G. P. SYMONDS.

MULTISPLITTER SPRAY NOZZLE.

APPLICATION FILED JUNE 22, 1917.

1,273,200. Patented July 23, 1918.

Fig. 1.

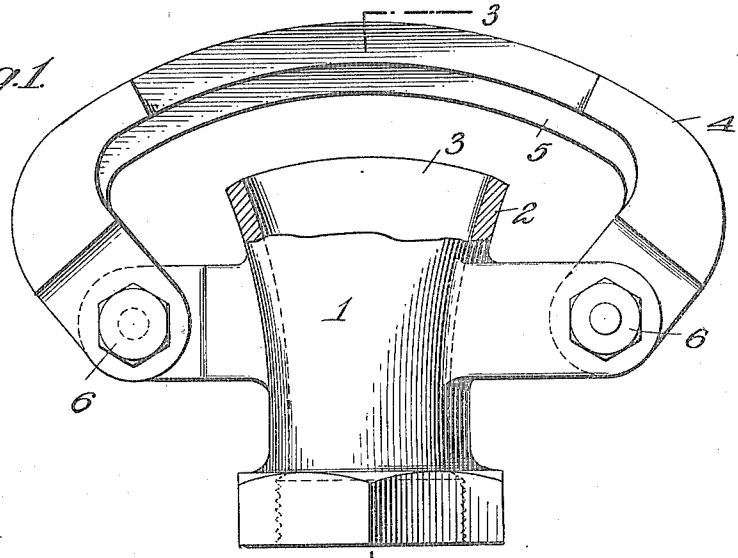


Fig. 2.

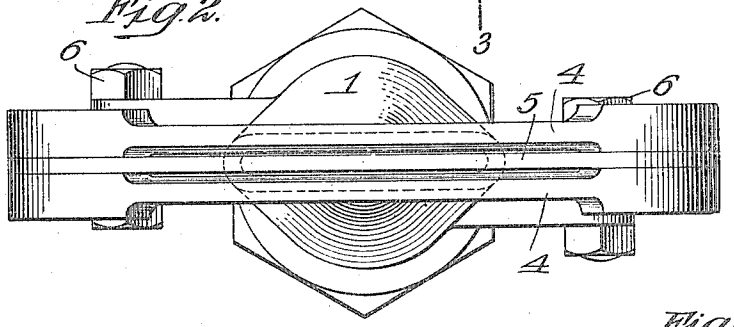


Fig. 3.

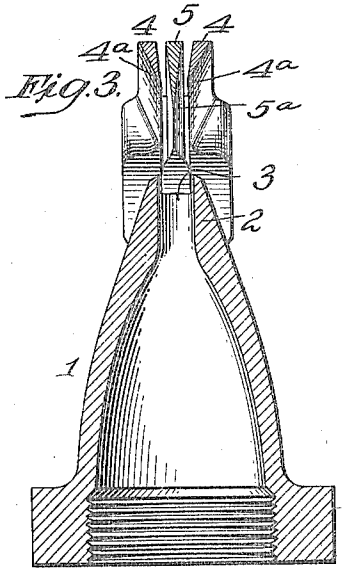


Fig. 4.

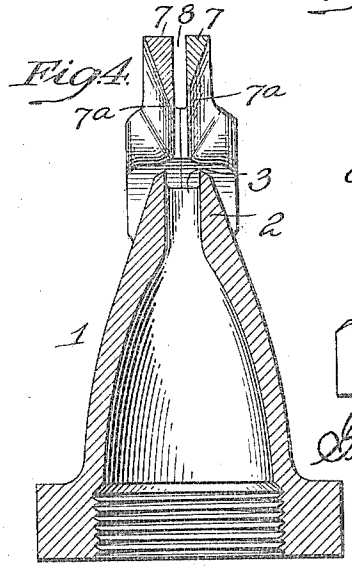
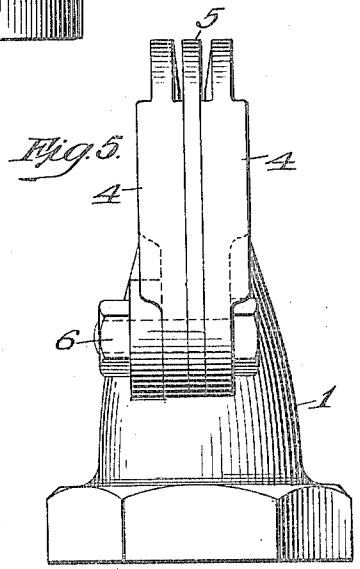


Fig. 5.



