

June 23, 1925.

1,542,989

W. M. CONNERY

AIR COOLED DAMPER

Filed May 22, 1924

4 Sheets-Sheet 1

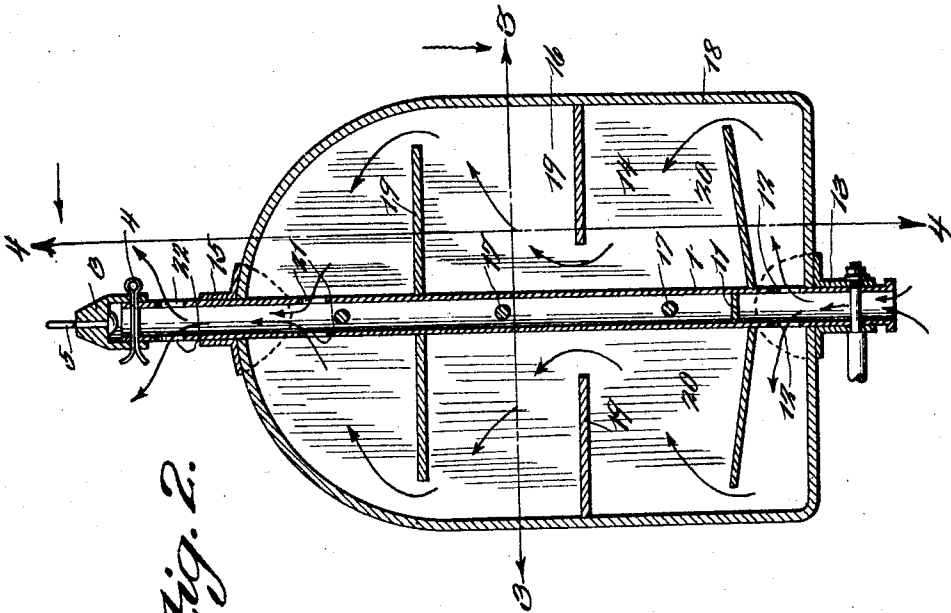


Fig. 2.

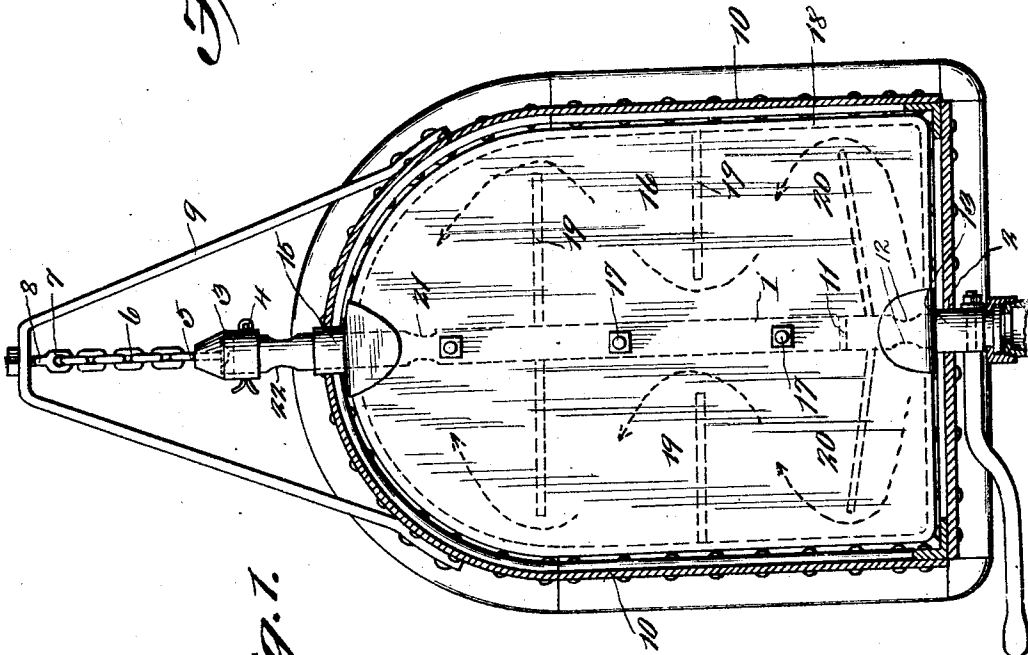


Fig. 1.

