

No. 832,090.

PATENTED OCT. 2, 1906.

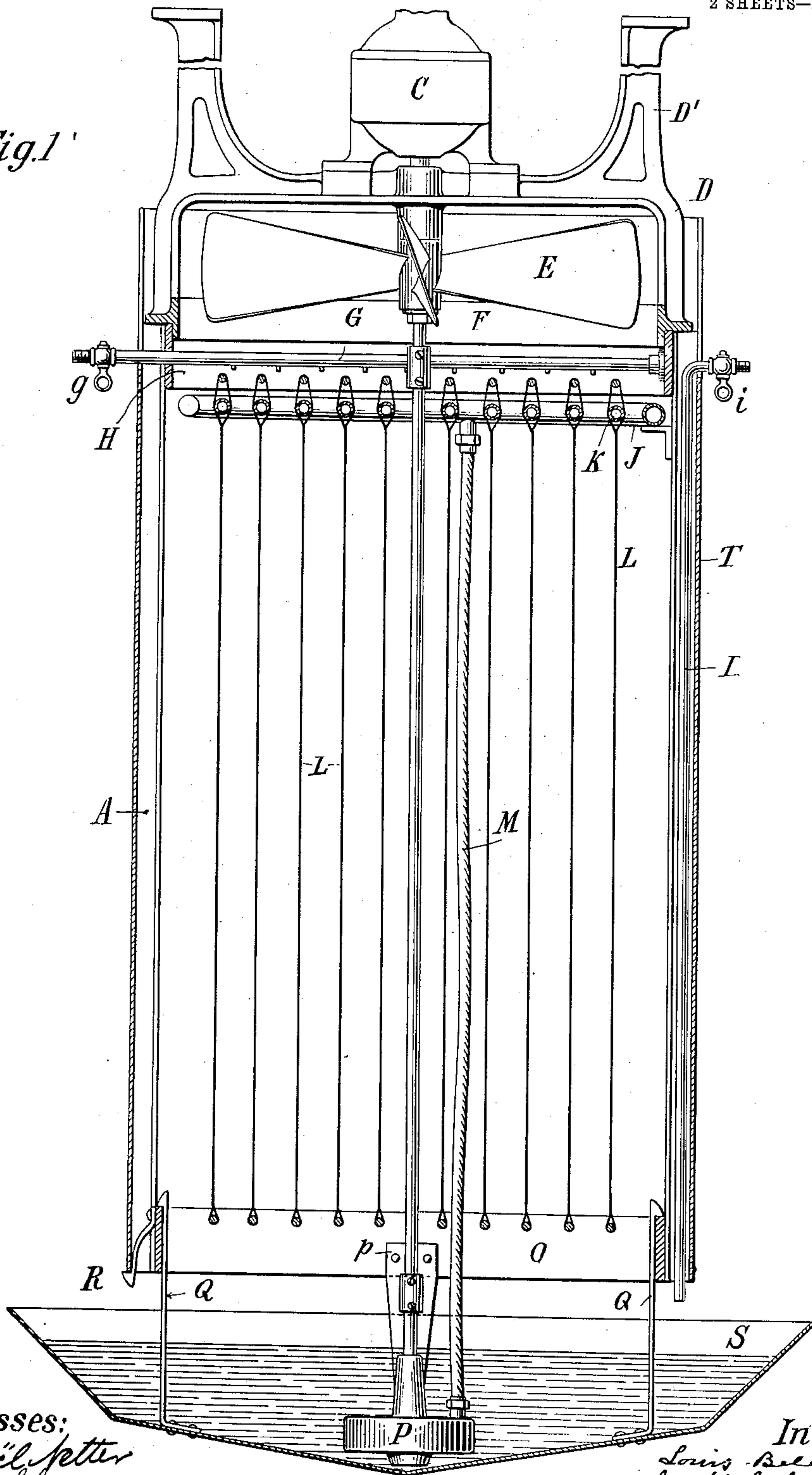
J. J. SMITH & L. BELL.

HUMIDIFIER.

APPLICATION FILED APR. 5, 1904.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses:  
Raphael Jetter  
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Inventors  
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by E. M. Bennett Atty.



