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(12) # EUROPEAN PATENT APPLICATION

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(54) **Improved sign.**

(57) A sign having rows and columns of selectively illuminable incandescent globes (15) in which each row is located so as to be seen only through an associated aperture (14) in the face of the sign. Mechanically the electronic circuitry associated with the sign may comprise two spaced circuit boards (21, 25), the spacing being provided by certain of the components (26). The time of display of messages on the sign can be varied depending upon the cognative latency of the particular message being displayed.

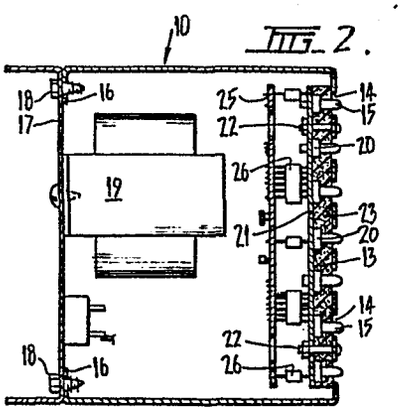

FIG. 2.

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IMPROVED SIGN

This invention relates to an improved sign and particularly to an improved sign on which the information to be transmitted can be readily and rapidly varied.

One form of such signs comprise a matrix of incandescent globes, each of which can be individually switched and which normally have shift registers associated therewith so that a message to be transmitted can be caused to move sequentially across the sign from one side thereof or from the top to the bottom or vice versa whilst the information, as long as it is visible, does not vary.

Such arrangements, providing large area signs, using, for example, normal mains powered incandescent globes are known and there have been proposed smaller signs and, whilst the electronics of these may not be complex, mechanically it has been difficult to provide a sign which is robust, provides the required output and which is compact and easily serviced. Also it is preferred that the illumination for each globe be restricted in area to provide a sharp and clear output.

It is an object of this invention to provide such a sign.

The sign of the invention, in a first aspect, comprises an outer wall being adapted to be directed towards the viewer and which has a number of apertures therein equivalent to the required number of globes in the sign, the wall being backed by a flexible resilient material having apertures in register with the apertures in the wall and against the inner surface of which material there are lighting modules with one incandescent globe being associated with each aperture in the surface and in the resilient material whereby when any globe is illuminated then the illumination provided by that globe can be seen only through the associated aperture.

This arrangement ensures that the message being displayed by the sign is clear and sharp as the light of the illuminated globes cannot be seen through the apertures

where unlit globes are located and, at the same time, it permits the globes to remain sufficiently cool so as not to overheat whilst still providing access to particular globes either from the front of the sign or by removal of the module carrying the globes, to enable replacement of burnt out globes.

In another aspect of the invention, I provide an arrangement whereby the circuit board module carrying the globes is spaced from a second circuit board by integrated circuits, the integrated circuits providing both mechanical and electrical connection between the two boards.

The integrated circuits may be Darlington arrays for selective operation of the globes. The location of these also aids in efficient cooling of these.

I have found it desirable to make a sign using a plurality of matrices, each of which carries forty-nine incandescent globes with the globes being in seven adjacent rows of seven. Preferably the globes may be automobile type globes which are adapted to be located in standard sockets and can be operated from a 25 volt power supply so that, basically, the sign is safe to be handled by unskilled persons.

During my experiments with the device of the invention I found that the time taken for individuals to identify short common words, such as a, the, is and and was less than the time taken to identify longer, more uncommon words and that for a sign to be fully satisfactory it could well be desirable to display those words for which a short cognative period is required for a shorter time than for the less common words.

In order to do this I initially throught that it may be necessary to incorporate into the control device for the sign a dictionary of words which should be displayed for a time less than the standard display time but, subsequently, I have found that by simply counting the number of characters to be displayed on each display period I can obtain satisfactory results by varying the display time in proportion to the character number.

In this way I can provide a sign which is easier to read than has conventionally been the case, is more pleasant for the viewer to read as it is not necessary for them, even though unconsciously, to linger upon material they have already perceived and comprehended and, at the same time, have provided a device with a throughput which is greater than would be the case if the device were operated conventionally. This, of course, is most important where the device is being used, for example, as an advertising sign.

In order that the invention may be more readily understood and put into practise, I shall describe two embodiments in the invention, together with the circuitry used with these embodiments in relation to the accompanying drawings.

In these drawings:-

Fig. 1 is a front perspective view of the sign of the first embodiment which, apart from size, can be considered similar to a similar view of the second embodiment;

Fig. 2 is a section along line 2-2 of Fig. 1 showing the arrangement of the components within the casing;

Fig. 3 is a broken front view at four levels from the face of the sign of Fig. 1;

Fig. 4 is a section, similar to that of Fig. 2, of a second embodiment of the invention;

Fig. 5 is a view, somewhat similar to Fig. 3, showing the arrangement of the embodiment;

Fig. 6 is a globe assembly used in relation to the embodiment of Figs. 4 and 5;

Fig. 7 is a schematic drawing of the electronic circuitry of the first embodiment;

Fig. 8 is a schematic view of the arrangement of the components indicated in Fig. 7; and

Fig. 9 is a schematic drawing of the electronic circuitry of the second embodiment.

The sign 10 of Figs. 1 to 3 has a casing 11 which may be made from sheet metal or the like and may be vented 12 at the ends.

The face 13 of the sign is provided with a large number of apertures 14 behind which are located or through which pass incandescent globes.

The sign may have inturned back edges 16 and may be closed by a plate 17 connected thereto by screws or the like 18, which plate may carry transformers 19 and other power supply components which are in electrical connection with the globes 15 or their associated circuitry.

The casing 11 may be provided with brackets or hooks, not shown, whereby the sign can be physically located or suspended.

The globes 15 and their holders 20 are mounted on a first circuit board 21 which is interconnected with the face 13 of the casing 11 by means of bolts 22.

Located between the circuit board 21 and the face 13 of the casing there is a flexible resilient material 23. This material is provided with apertures 24 which correspond to the apertures 14, that is to the location of the globes 15.

