with 0.1 % of salad oil was burned in actual combustion apparatus which incorporated a wick of the embodiment of the invention (ceramic wick) and a conventional wick (glass wick), respectively. As seen from Figure 7, the ceramic wick according to the embodiment of the invention exhibits a substantially superior characeristics (as shown by solid line) as compared with the conventional wick (as shown by broken line). The reason for this is that the vaporizing portion 15a is formed by manufacturing short fibres of ceramic in a manner like paper and binding the resulting product by means of a binder and the short fibres in the resulting vaporizing portion are closely packed to provide a large number of fine and uniform capillary tubes, all of which are capable of drawing fuel up. In contrast, the vaporizing portion consisting of a conventional glass wick is constructed such that long fibres get coarsely interwined to provide fibrous lattices, along which fuel is drawn up, and other spaces in the glass wick except for the fibrous lattices do not contain any fuel. This is satisfied by amounts of fuel contained per unit volume, as shown in Table 1. With the ceramic wick, the

amount of fuel contained per unit volume is scarcely varied whether the height above the fuel surface (hereinafter, referred to as "draw-up height") is 20 mm or 90 mm. In contrast, with the glass wick, the amount of fuel contained per unit volume is reduced the more the draw-up height, and is approximately half that in the case of the ceramic wick when the draw-up height is 90 mm.

TABLE 1

Quality of the vaporizing portion 15a	Amounts of fuel contained per unit volume (g/cm^3)	
	Draw-up height 20 mm	Draw-up height 90 mm
Ceramic wick (the embodiment of the invention)	0.65	0.60
Glass wick (conventional)	0.56	0.32

With the ceramic wick, the surface of the vaporizing portion 15a is suffused with fuel to permit the end surface thereof to serve as a vaporizing surface, and an amount of fuel contained per unit volume is large in the inside of the vaporizing portion 15a where the temperature is lower than at the surface such that tar is hard to be produced, thereby eliminating reduc-

tion in the rate of combustion.

In the glass wick, spaces defined between fibres are large, and the amount of fuel contained per unit volume is not so much at the surface of the vaporizing portion. Accordingly, fuel vaporizes at the surfaces of fibres inside the vaporizing portion, at which surfaces tar-like substances are produced. Thus fuel is prevented from being supplied to the area of the vaporizing portion above that area where the tar-like substances are produced, so that reduction in the rate of combustion is liable to be caused. In this manner, the use of the ceramic wick greatly improves durability to inferior kerosene as compared with conventional glass wicks and the like.

The auxiliary wick 14 is provided in order to speed up fire spreading over the entire top of the vaporization portion after lighting. Conventional wicks consisting of glass fibres are thin in thickness at or near the tip end thereof and diverge at the tip ends thereof so as to increase vaporizing surface areas, so that an amount of fuel contained in the tip end portions is small to cause rapid fire spreading after lighting. With the ceramic wick according to the embodiment of the invention, however, an amount of fuel contained per unit volume is substantial near the tip end of the vaporizing portion 15a, so that rapid temperature rise is hard to be produced after lighting, thus taking much time for

fire spreading. Therefore, the auxiliary wick 14 is provided which includes glass fibres or fire resistant fibres at the tip end thereof for rapid fire spreading. In addition, the tip end of the auxiliary wick 14 extends slightly beyond the tip end of the vaporizing porton 15a whereby after lighting a large flame is formed above the vaporizing portion 15a to ensure fire spreading over the tip end of the vaporizing porton 15a. The lower end of the auxiliary wick 14 is positoned above the fuel surface during burning, and is dipped in the body of fuel after fire is put out by lowering the wick. Thus fuel is drawn up through the wick 13 and the auxiliary wick 14 after fire is put out while transfer of fuel therebetween is prevented by the first and second isolation bodies 18 and 17 such that fuel for vaporization is drawn up through the wick 13 and fuel required for fire lighting and fire spreding is independently drawn up through the auxiliary wick 14. During burning fuel is continualy drawn up through the wick 13 but not through the auxiliary wick 14 since the latter is spaced from the fuel surface. Accordingly, fuel having been drawn up through the auxiliary wick 14 after fire is put out is burnt up in a short period of time after fire lighting and fire spreading, and the auxiliary wick 14 is not supplied with fuel during normal burning, so that deposition of tar-like substances are scarsely found on the wick 14 to enable maintaining fire

lighting and fire spreading characteristics in the initial condition for a long period of time.

Here, it is to be noted that the fire lighting characteristics is largely influenced by the extend over which the tip end of the auxiliary wick 14 extends upward beyond the tip end of the wick 13. Figure 8 shows changes in the rate of combustion at the time of fire lighting (100 % during normal combustion) when the extent described above is 7 mm (curve a), 5 mm (curve b), 3 mm (curve c) and 1 mm (curve d), respectively. In the case of 7 mm of the extend, excessive combustion is observed as shown by the curve a. This is becuase the larger the above noted extend the more an amount of fuel contained in the tip end of the auxiliary wick 14 whereby a large flame is formed above the auxilairy wick 14 after fire lighting to cause rapid temperature rise and an increase in the amount of vaporized fuel, thus rapidly increasing the rate of combustion. In such case, the area over the combustion chamber 12 remains in a low temperature condition to suppress burning reaction, thus resulting in an increase in odor, soot and carbon monoxide. In the embodiment of the invention, excessive combustion was not observed when the above noted extent was 5 mm and less.

