

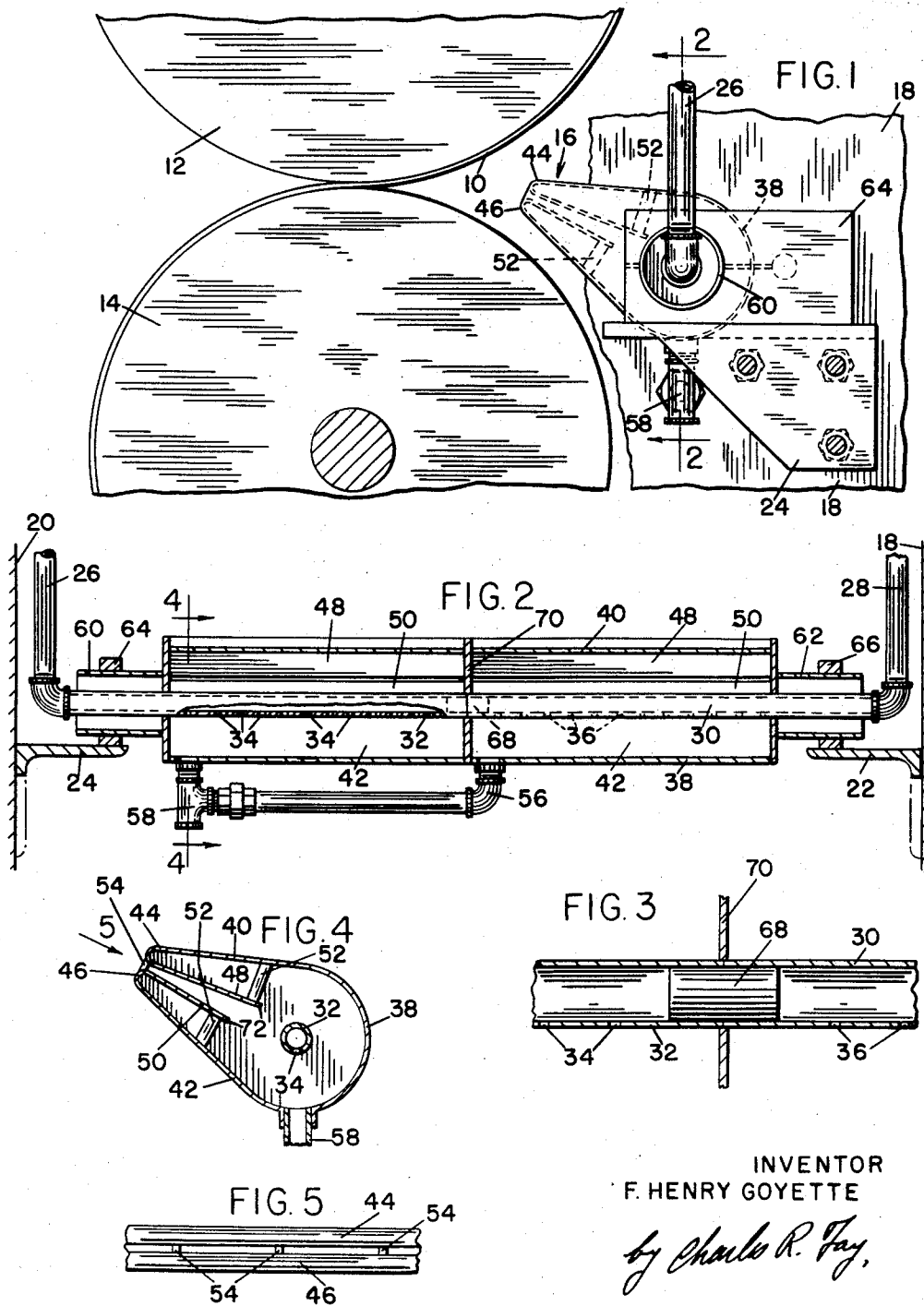
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DRIPLESS STEAM SHOWER PIPE

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DRIPLESS STEAM SHOWER PIPE

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This invention relates to a new and improved dripless steam shower pipe particularly adapted for use in the paper-making industry and for the purpose of applying moisture to a web evenly by means of a steam shower where the web may be traveling through a set of rolls for instance or on a Fourdrinier wire, or in any other relation. The principal object of the invention resides in the provision of an apparatus for applying the steam shower without spitting, whereby an even continuous moisture is provided on the surface of the paper without blobs or drops of moisture being ejected from the shower-head as has been the problem in the prior art with respect to the application of moisture to paper in the process of being manufactured, particularly in calendering.