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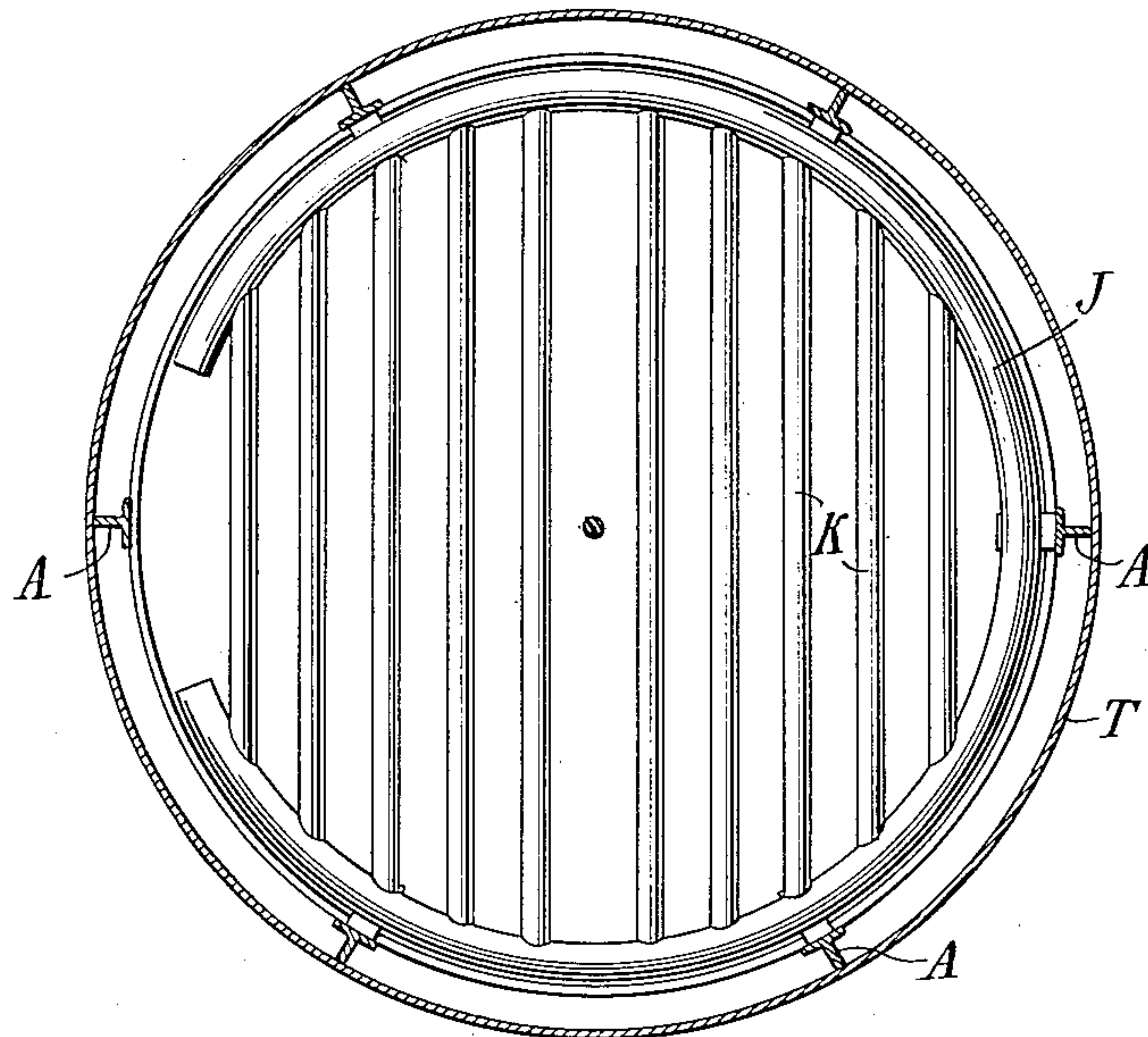
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