

April 2, 1935.

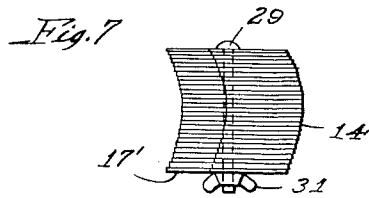
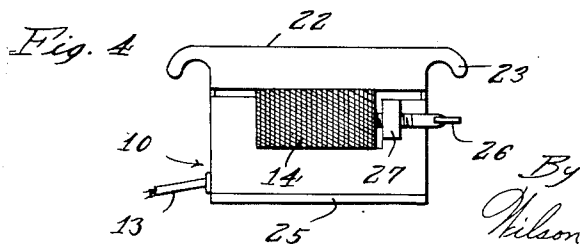
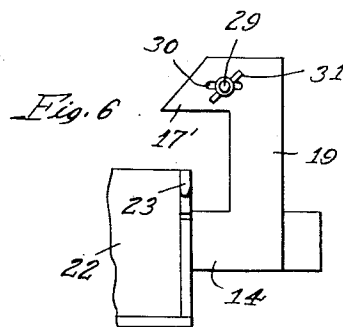
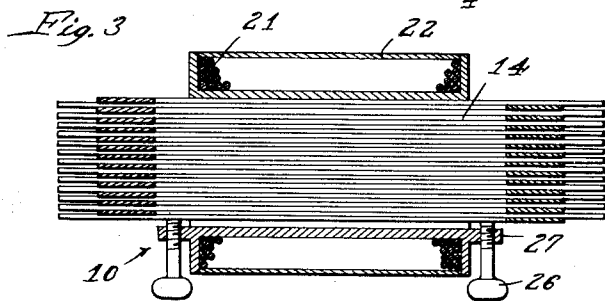
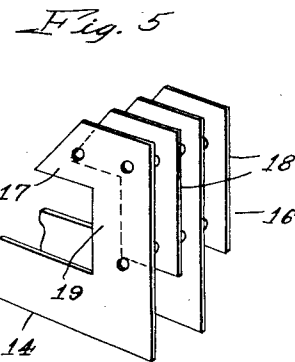
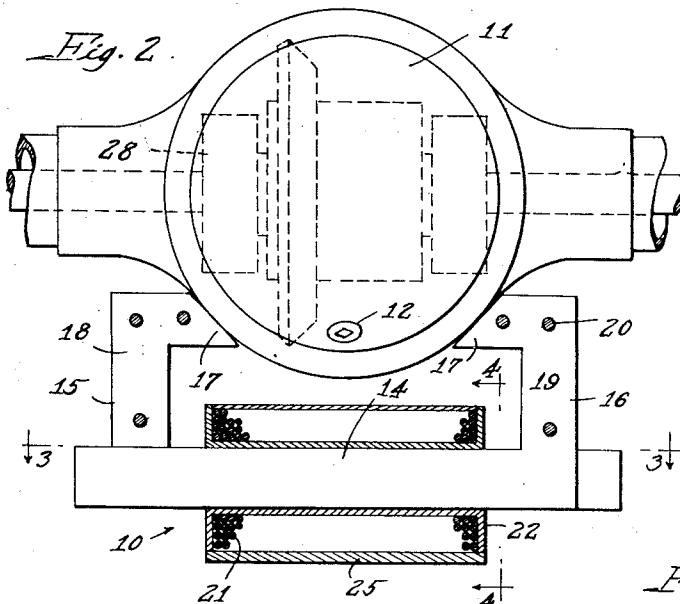
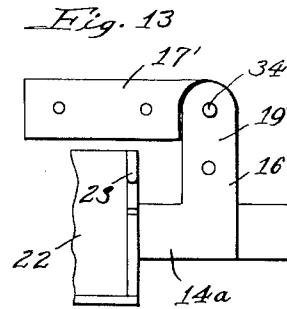
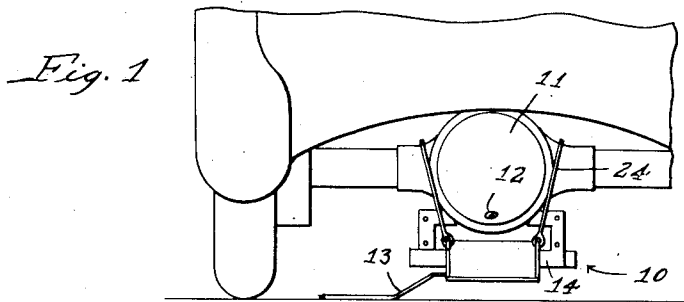
R. A. BROWN

