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DRIPLESS STEAM SHOWER PIPE

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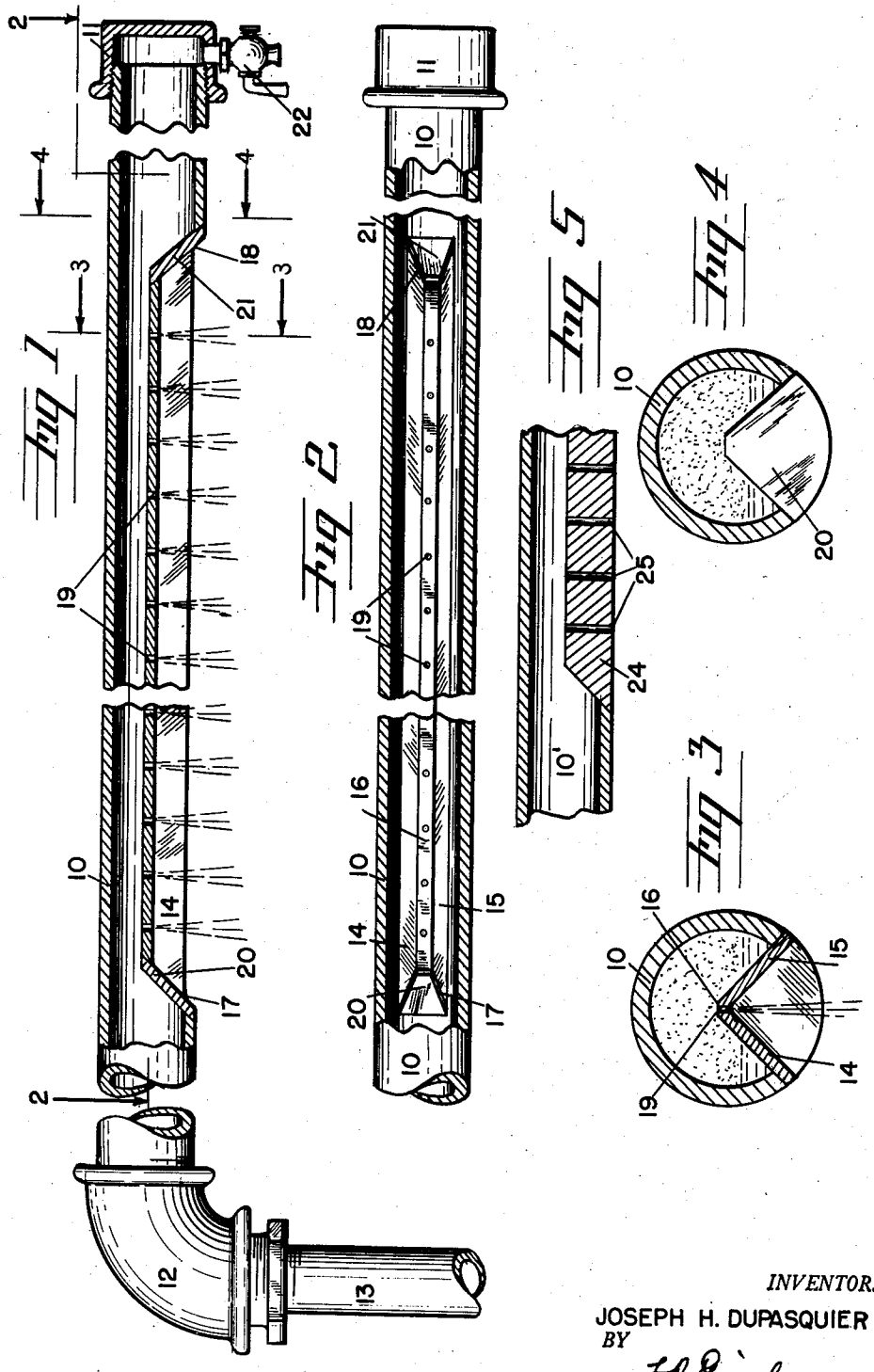


Fig. 1

Fig. 2

Fig. 5

Fig. 4

Fig. 3

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DRIPLESS STEAM SHOWER PIPE

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This invention relates in general to devices, including pipes, nozzles, and the like, by means of which a series of steam jets or a steam shower can be emitted. More specifically, this invention relates to steam shower pipes in which a plurality of orifices or jet openings are provided for an extended distance along the pipe to enable a series of steam jets to be discharged from the pipe so as to constitute a steam shower, and particularly such a steam shower pipe from which the resulting steam shower is to be discharged in a downwardly direction.

Steam showers, and thus steam shower pipes, perform important functions in the manufacture of paper, and the present invention is primarily concerned with the steam shower pipes used in this connection. For example, in the early formation of the pulp mat on the Fourdrinier wire it is customary to have a steam shower directed downwardly on the mat for the purpose of getting rid of air bubbles which may collect on the surfaces of the mat, and also later on in the paper making process, steam showers may be used for adding moisture to the sheet for the purpose of giving a better finish or gloss to the final paper.

