



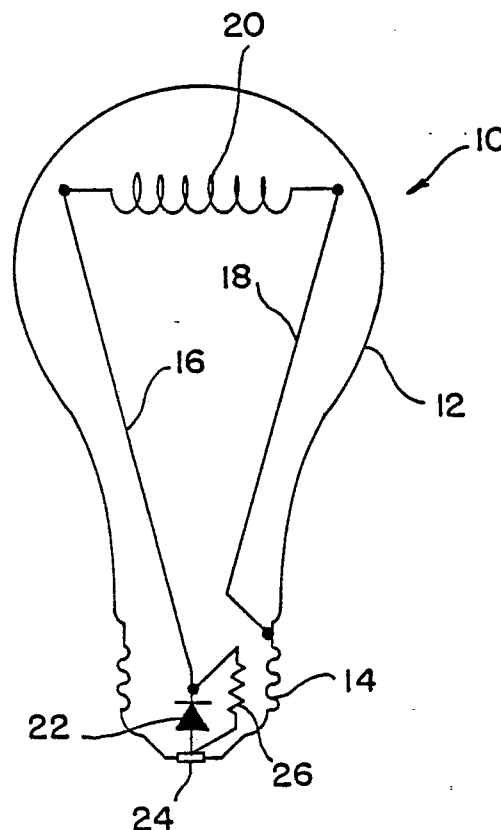
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<p>(21) International Application Number: PCT/US86/02678 (22) International Filing Date: 12 December 1986 (12.12.86) (71)(72) Applicant and Inventor: PONCE, Emiliano, Jr. [US/US]; 3715 Maple Road, Alderwood Manor, WA 98037 (US). (74) Agents: RONDEAU, George, C., Jr. et al.; Seed and Berry, 6300 Columbia Center, Seattle, WA 98104-7092 (US). (81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent).</p>		<p><b>Published</b> <i>With international search report.</i></p>

(54) Title: LONG LIFE TRAFFIC CONTROL LAMP AND SOCKET INSERT

(57) Abstract

A long-life incandescent lamp and a socket insert for use with conventional lamps to provide long life. The lamp (10) includes a sealed glass envelope (12), a base (14) fixedly attached to the glass envelope, a center contact (24) fixedly attached to the base and electrically insulated therefrom, a pair of lead wires (16, 18) extending within the envelope, an illuminable filament (20) disposed within the envelope and electrically connected between the lead wires, a diode (22) electrically connected between the center contact and the one lead wire for half-wave rectifying current to the filament, and a resistor (26) for providing a resistive bridge between the base and center contact. The resistor has a resistance substantially in excess of the resistance of the filament, preferably no greater than 27 Kohms.



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Description

## LONG LIFE TRAFFIC CONTROL LAMP AND SOCKET INSERT

Technical Field

The present invention relates generally to traffic control lamps, and more particularly, to a long-life incandescent traffic control lamp and a socket insert for use with a conventional traffic control lamp that will function with solid state electronic traffic controllers having conflict monitors.

Background Art

Whenever a traffic control lamp used in stop lights and other traffic control devices burns out or otherwise needs replacement, a maintenance crew must be dispatched to replace the lamp. The cost involved in changing such a lamp far exceeds the value of the lamp itself, often requiring lifting equipment to lift personnel to the traffic signal which may be far above the street level, and the services of several persons to operate the lift, change the lamp, and direct traffic. During the time period when the traffic control lamp is inoperative, traffic congestion and confusion of drivers and pedestrians may occur and an accident may result. Until the maintenance crew arrives and the traffic control lamp is replaced, the services of traffic police are many times required, placing a burden on the police department. If the life of the traffic control lamp can be extended and fewer replacements required, substantial savings will be realized and traffic flow will not be interrupted so frequently due to inoperative lamps.

It is well known that the use of a diode in series with the filament of an incandescent lamp operated on alternating current significantly increases the life of the lamp, only requiring an increase in the lamp's wattage

rating to produce a lumen output equivalent to the lamp previously used. The diode provides half-wave rectified direct current to the lamp filament.

One approach to using a diode with a lamp is to  
5 install the diode in a disc-shaped support which is positionable within the lamp socket with one contact surface in electrical contact with the center contact of the socket and another contact surface in electrical contact with the center contact of the lamp. The diode is positioned within  
10 the diode disc and is connected between the two contact surfaces. To facilitate proper alignment of the diode disc contact surfaces with the lamp and socket center contacts, the disc is sometimes provided with an adhesive which may be used to glue the disc to the base of the lamp and allows  
15 the disc to travel with the lamp as it is screwed into the socket.

