Nov. 25, 1930. J. S. KNOWLSON 1,782,928

HUMIDIFIER

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Fig. 1.

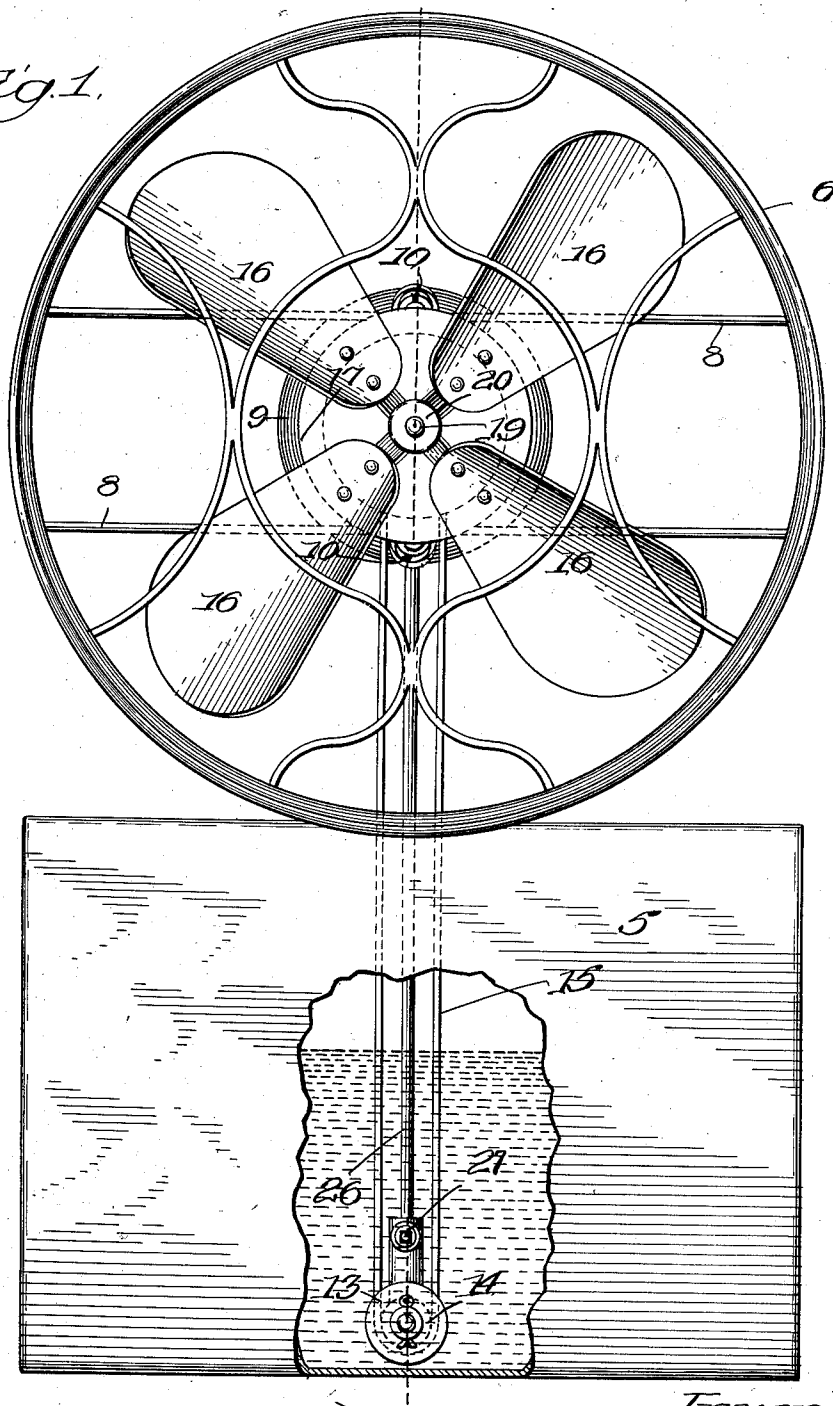

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Fig. 2.

