A. F. HARTER.

HOT AIR FURNACE.

APPLICATION FILED APR. 15, 1924.

1,398,264.

Patented Nov. 29, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

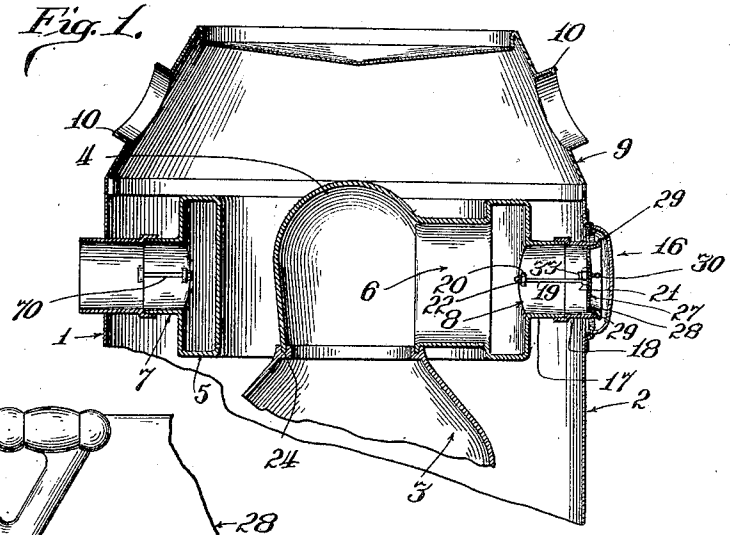


Fig. 6.

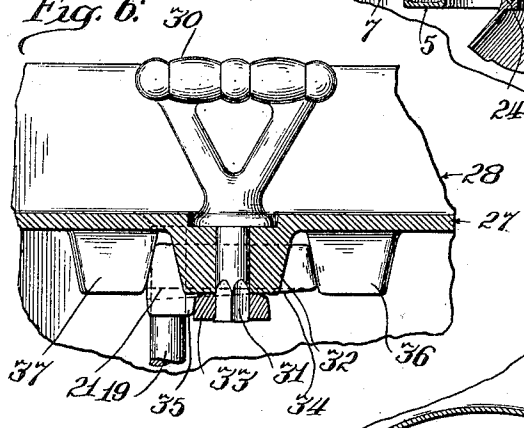
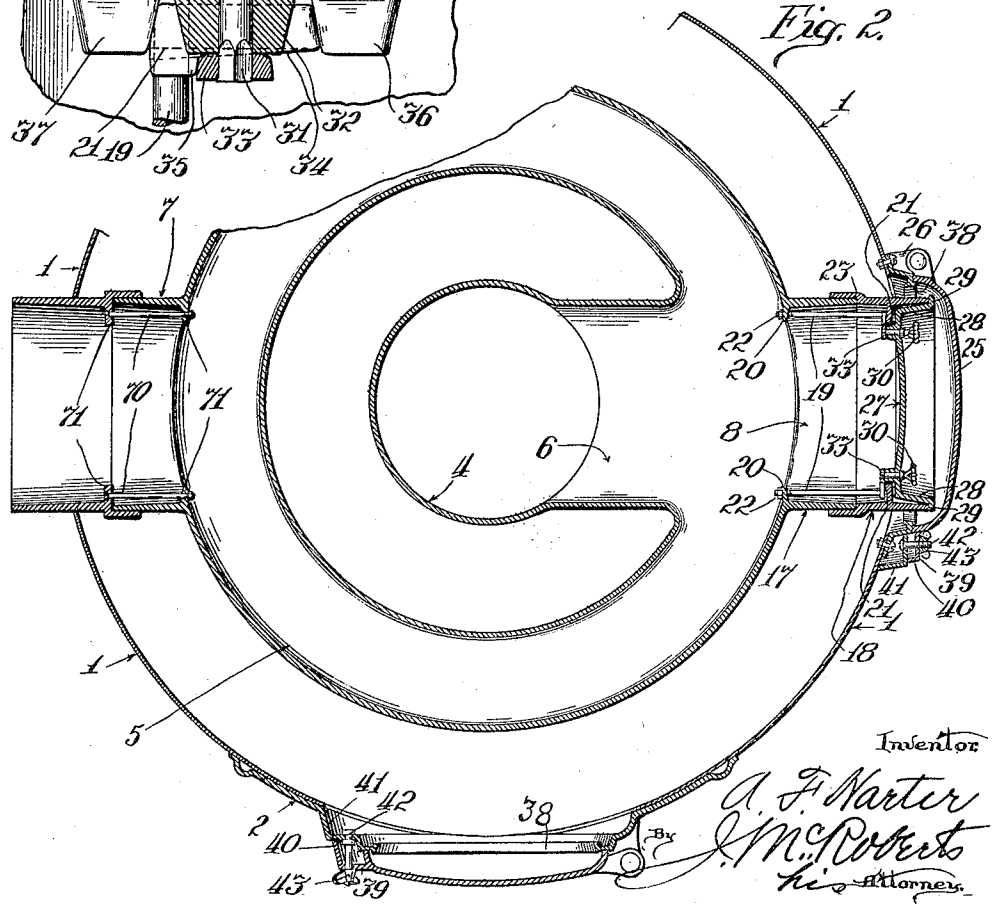


