

J. MURPHY.

Methods of Treating Manufactured India Rubber Hose
Tubing, &c., with Antiseptics.

No. 151,418.

Patented May 26, 1874.

Fig. 1.

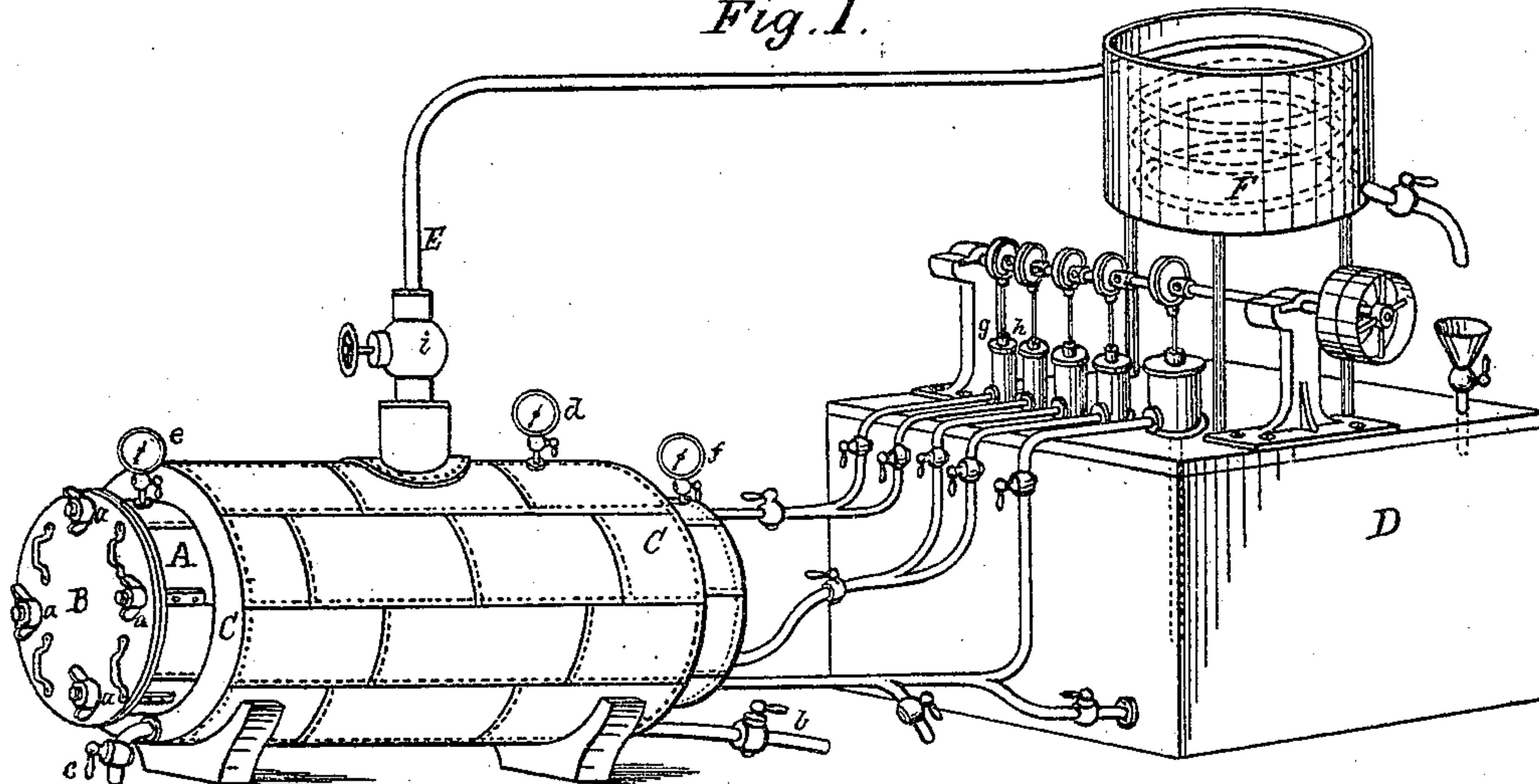


Fig. 2.

