

H. GUMTOW.  
WATER SPRAYING APPARATUS.

No. 602,074.

Patented Apr. 12, 1898.

Fig. 1.

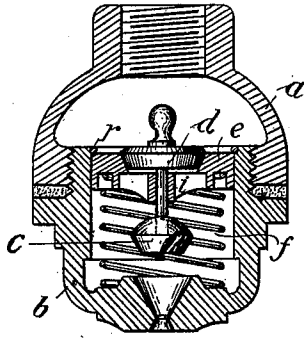


Fig. 2.

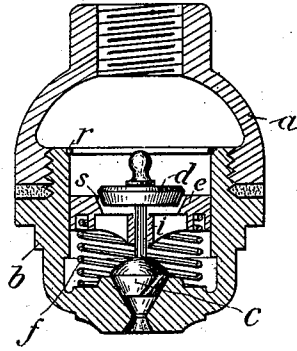


Fig. 3.<sup>a</sup>

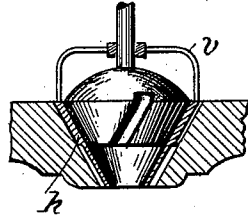


Fig. 3.

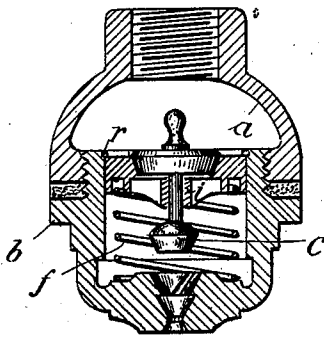
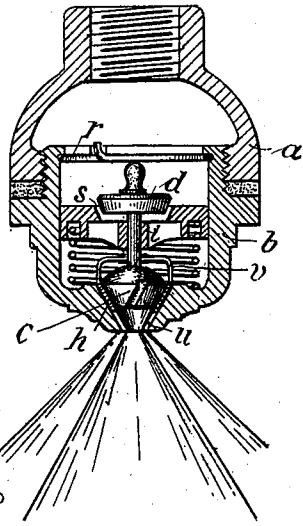


Fig. 4.



Witnesses:  
W. C. Pinckney  
C. Holloway

Inventor:  
Hermann Gumtow  
J. E. Muldrew  
att'y.

(No Model.)

2 Sheets—Sheet 2.

# H. GUMTOW. WATER SPRAYING APPARATUS.

No. 602,074.

Patented Apr. 12, 1898.

Fig. 8.

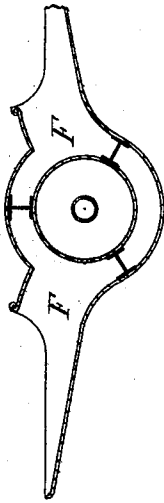


Fig. 9.

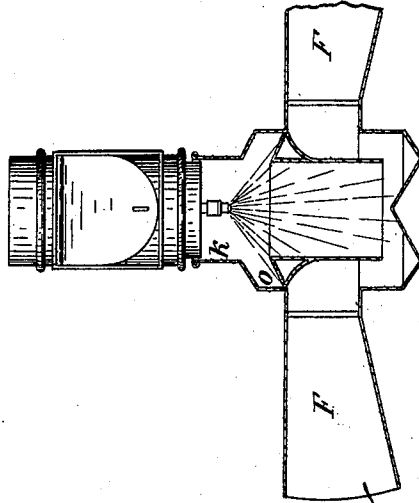


Fig. 7.

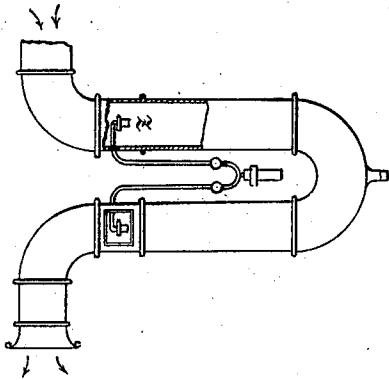


Fig. 6.

