Jan. 29, 1963 J. R. VOSEFSKI 3,076,084

CIGAR LIGHTER

Filed Oct. 18, 1961

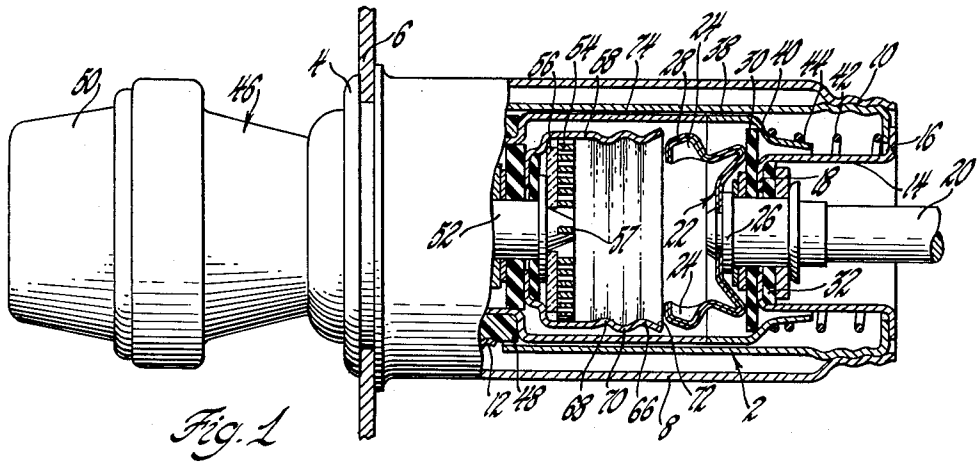


Fig. 1

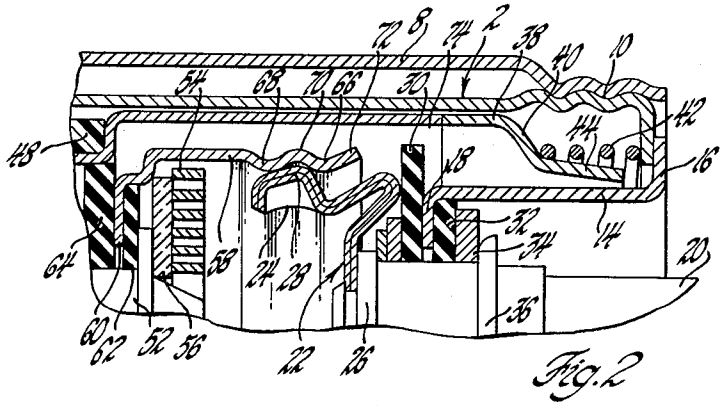


Fig. 2

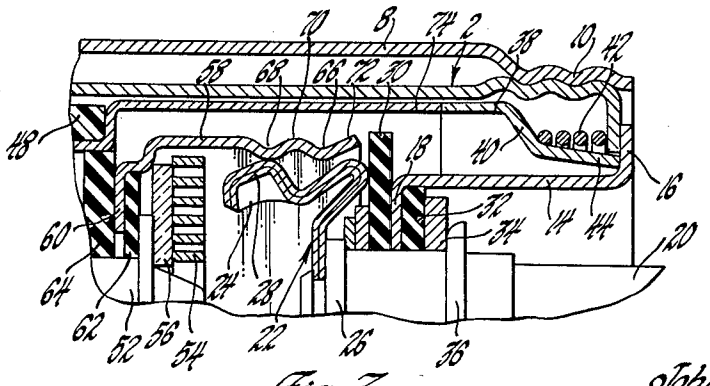


Fig. 3

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3,076,084
Patented Jan. 29, 1963

3,076,084
CIGAR LIGHTER

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Filed Oct. 18, 1961, Ser. No. 145,930
5 Claims. (Cl. 219—32)

This invention pertains to electrical cigar and cigarette lighters and, more particularly, to a contact assembly for such lighters.

