Feb. 27, 1951 R. SOLOMON ET AL 2,543,606

APPARATUS FOR PRODUCING SIMULATED SNOWSTORMS

Filed April 5, 1949 4 Sheets-Sheet 1

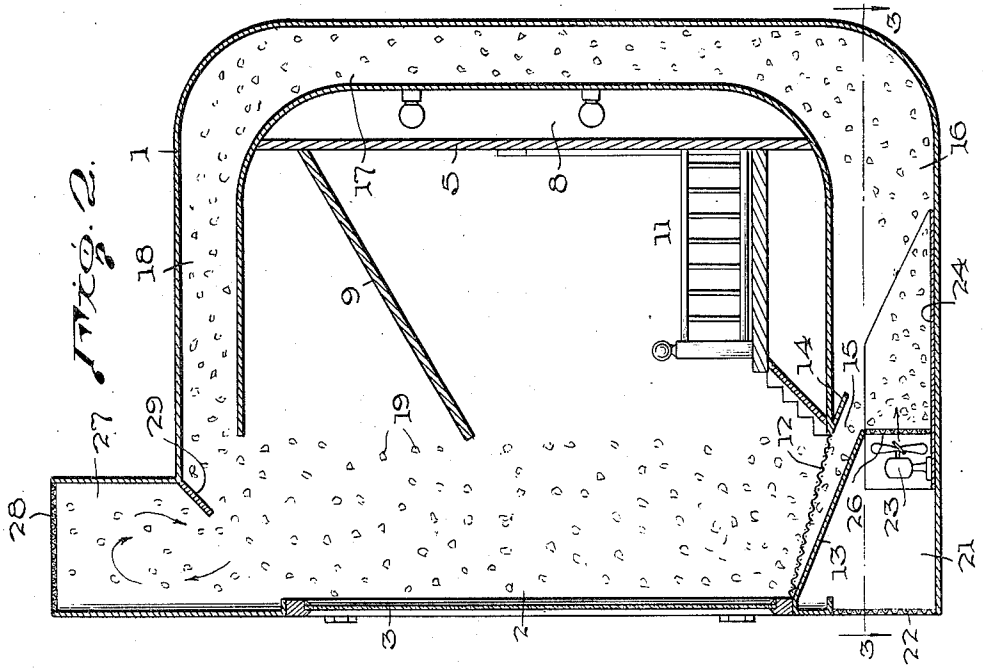


Fig. 2.

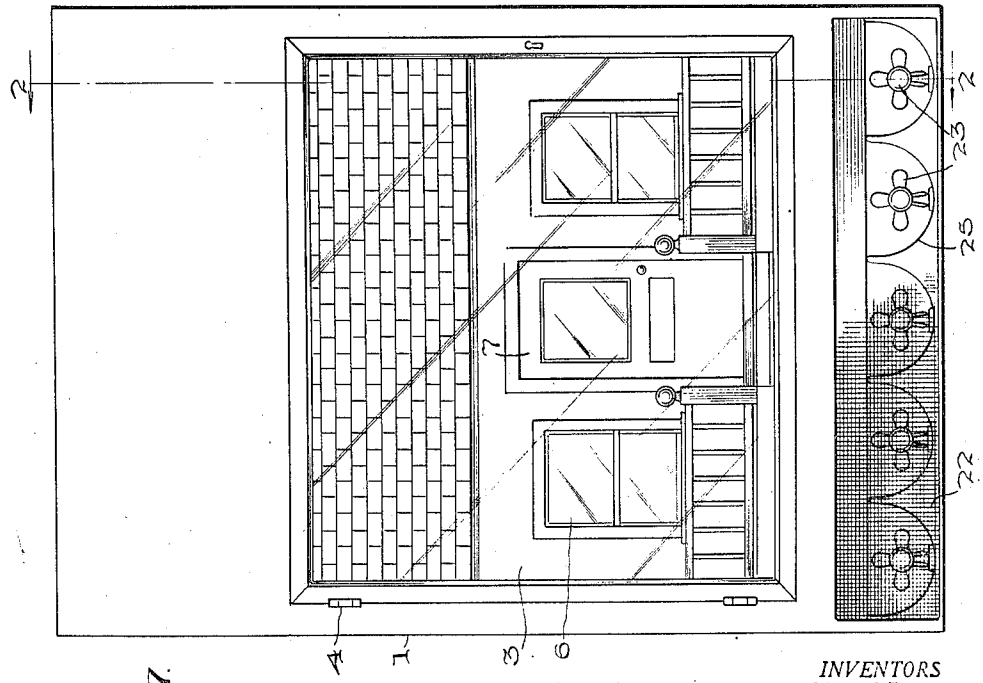


Fig. 1.