Another approach is illustrated in U.S. Patent No. 3,869,631, in which a diode is mounted within the lamp between the lamp base and the stem press of the lamp, external of the gas-filled glass envelope containing the lamp  
20 filament.

The use of such a diode disc or lamp will extend the life of a traffic control lamp; however, it has been found that the addition of the diode causes solid state  
25 electronic traffic controllers having conflict monitors to malfunction and indicate an error condition. When an error condition is indicated, the traffic controller for a stop light enters a conflict mode and automatically switches a red or yellow flashing signal to the entire intersection.

30 It will therefore be appreciated that there has been a need for a long-life incandescent traffic control lamp and for a socket insert which may be used with conventional traffic control lamps to provide long life, but which are operable with solid state electronic traffic controllers having conflict monitors. The traffic control  
35 lamp and socket insert should provide for extended lamp

life with minimal energy loss, should be inexpensive to manufacture, and should use readily available components without unduly high power rating requirements. The present invention fulfills this need and further provides other related advantages.

#### Disclosure of the Invention

The present invention resides in a long-life incandescent lamp and a socket insert for use with conventional lamps to provide long life. The lamp includes a sealed glass envelope, a first electrical contact external of the glass envelope, a second electrical contact external of the glass envelope and electrically insulated from the first contact, an illuminable filament disposed within the glass envelope and electrically connected between the first and second contacts, a rectifier means for rectifying current to the filament, and a resistive means for providing a resistive bridge between the first and second contacts. The resistive means has a resistance substantially in excess of the resistance of the filament.

More specifically, one of the first or second contacts is a base fixedly attached to the glass envelope and sized to be received in a socket, while the other of the first or second contacts is a center contact fixedly attached to the base and electrically insulated therefrom. A pair of lead wires extend within the glass envelope and the filament is electrically connected between the lead wires. The rectifier means is a diode electrically connected between one of the pair of lead wires and one of the base or center contacts in series with the filament, with the other one of the pair of lead wires being electrically connected to the other one of the base or center contacts. The resistive means is a resistor.

In one embodiment of the invention, the resistor is electrically connected between the center contact and the base in parallel with the in-series combination of the

filament and the diode. In another embodiment of the invention, the resistor is electrically connected between the anode and the cathode of the diode in parallel with the diode. When used with presently available solid state electronic traffic controllers, the resistor has a resistance of no greater than 27K ohms. The diode rectifies the alternating current to provide a direct drive current to the filament to improve lamp life, and the resistor provides a low-current electrical bypass of the diode to avoid indication of an error condition by the conflict monitor.

An alternative embodiment of the invention is a socket insert for use with a conventional incandescent lamp having a center base contact and operating on alternating current in order to extend the life of the lamp. The insert includes a support body positionable within a lamp socket between the incandescent lamp and the center contact of the socket. The support body has a first contact for electrical contact with the center contact of the lamp and a second contact for electrical contact with the center contact of the socket. A diode is electrically connected between the first and second contacts, and a resistive element is also electrically connected between the first and second contacts in parallel with the diode.

Other features and advantages of the invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings.

#### Brief Description of the Drawings

Figure 1 is a schematic drawing of an incandescent lamp embodying the present invention.

Figure 2 is a schematic drawing of an alternative embodiment of the lamp shown in Figure 1.

Figure 3 is a schematic drawing of a socket insert embodying the present invention for use with a conventional incandescent lamp, showing the insert position be-

tween the base of a lamp and a lamp socket prior to placement of the insert within the socket.

#### Best Mode for Carrying Out the Invention

5           As shown in the drawings for purposes of illustration, the present invention is embodied in an incandescent lamp, indicated generally by reference numeral 10. The lamp 10 includes a sealed glass envelope 12, a metallic screw base 14 fixedly attached to the lower end of the  
10 glass envelope, a pair of lead wires 16 and 18, and an illuminable filament 20 disposed within the glass envelope and connected between the lead wires. Except as will be described hereinafter, the lamp is of conventional and well known design, and will not be described or shown in detail  
15 herein. One such incandescent lamp is shown and described in U.S. Patent No. 3,869,631, incorporated herein by reference.

In conventional manner, the lead wire 18 is connected directly to the base 14. The other lead wire 16 is  
20 connected to the cathode of a diode 22, and the anode of the diode is connected to a center contact 24 of the base 14. The center contact 24 is fixedly attached to the base 14 and electrically insulated therefrom.

