Aug. 27, 1935. J. R. McDERMET 2,012,454

SPRAY DEVICE

Filed May 19, 1933 2 Sheets-Sheet 1

Fig. 2.

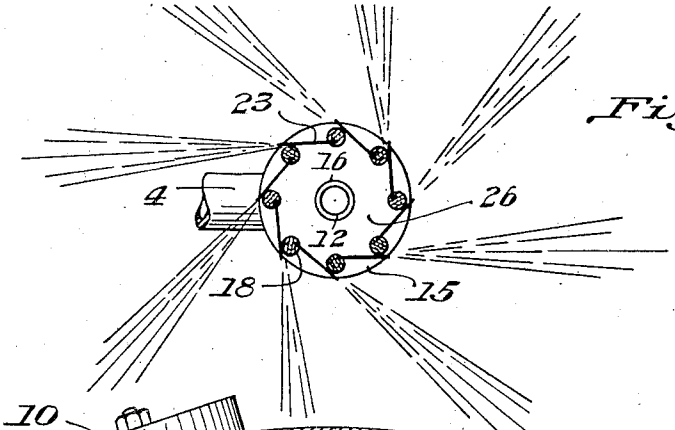
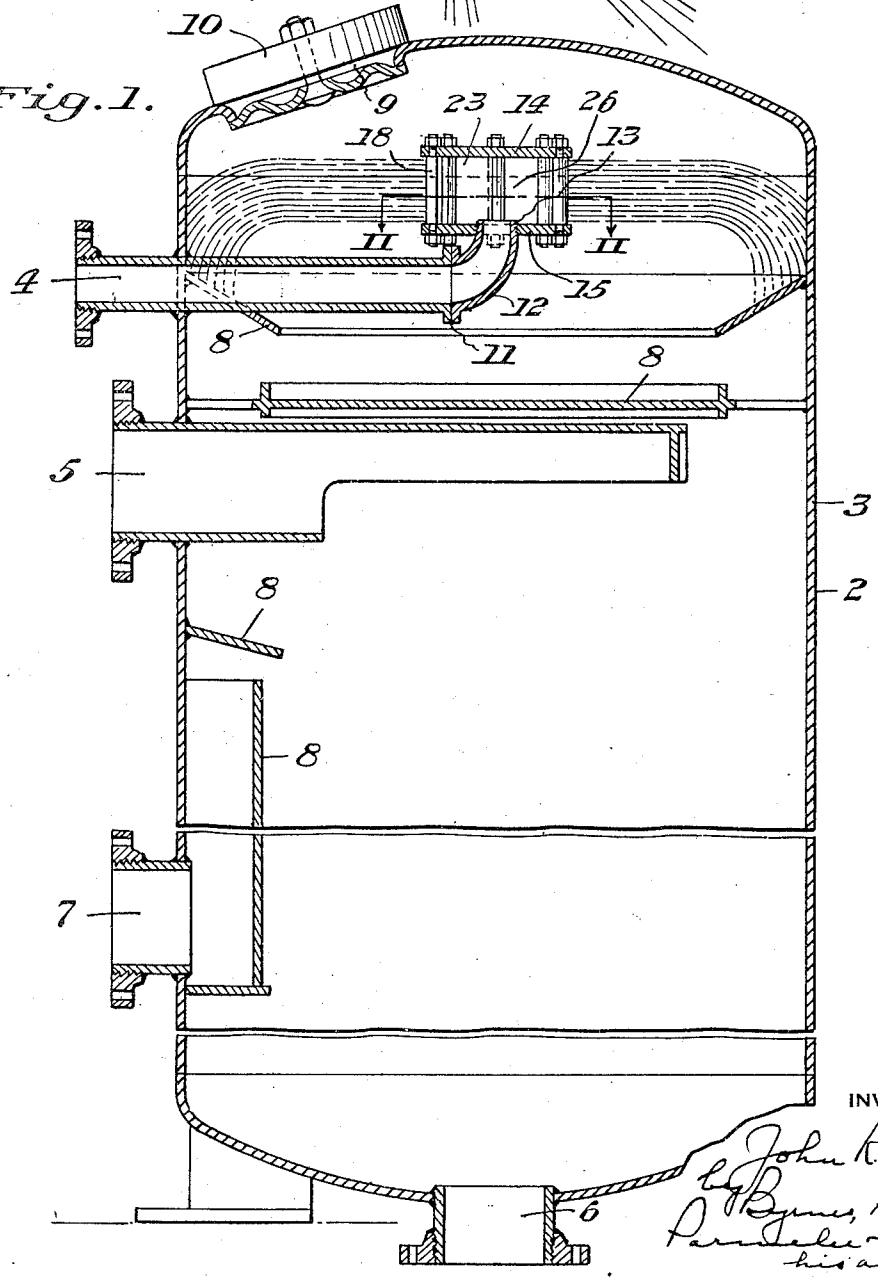



Fig. 1.




