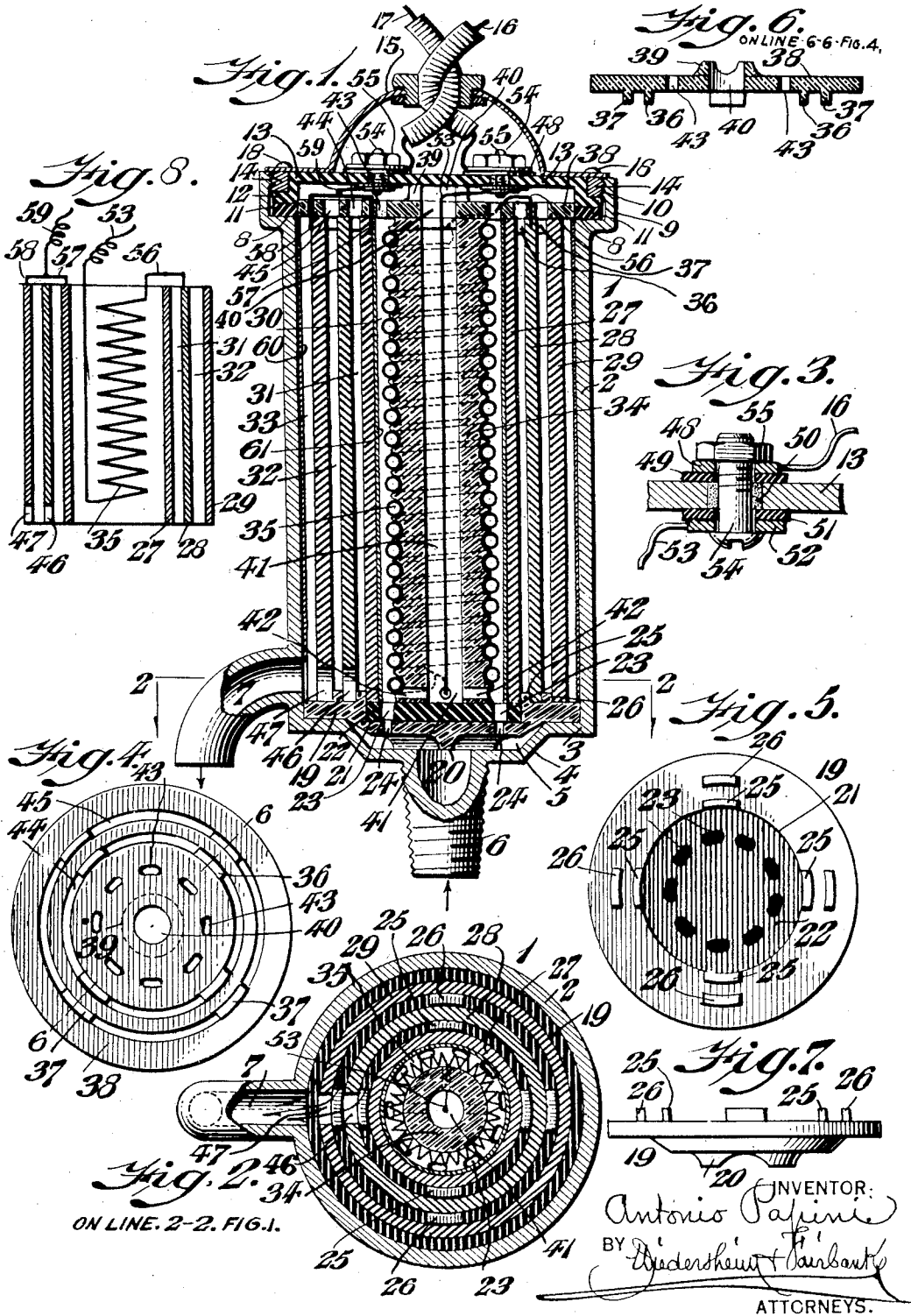


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 AUTOMATIC HEATER FOR WATER AND OTHER LIQUIDS.
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UNITED STATES PATENT OFFICE.

