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(54) Container for the simultaneous administration of barium sulphate suspension and air in the double contrast x-ray examination of the upper digestive tract.

(57) Container for the simultaneous administration of barium sulphate suspension and air in the double contrast X-ray examination of the upper digestive tract, comprising a glass-shaped container (1) and an airtight cover (2), to the internal side of which a substantially cylindrical air chamber (3) is connected; the cover (2) is provided with a mouth-piece (7) having elliptical cross section, and divided into two parallel ducts: the first one (9), on the part that comes into contact with the lower lip of the patient, for the barium suspension flow, and the second one (6) for the air flow.

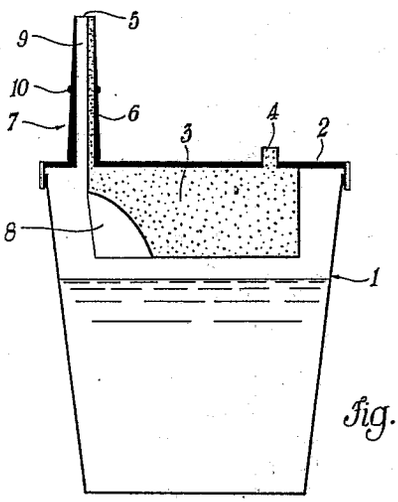

Fig. 1

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Description

CONTAINER FOR THE SIMULTANEOUS ADMINISTRATION OF BARIUM SULPHATE SUSPENSION AND AIR IN THE DOUBLE CONTRAST X-RAY EXAMINATION OF THE UPPER DIGESTIVE TRACT.

This invention relates to a container for the simultaneous administration of barium sulphate suspension and air in the double contrast X-ray examination of the upper digestive tract.

More particularly, the invention concerns a container as mentioned above, specifically designed for a routine X-ray study of the oesophagus, by which the simultaneous administration of the barium sulphate and air occurs without the use of mechanical insufflation means.

It is known that the oesophagus X-ray study with the double contrast technique, in the routine examination of the upper digestive apparatus, is of a vital importance especially for the early diagnosis of the cancerous lesions. Till now several techniques have been used for the double contrast examination of oesophagus, but each one presents disadvantages which disturb the study. The most recent one, based on insufflation of air generated by a compressor and introduced in the mouth by a nozzle, through which also the barium contrast passes, frequently causes deglutition difficulty with regurgitation and vomit. Since, nevertheless, this technique of insufflating air at the same time as the barium is ingested is efficient to obtain a good double contrast of oesophagus in the routine examination, it has been thought it useful to improve said technique by means of this invention, by providing a container which does not need a forced air insufflation.

Thus, the object of this invention is to provide a container for administration of barium sulphate suspension which allows spontaneous deglutition of air, simultaneously as the barium suspension, whithout need of forced insufflation, and with no tubing for connection with air supply.

According to the invention, there is proposed a glass-shaped container, provided with an air-tight cover to which a substantially cylindrical internal air chamber is connected, a circular central portion of said cover constituting the top wall of said chamber, said cover being provided with an air inlet connecting said air chamber to the outside through the cover. A mouth-piece projects from the cover, having an elliptical cross-section, being tapered towards the end opposite to the cover, and being divided into two parallel ducts: the first one, of a larger section,communicating with the interior of the container, for the barium suspension flow, and the second one, communicating with the air chamber, for the air flow.

Said first duct for the barium suspension flow is located in the lower portion of the mouth-piece, that is on the side that comes into contact with the lower lip during the administration.

By means of such a device the air, after passing through the air chamber, comes to the mouth through a semilunar fissure, formed adjacent the upper rim of the mouth-piece orifice. In this way, any obstacle from the tongue is avoided and the barium suspension spreads towards the palate more easily than it would happen if a central little tube placed adjacent to the upper rim or, worse, to the lower one, were used, as it occurs in some of the above-mentioned known devices.

The barium suspension comes to the mouth flowing throug the remaining space in the lower part of the mouth-piece, being the size ratios of the two flow orifices - for air and barium - fixed to such a value that the amount of barium suspension reaching the mouth is the minimum one sufficient for a normal deglutition.

This expedient allows longer times of examination of the oesophagus, as it causes a greater amount of air to enter at each deglutition of barium sulphate suspension.