INVENTORS
RANDOLPH SOLOMON
MARVIN R. SOLOMON

BY Pennie Edmonds Morton Barrow

ATTORNEYS

Feb. 27, 1951 R. SOLOMON ET AL 2,543,606

APPARATUS FOR PRODUCING SIMULATED SNOWSTORMS

Filed April 5, 1949 4 Sheets-Sheet 2

Fig. 3.

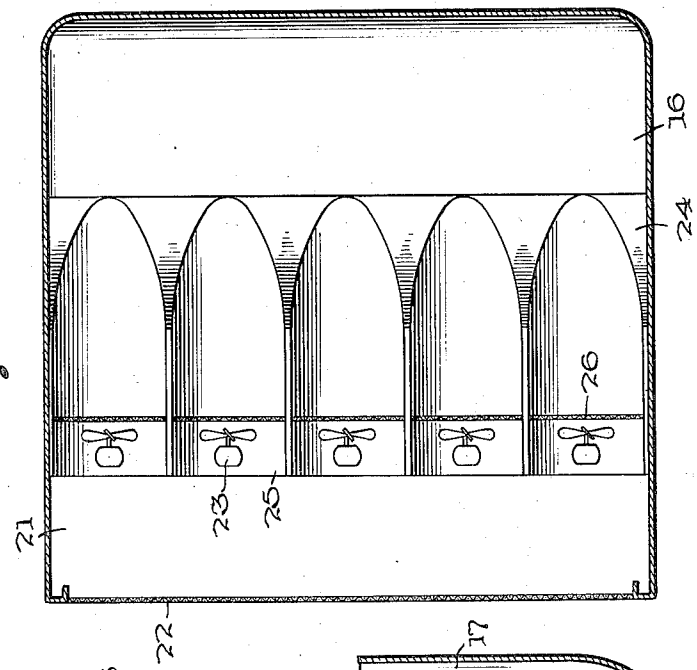


Fig. 7.

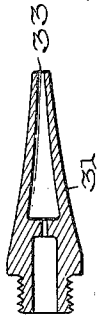


Fig. 6.

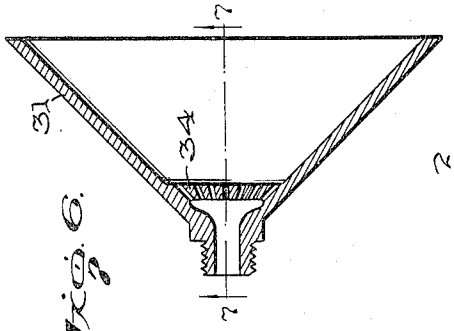


Fig. 4.

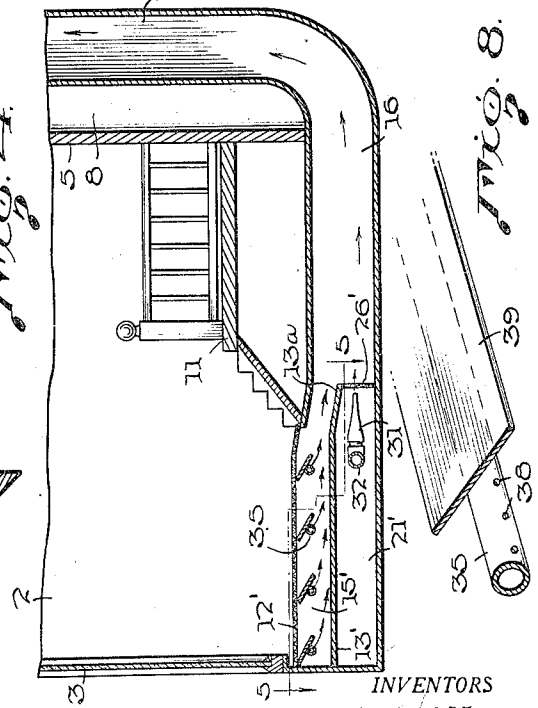


Fig. 8.

INVENTORS
RANDOLPH SOLOMON
MARVIN R. SOLOMON

BY Pennie Edmonds Morton Taylor & Adams

ATTORNEYS

Feb. 27, 1951 R. SOLOMON ET AL 2,543,606

APPARATUS FOR PRODUCING SIMULATED SNOWSTORMS

Filed April 5, 1949 4 Sheets-Sheet 3

Fig. 5.

