Oct. 9, 1951 R. M. SHEARMAN 2,571,069

ARTIFICIAL SNOW MACHINE.

Filed March 12, 1948

Fig. 2

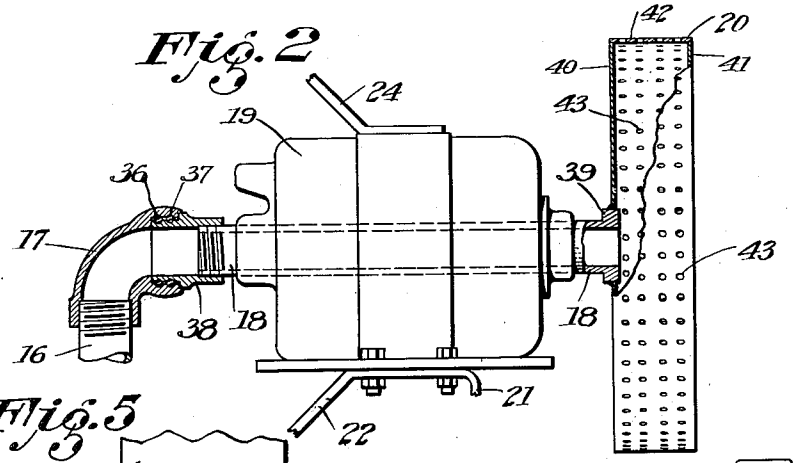


Fig. 5

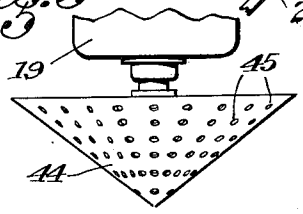


Fig. 4

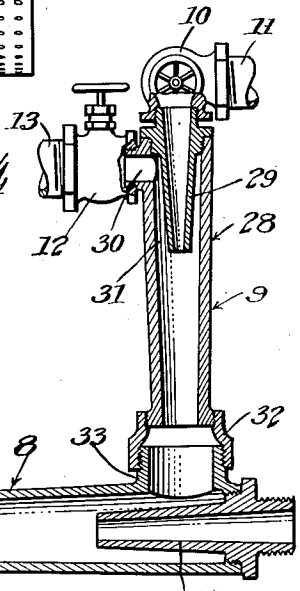


Fig. 1

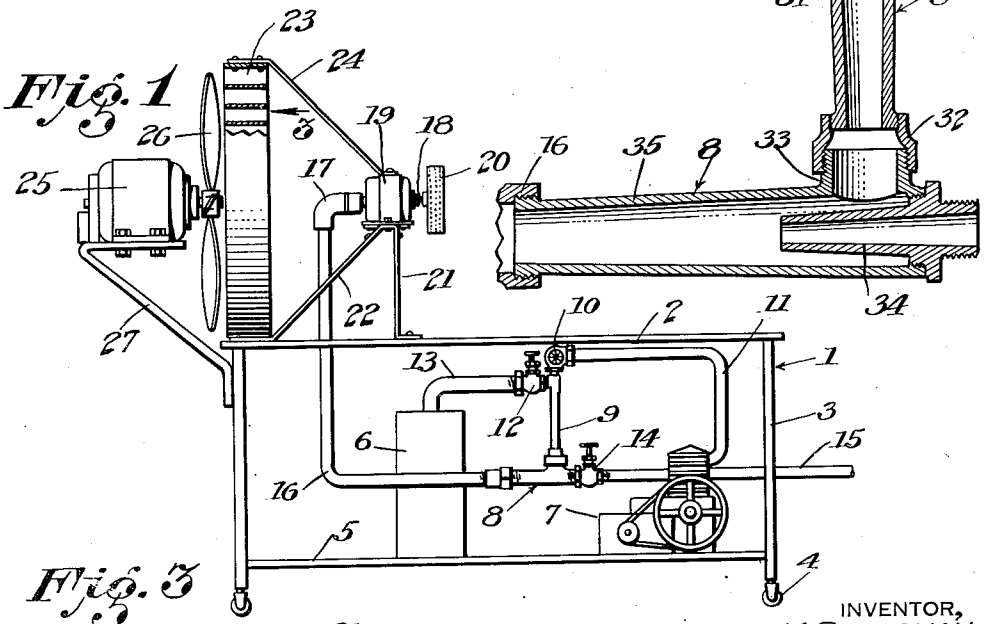
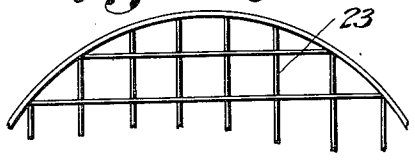