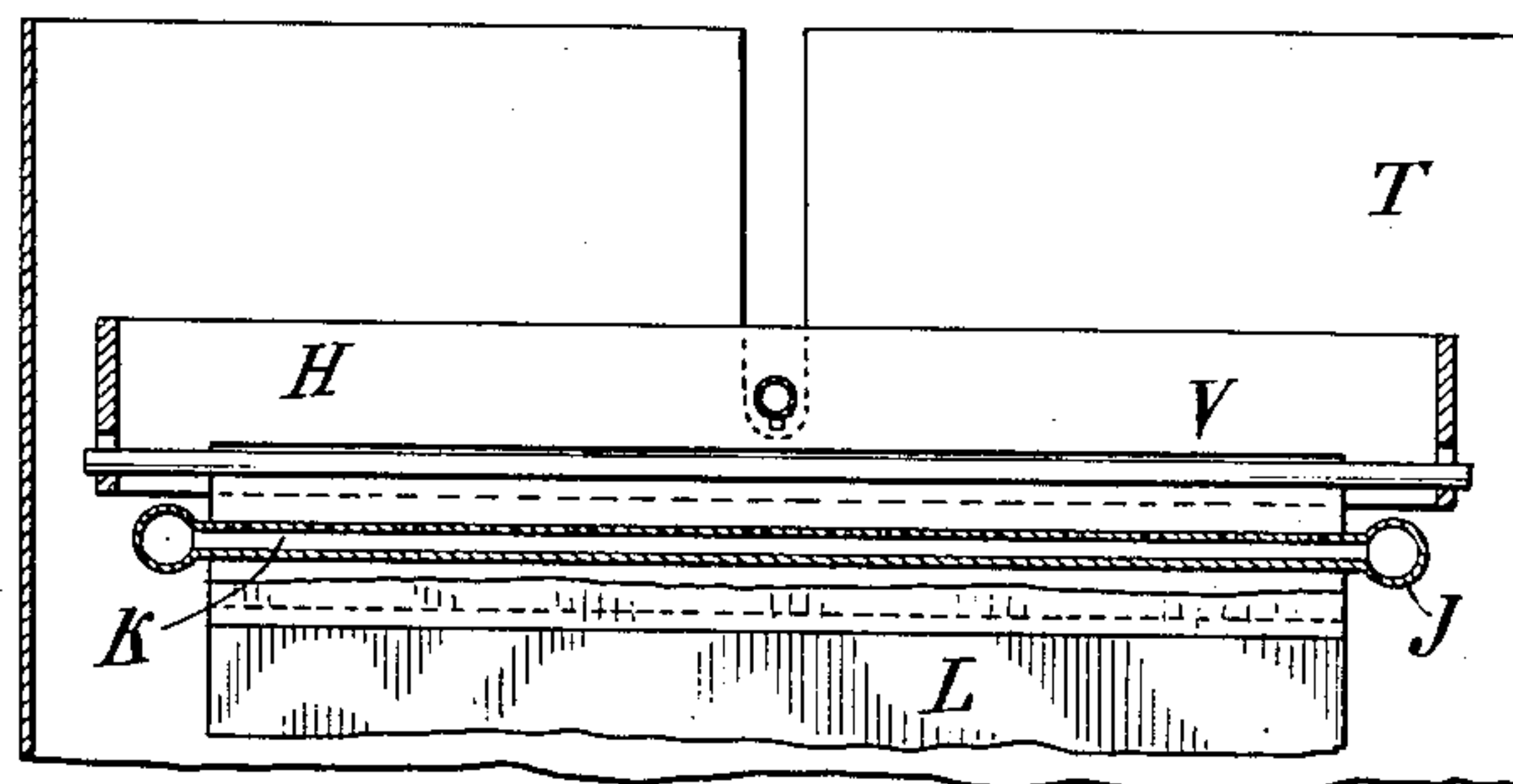
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2 SHEETS—SHEET 2.

