Sept. 27, 1955 A. KINKEAD 2,718,841

WALL FLUE

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Fig. 1.

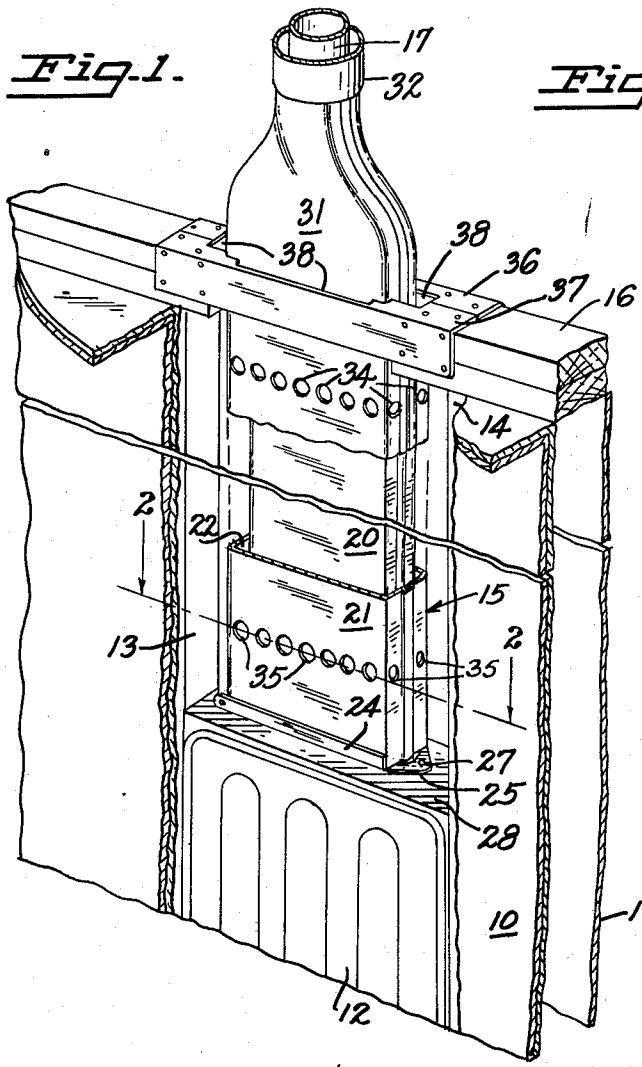
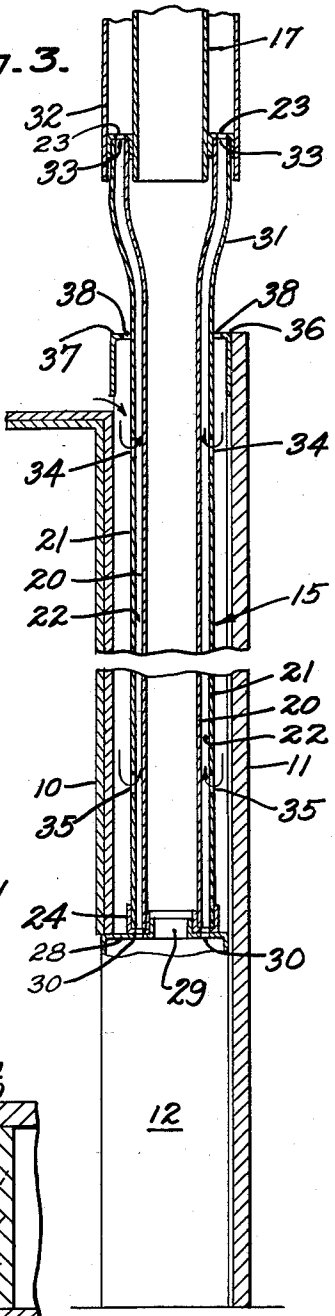


Fig. 3.



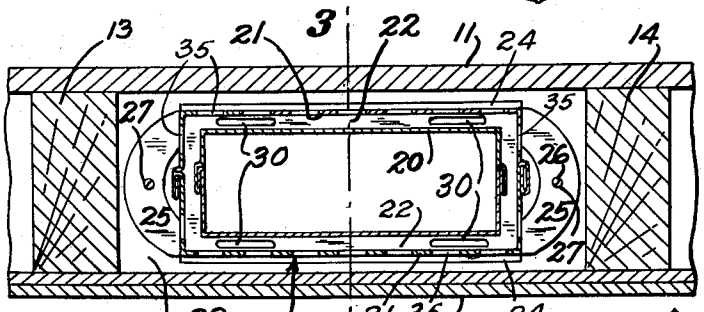


Fig. 2.

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WALL FLUE

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6 Claims. (Cl. 98—46)

This invention relates to an improved flue pipe that is particularly useful when the installation must be made in a building wall.