In the past it has been found that a steam shower directed against the paper web discharges drops of water, "spitting," together with the steam condensation occurs in the steam shower-head, which condensation is frequently blown out along with the steam and applied to the paper in drops. This produces weak spots and imperfections in the final paper sheet, and in some cases causes the web to stick to the calender rolls, and also causes streaking in the finished paper.

It is the principal object of the present invention to provide an apparatus for providing the steam shower continuously, uninterruptedly, and without any drops being discharged from the steam shower to the paper. To this end, the invention comprises the provision of a new and improved shower-head which may be in the form of an elongated sheet metal chamber or the like extending from side-to-side of the web and in which there is provided a smaller pipe which leads live steam into the aforesaid chamber, together with special new and improved means providing for catching of any condensation within the shower-head chamber and depositing the same at the bottom of the sheet metal chamber whereby the same may be quickly and easily discharged without coming in contact with or even approaching a special new and improved spout or steam orifice within the chamber; the provision of a device or apparatus as above described including a spout inside the main or primary chamber which directs the steam from the chamber outwardly thereof against the paper web, said spout being elongated and comprising walls which converge from the inner portion of the main or primary chamber toward the exterior thereof, and narrow down to a relatively small slit or elongated orifice through which the steam is expelled under pressure, said spout walls being unequal in length and having a relatively shorter wall located underneath an upper wall, whereby condensation running down the longer upper wall will fall into the main chamber and be discharged, rather than having any possibility of falling into the area of the spout where such condensation could possibly be expelled under steam pressure, forming drops of water on the traveling paper web.

Other objects and advantages of the invention will appear hereinafter.

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Reference is to be had to the accompanying drawings, in which

Fig. 1 is a view illustrating the apparatus and an application thereof to a set of calender rolls;

Fig. 2 is a section on line 2—2 of Fig. 1;

Fig. 3 is a view showing an enlargement of the barriers centrally located in the apparatus;

Fig. 4 is a section on line 4—4 of Fig. 2; and

Fig. 5 is a view in elevation, looking in the direction of arrow 5 in Fig. 4 and showing the orifice of the spout.

In carrying out the present invention, the same is shown as applied to a web of paper 10 which is traveling through the nip of a pair of calender rolls 12 and 14. As shown, the steam shower-head or chamber which is the subject matter of the present invention is indicated generally by the reference numeral 16. It extends across the machine and it is mounted in any way desired, as for instance at its ends on the framework of the machine as indicated at 18 and 20, upon a pair of brackets or other supports 22, 24.

The present construction is preferably divided into two longitudinal sections which are co-axially arranged and are supported between the ends of the framework of the machine. This is for the reason that the steam may be applied to one-half only of the traveling web or it may be applied under different pressures to the two halves of the web. In any event, there are two steam inlet pipes indicated at 26 and 28, and these pipes lead steam under pressure from any source to a generally central location in the steam shower-head as indicated generally at 30, 32. The representation of 30 and 32 is in the form of an ordinary cylindrical pipe or pipes having steam orifices at 34, 36. It is preferred that these orifices point downwardly.

The pipes are located generally centrally and axially of a sheet metal or the like chamber indicated at 38. As shown in Fig. 4, this chamber is provided with a semi-circular portion at the right side thereof, the pipe 32 being located generally in the center. The walls 40 and 42 extend from this portion and converge toward and form a pair of rounded lips 44 and 46. At the lips, the walls are curved re-entrantly into the interior of the showerhead chamber and these walls are indicated at 48 and 50. Walls 48 and 50 diverge toward the pipe 30, 32 as clearly shown in Fig. 4 and the converging walls 40 and 42 point upwardly to the left so as to be arranged to cause the steam shower to impinge upon the paper web 10 as shown in Fig. 1.

