Feb. 13, 1934. E. A. RUSSELL ET AL 1,946,547

STEAM AND ELECTRIC HEATING UNIT

Filed Dec. 14, 1931

Fig. 1.

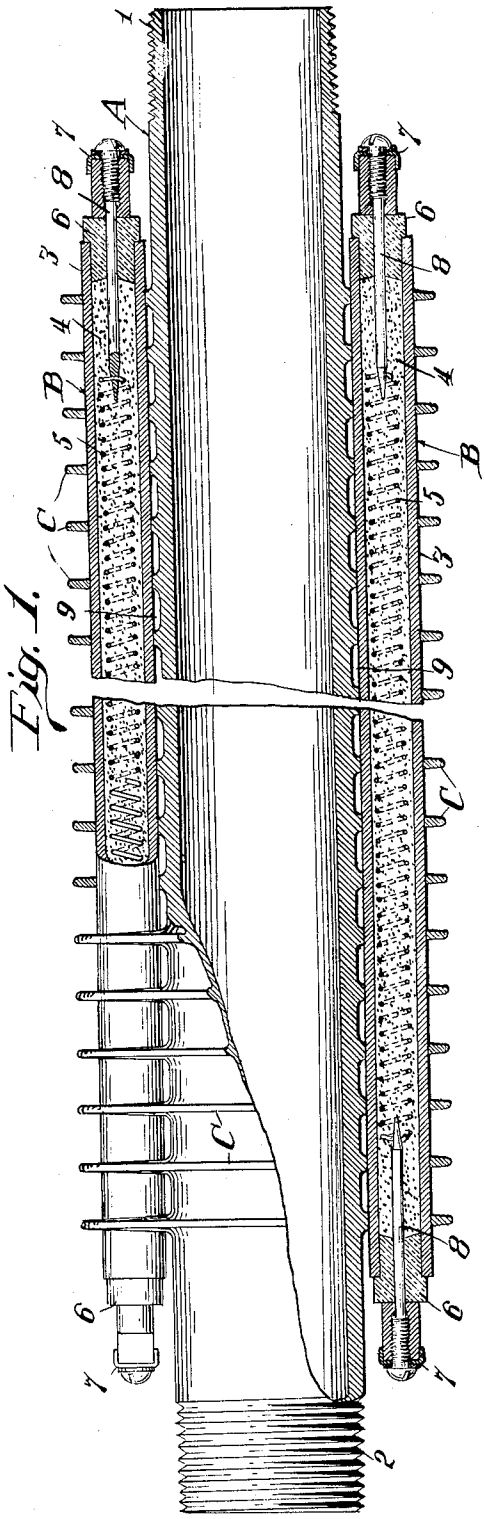


Fig. 3.

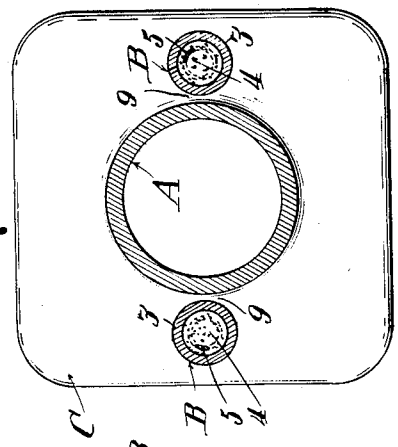
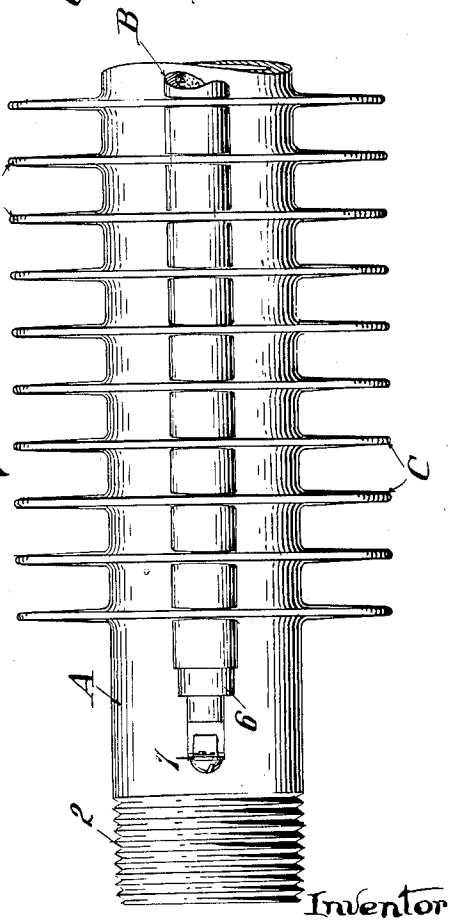


Fig. 2.