Fig. 3



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ARTIFICIAL SNOW MACHINE

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10 Claims. (Cl. 261—22)

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The present invention relates to a machine adapted to produce artificial snow. The machine is of a type which may be used for motion picture purposes.

It often becomes necessary to produce a blizzard, light falling snow, or a heavy snowing, on a street scene of a city. To use ice which has been crushed and then blown by a blast of air is quite unsatisfactory for the reason that the ice melts very quickly. Furthermore, the use of ice is impracticable due to the fact that it does not float and falls very rapidly.

An object of the present invention is a machine for producing artificial snow in such a manner that the flakes have all the appearance of snow, are soft to the touch, evaporate without resulting wetness, will not produce injury to actors, wherein the size of the snow flakes may be varied at the will of the operator of the machine, and an artificial snow which will remain upon objects for a duration of time without evaporation.

It is to be realized that a snow scene must be such as to have reality and to accomplish this, the present machine is capable of building snow drifts, as well as causing the appearance of a building up of the snow during a snow fall.

The present machine overcomes all the difficulties that are inherent where ice machines are used for the production of snow, and the present machine is easily moved, occupies small space, is inexpensive in cost of manufacture, easily controlled, and superior to machines now known to the inventor.

With the above mentioned and other objects in view, the invention consists in the novel and useful provision, formation, construction, and relative arrangement of parts, members and features, all as shown in one embodiment in the accompanying drawing, described generally, and more particularly pointed out in the claims.

In the drawing:

Figure 1 is a side elevation of the improved artificial snow machine of the invention,

Figure 2 is a fragmentary, partially sectional view on an enlarged scale, of the drum end of the machine,

Figure 3 is a fragmentary view on an enlarged scale and looking in the direction of the arrows 3 of Figure 1,

Figure 4 is a fragmentary view, partly in section, of the ejector means used in the practice of the invention, and,

Figure 5 is a fragmentary view of a modified drum.

Referring now with particularity to the drawing, the improved artificial snow machine is designated as an entirety by the numeral 1, and the same includes a top 2 mounted upon legs, designated generally as 3, of which there may be any number—usualy four—which legs in turn carry casters 4. Beneath the top 2 and secured to the legs is a shelf 5. All of the apparatus hereinafter described is either supported on the shelf or on the top. The casters make it possible to move the machine as an entirety.

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The mechanism of the invention includes a tank 6 supported on the shelf 5, an air compressor 7 secured to the shelf, and ejector means 8 and 9. The ejector means 9 communicates with the compressor 7 through a valve connection 10 and a pipe 11, while the ejector 9 likewise communicates with tank 6 through valve 12 and the pipe 13. The ejector 8 is in valved connection at 14 with a pipe 15 which leads to a source of water supply and the ejector means 8 communicates through a flexible hose 16 with a swivel joint fitting 17. The swivel joint fitting, in turn, connects with a hollow or tubular shaft 18 of a motor 19. One end of the shaft 18 carries a perforated drum 20 or 44. The motor 19 is mounted upon suitable framin, such as the pedestal shown at 21, which pedestal is secured to the top 2. A brace 22 is carried between the motor or a support for the motor and the top. Rearward of motor 19 is a grille or honeycomb 23 and the brace 22 as well as brace 24 are secured to the grille or honeycomb for the purpose of stabilizing the same. The motor 25 carries a propeller 26 for the purpose of driving a blast of air through the grille and past the drum 20. The motor 25 is carried by support 27 secured to one of the legs 3.

