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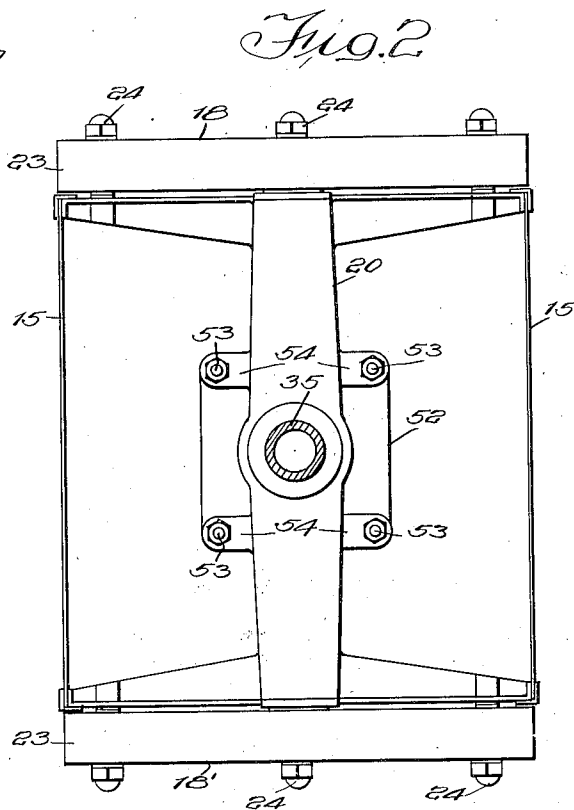
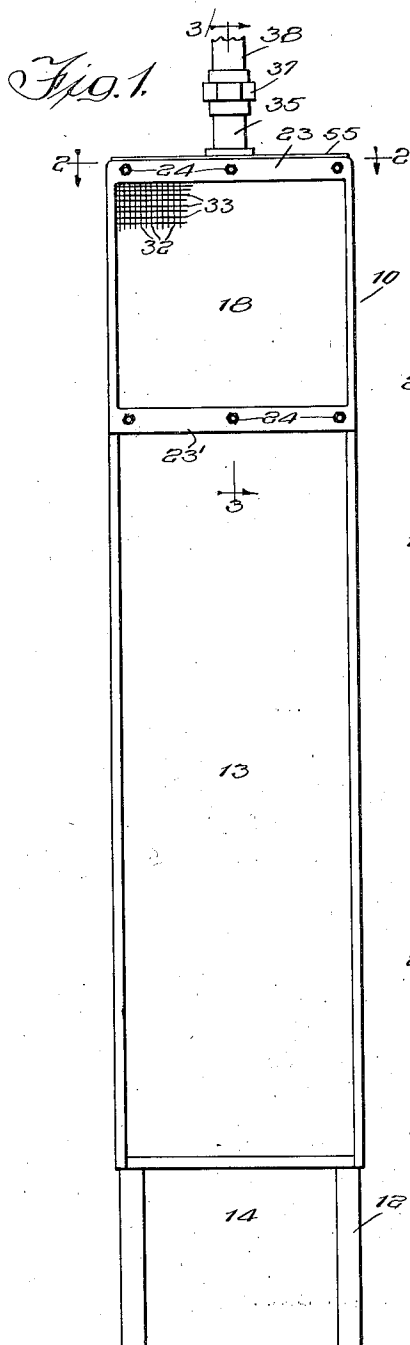
A. B. MODINE

1,885,371

HEATING APPARATUS

Filed Aug. 9, 1929

3 Sheets-Sheet 1



Witness:

William P. Kilroy

Inventor:  
Arthur B. Modine

Hill & Hill

By

Attys

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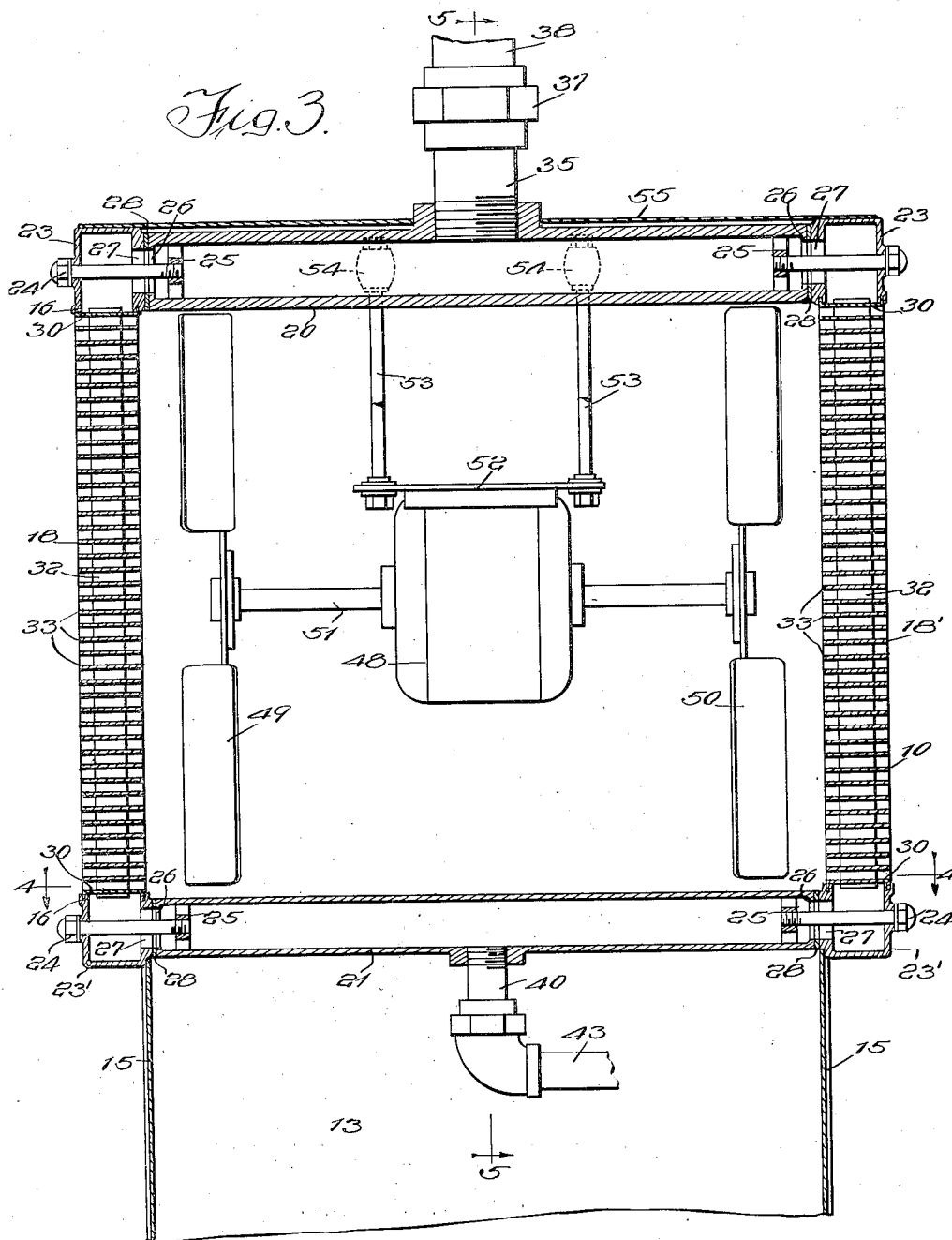
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3 Sheets-Sheet 3

