(No Model.) 3 Sheets—Sheet 1.

W. V. WALLACE.

AIR MOISTENING APPARATUS FOR FACTORIES.

No. 335,403. Patented Feb. 2, 1886.

Fig. 2.

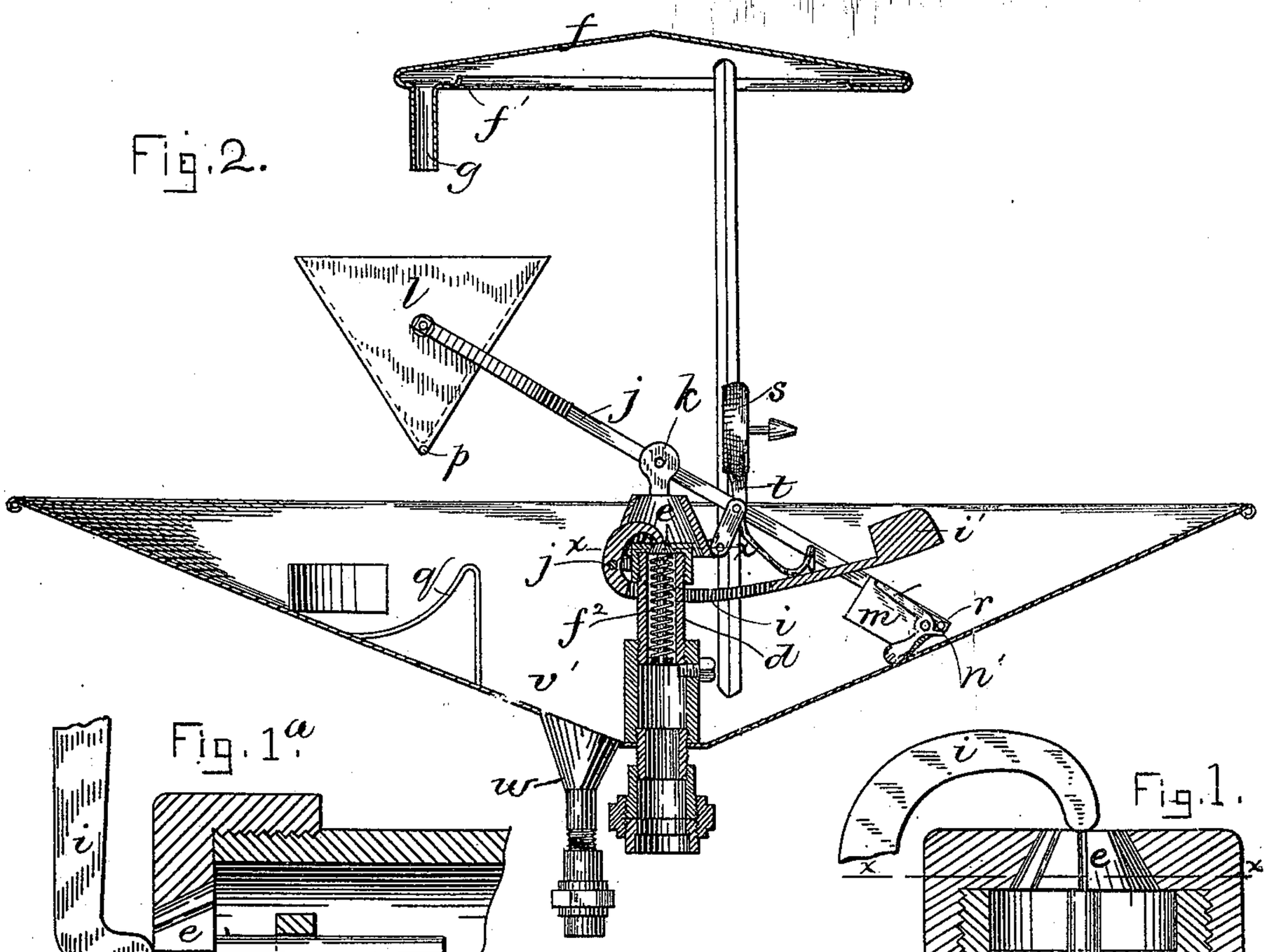


Fig. 1ª.

Fig. 1.

