April 9, 1940. E. C. BOOTH 2,196,174

HEATER

Filed April 1, 1937

Fig. 1.

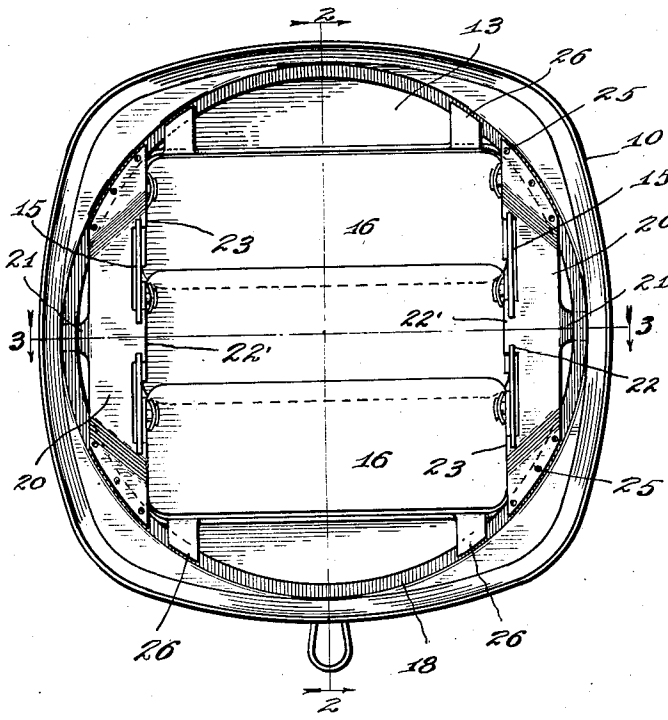


Fig. 2.

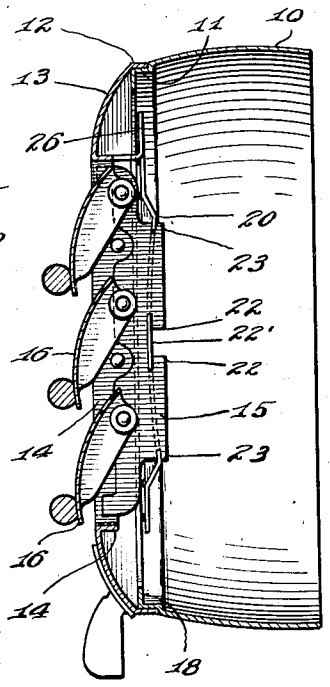


Fig. 3.

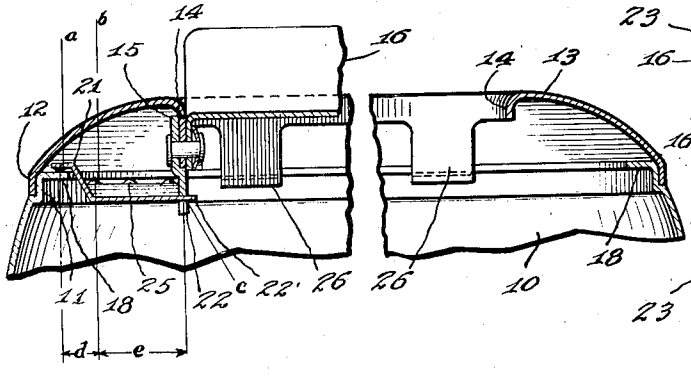
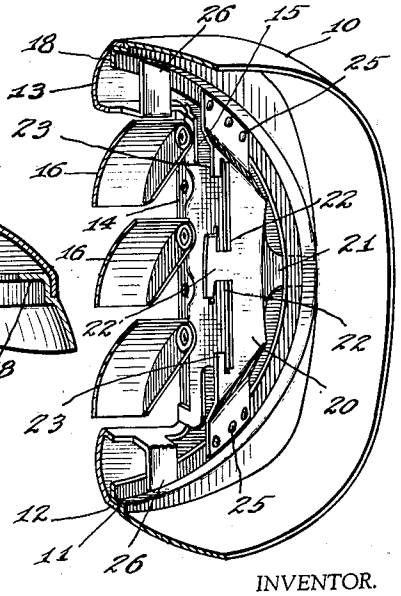


Fig. 4.



INVENTOR.

EARL C. BOOTH,

BY

ATTORNEYS.