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Fig. 3.

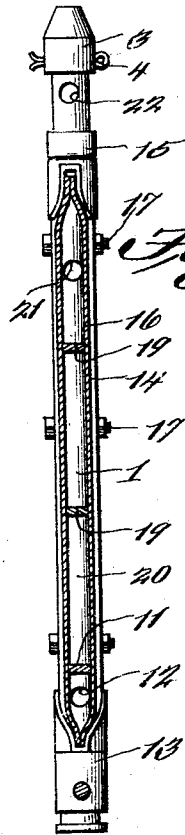
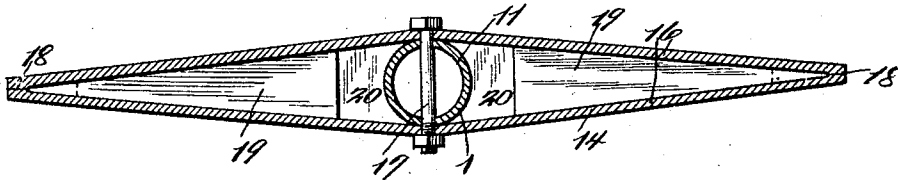


Fig. 4.

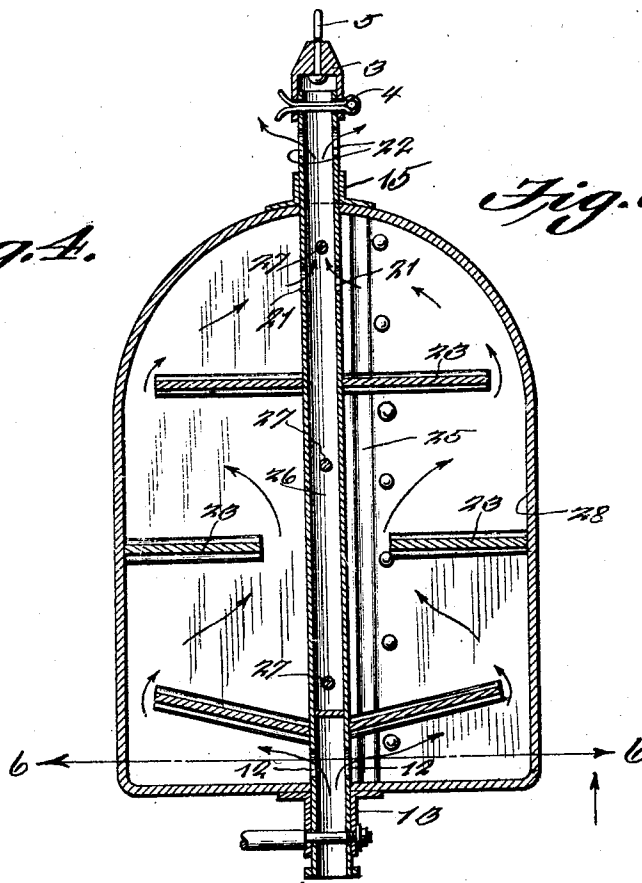


Fig. 5.