Taking into account the viscosity of the barium suspension, that limits the flow rate through ducts of oval section of reduced height (said oval section being necessary, moreover, to control the position of the mouth-piece in the patient's mouth), it is suggested, according to this invention, to maintain the ratio between the heights of the two orifices for the flow of air and barium suspension within the range of from 1/2 and 1/10, preferably to 1/4, said heights being measured along the minor axis of the mouth-piece elliptic section.

Moreover, the air chamber built under the cover helps in raising the amount of air that can be swallowed at each deglutition of barium, since it somehow slows down the flow of the barium suspension out of the container, towards the outlet to the mouth-piece. In fact, said chamber constitutes an obstacle that projects towards the inside of the container, and increases the friction surface in contact with the barium suspension, thus limiting its flow velocity, owing to its viscosity.

In order to reduce the obstacle caused by the cylindrical air chamber to the flow of barium suspension towards the mouth-piece, a hollow is provided in the lower part of the air chamber, in the peripheral zone facing the outlet to the mouth-piece.

A transversal rib is placed externally around the mouth-piece, at a short distance from the orifice, in order to define the point where the lips must be placed while drinking from the container.

In another embodiment of the invention, the central circular portion of cover forming the upper wall of the air chamber is missing, so that a closed chamber for the air is no more present, and the cover shows a cylindrical cavity, open towards the outside.

The air from outside enters the container directly at the base of the mouth-piece, the air duct of which opens into the cavity, thus being subject to a reduced pressure drop.

The cylindrical cavity is open towards the outside, and forms a projecting part towards the interior of the container, in the same way as the air chamber of the previous embodiment does. Consequently, the above-mentioned advantage of slowing down the

barium suspension flow rate towards the mouth-piece is maintained, and, at the same time, a notable economy of production is obtained, since the cover can be manufactured by means of only one mold.

By means of the device of the present invention the simultaneous administration of barium and air occurs without difficulty and the oesophagus can be in all cases examined by the double contrast technique. Moreover, in many cases the air insufflated is also sufficient for the double contrast study of the stomach and duodenum.

The invention will now described with specific reference to the enclosed drawings in which:

Figure 1 shows a vertical sectional view of the container according to a first embodiment of present invention;

Figure 2 shows a complete top plan view of the same;

Figure 3 shows a vertical sectional view of the container according to a second embodiment; and

Figure 4 shows a top plan view of the same.

In figure 1 there is shown a container 1 having a truncatedconical form provided with a cover 2. The cover 2 shows, on the internal part, the air chamber 3 which is in communication with the outside by the air inlet tube 4 and with the delivering orifice 5 through the duct 6 in the mouth-piece 7.

The air chamber 3 has a substantially cylindric form, with a hollow 8 made on the side turned towards the mouth-piece 7 which serves to facilitate the barium suspension flow.

As it can be noted also from figure 2, the mouth-piece 7 has an elliptic cross section and the air duct 6, or semilunar form, is placed in the upper part of the mouth-piece 7, turned towards the palate. The remaining part of the elliptic section of the mouth-piece 7 is occupied by the duct 9 for the barium sulphate suspension. If the two above-mentioned cross sections are accurately proportioned, an optimal ratio between the barium flow rate and the quantity of air swallowed together with it will be obtained. This technique allows to perform the best oesophagus X-ray examination with the double contrast method. At present a preferred size for the two air and barium sections 6 and 9 is, for example, 2 mm for the first one and 8 mm for the second one.

It has to be pointed out also that the air chamber 3 inside the container 1 increases the contact surface with the barium suspension when the container 1 is lifted for the deglutition, thus increasing the friction resistances to the flow of the viscous suspension, so as to reduce the barium administration velocity.

Figure 1 also shows the rib 10 for positioning the patient's mouth.

The embodiment of figures 3 and 4 corresponds exactly to the one of figures 1 and 2 (and the same numerals indicate corresponding elements), except for the fact that the central circular portion of the cover is missing, so that the cavity 3 is completely open towards the outside. The dotted line shows the missing part of the cover and the missing inlet tube 4, for comparison with the previous embodiment.

Although the present invention has been disclosed with particular reference to some of its preferred embodiments, it is to be understood that modifications and changes may be made by those who are skilled in the art without departing from its true spirit and scope.