Patented Apr. 9, 1940

2,196,174

UNITED STATES PATENT OFFICE

2,196,174

HEATER

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Application April 1, 1937, Serial No. 134,268

5 Claims. (Cl. 98—2)

My invention relates to automobile-body heaters of the circulating fluid type and to other devices in which the discharge of air through an opening is controlled both in volume and direction by one or more shutters mounted in a frame which is rotatable about the axis of the opening. In prior devices of this kind, means have been employed for providing a certain amount of friction between the shutter-carrying frame and the shell or conduit on which it is mounted. In a common form of automobile heater, in which air is discharged through a circular opening in the front face of the shell, such means usually took the form of a spring or spring-mounted shoe supported from the shutter-carrying frame and bearing against the rear face of the shell-wall adjacent the edge of the opening. In these devices friction between the shutter-carrying frame and shell as well as between the shell and the spring or spring-pressed shoe has been depended upon to hold the shutter-carrying frame in any desired position of adjustment. Because of inevitable inaccuracies in manufacture and because of the possibility of the presence of paint or other shell-finish between the shell and the shutter-carrying frame, friction between those elements is difficult to control.

It is the object of my invention to provide for a shutter-carrying frame in a device of the type described a friction brake which will be more nearly constant in its action than prior brakes of which I am aware and which will accommodate inaccuracies in manufacture without the production of marked variations in braking effort. A further object of my invention is to produce a brake which will have advantages over prior brakes in respect to cost of manufacture and simplicity.

In carrying out my invention, I attach rather loosely to the shutter-carrying frame a member of spring steel or of any other suitable material so formed as to bear resiliently against both the inner and outer faces of the shell at the edge of the air-discharge opening. Desirably, there are two of such braking means located at diametrically opposite points on the shutter-carrying frame. The points of contact between each of the brake members and the shell and the point of attachment of the brake member to the shutter-carrying frame are so arranged that any effort forcing the shutter-carrying frame against the outer face of the shell is relatively small in comparison with the force with which the parts of the brake bear against the opposite faces of the shell-wall. Thus almost all the braking effort is exerted between the brake members and the shell and the character of the fit between the shutter-carrying frame and the shell is without any substantial effect on the resistance to their relative rotation.

The accompanying drawing illustrates my invention: Fig. 1 is a rear elevation of the front half of the shell of an automobile-body heater with my invention incorporated therein; Figs. 2 and 3 are sections on the lines 2—2 and 3—3 of Fig. 1 respectively; and Fig. 4 is an isometric view of the front shell-half with portions broken away.

In the drawing, the front half 10 of the shell or housing suitable for enclosing an automobile-body heater is illustrated. My invention is not concerned with other portions of the shell or heater. The shell shown is formed at its front face with a short, forwardly projecting circular extension 11 providing a seat for a rearwardly directed annular flange 12 on a shutter-carrying frame 13. The fit of the extension 11 within the flange 12 is not close. The shutter-carrying frame 13 has a central air discharge opening, conveniently of a generally rectangular shape, and the material of the frame about such opening is bent inwardly to form a flange 14. At opposite sides of the opening in the frame 13 there are secured to the flange 14 reinforcing members 15 to which adjustable shutters 16 are riveted.

In embodying my invention in such a construction as has just been described, the edge of the circular projection 11 is turned inwardly to form a plane annular flange 18. Brake members, conveniently carried by the reinforcements 15, frictionally engage opposite sides of the flange 18, thus serving to hold the shutter-carrying frame in any desired position of annular adjustment about its axis.

As previously indicated, I prefer to provide two brakes located at opposite sides of the shutter-carrying frame. Each of these brakes takes the form of a strip 20 of spring steel or other suitable material adapted to extend chordally of the flange 18 with its ends resting on the inner surface of such flange. Near its center, the brake 20 is provided with an outwardly extending projection 21 which is offset out of the plane of the strip to engage the outer face of the flange 18.

The method of attaching each brake strip 20 to the shutter-carrying frame may take various forms; but I prefer the arrangement illustrated in the drawing. As there indicated, the inner edge of each reinforcement 15 is notched, and the side walls of the notch are undercut to leave two tongues 22. The brake strip 20 is provided centrally with an inwardly extending ear 22' which is received in the undercut portions of the notch in the reinforcement 15, beneath the tongues 22. In addition, the strip 20 is provided near each end with a finger 23 engaging the inner face of the reinforcement 15.

Prior to the assembly of the device illustrated, the tongues 22 are bent approximately perpendicularly to the reinforcement 15 to permit the ear 22' to enter the notch in the reinforcement 15 as the brake strip 20 is dropped over the reinforcement with the fingers 23 embracing the ends thereof. The tongues 22 are thereafter bent back over the ear 22', as illustrated, to hold the brake strip in place.