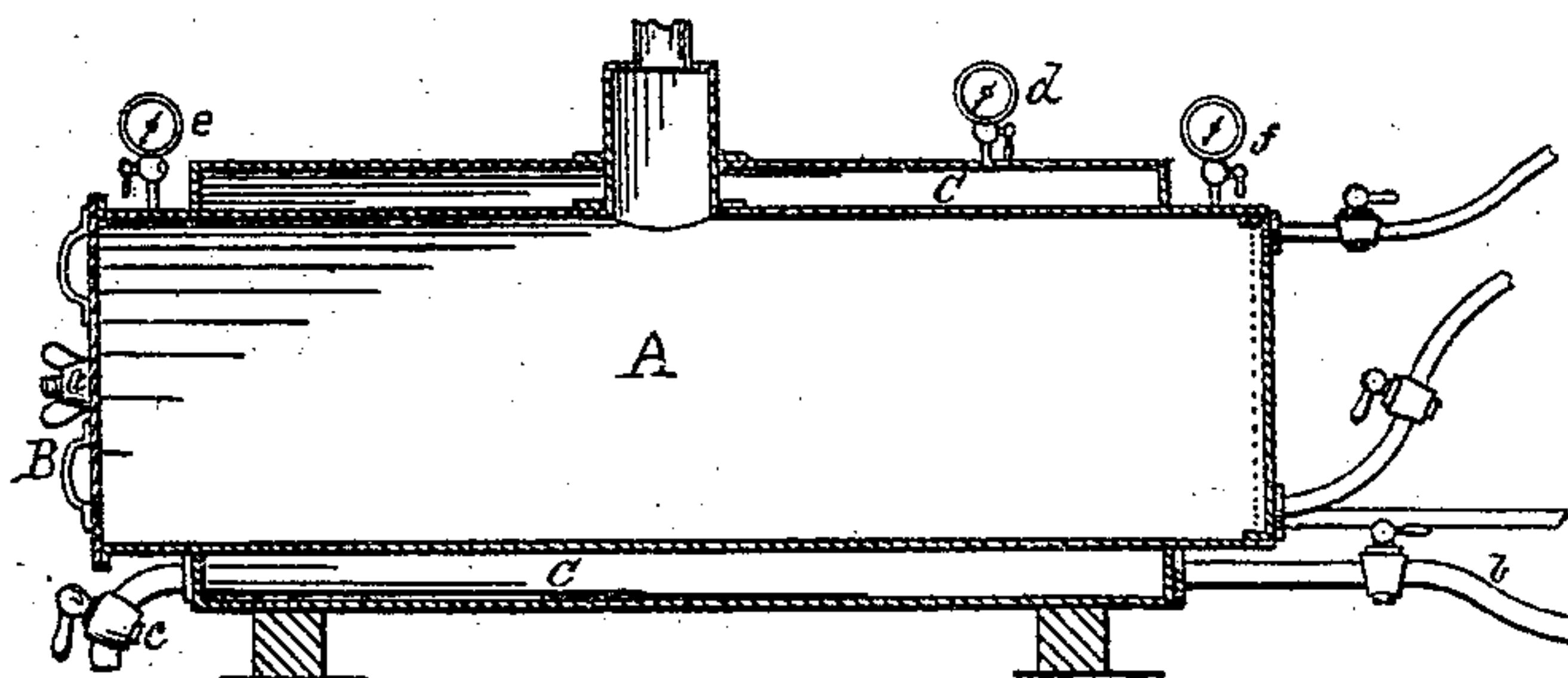


Fig. 3.