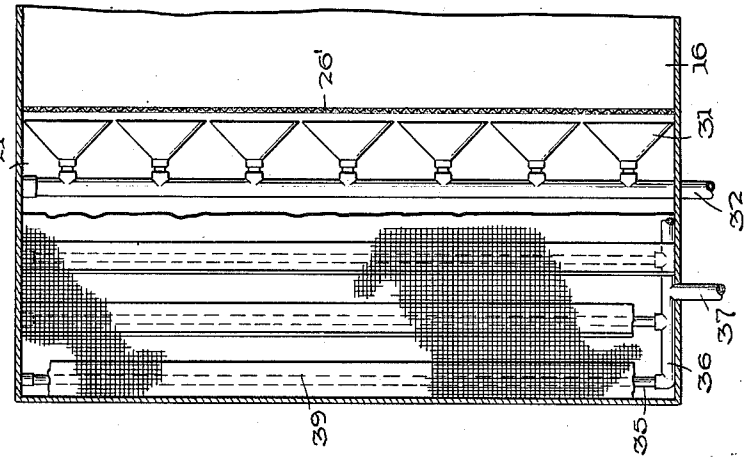
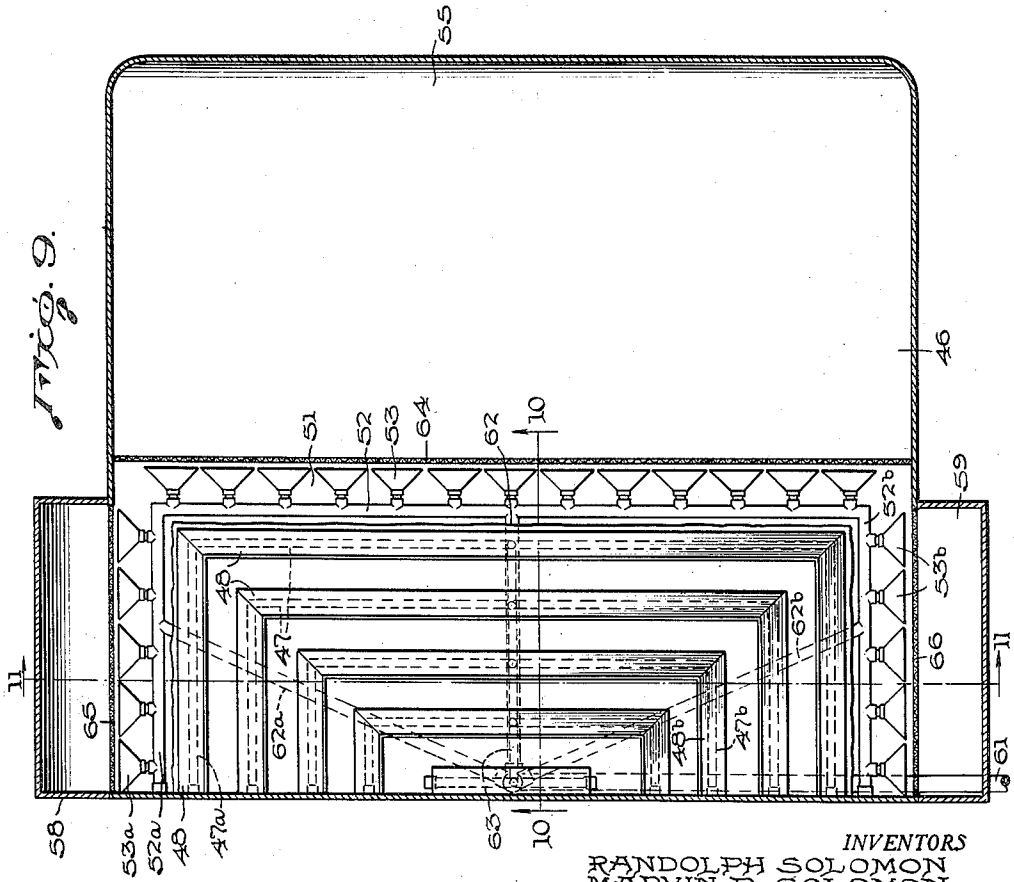


Fig. 9.



