March 25, 1941. O. M. SUMMERS 2,235,966

REFRIGERATING APPARATUS

Filed June 27, 1935 2 Sheets-Sheet 1

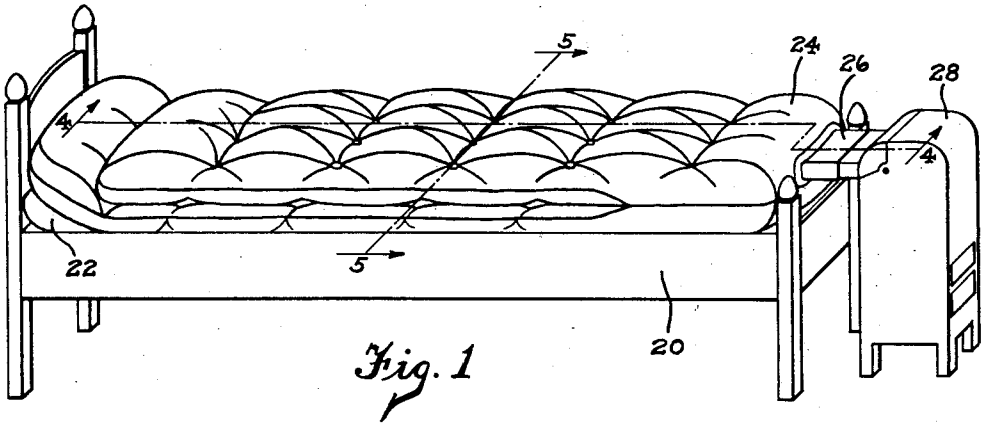


Fig. 1

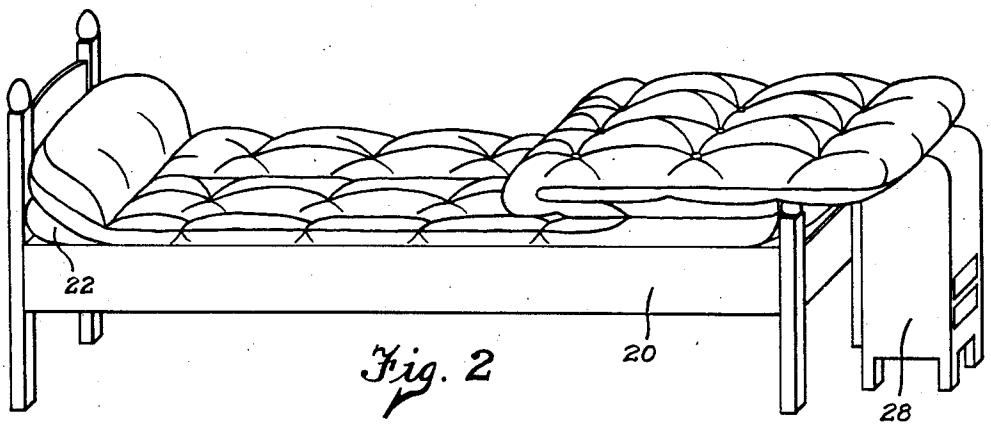


Fig. 2

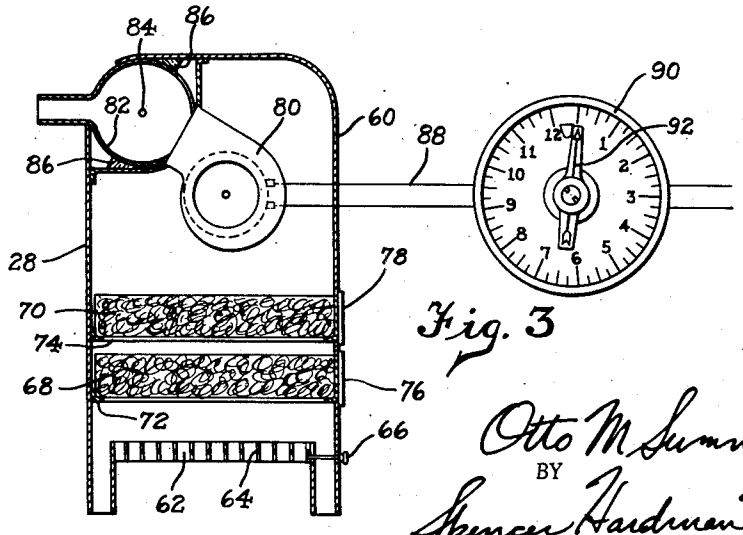


Fig. 3

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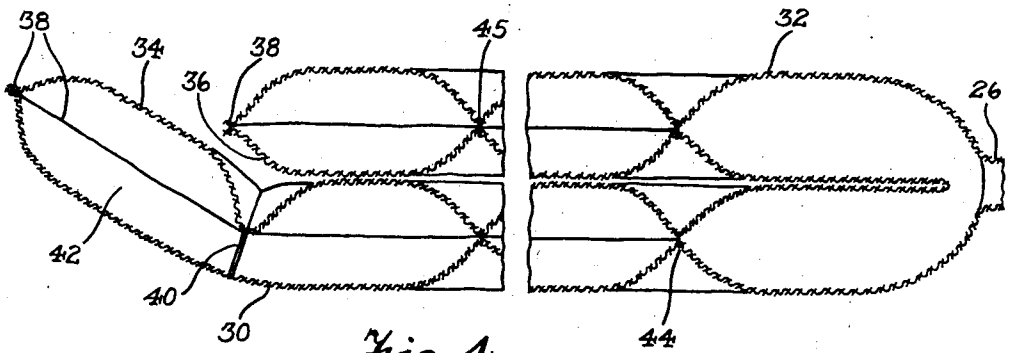


Fig. 4

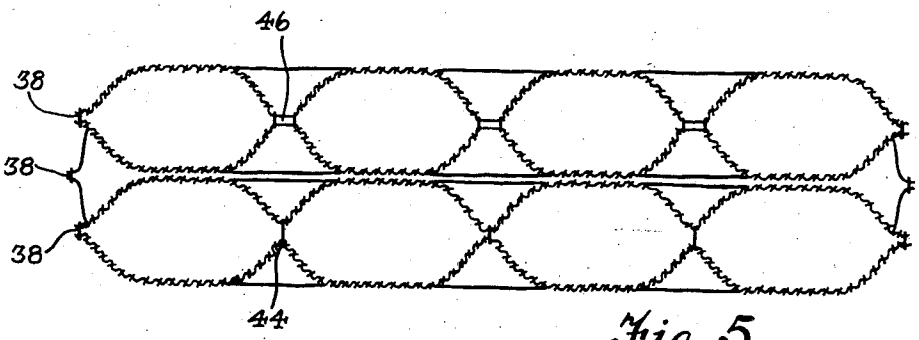


