

Nov. 8, 1949

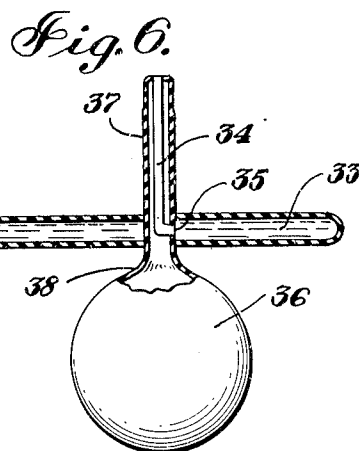
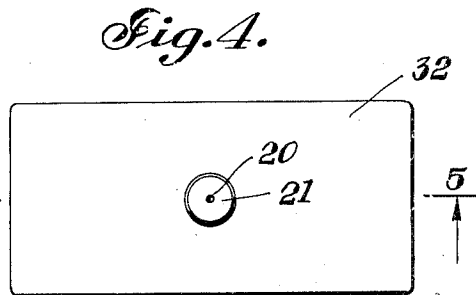
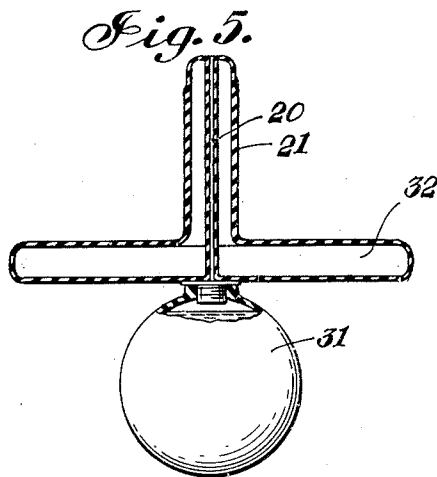
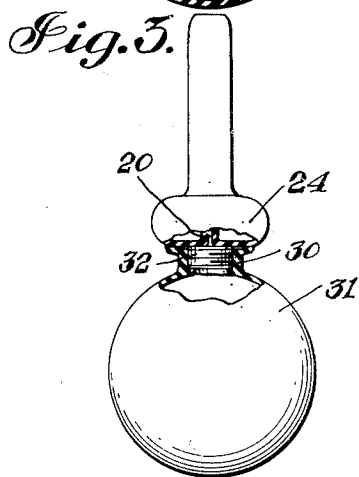
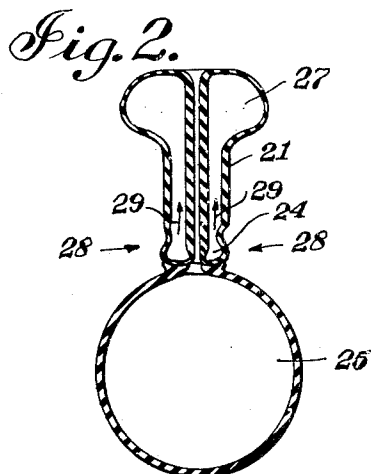
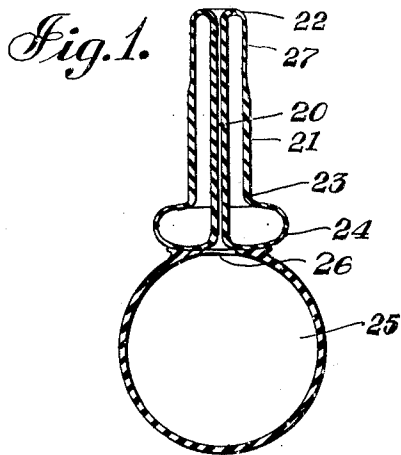
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2,487,630

SYRINGE

Filed July 25, 1946

2 Sheets-Sheet 1



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Fig. 7.

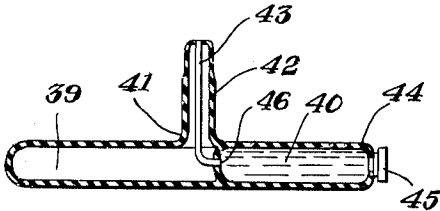


Fig. 8.