The foregoing constitutes a brief description of the various instrumentalities used in the practice of the invention, together with the cooperative arrangement thereof. The compressor 7 is of any ordinary type which may rapidly compress air and may include an air pressure chamber or tank in addition to the compressor shown, if found necessary. The material which is to be stored in the container 6 is of a nature which will combine with water and air to produce the artificial snow. This material is known to the trade as "Phomaide," a material which is used in firefighting. This material is described in United States Letters Patent to McElroy, et al., Patent No. 1,829,714, granted October 27, 1931, and entitled "Art of Firefighting and Fire Protection." In said patent, the inventors point out that aluminum sulphate and sodium bicarbonate may be utilized, as well as certain acids or other gas producing

reagents and albumen to form a lather of foam-like minute bubbles. In addition to the use of "Phomaide," I may utilize a material formed by a solution of dilute sulphuric acid and natural gypsum or calcium sulphate, as described in United States Letters Patent No. 1,746,717, granted February 11, 1930, for "Artificial Snow," to Ralph W. Simpson. United States Letters Patent to John A. Rice, No. 1,569,396, granted January 12, 1926, for "Process of Producing Artificial Snow," discloses the use of finely powdered rosin with water, to which is added aqua-ammonia for the purpose of saponifying the rosin. However, for practical purposes, I prefer to use "Phomaide," as it is commercially known, and a small amount thereof is used with a large amount of water, together with air under pressure; for instance, 1 part of "Phomaide" to 10 parts of water, while exerting an air pressure of 100 pounds per square inch. To accomplish this, I provide at 8 and 9 the two ejector devices. These devices are illustrated in section in Figure 4. It will be observed that the ejector device 9 includes a Venturi tube 28, within which is positioned a nozzle 29, the inlet of the nozzle leading to valve 10, with the outlet of the nozzle positioned inwardly of the Venturi tube and in such a manner that valve 12, at its outlet 30, communicates with the space 31 included between the nozzle and the interior of the tube 28. Such arrangement, of course, acts as an ejector in that, dependent upon the opening of valve 12, the foam material in container 6 is drawn within the ejector in measured quantity. The outlet end of the Venturi tube is secured by a coupling 32 to a fitting 33 which communicates with the space included between a nozzle 34 and the interior of Venturi tube 35 which constitutes the ejector means 8. Nozzle 34 is connected through valve 14 with pipe 15 leading to the source of water supply and, as previously stated, the outlet end of the Venturi tube 35 is connected through a suitable fitting with flexible pipe 16. Hence, by regulating the valve openings of valves 10, 12 and 14, any desired relationship between air, water, and foam material may be attained, whereby the proportions of said materials or substances may be proportionately varied at will.

The swivel joint at 17 is such as to allow the hollow shaft 18 of the motor 19 to rotate while permitting the material to pass through pipe 16, fitting 17, and into the drum 20. It will be noted that the internal diameter of the pipe 16 and of shaft 18 are approximately the same. A construction such as shown at 17 is ordinary in the practice, and usually includes the use of so-called O rings which permit the fitting or joint to move and prevent leakage. In Figure 2, this swivel joint is detailed and has a 90° bend with a pair of annular grooves at one end of said fitting, as shown at 36 and 37, the fitting 38 being oppositely grooved, and between said grooves are fitted the O rings. The fitting 38 is connected with the hollow shaft 18 of the motor 19. The outer end of said hollow shaft is enlarged at 39 and carries the drum 20.

Drum 20 includes a pair of imperforate spaced-apart side plates 40 and 41, with a circular wall 42 interconnecting the peripheries of said side plates 40 and 41. The circular wall 42 is formed with a plurality of spaced circumferential transverse openings 43 which may be arranged in rows. These openings or perforations permit the material to escape therethrough, which material is acted upon by a blast of air directed through the grille or honeycomb 23 by the propeller 26 when the motor 25 is in operation.

In Figure 5, the drum 44 is conical in form and the side wall is provided with rows of perforations 45. The hollow or tubular motor shaft attaches to the base, as shown.