Wall 50 is shorter than wall 48, wall 50 being the lower wall of the spout, under wall 48, and these walls may be strengthened and held in position by means of separators or pins 52 and 54 and there are shown other pins which connect the lips of the spout and help to rigidify the same.

At the bottom of the semi-circular portion of the chamber there is provided a pair of drains as at 56 and 58, these communicating if desirable. Any moisture which condenses within the chamber 38 will of course flow down and out through these drains.

The chamber may be mounted if desired in a pair of journal-like members 60 and 62 and the rotative position thereof may be adjusted by means of these journals which are mounted in corresponding blocks 64 and 66.

The two pipes 30 and 32 are separated by means of a plug or block 68, see Fig. 3, and the steam chamber itself may be provided with a dividing partition 70, so that steam entering pipe 26 is distributed through the left-hand one-half part of the shower-head, and steam coming in through pipe 28 is distributed through the right-hand side thereof.

In the operation of the device, the steam issues from ports 34 and 36 and under steam pressure it then issues through the spout formed by the converging walls 48

and 50 and out through the nozzle at the lips 44 and 46. Any condensation of the steam in the chamber falls to the bottom thereof and out through the drains. If any condensation is formed at the under side of wall 50, it again falls down the incline to the drain whereas condensation formed against wall 40 will fall onto the upper surface of wall 48, and off the end thereof as at 72 without, however, impinging upon wall 50. If moisture should collect on the top of wall 50, it might be blown out with the steam, but in this case no condensation will form at that point since there is a continuous passage of steam through the nozzle between the converging walls 48 and 50, and the only condensation is at the under surfaces of the main part of the chamber or on walls 48 and 50, whence it will run off without damage.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. A steam shower device of the class described comprising an elongated steam-conducting pipe having orifices therein, means forming a surrounding chamber for said pipe, said chamber comprising in general a relatively enlarged portion at one side thereof and a pair of relatively converging side walls connected thereto and forming a relatively small portion of the chamber, said converging side walls forming a spout for leading steam from the pipe through the chamber and to the exterior of the latter, said spout being relatively elongated, and interiorly of the chamber including a pair of spaced, free-ended longitudinal walls which converge from a point within the steam chamber outwardly to the end of the spout, and a drain in the chamber.

2. A steam shower device of the class described comprising an elongated steam-conducting pipe having orifices therein, means forming a surrounding chamber for said pipe, said chamber comprising in general a relatively enlarged portion at one side thereof and a pair of relatively converging side walls connected thereto and forming a relatively small portion of the chamber, said converging side walls forming a spout for leading steam from the pipe through the chamber and to the exterior of the latter, said spout being relatively elongated, and interiorly of the chamber including a pair of spaced, free-ended longitudinal walls which converge from a point within the steam chamber outwardly to the end of the spout, and a drain in the chamber, said interior walls terminating short of said steam pipe and being located on an angle with respect to the horizontal.

3. A steam shower device of the class described comprising an elongated steam-conducting pipe having orifices therein, means forming a surrounding chamber for said pipe, said chamber comprising in general a relatively enlarged portion at one side thereof and a pair of relatively converging side walls connected thereto and forming a relatively small portion of the chamber, said converging side walls forming a spout for leading steam from the pipe through the chamber and to the exterior of the latter, said spout being relatively elongated, and interiorly of the chamber including a pair of spaced, free-ended longitudinal walls which converge from a point within the steam chamber outwardly to the end of the spout, and a drain in the chamber, said interior walls terminating short of said steam pipe and being located on an angle with respect to the horizontal, said angle being inclined upwardly toward the mouth of the spout of the steam shower, one of said interior walls being shorter than the other.

4. A steam shower device of the class described comprising an elongated steam-conducting pipe having orifices therein, means forming a surrounding chamber for said pipe, said chamber comprising in general a relatively enlarged portion at one side thereof and a pair of relatively converging side walls connected thereto and

forming a relatively small portion of the chamber, said converging side walls forming a spout for leading steam from the pipe through the chamber and to the exterior of the latter, said spout being relatively elongated, and interiorly of the chamber including a pair of spaced, free-ended longitudinal walls which converge from a point within the steam chamber outwardly to the end of the spout, and a drain in the chamber, said interior walls terminating short of said steam pipe and being located on an angle with respect to the horizontal, said angle being inclined upwardly toward the mouth of the spout of the steam shower, one of said interior walls being shorter than the other, the shorter wall underlying the longer wall so that condensation in said steam chamber will fail to fall on said shorter wall but will be deposited in the bottom of the chamber.