Associated with each circuit board 21 there is a second circuit board 25 and the circuit boards 21 and 25 form modules which may preferably be a seven by seven matrix although, for convenience of manufacture, two such modules may be located on a board so that each board carries fourteen by seven globes.
The circuitry to operate each globe comprises a bistable multi vibrator (flip flop) and a Darlington array, which can selectively switch the globe into an illuminated or non-illuminated state and shift registers whereby adjacent globes along the row can be selectively illuminated, if the preceding globe was illuminated and assuming the message of the sign is moving across the sign. Of course, if it is moving up and down the sign, so the illumination will be in adjacent columns but, for convenience, I shall not describe this form.

I have found that it is possible to make use of the Darlington arrays 26 to physically locate the boards 21 and 25 and, in this way, I get what is mechanically a good interconnection between the boards without placing undue mechanical strain on the Darlington arrays, I obtain maximum efficiency of electric connection as the contacts of the arrays are in direct connection with the printed circuits on each board, there is the availability of good heat transfer from the arrays which transmit substantial current and yet the construction is simple and uncomplicated.

Adjacent boards 21 and 25 may be so formed that they can be directly connected, as by forming blades or sockets along their edges or, preferably, connector plugs on flexible connectors can be used.

The sockets 20 for the globes 15 can be so located that when the globes are inserted they make direct electrical contact with the power supply busses on the circuit board 21.

The sign may be driven by a micro-computer, whereby the message being transmitted can be readily varied or, alternatively, a plug-in EPROM card can be provided so as to initiate a particular message which is changed simply by changing the EPROM card. This latter form of the device is most satisfactory for, say, a shop chain where it may be desired to have a large number of stores carrying the same sign at any time and the EPROMS can be programmed at a central position and distributed to each of the stores.

The arrangement of the front face 13, the resilient material 23 and the globes is such that, when any globe is illuminated, its illumination can be seen only through its associated aperture and, thus, there tends to be no diffusion of the message being shown by the sign.

At the same time, the globes are relatively easy to access, either through the front face or by releasing the matrix to permit replacement.

If required, to help dissipation of heat, the rear of the sign may be effectively closed and one or more fans used to continually move air over the operative surfaces to maintain an optimum operating temperature.

The embodiment of Figs. 4 to 6 is applicable to a larger sign where space is not of such importance as for the earlier embodiment and, in this case, the front face 113 of the casing 111 is formed with apertures 114 and behind this there is a flexible resilient material 123 having apertures 124 through which globes 115 pass.

Instead of using the circuit board construction described in relation to the first embodiment, in this case I use a single circuit board 130 which is provided with shaped apertures 131 which are adapted to receive a globe 115 located in a globe carrier 132, the arrangement being such that when the globe carrier 132 is inserted into aperture 131 and rotated through 90^{o} the globe is automatically brought into electric contact with power busses 133.

Power to these is controlled, as in the last embodiment, by bistable multi vibrators, Darlington arrays and shift registers, as will be described in relation to the circuitry of the device.

In this case at least, although a substantial percentage of the heat of the globes is directly dissipated through the front face of the sign, it is preferred that at least one fan be provided to provide flow through ventilation and, thus, to ensure maintenance of the required operating temperature.

The arrangement of the invention, electronically, is basically simple and, as previously mentioned, can be provided by a number of modules, each of which is identical.

I shall refer firstly to the circuit of Fig. 9 as this is laid out to be simple to follow and each globe, which is labelled from L1A to L7G has associated therewith a shift register, the shift registers being the integrated circuits IC1 to IC7 and a Darlington array which are included in integrated circuits IC8 to IC21.

Each globe has one contact in connection with a 25 volt line which is provided as a power bus on the circuit board 130 and the other by way of busses 133 to the associated Darlington array.

The Darlington arrays are connected to earth and thus, when switched, current can flow from the voltage supply through the appropriate globe, thus igniting the globe.

Control of the Darlington arrays is from the output of the shift registers and these outputs are controlled by the input data on the data lines 1 to 7 which are, in turn, switched by the clock circuit.

Where a message is to run across the face of the sign, the shift register, on each pulse received from the clock circuit, examines what was the situation relating to the immediate preceding globe in the row and transfers this condition to the next globe and so on.

Because of the completely modular construction the situation relating to the last globe in any row can then be readily transmitted through a data output line to the first globe in the next row so that the whole sign operates as a unit.

The data input to the first module can be generated from an EPROM or directly from a computer.

It will be seen that as each group, in this case of seven globes, is controlled by one particular Darlington array the arrangement of a power supply, even for a very long

or very large sign is basically simple as it is only necessary to provide, say, an unregulated 25 volt AC supply for a particular group of Darlington array and the power supplies can be duplicated, if required, to provide sufficient power.

As the switching is done by pulses generated from the computer and timed by the clock, there is no electrical limitation to the size the sign can be.

Fig. 7 shows the much more compact array of the embodiment of Fig. 1 but electrically and electronically this operates in an identical manner to the arrangement of Fig. 9 and its operation will not further be described.

Where I am using a running sign, the pulses provided from the clock are constant or, at least, are basically the same in time at any time. It will be appreciated that there may be occasions when it is desired to cause a display to run more rapidly or more slowly but at any particular time the rate of movement of the display remains the same.

However, when I am using the sign in a mode to show messages and then replace the message with a further message, I can use the clock to provide a derivative pulse to control the length of time any particular message is displayed.

As mentioned previously, initially I thought that the time should be varied depending upon the cognative time for normal persons to identify particular words and this would have necessitated a large dictionary so that words could be provided with a time which varies with the cognative latency of the particular word. However, I have found, surprisingly, that there is a sufficiently close relationship between the length of the word and the time taken to identify and that a close approximation with the required time can be obtained by counting the number of characters to be displayed and displaying these for a time which is dependent upon the number.