Figure 9 shows changes in the peak value of the amount of carbon monoxide at the time of fire lighting when the above noted extend of the auxiliary

wick 14 was varied. As seen from the drawing, the greater the peak value the larger the extend of the auxiliary wick 14. It is to be noted that Figure 9 shows only the peak values and periods of time during which carbon monoxide was produced were quite short. Thereofore, the peak value not much exceeding 500 ppm is believed not to present any problem in actual use. In the embodment of the invention, production of soot (area of oblique lines in Figure 9) was observed when the above noted extend of the auxiliary wick 14 was 5 mm and more. While the peak value of carbon monoxide was low when the above noted extend was 1 mm and less, carbon monoxide was prduced at a relatively high level for a long period of time to disadvantageously provide a large amount thereof as a whole.

Figure 10 shows changes in periods of time required for fire spreaidng when the above noted extend of the auxiliary wick 14 was varied. When the extent was 1 mm and more, fire spreading was completed within ten seconds and less while it took a good long time when the extent was 1 mm and less. This is because flames formed above the auxiliary wick 14 after fire lighting were small when the above noted extend was small, so that an adequate temperature rise and an increase in the amount of vaporized fuel in the circumferential direction of the auxiliary wick 14 could not be brought about to thereby cause odor, soot and carbon monoxide to be

unfavorably produced in large quantities. Judging from the above result, it is required that in order to suppress production of odor, soot and carbon monoxide after fire lighting, fire spreading be rapidly attained over the entire top of the vaporization portion after fire lighting, reduction in an amount of fuel contained in the auxiliary wick 14 as well as vaporization of fuel from the vaporizing portion 15a be promoted, and initial combustion be gradually changed into normal combustion substantially in the form of complete combustion while suppressing excessibve combustion. To this end, the extent over which the auxiliary wick 14 extends beyond the to end of the vaporizing portion 15a is preferably in the range of 1 mm to 5 mm. In addition, the embodiment of the invention is greatly advantageous in that extremely simple replacement can be accomplished by the constitution in which the vaporization section 15 and the draw-up member 16 are detachably connected to each other. More specifically, no matter how superior durability the vaporization sectoin 15 has to inferior kerosene, it is impossible to eliminate production of tar to the utmost. According to the embodiment of the invention, besides improving the durability of the wick as much as possible, only the vaporization section 15 can be replaced in a simple operation in case the wick is deteriorated.

Figure 11 shows a manner in which the vapori-

zation section 15 is replaced by a new one. The tip end of the vaporizing portion 15a is formed diametrically thereof with at least two recesses 23. The first isolation body 18 is provided with latch portoins 24 which are disposed adjacent the recesses 23 of the vaporizing portion 15a and are smaller than the recesses 23. The first isolation body 18 is further provided with bent portions 25 which are directed toward the vaporization section 15. Reference numeral 26 designates a jig which is used for replacement of the wick and is formed at its tip ends with latches 27. In mounting the vaporization section 15 on the apparatus, the projections 20 are moved to the leftward ends of the apertures 22 along the guides 21. Thereafter the latches 27 of the jig 26 are inserted into the latch portions 24 for rotation thereof in an arrow direction a in Figure 11 whereupon the projections 20 are moved in the aperture 22 to be fixed at the rightward ends thereof. When the vaporization section 15 needs to be replaced by a new one after long use of the wick, the latches 27 of the jig 26 are inserted into the latch portions 24 for rotation of the first isolation body 18 in the direction b in Figure 11 whereupon the projections 20 are moved to the leftward ends of the apertures 22. The provision of the latches 27 on the ends of the jig 26 enables readily removing the vaporization section 15 only by engaging the latches 27 with the latch portions 24 and lifting the jig 26 with-

out the necessity of touching the wick soiled with fuel. The latch portions 24 formed on the bent portions 25 serve to engage with the jig 26, and may be notches 24 as shown in Figures 12A and 12B in place of apertures provided that the latches 27 on the jig 26 take suitable configurations.

Another feature of the embodiment of the invention resides in that at least one of the recesses 23 diametrically provided on the tip end of the vaporization section 15 is disposed in facing relationship with a lighting device 28 provided near the vaporization section to thereby improve the lighting characteristics of the apparatus. More specifically, if the recesses 23 were not disposed on the tip end of the vaporization-section 15 in facing relationship with the lighting device 28, the tip end of the vaporization section 15 where a large amount of fuel is contained would be difficult to be subject to rapid temperature rise even when the auxiliary wick 14 is lighted. In contrast, the provision of the recesses 23 in facing relationship with the lighting device 28 results in forming corners 29 on the vaporization section 15 as shown in Figure 11 which corners are so small in heat capacity as to be subject to rapid temperaure rise, thus facilitating fire spreading from the auxiliary wick 14 to the vaporization portion 15a.

