June 4, 1929. C. S. MORGAN 1,715,941

INSULATION FOR HEATING ELEMENTS

Filed May 28, 1927

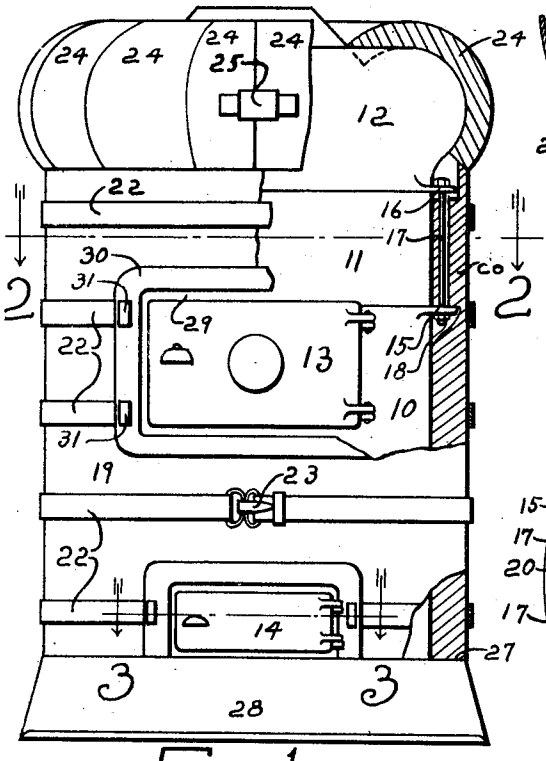



FIG 1

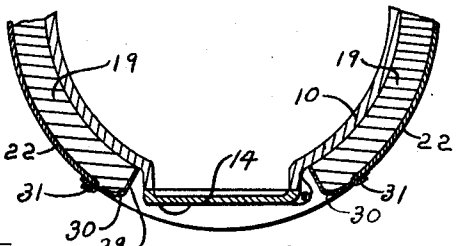



FIG 3

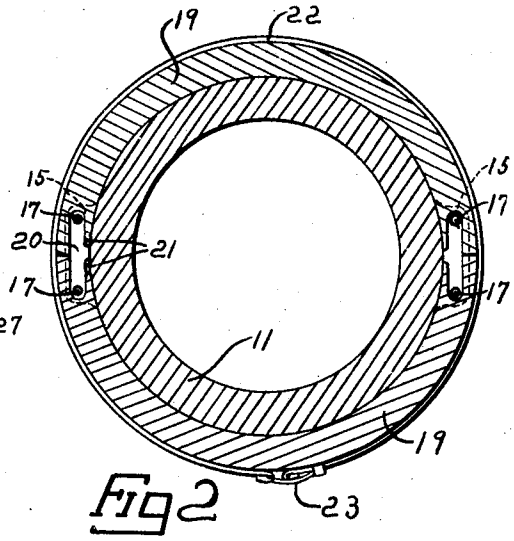



FIG 2

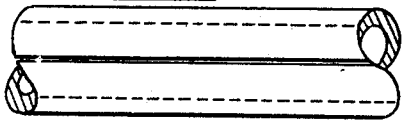


FIG 4

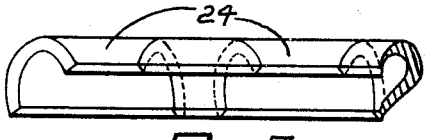



FIG 5

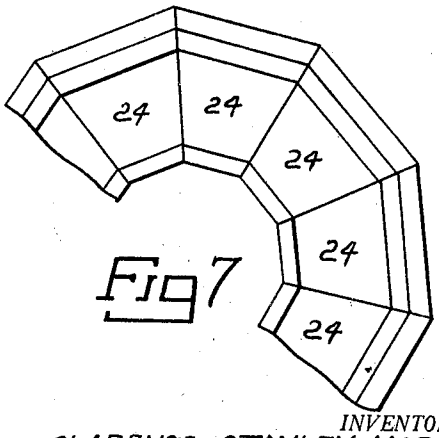



FIG 7



FIG 6

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# UNITED STATES PATENT OFFICE.