Inventor

Edward A. Russell

and Donald W. Miller

By Barnett & Truman

Attorneys.

Patented Feb. 13, 1934

1,946,547

UNITED STATES PATENT OFFICE

1,946,547

STEAM AND ELECTRIC HEATING UNIT

Edward A. Russell, Chicago, and Donald W. Miller, Elmhurst, Ill., assignors to Vapor Car Heating Company, Inc., Chicago, Ill., a corporation of New York

Application December 14, 1931
Serial No. 580,840

3 Claims. (Cl. 219—38)

This invention relates to a new and improved steam and electric heating unit adapted to be used as a part of a heating system which is adapted to utilize alternatively either steam or electricity as the source of heating energy.

More specifically the invention comprises a section of steam pipe, and one or more electric heating elements of a length similar to that of the pipe, which are held in substantially parallel relationship by a plurality of spaced apart metallic fins through which the pipe and heating elements extend transversely, the fins preferably being cast integral with the pipe and about the heating element.

The principal object of the present invention is to provide an improved heating element of the type briefly described hereinabove and disclosed more in detail in the specifications which follow.

Another object is to provide an improved method of forming a combined steam and electric heating unit.

Other objects and advantages of this invention will be more apparent from the following detailed description of one approved form of apparatus constructed according to the principles of this invention.

In the accompanying drawing:

Fig. 1 is a partial elevation and partial central longitudinal section of the improved heating unit, the unit being broken away intermediate its ends.

Fig. 2 is a plan view of one end portion of the unit shown in Fig. 1.

Fig. 3 is a transverse section through the heating unit.

The heating unit comprises a pipe section A, one or more similar electric heating units B, and a plurality of radiating or heat-conducting fins C.

The member A is in the form of a section of steam pipe of any suitable length, usually straight, and threaded at the ends at 1 and 2 to receive pipe fittings so that it may be connected in as a part of a radiating system, for example as a part of the steam or vapor heating systems used on railway cars.

The electric heating element B may take any one of a variety of forms, it only being essential that the element include an outer metallic shell and an inner electric heating element suitably insulated therefrom. In the preferred form here shown the heating element comprises an outer metallic tube 3, preferably of a length similar to that of the pipe section A, although usually somewhat shorter as here shown so as to permit the attachment of the pipe fittings or other coupling members to the threaded ends of the pipe section. The diameter of the pipe 3 will usually be considerably smaller than that of the steam pipe A, particularly if a plurality of the elements B are used in each heating unit. The tube 3 is substantially filled with a quantity of insulating material 4, preferably a powdered mineral substance of very poor conductivity, in which is imbedded the electric conductor 5 which may be in the form of a coil of high-resistance wire. Each end of the tube 3 is closed by a plug 6 of insulating material on which is mounted a binding post or terminal 7 from which a conducting post or rod 8 projects through plug 6 into contact with one end of coil 5. The two terminals 7 are connected into the electric circuit so that current will flow from one terminal through post 8, coil 5 and the other post 8 to the opposite terminal 7. All parts of this circuit are insulated from the enclosing tube 3 by means of the plugs 6 and the insulating material 4 in which coil 5 is imbedded.

It is now a well known expedient to increase the radiating or heat-dispersing surface of a steam pipe by forming or mounting thereon a plurality of spaced apart metallic fins, such as indicated at C in the drawing. This gives an extended surface with which the air circulating adjacent the pipe can contact. Such a finned steam pipe has a heat-dispersing capacity substantially equivalent to that of four ordinary steam pipes of similar size. These radiating or heat-conducting fins will function in the same manner when applied to an electric heating element such as indicated at B.