Figure 13 shows another manner in which the

vaporization section 15 is replaced by a new one. The first isolation body 18 is provided at its tip end with at least two projections 30 which are disposed diametrically of the isolation body 18 and are bent toward the vaporization section 15 to provide bent portions 25 and latch portions 24. Replacement of the vaporization section by a new one is performed in a manner like the manner as shown in Figure 11. In the embodiment of the invention as shown in Figure 13, the configurations of the latch portions 24 and the latches 27 may be suitably selected. In addition, the embodiment of the invention as shown in Figure 13 has a feature in that the embodiment of the invention as shown in Figure 13 has a feature in that the height x of the projections 30 relative to the tip end of the first isolation body 18 or the second isolation body 17 is smaller than the height y of the auxiliary wick 14 relative to the top end of the first isolation body 18 or the second isolation body 17 to thereby promote fire spreading after fire lighting. On the contrary, if the height x of the projctions 30 were larger than the height y of the auxiliary wick 14, flames would be cooled down due to the large heat capacity of the projections 30 to impede rapid fire spreading. In contrast, in case the height x of the projections 30 is smaller than the height y of the auxiliary wick 14, an annular portion of the auxiliary wick 14 extending above the projections 30 which

portions has a width of (y - x) can take change of performing fire spreading. Table 2 shows how fire spreading is changed when the height of hte auxiliary wick 14 above the vaporization section 15 was set at 4 mm and the height of the projections 30 above the vaporization section 15 was varied.

TABLE 2

Height of the auxiliary wick (y)	4 mm		
Height of the projections (x)	6 mm	4 mm	2 mm
Time required for fire spreading	3 min. and more	22 sec.	8 sec.

When the projections 30 were higher than the top end of hte auxiliary wick 14, flames were completely impeded by the projections 30, thereby resulting in taking much time for fire spreading. When the projections 30 were flush with the auxiliary wick 14, flames were stopped for a short period of time, and fire spreading was effected. When the projections 30 were lower than the auxiliary wick 14, fire spreading was rapidly effected while flames were not impeded.

In the embodiment of the invention, the arrangement in which the projections 30 are bent toward

the wick is for the sake of lowering the top ends of the projections 30 as far as possible. Since pulling and rotating forces are exerted on the projections 30 by engaging the latches 30 of the jig 26 therewith, the projections 30 need to have a relatively large strength and accordingly become large in size. Thus it is difficult to lower the top ends of the projections 30 below the top ends of the auxiliary wick 14 while extending the projections 30 upward, as shown in Figure 14, since the fire spreading characteristics will be marred when $x > y$. For this reason, the projections 30 are bent toward the wick 13 to limit the hegiht of the top ends of the projections 30 above the top end of the first isolation body 18 or the second isolation body 17 to the thickness of the latches 27 of the jig 26 or near, so that the fire spreading characteristics of the apparatus is not marred to present rapid fire spreading at all times while the strength of the projections 30 is maintained.

As described above, the wick according to the present invention makes it possible to suppress production of tar-like substances and eliminate the resulting reduction in the rate of combustion, and is greatly improved in its durability to inferior kerosene as well as in its fire spreading characteristics to maintain the latter for a long time, thereby reducing odor, soot and carbon monoxide produced due to degradation of fire

spreading characteristics. When tar-like substances are deposited on the vaporization section after a long time use to render same unfit for use, replacement of only the vaporization section will suffice since it is detachably connected to the draw-up member. Such replacement is low in cost and is readily and cleanly performed without the necessity of removing any elements constituting the apparatus and touching the solid wick.

It will be understood that various modifications and changes may be made in the configuration of the wick described above which may come within the spirit of this invention and all such changes and modifications coming within the scope of the appended claims are embraced thereby.

CLAIMS

1. A wick for combustion of liquid fuel comprising a primary wick (13) an auxiliary wick (14) provided laterally of said primary wick and having its top end extending above the top end of said primary wick, the lower end of the auxiliary wick being adapted to be positioned above the liquid fuel surface during normal combustion and to be dipped into the liquid fuel after fire is put out, isolation means (17, 18) interposed between said primary wick and said auxiliary wick for interrupting transfer of said liquid fuel therebetween, said primary wick comprising an upper vaporization section (15) and a lower draw-up section (16) provided below said vaporization section and detachably joined thereto.

2. A wick as set forth in claim 1 wherein said vaporization section (15) of the primary wick is held by a first isolation body (18) and said draw-up section (16) of the primary wick is held by a second isolation body (17) and wherein said first and second isolation bodies are detachably joined to each other.

3. A wick as set forth in claim 1 wherein said vaporization section (15) comprises a sheet (15a) formed of heat resistant inorganic fibres.

4. A wick as set forth in claim 1 wherein the top end of said auxiliary wick (14) projects a distance of 1 mm to 5 mm above the top end of said primary wick

(13).

5. A wick as set forth in claim 2 wherein the top end of said vaporization sectoin (15) is provided at diametrically symmetrical locations thereof with recesses (23) and said first isolation body (18) is provided with latch portions (24) which are smaller in size than said recesses and are disposed in facing relationship with said recesses.

6. A wick as set forth in claim 5 wherein at least one of said recesses (23) on the top of the vaporization section is disposed in facing relationship with a lighting means (28) provided near the top end of the vaporization section.

7. A wick as set forth in claim 7 wherein said first isolation body (18) is formed at two or more symmetrical locations on the top end thereof with projections (25) which include latch portions (24) and have the top ends thereof disposed below the top end of said auxiliary wick.

8. A wick as set forth in claim 5 or 6 wherein said first isolation body (18) is bent at locations facing said recesses (23) to be directed toward said vaporization section.