INVENTOR

John R. McDermet

by Byrnes, Stebbins, Parmelee & Blenko

his attorneys

Aug. 27, 1935. J. R. McDERMET 2,012,454

SPRAY DEVICE

Filed May 19, 1933 2 Sheets-Sheet 2

Fig. 3.

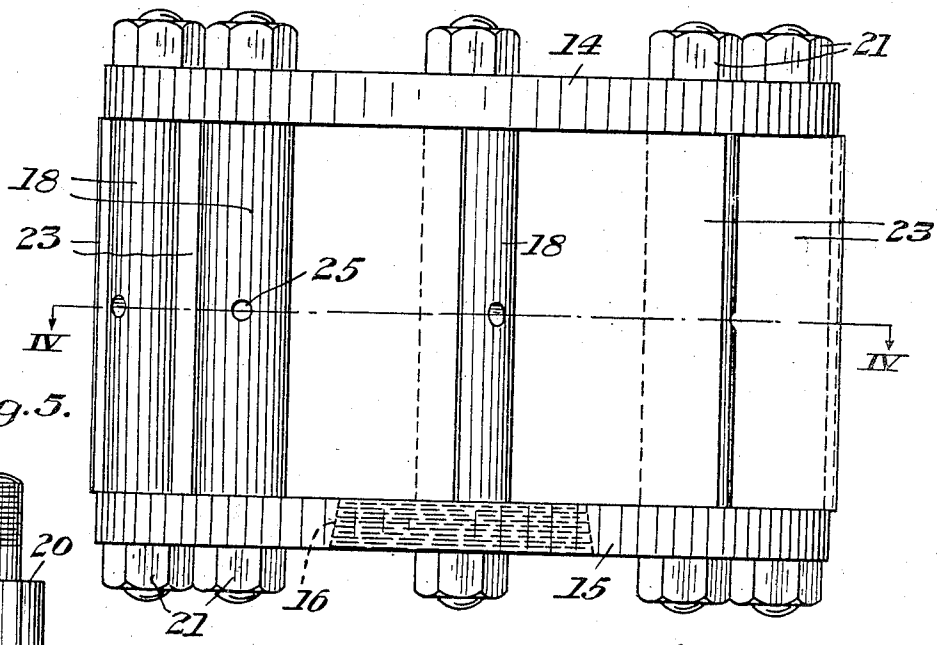



Fig. 5.

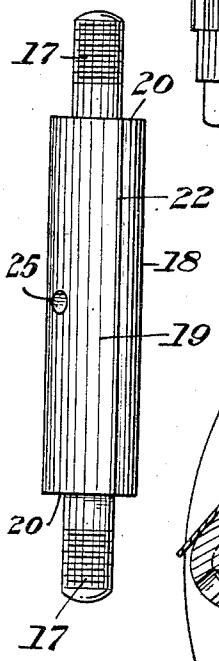
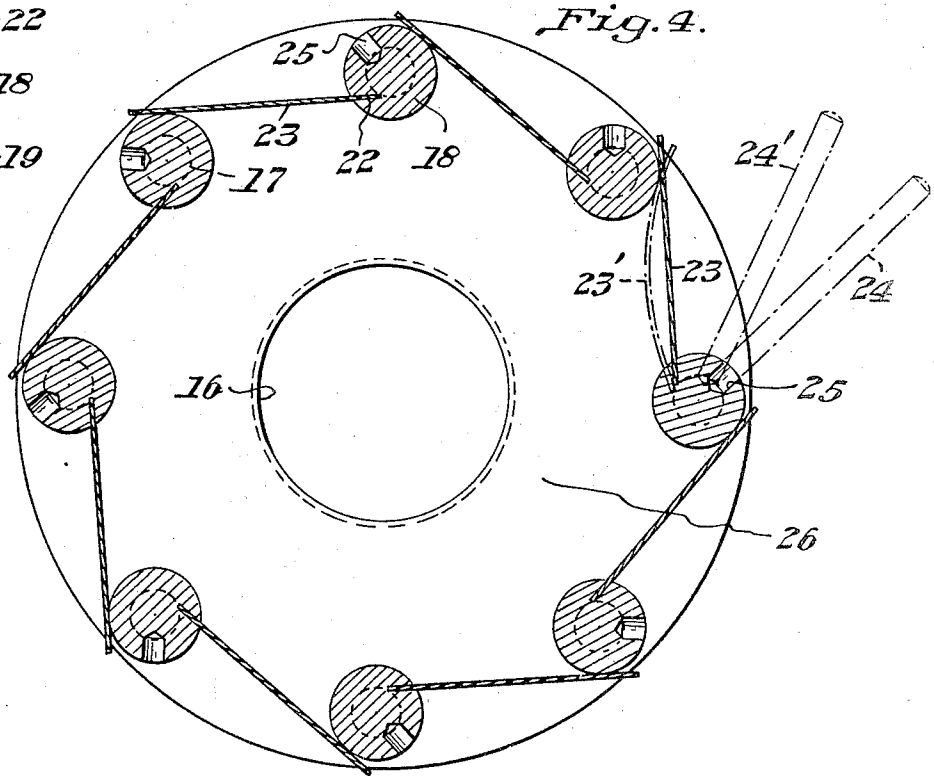



