Dec. 14, 1937. T. W. WARREN 2,102,049

ILLUMINATING APPARATUS AND METHOD OF MAKING SAME

Filed March 15, 1934 2 Sheets-Sheet 1

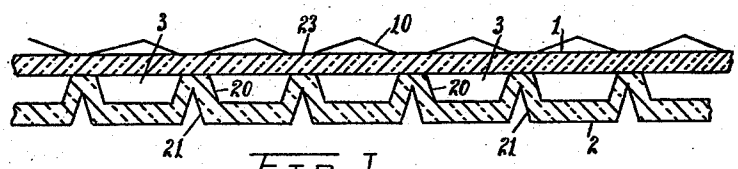

Fig. 1.

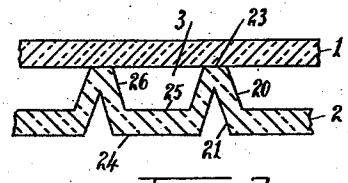

Fig. 2.

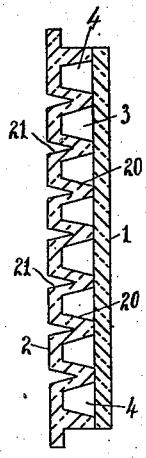

Fig 4.

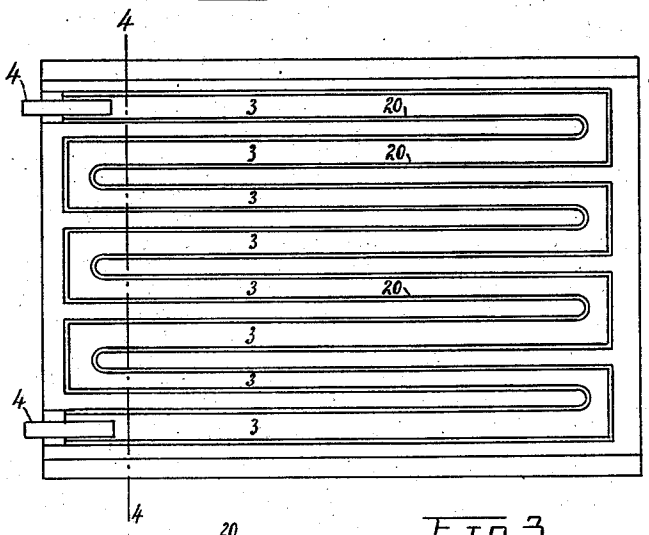

Fig. 3.

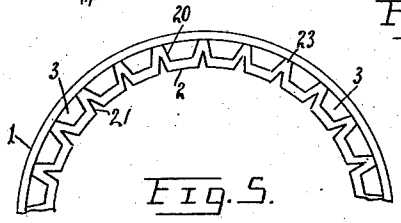

Fig. 5.

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ILLUMINATING APPARATUS AND METHOD OF MAKING SAME

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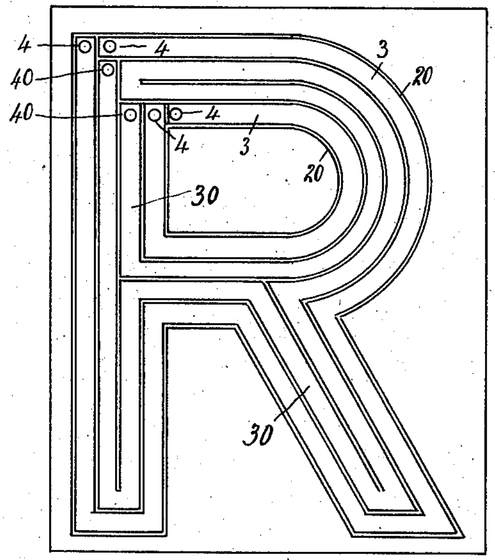

Fig. 6.

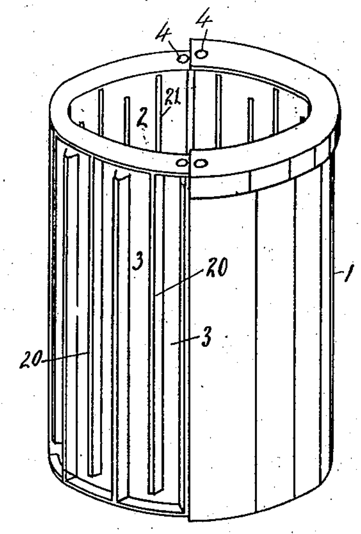

Fig. 7.

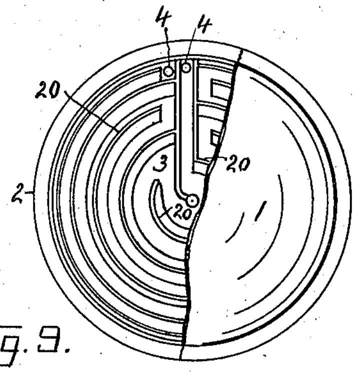

Fig. 9.

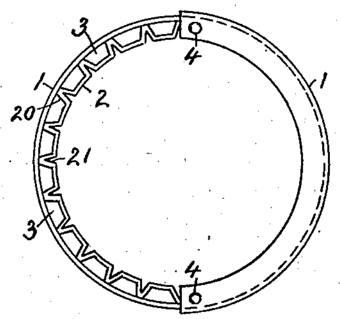

Fig. 8.

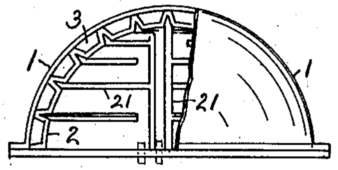

Fig 10.