Electrical lighters of the type commonly in use today with automotive vehicles typically comprise a tubular or cylindrical holding unit or case having a deep well or cavity within which an igniting unit or lighter plug is removably insertable. The igniting and holding units respectively carry latching and contact members through which an electrical circuit may be established to bring the heating element of the igniting unit to a substantially predetermined temperature for use. The contact member carried by the holding unit usually takes the form of a plurality of resilient bimetallic temperature responsive contact fingers which will latchingly engage the contact member of the removable igniting unit, commonly in the form of a cup surrounding the heating element, to maintain the assembly in a circuit-closing position during the heating cycle, while the contact fingers are automatically releasable from the contact member carried by the igniting unit upon the desired heating element temperature being reached. Suitable ejection means are provided to eject the igniting unit automatically to a holding position within the holding case for subsequent removal and use after the element has been heated.

After heating the element as aforementioned, it often happens that one using the igniting unit waits too long before removing same and finds that the heating element has cooled. In such circumstances, the igniting unit or plug will be reinserted in the holding unit or case to obtain a "relight." However, quite frequently, the bimetallic contact fingers still retain sufficient residual heat from the prior heating cycle to prevent latching engagement with the contact member of the plug in opposition to the force of the aforementioned ejecting means and, moreover, the residual heat in the contact fingers pulls them away from the contact member on the plug to such an extent that they cannot engage to remake the heating circuit. To provide for such a situation, electrical lighters of the type aforementioned typically include a rigid washer or "relight" contact in the holding unit or case immediately axially rearwardly of the bimetallic contact fingers aforementioned. Consequently, to obtain a "relight," the operator need merely reinsert the plug in the holding case to engage the contact member of the plug against the rigid "relight" washer of the case to make a secondary or "relight" circuit through the heating element. The United States Patent to Jorgensen et al.—2,828,400 entitled "Cigar Lighter" and dated March 25, 1958, discloses one example of a lighter assembly of the type aforementioned.

While lighter assemblies of the type aforementioned and as exemplified by the Jorgensen et al. patent have met with considerable commercial success, certain problems are presented thereby. In the first instance, and as will be obvious from the foregoing, two contact members must be provided in the holding unit or case; that is, the bimetallic latch fingers which function to provide a primary heating circuit and the secondary contact member in the form, for example, of a rigid "relight" washer. Secondly, under the circumstances aforementioned in which the user of the lighter plug inserts the latter into the holding case to obtain a "relight," the lighter plug must be manually retained against the "relight" contact member since the primary contact member or bimetallic fingers contain enough residual heat to prevent them from latching engagement with the contact member carried by the plug in opposition to the ejecting means. Consequently, the user of the lighter must employ a certain amount of guess work to determine when the heating element reaches a predetermined heat. As a result, the plug may be held in the secondary or "relight" circuit-closing position too long, resulting in damage or even burn-out of the heating element.

Furthermore, and as is well known to those acquainted with this art, currents as high as approximately 20 amperes are conducted through the contact members of such a lighter assembly. In order to safely conduct such high currents, the respective contact members of the lighter assembly are fabricated to have as large a contact area as possible, and quite often the contact member associated with the lighter plug is often plated with silver or other suitable metal in order to increase its conductivity. Moreover, in order to prevent severe arcing between the contacts upon release thereof, it will be apparent that the automatic ejection action of the lighter plug should be quite rapid. Even less severe arcing, occurring to some extent during each cycle of operation, may progressively burn the engageable areas of the contact members thereby burning away the conductive plating which may have been provided thereon, and roughening the contact areas. As a consequence of the aforementioned arcing during repeated cycles of lighter use, the engageable primary contact members may begin to stick thereby slowing the ejection action of the lighting unit or plug and allowing the relatively high currents to continue to pass through the contact members thereby resulting in very severe arcing between the contact members, reduction in the service life of the lighter, or even dangerous fires.

This problem of roughened areas on the primary contacts of the lighter assembly is magnified considerably by the use of a rigid "relight" washer within the holding unit or case. In other words, under the circumstances aforementioned in which the lighter plug is held manually against such a rigid "relight" washer or contact, the latter has a tendency to roughen, gouge or abrade the contact member engageable therewith and carried by the lighter plug. This abrading or gouging action tends to wear off the highly conductive coating or plating on the contact member of the lighter plug, while roughening the contact surface itself. Inasmuch as the lighter plug is placed in many different rotational positions within the holding case during use, such a roughened contact area on the lighter plug eventually comes into repeated contact with the contact area of the primary temperature responsive contact fingers of the holding unit or case thereby abrading and roughening the latter. As a result, even through the heating element of the lighter plug would reach the desired temperature through the primary contacts and heating circuit, the igniting unit may tend to stick within the holding case thereby resulting in severe arcing and reduced service life, and potential danger of serious fires as aforementioned.