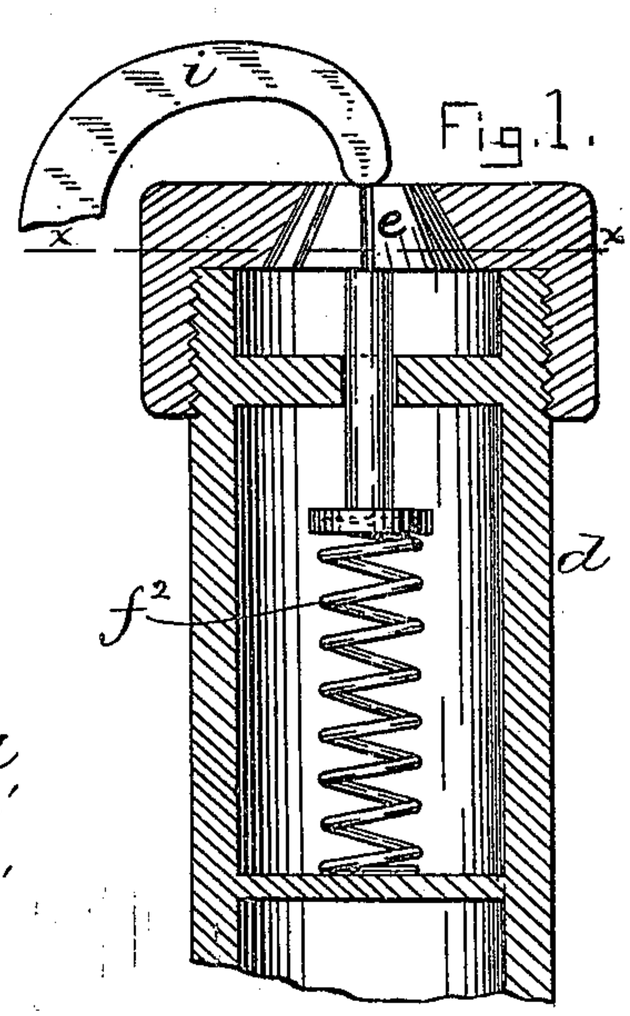
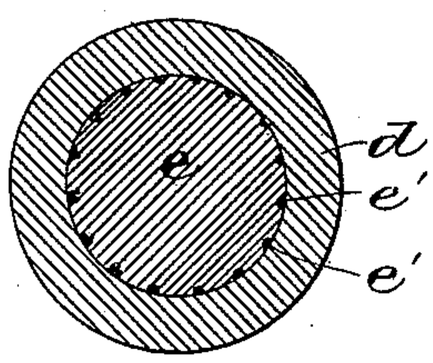


Fig. 3.



WITNESSES:

J. H. Brown.
Thos. E. O'Connor

INVENTOR:

W. V. Wallace
by Wright Brown
Attys.

(No Model.) 3 Sheets—Sheet 2.