Fig. 2.



Inventor

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By J. McRoberts

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2 SHEETS—SHEET 2.

Fig. 3.

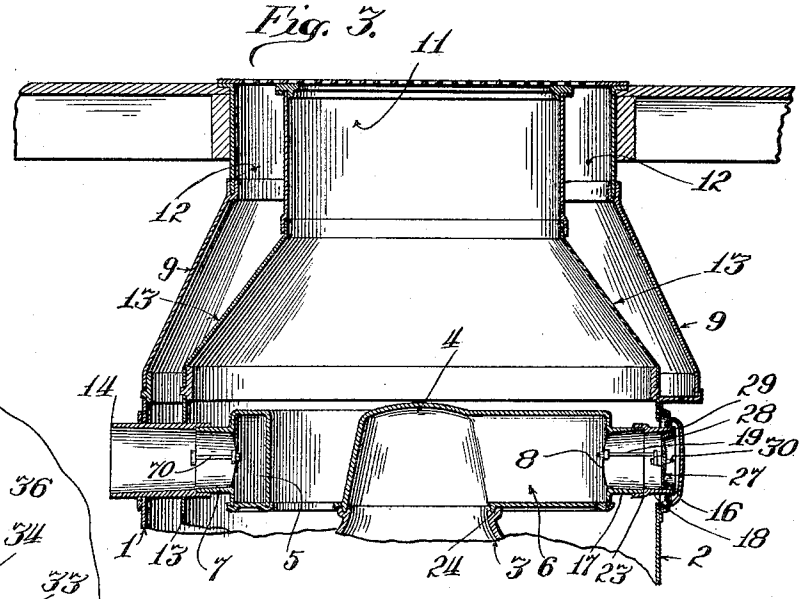


Fig. 5.