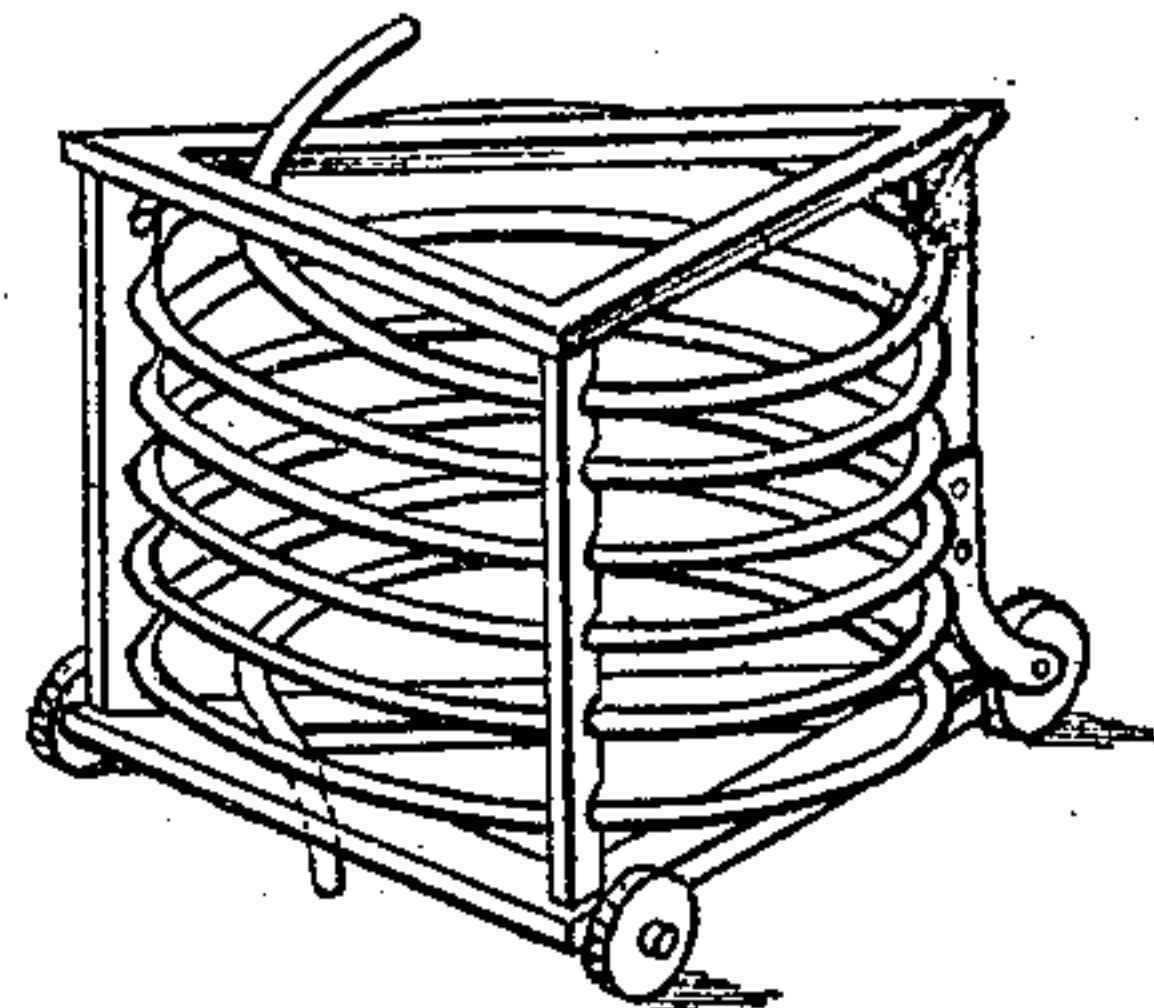