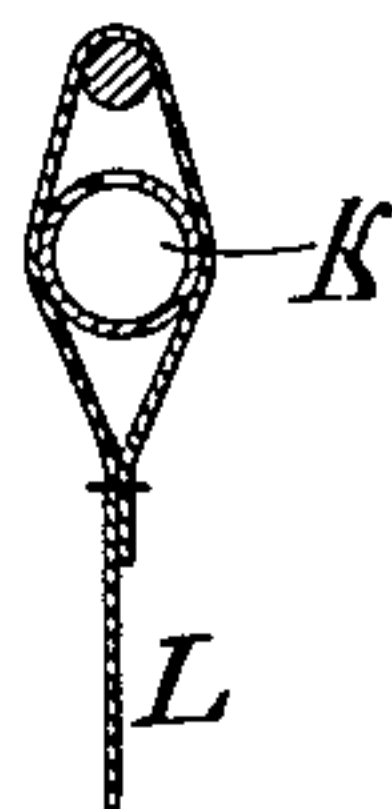
*Fig. 2*



*Fig. 3*



*Fig. 4*



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# UNITED STATES PATENT OFFICE.

JOSEPH J. SMITH, OF NEW YORK, N. Y., AND LOUIS BELL, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO BELL PURE AIR AND COOLING COMPANY, OF NEW YORK, N. Y.

## HUMIDIFIER.

No. 832,090.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Application filed April 5, 1904. Serial No. 201,752.

*To all whom it may concern:*

Be it known that we, JOSEPH J. SMITH, residing in the city, county, and State of New York, and LOUIS BELL, residing at Boston, county of Suffolk, State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Humidifiers, of which the following specification and accompanying drawings disclose as an illustration one embodiment thereof which we now regard as the best out of the various forms in which the principles of the invention may be applied.

In the drawings, Figure 1 is a vertical section of our device. Fig. 2 is a horizontal section thereof, and Figs. 3 and 4 show details.

Our invention involves an apparatus for humidifying the atmosphere of an apartment, such as a living-room, but more particularly a mill, a tobacco store or factory, or other apartment wherein it is required that the atmosphere must contain a given degree of humidity greater or more stable than that of the normal outside atmosphere or that of the normal outside air when introduced into the apartment through the ordinary heating apparatus.

Our device is of the type wherein the air of the apartment is caused to pass over sheets or surfaces constantly moistened by a flow of water, and we have found that under certain conditions the drop of temperature on the sheets due to the evaporation of the moisture is sufficient to prevent the normal and satisfactory operation of the system. To overcome this difficulty, we have devised the method of humidifying the atmosphere of an apartment by passing it over a series of moistened surfaces and reheating it at the time of its passage, the reheating means being a small jet of steam delivered into the air-current just as it reaches the moistened sheets or surfaces and passed therewith over the surfaces. The amount of heat supplied by the steam will be substantially equal to that lost by the evaporation of the water, and in operating with this heat the steam will be condensed, so that the outgoing current is moistened air and not steam. The condensation of the

steam by the air-blast may be regarded as one mode of humidifying and the evaporation of the water as another mode, and by making these two modes supplementary to each other and adjusting them with respect to each other we may meet all the varying conditions of weather and atmosphere that are encountered in practice. In humidifying an apartment this process will be carried out locally at a series of separate points, each a center toward which the dry air is drawn and from which the moistened air is radiated. We have devised certain apparatus for carrying this process into effect in an advantageous form, as will now be described.

Referring to Fig. 1, there is shown the general character of our device, which is of a cylindrical form and adapted to be suspended from the ceiling of the apartment to be treated. D is a bracket provided with upwardly-extending arms D', by which it is secured to the ceiling or other overhead point of support. On the upper side of the bracket is the electric motor C or other driving agency, having its shaft vertical. E is a fan on the under side of the frame or bracket, which is driven by the motor and acts to send a current of air downward over the sheets. The outer ends of the bracket-arms of D are joined by a ring F, and below this is a second wider ring H, forming substantially a part of the bracket, to which are secured the upper ends of six vertical ribs A A, &c., which are joined at their lower ends to a similar ring O. This constitutes the skeleton frame of the apparatus. Over this frame a cylindrical casing T is passed, being lifted up from below and held in place by a suitable retaining device, such as a latch R. Below the casing is a flaring water-pan S, hung from the ring O by spring-rods Q Q, having latches at their upper ends to engage the ring. Within the casing the fan-shaft is continued down to the lower end and drives a pump P, supported in the water-pan by brackets p from ring O. The pan is thus wholly independent of the pump and can be removed downward from the remainder of the apparatus, leaving the pump suspended on its brackets.