Claims

1. Container for the simultaneous administration of barium sulphate suspension and air in the double contrast X-ray examination of the upper digestive tract, characterized in that it comprises a glass-shaped container, and an air-tight cover, to which a substantially cylindrical air chamber is connected, a circular central portion of said cover constituting the top wall of said air chamber, said cover being provided with an air inlet connecting said air chamber to the outside, and with a projecting mouth-piece having elliptical cross-section, being rastremated towards its end opposite to the cover, and being divided into two parallel ducts, the first one, of a larger cross-section, communicating with the interior of the container, for the barium suspension flow, and the second one, communicating with the air chamber, for the air flow, being said first duct located in the lower part of said mouth-piece, which lower part comes into contact with the lower lip of the patient.

2. Container according to claim 1, wherein said substantially cylindrical air chamber has a hollow in its lower part, in the peripheral zone facing the outlet to the mouth-piece.

3. Container for the simultaneous administration of barium sulphate suspension and air in the double contrast X-ray examination of the upper digestive tract, characterized in that it comprises a glass-shaped container, and an air-tight cover, having a central, substantially cylindrical cavity open towards the outside, and a projecting mouth-piece, having elliptical cross-section, being rastremated towards its end opposite to the cover, and being divided into two parallel ducts, the first one of a larger cross section, communicating with the interior of the container, for the barium suspension flow, and the second one, open towards said cavity at its base, for the air flow, being said first duct located in the lower part of said mouth-piece, which lower part comes into contact with the lower lip of the patient.

4. Container according to claim 3, wherein the portion of said cover forming said substantially cylindrical cavity has a hollow, open towards the interior of the container, in its lower part, in the peripheral zone facing the outlet to said mouth-piece.

5. Container according to each one of claims 1-4, wherein the ratio between the heights of the two cross sections of said first and second duct, measured along the minor axis of said elliptical section, is in the range between 2/1 and 10/1.

6. Container according to claim 5, wherein said ratio is of 4/1.

7. Container according to each one of claims 1-6, wherein a transversal rib is placed externally around said mouth-piece, at a short distance from the orifice, so as to define the point where the patient's lips must be placed.