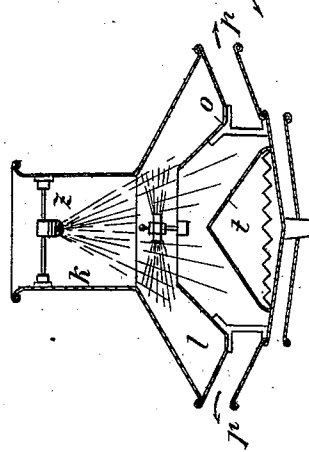
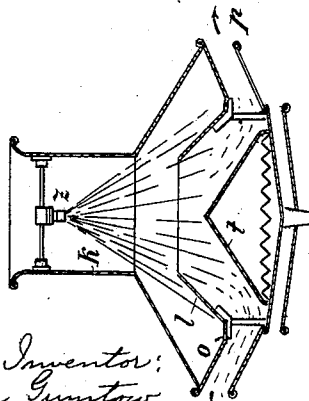


Fig. 5.



Witnesses:  
W. C. Pinckney  
C. Calloway

Inventor:  
Hermann Gumtow  
By J. M. Bowen  
Atty.

# UNITED STATES PATENT OFFICE.

HERMANN GUMTOW, OF VIENNA, AUSTRIA-HUNGARY.

## WATER-SPRAYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 602,074, dated April 12, 1898.

Application filed June 15, 1897. Serial No. 640,810. (No model.) Patented in Germany June 11, 1895, No. 91,908; in England June 18, 1895, No. 11,834; in Hungary June 18, 1895, No. 4,214; in Italy June 21, 1895, No. 39,169/472, and in Austria September 13, 1895, No. 45/3,316.

*To all whom it may concern:*

Be it known that I, HERMANN GUMTOW, engineer, a citizen of Germany, residing at Vienna, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in or Relating to Water-Spraying Apparatus for Damping Air, Ventilation, and Like Purposes, of which the following is a specification, and upon which I have received foreign patents as follows: in Great Britain, No. 11,834, dated June 18, 1895; in Germany, No. 91,908, dated June 11, 1895; in Austria, No. 45/3,316, dated September 13, 1895; in Hungary, No. 4,214, dated June 18, 1895, and in Italy, No. 39,169/472, dated June 21, 1895.

This invention relates to water-jet apparatus for air-damping and ventilation, the action of which consists in spraying water under pressure, the water thus sprayed drawing in the air by aspiration or suction and forcing it forward, so creating an air-current for ventilation.

A principal element in this invention is the water-spraying device, since the useful effect of the apparatus is mainly dependent upon the construction and arrangement thereof.

For the purpose of creating a powerful draft or ventilating air-current the sprayer must be so constructed that the sprayed water is hurled forward or continuously injected with the greatest possible velocity and force. Further, the water must be delivered from the spraying apparatus in the finest possible state of comminution, so that a rational working—*i. e.*, the utmost possible effect with the least possible quantity of water—may be obtained. Moreover, care must be taken to see that the sprayer is not liable to sudden choking or stoppage while at work, whereby its service would be unreliable.

Figures 1 and 2 show the improved sprayer in section, the former representing the separate working parts as they are when in the state of rest or inaction, the latter when in action.

The spraying device is composed of an upper part *a*, which is connected with the high-pressure water-pipe or the discharge-pipe of a force-pump, and a lower part *b*, secured to the former, *a*, by a hermetically-sealed screw-

joint, which has a cylindrical interior containing a movable ring-shaped part *e*, pressed upward by a coiled spring *f* against a spring retaining-ring *r*. The body of the movable ring *e* is provided with an orifice for the reception and guidance of a stem *i* and a conical seat, after the manner of a valve-seat, to receive a valve-body *d*.