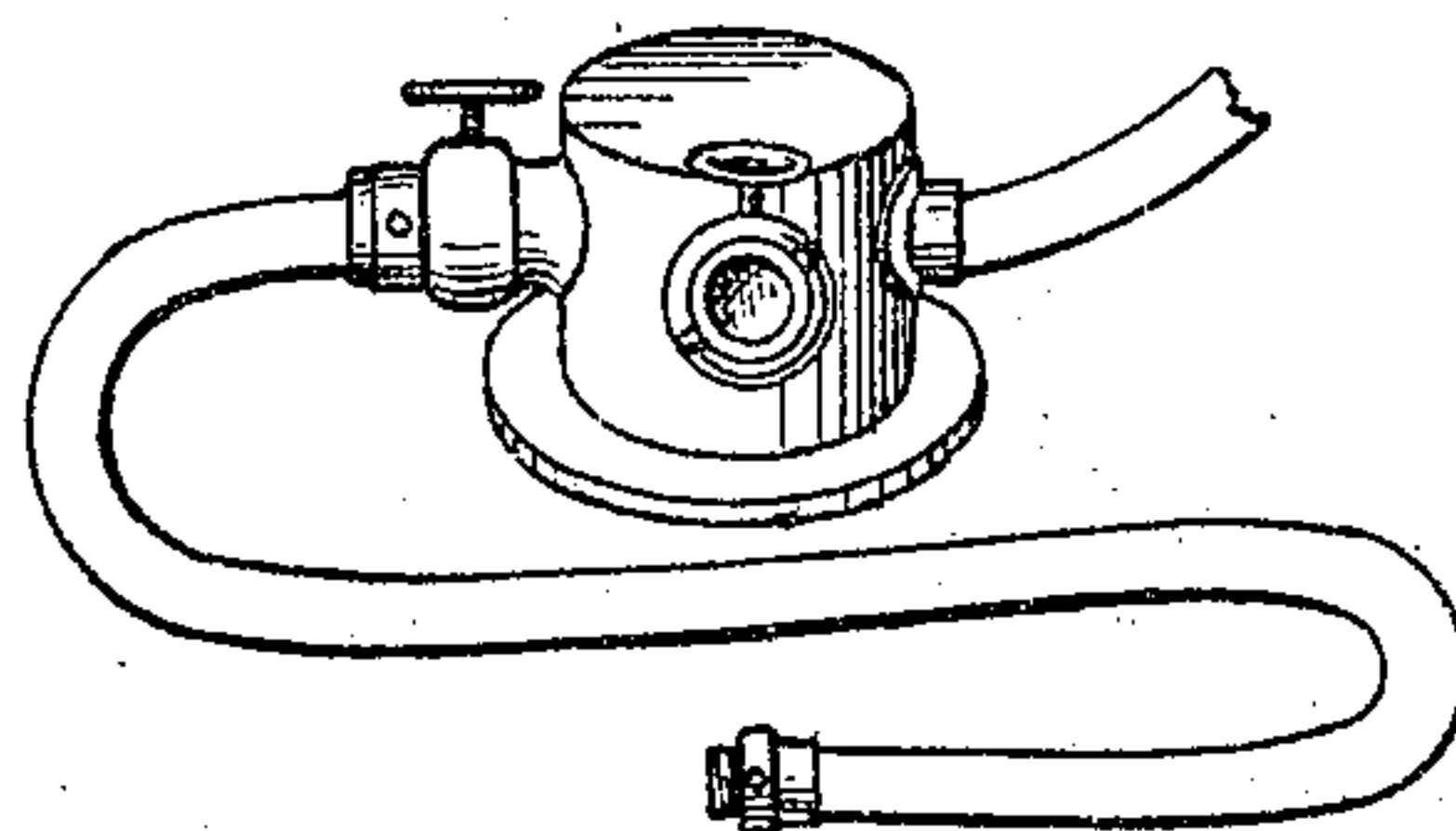