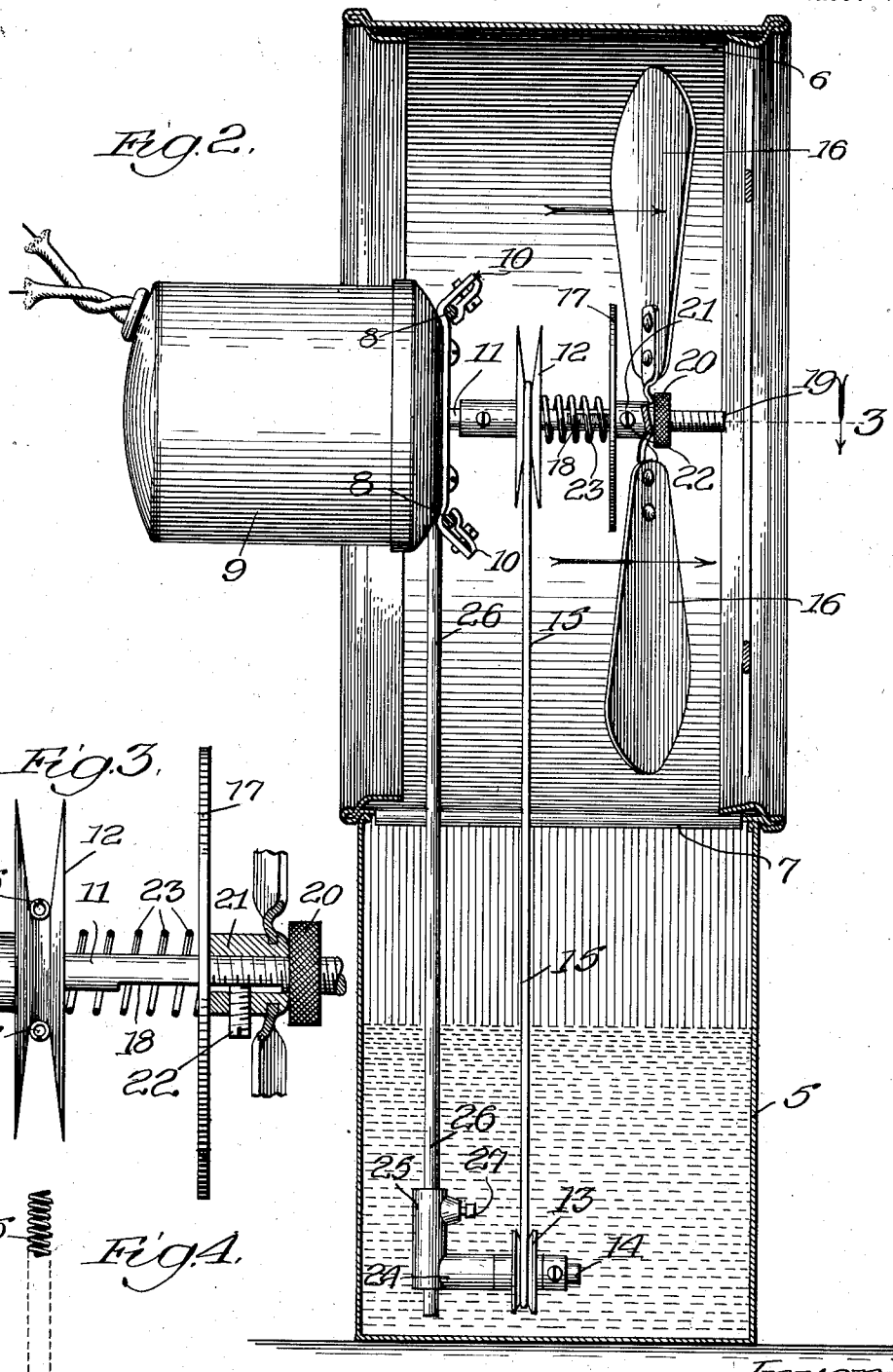

Fig. 3.

