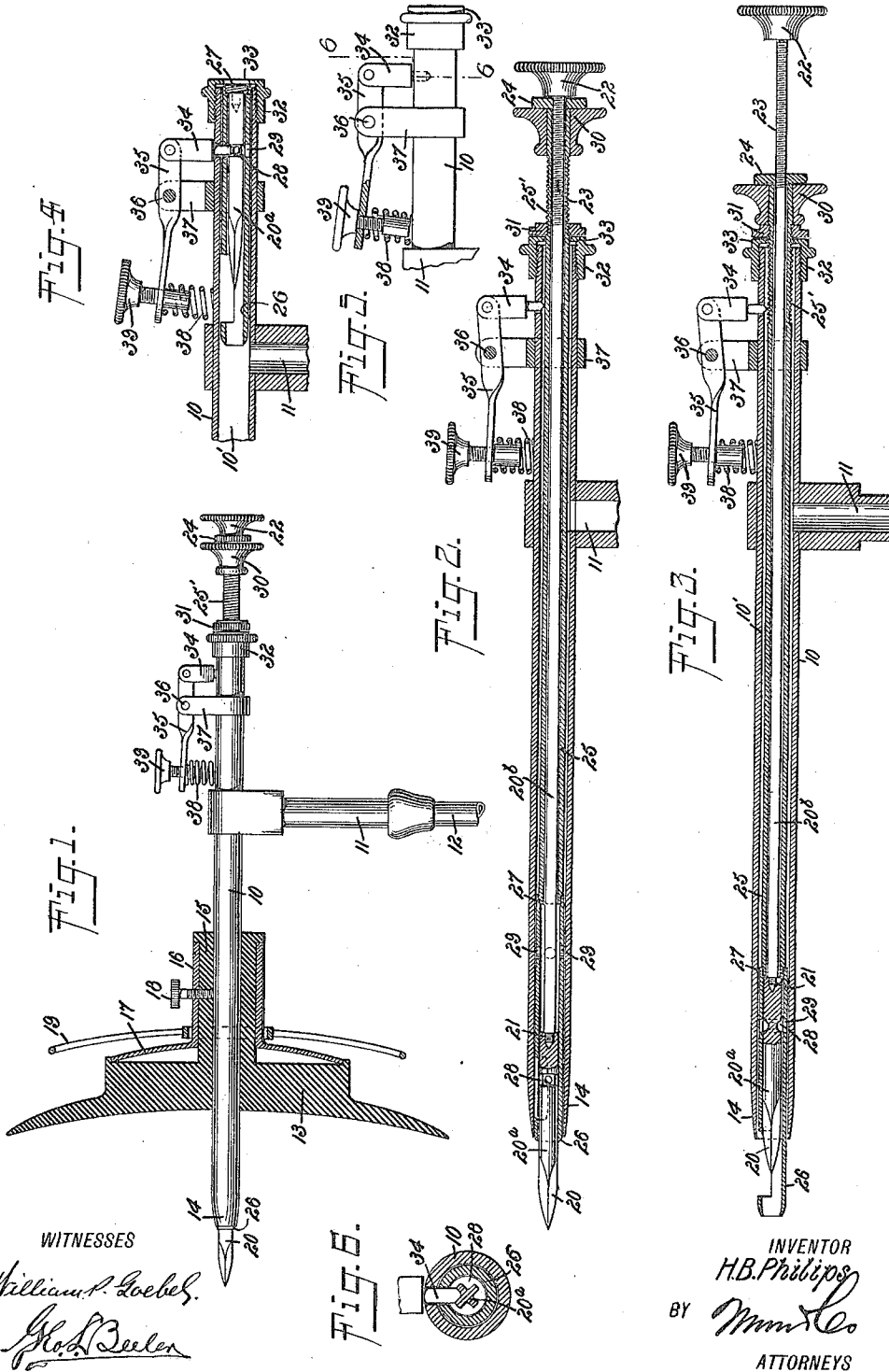


H. B. PHILIPS.  
THERAPEUTIC APPARATUS.  
APPLICATION FILED MAY 2, 1916.

1,213,001.