Fig. 4.




INVENTOR

John R. McDermet

by Byrnes, Stebbins, Rumble & Adams

his attorneys

Patented Aug. 27, 1935

2,012,454

# UNITED STATES PATENT OFFICE

2,012,454

## SPRAY DEVICE

John R. McDermet, Jeannette, Pa., assignor to Elliott Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application May 19, 1933, Serial No. 671,856

14 Claims. (Cl. 299—133)

This invention relates to spray devices, and more particularly to devices for spraying fluids. It relates still more particularly to a device for spraying fluids in one or more thin substantially sheet-like sprays or streams affording a large surface area, and especially well adapted for use in water treatment systems such as heaters, condensers, evaporators, etc.

In various processes involving the use of fluids, and particularly liquids, such as water, it is desirable to spray the fluid in such manner as to afford a large surface area of the sprayed fluid such, for example, as for contact with live steam in a heater or condenser. It has been customary to use perforated pipes or spray heads for this purpose, the fluid commonly being sprayed in small individual streams. The relatively small spray orifices become clogged, necessitating frequent cleaning, and the closely grouped small individual streams may tend to prevent the steam from penetrating through the outer streams to those nearer the center of the spray, thus reducing the efficiency of the operation.

I provide a spray device which eliminates all possibility of clogging and which sprays the fluid in thin sheet-like sprays or streams, access being afforded to opposite sides thereof without interference from other of the streams whereby to increase the efficiency of the operation. I preferably utilize one or more closure members adapted for movement, preferably by the pressure of the fluid to be sprayed, to permit egress of the fluid in a thin sheet-like stream. I preferably utilize a closure or gate member adapted to be swung or deformed away from a cooperating closure member and preferably having a portion of a face thereof resiliently pressing against such cooperating closure member. The gate member is preferably of sheet-like form and the material thereof is preferably resilient so that it may press against the cooperating closure member by reason of its own inherent resilience and be adapted to be separated therefrom by the pressure of the fluid to be sprayed.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention, wherein

Figure 1 is a vertical cross-sectional view through a heater of well known type but having one form of my improved spray device utilized therein;

Figure 2 is a horizontal cross-sectional view taken on the line II—II of Figure 1;

Figure 3 is an elevational view to enlarged scale of the spray device;

Figure 4 is a horizontal cross-sectional view taken on the line IV—IV of Figure 3; and

Figure 5 is a detail view showing one of the posts of the spray device.

Referring more particularly to the drawings, there is shown in Figure 1 a heater designated generally by reference numeral 2 which comprises a shell 3 having a water inlet 4, a steam inlet 5, a delivery outlet 6 and an overflow outlet 7. Baffle means 8 are provided, as is common in such heaters. There is provided a manhole 9 closed by a suitable cover structure 10. The construction thus far described may be of any desired or well known type and is not herein claimed per se.

Connected with the water inlet conduit 4 at 11 is an elbow 12 which extends generally upwardly and has its outer extremity threaded as at 13. The elbow 12 is adapted to receive at its outer threaded extremity a spray device for spraying water within the heater in such manner that the water will mingle with the steam introduced through the steam inlet 5, resulting in heating the water and condensing the steam.

The spray device is shown to enlarged scale in Figures 3 and 4. It comprises top and bottom members 14 and 15, respectively, the latter having a central threaded hole 16 adapted for cooperation with the threads 13 of the elbow 12 shown in Figure 1. The top and bottom members 14 and 15 are correspondingly perforated adjacent their peripheries to receive reduced threaded extensions 17 of posts 18. Each post 18 comprises an enlarged generally cylindrical body portion 19 having formed integrally or connected therewith the opposite reduced threaded extensions 17. The posts 18 are of uniform size and space apart the top and bottom members in substantially parallel relation, such members abutting respectively against shoulders 20 formed on the posts between the enlarged body portions 19 and reduced threaded extensions 17 thereof. Nuts 21 are threaded over the extensions 17 to hold the assembled parts together.