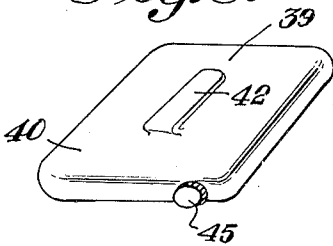


Fig. 9.

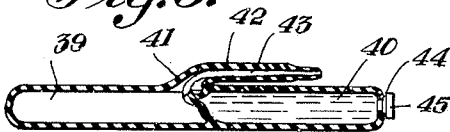


Fig. 10.

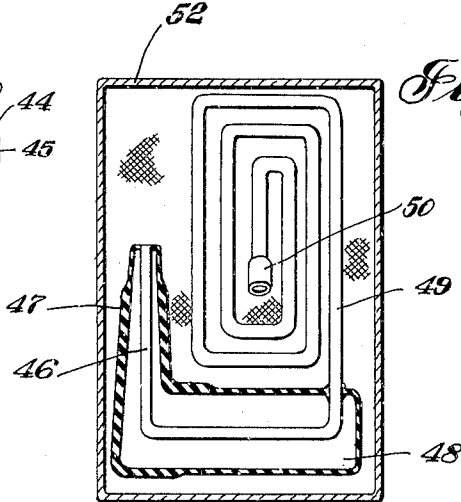


Fig. 12.

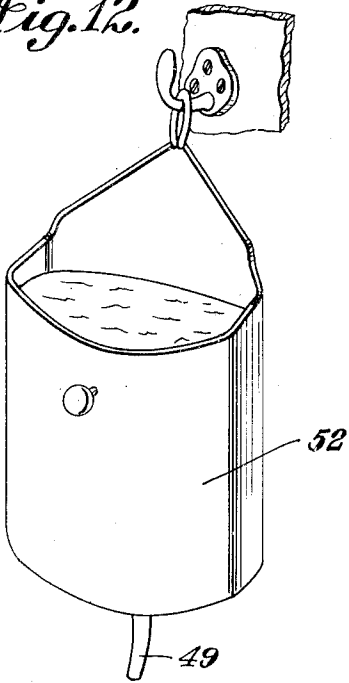
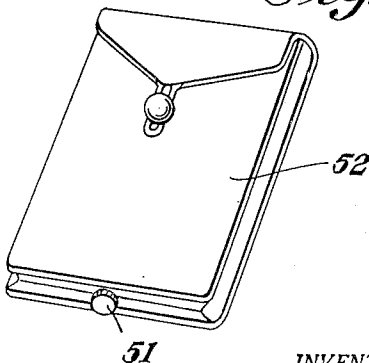


Fig. 11.



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## UNITED STATES PATENT OFFICE

2,487,630

SYRINGE

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Application July 25, 1946, Serial No. 686,137

5 Claims. (Cl. 128—246)

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My present invention relates to syringes and more particularly to syringes for introducing liquid or liquids into cavities of the human body.

It is another object of my present invention to provide a syringe arrangement by which it is possible to introduce a liquid into a cavity of the human body so that it reaches the entire inner surface of this cavity.

It is another object of my present invention to provide a syringe by which it is possible to expand the cavity of the body into which the syringe is to be introduced before introduction of the liquid.

Another object of my present invention is a syringe which is constructed so that its outer surface contacting the walls of the cavity into which the syringe is introduced is resilient, so as to prevent any injury to the tissues of the cavity.

Still another object of my present invention consists of a syringe constructed so that the diameter of its front end can be adjusted by the person using the same after introduction of the syringe into the body cavity.

With the above objects in view, my present invention mainly consists of a syringe for introducing liquids into a cavity of the human body comprising in combination a tubular conduit for introducing the liquid, an introducing opening at the front end of this tubular conduit, means for supplying liquid into and through the tubular conduit described above, an expandible member arranged at the front end of the tubular conduit, and finally, means connected with this expandible member for expanding the same, whenever required.