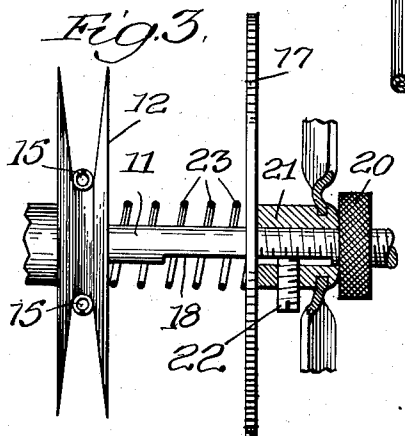

Fig. 4.

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UNITED STATES PATENT OFFICE

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HUMIDIFIER

Application filed November 11, 1929. Serial No. 406,354.

My invention relates generally to humidifying apparatus and particularly to such apparatus for use in discharging into the air within a room, a stream of finely divided water or other desired liquid, in the form of a spray or mist to effect the desired intermixture of the liquid with the air in the room.

My primary objects are to provide a novel, simple and inexpensive construction of humidifier of the general type above referred to; to provide a construction which shall permit of the regulable control of the amount of liquid discharged from the apparatus and the size of the particles of liquid forming the spray or mist; and other objects as will be manifest from the following description.

Referring to the accompanying drawings:

Figure 1 is a view in front elevation of a humidifier embodying my invention, a portion of the front of the liquid receptacle being broken away to disclose an interior detail.

Figure 2 is a section taken at the line 2 on Fig. 1 and viewed in the direction of the arrow.

Figure 3 is an enlarged broken section taken at the line 3 on Fig. 2 and viewed in the direction of the arrow; and

Figure 4, a broken view of the flexible endless element forming a part of my improved humidifier.

Referring to the preferred illustrated embodiment of my invention, it comprises a receptacle 5 for the liquid, such as water, and which may be perfumed or medicated, as desired, and from which the stream of spray or mist, to be discharged for mixture with the air in the room, is produced. The upper end of the receptacle 5 is open, and supported thereon is a substantially horizontally disposed endless band 6 open at its opposite ends and containing an opening 7 in its bottom portion at which it communicates with the receptacle 5. The band 6 which forms an open-ended housing is provided with a pair of parallel horizontal rods 8 adjacent its open rear end, these rods forming a support for a power device such as the electric motor represented at 9 which is positioned in the housing concentric with the axis of the latter, the motor being shown as provided with clips 10 at which it is supported on the rods 8.

The shaft of the motor 9 and represented at 11 extends forwardly in the housing 6 and is provided with a pulley 12 rigid thereon and located directly above the receptacle 5, the grooved portion of this pulley being preferably deep as shown with its peripheral edges substantially sharp. Extending about the pulley 12 and a pulley 13 journalled on a stationary shaft 14 in the bottom of the receptacle 5, is an endless element 15 which is thus submerged at its lower end in the liquid in the receptacle 5 and, in the use of the device, is driven by the motor 9 to continuously elevate into the housing 6 liquid from the receptacle 5, for subjection to the blast of air produced through the housing 6 as hereinafter described.

The endless element 15 may be of any desirable construction it being preferred, however, that it be in the form of an endless coil spring as represented in Fig. 4.

It may be here stated that in the operation of the motor 9 the water elevated by the element 15 discharges tangentially, and in relatively finely divided condition, throughout the periphery of the pulley 12 for the passage therethrough of a blast of air flowing through the housing 6.

In the arrangement shown the blast of air is produced by a fan 16 mounted on the armature shaft 11 and driven thereby, this fan being located beyond the pulley 12 and operating to produce a flow of air through the housing 6 in the direction of the arrow in Fig. 2.

The subjection of the water discharged at the upper end of the element 15 as above stated, to the flow of air produced by the fan 16, causes the liquid, in the form of a spray or mist, to become entrained in the air and discharged through the outlet of the housing 6. Such of the liquid as does not become entrained in the air impinges against the inner surface of the housing 6 and flows

downwardly to the opening 7 and thence into the receptacle 5.

