

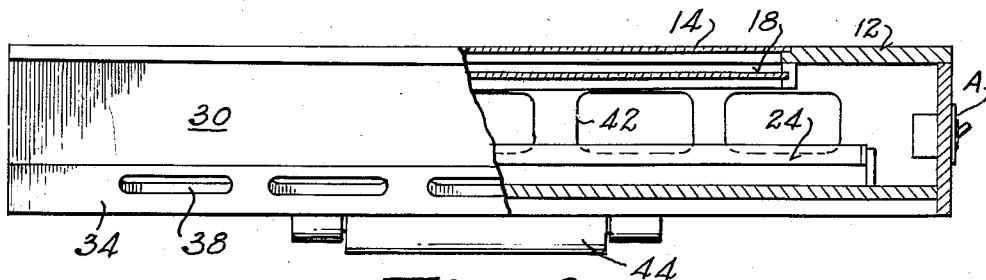
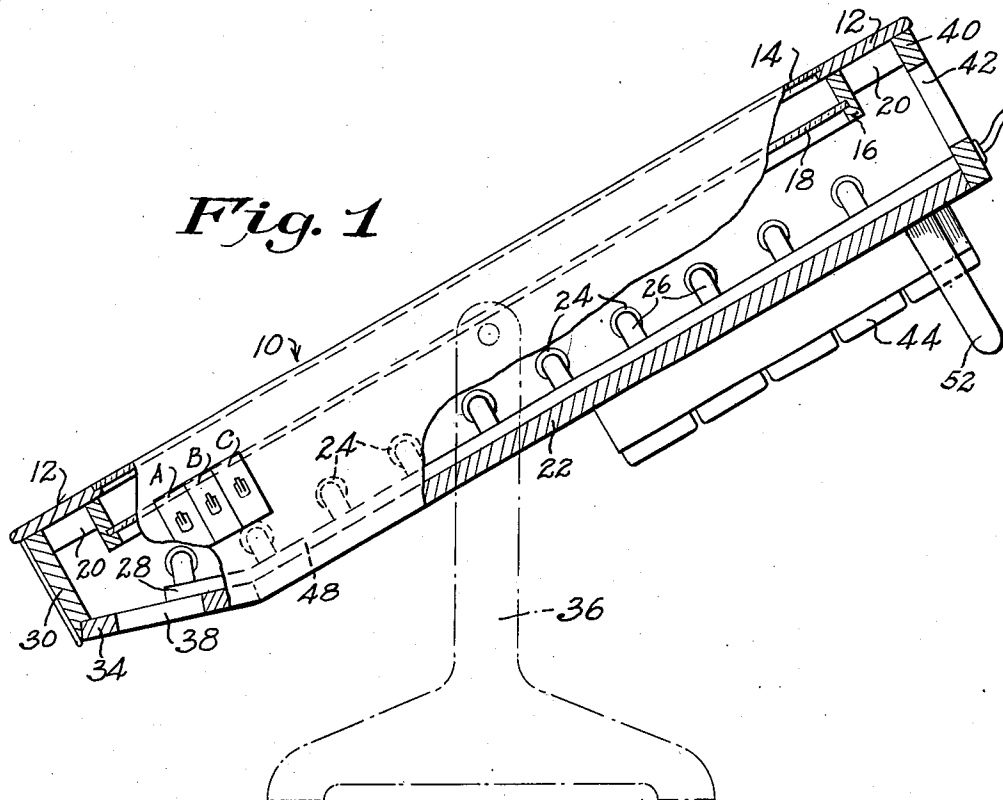
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W. S. LOESCH
TRACING TABLE