1,996,502

HOUSING HEATER

Filed Aug. 4, 1933

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 8

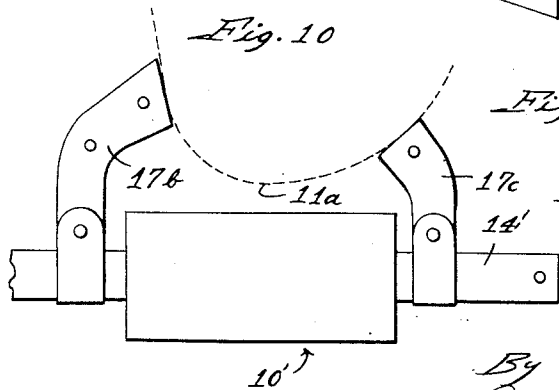
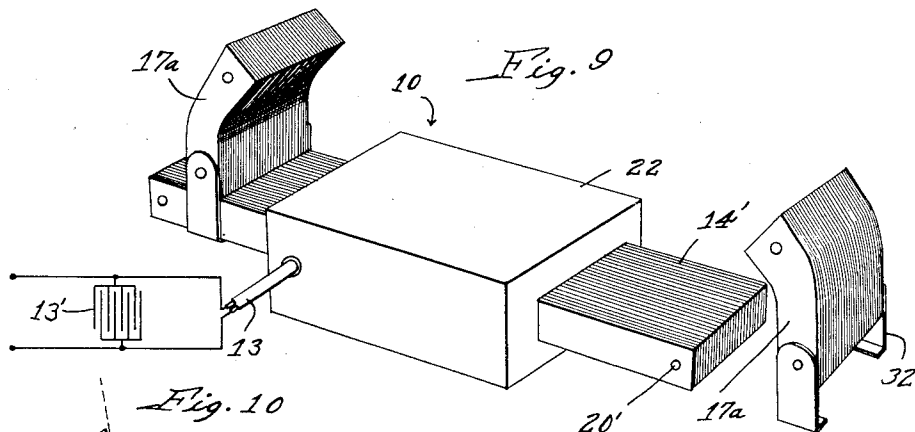
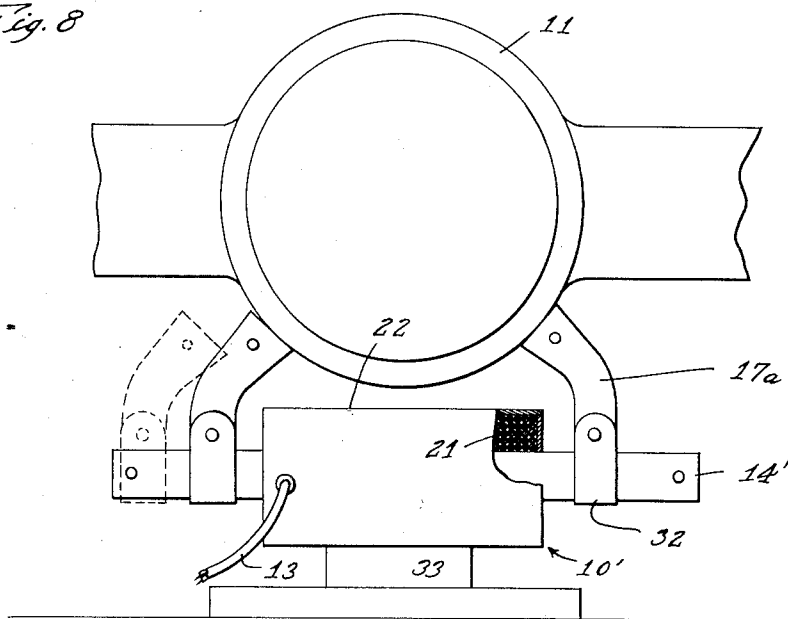
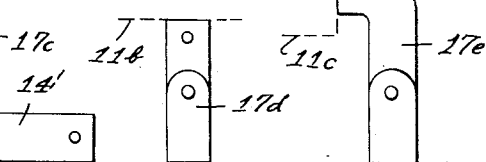


Fig. 11

Fig. 12



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UNITED STATES PATENT OFFICE

1,996,502

HOUSING HEATER

Ray A. Brown, Rockford, Ill.