It is very important, however, when steam showers are directed against pulp mats or paper webs, in the process of the paper manufacture, to avoid the discharging of any drops of water against the mat or web with the steam, for, as will be readily understood, the resulting impact of drops of water blown out from the steam orifices against the mat or web might produce weak spots or other imperfections in the final paper sheet.

Similarly, if a drop of water with the steam is forcibily delivered against a thin or light sheet during a later stage, this might cause the sheet to stick to the calender rolls of the machine, and if the paper sheet were heavy, such a delivered drop of water, while not causing the sheet to stick to the calender rolls, would at least make a streak in the finished paper extending for several inches.

While it is customary to provide steam shower pipes with taps, drains, and other means for preventing and disposing of accumulations of water in the shower pipe, nevertheless, to the best of my knowledge, no practical means has been found heretofore for entirely preventing some water from collecting along the bottom in the inside of a horizontal steam shower pipe during the discharging of the steam jets comprising the steam shower. The result has been that from time to time at least a portion of the collected water would be blown out with the steam through the jet openings.

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The object of this invention is to provide an improved steam shower pipe, adapted to be mounted in substantially horizontal position and discharging a row of steam jets downwardly, from which shower pipe all danger of the discharging of drops of water with the steam shower will be eliminated.

A related object of the invention is to provide an improved steam shower pipe, of the type above indicated, which will be practical and relatively simple and inexpensive to manufacture.

The manner in which these objects and other advantages are attained with my invention will be readily understood from the following brief description with reference to the accompanying drawings.

In the drawings:

Fig. 1 is an elevation, partly in section, of a steam shower pipe assembly formed in accordance with my invention;

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

Fig. 3 is a vertical transverse section taken on line 3—3 of Figs. 1 and 2;

Fig. 4 is a vertical transverse section taken on line 4—4 of Figs. 1 and 2; and

Fig. 5 is a fragmentary sectional elevation, similar in part to Fig. 1, but showing a modified construction for carrying out my invention.

The reference character 10 in the drawings indicates the body of an ordinary pipe of any desired length or size, suitable for use as the steam shower pipe, and adapted to be mounted in horizontal position by any suitable means (not shown). A longitudinal portion or strip is cut away from the pipe bottom for a length corresponding approximately to the desired shower line length. Preferably the arcuate width of this cut away portion from the bottom of the pipe body is about 90°, or approximately one-fourth of the cylindrical surface along that portion of the pipe from which the strip portion is cut.

Referring to Figs. 1 to 4 inclusive, an inverted V-shaped section, which preferably may constitute a section of angle iron, having two converging lateral walls 14 and 15, the dihedral angle formed by the lateral walls corersponding in degrees to the arcuate width of the cut out portion in the pipe 10, and having a length corresponding to the length of the cut out pipe portion, is prepared for mounting in the pipe. The ends of the lateral walls of the V-shaped section are cut off obliquely, as indicated at 17 and 18, and end plates 20 and 21 in the shape of sectors of circles of proper size are welded on the ends of the V-shaped section so as to complete the in-

sert. Steam jet holes 19 of the desired dimension and of the desired spacing for the shower steam jets are drilled downwardly through the ridge or vertex of the V-shaped section, the axes of the drilled holes 19 extending in a plane bisecting the dihedral angle of the V-shaped section. Preferably the ridge of the V-shaped section is formed with a narrow flat top surface, or the peak of the ridge is ground down to provide such a narrow flat top surface, as indicated at 16 in the drawings. This flat top surface 16 facilitates the drilling of the jet holes 19 and also provides a better top entrance for the discharging steam jet holes.

When the V-shaped section has thus been completed it is welded in place in the pipe 10 and the joints between the sides and ends of the V-shaped section and the corresponding edges of the cut-out portion of the pipe wall are made watertight and steamtight, thus completing the shower pipe construction. One end of the shower pipe is connected by suitable joint, such as the elbow joint shown at 12 in Fig. 1, or by any other suitable means, to a steam supply pipe 13 connected with a suitable source of steam supply (not shown), and the other end of the shower pipe is closed in any suitable manner, for example, by a cap such as that shown at 11.

A water outlet tap 22 (Fig. 1) is placed in the bottom of the shower pipe beyond the V-shaped insert, or preferably in the bottom of the cap 11. This tap is left partly open at all times when the shower is in use to act as a bleeder for the water collected in the pipe.

As will now be apparent, during the operation of the steam shower any water which collects in the shower pipe will settle along the bottom of the pipe and in the two valleys or troughs along the sides of the V-shaped insert formed between the sloping side walls of the insert and the adjacent portion of the pipe wall. Before any water would be discharged through the steam jet holes 19, the water in the shower pipe would have to reach a height of approximately up to the top of the insert portion or, in the construction as described, approximately up to the pipe axis, which of course could hardly occur under any circumstances.