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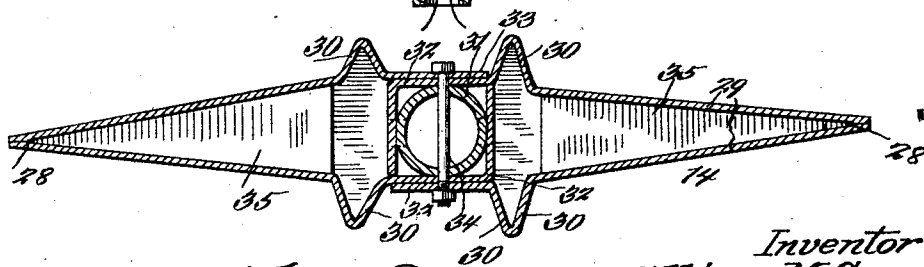
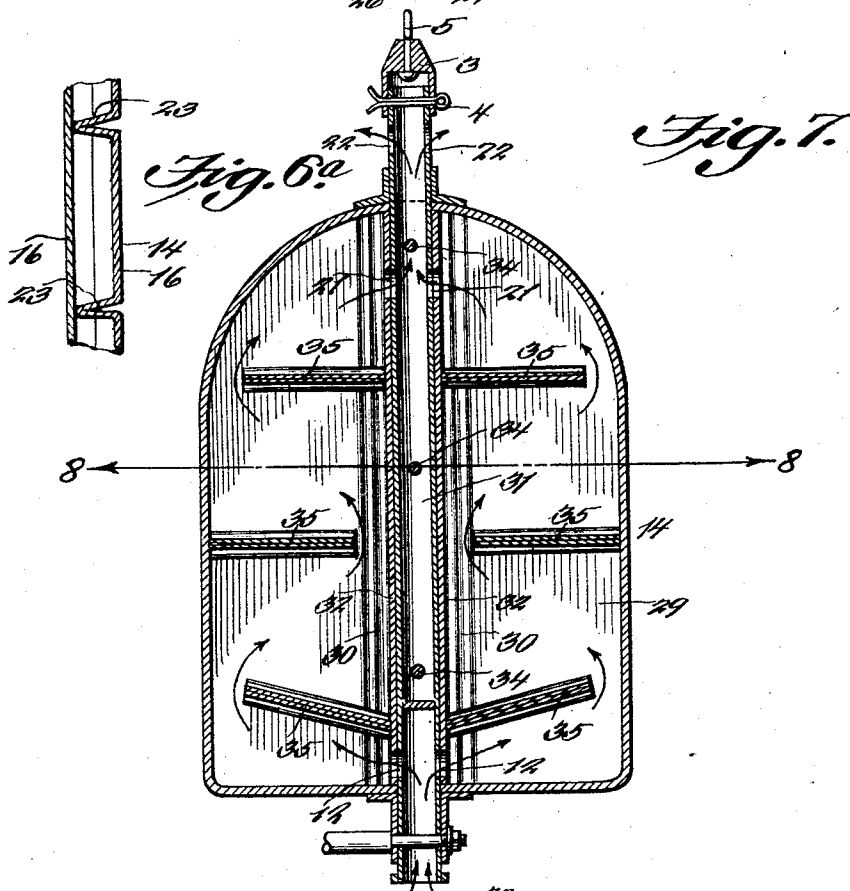
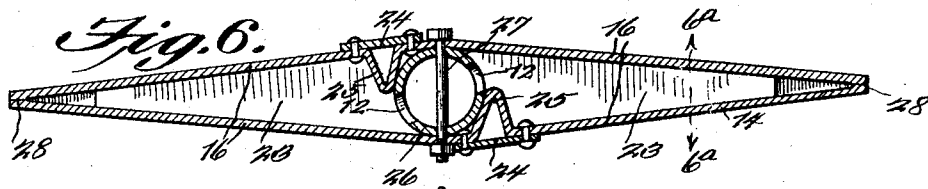
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Fig. 9.

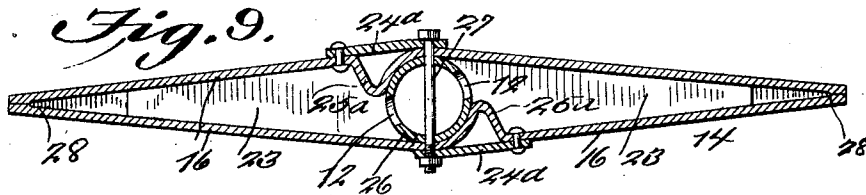


Fig. 10.