Fig. 5

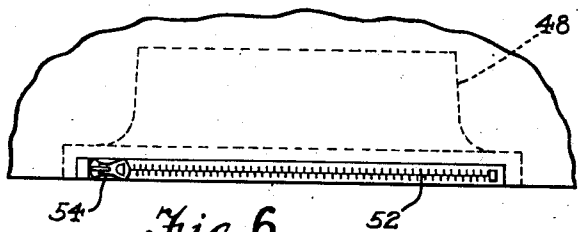


Fig. 6

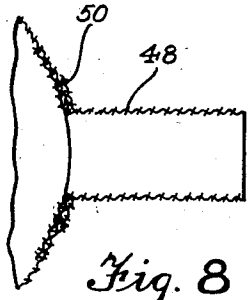


Fig. 8

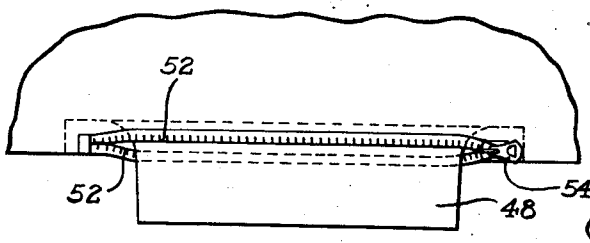


Fig. 7

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UNITED STATES PATENT OFFICE

2,235,966

REFRIGERATING APPARATUS

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Application June 27, 1935, Serial No. 28,777