Not only will the water particles or any water condensate in contact with the wall of the pipe and the sloping walls of the V-shaped insert settle along the bottom of the pipe or in the two valleys formed by the insert, but the impact of the portion of the incoming steam which strikes against the sloping end wall 20 of the V-shaped insert will also tend to separate out from the steam any larger particles of water which might be carried along by the steam. The arresting of the progress of these water particles will cause them to settle in the troughs or valleys along the bottom of the V-shaped insert.

In the modified construction shown in Fig. 5, the insert 24, which is similarly mounted in the similar longitudinal slot in the steam shower pipe 10', is solid throughout its extent. Thus the cross section of the insert 24 resembles the sector of a circle instead of the inverted V of the insert of Figs. 1, 2 and 3. The joints between the sides and ends of the insert 24 and the corresponding edges of the slot in the pipe 10' are made watertight and steamtight, and steam jet holes 25 of the desired dimension and desired spacing are drilled through the insert 24 so to extend in a longitudinal medial plane along the insert. In all other respects the steam shower pipe is the same as previously described and functions in the same manner.

My improved steam shower pipe, when constructed in either of the forms which I have illustrated and described, can be fabricated very easily and inexpensively. I consider the inverted V-shaped insert of Figs. 1, 2 and 3 to be the preferred form for the insert since with this construction a length of common angle iron, cut to the right size, can be used for the insert, and, when the arcuate width of the cut out portion of the cylindrical wall of the pipe is approximately 90°, such a section of angle iron will have the top ridge of the insert approximately in the line of the pipe axis, and this I consider preferable although it is not absolutely necessary.

Obviously other modifications in the construction and in the size and angularity of the insert would be possible within the scope of my invention, and it is not my intention to restrict the same except as set forth in the claims.

I claim:

1. In a steam shower device of the character described, a pipe having a longitudinal slot extending along said pipe for a distance corresponding approximately to the desired shower line length, an insert in said slot, the sides and ends of said insert joined to the side and end edges of said slot in a leak-proof connection, the lateral sides of said insert extending in planes converging within said pipe, and steam jet holes extending through said insert for the discharging of steam jets from said pipe, said jet holes located along the ridge formed by the converging lateral sides of said insert and all extending in a single longitudinal plane with the axis of the pipe.

2. In a steam shower device of the character described, a pipe having a slot extending longitudinally along said pipe for a distance corresponding approximately to the desired shower line length, and an insert substantially V-shaped in cross section extending inwardly along said slot and having side walls and end closures meeting the pipe wall edges around said slot in a leak-proof connection, the side walls of said insert converging along the axis of said pipe, and a row of steam jet holes extending through said insert along the axial line of said pipe.

3. In a steam shower device of the character described, a pipe having a slot extending longitudinally along the bottom of said pipe for a distance corresponding approximately to the desired shower line length, the arcuate width of said slot being approximately 90°, and an inverted section substantially V-shaped in cross section extending inwardly along said slot and having side walls and end closures meeting the pipe wall edges around said slot in a leak-proof connection, the side walls of said section converging along the axis of said pipe, the end closures of said section sloping obliquely inwardly, steam jet holes extending downwardly through the vertex of said inverted section and located all in the same longitudinal plane.

4. In a steam shower device of the character described, a pipe adapted to be mounted in substantially horizontal position and having a slot cut out from its cylindrical wall along the bottom side of said pipe and extending longitudinally along said pipe for a distance corresponding approximately to the desired shower line length, and an inverted V-shaped insert extending inwardly along said slot and having side walls and end closures joined to the pipe wall edges around

said slot with a leak-proof connection, the side walls of said insert converging in a line parallel to the axis of said pipe, the dihedral angle formed by said side walls corresponding in degrees approximately to the arcuate width of said slot, the end closures of said insert sloping obliquely inwardly, the top of the ridge along said insert having a narrow substantially flat, longitudinally-extending surface, a row of steam jet holes extending downwardly through said insert along the center line, the axes of said holes located in a plane bisecting the dihedral angle formed by the sides of said insert.

5. A steam shower device of the character described including a pipe having a slot extending longitudinally along the bottom of said pipe for a distance corresponding approximately to the desired shower line length, an inverted section substantially V-shaped in cross section extending inwardly along said slot and having side walls

and end closures meeting the pipe wall edges around said slot in a leak-proof connection, the side walls of said section converging in a line parallel to the axis of said pipe, a row of steam jet holes extending downwardly through said section along the center line, means for connecting one end of said pipe to a source of steam, a closure for the other end of said pipe, and a water drain tap located at said latter end of said pipe beyond said section.

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