When the lamp 10 is screwed into a socket (not  
25 shown), the center contact of the socket engages and makes electrical contact with the center contact 24 of the lamp 10, and the base 14 engages and makes electrical contact with the correspondingly threaded portion of the socket. With alternating current provided to the lamp 10 through  
30 the socket, the diode 22 rectifies the current to the filament 20 to produce a half-wave rectified direct current and provide the long-life characteristic of the lamp.

In accordance with the present invention, the lamp 10 also includes a bypass resistor 26 electrically  
35 connecting the center contact 24 with the lamp base 14. In the embodiment of the invention shown in Figure 1, the by-

pass resistor 26 is electrically connected between the anode and the cathode of the diode 22 in parallel with the diode. In the alternative embodiment of the invention shown in Figure 2, the bypass resistor 26 is connected in parallel with the in-series combination of the filament 20 and the diode 22. The bypass resistor 26 and the diode 22 are positioned within the lamp 10, external of the sealed glass envelope 12 containing the heated filament 20.

In both embodiments, the bypass resistor 26 has a resistance substantially in excess of the resistance of the filament 20 and provides a low-current bypass of the diode 22. In such fashion, the conflict monitor sensing circuits of the traffic controller with which the lamp 10 is used will sense a current path through the lamp 10 at all times. The bypass resistor 26 provides a continuous electrical path to the conflict monitor which is necessary to avoid the monitor indicating a specious error condition and entering a conflict mode. The current flow through the bypass resistor 26 when the diode 22 is back-biased will be at a substantially lower level than the current through the diode and filament when the diode is forward-biased with a drive current supplied to the filament.

It has been found that with many of the solid state electronic traffic controllers, a lamp 10 with a fixed resistance for the bypass resistor 26 of approximately 22K to 27K ohms or less will operate satisfactorily and avoid malfunctioning of the traffic controller. The bypass resistor 26 should be selected with as high a resistance value as will operate satisfactorily with the traffic controller with which the lamp 10 is used to avoid any unnecessary dissipation of energy during the portion of the alternating current cycle when the diode 22 is reverse-biased.

In the embodiment shown in Figure 1, the diode 22, and in the embodiment shown in Figure 2, the in-series combination of the diode 22 and the filament 20, have relatively low resistance and effectively short-circuit the



bypass resistor 26 when the diode is forward-biased to supply a drive current to the filament.

It is noted that while the lamp 10 has been described as a traffic control lamp, the lamp of the present invention may be used in other situations, such as a security light monitored by a sensing circuit which will not function when a diode is used in the conventional manner to achieve long life for the lamp. It is also noted that the orientation of the diode 22 may be reversed or the diode may be connected between the lead wire 18 and the base 14, while still achieving the benefit of the present invention. Although an arrangement is shown and described using a single diode 22 for half-wave rectification, the present invention may be used when the alternating current powering the lamp is rectified to a greater or lesser extent.

The bypass resistor 26 of the present invention may be a resistor of fixed value or may have the necessary resistance supplied by a variable resistor or other device having a resistive element, such as a thermistor. The bypass resistor 26 and the diode 22 may be fabricated as discrete components, as an integrated circuit, or otherwise. Of course, the bypass resistor 26 can be produced by a combination of resistive elements in series or parallel producing the desired resistance.

With the present invention, the bypass resistor 26 may be a discrete component of conventional design and will typically have a standard power rating which makes the component readily available and inexpensive. Using an alternating current with a line voltage of 110 volts and a resistance of 22K ohms for the bypass resistor 26, the maximum power dissipated by the resistor is only slightly in excess of one-half watt.

While the lamp 10 of the present invention has been shown and described with the diode 22 and the bypass resistor 26 positioned within the lamp, the diode and by-

pass resistor may be located at any desirable location within or outside of the lamp, as dictated by manufacturing economics or design choice.

Another alternative embodiment of the invention is shown in Figure 3 and includes a socket insert, indicated generally by reference numeral 28. The insert 28 has a support body 30 with a disc shape sized for insertion into a lamp socket 32. The insert 28 is positioned within the socket 32 between a center contact 33 of the socket and a center contact 34 of a conventional lamp 36.

The insert 28 is provided with a first contact surface 38 positioned on one face of the disc body 30 for engagement and electrical contact with the center contact 34 of the lamp 36, and a second contact surface 40 positioned on the opposite face of the disc body for engagement and electrical contact with the center contact 33 of the socket 32. Electrically connected in parallel between the first and second contact surfaces 38 and 40 is a diode 22' and a bypass resistor 26'. As described above for the first two embodiments of the invention, the bypass resistor 26' provides a continuous electrical path through the lamp 36 even when the diode 22' is reverse-biased to prevent the traffic controller with which the conventional lamp 36 is being using from indicating an error condition and entering a conflict mode.