Application August 4, 1933, Serial No. 683,577

9 Claims. (Cl. 219—47)

This invention relates to a heater of the type disclosed in my copending application, Serial No. 661,808, filed March 20, 1933.

The heater of the application referred to is a portable unit for application to a differential or transmission housing on motor vehicles to render the lubricant sufficiently fluid by heating to permit easy drainage, and also adapted for application to the engine crank case to heat the lubricant and facilitate starting. The principal object of the present invention is to provide a heater of that type of more economical construction and more readily adjustable to different sizes and shapes of housings.

Another object of the invention is to provide a heater of this kind having removable jaws which may be provided in different sizes and shapes for different uses, whereby to make one heater answer all needs.

Other objects and advantages of my invention will appear in the following detailed description in which reference is made to the accompanying drawings, wherein—

Figure 1 is a rear view of an automobile showing a heater made in accordance with my invention in position on the differential housing;

Fig. 2 is a view of the housing and heater on a larger scale showing the heater in longitudinal section;

Fig. 3 is a horizontal section on the line 3—3 of Fig. 2;

Fig. 4 is a cross-section on the line 4—4 of Fig. 2;

Fig. 5 is a perspective detail of a few core laminae indicating their form and method of assembly;

Fig. 6 is a rear view of one end of the heater showing a modified or alternative construction of the jaw;

Fig. 7 is a top view of the jaw appearing in Fig. 6 showing how the laminae are adapted to be displaced with respect to one another to conform to the shape of the housing;

Fig. 8 is a view similar to Fig. 2 showing another form of heater;

Fig. 9 is a perspective view of the heater of Fig. 8 with one jaw removed to better illustrate the construction;

Fig. 10 is a view similar to Fig. 8 showing other jaws in place on the heater to fit a different shaped housing;

Figs. 11 and 12 are views of detached jaws indicating the uses for which they are especially designed, and

Fig. 13 is a view similar to Fig. 6 showing still another modification in the jaw construction.

Similar reference numerals are applied to corresponding parts throughout the views.

It has been the practice in cleaning out differential and transmission housings for replacing the lubricant, to use steam to loosen and clear out the lubricant, or to flush out the lubricant with kerosene or gasoline. The heater of my invention is designed to render the lubricant sufficiently fluid by heating the wall of the housing to permit easy drainage when the plug is removed. In that way, nothing foreign is allowed to get into the housing and interfere with good lubrication. Where steam was used, there was always some water left in the housing which in cold weather would freeze, and in any event, was objectionable for obvious reasons. Where kerosene or gasoline was used it got into the working parts and kept lubricant from getting in so that the parts were improperly lubricated. The kerosene or gasoline also caused objectionable dilution of the lubricant. Aside from the fact that the steam, kerosene or gasoline left the housing in an unfit condition, the use of such a medium was objectionable because of the amount of time consumed; the heater of my invention performs the operation in a fraction of the time. In Figure 1, the heater is indicated generally by the numeral 10 in position on the differential housing 11 of an automobile for the purpose of making the lubricant therein sufficiently fluid by heating the wall of the housing to permit easy drainage when the plug 12 is removed. While I have shown the heater applied to a differential housing, it should be understood that it may also be applied to the transmission housing for a similar purpose or to the engine crank case either for the same purpose, or for the purpose of preparing a frozen up car for starting. Heaters of this type will find use at air ports for heating the crank cases of air-craft engines in preparation for flight, thereby reducing the fuel consumption and time loss in warming up. It will further appear that while I have shown an automobile, the invention is applicable to any motor vehicle.