Prior art flue pipes failed to solve the problem of providing a construction adapted to meet the necessary Underwriters Laboratories, Inc., safety standards for installation in a narrow wall. Unless extra wall thickness was provided to give a necessarily wide clearance to prior art flue pipes, the inside of the building walls became too hot and constituted a fire hazard. The heat also affected the outer surface of the walls cracking plaster and peeling or discoloring painted and papered surfaces. The introduction of double-walled pipe failed to solve these problems, because the temperature soon built up inside the walls, aided by the adjacent air inside the building walls and between the two pipe walls.

The present invention has solved these problems by a structure that causes a flow of cool air through the wall space surrounding the flue pipe. The building walls are air cooled and their temperatures are kept low. The air is caused to enter the space between the pipe walls, cooling the flue pipe also. There is a constant current of cooling air drawn in.

The novel structure is a new type of double-walled flue pipe with vent holes through its outer wall at a point where the hot air passing up between the pipe walls will suck cool air in through these vent holes. This suction causes cool air to flow down the space between the flue pipe and the house wall.

As a result of the improved structure, it is now possible for the first time to install a wall-heater fluepipe that gives complete protection to combustible wall surfaces on 2" x 4" studding. Underwriters Laboratories, Inc., approved the pipe after extended tests and added to their approval an additional provision permitting its use in a wall when placed within ⅜ of an inch of combustible material.

The results of some tests on vent pipe embodying this invention and installed only ⅜ of an inch from pine board walls on 2" x 4" wood studding were as follows:

Flue Gas Temperature, ° F.	Rise of Wall Surface Temperature Over Room Temperature	
	Inside Surface, ° F.	Outside Surface, ° F.
550	75	45
450	60	36
350	40	28

Under such a test the Underwriters Laboratories, Inc., allow a maximum temperature rise of 90° F., which maximum had always been exceeded by structures heretofore in use, under such test conditions. The flue pipe embodying the present invention was, as the table shows, well within these maximum limits.

Other advantages, features, objects, and uses of the

invention will be suggested by the following description of an illustrative embodiment thereof, presented in accordance with United States Revised Statutes, Section 4888. Being illustrative, the description and drawings are not intended to limit the invention to the mere details disclosed, the scope of the invention being clearly indicated by the appended claims.

In the drawings:

Fig. 1 is a view in perspective, with portions broken away, showing a flue pipe embodying the invention installed in a building wall over a wall heater and connected at its upper end to another double-walled flue pipe, the upper end of which is broken off. The building walls are shown broken away at each side and are broken away in the middle to show the heater and the flue pipe. The flue pipe and wall itself are shown broken in the middle to conserve space, and a portion of the outer wall of the flue pipe is broken away to show its inner wall.

Fig. 2 is an enlarged view in section taken along the line 2—2 in Fig. 1, with the house walls shown in place.

Fig. 3 is a view in section taken along the line 3—3 in Fig. 2, the view being broken in the middle to conserve space.

The drawings show an illustrative installation where two combustible wall surfaces **10** and **11** are supported by two-by-four studding. A wall heater **12** is located in the lower portion of the wall between studs **13** and **14**. A flue or wall vent **15**, embodying the principles of the invention, is provided to conduct the hot flue gases from the heater **12** out from inside the wall, up through a gap cut in the ceiling plate **16**, and into an attic space where it is coupled to any suitable double-walled flue pipe **17** for venting through the roof.

The flue pipe **15** is a completely self-contained unit having an inner wall **20** and an outer wall **21**, to provide a passage **22** between them. The walls **20**, **21** may be held apart at a substantailly uniform distance by any suitable spacing means. A preferred type of spacer comprises simply the end members in the form of a coupling member **23** at the pipe's upper end and a base bracket **24** at its lower end. The pipe walls **20**, **21**, the coupling member **23**, and the base **24** may be made from any suitable material, preferably one that is non-breakable and corrosion resistant, such as an aluminum alloy.

The base bracket **24** shown in the drawings has a pair of flanges **25**, one on each side, and each flange has one or more holes **26** through which a screw **27** may pass for securing the flue pipe **15** firmly to the header plate **28** of the heater **12**, around its flue opening **29**. The flue gases may then pass up into the inside pipe wall **20**. If the heater **12** has double walls, there may be communication between them and the passage **22** through openings **30** in the base bracket **24**.

Preferably the flue pipe **15** is rectangular in cross-section for most of its height, beginning with the base bracket **24**, because this shape enables precise spacing from the walls **10**, **11** and the studs **13**, **14**. The rectangular shape also affords the maximum amount of insulation per cross-sectional area for most installations. In other installations, such as in-curved walls, the cross sectional shape of the flue pipe **15** may be varied if desired. The upper portion **31** of the flue pipe **15** that projects above the plate **16** is usually joined to the flue pipe **17** of more conventional shape or design, and for that reason this neck portion **31** may terminate in a circular, oval, or other cross-sectional shape at the coupling member **23**, so that it can be attached to a coupling member **32** at the lower end of the flue pipe **17**. Continuous passage of air through the passage **22** is assured by holes **33** through the coupling member **23**.