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AUTOMATIC HEATER FOR WATER AND OTHER LIQUIDS.

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Application filed April 26, 1920. Serial No. 376,445.

To all whom it may concern:

Be it known that I, ANTONIO PAPINI, a subject of the King of Italy, having resided in the United States one year last past, and having declared my intentions of becoming a citizen thereof, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Automatic Heater for Water and other Liquid, of which the following is a specification.

My invention consists of a novel construction of an automatic electric heater for water or other liquid, wherein I employ a battery of carbon tubes or open ended carbon cylinders connected in series with a heating coil or element, whose ohmic resistance is ten times or more, that of the carbon when immersed in water.

My invention further consists of a novel construction of a heater case, having at its upper and lower portions porcelain apertured plates of novel construction and provided with spacing devices for enabling the battery of carbon tubes or open ended cylinders to be accurately and positively positioned and retained with respect to each other in said casing.

My invention further consists of a novel manner of assembling a battery of carbon cylinders, a porcelain muffler and its resistance coil in series with said battery and with respect to the upper and lower apertured porcelain disks and the cover of the casing, whereby all of the parts are effectively housed when in assembled condition.

It further consists of a novel manner of assembling the carbons, resistance coil and their adjuncts, whereby the fluid is effectively and automatically heated and a free circulation thereof permitted.

It further consists of a novel manner of insulating and sealing the connections for the electrical conductors.

It further consists of a novel construction of upper and lower apertured insulating disks, which are provided with spacing devices for positioning the battery of carbons employed.

It further consists of other novel features of construction, all as will hereinafter be fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at pres-

ent preferred by me, since the same will be found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a vertical sectional view of an automatic electric liquid heater embodying my invention.

Fig. 2 represents a section on line 2—2 of Fig. 1.

Fig. 3 represents on an enlarged scale a vertical sectional view of the top cover plate, showing the insulating and sealing devices employed.

Fig. 4 represents a plan view of the under side of the upper porcelain disk employed.

Fig. 5 represents a top plan view of the bottom porcelain disk showing the spacing devices thereon.

Fig. 6 represents a section on the line 6—6 of Fig. 4.

Fig. 7 represents a side elevation of Fig. 5.

Fig. 8 represents a wiring diagram, showing the electrical connections common to the battery of carbon tubes or open ended cylinders employed and the resistance coil, connected in series with said battery.

Similar numerals of reference indicate corresponding parts.

1 designates my novel construction of electric water heater, wherein I employ the case 2, which may be cast out of white metal or the like, and is provided with the bottom 3, having a central depressed portion 4, whereby the inlet chamber 5 is formed which communicates with the inlet 6 for the water or other fluid to be heated, the flow thereof to said inlet being controlled by any suitable valve, cock or the like, which it is unnecessary to show or describe in detail. 7 designates the outlet for the heated liquid, which is located at the lower portion of the case 2, while the upper portion of the latter is cast open and provided with the horizontal seat or shoulder 8, above which extends the annular flange 9, which is internally threaded at 10.

11 designates a steam packing washer which is supported on the seat 8, and upon which rests the outer deflected ring or flange

12 of the top member 13, which is held in position in the upper part of the case 2 by the externally threaded ring 14, which is screwed into engagement with the threaded portion 10 by means of a spanner wrench or the like, whereby the top of the case 2 is tightly closed or sealed. 15 designates the cover for the electrical connections 16 and 17, which is an inverted flanged cup held in position with respect to the ring 14 and the top 13 by the screws 18, which may be screwed into the ring 14.