The copending United States application of D. R. Crumb, Serial Number 773,591 filed November 13, 1958, now Patent No. 3,012,127 and entitled "Contact Assembly for Lighter" discloses one solution to this problem of a rigid secondary or "relight" contact abrading, gouging or roughening the contact surface of the contact member carried by the removable lighter plug. However, as in the Jorgensen et al. patent aforementioned, a secondary or "relight" contact member is still required

to provide the secondary or "relight" circuit under the circumstances aforementioned.

Still another problem presented by known lighters, as exemplified by both the Jorgensen et al. patent and the copending Crumb application, resides in the fact that, upon inserting the lighter plug into the case to latchingly engage the contact fingers to close the primary heating circuit, the contact member carried by the lighter plug will first engage the contact fingers carried by the holding cases, then disengage the latter and then reengage them. This make-break-make cycle of circuit-closing engagement often results in arcing between the primary contact members carried respectively by the lighter plug and the holding case, thereby burning the contact areas thereof. Consequently, the cooperatingly engageable contact areas of the contact members carried respectively by the lighter plug and holding case may be burned, thereby further contributing to the tendency of the lighter plug to stick to the bimetal contact fingers in opposition to the plug-ejection means, causing further damage to the lighter for reasons mentioned above. The United States patent to Jorgensen—2,810,814 entitled "Cigar Lighter" and dated October 22, 1957, presents one solution to this problem of make-break-make cycling during primary circuit-closing engagement of the contacts of the lighter assembly. However, as in the Jorgensen et al. patent and Crumb application aforementioned, a rigid secondary or "relight" washer is still required, resulting in the problem of element burn-out or damage during use of the "relight" circuit and, like the Jorgensen et al. construction, roughening, abrading, or gouging of the contact surface of the contact member carried by the lighter plug with the undesirable consequences aforementioned.

It is, therefore, a principal object and feature of this invention to provide an improved lighter assembly comprising but a single contact assembly carried, respectively, by a holding unit or case and a lighting unit or plug removably insertable therein while still obtaining both a primary heating circuit and a secondary heating circuit.

It is yet another object and feature of this invention to provide a lighter assembly of the type aforementioned characterized by but a single contact assembly carried, respectively, by a removable lighter plug and its supporting holding case which provides not only a primary and secondary "relight" circuit but, in both instances, means responsive to a predetermined temperature for breaking such circuits prior to damage occurring to the heating element or other parts of the assembly.

It is yet another object and feature of this invention to provide a lighter assembly of the type aforementioned characterized by a single contact mechanism carried, respectively, by a removable lighter plug and holding case to provide both a primary and a secondary or "relight" circuit including means responsive to the temperature of the lighter heating element to break such circuits, and so constructed and arranged as to prevent make-break-make cycling during primary circuit-closing engagement of the respective contact assemblies.

It is yet another object and feature of this invention to provide a lighter assembly of the type aforementioned in which the removable igniting unit or plug and its supporting holding unit or case are respectively provided with a single contact means, one of which comprises bimetallic resilient temperature responsive fingers engageable with the contact member carried by the other unit to make both a primary heating circuit and a secondary "relight" circuit, whereby the resiliency of the bimetal fingers prevents abrading, gouging or roughening of the contact surface of the contact member carried by the other unit upon closing the secondary or "relight" circuit.

These and other objects, features and advantages of the invention will become more apparent hereinafter as the description of the invention proceeds, and in which reference is made to the drawings in which:

FIGURE 1 illustrates a lighter assembly with the components thereof in an open-circuit storage or holding position;

FIGURE 2 is a fragmentary enlarged view of FIGURE 1, but showing the contact mechanism of the lighter in a primary circuit-closing and latching position; and

FIGURE 3 is a view corresponding generally to FIGURE 2, but showing the contact mechanism of the assembly in a secondary or "relight" position.