The body portion 19 of each post 18 is provided with a groove 22 extending thereinto from its peripheral surface and preferably extending longitudinally from end to end of the body portion 19. Each such groove is adapted to receive a closure or gate member 23 which is preferably formed of sheet material. The material of the gate members 23 is preferably of resilient char-

acter and each gate member preferably extends substantially to and normally contacts the body portion of an adjacent post. Each gate member preferably has a portion of a face thereof normally in contact with an outer portion of the body portion of such adjacent post and presses thereagainst with a predetermined pressure preferably produced by reason of the resiliency of the material of the gate member. The respective posts are angularly adjustable whereby to control the pressure of the respective gate members against the posts adjacent thereto. When it is desired to adjust one of the posts the nuts 21 threaded on its extensions 17 are loosened and the post is rotated in the desired direction by inserting a pin 24 into a hole 25 conveniently provided in the outer portion of the periphery of the post, and when the post assumes the desired adjusted position the nuts are again tightened, holding it in such position. Rotation of any of the posts in the counterclockwise direction, viewing Figure 4, increases the pressure with which its gate member presses against the adjacent post. One of the gate members 23 is shown in chain lines at 23' as having been placed under pressure or tension considerably greater than as shown in the solid line position. The pin position 24 corresponds with the solid line position 23 of the gate member, and the pin position 24' corresponds with the chain line position 23' of the gate member.

Thus the respective posts and gate members form cooperating closure members which, together with the top and bottom members 14 and 15, provide a chamber 26 into which water is introduced through the inlet pipe 4 and elbow 12. The water tends to build up in the chamber 26 and continues to do so until its pressure is great enough to move the gate members outwardly to permit discharge of water between each gate member and the post engaged by a portion of a face of such gate member. The water will be discharged from the chamber 26 in a number of differently directed thin sheet-like streams, the height of which will be determined by the height of water in the chamber. This in turn can be controlled by the adjustment of the gate members so that any desired height may be obtained.

All danger of clogging in the spray device is eliminated and the respective thin sheet-like streams are projected in various directions and are separated sufficiently to give the steam an opportunity to move generally upwardly therebetween and into contact with opposite faces of each of such thin sheet-like streams. Thus a maximum of efficiency with a minimum of trouble and complications is obtained.

Not all of the outlets provided by the several gate members need be used at one time, especially if a relatively small quantity of water is to be sprayed. The gate members at such outlets as it is desired not to use may be placed under sufficient tension that the pressure of the fluid will not open them. Furthermore, instead of having the gate members made of flexible or resilient material the posts may be mounted for resilient pivotal movement, thereby serving the same purpose. The respective gate members may be connected with the posts carrying them simply by forcing the gate members into the slots, and, if desired, the edges of the slots may then be peened over to tightly hold the gate members in place, or rivets, set screws or other convenient means may be used to insure that the gate members remain in place with respect to their posts.

The vertical dimension of the gate members is preferably substantially the same as the vertical dimension of the body portion 19 of each post so that the gate members and posts taken together substantially completely close the chamber 26 when the fluid pressure within the chamber is not sufficient to open any of the gate members. Whatever slight leakage may occur between the top and bottom members and the gate members and posts will not be sufficient to deleteriously affect the operation of the device.

While I have shown and described a present preferred embodiment of the invention, it is to be distinctly understood that the same is not limited thereto, but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A spray device, comprising a chamber having at least one bounding surface, an inlet to said chamber, and an outlet from said chamber comprising a gate member of flexible sheet material and a cooperating closure member, the gate member being movable in such manner as to maintain approximate contact with said bounding surface during such movement and normally closing against said cooperating closure member with the sheet material slightly flexed and being adapted to be resiliently moved away therefrom to permit discharge of fluid from the chamber, the effective contact area between the gate member and closure member approaching a straight line.

2. A spray device, comprising a chamber having at least one bounding surface, an inlet to said chamber, and an outlet from said chamber comprising a generally vertically extending gate member of generally sheet form having its lower portion in approximate contact with said bounding surface during movement thereof and a cooperating closure member having a generally vertically extending surface portion against which a portion of a face of the gate member is normally adapted to lie to close the outlet, said members being adapted to be separated to permit discharge of fluid therebetween.