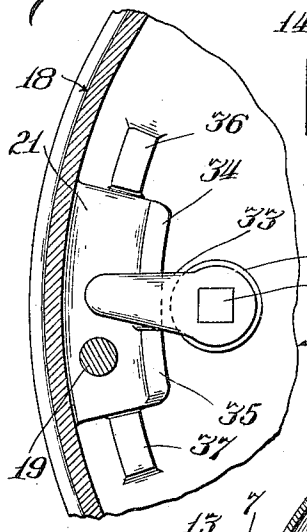
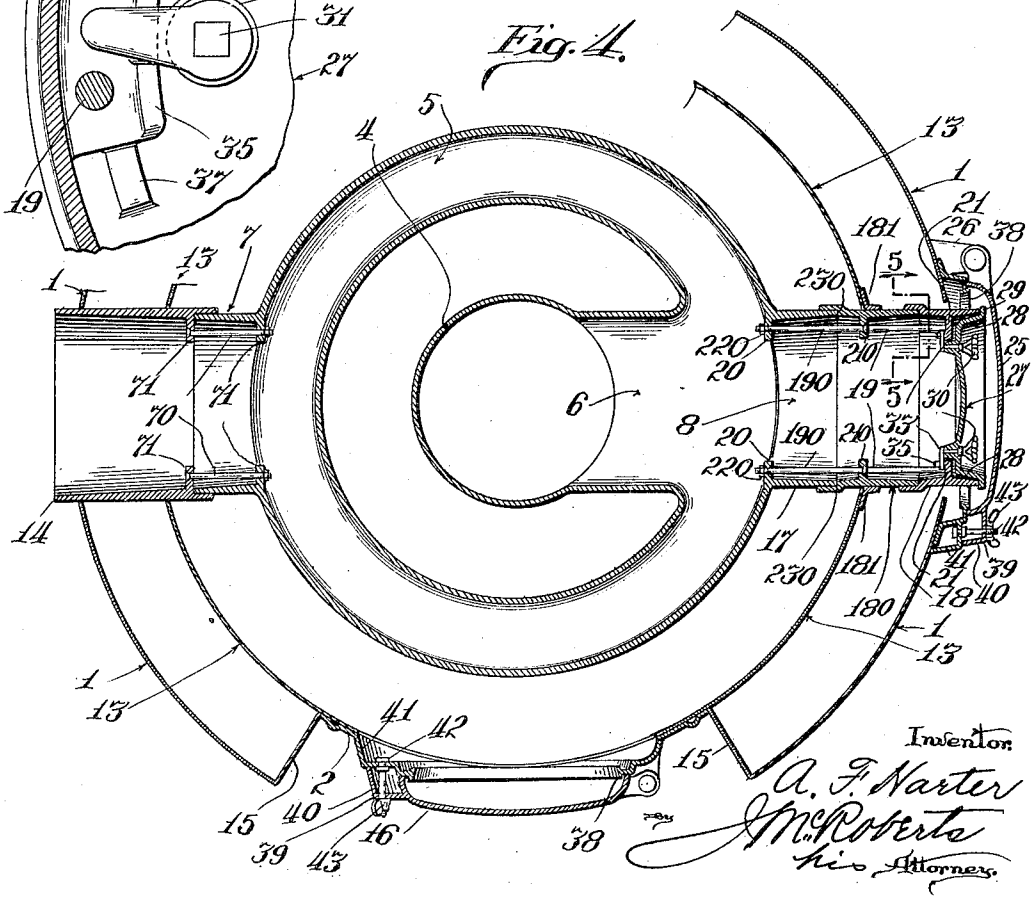


Fig. 4.



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UNITED STATES PATENT OFFICE.

AUGUSTUS F. HARTER, OF OAK PARK, ILLINOIS, ASSIGNOR TO CRIBBEN & SEXTON COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

HOT-AIR FURNACE.

1,398,264. Specification of Letters Patent. Patented Nov. 29, 1921.

Application filed April 15, 1921. Serial No. 461,465.

To all whom it may concern:

Be it known that I, AUGUSTUS F. HARTER, a citizen of the United States, residing at Oak Park, in the county of Cook, State of Illinois, having invented certain new and useful Improvements in Hot-Air Furnaces, do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to clean-outs for hot-air furnaces of either the pipe or the pipeless types, and consists in the novel and useful constructions herein described and then pointed out in the appended claims.

In the accompanying drawings, which illustrate practical embodiments of the various features of my invention in furnaces of both said types and in which the same reference numerals indicate similar parts in the different figures,

Figure 1 is a view showing a central vertical section through the upper portion of a pipe furnace embodying my invention; Fig. 2 is a cross-sectional view showing the arrangement of parts when the clean-out is at one side of a pipe furnace; Fig. 3 is a view similar to Fig. 1 through the upper portion of a pipeless furnace; Fig. 4 is a cross-sectional view showing the arrangement of parts when the clean-out is at one side of a pipeless furnace; Fig. 5 is a detail sectional view on the line 5—5 of Fig. 4, and Fig. 6 is a detail view of parts of the clean-out.