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2 Sheets-Sheet 1



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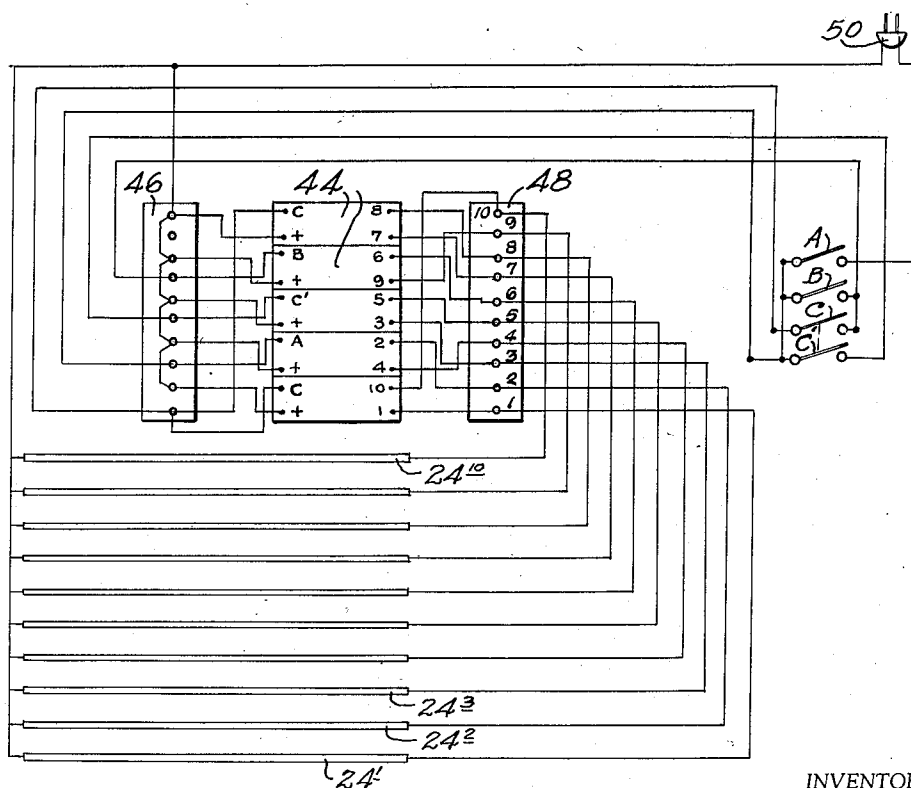
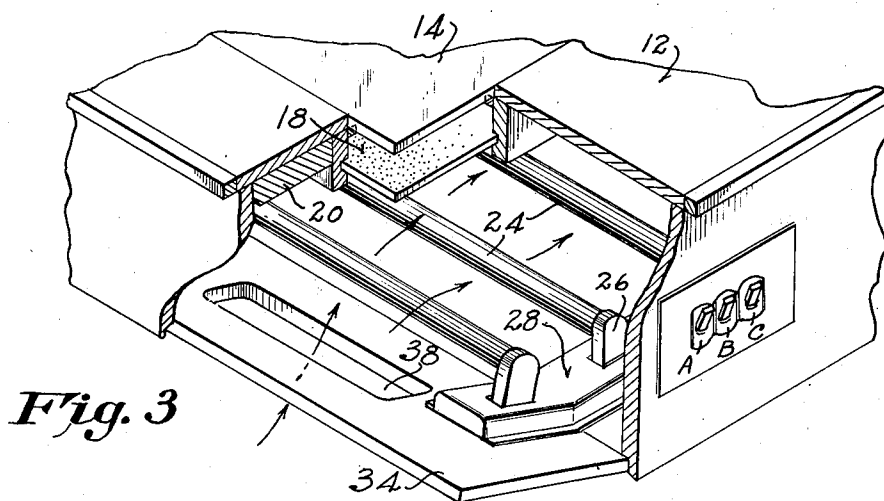
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2 Sheets-Sheet 2



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2,701,838

TRACING TABLE

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3 Claims. (Cl. 240—2)

This invention pertains to tracing tables, such as are used by artists, draftsmen and engineers for the tracing of drawings, prints, photographs and like materials. The invention deals specifically with an improved construction and arrangement of parts which provides adequate and controlled illumination through the material being copied, with a minimum of heat and low consumption of power. Other features of the invention include a simple and rugged mechanical construction, the provision of a chamfered front construction for most convenient use, and centralized controls for selectively energizing the lamps employed.