3. A spray device, comprising a chamber having at least one bounding surface, an inlet to said chamber, and an outlet from said chamber comprising a generally upwardly and downwardly extending closure member and a cooperating closure member relatively movable generally in a plane transverse to said first mentioned closure member and adapted to contact therewith to close the outlet, said second mentioned closure member having its lower portion in approximate contact with said bounding surface during movement thereof.

4. A spray device, comprising a chamber having at least one bounding surface, an inlet to said chamber, and an outlet from said chamber comprising a generally upwardly and downwardly extending closure member, and a cooperating closure member of generally sheet form relatively movable generally in a plane transverse to said first mentioned closure member and adapted to assume a position with a portion of a face thereof in contact with said first mentioned closure member to close the outlet, said second mentioned closure member having its lower portion in approximate contact with said bounding surface during movement thereof.

5. A spray device, comprising a chamber having at least one bounding surface, an inlet to said chamber, and an outlet from said chamber comprising a gate member and a cooperating closure member adapted to engage a portion of a face of the gate member in substantially

straight line contact only, said members being adapted to be separated to permit discharge of fluid therebetween, said gate member having a portion in approximate contact with said bounding surface during movement thereof.

6. A spray device, comprising a chamber having opposite bounding surfaces, an inlet to said chamber, and an outlet from said chamber comprising a gate member movable between said opposite bounding surfaces and adapted to maintain approximate contact therewith during such movement and a cooperating closure member adapted to engage a portion of a face of the gate member, said members being normally resiliently urged together and being adapted to be separated by fluid pressure within the chamber to permit discharge of fluid therefrom.

7. A spray device, comprising a chamber having at least one bounding surface, an inlet to said chamber, and an outlet from said chamber comprising a gate member of resilient sheet material and a cooperating closure member adapted to engage a portion of a face of the gate member adjacent a substantially straight edge of the gate member, said members being normally resiliently urged together by the resiliency of the material of the gate member and being adapted to be separated by fluid pressure within the chamber to permit discharge of fluid therefrom, said gate member having a portion in approximate contact with said bounding surface during movement thereof.

8. A spray device, comprising a chamber having a substantially flat bottom, an inlet to said chamber, an outlet from said chamber comprising a generally horizontally movable gate member adapted to maintain approximate contact with said bottom during movement and a cooperating closure member adapted to engage a portion of a face of the gate member, said members being normally resiliently urged together and being adapted to be separated by fluid pressure within the chamber to permit discharge of fluid therefrom, and means for controlling the degree of resilient urging together of said members.

9. A spray device, comprising a chamber having at least one bounding surface and having spaced posts, and a gate member extending generally parallel to the axes of said posts associated with one of said posts and normally extending to another thereof and closing the space therebetween, said gate member being movable away from said second mentioned post to permit discharge of fluid from the chamber and having a portion in approximate contact with said bounding surface during such movement.

10. A spray device, comprising a chamber having at least one bounding surface and having spaced closure members, and a gate member associated with one of said closure members and extending generally parallel thereto and normally resiliently urged into contact with another thereof, said gate member being movable away from said second mentioned closure member by fluid pressure within the chamber to permit discharge of fluid therefrom and having a portion in approximate contact with said bounding surface during such movement.

11. A spray device, comprising a chamber having at least one bounding surface and having spaced uprights, and a gate member of resilient material associated with and extending generally parallel to one of such uprights and normally urged by its own resiliency into contact with another of such uprights, said gate member being movable away from said second mentioned upright by fluid pressure within the chamber to permit discharge of fluid therefrom and having a portion in approximate contact with said bounding surface during such movement.

12. A spray device, comprising a chamber having at least one bounding surface and having spaced posts, and a gate member of resilient material connected with one of such posts and normally urged by its own resiliency into contact with another of such posts, said gate member being movable away from said second mentioned post by fluid pressure within the chamber to permit discharge of fluid therefrom and having a portion in approximate contact with said bounding surface during such movement, said first mentioned post being angularly adjustable to adjust the pressure with which said gate member is urged into contact with said second mentioned post.

13. A spray device, comprising a chamber having at least one bounding surface, an inlet opening into said chamber generally vertically, and gate members extending generally vertically and normally forming the major portion of the side wall of the chamber, said gate members being movable generally horizontally by fluid pressure within the chamber to permit discharge of fluid therefrom and having lower portions thereof in approximate contact with said bounding surface during such movement.

14. A spray device comprising a chamber having a fluid inlet, said chamber having a substantially flat wall, and means including a movable gate member controlling outlet from said chamber, said gate member having a substantially straight portion adapted to remain in approximate contact with said substantially flat wall during movement of the gate member to prevent substantial passage of fluid therebetween.

JOHN R. McDERMET.