INVENTORS
RANDOLPH SOLOMON
MARVIN R. SOLOMON

BY Pennie Edmonds Morton & Barrows

ATTORNEYS

Feb. 27, 1951 R. SOLOMON ET AL 2,543,606

APPARATUS FOR PRODUCING SIMULATED SNOWSTORMS

Filed April 5, 1949 4 Sheets-Sheet 4

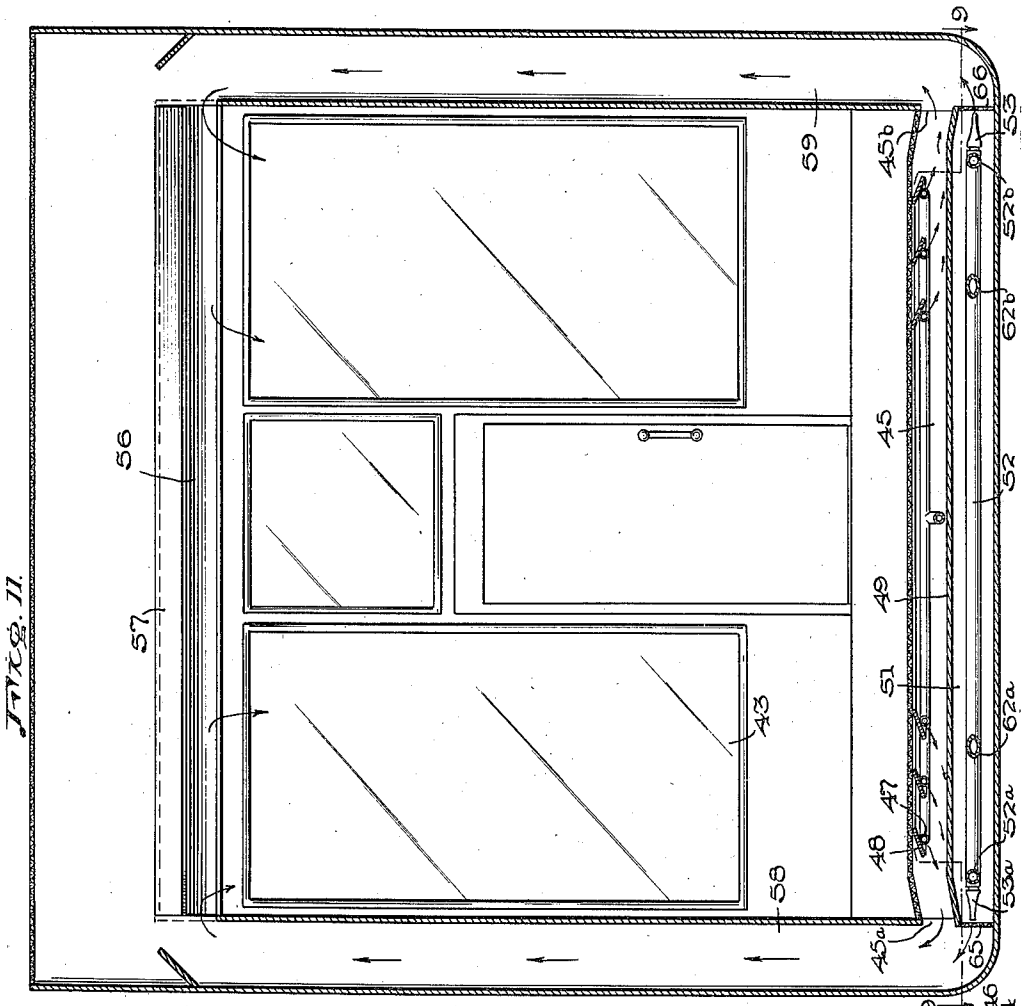


Fig. 11.

Fig. 10.

INVENTORS
RANDOLPH SOLOMON
MARVIN R SOLOMON
BY Pennie Edmonds Morton & Barrows
ATTORNEYS

Patented Feb. 27, 1951 2,543,606

UNITED STATES PATENT OFFICE

2,543,606

APPARATUS FOR PRODUCING SIMULATED SNOWSTORMS

Randolph Solomon, Washington, D. C., and Marvin R. Solomon, Alexandria, Va.; said Randolph Solomon assignor of one-fourth to Florence W. Solomon and said Marvin R. Solomon assignor of one-fourth to Martha L. Solomon, both of Alexandria, Va.

Application April 5, 1949, Serial No. 85,666

7 Claims. (Cl. 272—8)

1

This invention relates to a display device which may be placed in or embodied in a show window or a theatre, or which may be used at any other place and which will produce a simulated snow storm.

In accordance with the invention, small particles of white paper or other material, which may be of a size and shape generally approximating snowflakes, are caused to fall slowly behind a window. As the small particles simulating the snowflakes reach the lower portion of the display device they are caught by a blast of air and conducted through a closed duct or passage to the upper portion of the display device to again fall slowly behind the window. Thus, the snow-simulating particles constantly are in circulation with the result that a simulation of a continuing snow storm is obtained as long as the blast of air continues.

The invention will be further described in connection with the accompanying drawings which illustrate several embodiments of apparatus which may be used in producing the simulated snow storms. However, it is to be understood that such further and detailed description is by way of exemplification and the invention is not limited thereby.

In the drawings:

Fig. 1 is a front elevational view of a display device embodying one form of my invention,

Fig. 2 is a vertical sectional view on line 2—2 of Fig. 1,

Fig. 3 is a horizontal sectional view on line 3—3 of Fig. 2,

Fig. 4 is a partial sectional view, similar to Fig. 2, of a modified form of the display device,

Fig. 5 is a horizontal sectional view on line 5—5 of Fig. 4,

Figs. 6, 7 and 8 are detail views of features of the embodiment of the invention shown in Figs. 4 and 5,

Fig. 9 is a horizontal sectional view of a further embodiment of the invention taken on line 9—9 of Fig. 11,

Fig. 10 is a vertical sectional view taken on line 10—10 of Fig. 9, and

Fig. 11 is a horizontal sectional view taken on line 11—11 of Fig. 9.