Fig. 4.



Witnesses.

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IMPROVEMENT IN THE METHODS OF TREATING MANUFACTURED INDIA-RUBBER HOSE, TUBING, &c., WITH ANTISEPTICS.

Specification forming part of Letters Patent No. 151,418, dated May 26, 1874; application filed November 25, 1873.

To all whom it may concern:

Be it known that I, JOHN MURPHY, of the city and county of New York, in the State of New York, have invented a certain new and useful Method of Treating Manufactured India-Rubber Hose, Tubing, &c., with Antiseptics; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear and true description thereof, and of an apparatus well adapted to facilitate its practice.

My present improvement relates to the preservative treatment not only of such india-rubber and gutta-percha goods as are composed in part of textile fabrics, but also to those in which no fibrous matter is employed; and my invention is based upon the discovery that rubber hose, tubing, &c., after vulcanization, can be practically charged with antiseptics. As heretofore practiced, antiseptics have been applied either to the textile fabric to be employed, prior to its being combined with the vulcanizable rubber compounds, or they have been mixed and compounded with the rubber and the several mineral matters usually employed in that connection. Antiseptics may be properly divided for the purposes of this specification into two general classes—the volatile and non-volatile—and for the purposes of description they will herein be separately considered.

Of the several volatile antiseptics, carbolic acid may be properly considered as the most valuable, and the one which has been practically employed as a hose-preservative to the greatest extent, with the most satisfactory results. When applied in solution, the textile fabrics have been immersed therein, and then well dried, for insuring proper adhesion thereto of the rubber compound, which is subsequently applied, and the hose formed in a manner well known, after which it is subjected to the requisite vulcanizing heat, varying slightly from 240° Fahrenheit upward. During the saturating, drying, and vulcanization processes, a constant waste by evaporation occurs, and but a comparatively small proportion of the carbolic acid originally held by the fabric when

taken from the solution can be found in the finished hose.

When the carbolic acid is incorporated with the plastic mass of rubber compound prior to its application to the textile fabrics, heated rolls are commonly employed for the mixing operation, and the mass is of necessity continually exposed to favorable evaporative conditions; and, after the goods have been subsequently vulcanized, it is found that a serious loss of the preservative has occurred. Not only is there this great waste of the preservative through the unavoidable incidents of the manufacture, but the finished article is not charged therewith to that extent as will enable it to successfully resist decay beyond certain general limits; and, however desirable such results may be, even if attained to any appreciable extent, it is obvious that a desideratum yet exists in the prolongation or extension of the said general limits of durability already known to have been practically attained.

By my improved process the finished vulcanized hose, tubing, &c., is charged with the preservative antiseptic, and, instead of incurring the waste incident to the previous modes described, I am enabled practically to avoid such waste, as there are no subsequent destructive incidents of manufacture.

The drawings annexed represent in Figure 1 a perspective view of an apparatus well adapted for the purpose of charging finished hose and other goods, and Fig. 2 represents a portion thereof in longitudinal vertical section.

In each of the figures, A denotes the charging-tank. It may be made of any suitable dimensions and adapted to receive the hose or tubing in straight lengths or in coils. Its head B is detachable, and is provided with an annular packing-ring for securing a tight joint when in position, and it is so held by head-bolts and nuts, as shown at *a*. In a complete apparatus the charging-tank will be provided with pressure and vacuum gages, as at *e* and *f*. C denotes a steam-jacket, which incloses the charging-tank for most of its length, and communicates with a steam-boiler by means of the pipe *b*. It is also provided with the

usual condense-water outlet at *c*, and the pressure-gage at *d*. D denotes the supply-tank in which the antiseptic liquor is deposited. Adjacent to this tank are certain pumps for performing the operation of filling the charging-tank. Several pumps are preferably to be employed; as, for instance, one of considerable capacity for rapid work to merely fill the charging-tank to ordinary fluid-pressure; also, say, two or more pumps of the class employed for hydraulic presses, are employed to force additional liquor into the tank until the requisite degree of hydrostatic pressure is attained therein for accomplishing the desired end. For the purpose of facilitating the charging process, certain vacuum-pumps, as at *g* and *h*, may be employed for exhausting the air from the charging-tank and the goods therein, in which case no rapid-working pump will be requisite, as the liquor may be admitted direct from the supply-tank through a connecting-pipe provided with a suitable cock. For the purpose of controlling and utilizing, by restoration, the vapors from the charging-tank prior to the removal of goods therefrom, a vapor-pipe, as at *E*, is provided and fitted with a suitable cock, as at *i*, for cutting off connection with the condensing-worm contained within the tank *F*.