It will be appreciated, that although specific embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

Claims

1. A long-life incandescent traffic control lamp for use with a traffic controller having a conflict monitor, comprising a sealed glass envelope having an illuminable filament disposed therein and electrically connected between a lamp base and a lamp center contact, said filament being connected to one of said base or said center contacts through a diode, said diode being bridged by a resistive element, whereby said diode rectifies drive current to said filament to improve lamp life while said resistive element provides a low-current electrical bypass of said diode to avoid indication of an error condition by the conflict monitor.

2. The traffic control lamp of claim 1 wherein said resistive element has a resistance substantially in excess of the resistance of said filament.

3. The traffic control lamp of claim 1 wherein said resistive element bridges said diode by being electrically connected between said center contact and said base.

4. The traffic control lamp of claim 1 wherein said resistive element bridges said diode by being electrically connected between the anode and the cathode of said diode.

5. A long-life incandescent lamp comprising:  
a sealed glass envelope;  
a base fixedly attached to said envelope and sized to be received in a socket;  
a center contact fixedly attached to said base and electrically insulated therefrom;  
a pair of lead wires extending within said envelope;  
an illuminable filament disposed in said envelope and electrically connected between said pair of lead wires;

a diode electrically connected between one of said pair of lead wires and one of said base or center contacts in series with said filament, with the other one of said pair of lead wires being electrically connected to the other one of said base or center contacts; and

a resistive element electrically connecting said base with said center contact and bypassing said diode.

6. The lamp of claim 5 wherein said resistive element electrically connects the anode to the cathode of said diode in parallel therewith.

7. The lamp of claim 5 wherein said resistive element is electrically connected in parallel with the in-series combination of said filament and said diode.

8. The lamp of claim 5 wherein said resistive element has a resistance of no greater than 27K ohms.

9. A socket insert for use with an incandescent lamp having a center base contact and operating on alternating current to extend the life of the lamp, comprising:

a support body positionable within a lamp socket between the incandescent lamp and the center contact of the socket, said support body having a first contact for electrical contact with the center contact of the lamp and a second contact for electrical contact with the center contact of the socket;

a diode electrically connected between said first and second contacts; and

a resistive element electrically connected between said first and second contacts in parallel with said diode.

10. A long-life incandescent traffic lamp comprising:  
a sealed glass envelope;  
a first electrical contact external of said glass envelope;

a second electrical contact external of said glass envelope and electrically insulated from said first contact;

an illuminable filament disposed within said glass envelope and electrically connected between said first and second contacts;

rectifier means for rectifying current to said filament; and

resistive means for providing a resistive bridge between said first and second contacts, said resistive means having a resistance substantially in excess of the resistance of said filament.

11. The traffic lamp of claim 10 wherein said rectifier means is a diode electrically connected in series with said filament between said filament and one of said first or second contacts.

12. The traffic lamp of claim 11 wherein said resistive means is a resistor electrically connected between the anode and the cathode of said diode.

13. The traffic lamp of claim 11 wherein said resistive means is a resistor electrically connected between said first and second contacts in parallel with the in-series combination of said filament and said diode.

