Aug. 6, 1957 G. P. COOPER ET AL 2,801,483

LUMINOUS SIGNS

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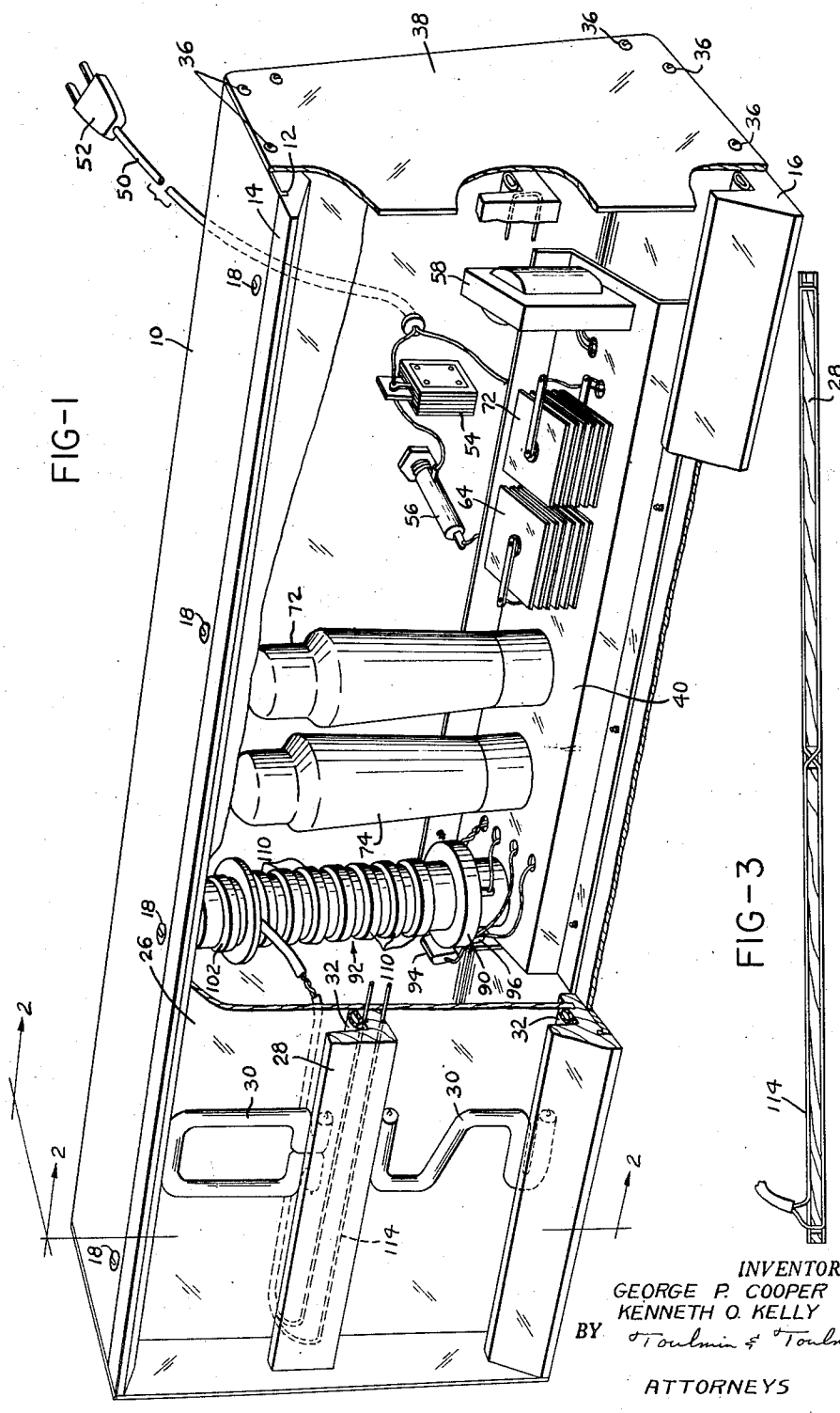