*Fig. 4.*

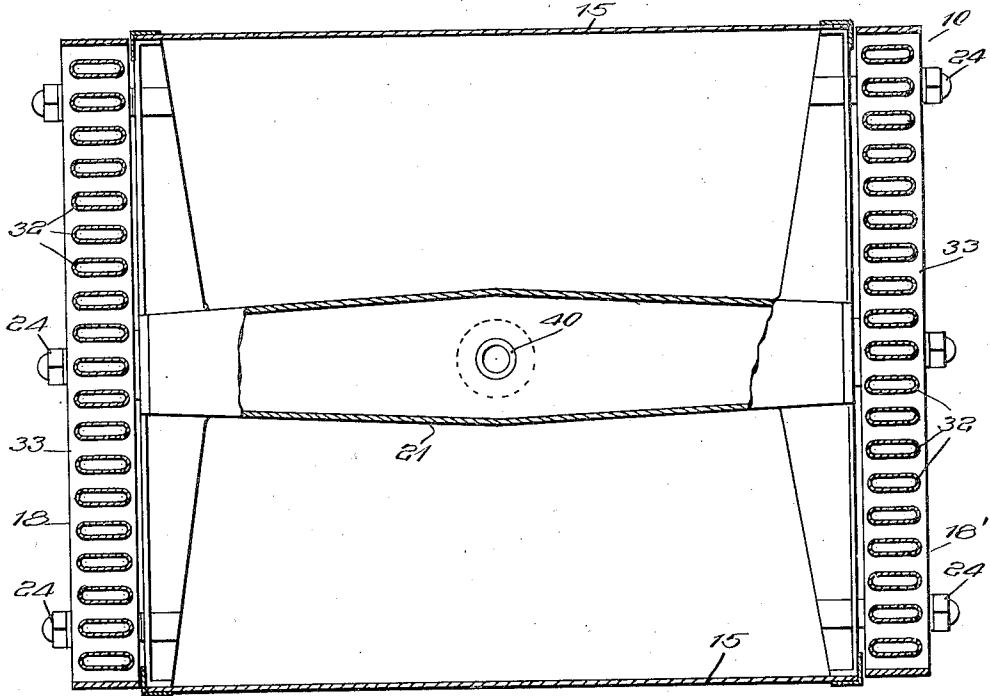
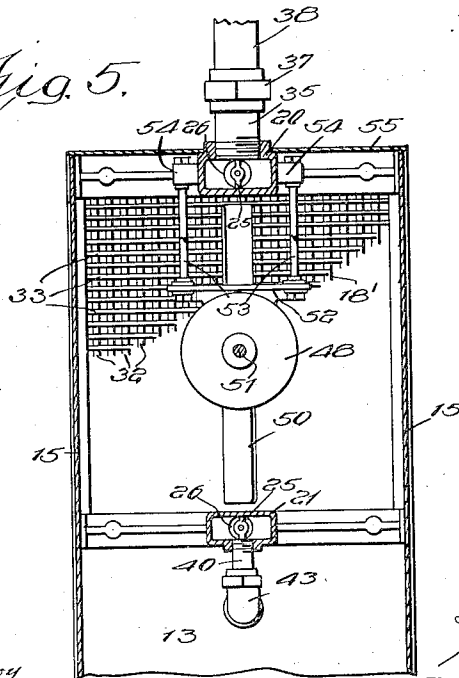


*Fig. 5.*



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## UNITED STATES PATENT OFFICE

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## HEATING APPARATUS

Application filed August 9, 1929. Serial No. 384,733.

My invention relates to heating apparatus and has to do more particularly with devices of the type referred to which are particularly adapted for heating a factory or other enclosure used for industrial purposes, although it will be readily understood that devices embodying my invention will have a wide range of applicability. The invention has as one of its principal objects the provision of a heating unit which may be set up upon the floor of an establishment and which will take the relatively cool air from adjacent the floor and deliver the air in a heated condition to the room in which the device is located.

Another object of the invention is the provision of a device which will cause circulation of air from the floor or lower portion of the room and deliver the air in a heated condition in several directions.

A further object of the invention is the provision of fans and a motor for operating the fans for causing a circulation of air through and from the device. Thus, devices embodying my invention may be conveniently positioned more or less centrally in an enclosure, from which position they will direct heated air in a plurality of directions.

Another object of the invention is the provision of a simple structure providing a connection between the piping of the heating system and certain radiators employed in the device whereby a heat exchange fluid passage between the piping of the system and the radiators is produced and to employ said structure as a support for the motor and fans.

A further object of my invention is to provide a device of the type referred to which will be particularly compact and composed of a relatively small number of simple parts, inexpensive to manufacture, easy to assemble and demount.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a side elevation of a heater embodying my invention;

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

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3; and

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 3.

In the preferred embodiment shown in the drawings, the heater, indicated generally at 10 in Fig. 1, is supported from the floor by means of legs 12. A casing member 13 is carried by the legs 12 and the heater 10 is located at the upper end of this casing. The lower end of the casing is located relatively to the floor so as to provide a space 14 which permits air to enter the bottom of this casing and be directed to the heating device to be heated thereby and discharged into the room. In the particular embodiment shown, the casing 13 is rectangular having front, rear and side walls 15.