In the drawings the reference numerals 1 and 2 respectively designate the outer casing and face-plate or front of a hot-air furnace, 3 the combustion-chamber above the usual fire-pot (not shown), 4 the combustion-dome of the radiator above the combustion-chamber, 5 the annular radiator, 6 the passageway connecting the dome and radiator, 7 the smoke-collar of the radiator piped to a chimney flue, 8 the usual clean-out opening in the radiator opposite the smoke-collar, and 9 the hood or top-bonnet. In the pipe type of furnace the hood is provided with the usual collars 10 for the pipes to convey the warm air to the different rooms as it rises through the casing. In the pipeless type the top of the hood is open to provide the central warm-air outlet 11 and the surrounding cold-air intake 12, and the outer casing 1 is of enlarged diameter to receive the inside shorter casing 13 which is suitably supported intermediate the outer casing and the furnace body to form an inner air-heating passage leading to the outlet 11 and an outer cold-air passage extending down from the cold-air intake 12 and communicating with the air-heating passage at the bottom, so that the warm air rises through the inner casing direct from the furnace and passes through the central outlet 11, and the cold air flows through the intake 12 and the cold-air passage to the lower part of the outer casing and then passes into the inside casing where it comes in contact with the heating surfaces, is heated and rises through the outlet 11 to recirculate through the building; the inner casing preferably is lined with asbestos to prevent the heat from radiating through it, and the smoke-collar 7 is provided with an extension 14 passing through the outer casing, which is provided with inwardly directed wings 15 at the sides of the front-plate 2 to close the cold-air chamber. All of these parts are of well-known construction and arrangement, with the usual fire-pot and accessories below the combustion-chamber. In both types it is customary practice to locate the clean-out opening 8 of the radiator opposite its smoke-exit 7 and to aline the discharge pipe of this opening with usual clean-out door 16 in the front-plate. In some instances heretofore the discharge-pipe of the clean-out opening terminates in the space between the radiator and clean-out door, while in others it extends into this door-opening in the front plate. In the former case, the soot and dirt from the radiator escape and are discharged into the space between the radiator and casing, and so pass into the stream of air circulating through the furnace and into the house. In the latter case, the smoke-exit 7 is always in the same position at the rear of the furnace, and so when the chimney-flue is not in the line of this exit it is necessary to provide elbows or curves in the connecting smoke-pipe, which interfere with and check the draft through the furnace.