FIG-1

FIG-3

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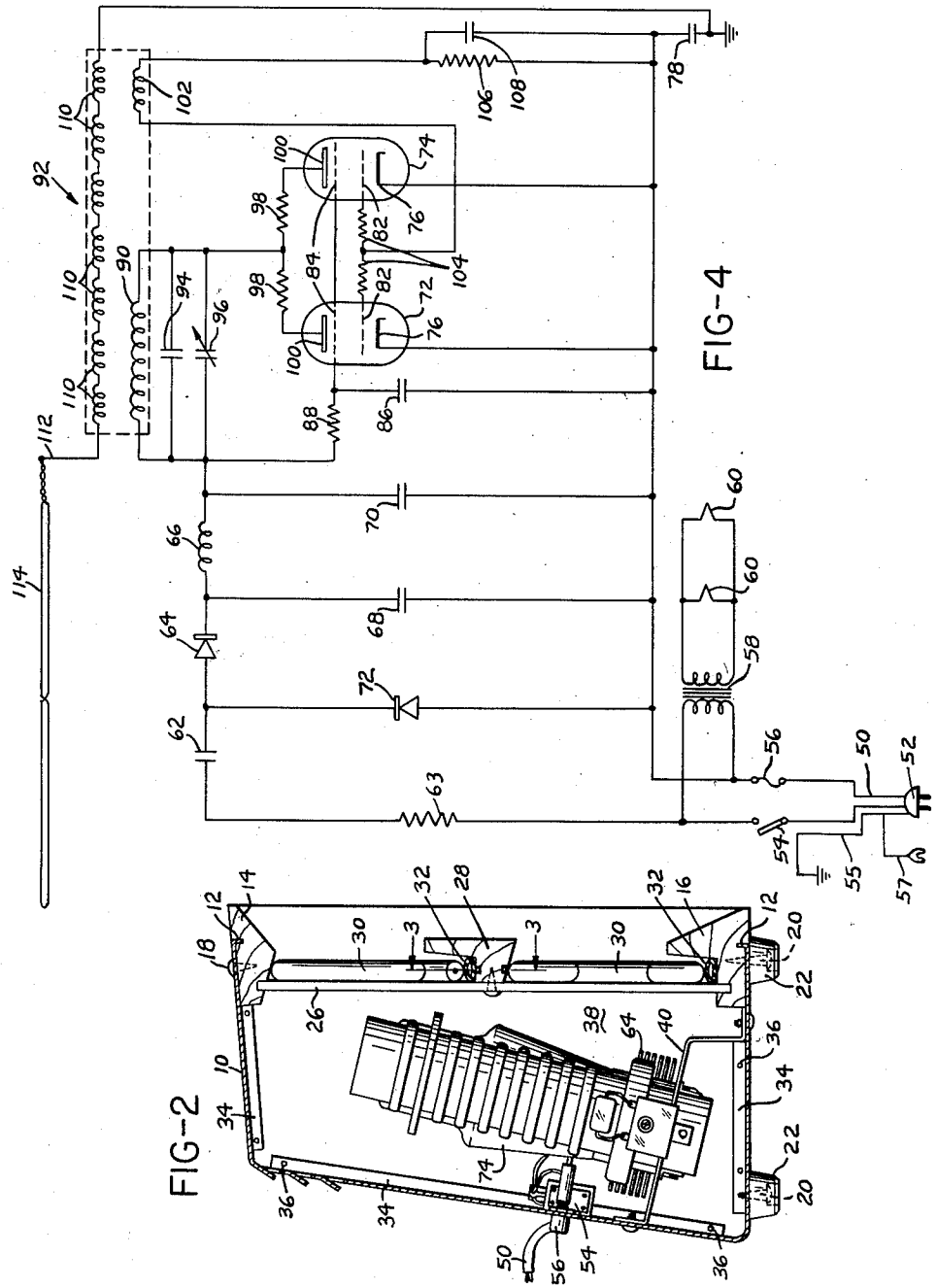


FIG-4

FIG-2

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LUMINOUS SIGNS

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1 Claim. (Cl. 40—130)

This invention relates to changeable signs, and in particular to the type of changeable sign in which glass tubes containing vapor or gas form the letters of the sign, and which letters have no electrical connection with the sign but are, rather, detachable therefrom and shiftable therein so that the sign can be changed at any time and can be arranged in any desired way.

An object of this invention is the provision of a sign of the nature referred to in which the letters or characters supported in the sign are easily removed therefrom or placed therein, but without there being any danger that the letters will get out of place in the sign or fall therefrom.