On the lower end of the spindle or stem *i* is fixed a cone or cone-shaped body *c*, which upon its convex surface is provided with several slanting slots or grooves. As soon as the water enters into the upper part *a* of the sprayer the body of the movable ring *e*, together with the valve-body *d*, is pressed down until the lower cone *c* lodges on the seat of the lower part *b*, (the coiled spring *f* being compressed and energized simultaneously,) a further descent of the valve-body *d* being thereby prevented; but the water continues further to depress the movable ring *e* and the valve-body *d*, through which the water finds its way to the lower part of the spraying apparatus, and issues under pressure through the grooves in the convex surface of the lower cone *c*. By the slant direction of these grooves on the cone-surface the water spurts therefrom with a rotary motion, and is consequently finely divided into spray. The degree of fineness of this comminution is naturally dependent upon, first, the slope; second, the size, and, third, the number of the grooves in the cone *c*. The opening at the upper valve-seating allows just as much water to pass through as the slots or channels on the surface of the cone *c* can discharge, and by reason of its fineness (dependent, of course, on the dimensions of the seat in the movable ring *e*) it prevents the passage of any large masses of impurities or extraneous matter, which the water might bring with it in mechanical suspension, into the lower part of the spraying apparatus, where they might stop up or choke the grooves in the cone *c*. When the spraying apparatus is stopped from working and thrown out of action by cutting off the water-supply, the coiled spring *f* raises the movable ring *e*, closes the opening against the upper valve-body *d*, and finally lifts the lower cone *c* from its seat. The water re-

maintaining in the lower part of the sprayer runs away, carrying with it any small impurities or extraneous matter which may have lodged in the slanting grooves of the surface of the cone *c*.

Fig. 3 shows a modification of the above-described spraying apparatus, in which the slanting slots are not cut in the cone *c*, but in its seat, the working being exactly the same.

Fig. 4 shows a spraying apparatus with a double spray device or arrangement. The seat of the cone *c* forms a hollow external cone *h*. (Shown on an enlarged scale in section in Fig. 4<sup>a</sup>.) Its outer conical surface is also provided in its upper part with slanting slots, so that the water passing through the latter on issuing from the annular orifice *u* also acquires rotary motion and is similarly reduced to the same finely-divided state. The hollow cone *h* is provided with a bow or yoke *v*, which is conducted to the stem or spindle *i*, and when the lower cone *c* is raised the hollow cone *h* is also lifted off its seat by the upper valve-body *d* and movable ring *e*, so that not only the slanting grooves on the conical surface of the cone *c*, but also those of the hollow cone *h*, are uncovered and set free, whereby also an automatic cleaning of the same is brought about.

All the sprayers at present in use have this great disadvantage that with a small or limited water-supply they entirely fail to divide and comminute the water or at most only affect the same very coarsely, and they have thus failed to justify their claims to efficiency in cases where a thoroughly complete, regular, and reliable spraying of the water is *sine qua non*. This defect is remedied by means of the present invention, inasmuch as the spraying apparatus in consequence of the power of resistance of the coiled spring *f* can only begin to act under a pressure of water sufficient to overcome that resistance and thereafter effects continuously an extremely-fine distribution of water-spray.

Another very important advantage of this improved apparatus over other sprayers is the keeping back of all coarse impurities in suspension in the water effected by the fineness of the opening *s* and the automatic cleansing of the slanting grooves in the curved surfaces of the cones *c* and *h*.

The sprayer as described above may be applied solely for such requirements or it may be used in combination with a lateral case and connections as an air damping, ventilating, and disinfecting apparatus.

Fig. 5 shows a circulating and air-damping apparatus in the upper part of which is arranged a water-sprayer in connection with a high-pressure water-pipe or a force-pump discharge-pipe. In the lower part of the apparatus is arranged a conical deflector *t* for the purpose of catching the coarser water particles and to give the air-current another direction. The upper spraying-passage *k* is widened at the bottom into a sort of bell-

mouth and with the adjacent conical part forms an opening *o*.

