E. T. LANCASTER.

POWER PLANT.

APPLICATION FILED JAN. 9, 1920.

1,358,219.

Patented Nov. 9, 1920.

Fig. 1.

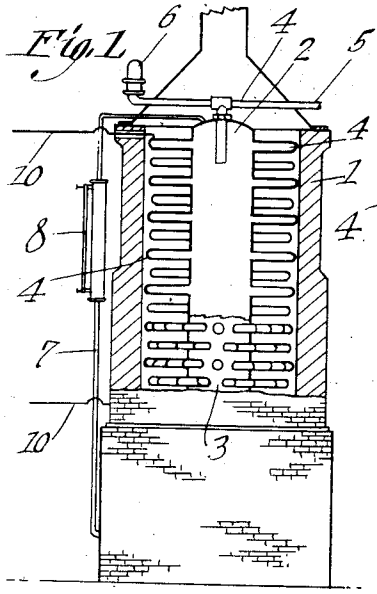


Fig. 2.

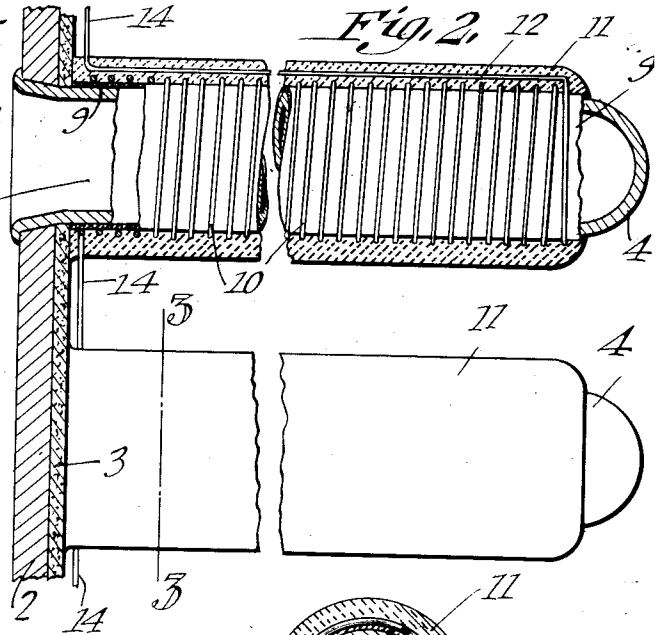


Fig. 4.

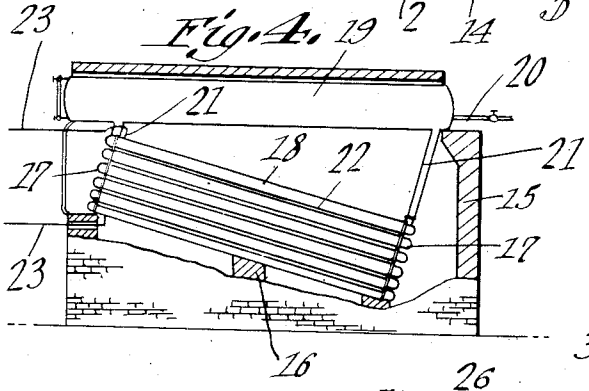


Fig. 3.

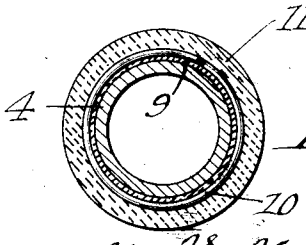


Fig. 6.

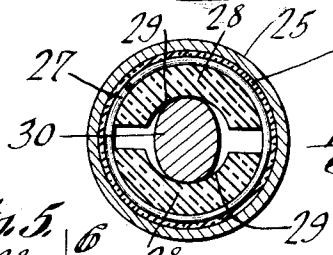


Fig. 7.