Referring first to Figs. 1 to 3, the display device comprises a housing 1 which encloses a display space 2 in which articles may be displayed and in which the simulated snow storm is produced. The housing may be a separate unit or it may form a part of or an entire display window of a store, or the like.

2

The front of the display space is closed by a large window 3 hinged at one side, as at 4, to give access to the space 2 for the arranging of displays and the like. The rear wall 5 of the display space 2 may be so formed as to depict any desired scene. In the drawings it is shown as depicting a portion of the front of a house; and in order to make it more realistic is formed with window and door simulations 6 and 7, respectively, having glass panes through which light from an illuminated space 8 in the rear of the wall 5 may shine. Lamps 9 are placed in the space 8 for providing the necessary illumination. A simulated roof 9 and porch 10 contribute to giving a more realistic appearance to the depicted house, and the porch provides a space on which displays may be made, if desired.

The floor of the space between the front of the porch 11 and the window 3, which also may be used for supporting articles to be displayed, is foraminous for the passage of artificial or simulated snowflakes in the manner hereinafter described and preferably is formed of a relatively coarse screen 12 having openings of such size that the artificial snowflakes will readily pass therethrough. An inclined wall 13 is positioned beneath the screen 12, and with the screen 12 and a baffle 14 forms a downwardly and rearwardly inclined space 15 which extends the entire width of the display space 2 and opens at its lower rear end into a lower horizontal duct 16 which also is the full width of the display space. The rear of the horizontal duct 16 communicates with a vertical duct which passes upwardly behind the illuminated space 8 and at its uper end connects with the rear side of a forwardly-extending upper horizontal duct 18. The upper horizontal duct 18, which also is the full width of the display space 2, is at a level above the window 3 and forms the ceiling of the display space. The forward or front end of the horizontal duct 18 is open and terminates a substantial distance from the front of the housing.

The display space 2, the inclined space 15, the lower and upper horizontal ducts 16 and 18, and the connecting vertical duct 17 form a path for the continuous circulation of simulated snowflakes 19, which preferably are formed of small pieces of light white tissue paper of a size approximating the size of real snowflakes. If desired, the paper of which the simulated snowflakes are formed may be slightly crumpled to increase its resistance to free falling.

The space between the bottom wall of the housing 1 and the inclined wall 13 forms an air

box 21 in front of the horizontal duct 16 extending the full width of the display device. The front wall 22 of the air box 21 is formed of wire mesh or otherwise made foraminous so that air from the outside will freely pass therethrough. A plurality of electric fans 23 provide means for pulling outside air into the air box and forcing it into the front end of the lower horizontal duct 16 to cause the desired circulation of the simulated snowflakes through the aforesaid path.

Preferably the electric fans are mounted on a removable support 24 formed with a plurality of semicircular troughs 25 with their upper sides open. An electric fan is positioned in each trough. Each trough is provided with a wire or other screen 26 positioned between the fan therein and the lower horizontal duct 16. The screens extend to the top of the troughs and at their upper edges meet the rear end of the inclined wall 13. The screens 26 are of sufficiently fine mesh that the simulated snowflakes will not pass therethrough and into the air box 21 when the fans are not operating. The fan support 24 extends rearwardly well beyond the rear of the inclined space 15 and into the lower horizontal duct 16. Thus, the simulated snowflakes dropping from the rear of the inclined space fall into the several troughs where they are caught by a blast from the fan in that particular trough and projected rearwardly in a restricted path so that a more uniform distribution of them is obtained.

A chimney or upward exhaust extension 27 of the housing extends entirely thereacross, above the display window 3. The chimney or exhaust extension 27 has its upper or outlet side covered with a screen 28 of mesh sufficiently fine to prevent the passage of the simulated snowflakes while permitting the free passage therethrough of the air in which they are entrained. The cross-sectional area of the chimney or extension 27 is relatively large compared to the cross-sectional area of the upper horizontal duct 18 to ensure that the velocity of the air traveling therethrough will be sufficiently low that the simulated snowflakes will drop therefrom and fall back into the display space and not collect on the inside of the screen 28 where they not only would clog the screen, but also be ineffective for their intended purpose. To further ensure the suspended simulated snowflakes dropping out of the air before it is exhausted through the chimney 27 and their falling down behind the display window, a downwardly-extending baffle 29 is positioned at the upper forward edge of the upper horizontal duct 18.