Referring now to the drawings, there is shown a substantially tubular or cylindrical holding unit or case **2** having a radial flange **4** at its open end adapted for abutment with a support panel **6** which may be the instrument panel of an automotive vehicle. The flange **4** is held in abutment with the panel **6** to support the holding case in the position shown in FIGURE 1 of the drawings by means of a locking sleeve **8** threadably engaging the rearward or inner end of the holding case as at **10** and abutting panel **6**. A plurality of spaced yieldable spring fingers **12** are lanced from or otherwise provided in the side wall of the holding case **2** so as to cooperate with the igniting unit or plug to be described to maintain the latter in an open-circuit holding or storage position within the holding case as illustrated in FIGURE 1. The base or inner end of the holding case is formed and closed by a substantially tubular sleeve **14** having a rearward annular flange **16** suitably secured to the holding case as by welding. At its forward or axially outer end, the tubular sleeve **14** is provided with an annular radial wall **18** having an aperture therein through which the metallic mounting stud **20** extends in spaced relationship thereto.

The central portion of the metallic primary contact member **22**, herein shown to include a pair of oppositely radially projecting resilient bimetallic temperature responsive fingers **24**, is riveted or otherwise suitably fixedly secured to the head of the stud **20** against the radial shoulder **26** thereon. Each of the fingers **24** includes a radially outwardly projecting curved contact surface **28** for engagement with a contact member on the igniting unit or plug to be described. A relatively large annular insulating washer **30** is supported on the mounting stud **20** in abutting contact with the wall **18** of the tubular sleeve **14**. An additional annular insulating washer **32** is supported on stud **20** and nested within sleeve **14** against the interior face of the wall **18**, and the washer **34** abuts washer **32** and shoulder **36** axially inwardly on the mounting stud **20**.

An ejection sleeve **38** is telescopicallv mounted within the holding case **2** about sleeve **14**, and includes a shoulder **40** normally urged into abutting stop engagement with the periphery of the insulating or stop washer **30** as shown in FIGURE 1 by means of an axially coiled spring **42** acting between the axially rearwardly extending skirt **44** of the ejection sleeve and the rear wall or base of the holding case. Axial inward movement of the ejection sleeve **38** is limited by abutment of the end of skirt **44** with the base of the holding case as shown in FIGURE 3.

The igniting unit **46** may be seen to include a main body portion **48** to which the handling knob **50** is secured. A metallic mounting stud **52** is secured to the igniting unit at the insertable end thereof. A heating element **54**, formed of continuous coils or ribbon-like electrically-resistant metal stock, is mounted on the end of stud **52** adjacent a suitable insulating washer **56** abutting a shoulder on the stud. One end of the heating element is staked or otherwise electrically and mechanically connected to the stud **52** as indicated at **57**, while the other end thereof is similarly connected to a cylindrical or tubular contact cup **58** which surrounds and extends axially an appreciable distance beyond the element **54**. The contact cup **58** includes an apertured base wall **60** surrounding the stud **52** and mounted between insulating washers **62** and **64** carried by the stud. The open end of the contact cup **58** terminates in a pair of radially inwardly projecting axially spaced annular ridges **66** and **68** defining an annular latch seat **70** therebetween; and a ra-

dially outwardly flaring mouth 72. Surrounding and spaced from the contact cup 58 is an outer sleeve 74 suitably secured to the main body portion 48 of the igniting unit and extending beyond the contact cup 58 and heating element 54.

It will be understood that the mounting stud 20 in the holding case forms a terminal adapted to be connected to a suitable electrical power source such as the vehicle battery. Current from such a power source is conducted through the mounting stud 20 to the contact fingers 24. With the igniting unit contact cup 58 in engagement with the contact fingers 24 as to be described, it will be understood that a circuit is established through the contact cup 58, heating element 54 and stud 52 to ground in the usual manner.