In doing this it is simple to provide a means whereby the count is made and the time is varied and, thus, by a simple modification to the input circuitry so a sign can be provided which is more confortable for a viewer to read, as there is no necessity for him to keep watching short and particular common words for quite some time after he has appreciated their meaning and, at the same time, gives a greater throughput of information as the time for a particular message to run is reduced in that only longer displays are shown for what was the normally acceptable period and all shorter displays are shown for periods which are more or less shorter than this. This, it will be appreciated, is most important in advertising signs where it is both

necessary to maintain the viewer's attention and, at the same time, to display as much information as possible in a given period.

CLAIMS

1. A sign comprising an outer wall (13) being adapted to be directed towards the viewer and which has a number of apertures (14) therein equivalent to the required number of globes (15) in the sign, the wall being backed by a resilient material (23) having apertures (24) in register with the apertures in the wall and against the inner surface of which material there are lighting modules with one incandescent globe (15) being associated with each aperture in the surface and in the resilient material whereby when any globe is illuminated then the illumination provided by that globe can be seen only through the associated apertures (14).

2. A sign as claimed in claim 1 wherein each lighting module includes a board (21) on which is located sockets (20) for the globes (15) which sockets are in connection with a power supply.

3. A sign as claimed in claim 2 wherein there are two spaced circuit boards (21, 25) which are mechanically and electrically interconnected by circuit components (26).

4. A sign as claimed in claim 3 in which the connection is by integrated circuit which includes Darlington arrays.

5. A sign as claimed in claim 1 wherein each globe is switched by a Darlington array which, in turn, is controlled by a bistable multi vibrator which is switched by an input data pulse.

6. A sign as claimed in claim 5 including shift registers associated with each row or each column of the sign whereby identical illuminated patterns can be caused to move across or down the sign.

7. A sign comprising a matrix of globes (15) which can be selectively switched to display messages of predetermined characters including in the switching circuit timing means whereby the length of time of display of a message is controlled and associated therewith is means whereby the number of characters to be displayed is counted and the length of time of display is varied depending on the number of characters.

FIG. 1.

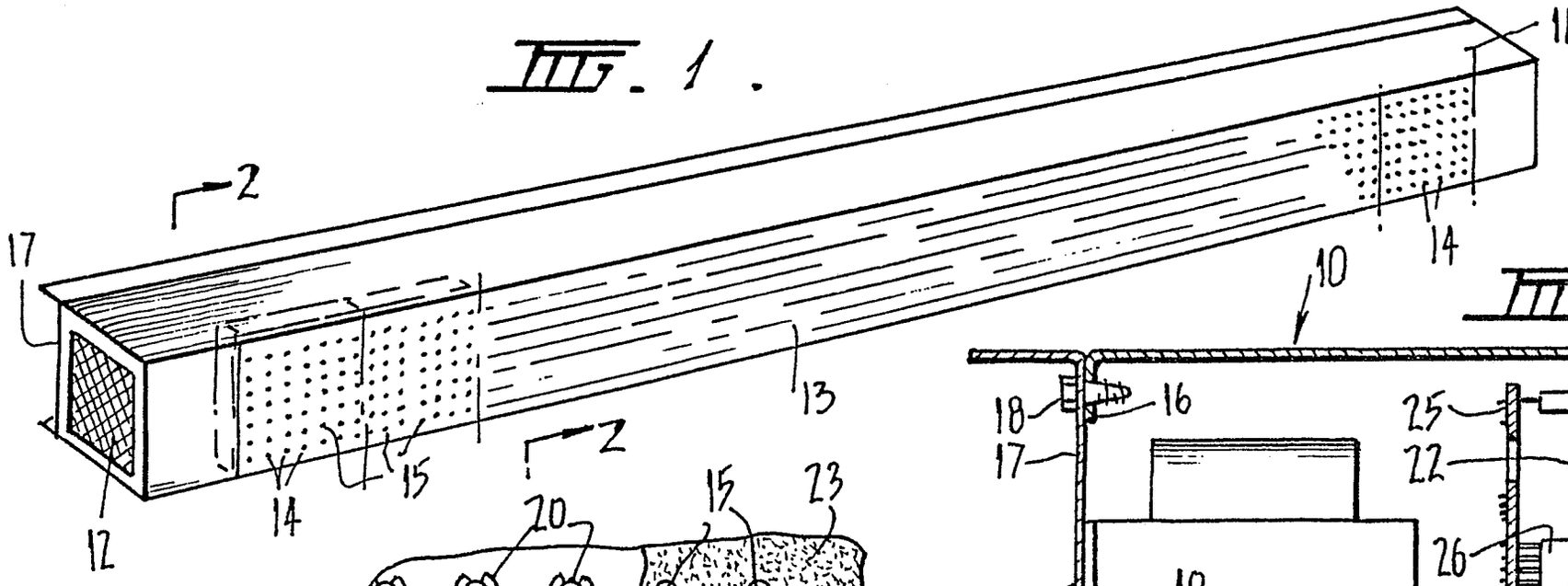


FIG. 2.