The heater 10 is of an electromagnetic type connected by means of a suitable extension cord 13 with an electric light socket preferably in an A. C. line, with a view to heating the wall of the housing by the passage of magnetic flux back and forth through the wall. I prefer to place a condenser across the line 13, as at 13' in Fig. 9, in order to keep the current in step with the voltage and thus increase the heating effect. A con-

siderable saving in power consumption is realized this way. Experiment has shown that it takes but a few minutes to heat a cold housing sufficiently to render the lubricant therein fluid so that it may be drained out easily. The heater, as best appears in Figs. 2 and 3, has a laminated core 14 made up in two sections 15 and 16 slidable on one another so as to bring the jaws 17 closer together or farther apart for application to different sized housings. The core sections are made up, as indicated in Fig. 5, with short pieces 18 inserted between the right angle portions 19 so as to leave spaces between the laminae of the one core section for the sliding therebetween of the laminae of the other core section. The spacing pieces 18 are preferably a few thousandths of an inch thicker than the other laminae so as to insure easy sliding of the core sections when the parts are riveted together, as indicated at 20. It is apparent from an inspection of Fig. 2 that the spacers 18 of the one core section are in the same plane with the full length laminae of the other core section. A single coil 21 mounted in a suitable housing 22 of non-magnetic material has the core sections extending through the center thereof for induction of magnetism. The coil 21 is, of course, connected with the extension cord 13, previously mentioned. Hooks 23 are provided on the housing to permit suspension of the heater on the rear axle by chains or cables, as shown at 24 in Figure 1. When the heater is brought into place from a pit, or where the differential housing is high enough to permit, blocks or a jack may be provided to support the heater with or without the chains or cables. The bottom 25 of the housing 22 is flat and heavy enough to be suitable for engagement of a jack thereon and the pressure exerted against the housing is transmitted through the core to the jaws to bring the same into snug engagement with the housing. When the current is turned on, there is, of course, such attraction between the housing and the jaws 17 that the heater is assured of proper contact even where the supporting means might not have the heater properly disposed. When the current is turned on, it is manifest that a magnetic circuit is produced through the core sections and that portion of the housing between the jaws 17. It takes very little time to get the housing heated sufficiently to render the lubricant therein fluid for drainage from the housing. The core being of laminated construction does not heat up enough to be objectionable. The jaws 17 are, of course, adjusted before the current is turned on for obvious reasons. Thumb screws 26 entered through lugs 27 provided on the end walls of the housing 22 may be tightened to clamp the laminae together after the desired adjustment has been made, in order to prevent likelihood of vibration. Usually, the jaws are adjusted to bring them close to the axle bearings 28 at the ends of the housing 11 so that heat will be transmitted along the axle sections to a certain extent to the differential gearing and thus insure some heating of the lubricant thereon sufficient to cause it to drain off.

In Figs. 6 and 7, I have shown a heater in which the core 14 does not have its laminae riveted but instead has a bolt 29 entered through slots 30 in the laminae and spacers to permit displacement of the parts with respect to one another in the manner shown in Fig. 7, in order to provide jaws 17 capable of conforming to the shape of the housing with which the jaws may be engaged. A wing nut 31, threaded on the end of the bolt 29, may be tightened to clamp the parts in their assumed

positions. Naturally, the greater the area of contact between the jaws and the wall of the housing the more efficient the performance of the heater becomes. The ultimate efficiency of the unit would be derived where the jaws had an area of contact with the housing wall equal to the cross-sectional area of the core, and that is approached as nearly as possible by making the jaws conformable to the shape of the housing.

In Fig. 13 I have shown a heater in which the core 14a is like that disclosed in Figs. 1-5 except that the slidable sections, one of which appears in the view and is numbered 16', have the right angle portions 19' constructed at their upper ends to receive alternate laminations of swingable jaws 17' between the alternate laminations of the portions 19'. A rivet 34 will serve as a pivot for each swingable jaw or else a bolt with a wing nut may be provided for this purpose to enable clamping the parts together when the swingable jaw is adjusted as desired. However, it is believed that the friction between the interfitted laminations is sufficient to hold the jaw in its adjusted position. The advantage of a heater of this construction lies in the fact that the same may be more easily adjusted to fit different sizes and shapes of housings, it being only necessary to swing the jaws up to the proper positions for engagement with the housing at the proper points. Such swingable jaws while shown in connection with the sections of an extensible core, might be provided on an ordinary non-extensible core.