2 Claims. (Cl. 128—376)

This invention relates to refrigerating apparatus and more particularly to means for improving bodily comfort.

It is well known that the skin of human beings constitutes a natural refrigerating system for regulating body temperature. This is interfered with by clothing and also retarded by a somewhat dead film of moist air which clings to the surface of the skin. When it is warm this makes it rather uncomfortable and causes restless nights.

It is an object of my invention to improve sleeping conditions during warm weather, and more particularly to provide a simple inexpensive means of wide application for making better use of the skin as a refrigerating system to improve bodily comfort and health.

It is another object of my invention to provide innumerable small jets of air capable of penetrating night clothing and directed directly at the surfaces of the body for breaking up the dead film of air enclosing the body to increase the natural refrigerating action and thereby increase bodily comfort.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a perspective view of one form of my apparatus showing the cover in place;

Fig. 2 is a perspective view similar to Fig. 1 with the upper portion of the cover folded back;

Fig. 3 is a vertical sectional view through the air filter and blower shown in Figs. 1 and 2 and including a time switch for controlling the operation of the blower;

Fig. 4 is a fragmentary sectional view taken along the lines 4—4 of Fig. 1;

Fig. 5 is a sectional view taken along the lines 5—5 of Fig. 1;

Fig. 6 is a top view of an inlet of the bag with the fastener in closed position so as to close the inlet;

Fig. 7 is a view of the inlet shown in Fig. 6, but with the inlet in open position ready to be connected to the blower; and

Fig. 8 is a sectional view through the opening shown in Fig. 7.

Essentially, in the apparatus disclosed herein, I have provided what might best be termed a bag of porous fabric normally intended to be used upon a bed during warm weather and having a portion to be placed beneath the body of the person sleeping upon the bed and another portion to be placed on top of the person sleeping. This bag is maintained in an inflated condition, when required to maintain the sleeper comfortable, by an air filter and blower which constantly discharges air into the bag and maintains it in an inflated condition so that the porous fabric of the bag is constantly held close to the surfaces of the skin and so that from the porous fabric minute jets of air are discharged close to and directly into contact with the body of the person sleeping thereon in order to make use of the natural refrigerating system of the body provided by the sweat glands, particularly by penetrating the night clothing and breaking up the film of substantially dead moist air which clings to the surface of the skin. Normally, the environment temperature falls during the night so that the blower may often be cut off after several hours and this is provided for by a simple time switch which may be set to cut off the blower at the end of any desired length of time up to twelve hours.

Referring now to the drawings, and more particularly to Figs. 1 and 2, there is shown a single bed 20 provided with the usual springs and mattress, as well as a pillow 22. Upon the mattress of this bed, I have provided an inflatable fabric bag 24 having a fabric inlet 26 at the foot end of the bed which is connected to an air filter and blower 28 provided at the foot end of the bed. While this inlet and blower are shown at the foot end of the bed, the inlet may, if desired, be at other positions so that the blower may be conveniently located according to the bed room and the particular disposition of the furniture within the room in which the apparatus is to be used. Quite commonly, many persons desire to have the blower at the side of the bed and in this case, additional inlets may be provided in such places which may be closed as the inlet 26 is closed as will be hereinafter explained.