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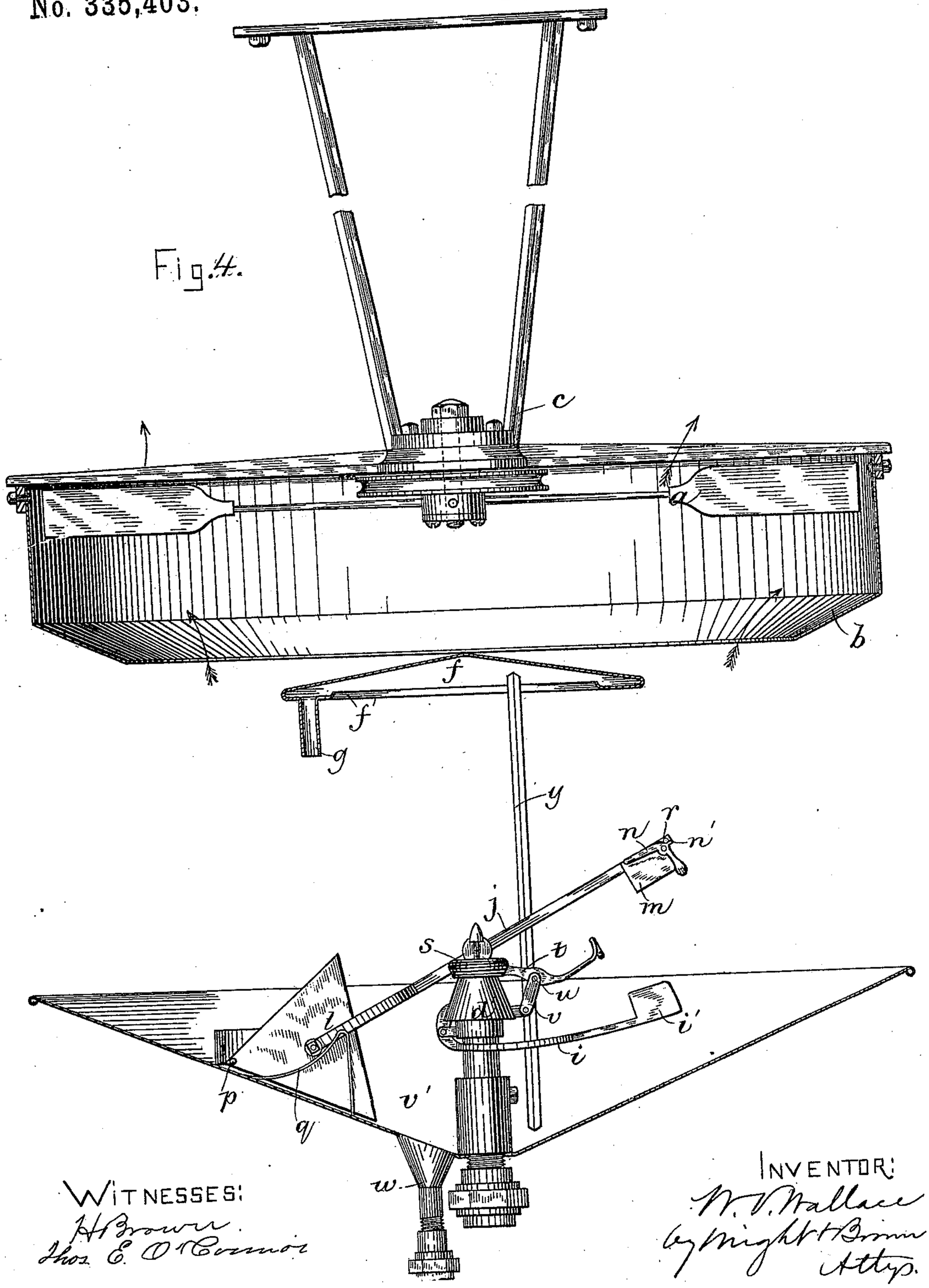
Fig. 4.



WITNESSES:
H. Brown.
Thos. E. O'Connor

INVENTOR:
W. V. Wallace
by Wright Brown
Attys.

(No Model.) 3 Sheets—Sheet 3.

W. V. WALLACE.

AIR MOISTENING APPARATUS FOR FACTORIES.

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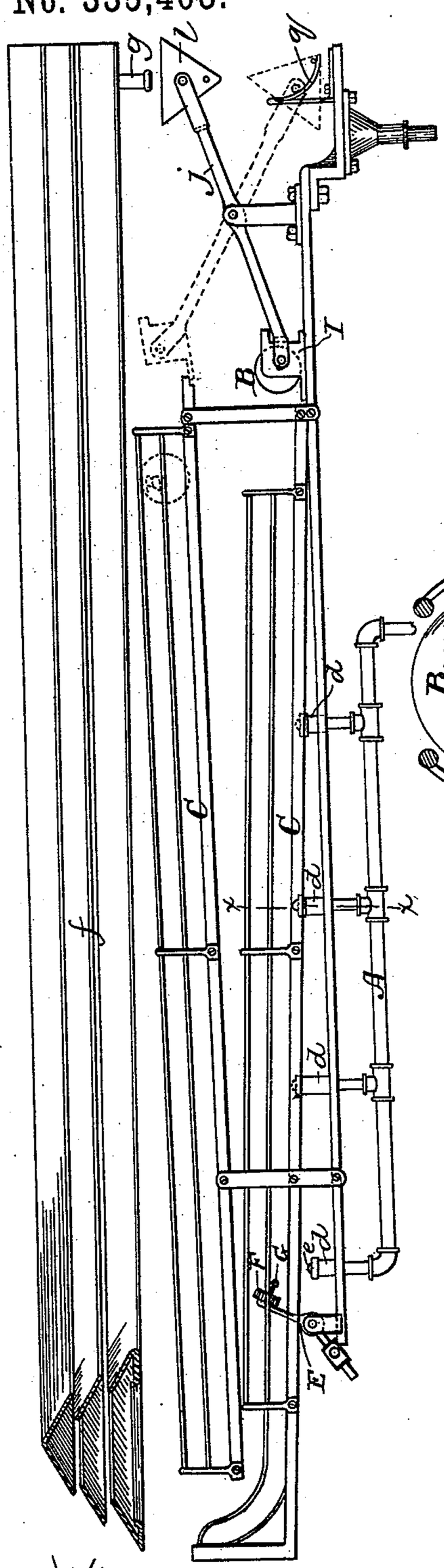

Fig. 5.