It is well known to provide a drawing or tracing table with a clear glass panel which is illuminated from beneath in order to render transparent various materials placed thereon, so that the same may be traced on to paper or other surfaces. Prior designs of this type have never met with much success, however, because their use has always entailed complications. Thus, where incandescent electric lamps have been used as the light source, a considerable amount of heat is thrown up through the material being copied, and their use for protracted periods has been either extremely uncomfortable or impossible. Attempts to reduce this effect have been made, as by using only one or a few localized light sources, such as incandescent lamps; however, to obtain adequate illumination at the particular locality in use, this has involved complicated arrangements for the moving of the light or lights from point to point. The use of enclosed cabinets has been suggested, but these either aggravate the heat problem or use so few lights, fixed or adjustable in position, that the illumination is inadequate.

Ideally, it would be desirable not only to vary the intensity of the illumination provided, but also to be able to control its spatial distribution. The intensity control is desirable not only because of the variations in opacity encountered in materials being copied, and the variations in thickness and opacity of the paper being used, but also because the visibility of the material depends to a considerable extent upon the general illumination in the work area. Thus, a rather faint illumination may be adequate where the surroundings are relatively dark, while a considerable brightness must be provided where the user is working in strong light. The desirability of some position control of the light source springs from the fact that the sizes of the subjects vary; quite often, also, only a portion of a large original print or drawing is to be traced, and it is desirable to localize the greatest intensity at this portion.

The present invention has for its principal object the provision of a tracing table arrangement providing a maximum of well-diffused illumination over the desired work area, while at the same time substantially eliminating excessive heat. To this end, the invention utilizes a comparatively large number of tubular light sources, such as fluorescent lamps, distributed beneath a transparent glass plate, together with switching means for enabling the user to energize either a few of the lamps located predominantly at one end of the transparent plate, or distributed more widely over its area. In this way, both the average intensity of lighting and its spatial distribution can be controlled.

A subsidiary object of the invention is to ensure the adequate diffusion of the light transmitted through the material being traced, by means which also serves as a heat insulating shield between the light sources and the working surface. To this end, a ground glass or other diffusing

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plate is interposed in spaced relation between the upper glass plate and the light sources, thereby insulating the upper plate, which forms the actual working surface, from the heat generated by the light sources. Clearly, certain forms of spaced-panel glasses (such as used in window construction) may also be employed.

Still another object of the invention is to provide an arrangement of the above type in which ventilating openings are provided and so distributed as to utilize the chimney effect to ensure an adequate circulation of room air over the light sources and out of the box forming the body of the device. In addition, the ballast units provided for the fluorescent lamps are mounted outside the box itself, so that their heat dissipation does not contribute materially to the total reaching the working surface.

The above and other objects and advantages of the invention will best be understood from the following detailed specification of a preferred embodiment thereof, given by way of example, and taken in connection with the appended drawing, in which:

Fig. 1 is a side elevation of the tracing table of the invention, with parts broken away and in section to illustrate the internal construction;

Fig. 2 is a front view of the device, again with parts broken away for clarity;

Fig. 3 is a fragmentary enlarged perspective view, partly broken away, of a front corner of the device; and

Fig. 4 is a wiring diagram showing one form of selective control for the plural light sources of the device.

Referring now to the drawings, and especially to Figs. 1 and 2 thereof, a preferred embodiment of the invention is shown as comprising a tracing table generally designated by the numeral 10, and comprising a shallow box having walls formed of any suitable material, such as wood or metal, and provided with an upper panel frame 12 having a central aperture within which is mounted a panel 14 of clear plate glass or plastic material, the latter being supported within the aperture as by rabbets or rails about the edge of the aperture. Beneath this aperture occupied by transparent panel 14, and surrounding the same, is a subordinate frame 16 rabbetted or grooved to receive a sheet or plate 18 of diffusing material, preferably ground glass or opal glass. As shown in Fig. 1, the underside of the top panel frame 12 may have secured thereto the spacing blocks such as 20, which operate to fix the position of the entire top assembly with respect to the shallow box containing the light sources to be described. The presence of these spacers or locators enables the top assembly to lie securely in place upon the top of the box without fixed fasteners, so that it may readily be removed, for example for the purpose of replacing light sources, or for other purposes.