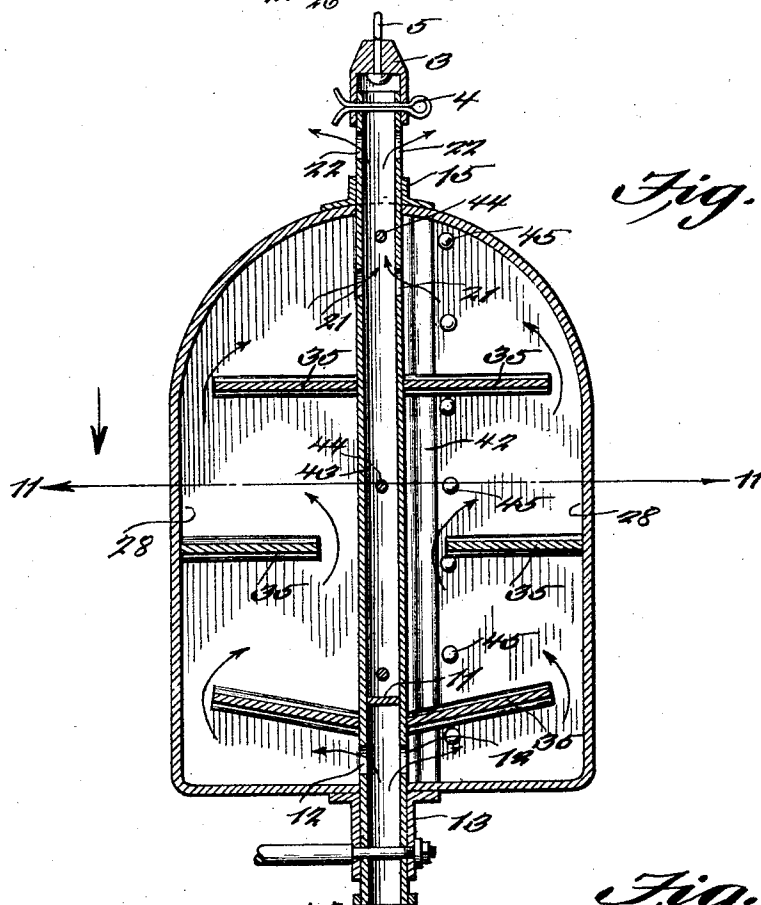
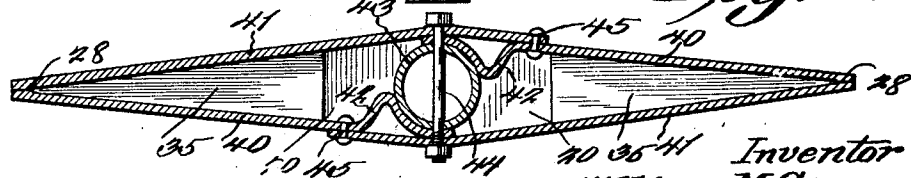


Fig. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM M. CONNERY, OF PHILADELPHIA, PENNSYLVANIA.

AIR-COOLED DAMPER.

Application filed May 22, 1924. Serial No. 715,139.

To all whom it may concern:

Be it known that WILLIAM M. CONNERY, a citizen of the United States of America, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, has invented a new and useful Air-Cooled Damper, of which the following is a specification.

Prior to the present invention, dampers have been used for superheat boiler furnaces and preheaters (such as disclosed in co-pending application in the name of William M. Connery, filed 22nd day of May, 1924, Serial No. 715,140) for the conduction of a forced draft to be heated by a regenerative use of the lower degrees of waste heat and subsequently injected into boiler furnaces for the purpose of aiding in the combustion of the fuel. In these constructions, there has been no attempt made and no purpose in view to obviate the warping of the walls of the damper. While the dampers are hollow, the purposes to which they are put are entirely different from the purposes of the present invention.

In large power generating plants superheat flues must be employed for conveying the products of combustion from the several boiler furnaces to a single chimney. This can be and has been safely and conveniently accomplished by breechings, such as disclosed in Letters Patent to William M. Connery, issued the 16th day of May, 1922, No. 1,416,334, wherein provision has been made for preventing undue collapsing of the walls of the flues or breechings.