To avoid the objectionable drawing of the liquid into the central portion of the fan which portion is the least effective for producing the flow of air and at which portion objectionable eddying currents are set up, I provide a shield represented at 17 shown as in the form of a circular disk concentrically positioned on the shaft 11 and interposed between the fan and the pulley 12.

The amount of liquid entrained in the air and the size of the drops of liquid constituting the stray or mist discharged from the housing 6, may be regulated by relatively adjusting the pulley 12 and the fan 16 in a direction lengthwise thereof. By adjusting these parts into closer relationship the amount of the liquid discharged from the housing 6 may be increased and the size of the particles of liquid forming the spray or mist increased, whereas, by adjusting these parts away from each other the amount of liquid discharging from the housing 6 will be decreased and the spray or mist will comprise smaller particles of the liquid.

In accordance with the preferred illustrated embodiment of my invention, provision is made for effecting the adjustment referred to by providing the shaft 11 at its outer end with a recess 18 extending longitudinally thereof, but short of its outer terminal portion. The outer end of the shaft 18 is threaded as represented at 19 and has screwed thereon an adjusting nut 20. The hub 21 of the fan 16 is unthreaded and carries a set screw 22 which extends into the recess 18 and is so adjusted that while it permits the hub 21 to be moved along the shaft 11 it holds this hub in driving engagement with the shaft. The shield 17 is also slidable along the shaft 11 and the fan 16 is held against the adjacent face of the nut 20 by a coil spring 23 which surrounds the shaft 11 and bears at its opposite ends against the pulley 12 and a face of the shield 17. It will be understood from the foregoing that by rotating the nut 20 in one direction the fan and shield will be moved along the shaft 11 toward the pulley 12 against the resistance of the spring 23, and by backing off the nut 20 in the opposite direction, the spring 23 will force the fan and shield in a direction away from the pulley.

It is preferred that the endless element 15 be of such construction, as for example in the form of a spiral spring as hereinbefore stated, that it will present a high degree of elasticity whereby when it is desired to use the apparatus merely for producing a blast of air without entraining liquid therein, the element 15 may be disengaged from the pulley 12 by stretching and displacing it and, if desired, looped over the upper one of the clamps 10, and when positioned on the pulley 12 will present the necessary amount of friction between the pulley 12 and element 15 for driving the latter.

The shaft 14 in the receptacle 5 is shown as extending laterally from a head 24 presenting a vertically disposed sleeve portion 25 mounted to be adjustable up and down on the lower end of a rod 26 rigidly secured at its upper end to the casing of the motor 9. A set screw 27 on the sleeve 25 clamps the latter in vertically adjusted position on the rod 26 to ensure the proper driving engagement between the pulley 12 and the element 15 and the regulating of the tension of the element 15.

The adjustable pulley 13 also permits of the varying of the tension of the element 15 which is of particular advantage when the element 15 is formed of a coil spring as by the varying of the tension of the element the amount of liquid elevated thereby may be regulated.

While I have illustrated and described a particular construction embodying my invention, I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. A humidifying apparatus comprising an endless traveling element formed of a coil spring, means for driving said element, means for contacting said element with the liquid to be discharged from the apparatus, and means for subjecting the liquid, carried by said element, to a blast of air.

2. A humidifying apparatus comprising an endless element formed of a coil spring, drive means for said element comprising pulleys over which said element extends, said pulleys being relatively adjustable toward and away from each other, means for contacting said element with the liquid to be discharged from the apparatus, and means for subjecting the liquid, carried by said element to a blast of air.

3. A humidifying apparatus comprising an endless element formed of a coil spring, drive means for said element comprising pulleys over which said element extends, said pulleys being relatively adjustable toward and away from each other, a receptacle for liquid into which said element extends and means for subjecting the liquid carried by said element, to a blast of air.

JAMES S. KNOWLSON.