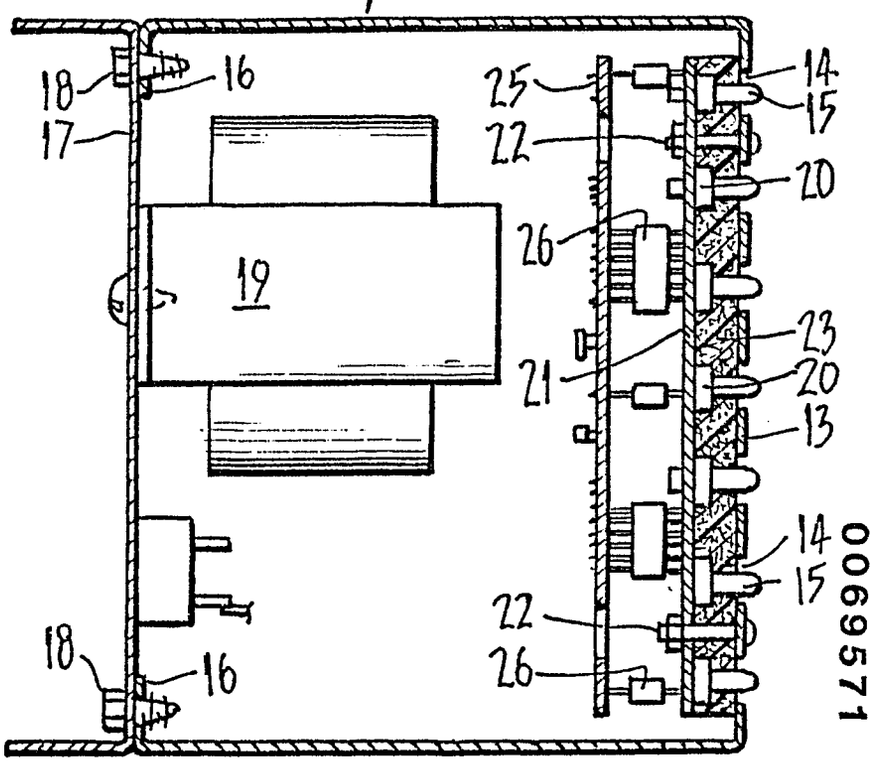
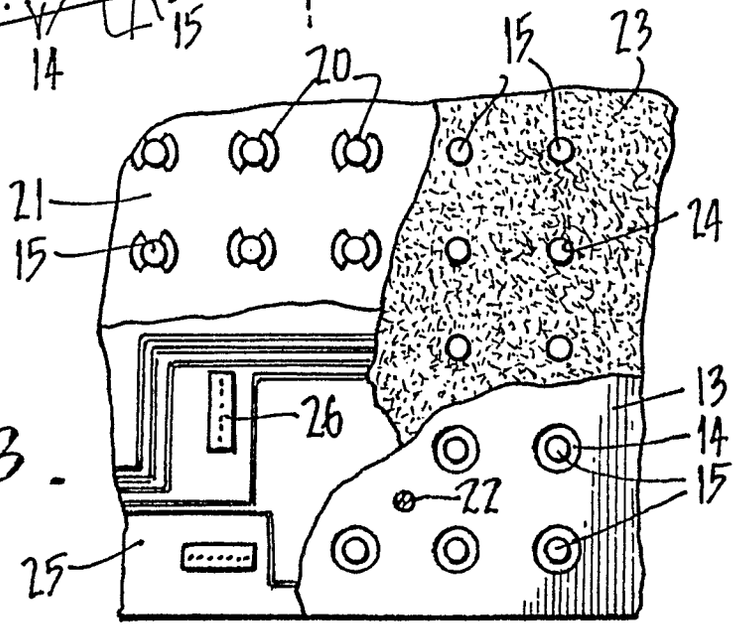


FIG. 3.



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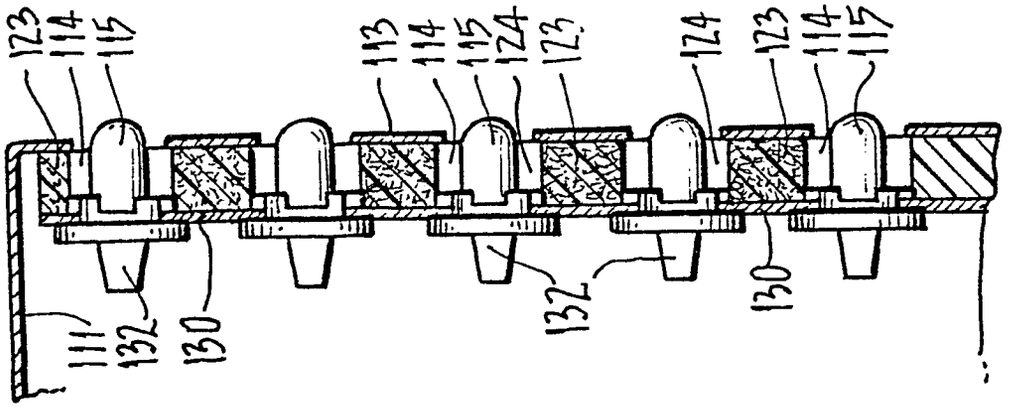

FIG. 4.

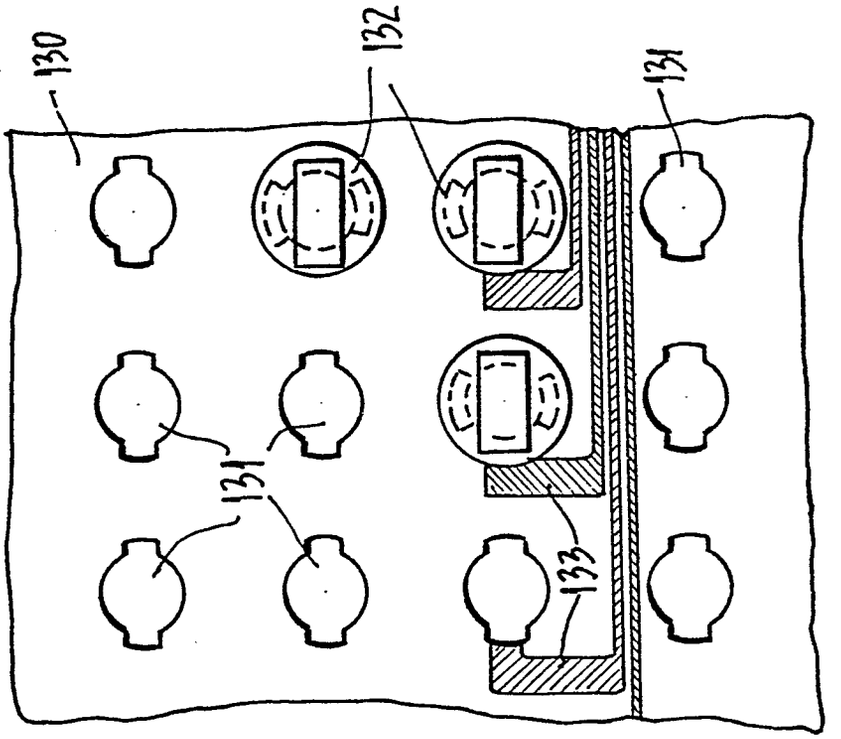

FIG. 5.