In operation, the simulated snowflakes dropping through the screen 12 are sucked through the passage 15 by the blasts from the fans 23 and then forced rearwardly along the lower horizontal duct or passage 16, upwardly through the vertical passage 17 and into the upper horizontal passage 18 through which they pass and from which they are discharged through the open forward end into the display space 2. The simulated snowflakes then fall slowly behind the window, giving the appearance of a natural snow storm. On leaving the upper horizontal duct 18, the air in which the simulated snowflakes were entrained, has its velocity greatly reduced, and at such reduced velocity passes upwardly through the chimney or exhaust extension 27 and discharges through the screened outlet 28. Any of the simulated snowflakes which pass upwardly into the chimney or exhaust extension 27 drop out of the upwardly-moving air and join those falling slowly behind the window 3, as the velocity of the air in the chimney or exhaust extension is not sufficient to hold them against the screen 28. Thus, the simulated snowflakes do not accumulate on the inside of the screen and block free passage of air therethrough. Hence, no back pressure builds up in the display space 2 which would interfere with the normal free circulation of the simulated snowflakes, as above described. As the simulated snowflakes reach the bottom or floor of the display space they again pass through the screen 12 for recirculation, so that the appearance of a snow storm continues as long as the fans 23 are operated.

The embodiment of the invention shown in Figs. 4 to 8 differs from the embodiment of Figs. 1 to 3 only with respect to the manner in which the simulated snowflakes are returned to the lower horizontal duct or passage 16 and returned to the upper portion of the display space 2. In those figures, like parts are designated with the same reference characters as the corresponding parts of Figs. 1 to 3.

In this form of the invention the screen 12' which forms the bottom or floor of the display space extends substantially horizontally from the front wall of the display device to the porch 11. Likewise, the wall 13' which forms the lower wall of the space 15' also extends horizontally except for the rear edge portion 13a which slopes slightly towards the lower horizontal duct or passage 16.

The front of the air box 21' is closed by an air impervious wall, and in place of the electric fans of Figs. 1 to 3, the air blasts for causing the circulation of the simulated snowflakes emanate from a series of rearwardly-directed, fish-tail nozzles 31 each threadedly connected to a compressed air manifold 32. As shown in Fig. 5, the nozzles are so positioned along the compressed air manifold that their adjacent edges almost touch one another; also, as disclosed in Fig. 7, each nozzle tapers to a narrow slit-like discharge opening 33. Thus, the air is discharged from the group of nozzles in the form of a sheet-like blast directed into the forward end of the lower horizontal duct or passage 16.

Each nozzle 31 has a perforated partition plate or baffle 34 extending across the rear portion thereof with the perforations therein diverging outwardly at each side of the center so that the blast of air emanating from the compressed air manifold will be spread out substantially uniform across the entire width of each of the nozzles and thereby better provide the sheet-like blast referred to above.

In order to facilitate passage of the simulated snowflakes through the space 15', a series of spaced compressed air pipes 35 extend crosswise of that space. Each pipe 35 is connected to a header 36 which in turn is connected to and receives compressed air from a supply pipe 37. Each pipe 35 is provided with air outlet perforations 38 spaced along the rear side thereof so that the jets of air issuing from the perforations will be directed rearwardly towards the lower horizontal duct 16. A deflector plate 39 is welded or otherwise secured to each of the pipes 35 and inclines rearwardly so that the simulated snowflakes which pass through the screen 12' and fall on the deflector plates will be deflected into the air blasts emitted from the perforations 38 and be carried rearwardly through the space 15' into the forward portion of the lower horizontal duct 16 where they are caught by the sheet-like blast

from the nozzles 31 and circulated to the display space in the manner described above with respect to Figs. 1 to 3.

The air supply pipes 32 and 37 may be connected to the same or separate sources of compressed air. However, if connected to the same source of supply, the pressure of the compressed air supplied to the pipe 37 preferably is reduced to below that supplied to pipe 32 so that the intensity of the blasts emanating from the perforations 38 will be less than the intensity of the blasts from the nozzles 31. It is only necessary that the intensity of the blasts from the perforations 38 be such as to ensure passage of the simulated snowflakes rearwardly through the space 15' to the duct 16 where they will be caught by the circulating blast from the nozzles 31.

A screen 26' extends entirely across the lower horizontal duct 16, just rearwardly of the nozzles to prevent the possibility of the simulated snowflakes passing backwardly into the air box 21' when the display device is not in operation.

The embodiment of the invention shown in Figs. 9, 10 and 11 is similar to that of the preceding forms but includes means for circulating the simulated snowflakes up ducts or passages at each side of the display device into the display space as well as up a duct or passage at the back thereof.

In this form of the invention, the display device comprises a housing 40 having a large front window 41 through which the display space 42 is visible. The window 41 may be hinged to give access to the display space in a manner similar to that in which the window 3 of Fig. 1 is hinged to the housing. The rear wall of the display space 42 is formed with simulated windows 43 through which, if desired, light from an illuminated space therebehind may shine.