If desired, those portions of the brake strip which engage the flange 18 may be provided with embossments 25 to localize the application of frictional effort and to prevent any sharp edge of the relatively hard brake-strip from scoring the flange 18.

With the arrangement of brake-strips described, the shutter-carrying frame 13 is held inwardly against the front of the shell 10 by a relatively small force. To prevent the shutter-carrying frame from being moved forwardly on the shell against this relatively small force, I may provide the flange 14 with ears 26 which extend inwardly of the shell and have their ends bent outwardly to overlie the flange 18. Normally, there is no engagement between the ears 26 and the flange 18, the shutter-carrying frame being held lightly against the outer face of the shell by its connection with the brake-strip 20.

As will be obvious, each of the strips 20 is so formed that when in place in the assembly it will be strained to cause its ends and the projection 21 to bear resiliently against the flange 18. Each of the strips 20 may be regarded (Fig. 3) as a lever extending radially of the shell, fulcrumed about the axis *b* approximately coincident with the outer edge of the strip, engaging the outer surface of the flange 18 at the point *a* on one side of such axis, and engaging the reinforcement 15 at point *c* on the opposite side of such axis. With this arrangement, the outward reaction of the flange 18 applied at the point *a* in Fig. 3 tends to rock the strip about the axis *b* in such a direction that the ear 22' will exert on the reinforcement 15 at point *c* an inwardly directed force tending to hold the frame 13 against the front face of the shell. However, the parts are so arranged that the lever-arm of the force *a* about the axis *b*, which lever-arm is the distance *d* in Fig. 3, is materially less than the lever-arm *e* of the force applied to the reinforcement 15 at point *c*. As a result, the force acting at point *c* and holding the frame 13 against the face of the shell is relatively small in comparison to the pressures exerted on opposite faces of the flange 18 at the points *a* and *b*.

It is to be noted that the connection between the frame 13 and each of the brake strips is loose in the sense that it does not define the angular position of the plane of the brake strip relative to the frame 13. This type of connection has advantages over a rigid connection not only because of its simplicity and cheapness but also because it accommodates for inaccuracies of manufacture and decreases the extent of variations in braking effort which result from such inaccuracies.

I claim as my invention:

1. In a device of the type described, a shutter-carrying frame having a central air-passing opening, one or more air-deflecting members mounted on said frame in association with said opening, a supporting wall having a circular air-passing opening alined with that of said frame, and a pair of diametrically opposite brake members carried by said frame, each of said members being of spring material and formed with portions bearing resiliently on opposite sides of said wall adjacent the circumference of the opening therein.

2. In a device of the type described, a shutter-carrying frame having a central air-passing opening, one or more air-deflecting members mounted on said frame in association with said opening, a supporting wall having a circular air-passing opening alined with that of said frame, and a pair of diametrically opposite brake members carried by said frame, each of said members being a spring-metal strip extending chordally of the opening in the wall and bearing at its ends against the inner surface of said wall, said strip having near its center an outwardly extending projection bearing against the outer surface of said wall and an inwardly extending projection, said frame being provided with a slot in which said inwardly extending projection is received.

3. In a device of the type described, a shutter-carrying frame having a central air-passing opening, one or more air-deflecting members mounted on said frame in association with said opening, a supporting wall having a circular air-passing opening alined with that of said frame, and a pair of diametrically opposite brake members carried by said frame, each of said members being a spring-metal strip extending chordally of the opening in the wall and bearing at its ends against the inner surface of said wall, said strip having near its center an outwardly extending projection bearing against the outer surface of said wall and being connected to said frame near its inner edge, the distance between the outer edge of said strip and its point of connection to said frame being materially greater than the distance between the outer edge of the strip and the point of engagement of said projection with said wall.

4. In a device of the type described, a shutter-carrying frame having a central air-passing opening, one or more air-deflecting members mounted on said frame in association with said opening, a supporting wall having a circular air-passing opening alined with that of said frame, and a pair of diametrically opposite brake members carried by said frame, each of said members being a spring-metal strip extending chordally of the opening in the wall and bearing at its ends against the inner surface of said wall, said strip being connected to said frame near its inner edge and having near its center an outwardly extending projection bearing against the outer surface of said wall.

5. In a device of the type described, a shutter-carrying frame having a central air-passing opening, one or more air-deflecting members mounted on said frame in association with said opening, a supporting wall having a circular air-passing opening alined with that of said frame, and brake means carried by said frame and bearing resiliently against opposite faces of said wall adjacent the circumference of the opening therein, the bearing of said brake means upon opposite faces of said wall being confined to points spaced about the circumference of said opening.

EARL C. BOOTH.