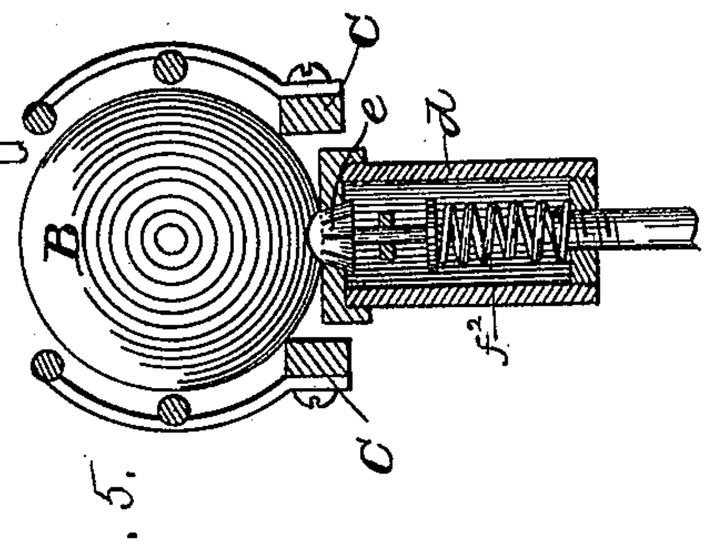

Fig. 6

WITNESSES:
Thos. E. O. Connor
H Brown.

Inventor
W. V. Wallace
by Wright & Brown
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM V. WALLACE, OF BOSTON, MASSACHUSETTS.

AIR-MOISTENING APPARATUS FOR FACTORIES.

SPECIFICATION forming part of Letters Patent No. 335,403, dated February 2, 1886.

Application filed July 25, 1885. Serial No. 172,689. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM V. WALLACE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Air-Moistening Apparatus, of which the following is a specification.

This invention relates to apparatus for moistening air in factories and other places where it is desirable that the air shall have a considerable degree of humidity; and it consists, mainly, in a water-discharging nozzle having a valve which is kept normally closed against a seat, so that the water can escape only through fine file-marks or grooves formed either in the surface of the valve or in its seat, whereby the escaping water is converted into spray, and means whereby said valve may be occasionally opened to permit the water to escape more rapidly and flush said grooves, for the purpose of clearing them from any obstructions that may be left in them by the water, the object being to secure a free discharge of spray and prevent the formation thereof from being obstructed by impurities in the water.

The invention also consists in the combination, with said valve, of means for automatically opening it at intervals to cause the flushing action, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a vertical section of a nozzle embodying my invention. Fig. 1ª represents a modification of the same. Fig. 2 represents a vertical section of a portion of an automatic apparatus embodying my invention. Fig. 3 represents an enlarged section on line *x x*, Fig. 1. Fig. 4 represents a section of the entire automatic apparatus partly shown in Fig. 2. Fig. 5 represents a side elevation of a series of nozzles and means for opening the valves thereof successively. Fig. 6 represents a section on line *x x*, Fig. 5.

The same letters of reference indicate the same parts in all the figures.

In carrying out my invention I provide a water-discharging nozzle or pipe, *d*, having near its discharging end an internal seat, *d'*, and a valve, *e*, which is normally pressed against said seat by any suitable means, as by a spring, *f*, as shown in Figs. 1 and 2, or by the pressure of the water against it, as shown in Fig. 1ª. Fine grooves or file-marks *e'* are formed either in the surface of the valve or of the seat, and these constitute the only outlet for the water when the valve is seated, and are of such size that the water escaping through them is converted into spray, which is taken up wholly or in part by the air into which it is ejected. It has been found that the fine grooves often become clogged by the impurities in the water, so that the formation of the spray is materially impeded. This difficulty may be remedied by opening the valve by any suitable means to permit the water to escape more rapidly, and thus flush or cleanse said grooves. In the present instance I have shown a lever, *i*, as the means for opening the valve, said lever being pivoted to a fixed support, and preferably operated automatically, as hereinafter described, although, if desired, said lever, or any suitable substitute therefor, may be operated by hand or by suitable mechanism controlled by an operative. It will be seen that by occasionally opening the valve the spray-forming grooves may be kept in good working order, a sufficient supply of spray for air-moistening purposes being thus insured.