At the bottom of the case 2, and above the chamber 5, I locate the disk 19 of porcelain or the like whose shape in cross section will be understood from the bottom of Fig. 1 and which has an outer flanged portion resting on the bottom 3 and an intermediate foot or recessed portion 20 resting on the bottom of the chamber 5, said disk having the recess 21 in the top thereof in which is seated the disk 22 of rubber or similar material which has the ports 23 therein, which aline with the ports 24 in the bottom of the disk 19. The top of the disk 19 is provided with the inner spacing lugs 25 and the outer spacing lugs 26, which serve to accurately position the bottoms of the carbon tubes or open ended cylinders 27, 28, and 29, which are concentrically arranged in the order stated, whereby thin, annular, water circulating passages 30, 31, 32 and 33 are formed, the inner passage 30 being in direct communication with the main inlet 6, through the chamber 5 and ports 24 and 23, as will be understood from Fig. 1.

34 designates a central open ended porcelain muffle having a coiled resistance wire 35 coiled around or secured to it. It will be evident that the battery of carbons 27, 28 and 29 is connected in series with the heating coil or element 35, and I prefer to have the ohmic resistance of the latter about ten times or more that of the carbons when immersed in water.

The upper ends of the concentric carbon cylinders 27, 28, and 29 are positioned between the inner lugs 36 and the outer lugs 37 of the upper porcelain plate 38 which has the top boss 39 thereon, which contacts with the bottom of the top member or cover 13, so that when the parts are assembled, as seen in Fig. 1, it will be apparent that the central muffle and the carbon cylinders are effectively held in assembled position.

The top plate 38 is provided with the central port 40, which alines with the passage 41 through the muffle 34, the latter having the bottom lateral ports 42 therein, and being also provided with the annular row of ports 43, which communicate with the water chamber 30, while the elongated inner and outer ports 44 and 45 (see Figs. 1 and 4) afford communication with the water cham-

bers 31 and 32 respectively. The lower portions of the outer carbon cylinders 28 and 29, have the recesses 46 and 47 therein, so that a free circulation of the heated medium by reason of the ports and passages above described is provided from the inlet 6 to the outlet 7.

It is essential that the electrical connections to the resistance coil 35 be water tight and properly insulated and in Figs. 1 and 3, I have shown a preferred form of construction, which is readily and cheaply assembled and is very efficient for the purpose desired, wherein the conductor 16 is secured to the contact washer 48, which rests upon the rubber washer 49, which rests upon the cover plate 13, in which is located the fiber bushing 50, below which is the rubber washer 51, below which is the contact washer 52, from which leads the conductor 53, to the bottom of the resistance coil 35. The parts 48, 49, 50, 51 and 52 are held in assembled position by the screw 54 and nut 55 as seen in Fig. 3, and a very efficient sealing and insulating device is thus produced.

As already explained, the lower end of the conductor 53 leads to the bottom of the resistance coil 35, while from the top of the latter leads the conductor 56 to the top of the intermediate carbon cylinder 28. From the top of the inner and outer carbon cylinders 27 and 29 lead the conductors 57 and 58 to the conductor 59, which latter through the medium of the insulating and sealing devices seen in the upper left hand portion of Fig. 1 (conforming to those seen in Fig. 3) is in electrical communication with the conductor 17.

I line the inside wall of the case 2 with porcelain or other insulating material, as indicated at 60, and I also line the inside of the inner carbon cylinder or tube with a similar insulating lining of porcelain or the like 61, as will be understood from Fig. 1.

The operation is as follows:—The water or other liquid to be heated on being admitted through the inlet 6, flows through the chamber 5, ports 23 and 24 upwardly through the chamber 30 in proximity to the resistance 35 and thence through the ports 43, 44 and 45 to the annular chambers 31 and 32 and thence downwardly through the recesses 46 and 47 to the outlet 7. When the water level reaches the proper height in the chambers between the carbons 27, 28 and 29, it closes the electric circuit, and the current passes through the resistance coil 35, which latter becomes heated and imparts its heat to the liquid in proximity thereto and the heated liquid is discharged through the holes or recesses 46 and 47 and the outlet 7, as will be evident to those skilled in this art.