As in the embodiment of the invention shown in Figs. 4 to 8, the bottom or floor of the display space is formed of a coarse screen 44 through which the simulated snowflakes pass into a space 45 through which they are directed rearwardly and into the forward or front end of a lower horizontal duct or passage 46 by jets of air discharged through perforated pipes 47 similar in all respects to the perforated pipes 35 shown in Figs. 4 and 8. Each of the perforated pipes 47 also has a downwardly-inclined deflector plate 48 welded or otherwise secured thereto to assist in directing the simulated snowflakes rearwardly through the space 45 and into the blasts of air discharged through the perforations of the pipes 47.

The partition wall 49 separates the space 45 from an air box 51 in which a compressed air manifold 52 is located. A series of fish-tail nozzles 53, identical with the nozzles 31, are threadedly connected to the compressed air manifold 52 and collectively discharge a sheet-like blast of air into the forward or front end of the lower horizontal duct or passage 46 where it entrains the simulated snowflakes and carries them rearwardly through said duct or passage into the vertically-extending duct or passage 55 at the rear of the display device. The simulated snowflakes are blown upwardly through the passage 55 and into the rear of an upper horizontal duct or passage 56 through which they pass and from which they are discharged at the open front end thereof into the display space 42, through which they fall slowly behind the window 41. A downwardly and forwardly inclined baffle 57 assists in directing the simulated snowflakes downwardly behind the window 41.

As so far described, the display device does not differ from the display device of Figs. 4 to 8. However, unlike the display device of those figures, the opposite lateral sides of the space 45 open as at 45^a and 45^b into vertically-extending side ducts or passages 58 and 59, and each of the perforated pipes 47 has extensions 47^a and 47^b extending rearwardly at its ends to which deflector plates 48^a and 48^b, inclined towards the respective sides, are attached. Also, the air manifold 52 has extensions 52^a and 52^b extending rearwardly at its ends, with series of fish-tail nozzles 53^a and 53^b threadedly connected to them.

Compressed air for the manifolds 52, 52^a and 52^b, as well as for the perforated pipes 47, 47^a and 47^b is supplied through a main supply pipe 61. Pipes 62, 62^a and 62^b extend from the main supply pipe 61 to the compressed air manifolds 52, 52^a and 52^b, and a pipe 63 connects the supply pipe 61 to each of the perforated air pipes 47, 47^a and 47^b.

To prevent possible passage of the simulated snowflakes into the air box 51 from the lower horizontal duct 46 when the display device is not in operation, a wire screen 64 having a mesh sufficiently small to prevent passage of the simulated snowflakes therethrough closes the rear side of the air box between the rear edge of the partition wall 49 and the bottom of the housing, and similar screens 65 and 66 close the lateral sides of the air box where they adjoin the vertical side ducts 58 and 59.

As in the preceding embodiments of the invention, a chimney or exhaust extension 67 extends upwardly at the top front of the housing and has its open upper side closed with a wire screen 68 through which the simulated snowflakes will not pass. The cross-sectional area of the chimney or exhaust extension is relatively large compared to the cross-sectional area of the upper horizontal duct 56 so that the air stream on discharge from the open forward end of the upper horizontal duct will have its velocity reduced sufficiently that the simulated snowflakes will drop therefrom and fall slowly behind the window 41.

Operation of the display device of Figs. 9 to 11 is similar to that of the preceding figures. The simulated snowflakes falling upon the foraminous floor 44 pass therethrough into the space 45. However, only those falling in front of the several perforated pipes 47 are directed rearwardly into the forward end of the lower horizontal duct 46 where they are caught by the sheet-like blast from the nozzles 53 and caused to pass through that duct, the vertical duct 55 and the upper horizontal duct 56 to be discharged into the upper portions of the display space 42. Those simulated snowflakes which fall in front of the lateral perforated pipes 47^a are blown directly into the lower end of the vertical left-hand side duct 58 where they are caught by the blast from the nozzles 53^a which carries them upwardly through that duct until they are deflected by the inclined baffle 69 at the upper end of that duct into the upper left-hand side of the display space 42. Likewise, those simulated snowflakes which fall in front of lateral perforated pipes 47^b are blown into the lower end of the right-hand side duct 59 and carried by the air blast from nozzles 53^b upwardly through that duct until the deflector

plate 71 at the upper end thereof deflects them into the upper right-hand side of the display space.

All of the simulated snowflakes enter the display space above the level of the show window 41 and slowly fall behind it, giving the appearance of a snow storm as long as compressed air is supplied to the nozzle to the nozzles 53, 53a and 53b.

The air stream from which the simulated snowflakes have fallen exhausts through the screen 68 at the top of the exhaust passage 67. The relatively large area of the exhaust passage ensures a sufficient reduction in the velocity of the air stream before it is exhausted that the simulated snowflakes readily fall therefrom into the display space and are not carried upwardly in the exhaust passage to collect on the inside of the screen 68 where they would clog the screen and cause a back pressure to build it up in the display space which would interfere with proper operation of the device.