The automatic mechanism shown in Figs. 2 and 4 to open the valve at intervals is as follows: Over the pipe *d*, I place a shield, *f*, preferably somewhat conical in form, which arrests a part of the spray discharged from the nozzle and causes it to accumulate and flow into a trough, *f'*, at the margin of the shield. Said trough is provided with a discharge-tube, *g*, through which the water arrested by the shield escapes to operate the devices which open the valve from time to time. Said devices, as here shown, consist of a lever, *i*, which is pivoted at *j* to an ear or offset on the pipe *d*, and has a short bent arm bearing on the valve *e*, and a longer arm provided with a weight, *i'*, and mechanism, hereinafter described, for automatically raising and releasing said weighted arm. The lever *i* is so weighted that when its longer arm is raised and then dropped the impetus of the falling weight thereon will cause the shorter arm of the lever to momentarily depress the valve *e* against the supporting pressure of the

spring f^2, thus forming an opening between the valve and seat, through which the water rushes and washes out any obstructions that may be in the grooves or file-marks e' until the spring f^2 reacts and presses the valve back to its seat, the force of the spring being so proportioned to the weight of the lever that the spring will normally hold the valve to its seat against the pressure of the shorter arm of the lever, although yielding momentarily to the impetus of the falling weighted arm of the lever. The lever is alternately raised and released by the oscillating movements of a lever, *j*, pivoted at *k* to a fixed support, and having at one end a receptacle, *l*, (which is pivoted to forks or arms formed on the lever,) and at the other end a weight, *m*, and a weighted catch, *n*. The weight *m* is sufficient to hold the lever *j* in the position shown in Fig. 1 when the receptacle is not filled with water, the receptacle being thus held in an elevated position under the discharge-tube *g*, so that it will receive the water dripping from the shield *f*. When the receptacle becomes nearly or partly filled with water, the weight of the water causes the receptacle to fall, and thus raise the end of the lever having the catch *n*. Said catch in rising bears against the weighted arm of the lever *i*, and first raises said arm until the catch passes by the outer end of the arm. This releases the arm, so that it falls, and thus causes the shorter arm to open the valve *e*, as already described. During the downward movement of the receptacle a stud, *p*, on its lower portion strikes a fixed curved guide, *q*, and causes the receptacle to tilt and discharge the water, as shown in Fig. 4. The weighted end of the lever *j* then falls and the emptied receptacle rises to its former position, the catch *n* yielding and passing over the end of the weighted arm *i*. The catch is provided with a projection, *n'*, which bears against a stud, *r*, on the lever *j* when said lever is moving upwardly, and is thus made rigid. When the lever is falling, the catch, in striking the lever *i*, swings upwardly its projection *n'*, separating it from the stud *r*.

s represents a cap attached to an arm, *t*, which is pivoted at *u* to a fixed ear, *v*, on the pipe *d*, and projects between the levers *j* and *i*, and is operated alternately by said levers. When the weighted arm *m* of the lever *j* is raised by the falling of the receptacle, the arm *t* is also raised until the cap *s* drops upon and covers the end of a hood, *d'*, affixed to the pipe *d*, while the weighted arm of the lever *i'* is falling and permitting the flushing discharge of water, said cap preventing the water from being forced upwardly, the water escaping downwardly between the pipe and hood. When the receptacle *l* rises, the weighted end of the lever *j*, in falling, strikes the arm *t* and thus raises the cap *s*, as shown in Fig. 1, so that it will not prevent the discharge of spray when the apparatus is working normally.

It will be seen that the described devices insure the frequent flushing and cleansing of the grooves or file-marks which form the spray. I do not, however, limit myself to the particular devices shown, but may modify the same in any desirable manner.

v' represents a pan which receives the water emptied from the receptacle *l*, and is provided with a waste-pipe, *w*, for the escape of such water.

In the present instance the shield *f* is supported by standards *y* rising from said pan.

a represents a rotary fan, of any suitable form, located over the shield *f*.

b represents a casing surrounding the fan and open at its top and bottom, so that the air set in motion by the fan will pass directly through the casing, as indicated by the arrows in Fig. 4. The object of the casing is to prevent the water that may be accumulated on the fan from being scattered about thereby. The arbor of the fan is mounted in a bearing in a bracket or hanger, *c*, adapted to be attached to a ceiling or other support. The water-pipe *d* is located in such proximity to the fan *a* and the casing *b* that the current of air caused to pass through the casing by the action of the fan will come in contact with and be moistened by the spray, and will therefore pass onward and be diffused by the fan.