The detailed construction of the fabric bag is shown on a larger scale in Figs. 4 and 5. This bag is provided with a porous fabric sheet 30 which may extend the complete length of the bag on the bottom side and if desired may be extended to form the top portion 32 of the bag. While I prefer to make the sheet 30 and the portion 32 of a suitable porous fabric, it will be evident from the explanation and discourse in following portions of this specification that it is not essential that this portion of the bag be porous. Joined to the lower sheet 30 and the upper sheet portion 32 is an inner sheet 34 having a

sheet portion 36 forming the under side of the top cover portion directly beneath the portion 32. The sheets 30 and 34 including the sheet portions 32 and 36 are joined by sewing at their edge portions as indicated by the reference character 38 at various points in Figs. 4 and 5. In addition, the lower sheet is joined at the point indicated by the reference character 40 to provide a pillow portion 42 and joined at various other points in a quilted fashion as indicated by the reference character 44. The upper portion is also joined together in a quilted fashion as shown by the reference character 46 at the head and foot ends thereof.

Between the head and the foot ends, the sheet portions 32 and 36 are joined by a slightly different construction which is best shown in Fig. 5. In this construction, indicated by the reference character 46 in Fig. 5, holes are provided in both the upper and lower sheets, the holes in the upper sheet being directly over the holes in the lower sheet portion 36. The edges of these holes are joined preferably by a buttonhole stitch to prevent the free escape of air from the bag by reason of these holes. These holes are provided so as to permit the escape of a portion of the air from between the upper and lower covers through the holes provided in the construction 46.

In this fabric bag, all portions are in free communication with the inlet 26 which is provided by a tubular piece of fabric 48 which is sewed as at 50 to the end portion of the bag. The edges of the bag at this inlet may be provided with slide fastening means 52 as best shown in Figs. 6 and 7 which may be closed by a slide fastener 54 as shown in Fig. 6 with the inlet 48 tucked into the bag or which may be opened and the inlet 48 be pulled out so that it extends from the bag as shown in Fig. 7. If desired, several inlets like this may be provided, the one being used being in the open position as shown in Fig. 7, while the others may be closed as shown in Fig. 6.

For my bag, or cover, I prefer to use a high grade of bed sheeting, preferably without any filler, having a tight, very regular and uniform weave of threads of substantially the same size with a firm uniform twist to the threads providing a smooth finish with a minimum of frayed particles. I have found bed sheeting having about 65 threads in one direction and 75 threads in a direction at right angles thereo, as well as some having about 78 threads in one direction and 71 threads in the direction at right angles thereto are most satisfactory. Each of these fabrics were of a high grade without filler and had a tight, regular and very uniform weave with very uniform high grade threads. Such fabrics have from 4,500 to about 5,600 minute holes per square inch. Obviously, it is not necessary to use these particular fabrics, but almost any material might be used which provides these tiny holes innumerable in number in the portions of the fabric or material which are next to the body of the person sleeping upon or within the bag.

In order to make proper use of my inflatable bag, it is necessary to provide a continuous supply of air. This air preferably is filtered before being supplied to the bag, although this is not necessary at least for normal persons, since the air is filtered to a certain extent when it passes through the porous fabric. However, for persons having hay fever or similar respiratory afflictions, it is advisable to filter the air before it is supplied to the bag. This air may be drawn from the room in which the bed is located, or it may be drawn from some external source such as the outside of the room. For hay fever patients, I prefer to seal a room as much as possible and to draw the air from the outside through a highly efficient filter system and then by means of a blower, discharge the air into the bag. The air discharged from the bag creates a pressure within the room which causes air to be forced out through the points of possible leakage to prevent any infiltration. In this way, the room may be constantly supplied with filtered air so that during the hay fever season, the particles in the air which cause discomfort may be excluded from the room and the hay fever sufferer may, while in the room, be protected from air laden with particles which might cause suffering.