In accordance with a preferred embodiment of my present invention, the means for supplying the liquid through the tubular conduit are connected with the rear end of the tubular conduit. These liquid supplying means might consist of a hollow rubber member, e. g. a rubber bulb or a rubber cushion adapted to be filled with the liquid to be introduced; these means might, however, also consist of an open receptacle connected in well known manner with the rear end of the tubular conduit to be introduced into the body cavity.

The expandible member arranged at the front end of the tubular conduit might be constructed and shaped in many different ways. I have however, found it is advisable to provide as such member a closed resilient rubber tube surrounding the tubular conduit extending rearwardly from the front end of this conduit and provided

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with an expandible front end portion surrounding the front end of the tubular conduit. By forcing a gaseous substance, e. g. air into this closed resilient rubber tube, the expandible rubber front end portion of the same is inflated, pressing against the walls of the body cavity and forcing the same apart so as to enable access of the introduced liquid to every portion of the inner surface of the cavity walls.

The means for expanding the above mentioned expandible member, e. g. the closed resilient rubber tube described in the preceding paragraph might also be constructed in different ways. Thus, it is possible to combine with the rear end of the closed resilient rubber tube an air filled bulb or cushion; however, it is theoretically also possible to provide separate pump-like means to connect the same by a tubular member with the expandible member, e. g. the rear end of the resilient rubber tube mentioned above.

It should be mentioned that in some cases it is advisable to make the tubular conduit relatively rigid so as to facilitate its introduction into a body cavity. In such event it is of particular importance to make the tubular expandible member surrounding the tubular conduit particularly resilient so as to prevent any possibility of injury to the tissues of the body cavity. It should be stressed that the tubular expandible member surrounding the conduit is resilient not only along its cylindrical side surface, but also at its front end thereby acting as cushioning means while the syringe is introduced into the body cavity.

I wish to note that the term "syringe" as used above and in the following description and claims is intended to define devices of whatever type by which it is possible to introduce liquid or liquids into a cavity of the human body.

It should also be noted that the term "liquid" as used above and in the following description and claims is intended to cover fluid of whatever type, as for instance, water, disinfecting fluids, or fluids having medicinal properties.

Furthermore, it should be stressed that the term "rubber" as used above and in the following description and claims is intended to cover not only natural rubber, but also artificial rubber and other substances, e. g. plastics having rubber-like qualities, i. e. being resilient and expandible.

Finally, it should be stressed that the term "cavity of the human body" is to be understood broadly, i. e. not limited to certain cavities. Thus, my new syringe might very well be used as a female douche, for introducing disinfecting

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fluids into the vaginal cavity; however, my new syringe is also adapted for introducing fluids into the rectal cavity of the human body. By reducing the size of my new syringe, particularly the size of the tubular conduit and the rubber tube surrounding the same, it is possible to obtain a syringe by which it is possible to introduce fluids into the aural or nasal cavities.

The novel features which I consider as characteristic for my invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a longitudinal section through a syringe according to my present invention, in uninflated inoperative condition;

Fig. 2 is a longitudinal section through the syringe shown in Fig. 1 in inflated operative condition;

Fig. 3 is a side view partly in longitudinal section of a slightly modified embodiment of a syringe of the type shown in Figs. 1 and 2;

Fig. 4 is a top view of a modified syringe similar to the one shown in Figs. 1 and 2;

Fig. 5 is a longitudinal section through the syringe shown in Fig. 4; along line 5—5 of Fig. 4;

Fig. 6 is a side view partly in longitudinal section of a modified embodiment of the syringe shown in Figs. 4 and 5;

Fig. 7 is a longitudinal section of still another modified embodiment of a syringe according to my present invention in operative condition;

Fig. 8 is a perspective view of the syringe shown in Fig. 7 in inoperative condition;

Fig. 9 is a longitudinal section through the syringe shown in Figs. 7 and 8, in inoperative condition;

Fig. 10 is a longitudinal section through still a further modified embodiment of a syringe according to my present invention;

Fig. 11 is a perspective view of a combined liquid receptacle and cover for a syringe of the type shown in Fig. 10; and

Fig. 12 is a perspective view of the combined liquid receptacle and cover shown in use.