In Fig. 5 I have shown a series of nozzles, *d*, of any desired number, affixed to a water-pipe, A, and each provided with a valve, *e*. Said valves are opened successively by a ball, B, which rolls along an inclined track, C, over the nozzles, and in passing over each nozzle depresses it to permit the above-described flushing action. Said ball may act directly on the protruding end of the valve, as shown in Fig. 6, or on a lever, E, as shown at the left-hand end of Fig. 5, said lever being pivoted to a fixed support and held normally raised by a weight, as shown in full lines, and depressed by the ball, so as to strike the valve and open it. The lever may have a cap, F, to prevent the water from escaping too freely when the valve is opened, and a swab, G, to enter the valve-seat and dislodge any matter that may adhere thereto. A roof, *f*, may be placed over the series of nozzles to break up the spray, said roof being composed of overlapping strips or slats separated by open spaces to permit the passage of vapor. The water accumulating on the roof flows through a drip-pipe, *g*, into a receptacle, *l*, pivoted to one end of a lever, *j*. Said lever is pivoted at its center to a fixed support, and has at its other end a pivoted carrier, I, which normally stands in position to receive the ball B when the latter reaches the lower end of the track C, and holds the receptacle *l* elevated, as shown in full lines in Fig. 5. When the receptacle *l* becomes filled with water it becomes heavier than the carrier and the ball therein, and elevates the carrier and ball, as shown in dotted lines, to the upper end of the inclined track C, the carrier striking a fixed stop and

being tilted thereby when it reaches the upper end of its movement, thus causing the ball to roll out upon the track. The ball rolls down the track, which is reversed in direction, or made in two sections, one of which is a reversed continuation of the other, and in passing along opens the valves, as described. When the receptacle *l* falls it is tipped by a guide, *q*, and the water in it is discharged, so that the lever is returned to its former position by the weight of the carrier I. It will be seen, therefore, that the carrier is ready to again receive the ball when the latter reaches the lower end of the track. The operation is thus continued, the ball being set in motion every time that the receptacle *l* is depressed by a sufficient accumulation of water.

This construction is especially adapted for large rooms—as in factories—where the employment of separate mechanism for each valve, as previously described, would be too expensive.

The series of valves may be opened simultaneously, if desired, by a rock-shaft having a series of arms bearing on the said valve, or by any other suitable mechanism.

I claim—

1. A water-discharging nozzle having a valve-seat and a valve normally bearing against said seat, and spray-forming grooves formed either in the valve or its seat, the valve being adapted to be separated from its seat to permit said grooves to be flushed by the escaping water, as set forth.

2. A water-discharging nozzle having a normally-closed valve, and spray-forming grooves in said valve or in its seat, combined with means, substantially as described, whereby said valve may be opened to permit the water to flush and cleanse said grooves.

3. The combination of a water-discharging nozzle having a normally-closed valve, and spray-forming grooves formed either in the valve or in its seat, a spray-collecting roof over said nozzle, a pivoted lever having a receptacle which is normally raised by the lever and receives the water from said roof, and devices, substantially as described, operated by the tilting movement of the lever, caused by the accumulation of water in its receptacle, to open said valve and permit the water to flush and cleanse said grooves, as set forth.

4. The combination of a nozzle having a normally-closed valve and spray-forming grooves, a lever pivoted to a fixed support and formed to strike and open said valve when displaced from its normal position, and automatic means, substantially as described, for displacing said lever, as set forth.

5. A series of water-discharge nozzles, each having a normally-closed valve, and spray-forming grooves in said valve or in its seat, combined with an inclined track, a ball adapted to roll on said track, and means, substantially as described, whereby said ball is automatically caused to roll along the track, the nozzles being arranged so that the movement of the ball along the track will open the valves successively, as set forth.

6. The combination of a series of nozzles, each having a normally-closed valve and spray-forming grooves, a roof over said nozzles, a pivoted lever having at one end a water-receptacle arranged to receive water from the roof, and at the other end a carrier, an inclined track arranged, as described, with relation to said nozzles and to the carrier, and a ball adapted to run upon the track and open the valves of the nozzles, said ball being received by the carrier when it reaches the lower end of the track, and raised and discharged onto the upper end of the track by the depression of the water-receptacle, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 15th day of July, 1885.

WILLIAM V. WALLACE.

Witnesses:

C. F. BROWN,

H. BROWN.