9. A wick as set forth in claim 7 wherein said projections (25) are bent toward the vaporization section.

FIG. 1

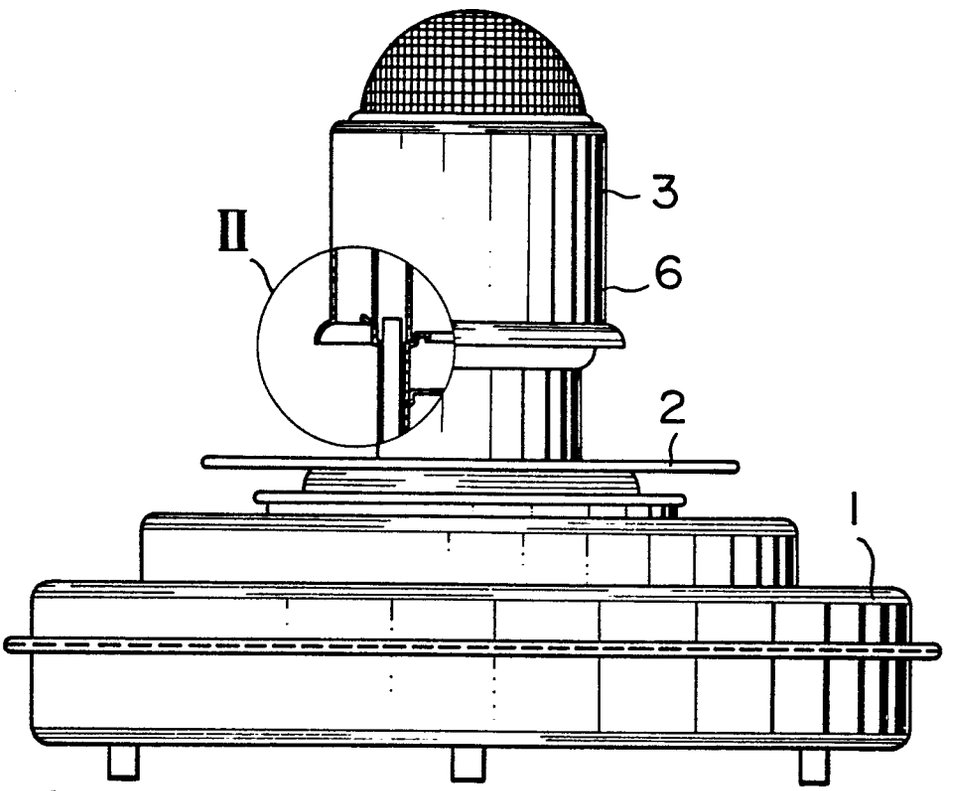


FIG. 2

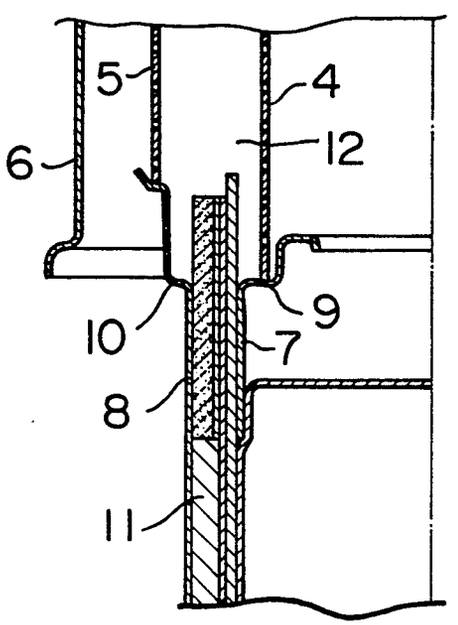


FIG. 3