In using these superheat flues or breechings, it is necessary to provide some means within the flues or breechings for controlling the gases in their flow and this has hitherto been done by movable plates within the term of damper. Within recent years, the sectional areas of these flues or breechings have so largely increased that warping of the plates or so-called dampers has become a serious menace due to the intensity of the heat passing through the flues or breechings.

With this menace in mind, it is a purpose of the present invention, in order to employ the superheat flue in the above-mentioned patent, to provide an improved damper which, though hollow as in the construc-

tions previously mentioned, is provided with means for causing a circulation of cooling air in a circuitous course through the damper, enabling the users of these superheat flues or breechings to operate power generating plants safely and conveniently without danger or chance of stoppage through failure of the dampers.

The dampers heretofore mentioned and which are hollow and designed for conduction of a forced draft to be heated by passing through the damper to aid in the combustion of fuel are not designed along practical lines, whereby it would be possible to claim a double use. The designers of such dampers did not have in mind the purpose of preventing warping, therefore the constructions are not such that they could be used for such a purpose, without the cost of installation being prohibitive. Furthermore, the designers of such structures have made no attempt to show how such dampers can be constructed in order to use them in superheat flues or breechings of increased cross sectional area in order to prevent warping.

Another purpose is to provide, in a damper for the conduction of cooling air from a forced draft, expansion stiffened hollow damper structures conforming to the cross sectional area of the flue or breeching, in combination with stiffening ribs, such as are used in Letters Patent No. 1,416,334, arranged in staggered relation to form circuitous passages to insure the conduction of the cooling air.

Still another purpose is to provide a damper for the conduction of cooling air from a forced draft outside and remote from the flue and discharged on the outside of the chimney and never from the outside to the inside of the flue, which is a characteristic of the former damper constructions previously mentioned.

A further purpose is to provide a damper built up of steel sheets having expansible stiffeners to be in the walls of the damper, the stiffeners being of unlimited extent as compared with their thickness. These stiffeners permit the damper walls to expand and contract due to the cool air on the interior and the heat on the exterior of the damper, so that the damper will

maintain its uniform shape and afford excellent service as well as durability.

A still further purpose is to provide a damper which, when constructed of steel sheets, the margins of the opposed walls of the damper may be welded, riveted or otherwise secured together, the steel sheets being disposed upon diametrically opposite sides of a hollow spindle and due to the marginal portions being fastened together, the walls are tapered toward each other in cross sectional area, which walls in themselves act as stiffeners and reinforcements to prevent undue warping of the damper, especially when assisted to a great extent by the stiffeners formed in the walls or steel sheets.

Moreover it is the aim to utilize a tubular spindle shaft in conjunction with the circuitous passages in the damper, for conveying the cooling air into and out of the circuitous passages, said spindle or shaft having means for the purpose of suspending the damper in its operative position.

It is to be understood that the particulars herein given are in no way limitative and that, while still keeping within the scope of the invention, any desired modifications of detail and desired proportions may be made in the apparatus according to the circumstances.

The invention comprises further features and combinations of parts to be hereinafter set forth, shown in the drawings and claimed.

In the drawings:

Figure 1 is a view of a superheat flue or breeching, showing the improved construction of damper applied in accordance with the invention.

Figure 2 is a sectional view through the damper, in fact, with one of its steel sheets or walls removed, more clearly showing the circuitous passages for the cooling air.

Figure 3 is a cross sectional view on line 3—3 of Figure 2, showing how the steel sheets or walls are fastened to the spindle or shaft and also showing the stiffeners.

Figure 4 is a sectional view on line 4—4 of Figure 2.

Figure 5 is a side view of a modified form of damper wherein the stiffeners are formed in the walls of the damper.

Figure 6 is a cross sectional view on line 6—6 of Figure 5.

Figure 6^a is a sectional view on line 6^a—6^a of Figure 6.

Figure 7 is an elevational view of another modified form of damper wherein the side walls, while employing the stiffening ribs in the walls themselves, are differently arranged in order to connect with the spindle or shaft.