The outer wall **21** of the flue pipe **15** is perforated by a plurality of vent openings **34**, which are located so as to

lie below the plate **16** and below the neck **31** where the change in shape occurs. They preferably lie near the top of the rectangular portion of the flue pipe **15**, and it is important that they lie beneath the plate **16**. There may also be another series of vent openings **35** through the pipe's outer wall, a short distance above the lower end of the flue **15**. These vent openings **34** and **35** have a very important effect. Hot air flowing upwardly through the passageway **22** sucks in air through the vents **34** and **35**, thereby inducing a flow of relatively cool air inside the house walls **10**, **11** and studs **13**, **14** and around the pipe **15**. This cool air movement aids in keeping the flue pipe **15** and the building walls **10**, **11** and studs **13**, **14** cool and at a safe temperature.

Installation is made after framing and before the completion of the walls. Before or after the heater **12** is put in place, the ceiling plate **16** is cut out to provide an opening for the upper end of the flue **15**. Then an angle plate **36** is secured at one side of the cut-out. Next the flue pipe **15** is put in position, and its flanges **25** are secured to the heater **12**. Then a second angle plate **37** is secured to the header **16** around the cut-out, positioning the upper end of the flue pipe **15**. Clearances **38** are provided on four sides between the pipe **15** and the plates **36**, **37** so that cooling air in the required quantity can flow down between the walls and the flue from the space above the plate **16**.

The builder can then complete the walls **10** and **11** across the studs **13**, **14**. There will be a clearance of at least ⅜ of an inch between the flue pipe **15**, and the walls. There will be greater clearance than that between it and the studs **13**, **14**. When the installation is completed, the flue pipe **15** will be enclosed inside the walls with its neck **31** sticking out over the ceiling plate **16**.

The flue pipe **15** is preferably short enough so that the openings **34** will be below the angle plates **36**, **37** and long enough so that the coupling **23** will be above them. By way of example only, it may be stated that flues **15** may be made in 3, 4, and 5 foot lengths which will take care of most wall installations. Such flues **15** may be practically any size to fit between wall studs. One size that has proven satisfactory is five inches across at the top coupling **23** and changing shape so its rectangular dimension is about 2⅞" x 7⅞". In this particular pipe, there are seven openings **34** on each wide wall of the pipe and two openings on each end wall making eighteen in all. The openings **34** are about ⅞" in diameter and are located about one inch below the lower end of the tapered neck **31**, where the change in shape begins. There are, in this illustrative example, the same number of openings **35** of the same size as the openings **34**, and they are located about 4½" above the lower end of the flue **15**. It will be obvious that these dimensions may be departed from and are given to illustrate a pipe that has been found satisfactory.

When the flue pipe **15** is in use, the hot flue gases from the heater **12** pass through the flue opening **29** into the inner pipe **20**. Hot air will then rise inside the passage **22** between the pipe walls **20** and **21**. As it rises, the hot air current sucks in cool air from outside the flue pipe **15**, through the openings **34** and **35**. This suction causes air from outside to be sucked into the space bounded by the walls **10**, **11** and studs **13**, **14** through the clearances **38**.

This current of cool air mixes with the warm air in the passage **22** and keeps the flue's outer wall **21** cool. It also flows past the studs **13**, **14** and the house walls **10**, **11** and the angle plates **36**, **37** and keeps them cool. Cool air is constantly drawn in from above the ceiling plates **16**, and the inside of the house wall is kept cool.

What is claimed is:

1. An all-metal flue installation, in combination with two spaced-apart imperforate building walls separated by studs, a ceiling plate, and a wall heater in between said walls, comprising a double-walled all-metal rectangular flue pipe having an inner rectangular imperforate wall in which the products of combustion are conveyed upwardly from said heater up through said ceiling plate; and an outer wall spaced from said inner wall and from said building walls and said studding and passing upwardly through a gap cut in said ceiling plate, space being provided between at least a portion of said outer pipe wall and said ceiling plate for the passage of air therebetween; said flue pipe having a neck starting just above said ceiling plate and terminating in a generally round coupling at the upper end of said flue pipe for attachment to a round double-walled flue pipe, said outer pipe wall being provided below said neck and below said ceiling plate with a plurality of perforations therethrough whereby air is caused to flow through said perforations when said inner pipe wall becomes warm, which flow of air in turn causes air to flow from above said ceiling plate to the space below said ceiling plate and between said building walls and studs adjacent said flue pipe; a flange at the bottom of said outer pipe wall adapted to provide space for attaching said flue pipe to said heater; and a plurality of perforations in said outer pipe wall spaced a short distance above said flange to introduce a further flow of air through the space between said inner and outer pipe walls.