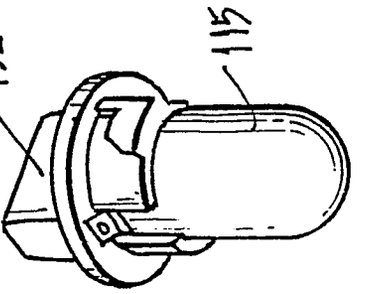

FIG. 6.

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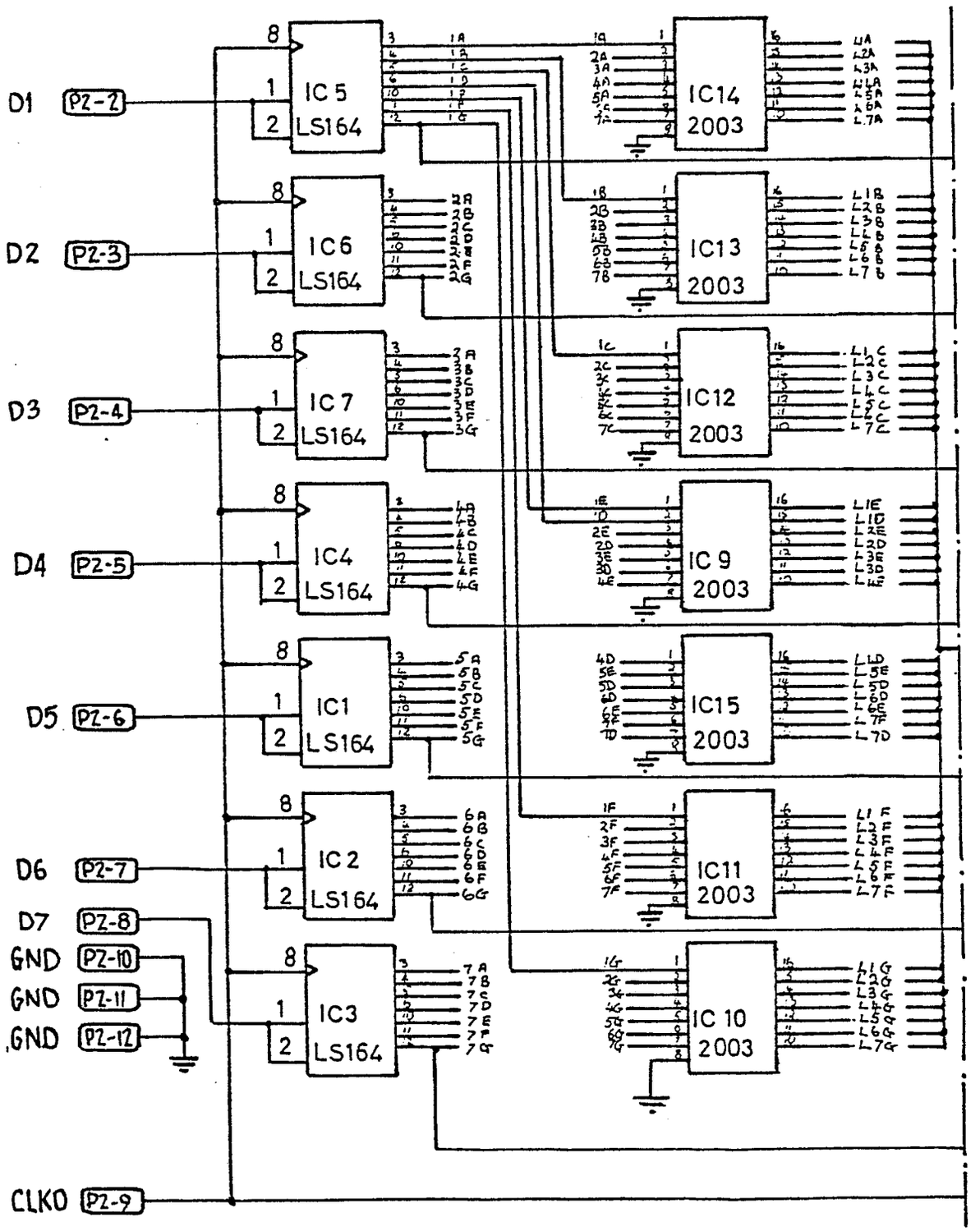

FIG. 7a.