According to the present invention, the electric heating elements B are mounted in and supported by the fins C which extend radially from pipe A at spaced intervals. Preferably the elements B extend substantially parallel to pipe A adjacent the sides thereof, but are spaced somewhat from the pipe as indicated at 9 so as to permit a circulation of air between the elements A and B. In the example here shown, two of the electric heating elements B are assembled with one pipe A in each heating unit, although it will be apparent that one or any suitable number of the elements B may be used in accordance with the size of the elements used and the heating capacity required.

In the preferred method of manufacture, the preformed elements B are placed in a suitable mold and the pipe section A and fins C are cast integrally about the elements B so that in the finished article these heating elements B will

extend transversely through the series of fins C, adjacent the sides of the pipe section A, and be supported permanently therein.

As alternative methods of manufacture, the fins C could be cast about pre-formed elements B and a pre-formed pipe A, or the fins C may be formed separately and secured about the elements A and B. It is preferred, however, to cast the fins about the elements so as to secure a substantially integral structure so that heat will be most efficiently conducted from either or both of the heating elements.

Although both steam and electricity could be used concurrently as sources of heating energy, this improved heating element will more usually be installed as a part of a steam heating system, for example in such steam heating systems as are now used on railway cars, and the electric heating elements used as a part of a reserve or auxiliary heating system when steam is not available as a heating medium. For example, the railway car may be used at times on a stretch of electrified trackway, at which times the steam locomotive is replaced by an electric locomotive. At these times the source of steam as a heating agent is absent, but electricity is available and the car can be heated by means of the heating elements B, which will be suitably connected up to form an adequate heating system. The fins C as well as the steam pipe A will then serve as extended radiating or heat-conducting surfaces for efficiently dispersing the heat furnished from the resistance coils in the elements B. It will thus be seen that the total exposed metallic surfaces of the pipe A, the tubes 3 of elements B, and the fins C, are always available to radiate or conduct the heat to the air circulating adjacent thereto no matter whether electricity or steam is used as the heating agent. In this manner an alternative electric heating system may be provided by the mere addition of a suitable number of the heating elements B together with the necessary electrical connections. The electrical heating system is supported by and practically incorporated in the steam heating system and utilizes the same heat-dispersing surfaces. The necessary added installation and dead-load to be carried is thus reduced to a minimum.

Improved combination heating units of the type herein disclosed may be connected up as desired, and in suitable numbers, to provide the form, size or capacity of heating system that may be required for any particular installation. While the special adaptability of this novel heating unit for use in railway car heating systems has been particularly referred to by way of example, it will be apparent that the unit is in no way limited to this use but may be embodied in any desired form of heating system wherein steam and electricity are to be used alternatively or concurrently.

We claim:

1. A combined steam and electric heating unit comprising a length of steam pipe having end portions to be threaded for engagement with fittings, the pipe between these end portions being provided with a plurality of integral fins projecting from its outer surface at spaced intervals, and an electric heating element consisting of a metal tube with an enclosed electric heater electrically insulated therefrom, the electric heating element having a length substantially equal to the unthreaded portion of the pipe and being cast within the fins so as to be positioned substantially parallel to and adjacent the pipe but spaced therefrom.

2. A combined steam and electric heating unit comprising a length of steam pipe having end portions to be threaded for engagement with fittings, the pipe between these end portions being provided with a plurality of integral fins projecting from its outer surface at spaced intervals, and an electric heating element consisting of a metal tube with an enclosed electric heater electrically insulated therefrom, the electric heating element having a length substantially equal to the unthreaded portion of the pipe and extending through and supported by the fins in intimate contact therewith so as to be positioned substantially parallel to and adjacent the pipe but spaced therefrom.

3. A combined steam and electric heating unit comprising a length of steam pipe having end portions to be threaded for engagement with fittings, the pipe between these end portions being provided with a plurality of integral fins projecting from its outer surface at spaced intervals and a plurality of similar electric heating elements each consisting of a metal tube with an enclosed electric heater electrically insulated therefrom, each electric heating element having a length substantially equal to the unthreaded portion of the pipe and being cast within the fins so as to be positioned substantially parallel to and adjacent the pipe but spaced therefrom.

EDWARD A. RUSSELL.
DONALD W. MILLER.