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## INSULATION FOR HEATING ELEMENTS.

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This invention relates to insulating coverings for curved surfaces, particularly such surfaces as are commonly encountered in furnaces, boilers and the like, the principal object being the provision of such insulating coverings formed into sections applicable as such to said curved surfaces, and securable thereto to form an insulating covering for the same.

Another object is to provide a covering for an element having an exterior cylindrical surface, and provided with bolts axially parallel with the axis of said surface and outwardly spaced therefrom, comprising sections each provided with recesses opening on the interior surface thereof for the reception of said bolts, said recesses being provided with tongued portions adapted to contact with said bolts and to prevent lateral displacement of the sections outwardly from said surface in the plane of said bolts.

Another object is to provide an insulating covering for an element having an exterior cylindrical surface and bolts axially parallel with the axis of said surface and outwardly spaced therefrom, and having flanges projecting outwardly from said surface receiving the lower ends of said bolts, said covering comprising a plurality of sections combining to form a cylinder, each section being provided with recesses opening on the interior surface thereof for the reception of said bolts and abutments for seating on said flanges for preventing axial displacement of the sections.

Another object is to provide an insulating covering for a surface curved in two directions, comprising a plurality of tapered generally circular sections each of which has a natural curved surface conforming in size and shape to one curve of the surface, said sections being secured together in edge to edge relationship to approximate the remaining curve of said surface.

A further object is to provide a sheet metal covering for openings formed in sectional insulating coverings, and means cooperating with said coverings for securing said sections together.

The above being among the objects of the present invention, the same consists in certain features of construction, combinations of parts and process of manufacture as will hereinafter be described, reference being had to the attached drawing, and then claimed, having the above and other objects in view.

In the accompanying drawings which show a suitable embodiment of the present invention, and in which like numerals refer to like parts throughout the several views,—

Fig. 1 is a front view of a conventional furnace, such as is used in the heating of houses, to which an insulating covering, shown in partially broken section and made in accordance with the present invention, is applied.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary sectional view taken as on line 3—3 of Fig. 1, illustrating the manner in which the protecting covering for the edge of the insulation around one of the furnace door openings is applied and the manner in which the said covering cooperates with the attached securing straps to secure the two insulating sections together.

Fig. 4 is a side view of a tube of insulating material such as is employed for forming the insulation for the dome of the furnace shown in Fig. 1, illustrating the same axially split on its diameter as a preliminary step to the formation of such insulation in sections.

Fig. 5 is a side view of one of the halves of the tube shown in Fig. 4, illustrating the position in which it is supported and the manner in which it is separated to form the insulating sections for the dome of the furnace shown in Fig. 1.

Fig. 6 is a perspective view of one of the insulating sections formed as indicated in Fig. 5.

Fig. 7 is a fragmentary bottom view of the assembled insulation for the dome of the furnace shown in Fig. 1, formed of parts shown in Fig. 6 cut from the tube shown in Fig. 4.

The principal object of the present invention is to provide an insulation for objects having curved surfaces which may be fabricated away from and independently of such objects in sections, and thereafter may be applied to the surface of such objects in an easy, simple and efficient manner resulting in insulation easily replaceable, easily applied, neat in appearance and which may be applied by unskilled labor.

In the accompanying drawing, by way of illustration, I show a furnace of the type conventionally used for heating dwelling houses, such furnaces being provided with a simple curved or cylindrical surface, and also a surface curved in two directions, to both of which surfaces insulation formed in accordance with the present invention may be applied.


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The furnace shown comprises a cylindrical body portion 10, a second cylindrical body portion 11 thereabove, and a dome 12, suitable doors such as 13 and 14 being provided for the introduction of fuel, removal of ash, etc. As is the conventional practice in such furnaces, flanges 15 and 16 are provided adjacent the upper and lower portions of the body portion 10 and dome 12 respectively at the sides thereof, bolts 17 extending therebetween and receiving nuts 18 thereon for clamping the body section 11 therebetween, the bolts 17 being parallel to the axes of the cylindrical portions 10 and 11 and being outwardly spaced from the exterior surface.