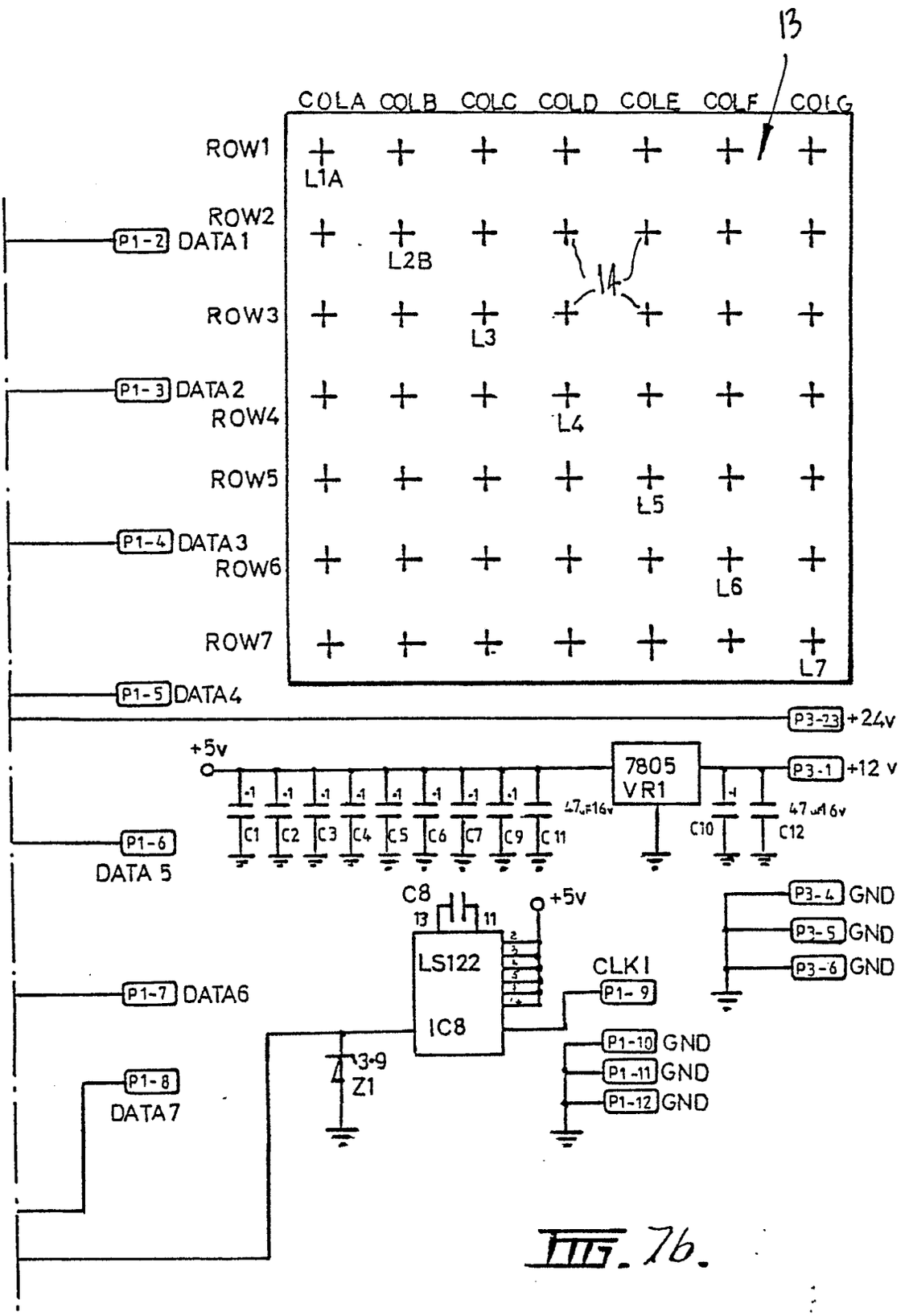
13
COLA COLB COLC COLD COLE COLF COLG
ROW1
ROW2
ROW3
ROW4
ROW5
ROW6
ROW7
L1A
L2B
L3
L4
L5
L6
L7
14
P1-2 DATA1
P1-3 DATA2
P1-4 DATA3
P1-5 DATA4
P1-6 DATA 5
P1-7 DATA6
P1-8 DATA7
P3-23 +24v
+5v
7805 VR1
P3-1 +12 v
C1 C2 C3 C4 C5 C6 C7 C9 C 11
47µF16v
C10
C12
47 µ16v
C8
13
11
+5v
LS122
IC8
CLK I
P1- 9
3-9
Z1
P1-10 GND
P1-11 GND
P1-12 GND
P3-4 GND
P3-5 GND
P3-6 GND

FIG. 7b.

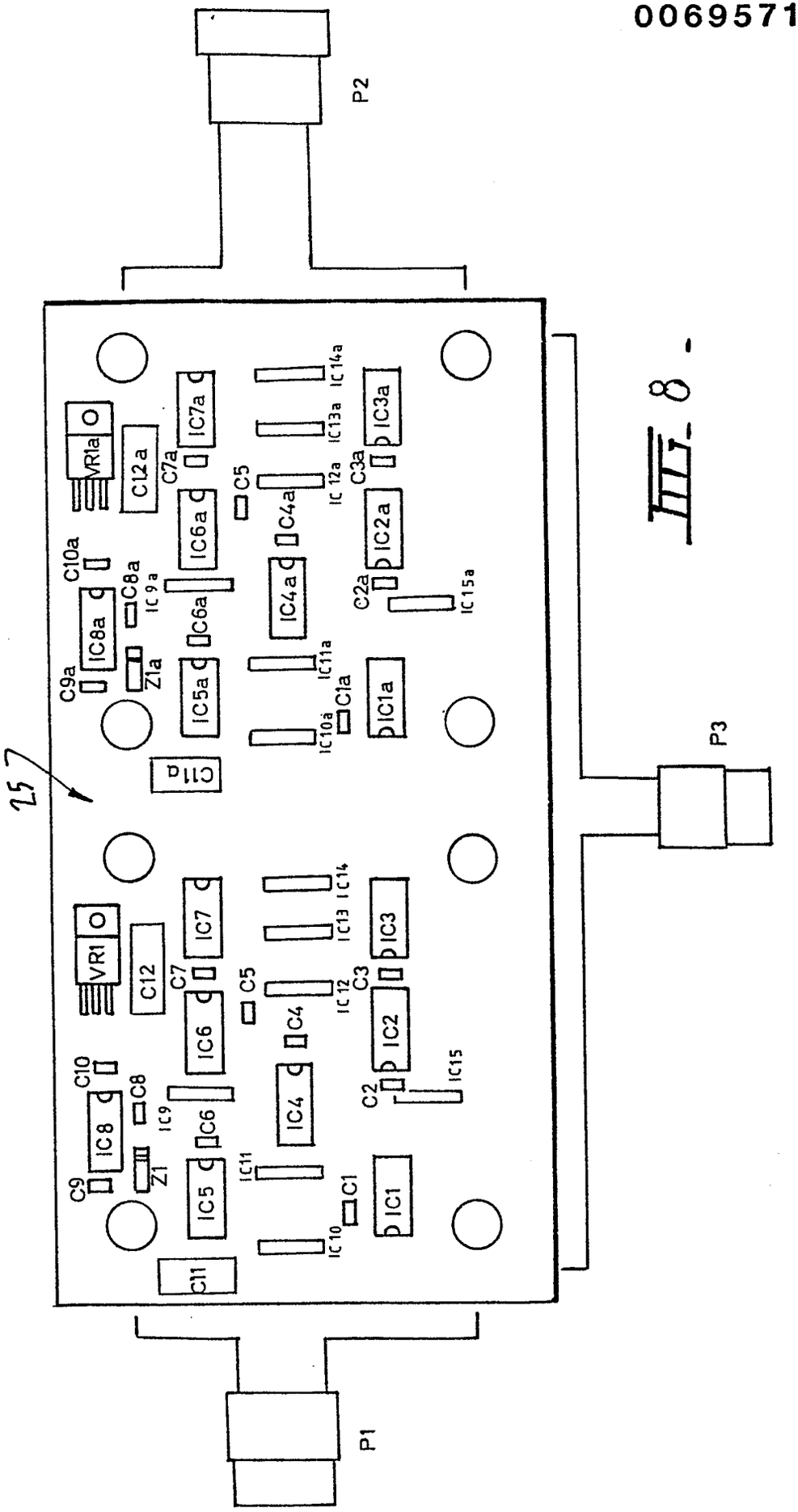
P2
P3
P1
15
VR1a
C12a
C7a
IC7a
C5
IC 12a
IC13a
IC14a
IC3a
C3a
IC4a
C4a
IC2a
C2a
IC15a
C10a
C8a
IC 9a
IC6a
C6a
C9a
IC8a
Z1a
IC5a
C11a
IC11a
C1a
IC10a
IC1a
VR1
C12
C7
IC7
IC13
IC14
IC3
C5
C4
IC12
C3
IC2
IC15
C10
C8
IC9
IC6
C6
C2
IC4
C9
Z1
IC5
IC11
C1
IC10
IC1
C11