Referring now to the operation of the assembly aforedescribed, it is to be noted first that FIGURE 1 of the sketch illustrates the lighter assembly in its normal holding or storage position; that is, the position in which the plug 46 is carried when not being used, or just following a heating cycle and just prior to removal from the holding case for use. To use the lighter in the normal manner, the knob 50 is pressed inwardly of the holding case 2 causing the contact cup 58 to ride over the contact fingers 24 which yield radially inwardly upon engagement with the flared mouth 72 of the contact cup. Ordinarily, the user of the plug will depress the knob 50 until such time as the end of the ejection sleeve skirt 44 bottoms against the base of the holding case as illustrated in FIGURE 3. At this time, the ejection spring 42 is compressed and the contact fingers 24 have moved successively past the ridge 66, and latch seat 70 on the contact cup into radial engagement with the second cup ridge 68 as illustrated in FIGURE 3. At this time, the vehicle operator releases the plug and the spring 42 expands slightly until the contact fingers 24 come to rest and latch in the seat 70 between the ridges 66 and 68 on the contact cup as illustrated in FIGURE 2. It is important to note that, as the cup rides over the fingers 24 from the FIGURE 1 position to the FIGURE 3 position to the latching position of FIGURE 2, the resilient contact and latch fingers remain in constant engagement with the contact cup; that is, once the contact is made, it is retained until the element is heated as described hereinafter.

With the assembly in the FIGURE 2 position, a heating circuit exists as aforementioned and, after the element 54 reaches a predetermined heat, the temperature responsive contact fingers 24 will have contracted radially inwardly to such an extent that the force of latching engagement of the latter wih the contact cup is overcome by he ejection spring 42. As a result, the plug 46 is rapidly thrust from the FIGURE 2 position back to the FIGURE 1 position and may then be removed for use.

As often happens, it may now be assumed that the user of the lighter waits a few moments too long before removing the lighter plug from the FIGURE 1 position, and finds that the element 54 has cooled. The plug may then be reinserted in the holding case to obtain a "relight." Thus, the plug is pushed all the way into the holding case until the ejection sleeve skirt 44 bottoms and the contact fingers 24 and cup 58 are disposed in the position of FIGURE 3. The plug is held in this position by the user thereof, and a circuit is made through the heating element as previously described. However, and of particular significance, should the plug be held in too long and to the point that the heating element 54 could be burned-out or otherwise damaged, the fingers 24 respond to the temperature and expand radially inwardly from the contact ridge 68 to break the circuit. In other words, the ejection sleeve stop positively insures that the ridge 68 on the cup 58 will stop opposite the fingers 24 to make contact, event through the fingers contain sufficient residual heat to prevent engagement thereof with the main body of the cup, and the fingers themselves form a circuit breaker to prevent overheating and damage to the element 54 during "relight" as well as when used in the normal manner in latching engagement with the contact cup. Furthermore, since the resilient bimetal fingers 24 are employed not only to make the usual primary circuit to the contact cup as illustrated in FIGURE 2 but also the secondary or "relight" circuit as aforementioned, it will be noted that there is no tendency for the flared mouth 72 or other contact surfaces of the cup 58 to be abraded, gouged or roughened by the contact fingers 24 which resiliently yield upon engagement therewith.

It will now be apparent from the foregoing description that the lighter assembly aforedescribed provides both a primary and a secondary or "relight" circuit while utilizing but a single contact mechanism carried, respectively, by the lighter plug and holding case; that is, although eliminating a third contact such as a rigid "relight" washer mounted in the holding case as in the prior art. Furthermore, the aforementioned construction prevents make-break-make cycling during primary circuit-closing engagement of the contact fingers and cup as illustrated in FIGURE 2, insures "relight" contact between the cup 58 and fingers 24 even when the latter are hot and bowed in to some extent, and the bimetal contact fingers 24 in the "relight" circuit as illustrated in FIGURE 3 act as an automatic circuit breaker.

Having disclosed a preferred embodiment of the invention by way of illustration, it is to be understood that the invention is not to be limited thereby but only by the claims which follow.

I claim:

1. A ligher assembly comprising a holding unit, an igniting unit removably insertable within said holding unit, a temperature responsive contact finger carried by one of said units, contact means carried by the other of said units including a latch seat and a projecting ridge adjacent said seat, said igniting unit having a holding position within said holding unit in which said contact means is out of contact with said finger and being further insertable into said holding unit to successively engage first said seat and thence said ridge of said contact means with said finger, and stop means preventing insertion of said igniting unit into said holding unit beyond the extent required to effect engagement of said ridge with said finger to form a single circuit between said units.