Figure 8 is a cross sectional view on line 8—8 of Figure 7.

Figure 9 is a transverse sectional view through a modified form of air cooled damper wherein the opposed walls of the damper, in constructing the reinforcing ribs 25, are made to conform to the cylindrical contour of the spindle.

Figure 10 is a vertical sectional view through an air cooled damper showing still another modified construction.

Figure 11 is a transverse sectional view on line 11—11 of Figure 10.

Referring to the drawings, preferably to Figures 1 to 3, inclusive, 1 designates the spindle, the lower end of which passes through a bearing 2 in the lower wall of the flue and may be coupled in any suitable manner (not shown) to a forced draft conductor (not shown), so that the cooling air may pass through the spindle, or shaft 1. The upper end of the spindle has a cap 3, there being a pin or bolt 4 passing through the cap and through the spindle. A suitable swiveled eye 5 is carried by the cap and to which a chain 6 is connected. The chain is, in turn, connected to an eye 7 of a bolt 8 which is suspended from a suitable support 9 rising from the upper wall of the flue or breeching 10.

At a point adjacent the lower part of the damper, the hollow spindle is provided with a partition or abutment 11 and between this partition or abutment and the lower edge of the damper, the spindle is provided with diametrically opposite openings 12. A suitable collar or sleeve 13 is fastened to the spindle and, in turn, to the walls of the damper proper 14, thereby affording a rigid and one form of practical construction. A similar collar or sleeve 15 is fastened to the upper portion of the spindle in any suitable manner, preferably by welding, and correspondingly fastened to the upper part of the damper. In this manner the damper proper 14 is movable with the spindle. Any suitable or practical means may be employed for operating the damper to closed or various open positions.

The damper proper 14 is made up of opposed steel sheets 16 constituting the opposite walls of the damper. These sheets are fastened to the spindle by means of bolts 17 which pass through the sheets and through the spindle. The marginal portions of the sheets may be fastened together by rivets or welding, as at 18.

It will be noted that in cross sectional area, as shown in Figure 3 and as shown in Figure 4, the damper walls are tapered toward and secured to each other which not only provides a damper which is hollow for the conduction of cooling air but acts to reinforce the walls of the damper especially when assisted by ribs or fins 19. In Figures 1 to 4, the ribs or fins 19 are constructed from plate metal of a single thickness and

are welded or otherwise secured in position. The ribs or fins 19 are disposed in staggered relation, thereby providing circuitous passages 20 upon opposite sides of the spindle or fulcrum.

Adjacent the top of the damper and on the interior thereof, the spindle or fulcrum is provided with diametrically opposite openings 21 through which the cooling air passes. Adjacent the terminal portion of the spindle and exteriorly of the upper end of the damper, diametrically opposite openings 22 are provided. Obviously, the cooling air from a forced draft from any suitable source passes through the spindle, through the openings 12, thence through the circuitous passages, then through the openings and eventually discharge through the openings 22 to the atmosphere. This cooling air from a forced draft acts to keep the damper thoroughly cooled and prevents the same from undue warping as a result of the intense heat which passes through the flue or breeching.

Referring to Figures 5 and 6, the walls of the damper are also made up of steel sheets but in lieu of the single thickness ribs or stiffeners 19, the stiffeners are constructed in the walls or steel plates, the ribs being designed in keeping with the ribs or stiffeners shown in Letters Patent No. 1,416,334. These ribs or stiffeners 23 are, therefore, V-shaped in cross sectional area and extend inwardly of the damper and their apexes touch and may be welded to the opposite walls. In this construction, it is possible, though not necessary, to provide cover plates 24 to close the hollow portions of the ribs or stiffeners 23. Furthermore, the opposite walls of the damper in Figures 5 and 6 have additional ribs or stiffeners 25 which are adjacent the spindle 26 through which bolts 27 pass for holding the walls to the spindle. In the construction in Figures 5 and 6, the marginal portions of the walls are shown as welded, as at 28. In this modified construction, the ribs or stiffeners are also staggered to cause the circuitous passages to be formed.