Another object of this invention is the provision of an arrangement in connection with the sign for creating an electrical field for illuminating the letters placed in the sign, but which electrical field is contained within a relatively small region whereby the influence of the electrical field is practically confined to the letters carried by the sign.

A further object of this invention is the provision of an energizing circuit for a sign of the nature referred to in which the circuit is quite simple and employs the fewest number of tubes and other fragile components.

A still further object of this invention is the provision of a sign of the nature referred to which is simple in construction and which can readily be dismantled for adjustment or repair if necessary.

These and other objects and advantages of this invention will become more apparent upon reference to the following specification taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view partly broken away showing a sign constructed according to this invention;

Figure 2 is a transverse sectional view indicated by the cutting plane of line 2—2 on Figure 1;

Figure 3 is a fragmentary sectional view indicated by line 3—3 on Figure 2 showing the arrangement in the unit of the high frequency high voltage electrode, by means of which the characters are energized to the point of luminescence; and

Figure 4 is a more or less diagrammatic representation of the energizing circuit of the device.

Referring to the drawings somewhat in more detail, the unit, as it is disclosed in Figures 1 through 3, comprises a main housing portion **10** which consists of a generally channel-shaped member, preferably of sheet metal, which has the forward edges of its top and bottom walls bent inwardly as at **12**.

The inwardly turned portions **12** fit into grooves formed in a longitudinally extending top member **14** and a longitudinally extending bottom member **16**. Screws **18** retain the top member **14** in place while screws **20** retain the bottom member **16** in place, and at the same time serve to hold the supporting feet **22** in position. Corresponding feet **24** are supported toward the rear of the bottom wall of the housing.

Top member **14** is grooved on its underneath side toward the rear, and bottom member **16** is similarly grooved on its upper side toward the rear, and these grooves serve to retain a supporting panel **26** in position.

This supporting panel is of wood or plastic, or of some other non-conductive material, which will not interfere with the electrical field that is to be established by the device.

In about the center of panel **26**, and extending longitudinally therealong, there is supported a center rail **28**. Center rail **28** is formed with a relatively deep trough along its upper side corresponding with the similarly formed deep trough in the upper side of lower member **16**.

The underneath side of center member **28** is formed with a slight downward incline, and this corresponds to a slight downward incline that is formed on the underneath side of upper member **14**.

As will be seen in Figure 2, the troughs formed in the top of lower member **16** and center member **28** cooperate with the inclines formed on the underneath side of the members thereabove for retaining the tubular glass characters **30** in position in the sign so that they can readily be inserted therein or readily detached therefrom.

For holding the tubular characters in position, the bottom of each of the center troughs may advantageously include a length of rubber tubing or other continuous resilient element, as at **32**; the provision of this element serving to hold the tubes upwardly against the inclined surfaces at their upper ends.

Each end of the housing is formed with turned-in flange means as at **34**, and these flange means are availed of for receiving screws **36** which retain the end closure panels **38** in position on the ends of the housing. These closure members are preferably of non-conductive material, such as wood or plastic.

Located within the housing, and supported at its forward edge on the bottom edge of the housing and its rear edge on the back wall of the housing, is platform **40** serving as a chassis to support the principal components of the electronic circuit, by means of which the tubular characters referred to are energized. The principal components of the electronic circuit are generally located within the device in Figures 1 and 2 and illustrated in diagrammatic form in the electric circuit of Figure 4.

Referring to Figure 4, together with Figure 1, the energizing circuit will be seen to comprise a cable **50** having a plug **52** on the end, by means of which the unit can be plugged into an electric outlet of nominal 150 volt rating.

The cable leads to the housing of the device and, at the housing end, the cable has in circuit therewith an on-off switch **54** and a fuse **56**. Connected across the cable within the housing is a transformer **58** which supplies the heaters **60** of the oscillator tubes of the circuit. The cable preferably includes a third wire **55** having one end connected to the chassis ground, and the other end provided with a connector clip **57**.

One side of the line established by the cable in the housing leads through to an electrolytic condenser **62** and a selenium rectifier **64** to a filter network comprising radio frequency choke **66** and capacitors **68** and **70** connected between opposite ends of radio frequency choke **66** and the opposite side of the line.

Capacitor **68** is preferably an electrolytic condenser, and capacitor **70** may advantageously be a paper condenser considerably smaller than capacitor **68**. Capacitor **62** is likewise an electrolytic condenser of about the same rating as the capacitor **68**.