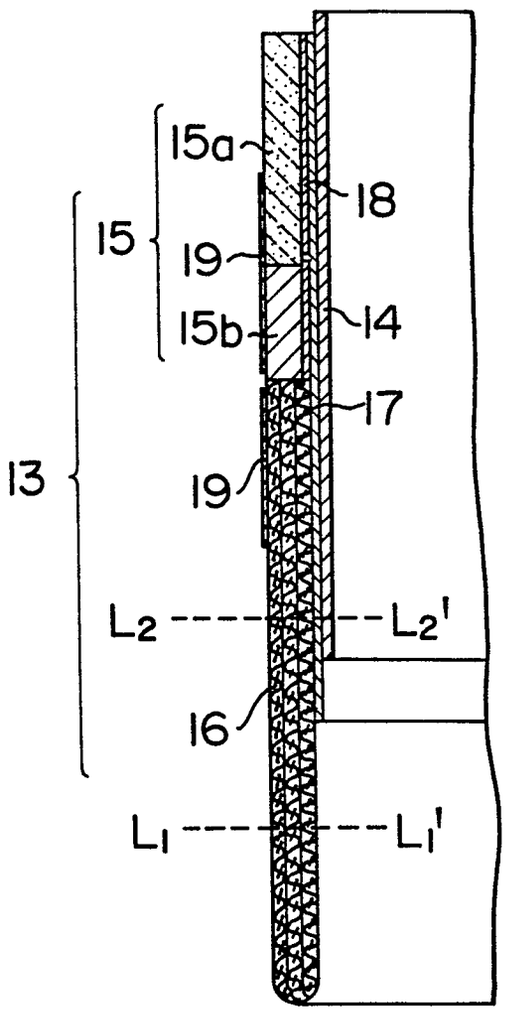


FIG. 4

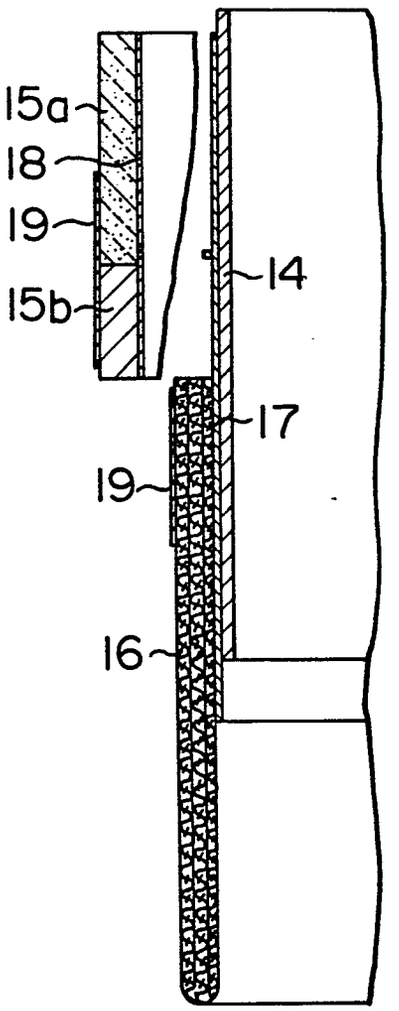
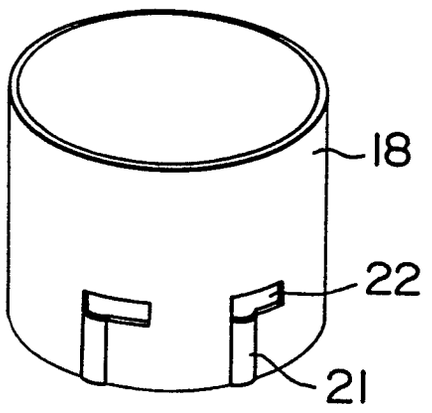


FIG.5



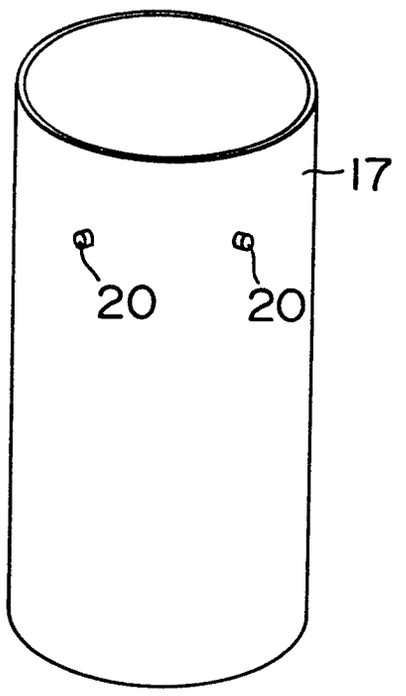
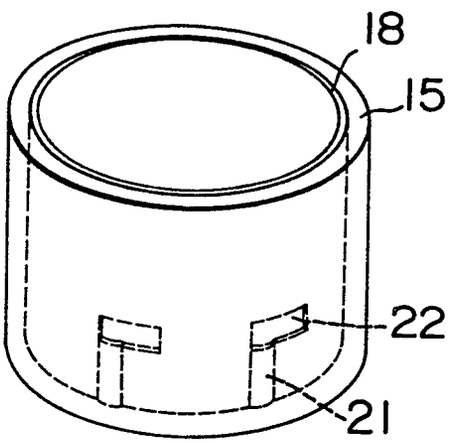