My invention provides a clean-out which is adjustable to any point of the casing so that regardless of the set of the furnace the smoke-exit may always be in line with the flue, and which in any radial position will discharge the soot and dirt from the radiator outside the furnace and so prevent it from passing into the stream of air circulating through the furnace and thence into the house. In practice I provide a short clean-out pipe 17 and a removable collar 18 that extends through the opening of the usual door 16 or through the outer casing as the case may be. The collar 18 is detachably connected to the pipe 17 by any suitable means, such for example as the elongated bolts 19 passing through opposite ears 20 and 21 on the inside of the pipe 17 and collar 18, respectively, and having their heads countersunk in the latter ears and their nuts 22 bearing on the former. The inner end of the collar fits over the free end of the pipe 17 and is provided with an internal shoulder 23 which rests against this pipe to properly position the collar so that its outer end extends outside the furnace. The radiator is revoluble on the combustion-chamber 3, its dome 5 being mounted thereon by the circular groove and tongue joint 24 as shown, so that the clean-out may be adjusted or set at any point around the furnace; when the furnace is set so that the smoke-exit 7 in its normal position opposite the face-plate is in line with the chimney-flue the clean-out will be set at the door 16 of the face-plate 2, as shown in Figs. 1 and 3, but when for any reason the furnace is set so that its smoke-exit in its normal position opposite the face-plate would be at an angle to the flue the radiator may be adjusted on the chamber 3 to bring the smoke-exit in line with the flue, this change of position being illustrated in Figs. 2 and 4 where the positions of the parts of the pipe furnace and of the pipeless furnace, respectively, are shown when the radiator is given a quarter turn from its position in Figs. 1 and 3 to bring the smoke-exit at one side of the casing and the clean-out at the opposite side. This shifting of the radiator obviates the use of all elbows or bends in the connecting smoke-pipe and eliminates the checks or interference with the furnace-draft produced by them. The radiator may be turned to point the smoke-exit in any radial direction, and the collar 18 may be correspondingly set with relation to the casing, and is long enough to extend through the casing 1 or the face-plate 2 as the case may be. In a pipe furnace, the collar 18 is of uniform length and extends through the front opening covered by the usual clean-out door 16 when the radiator is set with its smoke-exit 7 at the rear of the face-plate (Fig. 1), or through an opening cut at the appropriate point in the casing 1 when the radiator is set with its exit 7 on a different radius (Fig. 2). In a pipeless furnace, when the radiator is set with its exit 7 at the rear of the face-plate the collar 18 is of the same length as in the pipe furnace and extends through the front plate 2 at the usual door 16 in the same way as shown in Fig. 3, but when the radiator in a pipeless furnace is set with its exit on a different radius the collar is elongated to pass across the cold-air space between the inner and outer casings, as shown in Fig. 4. This may be done by merely lengthening the collar or by splicing it; in the latter case, an inner section 180 having an internal shoulder 230 surrounds the pipe 17 and enters the collar 18, being provided with internal ears 210 of sufficient size to receive the bolts 19 and the supplemental bolts 190, the shanks of the latter passing through the ears 20 to receive the attaching nuts 220. In both types of furnace when the radiator is moved to a position other than with its collar at the door 16 the opening in the front-plate may be permanently closed by this door or a filler-cap, and the casings will be pierced at appropriate points for the necessary openings for the smoke-exit and clean-out collar. Also, in such case the opening in the outer casing for the collar will be closed by a door 25 swinging on a suitable frame 26 mounted on the casing.

I further provide a gas-tight closure for the clean-out collar. Preferably the inner surface of the outer portion of the collar is beveled or flared outwardly to give it a bell-mouth shape to the line of its ears, and is closed by a dish-shaped closure-cap comprising a countersunk head 27 and a correspondingly beveled forward skirt 28 forming a spigot closely fitting the bell-mouth of the collar and having a peripheral flange 29 to overlie its outer end. The cap is held in place by opposite turn-bolts, each having a handle 30 in the countersink of the cap and its shank 31 passing through the head 27 and a rearward box 32 thereon providing an extended bearing surface, and carrying at its inner end an angular wing 33 in the rear of the plane of the inner side of the ears 21 to engage behind the lowest point of an inclined or beveled cam-way 34 on the ear to draw the spigot into the bell when the bolts are turned to locking position, stop-shoulders 35 on the ears being provided if desired to limit the sweep of the wings. The cap is also provided with opposite pairs of rearwardly projecting lugs 36 and 37 in extension of the bevel of the skirt, the units of each pair being adjacent one of the bolts and spaced above and below the associated bolt a sufficient distance to form a seat in line with the bolt to receive one of the ears 21 when the cap is applied. The lugs position and center the cap in relation to the ears

so that the wings of the bolts engage behind the ears, the face of the head 27 being provided with arrows to indicate the direction of rotation of the bolts to draw and lock the cap in place.

The closure cap seals the clean-out so that no smoke or gases can escape through it. Also, as the cap is carried by the clean-out and is independent of the casing and front plate, and as the clean-out openings in both those parts are sufficiently larger than the clean-out to allow ample clearance for differences in contraction and expansion of the parts, the clean-out never contacts with the casing. The extreme heat to which the interior parts of the furnace are subjected in comparison with the front-plate and casing causes these former parts to expand much more rapidly and extensively than the latter, so that the clean-out rises in its opening in the casing or front-plate as the case may be, and by supporting the clean-out independently of these latter parts the problem of unequal expansion is eliminated and there is no tendency of the several parts to bind or crack, while at the same time a gas-tight closure of the clean-out is assured.