The syringe shown in Figs. 1 and 2 comprises as main elements the tubular conduit 20 surrounded by the resilient rubber tube 21 closed at its front end 22 and open at its rear end 23; the compressible rubber bulb 24 connected as shown with the rear end 23 of the resilient rubber tube 21 and the ball-shaped rubber bulb 25 connected to the rear end 26 of the tubular conduit 20 communicating with the same.

In accordance with my present invention, the conduit 20 consists of a relatively rigid material, e. g. so-called hard rubber, while the rubber tube 21 is made of a relatively soft, resilient material, e. g. soft rubber. The rear part of this rubber tube 21, although resilient, has to consist of a substantially non-stretchable, non-expandable material, while the front end 27 of the rubber tube 21 consists of an expandible material, e. g. very thin rubber.

The rubber bulb 24, filled with air, and the rubber bulb 25, adapted to be filled with the liquid to be introduced, have both to be of compressible material of a type which is resilient and shape retaining, i. e. a material which returns after compression and release into its original condition.

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If a syringe of the above described type is compressed in direction of arrows 28, i. e. if pressure is exerted against the rubber bulb 24 in the direction indicated above, the air contained in rubber bulb 24 will be forced in direction of arrow 29 into the resilient rubber tube 21. As the rear portion of tube 21 is non-expandable, it will not change its shape by introduction of the air. Contrary thereto, the front end portion 27 of the tube being expandible, it will be inflated and resume the shape shown in Fig. 2.

A syringe of the type described above operates as follows:

First, the ball-shaped rubber bulb 25 is filled with the liquid to be introduced, by immersing the front end 22 of the tubular conduit 20 into the liquid and thereafter compressing and releasing bulb 25. After filling the bulb 25 in this manner with the liquid to be introduced the entire front part of the syringe, i. e. the tubular conduit 20 together with the surrounding resilient rubber tube 21 are introduced into the cavity. The next step in application of the syringe consists in compressing the rubber bulb 24; thereby inflating the front end portion 27 of the resilient rubber tube 21 as shown in Fig. 2 and described above. This inflation will cause expansion of the front end portion 27 which in turn will result in a certain pressure against the walls of the cavity forcing the same apart and thereby smoothing the usually uneven surface of the cavity, making it better accessible to the introduced liquid. Thereafter, the ball-shaped rubber bulb 25 is compressed, resulting in ejection of the liquid contained in the rubber bulb 25 through conduit 20 into the cavity, the wall surfaces of which have been smoothed in advance by action of the expanded front end portion 27 of rubber tube 21. If desired, it is possible to move during introduction of the liquid the entire syringe slowly outward while keeping the front end portion 27 of the tube 21 expanded, thereby expanding consecutive portions of the cavity; ensuring complete wetting of all surface portions of the same.

In Figs. 3 to 12 inclusive, I have shown various modifications of the syringe described above and shown in Figs. 1 and 2. These modifications differ in various respects from the syringe shown in the mentioned figures and referred to above; however, all of them include the basic features of my present invention, namely a tubular conduit, a closed resilient rubber tube of the type defined above, means for inflating the rubber tube and means for supplying and forcing liquid through the tubular conduit.

The syringe shown in Fig. 3 is very similar to the ones shown in Figs. 1 and 2; the only difference is that instead of firmly securing the ball-shaped rubber bulb 25 to the syringe, I provide as shown a screw threaded tubular extension 30 firmly secured to the rubber bulb 24 and communicating with the tubular conduit 20. By means of this screw threaded extension 30 I attach the ball-shaped rubber bulb 31 which is provided also with a screw threaded extension 32 to the syringe. Thus, it is possible to unscrew the rubber bulb 31 for cleaning purposes, whenever required.