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MULTISPLITTER SPRAY-NOZZLE.

1,273,200. Specification of Letters Patent. Patented July 23, 1918.

Application filed June 22, 1917. Serial No. 176,270.

To all whom it may concern:

Be it known that I, GEORGE P. SYMONDS, a citizen of the United States, and resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Multisplitter Spray-Nozzles, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention concerns a novel and useful fluid or liquid spray head, the primary object of which is to diffuse or distribute water or other liquid in a wide and extensive manner so that a very large amount of liquid surface may be presented to the action of the air. The invention is especially applicable to cooling towers and also out-of-door cooling ponds wherewith it is desirable to distribute or diffuse the water and bring it into contact with as large an amount of air as possible during the cooling process. In so doing it is important that the slot in the nozzle through which the water is ejected should have a substantial size so that it will not become easily clogged with debris or other foreign matter. In carrying the invention into practical effect, therefore, I combine with a split spray nozzle a plurality of splitting devices located in proximity to each other and removed to a distance from the water emitting slot so that the main stream of water issuing from the nozzle will be subdivided into a plurality of sheets or vapor areas, which will afford a large aqueous surface to be acted upon by the circulating currents of air; and further, the invention may be said to comprise numerous details and peculiarities in the construction, arrangement, and combination of the various parts, substantially as will be hereinafter described and claimed.

In the accompanying drawing illustrating my invention:

Figure 1 is a side elevation of my improved spray head;

Fig. 2 is a top plan view of the same;

Fig. 3 is a vertical section on the line 3, 3 of Fig. 1;

Fig. 4 is a transverse section of a modified form of the invention having a different number of splitting devices;

Fig. 5 is an end elevation of the device represented in Figs. 1 and 2.

Similar characters of reference designate corresponding parts throughout the different figures of the drawing.

The spray head is composed essentially of a pipe 1 which may terminate in any desired manner, but usually has a flattened or widened end 2 having therein a long flat orifice or slot 3, whose walls are parallel to each other, as indicated in Figs. 3 and 4, so that the stream of water passing through the pipe 1 from any source with which said pipe may be connected, and striking the flattened end 2 will emerge through the flat slot 3 in a sheet of water having a substantial width and other proportions.

The slot 3 is a fairly wide one, so that it will not become easily clogged with foreign matter, such as the debris which commonly accumulates in a cooling tower, for it must be recognized that in cooling towers and the like where my present invention manifestly may have a peculiar value, that the action of the water should be free and its flow not easily obstructed or interfered with by the presence of foreign matter.

Supported on the flat slotted nozzle 2 in any convenient manner, or mounted in any suitable way with reference to said nozzle 2, is a plurality of splitters consisting of a plurality of yokes attached by means of bolts 6 to the slotted nozzle 2, or cast integral with the pipe 1 or otherwise formed and arranged in order than certain portions of said yokes which have sharpened edges may be located opposite to the slot 3 in the path of the issuing stream of water, the location of said sharp edges being at a distance from the slot 2. In the example of the invention shown in Figs. 1, 2, 3, and 4, I have indicated two yokes 4, 4, each having a knife edge 4^a opposite to the slot 3, and a third intermediate yoke 5 having a knife edge 5^a also opposite to the slot 3. Hence, it will be seen that the edges 4^a of the yokes 4 and the edge 5^a of the yoke 5 are immediately opposite to the outlet slot 3 and removed to a distance therefrom, so that they will be struck by the sheet of water issuing from the slot 3, and will consequently divide said sheet of water into a plurality of thin sheets which will bear a certain relation in their size to the size of the slot 3 in the flat nozzle 2. Further, it

will be seen that the center splitter 5 has its edge 5ª nearer to the slot 3 than are the companion knife edges 4ª of the splitters 4, the position of the knife edge 5ª being also located centrally opposite to slot 3. The space between the splitters 4 and 5 will also bear a definite ratio to the size of the slot 3 in the nozzle 2. Hence, it will be understood that the knife edge 5ª cleaves the volume of water issuing from the slot 3 into two parts, or so splits it that half is diverted to one side of the splitter 5 and half to the other side. Each of these halves of the volume of water which issues from the slot 3 when thus diverted to the sides of the splitter 5 will strike the knife edges 4ª which, as I have said, are located farther away from the slot 3 than is the knife edge 5ª, and each of said half volumes will be split in twain so that half or one-quarter of the original volume issuing from the slot 3 will be diverted to one side of each splitter 4 and half to the other side, so that in this way a plurality of vapor zones or areas of substantial size are created, and thus the diffusion of the water is very large, and a great amount of water surface is created and brought into contact with the currents of air which are circulating or flowing past or around the spray head.