The insulating covering of the body portions 10 and 11 formed in accordance with the present invention, comprises two or more sections 19 formed to simulate a portion of a hollow cylinder or tube, and preferably of a length sufficient to extend from the dome 12 to the bottom of the body portion 10, the radius of the inner surface of these sections being substantially equal to the radius of the outer surface of the body portions 10 and 11 of the furnace. A sufficient number of such sections 19 are provided, two being provided in the construction shown, so that when they are assembled together they will completely surround the body portions 10 and 11.

In accordance with the present invention I provide a novel means for securing the sections 19 to, and supporting them on the furnace. This means comprises recesses 20 formed within each section 19 in a direction parallel to the axes of the body portions 10 and 11, and opening on the interior face of each section 19 along the respective edges thereof which are preferably adjacent the bolts 17. Each recess 20 is also provided with an inwardly extending tongue extending out from one wall thereof in the general direction of the adjacent surface of the body portion of the furnace, the recesses 20 and tongues 21 being so formed that the sections 19 may be applied to the furnace in a radial direction, with the tongues 21 received between the bolts 17 and the adjacent surface of the furnace, and the bolts 17 being received within the recesses 20. This manner of forming the recesses 20 with the tongues 21 prevents the edges of the sections 19 from moving laterally outwardly from the surface of the furnace. In addition, the insulating material of the sections 19 adjacent the lower ends of the recesses 20 is cut away to form abutments 26 adapted to seat upon the upper face of the lower flanges 15 formed on the body portion 10, thereby providing means for preventing the sections 19 from slipping downwardly on the furnace when no projecting surface such as 27 is provided on the base 28 of the furnace.

In order to suitably finish the exposed edges of the insulation of sections 19 where the same is cut out to accommodate the doors 13 and 14, I provide a sheet metal frame for each opening having an inwardly extending portion 29 fitting the edge portions of such openings, and a face portion 30 overlying the adjacent surface of the sections 19 around the corresponding opening. The side edges of the face portions 30 are provided with two or more openings 31 in which are received the reversely bent ends of the straps 22. The straps 22 in the plane of such door openings are formed in two parts, one end of each being secured to the face 30 of the frame in the manner described, and the opposite ends extending around the furnace and being suitably secured together by a buckle such as 23 or by other suitable means thereby securely holding sections 19 in place against the surface of the furnace. The straps 22, in such a case, serve the dual function of securing the door opening frames in place and securing the sections 19 to the furnace. Where a strap such as 22 is employed out of the plane of such door openings, it may be constructed in a single piece as illustrated in Fig. 1, with its ends joined by the buckle 23 previously described.

The upper edges of the sections 19 I prefer to extend slightly above the upper edge of the body portion 11, and bevel them off at an angle to the axis of the furnace in the manner shown in Fig. 1 for the purpose to be hereinafter explained. The dome 12 of such furnace is usually circular in two directions, the particular dome shown having a surface approximating a part of the surface of a torus, and although the method of making and the insulation provided by the present invention is described as being applied to the particular form of dome shown, the same general steps and method of application may be followed out for any of the conventional types of rounded furnace domes on the market. It is also to be noted that the method of insulating the dome 12 as described herein is not limited to the insulation of furnace domes but may be employed in the insulation of any heated surface curved in more than one direction.

Attention is called to the fact that not only is a section taken through the dome 12 in a horizontal plane circular, but a section taken vertically through the dome in a plane passing through the axis thereof also presents a section at least partially circular.