The pump takes water from the pan and delivers it by tube M to the distributing-header, which is formed, as shown in Fig. 2, somewhat like a grate or grid, with a large circular tube J spanned across by a series of transverse tubes K. Each of the transverse tubes is perforated on its upper side and has a sheet or "mantle" looped at its upper end over the transverse tube and over a bridge-piece, serving to hold it away from the perforations on the tube, and at its lower end looped around and drawn taut by a transverse rod across ring O. By this construction the lifted water is maintained distributed through the header, and the pump merely serves to raise the level of the water in the header, causing it to overflow onto the mantles uniformly at all points. Any surplus water flows back into the header and is again lifted by the pump. This form of humidifier is one which we have found well adapted to be suspended or supported by its upper end and to afford support for the mantles at both top and bottom and permit access to the mantles, as well as to perform the other functions assigned to it in the most efficient manner.

A steam-pipe G, having a series of small openings or discharge-nozzles on its under side, is extended across the upper edges of the mantles between them and the fan. The supply of steam to this pipe is admitted and adjusted by a cock g. The proper effect is secured when the quantity of steam is sufficient to counteract the lowering of temperature by the evaporation on the mantles. The steam in so doing is condensed and in operation gives no effect visible to the eye. It will be seen that the steam-laden air-currents pass downwardly between the adjacent moistened cloth mantles and are thus in contact with wet walls on both sides. The desired evaporative and condensing effects then take place and may be accurately regulated by suitably adjusting the volume of air-flow and quantity of steam to the wetness of the fibrous mantles. The water may, if desired, be supplied to pan S by means of a pipe I, permanently connected to a water-main and controlled by a cock i. The pan may be filled in any other suitable way prior to a run of the apparatus.

In practice an apartment is humidified by placing a plurality of these machines at different points around the apartment, each one forming a local center toward which the dry air at the top of the room in the vicinity of the device tends to flow and from which the moistened air is radiated outward. A steam-pipe will be led to each one, so that the air may be locally heated by and passed over the mantles, together with the steam, in the manner already described. It will be understood that this process does not disturb

or depend upon the normal temperature of the apartment, but avoids such disturbance by creating at such local point the conditions required for evaporation regardless of the general temperature and conditions of the room. It overcomes the local drop of temperature which would be caused by the evaporation, leaving the general conditions of the apartment substantially unchanged except for the added degrees of humidity thereby secured. In other words, the locally-applied heat is supplementary to the normal heat of the apartment applied generally thereto in the usual ways.

What we claim as new, and desire to secure by Letters Patent, is—

1. A humidifier comprising a casing forming an air-conduit with an opening to the apartment to be humidified, a series of fibrous sheets or mantles mounted therein side by side with air-passages between them, means to supply water to the upper ends of the mantles for the purpose of moistening the latter, a blower for causing currents of air to pass between the mantles, a steam-pipe having a series of outlets to the spaces between the mantles whereby a plurality of steam-jets are added to the currents of air which pass between the moistened fibrous mantles, and means for adjusting the quantity of steam with respect to the force of the air-current and the rate of water-supply so as to compensate for the drop in temperature due to evaporation.

2. A humidifier having at one end a bracket adapted to suspend the humidifier from an elevated support and provided with a fan and means for supporting a series of mantles by one end and for distributing water thereto, a frame member at the opposite end of the humidifier connected by ribs with said bracket, said bracket, ribs and frame member constituting a skeleton frame, a series of mantle-supports mounted on said frame member, a series of evaporating-mantles attached by opposite ends to the supports on the bracket and frame member respectively and adapted to be moistened by said water-distributing means, and a tubular casing inclosing the mantles and open at both ends, for confining the fan-current, said casing being supported by said frame and constructed and arranged to permit lateral access to the mantles.

3. A humidifier having a skeleton frame composed of an upper bracket for suspending the humidifier, a lower frame member and connecting-ribs, a series of rods carried by the bracket and lower frame member respectively, a series of evaporating-mantles supported at opposite ends by said rods, means carried by the bracket for supplying water to said mantles, a fan journaled on the bracket,



a tubular draft-casing mounted on and inclosing the frame and constructed and arranged to permit lateral access to the mantles, and a lower drip-pan removably attached to the frame and separated from the lower edge of the casing by an opening for the passage of the air-current.

In witness whereof we have hereunto set

our hands, before two subscribing witnesses,  
this 2d day of April, 1904.

JOS. J. SMITH.  
LOUIS BELL.

Witnesses:

W. M. BROWN,  
HENRY H. FISH.