Fig. 8

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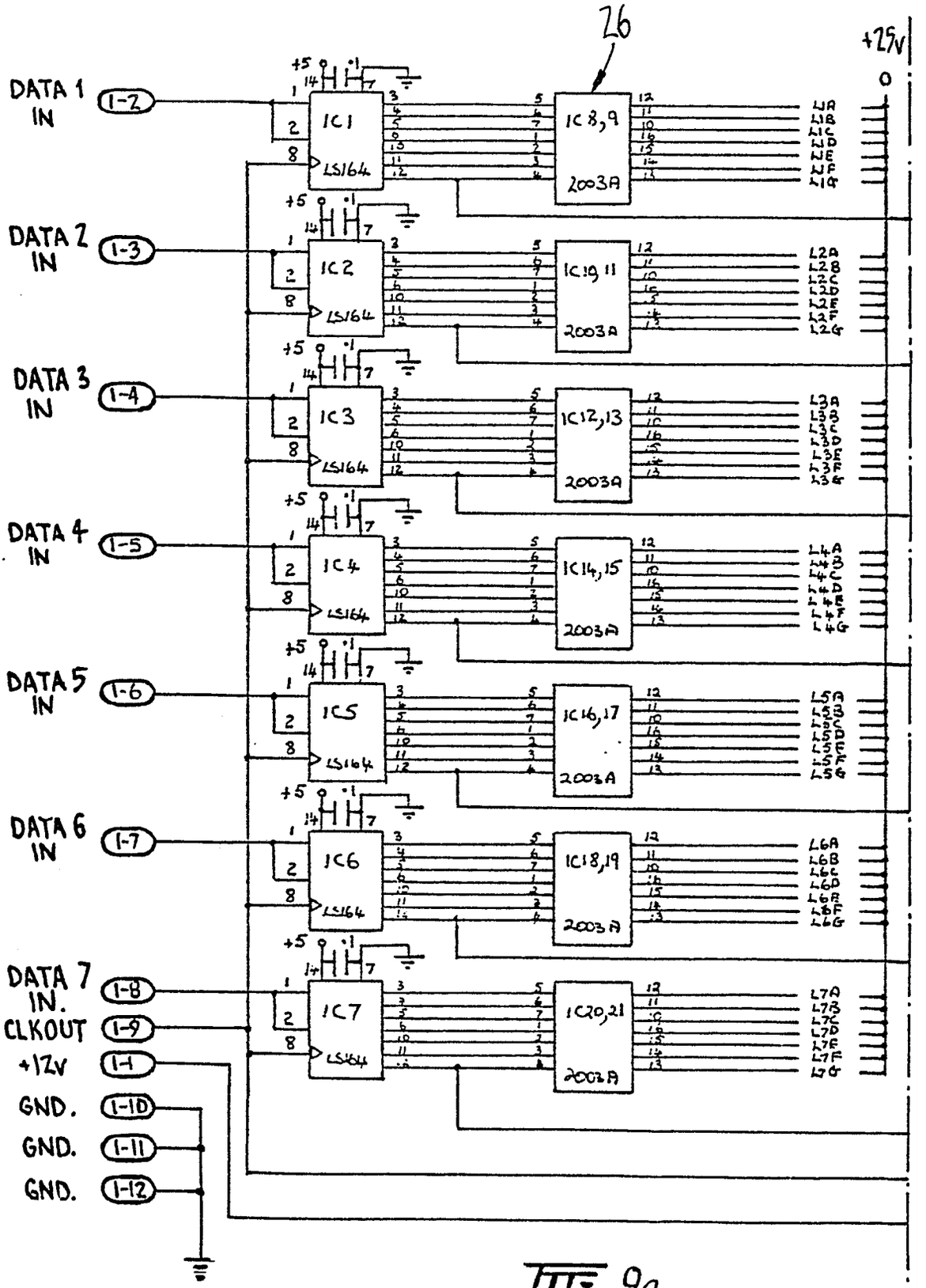

FIG. 9a.