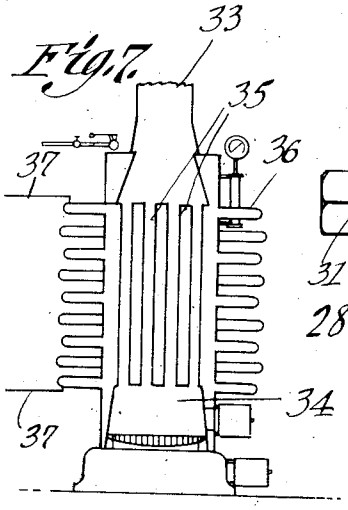
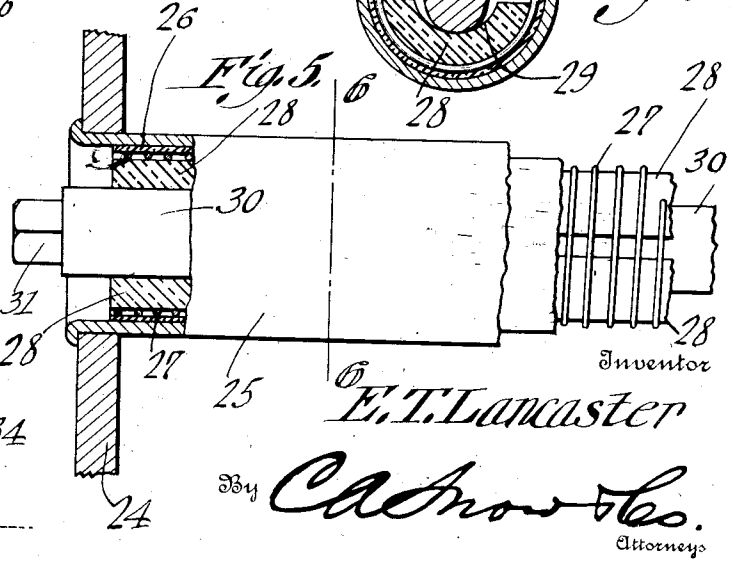


Fig. 5.



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UNITED STATES PATENT OFFICE.

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POWER PLANT.

1,358,219. Specification of Letters Patent. Patented Nov. 9, 1920.

Application filed January 9, 1920. Serial No. 350,395.

To all whom it may concern:

Be it known that I, EDGAR T. LANCASTER, a citizen of the United States, residing at Palatka, in the county of Putnam and State of Florida, have invented a new and useful Power Plant, of which the following is a specification.

It is the object of this invention to provide means whereby, without resorting to combustion, steam may be produced in a boiler or like device. The invention contemplates, generally stated, that the heat shall be supplied by the operation of an electrical resistance coil.

The invention aims to obviate the disadvantages arising when steam is produced through the combustive action of fuel in the common manner. Thus, it is obvious that in a device of the kind hereinafter described, fuel cost will be cut down and overhead charges for labor be minimized, workmen heretofore serving as stokers, being released for other employment. The structure which I have invented eliminates disasters arising from the presence of poisonous gases, sparks and the like, common when steam is generated by fire, in the usual way. An important object of the invention is to render the operation of a boiler-heating means facile, in that no operation more complicated or onerous than the control of an electrical current is required. The invention aims to promote cleanliness, in that there will be no smoke or soot. Further, there will be no ashes to cart away, space being saved, in that no room need be set apart and preserved for the storage of ashes or fuel.

The invention aims to provide a device which will be certain and satisfactory in operation, under the varying conditions surrounding the maintenance and control of steam boilers, a steady and intense heat being produced, the degree of heat being at all times under the governance of an operator, through the working of simple instrumentalities, whereby an electrical current is controlled. Another advantage of the invention is that, by its use, a large amount of fuel now used in connection with steam boilers, will be set free for other uses, a corresponding cheapening in the cost of fuel resulting

Many applications of the invention are possible, and in this specification a few applications only will be alluded to or described, the practised eye and the technical training of a mechanical engineer being relied upon to extend the field of use to its utmost limits. It may be stated, however, that the device forming the subject matter of this application may be employed in electric light and power plants, a comparatively small portion of the current being shunted and used to heat the means whereby the water in the boiler is converted into steam. In manufacturing and industrial plants also, the structure will be of use; and it will find its place in buildings wherein steam heat is employed. In its various modifications, the structure may be used for operating street cars, automobiles, tractors and the like. It is within the contemplation and the purview of the invention that the same shall play an important part in the development of air craft of various kinds.