The method of using the apparatus may be briefly explained as follows: The charging-tank may be filled with the vulcanized hose laid lengthwise therein or in separate coils. When coiled, and to be set on edge, however, it will be advisable to fill the interior of the hose with the fluid as far as may be practicable, and this may readily be done as each coil is placed within the charging-tank by means of a small conducting-hose. After being properly filled with hose, the head *B* is put on and screwed into proper position. The vacuum-pumps (if such are employed) are then put into operation until the air is well exhausted from the charging-tank, when the antiseptic solution is admitted from the supply-tank. When the charging-tank has been filled with the fluids at their normal pressure, the hydrostatic pumps are put into operation, and such additional antiseptic fluid is forced into the charging-tank as is necessary to effect the desired degree of pressure therein, which can be varied to meet the different requirements, and be regulated with a view to the capacity or strength of the tank. When thin goods are being treated, a low pressure of, say, from fifty to one hundred pounds, will produce desirable results; but the pressure on heavy goods should be at least one hundred and fifty pounds to the square inch, if only ordinary rapidity in the operation is desired; and if very rapid action is sought, the pressure may be increased to any degree, limited only by that degree which could not be exceeded with safety to the apparatus. After having been permitted to remain in the tank from one to ten hours, or even more, according to the na-

ture of the goods and the degree of pressure maintained, the fluid will be drawn off from the tank, and if the hose be laid in straight lengths, and also so laid that each piece at a point midway between the two ends will be higher than either end, all, or practically all, of the fluid may be readily withdrawn, after which steam is let into the jacket *C* until its temperature and that of the charging-tank is raised to about 212° Fahrenheit. The cock *i* in the pipe *E* meantime being opened, all the drying vapors of the volatile antiseptic may be conducted to the worm in the tank *F*, and there condensed and recovered.

When coils within the charging-tank are placed horizontally, with one end of the hose in each instance arranged at the bottom of the coil, no difficulty will be experienced in drawing off the fluid from within the hose without further manipulation; but if the coils are placed on edge and filled while in that position, as before described, it will of course be necessary, before applying the steam to the jacket, to remove the head and discharge the fluid from each of the coils, and replace them in the charging-tank or a similar one, for drying off and for recovering the excess of the antiseptic.

In Fig. 3 I have shown a vertical metallic cage in which the hose may be coiled, so that a ready discharge of the fluid from the interior thereof may be readily effected without special manipulation, as from the upper end of the hose to the lower the fluids will readily flow. A charging-tank for receiving these cages in a vertical position would preferably be made with a level floor, and such a one could as well be used for receiving the vertical or horizontal coils without cages, or the hose laid out straight therein.

In treating vulcanized rubber hose or tubing with volatile antiseptics no difficulty will be experienced in charging, even when couplings are attached, as from the peculiar penetrative nature of any volatile antiseptic—like carbolic acid, for instance—it can readily be forced bodily into and through the hose laterally, and will practically penetrate and charge even those portions with which the couplings are engaged. It is owing to this fact that my process possesses peculiar value, as any hose, after having been in service for such length of time as will warrant a further application of preservatives, may be placed within the charging-tank and recharged with antiseptics, and this operation may be repeated from time to time, and thereby practically reduce the liability of destruction to hose to that which is only incident to its actual wear and tear.

It is evident that the mere act of treatment does not preserve the goods, as the actual presence of the antiseptic must alone be relied on, and if, through its volatile characteristics, it in course of time shall depart therefrom, no further benefit can accrue from the mere fact of its former presence.

In Fig. 4 I show a device for simultaneously charging several lengths of the finished hose by means of a volume of volatile antiseptic fluid introduced into the interior thereof. The section of hose in each case is closed at one end and communicatingly secured at the other to the charging-chamber, into which the fluid is forced from the pumps. This mode of application is obviously not of equal value to that involving the complete immersion in the charging-tank, as it is slower in its operation, and not so complete in its effects. An internal pressure of, say, one hundred pounds to the square inch of an antiseptic fluid having a penetrative character equal to that of carbolic acid will, however, produce results comparatively desirable, and of marked value.