Although in the specific example of the invention which I have just been describing I have referred to the splitters 4 and 5 as independent members bolted or otherwise supported upon the pipe 1, yet it is evident that they may all be made integral with each other and then formed with slots between the several knife edges, as the result will be the same, if so be that splitting edges properly located with reference to the main slot 3 are disposed in a proper manner in relation thereto at a distance therefrom and that proper channels are offered between the knife edges to enable the subdivided volume of water to distribute itself in expanding sheets for the purpose in view. Also, it will be evident that the knife edges 4ª and 5ª may be differently located in reference to the slot 3 from what I have shown them in Fig. 3 of the drawing without departing from the invention, inasmuch as the question of position and relative arrangement and proportions of the different parts will vary under different conditions.

In the alternative form of the invention shown in Fig. 4 I utilize a pair of yokes 7, 7, having splitting knife edges 7ª, the space 8 between said splitters 7, 7 being directly opposite to the center of the slot 3 so that the outflowing water instead of striking a splitter situated centrally thereof, will strike a pair of splitters located opposite but at different distances from the center of the issuing steam, and thus said stream will be cut into three equal parts, two of which will be diverted sidewise on the outer surfaces of the splitter 7 while the central portion will be a single third of the water which will enter and pass through the intermediate slot 8 between the two splitters 7, 7, but a result similar to that attained by the mechanism in Figs. 1, 2, and 3 will be achieved by the devices of Fig. 4 in substantially the same way with fully equal advantages, which differ only in respect of the size and quantity of the volume of water which is being handled. Further, while in this modification of Fig. 4 the pair of yokes 7 is shown, it will be evident that they might be made integral with a central slot, which will enable a pair of sharp cutting edges to be furnished of the proper shape and dimensions.

The splitters may obviously be multiplied so as to increase the subdivision and enlarge the water surface. The triangularity of the splitters may obviously vary in respect to the size of the angles and the knife edges may be of greater or less length and bevel, if only a sufficiently sharp edge in each case is furnished in the path of the issuing stream of water to subdivide it quickly and efficiently. Further, it must be kept in mind at all times that the primary stream of water coming through the slot 3 of the nozzle 2 from the pipe 1 must be of some substantial size, for the slot must not be small enough to be interfered with by debris and other substances that would choke it up and destroy its utility, such substantial stream being essential in cooling towers and other apparatus where the water must be brought into intimate contact with the air. Therefore, I desire it clearly understood that many changes in the precise construction and arrangement of the various parts may be made without exceeding the scope of my invention, and in all of such cases it will be evident that the cutting edges must be located in the path of the issuing stream and at a short distance from the slot in the nozzle. It will be seen that when the cutting edges are at different distances from the slot any debris will not be caught by the cutters but will be easily thrown off.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination with a spraying nozzle having a wide flat end formed with an elongated slot therein through which a sheet of water emerges, said slot being of a substantial width to prevent clogging with debris, of a plurality of parallel cutters arranged in the path of the issuing stream at a distance therefrom and lying in the same general direction as the elongated slot and longer than the same, the middle one of said cutters being nearer to the flat slot than the others and situated centrally with reference

to said slot so that debris and foreign matter will not be caught by the cutters but will be thrown off therefrom.

2. The combination with a spraying nozzle having a wide flat end formed with an elongated slot through which a sheet of water emerges, said slot being of substantial width to prevent clogging with debris, of a plurality of parallel cutters arranged in the path of the issuing stream at a distance therefrom and lying in the same general direction as the slot, one or more of the cutters being located nearer to the slot than the other to prevent debris from being caught by the cutters, said cutters having the function of dividing the issuing stream into a plurality of thin diverging sheets which will bear a certain relation in their size to the size of the slot in the nozzle.

In testimony whereof I hereunto affix my signature.

GEORGE P. SYMONDS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."