When the device is embodied in an airplane, the noise of the engine will be eliminated, and it is well known that, especially in time of warfare, the utility of airplanes has been limited to no small or inappreciable degree by the obtrusive noise of an internal combustion engine. Spark and carbureter troubles—difficulties which appear to be part and parcel of the operation of an internal combustion engine—will be eliminated. The operator will be able to control the speed of the airplane absolutely, either in flight, or during the making of a landing. An airplane wherein the device forming the subject matter of this application is embodied, can rise from a restricted ground area, or light upon a small area, between buildings, in cities or elsewhere. The engine of the airplane may be reversed readily, so as to retard speed, particularly during a precipitate or unexpected descent, fatal accidents being avoided.

In general, this invention provides a means superior to all other means now known or used for producing steam, regardless of the use to which the steam is put, and, in its ultimate application, the invention will displace internal combustion engines and other prime movers now used to disadvantage, because no efficient and practical substitute has been devised and made accessible to the public.

With the above and other objects in view, the invention consists in the novel construction and arrangement of parts, hereinafter described, claimed, and shown in the accompanying drawings, it being understood that,

within the scope of what is claimed, a mechanic may depart widely from the description and from the disclosure of the drawings, without sacrificing the utility of the invention or placing the same in jeopardy.

A clear understanding of the wide scope of my invention may be had in the following description, when the same is read upon and in connection with the drawing constituting a portion of this application. When reference is had to the drawing, by a person skilled in the art, it will be observed that:—

Figure 1 shows in elevation, a porcupine boiler wherein the device forming the subject matter of this application has been embodied, parts appearing in section, and the view being diagrammatic to some extent;

Fig. 2 is a fragmental vertical section taken through the boiler shown in Fig. 1, the view illustrating, particularly, the way in which the heating means is carried by the tubes of the boiler;

Fig. 3 is a vertical transverse section taken approximately upon the line which, in Fig. 2 of the drawings, is denoted by the numerals 3—3;

Fig. 4 is a sectional view disclosing the invention embodied in a tubular boiler;

Fig. 5 is a sectional detail, disclosing the invention in the form which it will assume when it is placed inside of a boiler tube;

Fig. 6 is a cross section, the line 6—6 in Fig. 5 indicating the cutting plane on which Fig. 6 is taken; and

Fig. 7 is a diagrammatic view in the nature of a vertical section showing a further application of the invention.

Figs. 1, 2 and 3 illustrate one embodiment of the invention, and in those figures, and particularly in Fig. 1, there is delineated a boiler of the Hazelton or porcupine type, embodying a casing 1 wherein an upright cylinder 2 is located, the cylinder often being surrounded by a lagging 3. Tubes 4 radiate from the cylinder 2 and are closed at their outer ends, the inner ends of the tubes communicating with the cylinder. The water circulates in the cylinder 2 and in the tubes 4 and finds an exit, to the point of use, through a pipe 5 which may communicate with a safety valve 6. The boiler is provided with a water column 7 carrying a gage glass 8, and may be supplied with any other appurtenances called for by established boiler room practice.

About each of the radial tubes 4, an insulating sleeve 9 is placed. This sleeve may be fashioned from any material which the taste of the manufacturer or the exigencies of the proposed use may demand. If considered expedient, the sleeve 9 may be made of mica. About the sleeve 9, a resistance wire 10 is wound spirally. The convolutions of the wire may be spaced in accordance with the opinions of the designer. Any suitable material may be used in the making of the resistance wire: the well known characteristics of German silver recommend that substance, but any of the commercial resistance wires may be employed. In alluding to a "wire" it is not to be understood that the resistance element 10 must be of circular cross section. Its function will not be undermined to any appreciable extent if it takes the form of a ribbon or strip.

The resistance element 10 is inclosed in a refractory covering 11. The particular material out of which the covering is constructed may be varied within wide limits. I have found that a plastic material is efficient, notably so far as the matter of applying it is concerned, and it is suggested or recommended, but not insisted upon, that the covering consist of a mixture of kaolin, ground quartz and liquid glass, a covering thus compounded being refractory to a high degree and being characterized by great strength. One end 12 of the resistance element 10 may be extended backwardly through the covering 11, a detail readily perceived upon a casual inspection of Fig. 2. The resistance elements on the various tubes 4 are connected in series, as indicated at 14 in Fig. 2 of the drawings.