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ILLUMINATING APPARATUS AND METHOD OF MAKING SAME

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Application March 15, 1934, Serial No. 715,666

2 Claims. (Cl. 176—122)

This invention relates to illumination by means of gas made incandescent by electric current and relates particularly to the containers of the gas.

Hitherto illumination by luminous gas has made use of tubes of glass which have been bent to provide for various designs of lighting apparatus. The tubes being of small size were of a fragile and easily broken character. The problem of providing broad surfaces of incandescence has been attempted by using parallel tubes with bent ends, but these arrangements were fragile, costly to make and expensive to maintain. Furthermore, the radiation of light was inefficient, defective and wasteful.

The present invention overcomes all these disadvantages and provides a means of furnishing broad surfaces of incandescent light either flat or curved, of great strength, giving maximum illumination, using a minimum quantity of gas and electric current and inexpensive to make and mount.

By means of this invention, incandescent gas illumination can be adapted to many fields hitherto impossible, unsuccessful, or too expensive for practical application.

The invention consists briefly in replacing the tubes as gas containers by sealed parallel channels in molded glass, in the form of plane or curved surfaces. The channels are so connected that a continuous gas container is provided of suitable area and length between the exciting electrodes.

Modification in the arrangement of the channels provides for a great variety of novel plane or colored lighting effects.

Reference is made to the accompanying drawings in which:—

Figure 1 shows a cross section of a flat container.

Figure 2 shows a diagram of the container element.

Figure 3 shows a plan view of the channelled member of a flat container.

Figure 4 shows a cross section of the container with the cover member in position.

Figure 5 shows a cross section of a curved container.

Figure 6 shows an arrangement for a two color sign.

Figure 7 shows a cylindrical form.

Figure 8 is a cross section of the form of Figure 7.

Figure 9 shows a dome.

Figure 10 shows a side view of the dome partly in section.

In Figure 2 is shown a cross section of a sealed channel.

The member 2 is blown glass having the channel 3, the ridges 20, and the grooves 21.

The member 1 has a surface that contacts with the edges 23 of the ridges 20. By means of gas jets or other heating methods the contacting edges 23 are fused to the member 1.

When a sealed channel of this approximate cross section is filled with gas and made incandescent by electric means, the radiation of the light produced, in a very large proportion passes through the member 1 and is diffused over a wide angle. Besides the direct radiation from the channel 3 the inclined sides 26 of the ridges 20 and the bottom 25 reflect the light through the member 1.

By silvering or making a mirror of the surface 24 practically all the light from the incandescent gas will pass outwards through the member 1 and the maximum illumination will thereby be utilized.

When a series of parallel channels 3 are connected as shown in Figure 3 to form a continuous channel sealed by fusion to a plate 1 at its edges, gas filled and electrodes 4, 4 mounted in its ends, an illuminating apparatus is provided that will emit a radiance of high efficiency, that is simple in construction, that forms an integral body, that is durable and not liable to fracture, that can be readily framed and that has an exposed surface which is easily kept clean.

Such an apparatus can be designed for special purposes, as for interior illumination, street lighting, signals and advertising signs.

When curved surfaces such as shown in Figure 5 are employed the range of utility is greatly extended. Cylindrical or globular forms can be readily constructed.

As the channelled glass member and surface member are blown in dies, quantity production is feasible and the cost reduced to a minimum.

Owing to the high proportion of light radiated, the channels can be made to contain a minimum amount of gas, and the current required is reduced to correspond, which effects great economy in cost and maintenance.

Owing to this apparatus having no exposed bends but being a complete unit with its surfaces fused together throughout, it is not liable to damage and can be handled by unskilled workmen without risk of injury.

The invention can be readily adapted to signs or devices in which two or more colors are employed by independent channel circuits filled with

different gases. This is shown in Figure 6 in which the inner and outer channels 3 between the electrodes 4, 4 produce one color while the intermediate channels 30 between the electrodes 40, 40 produce a different color. The whole device forming one piece of substantial and easily cleaned shape.

With cylinders such as are shown in Figures 7 and 8 a form is provided which is adapted for under water illumination where the pressures are high.

It is obvious that the sealed channels may be varied in size, width and depth and that the walls of the channels may be curved as well as flat surfaces.

Figures 9 and 10 represent a domed form of channelled container.

Instead of the cover member being a plane surface it can be blown to provide facets 10 between the contact points 23 with the channelled member, as shown in dotted lines in Fig. 1.

The method of making the invention is as follows:—

Dies are prepared to mold the two members and suitable glass is blown into the molds to provide parts of the required thickness.

The molded members are then placed in position with the edges of the channelled member contacting with the surface of the other member, gas jets are then applied in the grooves under the ridges and to the surface above the contacting area and the ridges are fused to the surface member throughout.

The channels are then filled with suitable gas and electrodes sealed in the ends of the channels.

What I claim is:—

1. The method of producing gas containers for incandescent gas illumination comprising molding a glass member with extended channels between inclined ridges with grooves under the ridges, molding a member with a surface adapted to contact with the ridges of the first member, fusing the contacting portions of the members by gas jets in the grooves and on the opposite surface at the same time to form an integral body.

2. The method of producing gas containers for incandescent gas illumination comprising molding a glass member with parallel channels between inclined ridges with grooves under the ridges, molding a member with a surface adapted to contact with the ridges of the first member, fusing the contacting portions of the members by gas jets applied in the grooves and on the opposite surface at the same time, and mounting electrodes at the ends of the channels, and filling the channels with a suitable gas and sealing them.

THOMAS W. WARREN.