In this connection I will state that I am well aware that vapors of carbolic acid and of other volatile antiseptics can be forced into the body of the hose after vulcanization if subjected to pneumatic pressure to a degree requisite for the purpose by means herein described. This manner of treatment, inasmuch as its novelty consists in charging the hose after vulcanization with antiseptics by means of great pressure, is fully embraced within the spirit of my present invention. As, however, the actual presence of the preservative is requisite, I prefer to treat the finished hose with the fluid antiseptic, as already described, for when so applied the greatest possible quantity can be injected in the shortest time, and with comparatively little attendant loss or waste.

Having thus described the process of applying the volatile class of antiseptics, I will now describe the method of applying those which belong to the non-volatile class. With these latter there is, of course, no material loss or waste in the operations incident to the manufacture of the goods; but there are certain other considerations involved to a greater or less extent, which may be best illustrated by the selection from them all of chloride of zinc, and that body is deemed by me as a fair representative of the general class of non-volatile antiseptics to which it belongs. That chloride of zinc applied to textile fabrics possesses antiseptic or rot-preventing properties, has been long conceded. If, however, it be applied to the textile fabric prior to the application of the rubber compound, and then exposed for vulcanization to the action of heat, at, say, from 200° to 250° Fahrenheit, a decomposition of the chloride of zinc takes place, and develops hydrochloric acid—a well-known destructive agent, especially when in contact with textile or fibrous fabrics, or vegetable matter generally. There are many other metallic salts which, under certain conditions, may be applied with more or less desirable results as antiseptics; but they, too, are liable to undergo chemical changes during the vulcanizing process, whereby they are converted into destructive rather than preserva-

tive agents. In applying the non-volatile antiseptics, which are generally metallic salts in aqueous solutions, it has been demonstrated to my satisfaction that it is difficult to impregnate vulcanized hose or tubing by lateral injection into the body of the hose; and I, therefore, would never place in the charging-tank to be treated therewith hose with the couplings attached thereto, as reliance must mainly be placed on the exposed ends of the textile fabric, which serves as a series of ducts for facilitating the advancement of the antiseptic fluid from each end toward the middle of each section or length. In this connection the exhausting of the air in the charging-tank has a marked value, as by that means the charging operation will be materially accelerated. When employing the non-volatile antiseptics the steam-jacket will not be needed, as it is desirable as a rule to avoid high temperatures during their use, especially when thereby injurious results accrue, as, for instance, in the case of the chloride of zinc. The ends of lengths of hose thus treated will be no doubt charged to a greater extent than the central portions; but it has been well demonstrated that it is adjacent to the coupling that hose first shows signs of decay, owing to the fact that those portions of the hose are more exposed to the air when not in use; and if hose-towers are used for drying, the lower ends of the vertically-extended hose remain wet long after the upper portions have dried.

Having thus described my invention, and the best methods known by me for its practical employment, I desire it to be distinctly understood that the apparatus herein shown and described is to form the subject of a separate application for Letters Patent, and in no sense is to be embraced herein; also, that I am aware that it has been suggested that antiseptics may be applied to textile fabrics contained in vessels from which air has been exhausted, or to which vapors with pneumatic pressure have been applied, and also that in some instances antiseptic fluid under hydrostatic pressure has been employed in suitable vessels for treating the fabrics contained therein, and I have no doubt that both of these modes have been practiced to some extent. I am not, however, aware that prior to my discovery thereof, it was ever known that vulcanized rubber, or goods composed either in whole or in part thereof, with or without a textile fabric combined therewith, could be by any means charged with antiseptic matter; and I, therefore, claim as new, to be secured by Letters Patent—

The improvement in the art of preserving india-rubber and gutta-percha hose, tubing, &c., which consists in forcibly charging the same after vulcanization with antiseptics by means of pressure, substantially as described.

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