The syringe shown in Figs. 4 and 5 differs from the syringe shown in Fig. 3 only in the shape of the rubber bulb 24. As shown, this bulb has the shape of a rubber cushion 32. A syringe of this type is particularly adapted for introduction of liquid into the vaginal cavity. It is used by first introducing into the vaginal cavity the tubular

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conduit 20 and the closed resilient rubber tube 21 and then pressing with the thighs against the rubber cushions 32 without the necessity of any manual operation.

In the syringe shown in Fig. 6, the function of the rubber cushion and rubber ball are reversed compared with the syringe shown in Fig. 5: while in the syringe shown in Fig. 5 the rubber cushion 32 contains the air, the rubber cushion 33 shown in Fig. 6 is connected with the tubular conduit 34 at 35 and serves for holding the liquid to be supplied and forced through conduit 34; similarly, while the ball shaped rubber bulb 31 in the syringe shown in Fig. 5 serves for holding the liquid to be introduced, the ball-shaped rubber bulb 36 of the syringe shown in Fig. 6 is connected at 38 with the closed resilient rubber tube 37 communicating with the same and containing the air serving for inflating the front portion of tube 37. This syringe is used in the same way as the one shown in Fig. 5, the only difference being that after introduction of the protruding syringe portion first the front end of tube 37 is inflated by manually compressing bulb 36 and then pressure is exerted by the thighs against the rubber cushion 33 so as to inject the liquid into the expanded vaginal cavity.

The syringe shown in Figs. 7 to 9 includes also a protruding syringe member of the type proposed by me. It includes also a rubber cushion comprising two separate cushion compartments 39 and 40. Cushion compartment 39 is air filled and communicates at 41 with the resilient rubber tube 42, while rubber compartment 40 is connected at 44 with the tubular conduit 43 communicating with the same. This compartment 40 is adapted to be filled with the liquid to be introduced into the vaginal cavity by means of the opening 44 which can be closed by the cap 45 as shown.

The syringe described in the preceding paragraph is used by first introducing into the body cavity, preferably the vaginal cavity, the protruding syringe portion consisting of the tubular conduit 43 and the resilient rubber tube 42 and then pressing first with one thigh against the cushion compartment 39, inflating thereby the front end portion of tube 42 and then pressing with the other thigh against the cushion compartment 40, thereby compressing the same and forcing the liquid contained in it through conduit 43 into the expanded vaginal cavity.

I wish to note that in the syringe shown in Figs. 7 and 9 and described in the preceding paragraphs the tubular conduit 43 is not rigid, but flexible so as to be adapted to be folded as shown in Figs. 8 and 9. The operative position shown in Fig. 7 is obtained by exerting slight pressure against the cushion compartment 39.

The syringe shown in Figs. 10 to 12 differs in substantial respects from the syringe described in the preceding paragraph, but is nevertheless based on the same invention. This syringe also includes a tubular conduit 46 surrounded by a resilient rubber tube 47 of the type defined above. The means for inflating the tube 47 consists of a tubular rubber extension 48 attached directly to the rear end of tube 47, communicating with the same. Compression of this tubular rubber extension 48 results in expansion of the front end portion of tube 47 in the same way as described above in connection with other syringe constructions according to my present invention.

The tubular conduit 46 is connected at its rear end to one end of hose 49. This hose is provided at its other end with a screw threaded connecting

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sleeve 50 adapted to be screwed on a corresponding screw threaded tubular member 51 provided in a wall of the combined liquid container and cover 52. This combined liquid container and cover 52 preferably consists of a water impervious sheet material and can either be used as shown in Fig. 12 for holding the liquid to be introduced through conduit 46 into the body cavity, or, as shown in Figs. 10 and 11, as a cover holding the entire syringe.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of devices for introducing liquids into expandible cavities differing from the types described above.