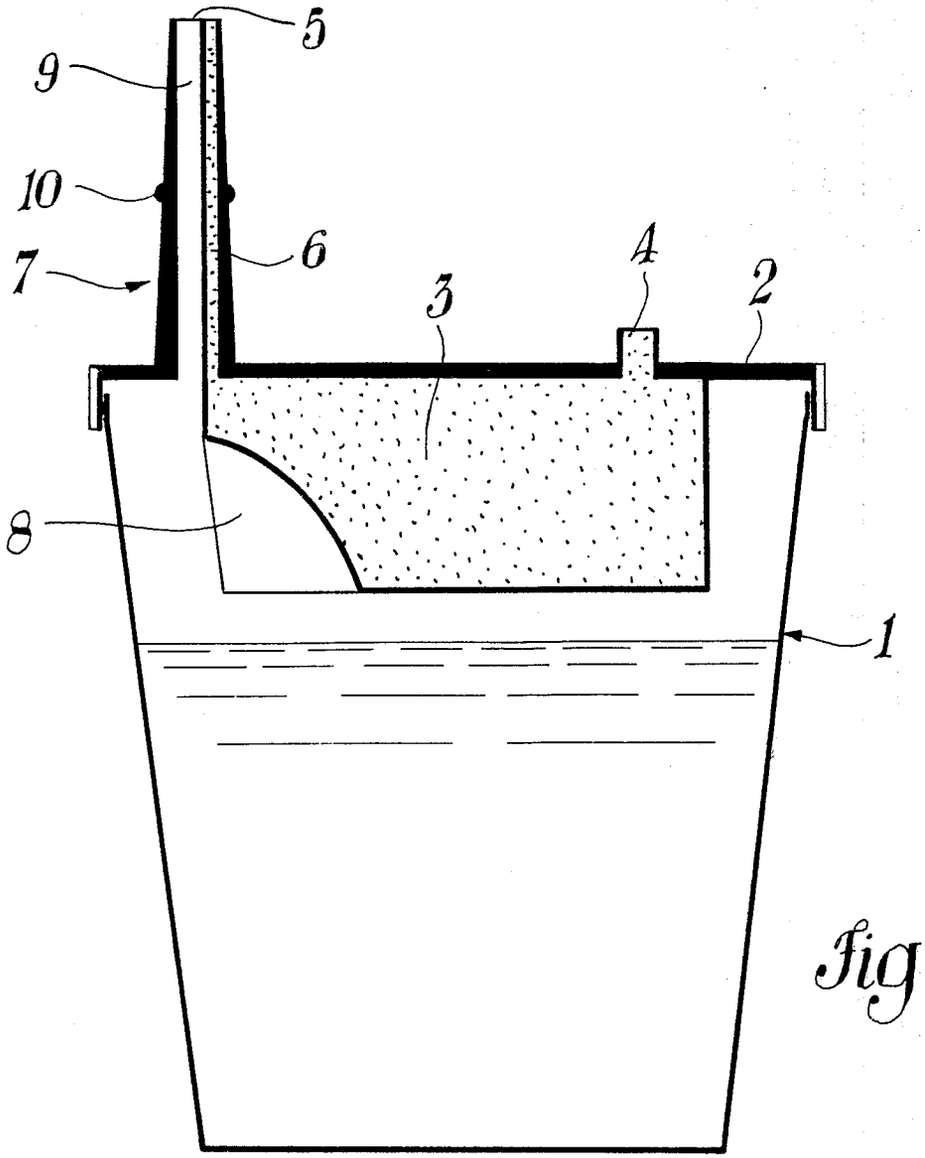

Fig. 1

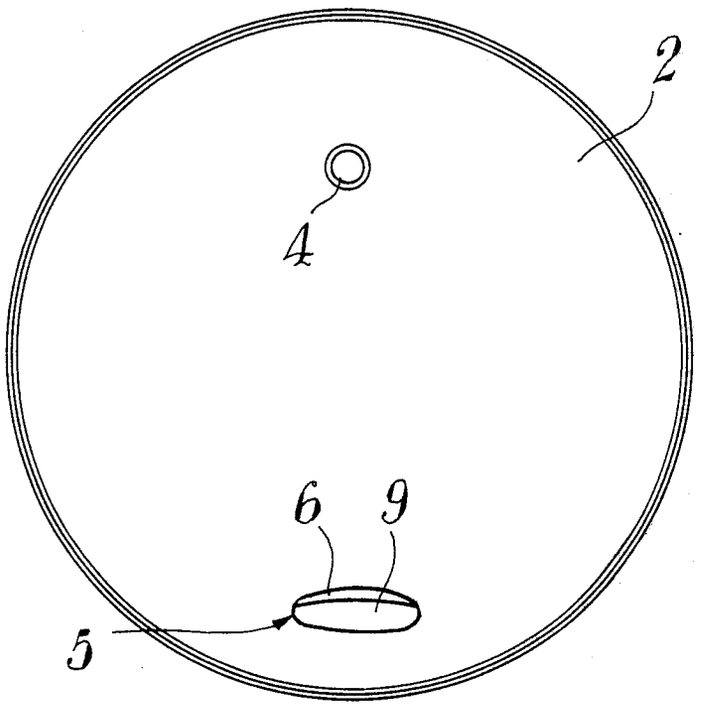

Fig. 2