2. A flue installation in between the studded walls of a building, including in combination with the two walls, the studding, and the ceiling plate, a double-walled flue pipe having an inner metal pipe to convey the products of combustion and an outer metal pipe spaced from it and spaced inwardly from said building walls and said studding, both said pipes passing upwardly through a gap cut in said plate; and a bracket member secured to said ceiling plate and having portions to position said flue pipe and portions providing a passage so that air can pass down from above said ceiling plate and around said outer pipe, said outer pipe having perforations therethrough below said bracket and said ceiling plate, so that cool air will flow down into said openings and thence up through the space between said inner and outer pipe walls.

3. An all-metal flue installation in combination with two spaced-apart imperforate building walls separated by studs, with a ceiling plate and with a wall heater in between said walls, comprising a double-walled, all-metal, generally rectangular flue pipe having an inner generally rectangular imperforate wall in which the products of combustion are conveyed upwardly from said heater to a locus above said ceiling plate; and an outer wall spaced substantially uniformly from said inner wall and spaced from said building walls and said studs, and passing upwardly through a gap cut in said ceiling plate, space being provided between at least a portion of said outer pipe wall and said ceiling plate for the passage of air therebetween; said flue pipe having a neck starting just above said ceiling plate and terminating in a coupling at the upper end of said flue pipe for attachment to a round double-walled flue pipe, said outer pipe wall being provided somewhere below said ceiling plate with a plurality of perforations therethrough whereby air is caused to flow through said perforations when said inner pipe wall becomes warm, which flow of air in turn causes cool air to flow from above said ceiling plate to the space below said ceiling plate and between said building walls and studs adjacent said flue pipe.

4. An all-metal flue comprising an inner substantially rectangular elongated imperforate wall forming an inner flue pipe and an outer substantially rectangular elongated wall concentrically disposed with respect to said pipe defining a passage therebetween, said pipe and passage having the ends thereof open, the upper end portions of the inner and outer walls being tapered to form a coupling means carried by the upper ends of said walls, said coupling means having an apertured portion extending from the outer wall to the inner wall forming a spacer means thereof, a lower supporting bracket carried at the lower ends of said walls, said bracket

having a portion extending between the inner and outer walls forming a lower spacing means therefor, said outer wall being provided intermediate said neck portion and said lower supporting bracket with a plurality of perforations therethrough, said perforations being disposed in upper and lower sets with said upper set being adjacent the tapered neck portion.

5. An all-metal flue comprising an inner substantially rectangular elongated imperforate wall forming an inner flue pipe and an outer substantially rectangular elongated wall concentrically disposed with respect to said pipe defining a passage therebetween, said pipe and passage having the ends thereof open, the upper end portions of the walls being tapered to form a neck portion terminating in a substantially circular outlet, a coupling means carried by the upper ends of said walls adapted to attach said flue to a second flue pipe, a lower supporting bracket carried at the lower ends of said walls, said coupling means and supporting bracket each having a portion thereof extending from the outer wall to the inner wall forming upper and lower spacing means respectively for said walls, said upper spacing means having openings therethrough intermediate the inner and outer walls, said outer wall being provided intermediate said neck portion and said lower supporting bracket with a plurality of perforations therethrough, said perforations being disposed in upper and lower sets with said upper set being adjacent the tapered neck portion, said lower supporting bracket having outwardly extending supporting flanges adapted to attach said flue to a heater for conducting the products of combustion therefrom up through said pipe whereby air is caused to flow through said perforations and passage when said inner wall becomes warm.

6. An all-metal flue comprising an inner substantially rectangular elongated imperforate wall forming an inner flue pipe and an outer substantially rectangular elongated wall concentrically disposed with respect to said pipe defining a passage therebetween, said pipe and passage having the ends thereof open, the upper end portions of the walls being tapered to form a neck portion terminating in a substantially circular outlet, a coupling means carried by the upper ends of said walls adapted to attach said flue to a second flue pipe, a lower supporting bracket carried at the lower ends of said walls, said coupling means and supporting bracket each having an apertured portion thereof extending from the outer wall to the inner wall forming upper and lower spacing means respectively for said walls, said outer wall being provided intermediate said neck portion and said lower supporting bracket with a plurality of perforations therethrough, said perforations being disposed in upper and lower sets with said upper set being adjacent the tapered neck portion, said lower supporting bracket having outwardly extending supporting flanges adapted to attach said flue to a heater for conducting the products of combustion therefrom up through said pipe whereby air is caused to flow through said perforations and passage when said inner wall becomes warm.

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