The amount of air and the air pressure required depends to a considerable degree upon the particular preferences of the sleeper which is most often due to particular constitutional differences between individuals. It, of course, varies according to the size of the bag, especially according to the size and the characteristics of the porous fabric used in the bag. With the particular type of fabric I prefer, that is, high quality bed sheeting, I find that the supplying of air at a sufficient pressure and quantity to cause from one to four cubic feet per minute to flow through each square foot of area of the fabric portion is the most comfortable and I find that about one and one-half to two and one-half cubic feet per minute of air for each square foot of porous fabric is about the most suitable rate in this range for this particular material. This in a single bed provides about 85,000,000 minute jets of air through the fabric which extend from one to two inches from the sheet. More than 6,000,000 of these jets of air come into contact with the body. However, depending upon the fabric and the preferences of the individual, I find that a jet length of from one-half to two and one-half inches is quite acceptable.

For the particular bag herein described, I find that the maintenance of a pressure within the bag of about one thirty-second of an inch to one-sixteenth of an inch water provides the most comfortable and satisfactory conditions. At this pressure, a comparatively large volume of air can be provided at a very low power consumption and this is sufficient to provide an adequate flow of air through the porous fabric to provide the jets of air which are used to cool the person using the bag or apparatus. This pressure is sufficient to maintain the bag in a satisfactory inflated condition and to cause the inner sheet portions 34 and 36 to mold themselves to the form and shape of the body of the person using the bag and especially to hold the fabric sufficiently close to the skin in order that the jets of air provided by the escape of air through the voids or holes in the fabric will impinge substantially at right angles the skin so that the film of dead air referred to above will be broken up and carried away. It is believed that this has a very healthful effect since it provides an air bath for the body of fresh air which has an invigorating effect and which stimulates particularly the sweat glands and other glands of the body through its stimulating and invigorating effect upon the skin.

The air which escapes between the upper and lower portions of the bag may escape from the sides thereof and also through the openings 46 in the upper portion of the bag. When bed sheeting is used as a material, the upper cover is very light in weight and when there are no outlets such as the outlets 46, the upper cover tends to be lifted because of the pressure which is formed beneath it making it possible for the lower sheet portion of this cover to move away sufficiently so that the jets of air from the lower sheet portion of this upper cover no longer reach the body, at least with sufficient force to give the desired effect. By providing the outlets 46, this undesired condition is avoided. In order to further avoid this condition, weights may be attached to the top cover most conveniently by providing them as a part of the outlets 46 such as by forming the outlets 46 by means of a metal eyelet fastener, or by providing metal weights within or surrounding the openings 46.

Obviously, it is only the sheets 34 and 36 which are in direct contact with the body and which compose the really operative portions of the bag. Therefore, if it were desired, the other portions of the bag could be made of impervious material so as to prevent the escape of air from the other portions of the bag and to reduce the amount of air required to be supplied to the bag. However, I find it more convenient to make the bag of a single type of washable material so that throughout its life if any changes in the condition of the fabric take place, it will take place uniformly throughout the bag. When other fabrics other than those I prefer are used, the air pressure maintained within the bag may vary within rather wide limits. I find, however, that air pressures between one sixty-fourth and one inch of water are the most suitable.

In order to supply the desired amount of air, I have provided the blower and air filter 28 having an outer casing 60 provided with an opening 62 in the bottom having movable shutters 64 which are moved to any desired position between fully open and fully closed position by a knob 66 so as to control the amount of air drawn into the cabinet by the blower. Immediately above the shutters 64 I provide two slabs of air filtering material 68 and 70 supported upon the flanges 72 and 74 within the cabinet and provided with fronts 76 and 78 upon the outside of the cabinet as in the manner of a drawer front. Thus, the filter slabs may be readily removed from the cabinet in the manner of an ordinary drawer. These slabs are preferably provided with glass wool or any other suitable form of filtering material.