Resistor **63** is preferably provided to protect the capacitors and rectifiers from large current surges during the A. C. line peaks.

A second selenium rectifier **72** is connected between capacitor **62** and rectifier **64** in the opposite side of the line. This arrangement represents a voltage doubling circuit so that power is drawn from the electric circuit on both half cycles, with all of the power being delivered to the filter circuit on the half cycle during which the side of the line leading to capacitor **62** is positive. This eliminates the necessity for the conventional full wave rectifier, thus reducing the cost of the circuit and replacing the more or less fragile rectifier tubes with the sturdier rectifiers referred to.

According to this invention two oscillator tubes connected in parallel are employed, but it will be evident that, since these tubes are in parallel, one tube of larger capacity could be employed and satisfactory results would be obtained. However, it is preferred to employ two tubes in parallel since either one of the tubes will maintain the tubes illuminated so that failure of one tube will not cause the sign to become inoperative.

The two tubes, which may be 6L6's, are located at **72** and **74**. These are the tubes supplied by the heaters **60** previously referred to. The cathodes **76** of the tubes are connected with ground via condenser **78**, said ground consisting of a connection with the chassis platform **40**. The cathodes are also connected with the side of the line opposite the side connected with capacitor **62**.

Each tube has internally connected beam-forming electrodes (not shown), a control grid **82**, and a screen grid **84**. The screen grids of the tube are connected together and then through a capacitor **86** with the cathodes of the tubes.

The screen grids are also connected through a resistor **88** of substantial size, with the right end of the filter network, as it is viewed in Figure 4, and also with one end of a tank circuit comprising the primary coil **90** of a radio frequency transformer indicated generally at **92**, and with the capacitors **94** and **96** being connected in parallel with coil **90**.

At least capacitor **96** is adjustable so that the circuit can be tuned. The other end of the tank circuit is connected through the resistors **98** with the plates **100** of the tubes **72** and **74**.

The radio frequency transformer **92** also comprises a coil **102**, one end of which is connected through the resistors **104** with the control grids **82** of the tubes **72** and **74**, and the other end of which is connected through the resistor **106** with the cathodes of the tubes, with a capacitor **108** being provided for by-passing resistor **106**. The radio frequency transformer **92** also comprises a series of seven serially connected secondary coils **110**, with one end of the serially connected group of coils being connected to ground, and the other end leading via wire **112** to a loop of wire **114** which is associated with center member **28** that is mounted on the front panel **26** of the device.

Loop **114** is preferably in the form of a figure **8**, as will be seen particularly in Figure 3, and may be fastened to member **28** or actually contained therein if desired. This element is shown as wire, but it will be understood that a flat ribbon could be employed if so desired.

The element is also referred to as being located in member **28**, but it will be apparent that it could also be located in panel **26** if so desired; the essential thing being that the element **28** is located in relatively close proximity with the tubes in each of the two tiers of the display device where characters are mounted.

Because of the arrangement of the present invention, wherein the element **114** is located in about the center of the front panel, the electric field established thereby is limited to that region in the front of the display device in which the tubes are to be located and slightly outwardly therefrom. We refer to this as a "contained field." Thus, signs according to the present invention can be placed in close proximity with each other without interfering with one another and, similarly, the sign does not produce any objectionable radio interference.

No particular reference has been made as to the exact nature of the sealed glass tubes forming the characters of the sign since these elements per se are well known in the art.

What these tubes consist of are glass tubes, either with or without an internal fluoresent or frosted coating, and containing gas such as neon, argon or helium, and with or without mercury vapor; the exact nature of the contents of the tubes being determined by the color desired.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions, and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claim.

We claim:

In an illuminated sign, a frame comprising a horizontally extending trough of sheet metal open at the front, a front panel of insulating material closing the front of the frame, means extending transversely along the bottom edges of said panel and along the center thereof forming upwardly opening grooves to receive tubular characters that luminesce in an electric field, an oscillator in said frame having a high frequency terminal, and a single loop electrode including a line and return in the center of said panel substantially midway between the top of the characters in said means extending along said bottom edge and the bottom of the characters in said means extending along the center of said panel to establish a single contained field extending longitudinally of said panel to energize all of characters.

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