The operation, uses and advantages of the invention just described are as follows:

Assuming that the device is used for the production of artificial snow when on location, the valves 10, 12 and 14 are opened, by way of example, so that one part of "Phomaide" is ejected by the ejector means 9 into ejector 8, under air pressure from the compressor 7 in proportion of 10 parts of water, and under an air pressure of 100 pounds per square inch. The nozzle 29 will cause the material in container 6 to be drawn therefrom through pipe 13, the valve 12, and into the Venturi-type tube 28, in the well understood manner. Also, the nozzle 34 will aid in movement of liquid therethrough, to-wit, water, in mixing the foam material and the air with the water. It will be understood that this is a continuous process and wherein the material is thoroughly admixed with air and water by the ejector system shown. The mixed mass is received within the rotating drum 20 or 44, it being assumed that the motor 19 is energized. Depending upon the volume of air directed in a horizontal path through use of the honeycomb 23 from the propeller 26, the material which is passed through the perforations of drum 20 or 44 is acted upon by the air blast to direct the path of movement of the flakes of artificial snow. The air under pressure from the fan 26, together with the rate of rotation of the drum plays an important part in this invention, in that the drum meters the size of the artificial snow flakes. In addition, if the proportion is varied so that the air delivered from compressor 7 is proportionately greater than the amount of material metered from the container 6 holding the foam material, the amount of water remaining the same, the flakes will be lighter in texture. If the amount of water is increased, the flakes will be heavier. Thus, the more air, the lighter the flakes. The area covered by the snow flakes is controlled by varying the revolutions per minute of the propeller 26. In other words, the greater the volume of air passed through the honeycomb, the greater the covering area of artificial snow. As the admixed "Phomaide," water, and air under pressure is directed into the drum, the mixture will pass through the perforations in said drum. If the drum is rotating slowly, a greater amount of material will pass through the perforations, with resulting larger flakes. On the other hand, if the drum is rotating at a high speed, the amount of material directed through the perforations will be small, as will likewise the flakes. The propeller 26, in its rate of revolution per minute, governs the covering area of the flakes only.

The admixed foam material must be directed into the drum, it being noted that the drum forms a complete enclosure, the only outlet being through the perforations. Hence, if too great an amount of the admixed foam material is fed into the rotating drum, the only result is larger flakes of artificial snow. Often snow is required to fall directly above a street. The conical drum 44 may be used with the motor suspended downwardly from a cable. When the conical drum is rotated, the foam material is thrown outwardly and downwardly. The air blast means need not

be used. I have found that best results are obtained when the foam material is piped directly into the drum, the drum perforations controlling the flake formation.

By this device, I have provided a dirigible structure, in that all of the essential mechanical apparatus is mounted upon a table which may be moved to different locations. The tank or container 6 may be filled with fluid of the type stated and all that it is necessary to do is connect the water line 15 with a source of water supply. Several of these machines may be used at different locations on the same set so as to produce variable effects, snow scenes such as may be produced by variable direction wind. The snow flakes will remain on the ground or set for a considerable period of time without melting, and as the snow flakes disappear without wetness, no harm is done to the set or to the actors. It is possible, by use of the present apparatus, to photograph and re-photograph the set and the action without varying the appearance of the set, something that would be quite impossible of accomplishment where crushed ice is used, as the ice, of necessity, melts and may cause damage to the set and a wetting of the action or actors.

Ordinarily, the motor 19 is controlled by a rheostat. If the artificial snow flakes formed by the rotating drum are too heavy, the rheostat is moved so as to increase motor speed, and vice versa, if the flakes are too light. All of this may be accomplished without varying the ratio of foam material to air and water.

I claim:

1. An apparatus for forming and dispersing artificial snow flakes including a foam material tank, an air compressor, a pipe for supplying water under pressure, a series of conduits for connecting the water pipe air compressor and foam material tank including injectors for successively feeding and commingling the materials and discharging the same through a single outlet, a motor, a hollow shaft for the motor swivelly connected at one end to said outlet, and a perforated metering drum at the other end of said shaft.

2. An apparatus for forming and dispersing artificial snow flakes including a foam material tank, an air compressor, a pipe for supplying water under pressure, a series of conduits for connecting the water pipe air compressor and foam material tank including injectors for successively feeding and commingling the materials and discharging the same through a single outlet, a motor, a hollow shaft for the motor swivelly connected at one end to said outlet, a perforated metering drum at the other end of said shaft, a second motor in spaced alignment with the first motor, and a propeller driven by the second motor to direct a blast of air across said perforated metering drum.