The heater 10 comprises a pair of radiator units 18 and 18' (Fig. 3) having manifolds 20 and 21, respectively, located at the opposite ends thereof. These manifolds as best seen in Figs. 2 and 4 are substantially H-shaped and communicate with said radiators, it being understood that these manifolds are respectively connected with the supply and return pipes of the heating system. The radiators 18 and 18' are each provided at their opposite ends with a tank respectively designated 23 and 23', the latter of which is secured to the manifold by means of bolts 24 threadedly engaging spider-like members 25 preferably formed integrally in the manifolds, as best seen in Fig. 3. The manifolds 20 and 21 are apertured as at 26 to register with apertures 27 in the tanks such as 23, gaskets 28 being interposed between the tanks and manifolds at these points so as to insure a fluid-tight connection. The tanks 23 and 23' are formed in a manner to provide an open side which is designed to be

closed by a header plate 30. To this end the parallel side walls of the tank are grooved as indicated at 16 to receive the opposite edges of the walls of the tanks 23. These header plates provide means in which to mount the ends of radiator tubes 32 on which tubes are mounted a plurality of vanes or fins 33. The vanes or fins are formed of any suitable material having high heat conductivity, but are preferably formed of sheet metal or the like.

It will be readily apparent from an inspection of Fig. 3 that the lower manifold 21 is substantially similar to the upper manifold 20 and has its opposite ends connected to the tanks 23' in a manner similar to the tanks 23, the latter of which are substantially similar to the tanks 23'. It is also evident that the tubes 32 serve as a means of communication between the tanks 23 and the tanks 23'.

The connection between the upper manifold and the supply side of the circulating system is formed by a nipple 35 which is threaded into the manifold 20, the nipple being connected with conduit 38 of the supply side of the heating system by means of a union 37. The manifold 21 is, as before stated, connected with return side 43 of the system by means of a nipple 40 which serves as a drain for the exhaust fluid. As before stated, means is provided for driving the heated air from the device. To this end a motor 48 is employed having fans 49 and 50 secured to a shaft 51 thereof, the motor being supported by the manifold 20 by means of a platform 52 which is suspended from said manifold by hangers 53, which are in turn mounted in laterally extending bosses 54. By the arrangement just described the motor is arranged within a casing which includes the radiators 18 and 18' with the fans located with respect to the radiators to draw relatively cool air through the casing 13 and discharge it in a heated condition from the radiators and into the room. Means is provided at the upper end of the structure for compelling the heated air to be discharged through the radiators. To this end a cover plate 55 is attached to the top of the manifold 21 by any suitable means. Thus, it will be seen that the heater 10 comprises substantially a housing for the motor and fans, which housing is formed by the front, side and rear walls 15, the top wall 55 and the heaters or radiators 18 and 18', the housing being open at the bottom.

In the operation of the device, the motor 48 is connected to any suitable source of electrical energy (not shown). Obviously, the heating fluid will pass from the supply side of the system through the manifold 20 where it will be divided, and directed so that part of the fluid passes through the heating unit 18 and part passes through the unit 18', the tanks 23', the manifold 21 and out through

the nipple 40 to the return side of the system. It will be apparent that the fans 49 and 50 will draw air upwardly from the floor into the casing 13 and project it outwardly in opposite directions through the heating units 18 and 18', these units serving to warm the air as it passes therethrough. Hence, a complete circulation of air will be maintained whereby the cool air from the lower part of the room is continually being removed and replaced by warm air. The motor 48, being disposed in the path of the relatively cold air will be protected from injury due to overheating.

Obviously, many modifications and various changes may be made in my invention without departing from the spirit thereof. For example, heating units such as the units 18 and 18' may be substituted for the side walls such as 15, and suitable means provided for directing a portion of the air through these heating units. In such an arrangement, it will be seen that heated air will be projected in substantially all directions from the heater 10.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, a housing, a plurality of radiator units forming walls of said housing, manifolds at the top and bottom of said units for respectively conducting heat exchange fluid to and from said units, and means within said housing for inducing a current of air to flow into said housing and outwardly therefrom through said units in a plurality of directions.

2. In a device of the class described, a housing, a plurality of radiator units forming walls of said housing, manifolds at the top and bottom of said units for respectively conducting heating fluid thereto and draining such fluid therefrom, means for supporting said housing from a floor or the like, and means within said housing for inducing a current of air to flow upwardly into said housing and outwardly therefrom through said units in a plurality of directions.

3. In a device of the class described, a housing, a pair of oppositely disposed radiator units forming walls of said housing, H-shaped manifolds at the top and bottom of said units respectively serving as a fluid inlet and drain, and means within said housing for inducing a current of air to flow into said housing and outwardly therefrom

through said units in a plurality of directions.

4. In a device of the class described, a housing, a plurality of radiator units forming walls of said housing, manifolds at the top and bottom of said units for respectively conducting heat exchange fluid to said units and for draining said fluid therefrom, a plurality of fans within said housing for inducing a current of air to flow into said housing and outwardly therefrom through said units in a plurality of directions, and a single motive means for operating said fans.