The doors 16 on the front-plate and 25 on the casing are cup-shape in cross-section and their edges fit over and embrace circular beads 38 on their frames to make dust-proof closures at their openings. The fastening-ear 39 of each door is also provided with an inwardly directed curved flange 40 fitting over the top and side of a projection 41 on its frame, and a threaded pin 42 on the projection passes through a hole in the ear to receive a wing-nut 43, so that the door is properly centered and locked in position.

The sleeve 17 and the clean-out collar constitute a clean-out pipe that is adjustable to any radial position to locate the opposite smoke-collar in line with the flue, and so avoids angles in the smoke-pipe and permits the furnace to be set in any required position; for example, where the flue is near a corner and the required position of the front-plate would bring the smoke-collar in its usual relation at the rear of the plate so near the other corner-wall that there would be no room for the smoke-pipe or for an elbow, the clean-out may be adjusted to position in line with the flue without affecting the location of the front-plate. In any position the clean-out pipe extends from the radiator to a point outside the furnace so that no refuse from the radiator can pass into the circulating air, and as its ears for connecting its parts are preferably at its sides this pipe has an unobstructed floor to allow the refuse from the radiator to be easily discharged outside the furnace in any position of the radiator, while the closure-cap is at all times seated in the pipe and so does not project beyond its end or interfere with the outside door, and the bell and spigot joint between the cap and pipe insures a gas-tight construction that prevents the escape of smoke or gas into the circulating system or into the furnace-room. The gap between the inner casing 13 and the part 180 may be closed by a flange 181 of a collar on the latter. The smoke-collar is preferably in sections connected by bolts 70 passing through ears 71 in the sections.

I claim:

1. A hot-air furnace having angularly disposed clean-out openings in its outer wall, a radiator, a clean-out pipe for the radiator adjustable to extend through either opening to discharge outside the furnace, and a closure-cap set into said pipe independently of the outer wall.

2. A hot-air furnace having a clean-out opening in its outer wall, a radiator having a clean-out pipe of less diameter than and extending through said opening, a closure-cap for said pipe independent of the outer wall, and means on the cap and pipe to lock the former in said position.

3. A hot-air furnace having a clean-out opening in its outer wall, a radiator having a clean-out pipe in said opening provided with a bell-mouth, a closure-cap having a spigot fitting said mouth, and means on the cap and pipe to center and lock the former in the latter.

4. A hot-air furnace having a clean-out opening in its outer wall, a radiator having a clean-out pipe in said opening provided with a bell-mouth, a closure-cap having a spigot fitting said mouth, opposite ears in the pipe having beveled ways on their inner faces, and turn-buttons on the cap having inner wings engaging said ways to draw the bell and spigot joint together and lock the cap in the pipe.

5. A hot-air furnace having a front-plate provided with a clean-out opening, an outer casing having a clean-out opening at one side of the plate, a radiator having a sectional clean-out pipe to extend through either opening, and a closure-cap mounted in the clean-out pipe.

6. A hot-air furnace having a front-plate provided with a clean-out opening, an outer casing provided at one side of said plate with a clean-out opening, a radiator having a shouldered clean-out collar to extend through either opening, and a closure-cap seated in the clean-out collar.

7. A hot-air furnace having a front-plate, an outer casing provided at one side of said plate with a clean-out opening, a radiator having a clean-out collar in the casing opening, a closure-cap mounted in the clean-out collar, opposite ears in the collar, bolts connecting the ears and casing, and means on the cap coöperating with the ears to lock the cap in the collar.

8. A hot-air furnace having a front-plate, an outer casing provided at opposite sides of the plate with smoke-pipe and clean-out openings, a radiator having a smoke-collar and a clean-out collar respectively in the casing openings, a closure-cap mounted on the clean-out collar, opposite ears in the latter collar, bolts connecting the ears and casing, and turn-buttons on the cap having inner wings to engage the ears to lock the cap in the collar.

In testimony whereof I affix my signature this 30th day of March, 1921.

AUGUSTUS F. HARTER.