When the apparatus is in action, the water from the sprayer forms a conical bell-shaped mass of finely-comminuted particles, which are further subdivided by the rebound from the curved conical surface of *l*, while at the same time sucking in the air from the room or space. The coarser dust particles of the water-spray are retained in the inclosed space formed, as shown, between *k* and *l* and are conveyed away directly. The indrawn air is thoroughly mixed with the fine particles of the water-spray and is completely saturated with the water-vapor, being cooled down to the temperature of the water, and then impinges upon the conical deflector *t*, whereby the watery particles, together with the water-spray, (in the form of mist,) issue again into the room or space through annular opening *p*.

Fig. 6 shows a modification of the apparatus last described, in which two sprayers are arranged in the lower part, these sprayers acting in opposite directions, so that the two conical films of finely-comminuted particles intersect and cause a still more minute subdivision of the water-spray, which is all carried away by the air-current induced by the sprayer *Z*, and, rebounding from the conical surfaces *l* and *t*, is discharged into the room or space through the annular opening *p*.

Fig. 7 shows a further modification consisting of an arrangement of a spraying apparatus in a U-shaped pipe as a ventilating apparatus.

Figs. 8 and 9 show a horizontal air-damping apparatus applicable as well to the supply of fresh air as to the circulation of the air in the room. Such an apparatus comprises a spraying canal or conduit which is enlarged downward and by means of the slanting prolongation forms an opening *o*. The operation is similar to that previously described and illustrated in Fig. 5, but with the difference that the damp saturated air is not discharged in the form of a ring but escapes in contrary directions through the two opposite wings *F*. By employing suitable connections with proper valves air may be drawn toward the apparatus either from the interior of the room, wherein it is located, or from a point outside of it.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a spraying device, the combination with a casing, of a valve-seat movably interposed between the inlet and the outlet, means for yieldingly resisting its movement, a movable valve adapted to coact with the valve-seat and to become separated therefrom upon movement of said seat, and a distributor for spreading the liquid, substantially as specified.

2. In a spraying device, the combination with a casing, of a valve-seat movably interposed between the inlet and the outlet, a spring

for yieldingly resisting its movement, a movable valve adapted to coact with the valve-seat and to become separated therefrom upon movement of said seat, a proper stop for arresting the movement of the seat while the same is actuated by said spring, and a distributor for spreading the liquid, substantially as specified.

3. In a spraying device, the combination with a casing, of a valve-seat movably interposed between the inlet and the outlet, means for yieldingly resisting its movement, a movable valve adapted to coact with the valve-seat and to become separated therefrom upon movement of said seat, and a spraying device having a channel through which the water is forced, the walls of said channel comprising a portion of the surface of the valve-body and a surrounding surface, substantially as specified.

4. In a spraying device, the combination with a casing, of a valve-seat movably interposed between the inlet and the outlet, means for yieldingly resisting its movement, a movable valve adapted to coact with the valve-seat, a movable, grooved, hollow cone adapted

to become seated in the outlet of the casing, a grooved portion of the movable valve-body being adapted to become seated in the hollow cone, and means for guiding said hollow cone along the valve-body, substantially as specified.

5. In a spraying device for damping air and ventilation purposes, the combination with a casing of a valve comprising a spindle and two cones such as *d* and *c*, the seating of the latter cone *c* being in the lower part of the casing and either the seating or the cone having suitable grooves cut in it, the seating of the former cone *d* being a movable ring such as *e*, a spring tending to raise this ring and a device to limit the upward movement of the movable ring substantially as and for the purpose described and illustrated in the accompanying drawings.

Signed at Vienna, in the Empire of Austria, this 22d day of May, 1897.

HERMANN GUMTOW.

Witnesses:

JOHANN LUSH,  
KARL HÜTTER.