In Figures 7 and 8, the opposed walls of the damper are also made of steel sheets 29, the marginal portions of which are bolted together. These steel sheets in this construction have their stiffening ribs 30 projecting outwardly instead of inwardly as in Figures 5 and 6, performing the same purpose as the ribs or stiffeners 25. These ribs or stiffeners 30 are adjacent the spindle or fulcrum 31. Furthermore, certain of the steel sheets or walls are angularly formed, as at 32, and embrace the spindle, while portions 33 of certain other sheets of the walls overlap the angular portions. These parts are secured to the spindle by means of bolts 34. The steel sheets or walls of the damper have

additional ribs or stiffeners 35 which are V-shaped in cross sectional area and extend inwardly as in Figures 5 and 6, and are also disposed in staggered relation in order to afford circuitous passages through which the cooling air passes for preventing warping of the walls of the damper.

Referring to Figure 9, it will be seen that the construction disclosed is similar to that shown in Figures 5 and 6, with the exception that the reinforcing ribs 25^a are curved to conform to the spindle of the damper, the cover plates 24^a acting to additionally reinforce the structure and yet permit of a certain amount of expansion and contraction and thereby prevent undue warping of the damper walls.

Referring to Figures 10 and 11, the opposed walls of the damper are in sections 40 and 41. The sections 40 have reinforcing ribs 42 which conform to the spindle 43 and are secured thereto by means of the bolts 44. The sections 41 also are secured to the spindle or journal by the bolts 44 but beyond the bolts, the sections 41 overlap the hollows of the reinforcing ribs 42 and are riveted at 45 to the sections 40. Otherwise, the damper disclosed in Figures 10 and 11 is constructed to provide for the circuitous passages, so that the damper may be readily cooled by cold air received from any source of supply and taken through a circuitous course as disclosed by the arrows.

The invention having been set forth, what is claimed is:

1. An air cooled damper comprising a hollow damper construction with a hollow spindle extending through and fastened to the damper, whereby the damper may be moved to closed and various open positions, the spindle having diametrically opposite openings adjacent the opposite ends of the damper but within the interior thereof, the damper having circuitous passages on opposite sides of the spindle and communicating with said openings for the conduction of a cooling air from the exterior at one end of the spindle and permitted to discharge at the opposite end of the spindle.

2. An air cooled damper including a hollow spindle adapted for connection with a source of cooling air and provided at one end with means to discharge the cooling air exteriorly of a flue or breeching, and a damper movable with the spindle and provided with circuitous passages on opposite sides thereof through which the cooling air passes from the spindle and then through the spindle at the opposite end and eventually to the atmosphere, said passages being in communication with the spindle at opposite ends of the damper and within the same.

3. An air cooled damper consisting of a

hollow spindle communicating at one end with a source of cooling air and provided with cooling air discharge means at its opposite end, and a damper of hollow structure movable with the spindle and provided with interior ribs or division walls in staggered relation, causing circuitous passages to be formed, the opposite ends of the circuitous passages being in communication with the spindle for the conduction of the cooling air through the damper to the atmosphere.

4. The combination with a breeching, of a damper spindle mounted therein communicating at one end with a source of cooling air and having air cooling discharging means at its opposite end, and a damper of hollow structure movable with the spindle and provided with circuitous passages communicating at their opposite ends with the interior of the spindle, whereby the cooling air may pass through the damper in circuitous courses.

5. The combination with a breeching, of a damper spindle mounted therein communicating at one end with a source of cooling air and having air cooling discharging means at its opposite end, and a damper of hollow structure movable with the spindle and provided with circuitous passages communicating at their opposite ends with the interior of the spindle, whereby the cooling air may pass through the damper in circuitous courses, said damper having its walls tapered toward each other in cross sectional area transversely and longitudinally, thereby preventing warping of the walls of the damper.

6. An air cooled damper including a hollow spindle communicating with a source of cooling fluid at one end, with discharge means for the fluid at the opposite end, and a damper of hollow structure fixed to the spindle and provided with circuitous passages communicating with the spindle at locations within the damper adjacent opposite ends thereof whereby, due to the conduction of the cooling fluid, the walls of the damper are prevented from undue warping as the result of intense heat in a flue or breeching.