When the flow of the water or other liquid ceases or the cock (not shown) in the inlet 6 is closed, the water between the car-

bons partly flows out or empties, partly by reason of gravity and partly by the pressure of steam generated by the heating element 35, whereby the space between the carbons immediately becomes dried out, and the circuit being opened, the current is practically shut off at once, so that there is no waste of electrical energy.

My novel device is entirely automatic and having no moving parts is obviously not liable to get out of order.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an automatic electric heater, a battery of open-ended carbon cylinders of different diameters, and a resistance coil supported concentrically within the smaller of said cylinders and connected in series with said battery and having an ohmic resistance substantially ten times that of said battery when immersed in water.

2. In an automatic electric heater, a battery of open-ended carbon cylinders of different diameters concentrically arranged, a muffler located within the cylinder of lesser diameter, and a resistance coil on said muffler connected in series with said battery and having an ohmic resistance of substantially ten times that of said battery when immersed in a liquid.

3. In an automatic electric heater, a battery of open-ended carbon cylinders of uniform length and different diameters concentrically arranged, a muffler located in the cylinder of lesser diameter, a resistance coil on said muffler connected in series with said battery and having an ohmic resistance of ten times that of said battery when immersed in the liquid to be heated, and apertured retaining devices contacting with the ends of said cylinders for spacing and retaining the latter in assembled position.

4. In an automatic electric heater, a battery of open-ended carbon cylinders of different diameters concentrically arranged, a muffler located within said cylinders, a resistance coil on said muffler connected in series with said battery and having an ohmic resistance of substantially ten times that of said battery when immersed in water, upper and lower apertured non-conducting plates engaging the ends of said cylinders, and spacing devices on said plates for concentrically positioning said cylinders.

5. In a device of the character stated, a battery of open-ended carbon cylinders of different diameters concentrically arranged, a resistance coil supported concentrically within the smaller of said cylinders and connected in series with said battery and having an ohmic resistance substantially ten times that of said battery when immersed in water, a case surrounding said battery,

sealing devices for the top of said case, upper and lower plates engaging the ends of said cylinders, and spacing lugs on said plates for positioning the upper and lower portions of said cylinders.

6. In an automatic electric heater, a case, a cover plate therefor, an inlet and outlet for the fluid to be heated at the lower portion of said case, a lower non-conducting plate supported on the bottom of said case, spacing devices on the top of said plate, a battery of concentric carbon cylinders supported upon said lower plate, and an upper non-conducting plate having spacing devices on the bottom thereof, whereby said cylinders are held in concentric alinement, said plates having ports therein to permit circulation of the liquid to be heated, in combination with a resistance coil connected in series with said cylinders.

7. In an automatic electric heater, a case, a cover plate therefor, an inlet and outlet for the fluid to be heated at the lower portion of said case, a lower non-conducting plate supported on the bottom of said case, spacing devices on the top of said plate, a battery of concentric carbon cylinders supported upon said plate and positioned by said spacing devices, and an upper plate having spacing devices on the bottom thereof and adapted to position the upper portions of said cylinders, said upper plate having a projection formed integral therewith and contacting with the bottom of said cover plate for securing the parts in assembled position.

8. In an automatic electric heater, a case, a cover plate therefor, an inlet and outlet for the fluid to be heated at the lower portion of said case, a lower non-conducting plate supported on the bottom of said case, spacing devices on the top of said plate, a battery of concentric carbon cylinders supported upon said plate and positioned by said spacing devices, and an upper plate having spacing devices on the bottom thereof and adapted to position the upper portions of said cylinders, said upper plate having a projection on its top contacting with the bottom of said cover plate for securing the parts in assembled position, in combination with a resistance coil connected in series with said cylinders.

9. In an automatic electric heater, a case, a cover plate therefor, an inlet and outlet for the fluid to be heated at the lower portion of said case, a lower apertured non-conducting plate supported on the bottom of said case, spacing devices on the top of said plate, a battery of concentric carbon cylinders supported upon said plate and located within the inner of said cylinders and supported between said plates, a muffle positioned within the inner cylinder, a resistance coil carried by said muffle and con-

ected in series to said battery and having an ohmic resistance of ten times that of said battery when immersed in water, said case inclosing said battery, and having on its interior a lining of non-conducting material, and a non-conducting lining on the inner periphery of the inner cylinder.