Those skilled in the art will understand, without a lengthy description or superfluous verbiage, that when an electrical current is passed through the resistance elements 10, the water in the tubes 4 and in the cylinder 2 will be converted into steam. The structure operates without smoke or soot, there being no waste of fuel, and it being possible to govern and regulate the heat with an exactness not possible when combustion is relied upon to produce the necessary rise in temperature.

It should not be supposed that, since the application of the invention to a porcupine boiler has been dwelt upon at considerable length, no other form of boiler may be supplied with the device forming the subject matter of this application. The porcupine boiler constitutes merely an illustration, and the specific enumeration of that boiler or any other boiler hereinafter described, is not to be taken as placing metes and bounds upon the field within which my invention may be used. Thus, in Fig. 4 of the drawings there is depicted a tubular boiler, often known to those skilled in the art, and particularly to the trade, as a Babcock and Wilcox boiler. This boiler comprises a casing 15 and a bridge wall 16. Within the casing 15, headers 17 are located, the headers being connected by water tubes 18. The numeral 19 has been used to direct the attention to the usual drum, having a feed pipe 20, and connected to the headers 17 by risers 21.

The insulating sleeve 9 of Fig. 2 is used in connection with the boiler shown in Fig. 4. The resistance wire 10 exercises the function hereinbefore ascribed to it, and the refractory covering, in Fig. 4, is denoted by the numeral 22. The ends of the conductor which forms the resistance element, appear at 23.

The embodiment of the invention forming the subject matter of Fig. 4, is characterized by no peculiarities of operation, the resistance element serving to heat the contents of the tubes 18, when an electrical current is passed through the conductor of which the resistance element constitutes a constituent part.

Figs. 5 and 6 have been introduced into the drawings for the purpose of making manifest the fact that a device constructed in accordance with the invention may be placed inside of a boiler tube, rather than upon the outside of the boiler tube, as shown in Fig. 2. In Fig. 5 the numeral 24 marks a flue sheet, carrying tubes 25. A sleeve 26 of insulating material is disposed within the tube 25, a resistance coil 27 being located within the sleeve, about a pair of trough-shaped retainers 28, the adjacent or inner surfaces of which are provided with concavities 29. Any desired material may be used in the making of the retainers 28, but porcelain is a substance not to be overlooked in this connection. An expander 30, of unequal transverse dimensions, is located in the concavities 29 of the retainers 28, and may be provided at one end with a polygonal head 31, to which a wrench or other suitable tool may be applied, to procure a rotation of the expander. When the expander is rotated, to assume the position shown in Fig. 6, the retainers 28 will be separated, and the structure will be held closely within the tube 25.

Circumstances may arise under which it is not desirable to use electricity to heat the cold water initially, it being perferred to raise the temperature of the water, perhaps to the boiling point, by combustion and then to maintain the water heated, through the instrumentality of an electrical resistance heater. When the experience of a heating engineer suggests a course of the sort above alluded to, recourse may be had to that embodiment of the invention shown in Fig. 7, or to some other embodiment capable of carrying out the idea, though constructed differently.

In Fig. 7, there is shown a shell 32 provided with a stack 33, the fore box appearing at 34. Fire tubes 35 extend from the fire box 34 to the stack 33, the space about the tubes and within the shell being adapted for the reception of water and steam. Tubes project outwardly from the shell 32, the outer ends of the tubes being closed, and the inner ends of the tubes communicating with the shell. The water is adapted to circulate in the tubes, as hereinbefore explained in connection with the porcupine boiler shown in Fig. 1. The tubes carry a refractory covering 36, and the heating coil, the sleeve and other elements of Fig. 2 are used, the ends of the conductor being shown at 37.

Clearly, when a fire is built in the box 34, the products of combustion, traversing the tubes 35, will convert the water into steam. When the boiling point has been reached, or at any other time, the fire in the box 34 may be permitted to die away, or may be quenched or banked, the heating element of which the members 37 constitute a part, being relied upon to maintain the steam pressure.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent of the United States of America is:—

The combination with a boiler tube, of retainers within the tube; a resistance element disposed about the retainers; and an expander of unequal transverse dimensions rotatable between the retainers to separate the same.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EDGAR T. LANCASTER.

Witnesses:
T. B. MERRILL,
MILDRED L. PEARCE.