Directly above the filter slabs, there is provided an electric motor driven blower 80, of the centrifugal type, preferably, which discharges directly into a movable discharge nozzle 82 which is rotatably mounted upon a shaft 84 so that it may be rotated through an angle of about 60°. This discharge member has a cylindrical portion and a flat rectangular spout which is adapted to fit into the inlet 48 of the fabric bag 24. The cylindrical portion is sealed by a suitable sealing material 86 so as to prevent the leakage of air under pressure from the blower 28. The blower 80 is preferably of the type for noiseless delivery of comparatively large volumes of air at low pressures in an efficient manner. When the bag is not in use, this blower unit may be used to circulate the air in the room, and may be tilted up to discharge air at an angle of from 45° to 60° upwardly so that air may be circulated over and above the bed.

If desired, the blower may be provided with an ice compartment above or below the filter slabs or a refrigerant evaporator to cool the air. However, I find that ordinarily such procedures are unnecessary since with ordinary air, it has the effect of making the person using the bag or apparatus feel as if the temperature were reduced from 10 to 15° F. Therefore, it might be said that it has the effect of a temperature reduction of from 10 to 15° and possibly more, since the refrigerating effect of the skin has a rather wide capacity which is controlled naturally by the skin glands to provide the required amount of natural refrigeration to maintain substantially the proper body temperature in air of such a temperature and humidity as is found naturally.

If desired, the blower may remain in operation throughout the night or throughout the time the person is sleeping and using the bed. However, since the house and the air in the rom as well as the outside air ordinarily drop in temperature during the night, it is often found that it is not necessary to have the blower operating throughout the night and that considerable electricity may be saved and more comfort may be provided if the blower is shut off at some time during the night. Often, it is only desired to keep the blower in operation until the person using the bag falls asleep.

Therefore, connected to the electric supply circuit 88 of the blower 80, I have provided a time switch 90 provided with a time controlling pointer handle 92 which may be set according to the dial to any point between zero and twelve hours so that the circuit of the blower will be opened at the expiration of that period of time. In this way, this time switch may be set to cut off in 1, 2, 3 or more hours according to the desires of the sleeper so that he will be comfortable throughout the night. If desired, this time switch may be used as a hand switch and shut off at any time desired. However, this time switch may be replaced by a hand switch if desired to reduce the cost of the apparatus.

I find that the use of this apparatus results in improved health and sleeping comfort particularly since the skin is enabled to function naturally as a natural refrigerating system which reacts to its environment conditions even under rather wide variations to keep the body within its proper and comfortable temperature range. It rapidly carries away the perspiration from the skin and provides an environment of clean fresh air which constantly bathes the surface of the skin. If certain portions of the air bag are found to give an undesirable amount of air, such as sometimes at the foot or head of the person, an additional layer of fabric may be provided or some object such as a pillow may be placed thereon. The pillow 22 may be placed either beneath the portion 42 or if desired, above the portion 42. It will thus be seen that my device is very adaptable and useful equipment which is durable, simple, is easy to manufacture and acquire. The bag is readily washable and may be washed in a manner similar to ordinary bed sheeting.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A body ventilating device comprising inflatable bag means having a lower portion upon which the body rests and an upper portion for covering the body, said upper and lower portions having portions adjacent the body provided with a multitude of minute orifices, and means for forcing air under pressure into the bag means to inflate the bag means and to discharge the air from the bag means in the form of jets of air issuing from the orifices and impinging upon the body, said upper portion of said bag means being provided with vents extending through said upper portion for permitting the escape of air from the space between the upper and lower portions occupied by the body.

2. A body ventilating device comprising inflatable bag means having a lower portion upon which the body rests and an upper portion for covering the body, said upper and lower portions having portions adjacent the body provided with a multitude of minute orifices, and means for forcing air under pressure into the bag means to inflate the bag means and to discharge the air from the bag means in the form of jets of air issuing from the orifices and impinging upon the body, said upper portion of said bag means being provided with vents extending through said upper portion for permitting the escape of air from the space between the upper and lower portions occupied by the body, said vents being sealed against the escape of air from the bag means.

OTTO M. SUMMERS.