2. A lighter assembly comprising a holding unit, an igniting unit removably insertable within said holding unit, a temperature responsive contact finger carried by one of said units, contact means carried by the other of said units including a latch seat and radially projecting annular ridge, said igniting unit having a holding position within said holding unit in which said contact means is out of contact with said finger, said latch seat and ridge being successively engageable by said finger during further insertion of said igniter unit into said holding unit beyond said holding position, and stop means limiting insertion of said igniting unit into said holding unit to a predetermined maximum extent to dispose said ridge radially opposite and in engagement with said finger to form a single circuit between said units.

3. A lighter assembly comprising a holding unit, an igniting unit removably insertable within said holding unit, a temperature responsive contact finger carried by one of said units, an axially extending contact cup carried by the other of said units and including first and second radially projecting axially spaced annular ridges defining an annular latch seat therebetween, said igniting unit having a holding position within said holding unit in which said cup is out of contact with said finger and being further insertable into said holding unit to a predetermined maximum extent to successively radially engage said first ridge, said latch seat and said second ridge with said finger, said igniting unit having a latching position upon insertion thereof into said holding unit less than said predetermined maximum extent in which said finger latchingly engages

said latch seat and a relight position upon insertion thereof to said predetermined maximum extent in which said finger radially engages said second ridge, and stop means limiting insertion of said igniting unit into said holding unit to said predetermined maximum extent to disposed said igniting unit in said relight position to form a single relight circuit between said units through said finger and said second ridge.

4. A lighter assembly comprising a holding unit removably insertable within said holding unit, plural radially spaced resilient temperature responsive contact fingers carried by one of said units, an axially extending contact cup carried by the other of said units and including first and second radially projecting axially spaced annular ridges defining an annular latch seat therebetween, said igniting unit having a holding position within said holding unit in which said cup is out of contact with said fingers and being further insertable into said holding unit to a predetermined maximum extent to successively radially engage said first ridge, said latch seat and said second ridge with said fingers, said igniting unit having a latching position upon insertion thereof into said holding unit less than said predetermined maximum extent in which said fingers latchingly engage said latch seat and a relight position upon insertion thereof to said predetermined maximum extent in which said fingers radially engage said second ridge, and a spring biased ejection sleeve engageable with said igniting unit and abuttable with said holding unit upon insertion of said igniting unit to said predetermined maximum extent to limit insertion of said igniting unit to said predetermined maximum extent.

5. A lighter assembly comprising a holding case having

a base end and an open end axially opposite thereto, a pair of radially oppositely disposed resilient temperature responsive contact fingers mounted within said case intermediate the ends of the latter, a lighter plug removably insertable within the open end of said case, a heating element secured to said plug at the insertable end thereof, a contact cup fixed to said plug and electrically connected to said element, said cup surrounding and extending axially beyond said element, first and second radially inwardly projecting axially spaced annular ridges on said cup defining an annular latch seat therebetween, said plug having a holding position within said case in which said cup is out of contact with said fingers and being further insertable into said case to a predetermined maximum extent to successively radially engage said first ridge, said latch seat and said second ridge with said fingers, said plug having a latching position upon insertion thereof into said case less than said maximum extent in which said fingers latching engage said latch seat and a relight position upon insertion thereof to said predetermined maximum extent in which said fingers radially engage said second ridge, and a spring biased ejection sleeve having one end thereof engageable with said plug and the other end thereof abuttable with the base end of said case to limit insertion of said plug to said predetermined maximum extent.

References Cited in the file of this patent

UNITED STATES PATENTS

2,810,814	Jorgensen	Oct. 22, 1957
3,012,127	Crumb	Dec. 5, 1961

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,076,084 January 29, 1963

John R. Vosefski

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 10, for "cases" read -- case --; column 4, line 61, for "or" read -- of --; column 5, line 50, for "wih" read -- with --; same line, for "he" read -- the --; line 73, for "event through" read -- even though --; column 6, line 32, for "ligher" read -- lighter --; line 50, after "and" insert -- a --; column 7, line 9, after "unit" insert -- , an igniting unit --; column 8, line 19, for "latching" read -- latchingly --.

Signed and sealed this 24th day of September 1963.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents

UNITED STATES PATENT OFFICE

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