The "heaviness" of the simulated snow storm which is produced in the display space in any of the embodiments of the invention may be controlled by the amount of the simulated snowflakes which are put in the display device for circulation as previously described and by controlling the intensity of the circulating air blasts, and consequently the rate at which the simulated snowflakes are circulated.

In each embodiment of the invention, the simulated snowflakes have been described as passing directly into the upper portion of the display space. However, if desired, they may first be deposited from the flowing air stream into a suitable receptacle above the display space and then permitted to pass from it into the top of the display space to fall slowly behind the show window. Also, changes may be made in the details of the display devices above described without departing from the spirit of the invention or sacrificing any of the advantages thereof.

We claim:

1. A snow-storm simulating device comprising a casing at least in part enclosing a display space through which simulated snowflakes are adapted to fall, a duct extending from adjacent the lower portion of said display space to adjacent the upper portion thereof, means whereby air from outside of said casing may be forced through said duct from the lower portion to the upper portion thereof, a passageway from the lower portion of the display space to the lower portion of said duct through which simulated snowflakes may pass for entrainment by air moving through the duct, a passageway from the upper portion of the duct to the upper portion of the display space, and means for separating sufficient of the air from the entrained simulated snowflakes and exhausting the separated air after the air and entrained snowflakes have been discharged from the upper end of the duct and before they have passed through the display space that the simulated snowflakes from which the air was separated will fall substantially freely through the display space.

2. A snow-storm simulating device as defined in claim 1 in which said air exhaust means has a cross-sectional area greater than the cross-sectional area of the outlet from the upper portion of the duct, whereby the velocity of the air passing from said outlet is reduced before being exhausted through said air exhaust means.

3. A snow-storm simulating device as defined in claim 1 in which the display space has a floor and the passage from the lower portion of the display space to the lower portion of the duct extends through the floor.

4. A snow-storm simulating device comprising a casing at least in part enclosing a display space, a floor for said display space, an air box beneath the floor, a space between the air box and the floor, said floor having openings therethrough through which simulated snowflakes may pass into the space between the air box and the floor, a duct having a lower end communicating both with said air box and the space between the air box and the floor and an upper end communicating with the upper portion of the display space, means for forcing air from said air box into the end of the duct with which it communicates to create a flow of air in said duct which will suck simulated snowflakes from the space between the air box and the floor into the duct for delivery to the upper portion of the display space, and means for separating sufficient of the air from the entrained simulated snowflakes and exhausting the separated air after the air and entrained snowflakes have been discharged from the upper end of the duct and before they have passed through the display space that the simulated snowflakes from which the air was separated will fall substantially freely through the display space.

5. A snow-storm simulating device as defined in claim 4 in which the air box has openings communicating with the atmosphere exteriorly of the casing, a plurality of electric fans are located in the air box and are positioned side-by-side for forcing air into and through the air duct, and means are provided for maintaining the air blast from each fan substantially separate from the air blast from each other fan until it enters the air duct.

6. A snow-storm simulating device as set forth in claim 4 in which a compressed air manifold is positioned in the air box and has a plurality of nozzles positioned to direct air blasts therefrom into the lower end portion of the duct.

7. A snow-storm simulating device comprising a casing at least in part enclosing a display space through which simulated snowflakes are adapted to fall, a floor for said display space having openings therethrough for the passage of simulated snowflakes, an air space beneath said floor for receiving simulated snowflakes passing through said openings, separate air ducts communicating with said air space beneath the floor and extending vertically at opposite sides and at the back of the display space, respectively, the upper ends of said vertical air ducts communicating with the upper portion of the display space, means for causing an upward draft of air in each of said ducts, at least one generally U-shaped compressed air pipe having perforations in the base thereof directed towards the vertical air duct in the rear of the display space and perforations in the legs thereof directed towards the respective vertical air ducts at the sides of the display space to cause simulated snowflakes falling into the air space beneath the floor to pass into said vertical ducts and to be entrained by the upwardly-moving drafts of air in them and to be carried thereby into the upper portion of the display space to fall therethrough, and means for separating sufficient of the air from the entrained simulated snowflakes and exhausting the separated air after the air and entrained snowflakes have been discharged from the upper end of the ducts and before they have passed through

the display space that the simulated snowflakes from which the air was separated will fall substantially freely through the display space.

RANDOLPH SOLOMON.
MARVIN R. SOLOMON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
177,585	Stoddard	May 16, 1876
1,101,422	Fielding	June 23, 1914
1,882,030	Pennington	Oct. 11, 1932
2,181,635	Tull	Nov. 28, 1939
2,332,174	Shreve	Oct. 19, 1943