FIG.6



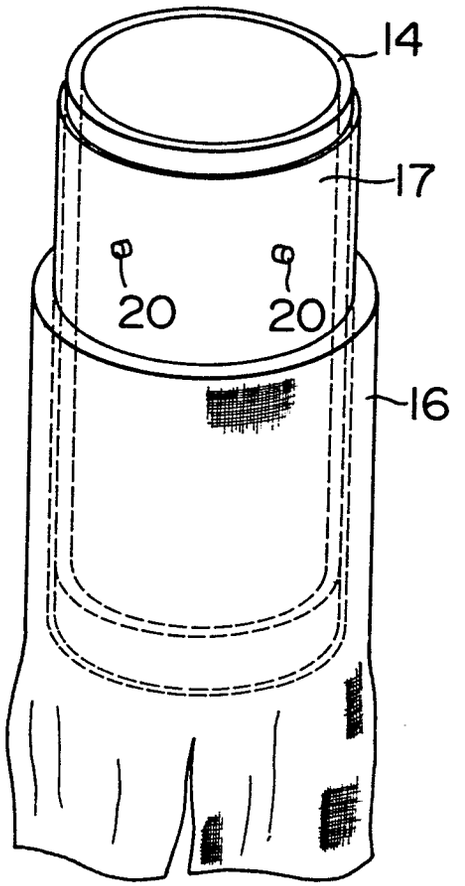


FIG. 7

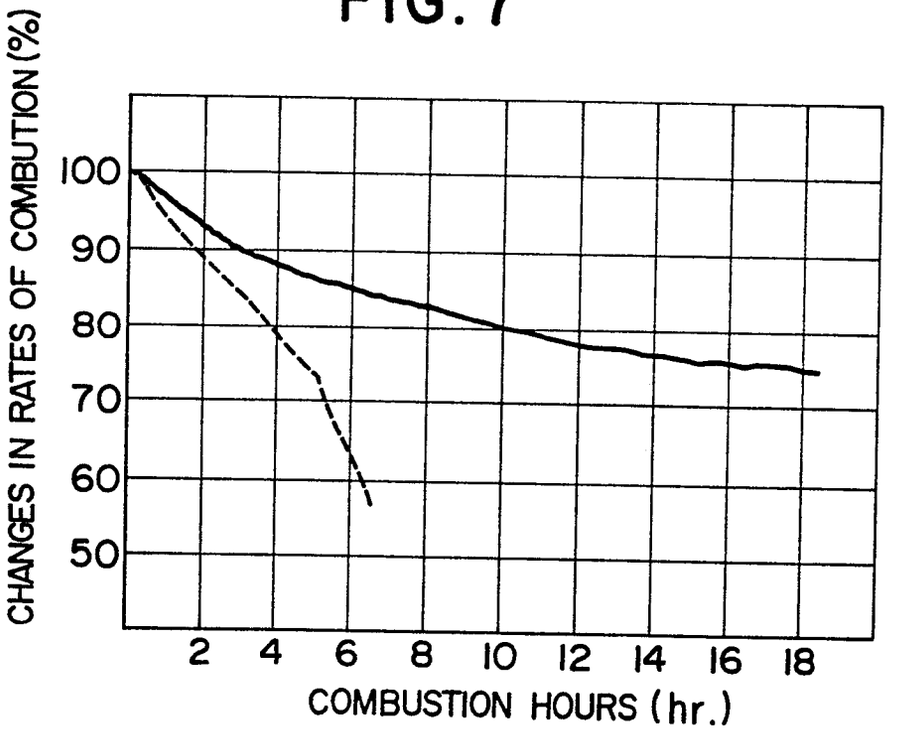

CHANGES IN RATES OF COMBUTION (%)
100
90
80
70
60
50
2
4
6
8
10
12
14
16
18
COMBUSTION HOURS (hr.)

FIG. 8

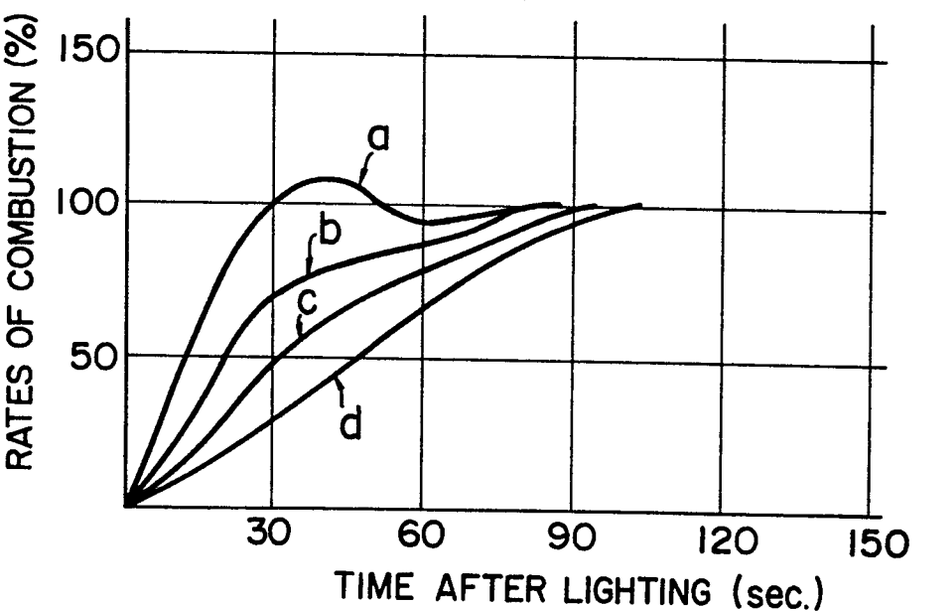

RATES OF COMBUSTION (%)
150
100
50
a
b
c
d
30
60
90
120
150
TIME AFTER LIGHTING (sec.)