Referring now to Figs. 8 and 9, which disclose the, at present, preferred form of heater, it will be observed that the heater indicated generally by the numeral 10' has a laminated core 14' extending through the housing 22 and the same distance from opposite ends thereof. The laminae are riveted together, as indicated at 20', to form a solid rigid core 14', as distinguished from the extensible core 14 made up of slidable sections. Jaws 17a of laminated construction have clips 32 provided on the bottom thereof for slidably mounting the same on the ends of the core 14'. The top surfaces of the ends of the core will, of course, be machined smooth and so will the bottom surfaces of the jaws, and the clips 32 will be constructed to fit neatly on the sides and bottom surfaces of the core whereby to eliminate likelihood of air gaps when the jaws are placed as desired on the core, and insure a good magnetic circuit through the core and jaws and through the housing engaged by the latter. It is apparent at a glance that a wide range of adjustment is made possible with this construction and it takes very little time to get the heater adjusted to suit the job in hand. The jaws are, of course, adjusted before the current is turned on and are held frictionally in adjusted position, and lock themselves to the core by magnetic attraction in the same way that the heater more or less locks itself to the housing being operated upon. While I have not shown any means in this construction for positively clamping the jaws 17a in adjusted position on the ends of the core 14', it should be understood that such provision may be made, if desired. For example, studs may be provided projecting downwardly from the jaws 17a into longitudinal slots provided in the end portions of the core 14', whereby to clamp the jaws in adjusted positions simply by tightening wing nuts on the lower ends of said studs against the bottom of the core. Blocks are shown at 33 for supporting the heater under the housing.

This heater construction makes it a practical

proposition to provide a variety of different sizes and shapes of jaws so that one unit will suit all needs. Thus, in Fig. 10, I have shown two jaws 17b and 17c of different shapes and sizes to make proper contact with a housing 11a, such as a transmission housing. There is so much variation in the sizes and shapes of housings that the facility with which different jaws may be substituted is quite an advantage. In Figs. 11 and 12 still other jaws 17d and 17e are shown cooperating with other housings indicated at 11b and 11c, respectively, the former engaging the flat bottom and the latter the flat side of a housing.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn so as to cover all legitimate modifications and adaptations.

I claim:

1. A heater for application to a housing to be heated comprising a core having contact jaws for engagement with the housing at spaced points, said jaws being mounted for lineal movement with respect to one another so as to adapt the heater to different sizes and shapes of housings, and means for inducing electromagnetic flux passage through the core and jaws and through the wall of said housing, whereby to heat the latter.

2. A heater for application to a housing to be heated comprising an electromagnetic coil, a core of magnetic permeable material extending longitudinally through the coil, and contact jaws carried on the opposite ends of the core for engagement with the housing at spaced points, said jaws being adjustable toward and away from one another lengthwise with respect to the core to adapt the heater to application to housings of different size and shape.

3. A heater for application to a housing to be heated comprising an electromagnetic coil, a core of magnetic permeable material extending longitudinally through the coil, and contact jaws carried on the opposite ends of the core for engagement with the housing at spaced points, said jaws being slidable toward and away from one another longitudinally relative to the core so as to adapt the heater to application to different sizes and shapes of housings.

4. A heater for application to a housing to be

heated comprising an electromagnetic coil, a core of magnetic permeable material extending longitudinally through the coil, and contact jaws carried on the opposite ends of the core for engagement with the housing at spaced points, said jaws being separate from the core and slidable thereon toward and away from one another to adapt the heater to application to different sizes and shapes of housings.

5. A heater for application to a housing to be heated comprising an electromagnetic coil, a core of magnetic permeable material extending longitudinally through the coil, and contact jaws carried on the opposite ends of the core for engagement with the housing at spaced points, said jaws being removably mounted on the core so as to permit substitution of different sized or shaped jaws, whereby to adapt the heater to use with different sizes and shapes of housings.

6. A heater for application to a housing to be heated comprising an electromagnetic coil, a core extending longitudinally through the coil and projecting from both ends, the top surfaces of the projecting ends being flat, and a pair of contact jaws suitable for engagement with spaced points of the housing to be heated having flat bottom surfaces slidable on the top surfaces of the core, whereby to permit disposition of the jaws in different positions of spaced relationship to accommodate therebetween different sizes and shapes of housings.

7. A heater as set forth in claim 6 including means on said jaws for removably and slidably holding the jaws in position on the core.

8. A heater as set forth in claim 6 including other jaws similar in form to the first-mentioned jaws so far as application to the core is concerned but having the contact ends thereof of different form, said jaws being interchangeable with the first mentioned jaws so as to adapt the heater to the requirements of different jobs.

9. In a heater of the electromagnetic type, an electromagnetic coil having conductors extending thereto from a source of alternating current, a core for said coil of magnetic material adapted to be engaged at spaced points with the part to be heated by induced flux passage back and forth therethrough, and a condenser across the line conductors.

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