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FIG. 1

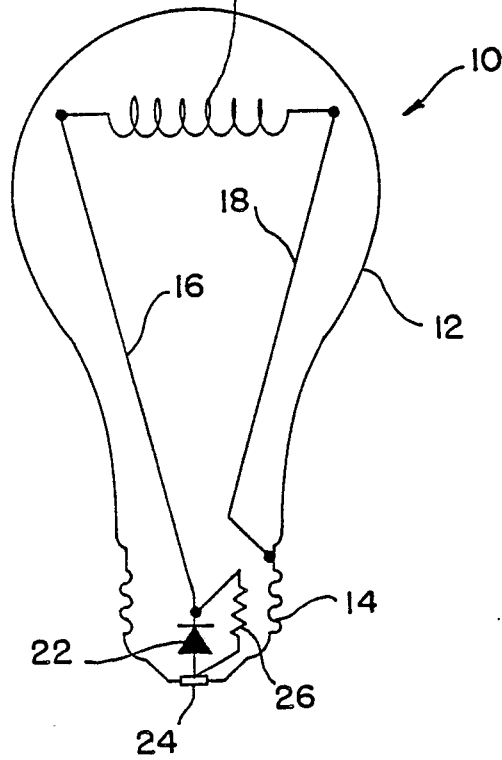


FIG. 2

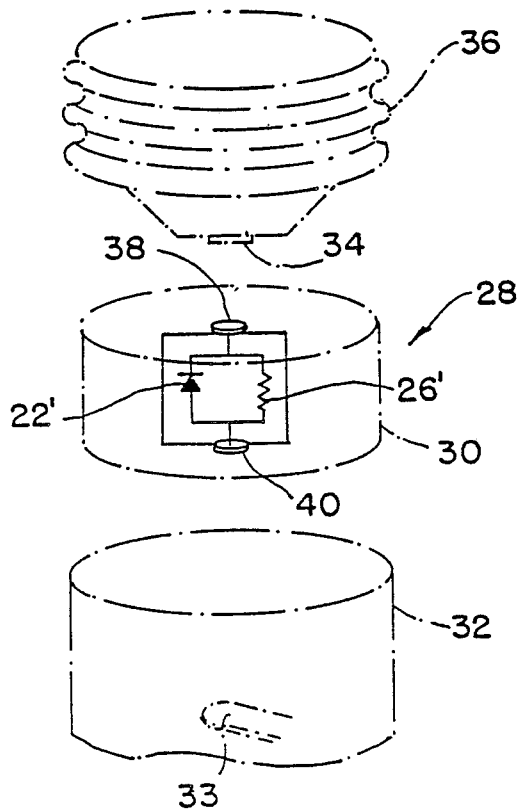
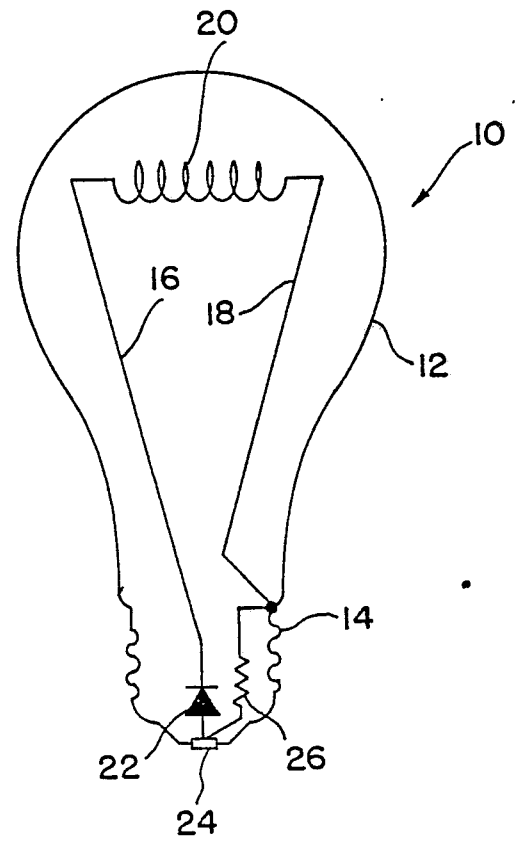


FIG. 3

# INTERNATIONAL SEARCH REPORT

International Application No PCT/US86/02678

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC(4) H05B 37/02; H01J 5/50 U.S. CL: 315/51, 52, 53, 71, 200R; 313/318; 340/931		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>4</sup>		
Classification System	Classification Symbols	
US	315/51, 52, 53, 71, 200R; 313/318; 340/931	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>		
Category *	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>
X	US, A, 3,818,263 (Belko) 18 June 1974 See Figs. 1-9, and the entire disclosure.	2-13
Y	US, A, 3,869,631 (Anderson et al) 04 March 1975 See Fig. 1, and col. 1, lines 31-46 and col. 2, lines 26-50.	1-8, 10-13
Y	US, A, 4,480,212 (Monahan et al) 30 October 1984 See Fig. 1, and col. 1 line 37 to col. 2 line 65 and col. 4, lines 20-36.	1-8, 10-13
Y	US, A, 3,836,814 (Rodriguez) 17 September 1974 See Figs 4-5, and abstract and col. 1, line 47 to col. 1, line 64.	1-8, 10-13
<p>* Special categories of cited documents: <sup>15</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search <sup>2</sup>		Date of Mailing of this International Search Report <sup>2</sup>
25 February 1987		06 MAR 1987
International Searching Authority <sup>1</sup>		Signature of Authorized Officer <sup>20</sup>
ISA/US		Michael Razavi

## III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No <sup>18</sup>
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A	US, A, 3,975,658 (Emtage et al) 17 August 1976 See Figs 4-5, and col. 2, lines 11-37	
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A	US, A 4,473,776 (Peters) 25 September 1984 See Fig. 1, col. 1, line 11 to col. 2, line 11	
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A	US, A 4,435,671 (Wouk) 06 March 1984 See Abstract.	
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