FIG.9

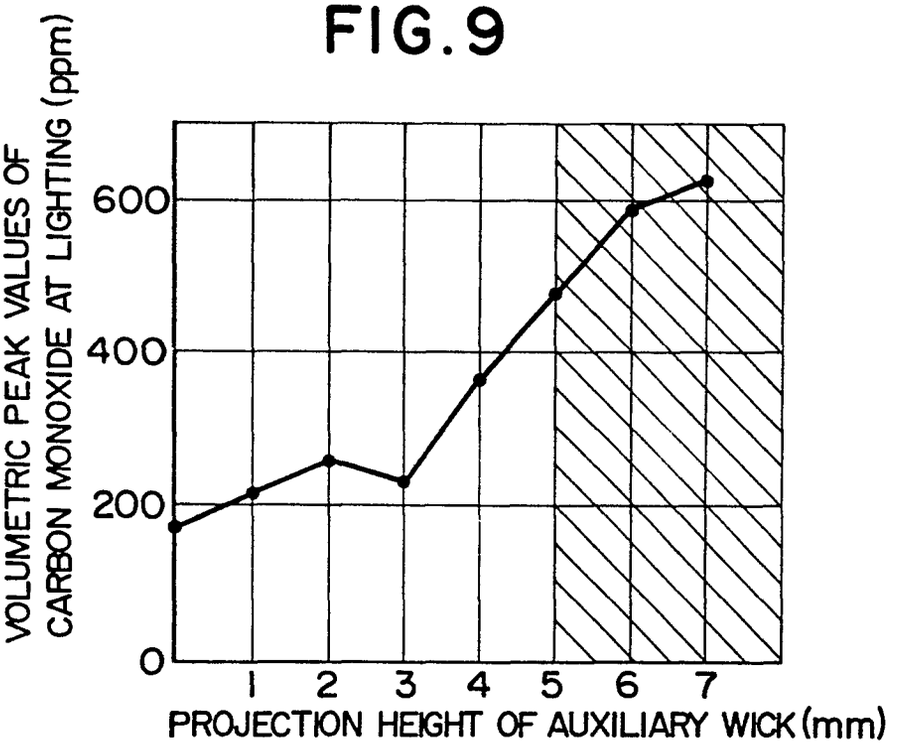

VOLUMETRIC PEAK VALUES OF CARBON MONOXIDE AT LIGHTING (ppm)
600
400
200
0
1 2 3 4 5 6 7
PROJECTION HEIGHT OF AUXILIARY WICK (mm)

FIG.10

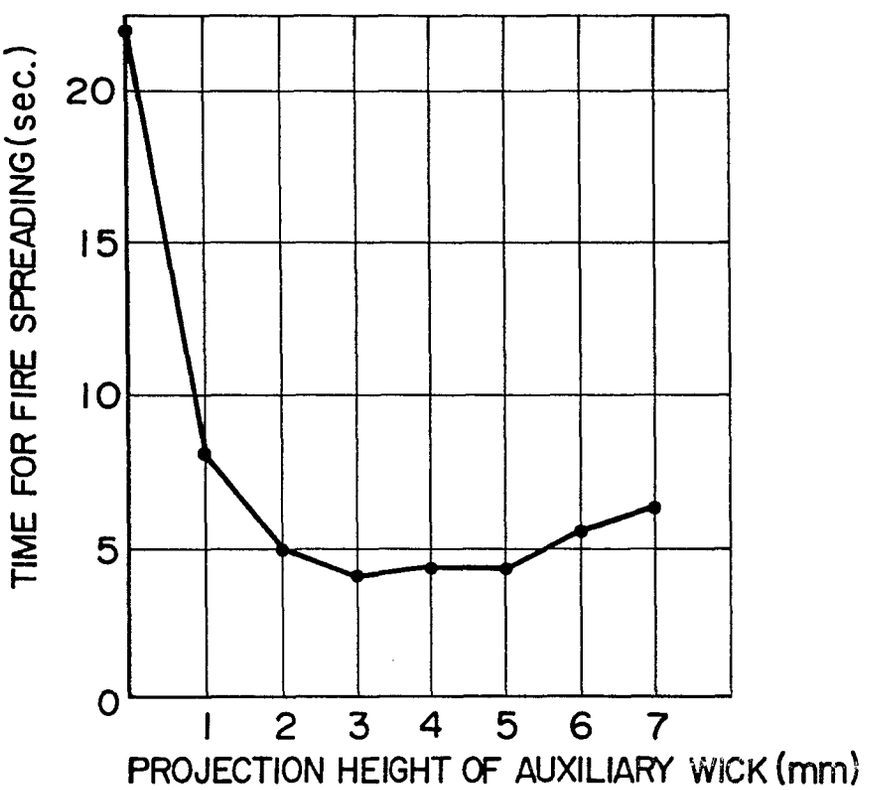

TIME FOR FIRE SPREADING (sec.)
20
15
10
5
0
1 2 3 4 5 6 7
PROJECTION HEIGHT OF AUXILIARY WICK (mm)