5. In a device of the class described, a housing, a pair of oppositely disposed radiator units forming walls of said housing, H-shaped manifolds at the top and bottom of said units respectively serving as a fluid inlet and drain, a pair of fans within said housing for inducing a current of air to flow into said housing and outwardly therefrom through said units in a plurality of directions, a single shaft on the opposite ends of which said fans are mounted, and means supported within said housing for rotating said shaft and fans.

6. In a device of the class described, a housing, a pair of oppositely disposed radiator units forming walls of said housing, H-shaped manifolds at the top and bottom of said units respectively serving as a fluid inlet and drain, a pair of fans within said housing for inducing a current of air to flow into said housing and outwardly therefrom through said units in a plurality of directions, a single shaft on the opposite ends of which said fans are mounted, and means suspended within said housing for rotating said shaft and fans.

7. In a device of the class described, a housing having a plurality of openings provided adjacent one end, members respectively providing a fluid supply and return, said members having their ends located at said openings, radiator units supported by said housing and means for connecting said units with said ends and air advancing means arranged in said housing and providing an element of means for inducing a current of air to flow into said housing and through said radiators.

8. In a device of the class described a housing having a plurality of openings, members supported by said housing respectively providing a fluid supply and return, radiator units located at said openings and connected with said members, and air advancing means arranged in said housing and providing an element of means for inducing a current of air to flow into said housing and through said radiators.

9. In a device of the class described, a housing having a plurality of openings, members supported by said housing respectively providing a fluid supply and return,

said members being located within said housing and at opposed edges of said openings, radiator units, means for separably connecting said units with said fluid supply and return, said units providing closures for said openings, air advancing means located in said housing and providing an element of means for inducing a current of air to flow into said housing and through said radiator units.

10. In a device of the class described, a housing, a plurality of radiator units forming walls of said housing, means within said housing for inducing a current of air to flow into said housing and outwardly therefrom through said units in a plurality of directions, a fluid supply and return connecting said radiators, said means being arranged between said fluid supply and return and said radiators.

11. In a device of the class described, a plurality of radiator units forming walls of a heat exchange unit, means for supporting said unit from a floor or the like, and means within said unit for inducing a current of air to flow upwardly into said housing and outwardly in a plurality of directions through said units, a fluid supply and return for said radiators secured to said supporting means, and means providing means for separably connecting said units with said fluid supply and return.

12. In a device of the class described, a heat exchange device including a plurality of radiator units forming walls of said device, means providing a supply and return for said units and providing supports for said units, said means providing an element of means for conducting air from a point adjacent said floor to said device, and means within said device for inducing a current of air to flow upwardly through said air conducting means into said device and outwardly therefrom through said unit in a plurality of directions.

13. In a device of the class described, a housing, a plurality of radiator units forming walls of said housing, a pair of fans within said housing for inducing a current of air to flow into said housing and outwardly therefrom through said units in a plurality of directions, a single shaft on the opposite ends of which said fans are mounted, and means for rotating said shaft and fans, elements respectively providing a fluid supply and return for said units, one of said elements providing a support for said last mentioned means.

14. In a duplex heating unit, spaced heat interchangers each comprising an upper and lower header tank and a communicative heat transferring core, means connecting the upper header tanks of said heat interchangers, and air propelling means suspended from said means comprising a motor and spaced

fans, one located adjacent each core for impelling a current of air outwardly through each core.

15. In a heating unit of the class described, spaced heat interchangers each comprising an upper and lower header tank and an intercommunicative heat transferring core, means communicatively connecting the upper header tanks of each heat interchanger for facilitating the connection thereof in a fluid heating medium system in parallel relation, a fan suspended from said means between said heat interchangers comprising a fan propeller adjacent each heat transferring core for propelling air outwardly therethrough, and means communicatively connecting the bottom header tanks for returning the heating medium from the latter to said fluid heating medium system.

20 16. A device of the class described comprising spaced heating units having air passages therethrough, a bridge rigidly connecting said heating units at their upper ends, and a fan located between said heating units and suspended from said bridge comprising spaced fan propellers, each of said fan propellers being located adjacent one of said heating units and formed to impel a current of air outwardly through the passages therein.

20 In witness whereof, I hereunto subscribe my name this 18th day of July, A. D. 1929.

ARTHUR B. MODINE.