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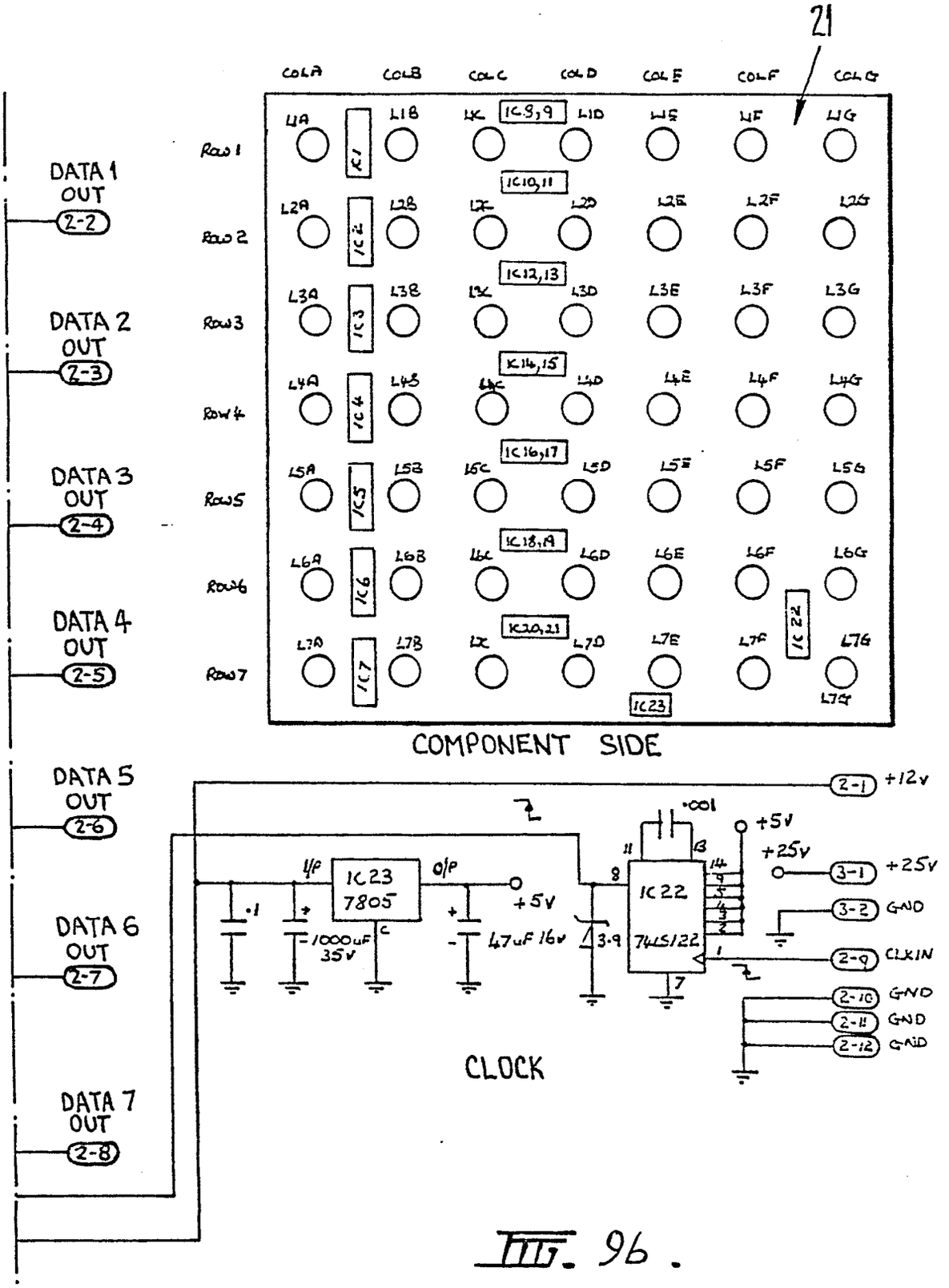

FIG. 96.

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EUROPEAN SEARCH REPORT

0069571
Application number

EP 82 30 3513

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X,Y	US-A-3 918 052 (KENNETH J. BRICHER) * Column 4, lines 20-68; column 5, lines 1-43; figures 2,3,5 *	1-3	G 09 F 13/28 G 09 G 3/00
Y	FR-A-2 106 842 (ADES-ELECTRIC) * Page 1, lines 22-29; figure 3 *	2	
Y	GB-A- 664 008 (GRAHAM CRAWFORD WALTER SMEE) * Page 2, lines 8-107; figures 1-3 *	3	
A	ELECTRONIC DESIGN, vol. 26, no. 4, February 1978, pages 76-80, Rochelle Park, USA "Directly viewed incandescent displays are hard to beat for high brightness and choice of colors. TTL-compatible, they also are easy to control and multiplex" * Page 78, column 1, paragraph 5; figure 4 *	4,5	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) G 09 F G 09 G
A	FR-A-1 526 674 (WILLIAM BROOKS) * Page 2, column 2, paragraph 1; page 3, column 1, lines 59-61; column 2, lines 1-48; page 6, column 1, paragraph 4, column 2; page 7, column 1, paragraphes 1,2; figures *	5,6	

-/-

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19-10-1982	MIOT F.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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European Patent Office

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Application number

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EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	IBM TECHNICAL DISCLOSURE BULLETIN, vol. 19, no. 1, June 1976, pages 41-42, New York, USA P.T. IVANCIE et al.: "Miniature moving alphanumeric display" * Page 42, paragraph 2; figure 2 *	7	
A	US-A-3 384 888 (JOHN D. HARNDEN et al.) * Claims; column 3, lines 1-35; column 13, lines 47-75; column 14, lines 1-11; figures *	7	
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

The present search report has been drawn up for all claims

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