7. A hollow damper with its walls tapered toward and connecting each other sectionally, transversely and longitudinally and provided with circuitous passages, a spindle movable with the damper and communicating with the opposite ends of the circuitous passages, and means for permitting a cooling fluid to pass through the spindle at one end and discharge at the opposite end.

8. A superheat breeching including a spindle end pieces mounted therein, said spindle end pieces having inlet and discharge passages from and to the exterior of the breeching, and a damper on the spindle end pieces and provided with circuitous pas-

sages therein connecting the inlet and discharge passages to permit a cooling fluid to pass therethrough from the exterior at one end of the spindle end pieces and discharge to the exterior at the other end piece.

9. An air cooled damper for superheat flues or breechings consisting of a hollow damper body provided with means to permit a cooling fluid to pass therethrough from the exterior to the exterior, the opposed walls of the damper having stiffeners disposed in staggered relation, causing circuitous passages to be formed for the cooling fluid.

10. An air cooled damper for superheat flues or breechings consisting of a hollow damper body provided with means to permit a cooling fluid to pass therethrough from the exterior to the exterior, said damper body consisting of opposed walls provided with stiffeners at points adjacent the center of the damper and extending longitudinally thereof, thereby stiffening the walls.

11. An air cooled damper for superheat flues or breechings consisting of a hollow damper body provided with means to permit a cooling fluid to pass therethrough from the exterior to the exterior of the breeching, the opposed walls of the damper having stiffeners disposed in staggered relation, causing circuitous passages to be formed for the cooling fluid, said walls of the damper body having stiffeners adjacent the longitudinal center of the damper for additionally reinforcing the damper walls and preventing undue warping and yet allowing the walls to expand and contract incident to the cooling fluid on the interior of the damper and the intense heat on the interior of the breeching.

12. A hollow damper structure provided with means for the conduction of a cooling fluid through the damper, said damper body consisting of opposed walls and a spindle, the opposed walls adjacent the spindle being angular in cross sectional area and secured to the spindle, certain of the walls overlapping, and stiffeners formed in the walls at points adjacent the spindle to prevent undue warping.

13. A hollow damper structure provided with means for the conduction of a cooling fluid through the damper, said damper body consisting of opposed walls and a spindle, the opposed walls adjacent the spindle being angular in cross sectional area and secured to the spindle, certain of the walls overlapping, and stiffeners mounted in the walls at points adjacent the spindle to prevent undue warping, the interior of the damper body having additional stiffeners disposed in staggered relation to provide circuitous passages for the cooling fluid.

14. A hollow damper body provided with means for the conduction of a cooling fluid therethrough to prevent warping of the

walls of the damper, said air conduction means consisting of circuitous passages extending in a plane longitudinally of the damper, communicating with a source of supply at one end and discharging to the atmosphere at the other end.

15. A hollow damper body structure provided with means for the conduction of a cooling fluid to prevent warping, the damper body having a spindle and consisting of opposed walls with certain parts thereof enveloping the spindle and secured thereto.

16. A hollow damper body structure provided with means for the conduction of a cooling fluid to prevent warping, the damper body having a spindle and consisting of opposed walls with certain parts thereof enveloping the spindle and secured thereto, the interior of the damper having stiffeners disposed in staggered relation causing circuitous passages to be formed as elements of the air cooling fluid conducting means.

17. The combination with a superheat breeching, of a spindle mounted across the breeching for rocking movement and having inlet and discharge passages at its opposite ends communicating with the exterior of the breeching, and a damper on the spindle and rockable therewith and provided with circuitous passages therein connecting the inlet and discharge passages to permit a cooling fluid to pass therethrough from the exterior and discharge to the exterior.

In witness whereof, in the presence of two witnesses, the inventor's signature is hereunto affixed.

WILLIAM M. CONNERY.

Witnesses:

E. C. ANCOTT,

ALBERT D. STEWART.