FIG. 11

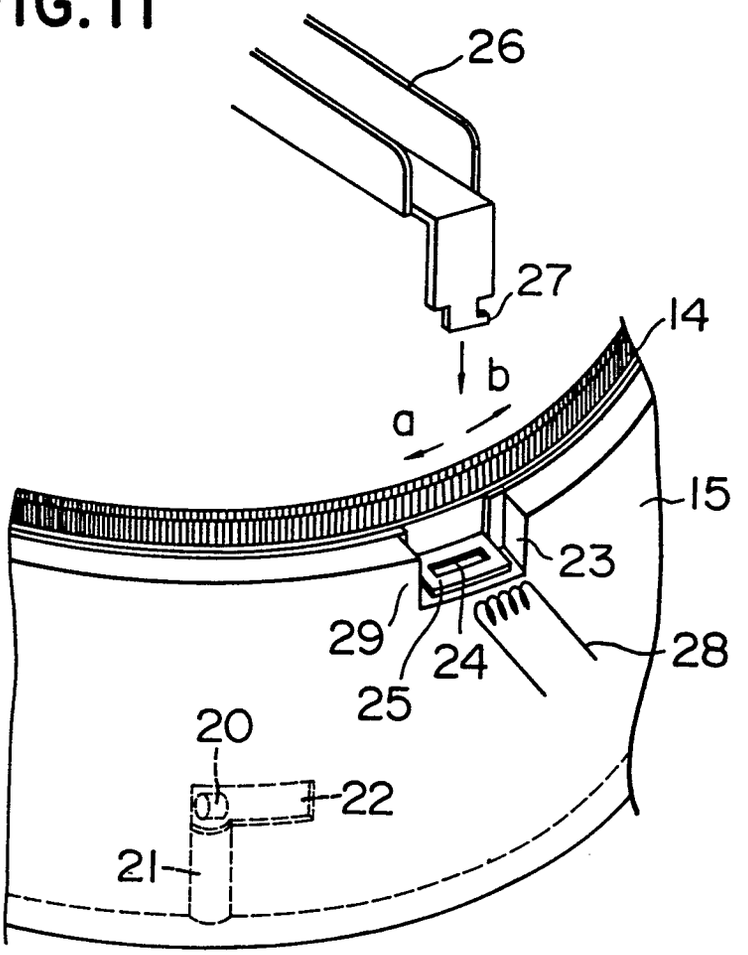


FIG. 12A

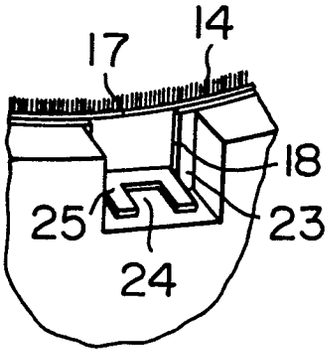


FIG. 12B

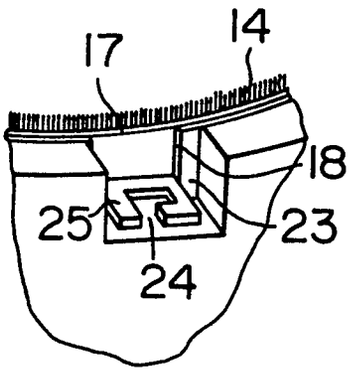


FIG. 13

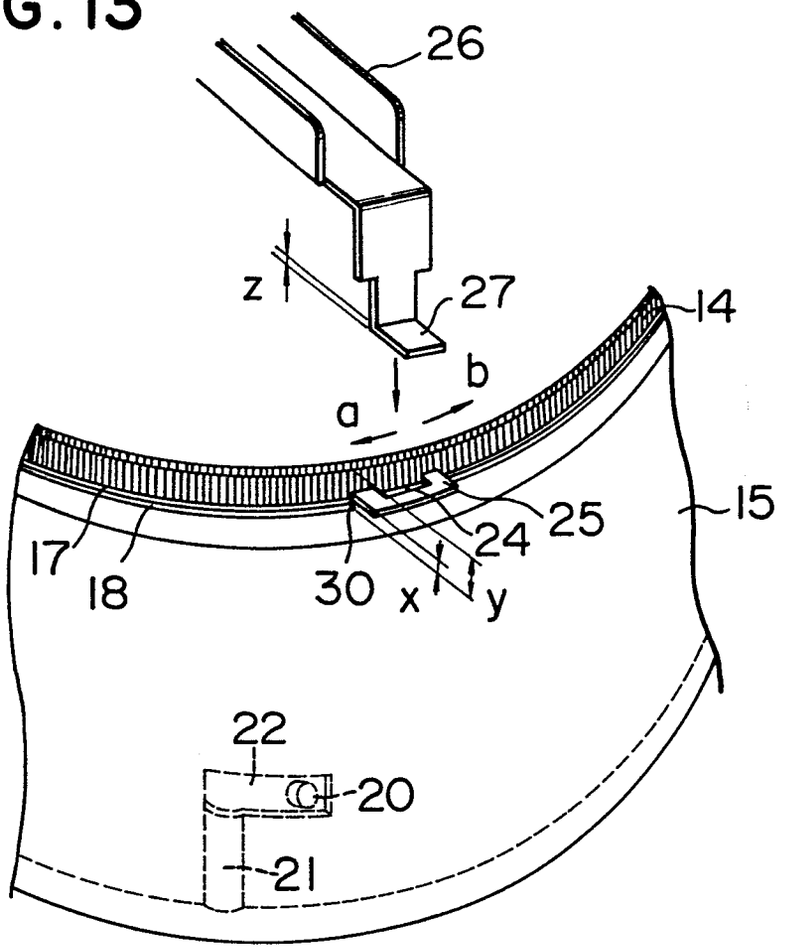
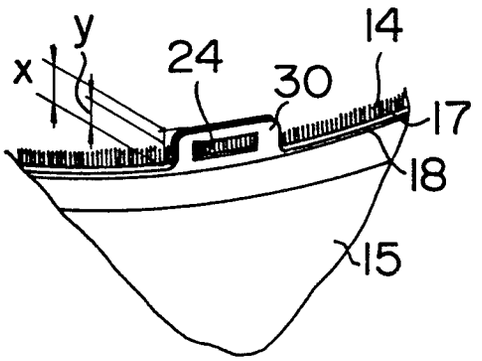


FIG. 14



European Patent Office

EUROPEAN SEARCH REPORT

0076568
Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 82304630.5

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	DE - C - 136 431 (BARTHEL) * Totality *	1,3	F 23 D 3/08
A	US - A - 1 065 834 (PIKE) * Totality *	1,3	
A	DE - B - 1 085 114 (THOMEE) * Totality *	1,3	
A	DE - C - 74 924 (MAGER) * Totality *	1,3	
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			F 23 D 3/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	30-12-1982	TSCHÖLLITSCH

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