In forming the insulation covering for the dome 12, a tube of insulating material of suitable thickness and having an inner radius substantially the same as the radius of the curved surface of the dome presented in vertical section therethrough is provided, as indicated in Fig. 4. As is also indicated in Fig. 4, this tube is split axially thereof through its diameter into two halves or parts, the line of split in this as in other cases depending upon that part of the circle which is

presented by the surface to be covered in one of its sections, being the vertical section through the dome 12, in the present case. Each half of the tube shown in Fig. 4 is then placed in a form or otherwise supported as indicated in Fig. 5, on an angle corresponding to the angle which the sections to be cut therefrom will lie when they are in position upon the furnace dome, and each half is then sawed or otherwise cut as indicated in Fig. 5, to form sections 24, the line of sawing being on a line corresponding to a radial line of a section taken horizontally through the furnace dome 12 in respect to the section when the same is applied to the dome 12. This provides sections 24 having cylindrical outer and inner surfaces, the end faces converging from one side of the section to the other to form wedge-shaped parts. These parts or sections 24, as indicated in Fig. 7, are then secured together in edge to edge relationship by cementing or other suitable means, with their narrow ends in alignment, thus causing their inner surfaces to approximate a circle having a radius substantially equal to the radius of the section of the dome 12 taken horizontally therethrough. It is preferable to secure several of such sections 24 together to form two or more larger unitary sections which may be applied as such to the furnace dome 12 and secured together to form a complete covering for the same.

When the sections 24 are applied to the furnace dome 12, their lower edges or faces abut against the upper beveled edges of the sections 19 to form a closed joint for the same. It may be found more desirable to join the sections 24 together in the edge to edge relationship described, to form a complete circle corresponding to one of the circular sections of the surface to be covered, and thereafter remove sufficient material from either the upper or lower face of the united sections to correctly accommodate the surface to which they are to be attached.

It will be apparent from the foregoing that the insulation herein provided may be transported from the shop to the point of application of the furnace, in sections, and may be readily and quickly secured in place upon the furnace by unskilled labor, the resulting covering necessarily fitting the furnace for which it has been made, and resulting in an efficient and presentable structure.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. In combination with a heating element provided with a cylindrical body and a dome circular in section in two directions, an insulation for said body comprising generally cylindrically shaped pre-formed sections secured thereto, and an insulation for said dome comprising a plurality of angularly formed generally cylindrically shaped pre-formed sections secured together about said dome to simulate the shape thereof.

2. In combination with a heating element having a cylindrical body portion and a dome curved in two directions, an insulating covering for said body portion comprising a plurality of cylindrically shaped pre-formed sections of insulating material secured to the exterior surface thereof, and an insulating covering for said dome comprising a plurality of pre-formed sections of insulating material approximating the shape thereof and secured thereto, each of the last mentioned sections comprising a plurality of wedge shaped portions of a cylinder joined together to approximate a curved surface.

3. In combination with an object provided with a surface circular in section in two different planes, an insulation covering for said surface comprising a plurality of generally cylindrically shaped pre-formed sections of greater width on one side than on the other thereof, said sections being fitted together to approximate said surface with their inner surfaces and being secured thereto.

4. An insulating covering for a surface curved in two directions, comprising a plurality of pre-formed sections curved in one direction to conform to one curve of said surface, and secured together to approximate the other curve of said surface.

5. An insulating covering for a surface curved in two directions, comprising a plurality of tapered generally circular pre-formed sections each having a natural curved surface conforming in size and shape to one curve of said surface, said sections being secured together in edge to edge relationship to approximate the remaining curve of said surface.

6. In combination, a cylindrical surface, members fixed in relation thereto and spaced therefrom extending in axially parallel relation to the axis of said surface, flanges projecting outwardly from said surface for receiving the lower ends of said members, an insulating pre-formed covering having an inner face corresponding with a portion of said surface and provided with outwardly and laterally extending recesses therein receiving said members, and abutments in said recesses seating on said flanges for the purpose of securing said covering against axial movement on said surface.

7. In combination with a heating element provided with an exterior cylindrical surface and bolts axially parallel with the axis of said surface and outwardly spaced therefrom, flanges on said surface receiving the lower ends of said bolts, an insulating covering for said surface comprising a plurality of sections combining to form a cylinder, said sections provided with recesses opening


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on the interior surface thereof for the reception of said bolts, and abutments seating on said flanges for preventing axial displacement of said sections.