Patented Jan. 16, 1917.



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# UNITED STATES PATENT OFFICE.

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## THERAPEUTIC APPARATUS.

1,213,001.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, HERMAN B. PHILIPS, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Therapeutic Apparatus, of which the following is a full, clear, and exact description.

This invention relates to a surgical apparatus and has particular reference to devices adapted especially for the automatic drainage of empyema.

Among the objects of the invention is to provide a specific improvement in the therapeutic apparatus covered by Letters Patent of the United States, No. 1,155,271, issued at my request to Ralph S. Philips, September 28, 1915, in the provision of a combined trocar and curette for immediate coöperation with the cannula constituting one of the main elements of the apparatus. In carrying out this invention therefore in a practical manner, I provide an especially formed cannula having a trocar attachment adapted to be carried as a standard feature of the cannula and serving to make an incision when accompanying the cannula, and providing means whereby the cannula may be introduced into the pleural cavity simultaneously with the making of the incision with the trocar. The trocar may then be withdrawn from the patient, leaving the cannula in place where it may be retained until the treatment is completed, special means being applied to the outlet of the cannula, of a nature preferably as set forth in the previous patent above mentioned, to create sufficient negative pressure or suction to insure complete and expeditious drainage.

Another object of the invention is to combine with the trocar an element in the nature of a curette adapted to be introduced into or through the cannula for the purpose of removing any obstructions that may interfere with the proper flow outwardly through the cannula or outlet.

A further object of the invention is to provide locking means to retain either or both of the trocar and curette elements in position in the outer end of the cannula and thereby render said outlet end of the cannula practically air tight.

With the foregoing and other objects in view the invention consists in the arrange-

ment and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed or suggested herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings, in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a side elevation of the main parts of the device, the rubber cup and securing means being in section, the parts being adjusted in position to employ the trocar for introducing the cannula into the pleural cavity; Fig. 2 is a vertical longitudinal section of the main parts of the device in the same position as in Fig. 1, the view, however, being on a larger scale and omitting the cup and fastening devices; Fig. 3 is a view corresponding to Fig. 2, but showing the curette projected and the trocar retracted; Fig. 4 is a view corresponding to the right hand end either of Figs. 2 or 3, but with the cannula and outlet in free open communication for normal drainage, this view indicating the temporary action of the locking device; Fig. 5 is a side elevation of the same parts as are shown in Fig. 4, but with the locking device set as a permanent lock; and Fig. 6 is a transverse sectional detail on the line 6—6 of Fig. 5.

Referring now more particularly to the drawings, I show a cannula 10 having a smooth cylindrical bore 10', and having secured thereto a tubular outlet 11 to which may be connected a flexible suction and drainage tube 12 of any desired length which, as stated in the previous patent, may be connected to a suction device if desired. A comparatively flat cup 13 of flexible rubber or the like is connected adjustably along the cannula between the point or tapered end 14 thereof and the outlet 11. The cup is shown provided with a neck 15 surrounded by a thimble 16 having a flange 17 reinforcing the central portion of the cup. A set screw 18 serves to position the cup along the cannula according to the depth that the cannula is to be operated. This cup constitutes a means in connection with the yoke 19 for securing the apparatus in fixed position until the operation is completed. In other words, when the cannula is once introduced into the pleural

cavity and strapped or otherwise bound in place to the patient, it will not be removed until the patient has practically recovered from the condition, no occasion being found for removing the cannula for the purpose of cleansing either it or the wound, or for facilitating the drainage operation.