The bottom wall of the shallow light box, designated by numeral 22, supports on its inner surface a plurality of parallel, spaced-apart light sources 24, which are preferably of the instant-starting fluorescent type having elongated tubular form. These extend across and beneath the area of the glass panel 14 and glass plate 18, so as to cast their light therethrough and through any materials placed upon the upper panel 14. As shown in the drawings, there may be a considerable number of these sources, ten being shown by way of illustration, and they are fixed in position. While fluorescent lamps have been stated as the preferred light source, because of their relative coolness of operation and the diffuse nature of their light, other equivalent sources may of course be used; also, the fluorescent lamps need not necessarily be of the instant-start type, although the latter are more convenient to use since they permit rapid changes in the lighting combinations by the means to be described below.

As shown in Fig. 2, and especially in the perspective view of Fig. 3, the sockets 26 for the tubular lamps 24 may be mounted upon metal conduit strips 28 extending along both lateral edges of the interior of the box. The depth of the box itself is such that the lamps 24 are spaced somewhat below the diffusing plate 18, as this contributes to uniformly of the illumination transmitted to the upper clear glass panel 14. The interior of the box itself is preferably painted or otherwise coated with a reflecting and/or diffusing material, such as aluminum paint, or porcelain-enameled reflectors, or the like may be

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employed, which will contribute appreciably both to the amount of light reflected through the upper panel 14 and to its uniformity.

It will be observed that the space between the upper clear glass panel 14 and the lower diffusing plate 18 is a dead-air space, in that it is closed off from direct communication with the portion of the box containing the light sources 24. Thus, advantage is taken of the spacing desired between these plates (for optical reasons of light diffusion) to provide a shield against the transmission of heat to the working surface of the device by convection currents.

In order to provide the desired spacing distance between the upper panel 14, diffusing plate 18 and light sources 24, plus the distance required for the mounting of the latter, a thickness dimension for the box is required which makes it rather unhandy for the user, who normally sits with the front edge of the box approximately in his lap. A thickness of about 8 inches is the smallest which can be used and provide the necessary structural features, while a thickness of not over 6 inches is about the maximum that can be tolerated at the front of the device for comfort. The present invention therefore provides the structure best shown in Figs. 1 and 3, in which the bottom surface of the box is tapered to provide the desired dimension at its front end. Thus, the front of the box is formed by a panel 30 perpendicular to the top panel frame 12, and connected to the bottom 22 of the box by the inclined panel 34, which will be approximately parallel to the user's lap when the device is tilted to a comfortable working position. In this connection, it may be mentioned that while the tracing light box of the invention is capable of use without legs, especially in the smaller sizes, being supported for example by an ordinary table, it can equally well be provided with a support of its own, preferably one which permits the height and inclination of the box to be adjusted. Such a support comprising legs 36 is indicated by chain lines in Fig. 1, so illustrated because it does not form an essential part of the present invention itself; the support structure may obviously be provided with height (rack-and-pinion) and inclination adjustments.

In order to decrease further the quantity of heat which is directed toward the working surface of the device, advantage is taken of the chimney effect resulting from the normal inclination of the device, and the heat generated by the lamps 24. To this end, the front inclined panel 34 is provided with a plurality of ventilating openings 38, and the rear wall 40 of the box (Fig. 1) is provided with similar openings 42. As illustrated by the flow arrows in Fig. 3, air heated by the lamps 24 will rise toward the rear of the box for egress through openings 42, and cool room air will be induced to enter via front openings 38. The air flow will withdraw heat from the lamps 24 that might otherwise find its way through the clear glass plate 14, and the flow of air over the under surface of the diffusing plate 18 will also tend to "wipe" this surface and keep it cooler than would otherwise be the case.

The use of the desired fluorescent lamps in the present invention involves the use of the inductive auxiliaries normally required for their operation, known as "ballasts." These devices in themselves dissipate a material quantity of heat, and it is desirable to locate them as far as possible from direct communication with the working surface of the device. As shown in Figs. 1 and 2, it is preferred to mount these devices, as indicated at numeral 44, on the outside of the bottom panel 32 and nearer the rear of the box than the front. This location places these heat-dissipating elements completely outside the box, and away from the working surface. Smaller, portable models of the tracing tables, that could be set on a table top or desk, could have the ballast support brackets combined with rear legs or elevators to incline the working surface to facilitate easier use by the draftsmen. Such rear legs are indicated in Fig. 1 at 52.