8. In combination with a furnace having a circular portion clamped between a pair of other portions by bolts extending between flanges formed on such portions, said bolts being outwardly spaced from said circular portion, and an insulating covering for said circular portion comprising a plurality of circularly formed sections each having an inner surface corresponding to the outer surface of said circular portion, said sections provided with tongued recesses opening on the inner surfaces of said sections for reception of said bolts, said tongues terminating at the lower of said flanges to form abutments for securing said sections against axial displacement, and said tongues serving to hold said sections against lateral displacement outwardly from said surface in the plane of said bolts.

9. In combination with a heating element having a cylindrical body and a dome curved in two directions, said body provided with tie members axially parallel to the axis thereof and outwardly spaced therefrom, an insulation for said body portion comprising relatively stiff pre-formed sections provided with inner surfaces matching the outer surface of said body and tongued recesses formed on the inner face thereof for receiving said tie members behind the tongues of said recesses, and an insulation for said dome formed of a plurality of tapered generally cylindrical sections fitted together to generally approximate the surface of said top.

10. In combination with a heating element having a cylindrical body and a dome curved in two directions, said body provided with tie members axially parallel to and outwardly spaced from said body, an insulation for said body comprising a plurality of preformed sections inwardly conforming in shape to the surface of said body and provided with recesses for lockingly engaging said tie members, the upper edges of said sections being axially tapered, and an insulation for said dome comprising a plurality of cylindrically surfaced tapered sections joined together to approximate the outer surface of said dome with their inner surfaces, and formed at one edge to matchingly engage said tapered edges of said insulation sections for said body.

11. The method of forming an insulating covering for a surface circular in two directions, comprising successively cutting sections from a tube of such insulating material in a plane out of perpendicular with the axis thereof, and thereafter securing said sections together with the corresponding narrow portions of said sections in the same general line.

12. The method of forming an insulating covering for a surface curved in two directions, comprising removing from a part of an axially separated tube of insulating material having an inside diameter approximating the diameter of one curve of said dome surface a series of sections of greater width on one side than on the opposite side, and thereafter joining said sections to approximate with their inner surfaces the other curve of said surface.

13. The method of forming an insulating covering for a surface circular in section in one direction and partially circular in section in a direction at right-angles to the first mentioned direction, comprising in axially splitting into two or more parts a tube of insulating material having an inside diameter approximately equal to the diameter of the second mentioned circular section, cutting from one or more of said parts a series of members of greater width on one side than on the other thereof, cementing the edges of said members together to form unitary sections approximating with their inner surfaces in a plane passing through the axes of all of said parts a circle of equal diameter to the first mentioned circular section, and thereafter joining said unitary sections together about said surface.

14. In combination with a sectional insulation for a heating surface, an opening through one of said sections, a frame for said opening comprising an inwardly extending part covering the edges of said section exposed in said opening and a marginal flange overlying the face of said section around said opening, and straps secured to said frame extending around said sections and joined together for holding said frame in position and for holding said sections against said surface.

15. In combination with a heating element, an insulating covering therefor comprising a plurality of relatively thick pre-formed sections of insulating material combining to cover at least a portion of the surface of said element, an opening through a wall of one of said sections for the swinging of a door, a sheet metal frame for said opening comprising an inwardly extending portion overlying the edges of said last mentioned section exposed in said opening and laterally outwardly extending marginal portions overlying the face of said section adjacent said opening, apertures in said outwardly extending marginal portions, and strap ends removably received in said apertures, said straps extending around said sections and being secured together in pairs whereby to hold said frame in position and said sections in contact with the surface of said element.

16. In combination with a heating element having a body portion and a dome curved in two directions, an insulating covering for the body comprising a plurality of pre-formed

sections of insulating material secured to the exterior thereof, an insulating covering for the dome comprising a plurality of pre-formed sections of insulating material, secured on the outer surface of the dome and having their bottoms resting on the tops of said first sections.

17. In combination with a heating element having a body portion and a dome curved in two directions, an insulating covering for the body comprising a plurality of pre-formed sections of insulating material secured to the exterior thereof, an insulating covering for the dome comprising a plurality of pre-formed sections of insulating material, secured on the outer surface of the dome and having their bottoms resting on the tops of said first sections, the mating faces of the first and second sections being angularly cut to provide a wedge like engagement.

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