10. In an automatic electric heater, a battery of open-ended carbon cylinders of uniform length and different diameters, upper and lower apertured non-conducting plates having spacing devices thereon for positioning the upper and lower ends of said cylinders, a hollow non-conducting muffler located within the inner of said cylinders and supported between said plates, a resistance coil carried by said muffler and connected in series to said battery and having an ohmic resistance of ten times that of said battery when immersed in water, a case inclosing said battery and having inlet and outlet openings in its bottom, and sealing devices for the top of said case.

11. In an automatic electric heater, a battery of open-ended carbon cylinders of different diameters, upper and lower non-conducting plates having spacing devices thereon for positioning the upper and lower ends of said cylinders, a non-conducting muffler located within the inner of said cylinders and supported between said plates, a resistance coil carried by said muffler and connected in series to said battery and having an ohmic resistance of ten times that of said battery when immersed in water, a case inclosing said battery and having on its interior a lining of non-conducting material, and a non-conducting lining on the inner periphery of the inner cylinder.

12. In an automatic electric heater, a battery of open-ended carbon cylinders of different diameters concentrically arranged, upper and lower non-conducting plates having spacing devices thereon for positioning the upper and lower ends of said cylinders, a non-conducting muffler located within the inner of said cylinders, and supported between said plates, a resistance coil carried by said muffler and connected in series to said battery and having an ohmic resistance of ten times that of said battery when immersed in water, a case inclosing said battery, a cover plate for said case, and sealing devices for said cover plate, said case having on its interior a lining of non-conducting material and the inner periphery of the inner cylinder being also lined with non-conducting material, said case having an inlet and an outlet in its lower portion for the liquid to be heated.

13. In an automatic electric heater, a case, a cover plate therefor, sealing devices for said plate, an inlet and outlet for the fluid to be heated at the lower portion of said case, a lower non-conducting plate sup-

ported on the bottom of said case, spacing devices on the top of said plate, a battery of concentric carbon cylinders supported upon said plate and positioned by said spacing devices, an upper plate having spacing devices on the bottom thereof, and adapted to position the upper portion of said cylinders, said upper plate having its top portion in contact with said cover plate for securing the parts in assembled position, said lower plate having a recess therein, a rubber disk supported in said recess, a non-conducting muffler mounted on said rubber disk, a resistance coil carried by said muffler, a cap above said cover plate, electrical conductors passing through said cap and cover plate, insulating and sealing devices carried by said cover plate, and connections from said insulating and sealing devices to said resistance coil and to said cylinders.

14. In a device of the character stated, an insulating and sealing connection comprising a plate, a contact washer 48 having a conductor connected thereto, a rubber washer 49 below said contact washer and in contact with the top of said plate, a second rubber washer 51 below said plate and in contact therewith, a contact washer 52 below said last-mentioned rubber washer, a screw 54 passing through said washers and plate and surrounded by an insulating sleeve 50 and a nut on said screw.

15. In a device of the character stated, an upper non-conducting plate having a central opening therethrough, an inner series of ports 43 and an outer series of elongated ports 44 and 45, spacing lugs 36 and 37 depending from said plate and concentrically arranged, a lower non-conducting plate having a central recess therein, a rubber disk seated in said recess and provided with ports 23 alining with ports 24 in said bottom plate, the top of the latter having spacing lugs 25 and 26 therein, a battery of carbon elements secured between and spaced apart by said plates and lugs, and a resistance coil connected in series with said carbon elements.

16. In a device of the character stated, a battery of three open-ended carbon cylinders concentrically arranged, a resistance coil mounted within the inner of said cylinders and connected to the intermediate cylinder, and electrical connections common to the inner and outer cylinders, the lower portions of the two outer cylinders having holes therein to permit the egress of the heated liquid.