While I have illustrated and described the invention as embodied in syringes for introducing liquids into body cavities, I do not intend to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of my invention.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

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

1. A syringe for introducing liquid into a cavity of the human body comprising in combination a tubular conduit for introducing said liquid; an introducing opening at the front end of said tubular conduit; a rubber bulb adapted to be filled with said liquid for supplying said liquid and forcing the same into and through said tubular conduit, said rubber bulb being connected with the rear end of said tubular conduit; a closed rubber tube surrounding said tubular conduit and said introducing opening at the front end thereof and having at its front an expandible front portion equally expandible in transverse direction and surrounding said front end of said tubular conduit and said introducing opening at the front end thereof; and a closed air filled rubber member connected with said closed rubber tube for forcing air into said closed rubber tube so as to equally expand said expandible front portion at the front end of the same in transverse direction, whenever required.

2. A syringe for introducing liquid into a cavity of the human body comprising in combination a tubular conduit for introducing said liquid; an introducing opening at the front end of said tubular conduit; a rubber bulb adapted to be filled with said liquid for supplying said liquid and forcing the same into and through said tubular conduit, said rubber bulb being connected with the rear end of said tubular conduit; a closed rubber tube surrounding said tubular conduit and said introducing opening at the front end thereof and extending rearwardly from said front end of the same, said closed rubber tube having an expandible front end portion equally expandible in transverse direction and surrounding said front end of said tubular conduit and said introducing opening at the front end thereof; and pump means connected with said closed rubber tube for forcing air into said closed rubber tube so as to equally inflate said expandible front end portion at the

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front end of said closed rubber tube surrounding said front end of said tubular conduit, whenever required.

3. A syringe for introducing liquid into a cavity of the human body comprising in combination a tubular conduit for introducing said liquid; an introducing opening at the front end of said tubular conduit; a rubber bulb adapted to be filled with said liquid for supplying said liquid and forcing the same into and through said tubular conduit, said rubber bulb being connected with the rear end of said tubular conduit; a closed rubber tube surrounding said tubular conduit and said introducing opening at the front end thereof and extending rearwardly from said front end of the same, said closed rubber tube having an expandible front end portion equally expandible in transverse direction and surrounding said front end of said tubular conduit and said introducing opening at the front end thereof; and a closed air filled rubber cushion connected with said closed rubber tube for forcing air into said closed rubber tube so as to equally inflate said expandible front end portion at the front end of said closed rubber tube surrounding said front end of said tubular conduit, whenever required.

4. A syringe for introducing liquid into a cavity of the human body comprising in combination a tubular conduit for introducing said liquid; an introducing opening at the front end of said tubular conduit; a closed rubber cushion adapted to be filled with said liquid for supplying said liquid and forcing the same into and through said tubular conduit, said closed rubber cushion being connected with the rear end of said tubular conduit; a closed rubber tube surrounding said tubular conduit and said introducing opening at the front end thereof and extending rearwardly from said front end of the same, said closed rubber tube having an expandible front end portion equally expandible in transverse direction and surrounding said front end of said tubular conduit and said introducing opening at the front end thereof; and a closed air filled rubber bulb connected with said closed rubber tube for forcing

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ing air into said closed rubber tube so as to equally inflate said expandible front end portion at the front end of said closed rubber tube surrounding said front end of said tubular conduit, whenever required.

5. A syringe for introducing liquid into a cavity of the human body comprising in combination a tubular conduit for introducing said liquid; an introducing opening at the front end of the tubular conduit; a first closed rubber cushion adapted to be filled with said liquid for supplying said liquid and forcing the same into and through said tubular conduit, said closed rubber cushion being connected with the rear end of said tubular conduit; a closed rubber tube surrounding said tubular conduit and said introducing opening at the front end thereof and extending rearwardly from said front end of the same, said closed rubber tube having an expandible front end portion equally expandible in transverse direction and surrounding said front end of said tubular conduit and said introducing opening at the front end thereof; and a second closed air filled rubber cushion connected with said closed rubber tube for forcing air into said closed rubber tube so as to equally inflate said expandible front end portion at the front end of said closed rubber tube surrounding said front end of said tubular conduit, whenever required.

OCTAVIO JOSE ALVAREZ.

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