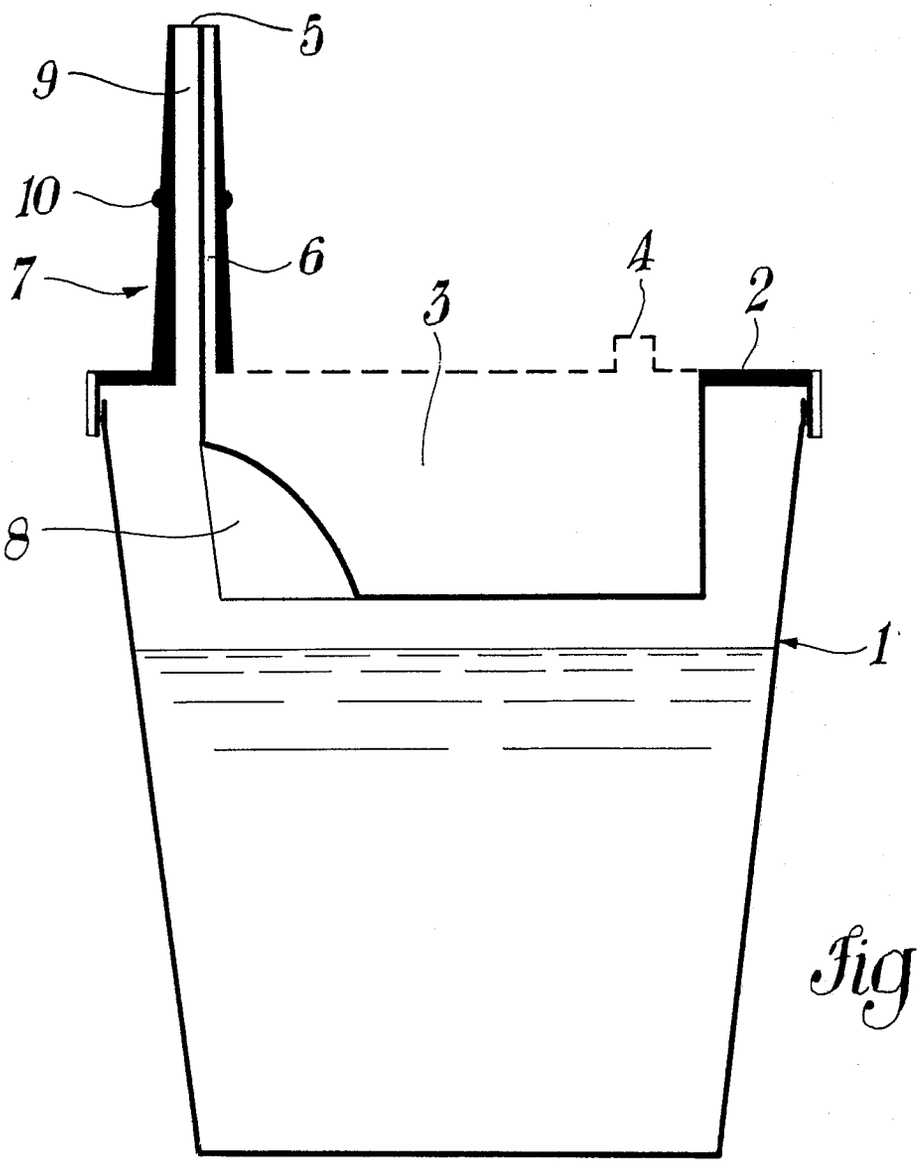

Fig. 3

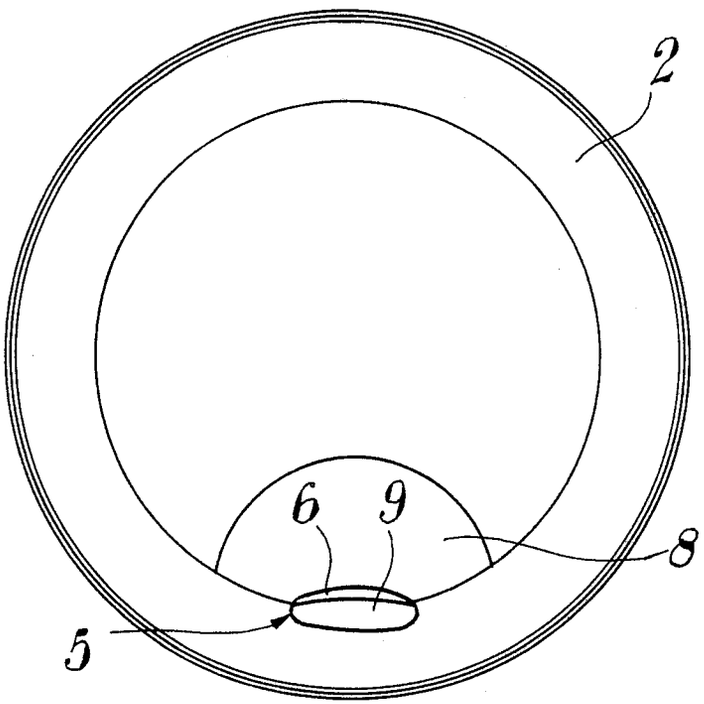

Fig. 4