3. An apparatus for forming and dispersing artificial snow flakes including a dirigible carriage, a foam material containing tank and an air compressor mounted on said carriage, a series of conduits connecting the air compressor and tank and leading to a pipe supplying water under pressure, injectors and valves for said conduits for feeding, commingling and controlling the volume of materials fed thereto, an outlet conduit extending to a point above the carriage, a pair of spaced aligned motors mounted on and above the carriage, a hollow shaft for one motor swivelly connected at one end to the outlet conduit, a perforated metering drum at the other end of said shaft, and a propeller driven by the second motor.

4. The method of forming artificial snow flakes which consists of mixing foam material, compressed air and water under pressure by successive controlled injections in a single direction of flow, directing the mixture to a single outlet zone, and centrifugalizing the mixture at said zone to form and disperse the mixture into artificial snow flakes.

5. The method of forming artificial snow flakes which consists of mixing foam material, compressed air and water under pressure by successive controlled injections in a single direction of flow, directing the mixture to a single outlet zone, centrifugalizing the mixture at said zone to form and disperse the mixture into artificial snow flakes, and directing a blast of air across the dispersed snow flakes to direct them to an area to be covered.

6. In an apparatus for forming and dispensing artificial snow flakes including an air compressor, a foam material tank and a water supply, means for feeding and commingling the air, foam material and water comprising a series of conduits connected therewith forming a single flow line starting with the air compressor and terminating with a single outlet, successive injectors in said line for successively feeding by injection of foam material and water in the flow line, a flow line control valve for each injector for controlling the volume of the fed materials to vary the texture of the commingled material, and a rotatable perforated metering means at the outlet of the flow line to form and disperse artificial snow flakes from the commingled material forced therethrough.

7. In an apparatus for forming and dispensing artificial snow flakes including an air compressor, a foam material tank and a water supply, means for feeding and commingling the air, foam material and water comprising a series of conduits connected therewith forming a single flow line starting with the air compressor and terminating with a single outlet, successive injectors in said line for successively feeding by injection of foam material and water in the flow line, a flow line control valve for each injector for controlling the volume of the fed materials to vary the texture of the commingled material, and a variable speed rotatable perforated metering drum at the outlet of the flow line to form, disperse and vary the size of artificial snow flakes formed from the commingled material forced therethrough.

8. In an apparatus for forming and dispensing artificial snow flakes including an air compressor, a foam material tank and a water supply, means for feeding and commingling the air, foam material and water comprising a series of conduits connected therewith forming a single flow line starting with the air compressor and terminating with a single outlet, successive injectors in said line for successively feeding by injection of foam material and water in the flow line, a flow line control valve for each injector for controlling the volume of the fed materials to vary the texture of the commingled material, a rotatable perforated metering means at the outlet of the flow line to form and disperse artificial snow flakes from the commingled material forced therethrough, and means to direct a blast of air across said metering means to direct the snow flakes over a given area.

9. In an apparatus for forming and dispensing

artificial snow flakes including an air compressor, a foam material tank and a water supply, means for feeding and commingling the air, foam material and water comprising a series of conduits connected therewith forming a single flow line starting with the air compressor and terminating with a single outlet, successive injectors in said line for successively feeding by injection of foam material and water in the flow line, a flow line control valve for each injector for controlling the volume of the fed materials to vary the texture of the commingled material, a variable speed rotatable perforated metering drum at the outlet of the flow line to form, disperse and vary the size of artificial snow flakes formed from the commingled material forced therethrough, and a variable speed fan to direct a blast of air across the drum to vary the area of dispersion of the snow flakes.

10. In an apparatus for forming and dispensing artificial snow flakes including an air compressor, a foam material tank and a water supply, means for feeding and commingling the air, foam material and water comprising a series of conduits connected therewith forming a single flow line starting with the air compressor and

terminating with a single outlet, successive injectors in said line for successively feeding by injection of foam material and water in the flow line, a flow line control valve for each injector for controlling the volume of the fed materials to vary the texture of the commingled material, a variable speed rotatable perforated metering drum at the outlet of the flow line to form, disperse and vary the size of artificial snow flakes formed from the commingled material forced therethrough, a variable speed fan to direct a blast of air across the drum to vary the area of dispersion of the snow flakes and a grille interposed between the fan and drum.

RUSSELL M. SHEARMAN.

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