17. In a device of the character stated, a battery of three open-ended carbon cylinders concentrically arranged, a case inclosing said battery, a resistance coil mounted within the inner of said cylinders and connected to the intermediate cylinder, electrical connections common to the inner and

outer cylinders, the lower portions of the two outer cylinders having holes therein to permit the egress of the heated liquid, the inner surface of said case being provided

5 with a non-conducting lining and a non-conducting lining on the inner portion of said inner cylinder.

18. In a device of the character stated, an upper non-conducting plate having a central opening therethrough, an inner series of ports 43, an outer series of elongated ports 44 and 45 and depending spacing lugs 36 and 37 concentrically arranged, a lower non-conducting plate 19 having a central recess therein, a rubber disk seated in said recess and provided with ports 23 alining with ports 24 in said bottom plate, the top of the latter having spacing lugs 25 and 26 therein, and a battery of carbon elements secured between and spaced apart by said plates and lugs, a porcelain muffler supported upon said rubber disk and held in position by said plates, said muffler having a vertical passage extending therethrough, and lateral ports at its bottom, a case inclosing said plate and battery, and a resistance coil mounted on said muffler and connected in series with said battery of carbon elements.

19. In a device of the character stated, an upper non-conducting plate having a central opening therethrough, an inner series of ports 43, an outer series of elongated ports 44 and 45 and depending spacing lugs 36 and 37 concentrically arranged, a lower non-conducting plate 19 having a central recess therein, a rubber disk seated in said recess and provided with ports alining with ports in said bottom plate, the top of the latter having spacing lugs 25 and 26 therein, a battery of tubular carbon elements secured between and spaced apart by said plates, a porcelain muffler supported upon said rubber disk and held in position between said plates, said muffler having a vertical passage extending therethrough, and lateral ports at its bottom and a resistance coil mounted on said muffler and connected in series with said battery of carbon elements.

20. In a device of the character stated, a case open at its top and provided at its bottom with inlet and outlet openings, a hollow muffler supported within said case, and having a resistance coil thereon, a plurality of carbon cylinders also supported within said case concentrically with respect to each other and to said muffler, an annular enlarge-

ment in the top of said case, a steam and water-tight packing ring supported upon a shoulder in the top of said case, a cover plate having a laterally projecting flange engaging said packing, and an externally threaded ring engaging an internal upper threaded portion of said case for holding said cover plate in assembled position.

21. In a device of the character stated, a case open at its top and provided at its bottom with inlet and outlet openings, a hollow muffler supported within said case and having a resistance coil thereon, a plurality of carbon cylinders also supported within said case concentrically with respect to each other and to said muffler, an annular enlargement in the top of said case, a steam and water-tight packing ring supported upon a shoulder in the top of said case, a cover plate having a laterally projecting flange engaging said packing, an externally threaded ring engaging an internal upper threaded portion of said case for holding the cover plate in assembled position, and an inverted cup-shaped plate supported on top of said cover plate and provided with a bottom flange and fastening devices common to said flange and said threaded ring.

22. In a device of the character stated, an upper non-conducting plate having a central opening therethrough, an inner series of ports 43, an outer series of elongated ports 44 and 45 and depending spacing lugs 36 and 37 concentrically arranged, a lower non-conducting plate 19 having a central recess therein, a rubber disk seated in said recess and provided with ports alining with ports in said lower plate, the top of the latter having spacing lugs 25 and 26 therein, a battery of carbon elements secured between and spaced apart by said plates and lugs, a porcelain muffler supported upon said rubber disk and held in position between said plates, said muffler having a vertical passage extending therethrough and lateral ports at its bottom, a resistance coil mounted on said muffler and connected in series with said battery of carbon elements, a case surrounding said plates and battery and having its inner wall provided with a non-conducting lining, and a non-conducting lining on the inner periphery of the inner carbon element.

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Witnesses:

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