Reference has been made to the use of a substantial number of tubular light sources in fixed positions within the box, and to the advantage which results from control of the lighting intensity and location pattern. The present invention achieves this result by providing for independent control of the energization of groups of the lamps 24, but by simple and convenient means. As shown in Figs. 1 to 3, the control comprises a group of three

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switches located in ganged relationship adjacent the front of the right-side panel of the box. Switches A and B may be ordinary single-pole toggle switches, while the third switch may be an ordinary double-pole toggle switch having blades C and C'.

As best shown in the schematic wiring diagram of Fig. 4, the lamps 24 and ballasts 44 (of which five are required in the disclosed embodiment, each energizing two of the ten lamps shown) are so connected that the switches permit not only complete on-off control for all lamps, but also a degree of selectivity of energization of different pairs of lamps. In other embodiments, each lamp may have its own ballast, with corresponding circuit changes. The lamps in Fig. 4 are designated by superscripts, such as 24¹, 24² and so on, the superscript indicating the position of the lamp counting from the front edge of the device. Terminal strips or blocks 46, 48 are provided to facilitate connections, and the wiring is arranged so that the following lamp combinations correspond to operation of the switches:

Switch combination	Lamps energized
All open.....	none.
A only closed.....	24 ² and 24 ⁴ .
A and B closed.....	24 ² , 24 ⁴ , 24 ⁶ , 24 ⁸ .
A and C-C' closed.....	24 ² , 24 ³ , 24 ⁴ , 24 ⁵ .
All closed.....	all on.

It will be seen that the closing of switch A lights lamps 24² and 24⁴ which provides illumination of moderate intensity for substantially half the working surface, and provides for working on relatively small objects of lesser opacity. Closing of switches A and C—C' lights lamps 24², 24³, 24⁴ and 24⁵, providing full intensity for substantially half the working surface and permits working on the smaller objects having greater opacity. Closing switches A and B lights lamps 24², 24⁴, 24⁶ and 24⁸, which provides moderate intensity for the full working surface. Closure of all three switches provides the maximum amount of light distributed uniformly over the working area. With this arrangement, not only is the lighting under adequate control, but the amount of heat generated can be minimized where only a moderate amount of light is required. The usual connection plug 50 is provided to enable the device to be powered from standard outlets.

While the invention has been described herein in considerable detail by way of example, it is obvious that numerous changes in structure and arrangement can be made by those skilled in the art without departing from the spirit of the invention, and the invention is therefore not to be understood as limited to such details, but only by the scope of the appended claims.

I claim:

1. A tracing table comprising a relatively shallow opaque box structure having side walls, front and back walls and a bottom panel, a clear transparent panel mounted substantially flush with the upper surface of said structure, an obliquely disposed panel running from side wall to opposite side wall and connecting the bottom panel with said front wall to provide a chamfered lower front edge adapting the structure to use in a position inclined to the horizontal, a plurality of tubular lamps disposed beneath said transparent panel and all parallel to said front wall, an energizing circuit for said lamps, and a group of switches each connected in said circuit and respectively connected to selected groups of said lamps, one of said switches controlling certain only of the lamps nearer the front wall, a second switch fed through the first switch and controlling certain of the lamps located more remote from the front wall, and a third switch having two circuits fed respectively through the first and second switches, one circuit controlling additional of the lamps nearer the front wall and the other circuit controlling lamps distributed both forwardly and rearwardly of the panel, whereby a relatively small number of switches can control lighting combinations distributed both as to the general area of the transparent panel and as to the degree of illumination in the forward area thereof.

2. The invention in accordance with claim 1, in which said lamps are fluorescent lamps, and including ballast elements electrically connected to said lamps and dis-

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posed outside said box structure on said bottom panel and adjacent the back wall.

3. The invention in accordance with claim 1, in which said obliquely disposed panel and said back wall are provided with ventilating openings to encourage the flow of heated air toward said back edge when the structure is used in an inclined position with the front wall lower than the back wall.

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