5. A steam shower construction comprising an inner steam pipe having orifices, means forming a chamber surrounding said steam pipe, said chamber comprising members located in spaced relation to said pipe but substantially completely enclosing the same, means on said chamber forming a steam shower spout, said means including a pair of converging exterior walls which extend upwardly in inclined relation to the horizontal and re-entrantly bend around into the interior of the steam chamber forming a pair of lips, and walls in extension of said lips within the steam chamber, said walls being diverging inwardly from said lips in a direction toward said pipe, said interior diverging walls forming a steam spout between which the steam travels in order to escape from the chamber, and a drain pipe for the chamber.

6. A steam shower construction comprising an inner steam pipe having orifices, means forming a chamber surrounding said steam pipe, said chamber comprising members located in spaced relation to said pipe but substantially completely enclosing the same, means on said chamber forming a steam shower spout, said means including a pair of converging exterior walls which extend upwardly in inclined relation to the horizontal and re-entrantly bend around into the interior of the steam chamber forming a pair of lips, and walls in extension of said lips within the steam chamber, said walls being diverging inwardly from said lips in a direction toward said pipe, said interior diverging walls forming a steam spout between which the steam travels in order to escape from the chamber, and a drain pipe for the chamber, said diverging inner walls being free-ended generally centrally of the chamber, and means for pivotally mounting said chamber to vary the said inclined relation.

7. A steam shower construction comprising an inner steam pipe having orifices, means forming a chamber surrounding said steam pipe, said chamber comprising members located in spaced relation to said pipe but substantially completely enclosing the same, means on said chamber forming a steam shower spout, said means including a pair of converging exterior walls which extend upwardly in inclined relation to the horizontal and re-entrantly bend around into the interior of the steam chamber forming a pair of lips, and walls in extension of said lips within the steam chamber, said walls being diverging inwardly from said lips in a direction toward said pipe, said interior diverging walls forming a steam spout between which the steam travels in order to escape from the chamber, and a drain pipe for the chamber, said diverging inner walls being free-ended generally centrally of the chamber, and means for pivotally mounting said chamber to vary the said inclined relation, said interior diverging walls being elongated and flat and forming an elongated nozzle which is narrow, one of said walls being located above the other being longer than the lower wall, condensation on the upper part of said chamber falling onto the upper longer wall, running down the same and dripping off to the bottom of the chamber without impinging on the top surface of said lower wall.

8. A steam shower apparatus comprising an elongated

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steam pipe having steam issuing orifices generally throughout the length thereof, a partition externally of said steam pipe, a chamber surrounding said steam pipe and divided by said partition into two half-chambers, each half-chamber being essentially the same in construction and comprising a generally pear-shaped outer wall, the larger end of which surrounds the steam pipe concentrically and extending into converging side walls terminating in rounded lips for a spout, said lips extending re-entrantly into the chamber in a pair of free-ended walls which diverge in a direction toward said steam pipe, means in said steam pipe in the area of said partition dividing the steam pipe into two generally separate steam-carrying members, means supporting said chamber adjacent the ends thereof, and a drain pipe for each chamber.

9. A steam shower apparatus comprising an elongated steam pipe having steam issuing orifices generally throughout the length thereof, a partition externally of said steam pipe, a chamber surrounding said steam pipe and divided by said partition into two half-chambers, each

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half-chamber being essentially the same in construction and comprising a generally pear-shaped outer wall, the larger end of which surrounds the steam pipe concentrically and extending into converging side walls terminating in rounded lips for a spout, said lips extending re-entrantly into the chamber in a pair of free-ended walls which diverge in a direction toward said steam pipe, means in said steam pipe in the area of said partition dividing the steam pipe into two generally separate steam-carrying members, means supporting said chamber adjacent the ends thereof, and a drain pipe for each chamber, said means supporting the chambers at the ends thereof providing for a rotative motion of said apparatus.

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