Referring now to the arrangement of the parts as shown in Figs. 1 and 2, which may be regarded as the first position or the adaptation of the apparatus to the introduction of the cannula into the pleural cavity, I provide a trocar 20 consisting of a pointed head 20<sup>a</sup> and a rod 20<sup>b</sup>, these two parts being detachably connected by the threaded nipple 21 extending from the rod into the tapped outer end of the trocar head. The outer end of the rod has rigidly connected to it a finger piece 22, adjacent which the rod is threaded at 23 for the accommodation of a lock nut or runner 24. Surrounding the rod is a tube 25. The main portion of this tube has a sliding fit upon the rod 20<sup>b</sup> but is slightly smaller in outside diameter than the bore of the cannula. The inner end of the tube 25, however, is enlarged forming the curette 26, the curette being connected to the main portion of the tube at the shoulder 27. The curette fits snugly, but slidably in and along the bore of the cannula. The head 20<sup>a</sup> of the trocar being larger than the rod 20<sup>b</sup> is adapted to abut against the shoulder 27 when the trocar is drawn outwardly, as shown in Fig. 3. In other words, the curette portion of the tube 25 is longer than the head of the trocar. In the position of the trocar just referred to, a circumferential groove 28 formed therearound registers with a series of holes 29 formed around the curette not far remote from the shoulder 27. The outer end of the tube 25 is fitted with a finger piece 30, adjacent which the tube is externally threaded at 25', and along this threaded portion operates a runner or lock nut 31. The outer end of the cannula is provided with a removable cap 32 threaded upon the otherwise open end of the cannula. Said cap 32 is provided with an inwardly projecting lip 33 forming a central opening through which the tube 25 may glide freely, but said cap serves to act as a stop against which the shoulder 27 of the curette strikes, as shown in Fig. 4, to limit the outward movement of the curette and trocar under ordinary operation. In this position of the parts, the plunger 34 carried by a lever 35 pivoted at 36 upon a bracket 37 fixed to the cannula, is adapted to snap downward through one of the holes 29 and into the groove 28 of the trocar. A spring 38 acts upon this lever tending to throw the plunger into locking position. In this position of the parts, the passageway outwardly through the cannula and outlet 11 is free and unobstructed for normal drainage oper-

ation. The lever 35 carries a thumb screw 39 which is adapted to be turned downwardly, as shown in Fig. 5, so that its lower end bears against the cannula and prevents the release of the plunger until this screw is again turned outwardly, as shown in Fig. 4.

The manner of operation or manipulation of the apparatus may be briefly summarized as follows: The cup 13 is adjusted along the cannula and fixed in position thereon by means of the set screw 18 according to the depth the cannula is to be inserted into the pleural cavity. For making the incision or for introducing the cannula, the finger piece 30 will be drawn outwardly from the cap 32, so as to draw the curette into the cannula. The sharp edge, however, of the curette may project or be visible so as to make a substantially smooth connection between the end of the cannula and the trocar head. The runner 31 is then run into place against the cap 32 thereby locking the finger piece 30 from movement toward the cannula. With the runner 24, however, run outwardly against the finger piece 22, the rod and trocar head may be projected inwardly beyond the point of the cannula and curette. By adjusting the runner 24 away from the finger piece 22, the length of the trocar beyond the cannula will be correspondingly decreased if desired. After the apparatus is inserted, as set forth, and bound to the patient for drainage operation, the curette and trocar will both be drawn outwardly until the shoulder 27 abuts against the cap lip 33, and the trocar head comes into contact with the shoulder 27. Then by slight rotation if necessary the plunger 34 will drop into locking position holding the parts in this position with open drainage space along the cannula and outlet. If the cannula should become occluded as may be detected in the practice of the invention, in accordance with the means set forth in the patent above referred to, the runner 31 is run outwardly against the finger piece 30, and the runner 24 is run against the finger piece 30 with the finger piece 22 spaced outwardly therefrom. In this position of the parts (see Fig. 3) when the plunger is released, the curette may be projected in advance of the trocar head to clear the passageway of any obstruction. When necessary to take the apparatus apart, the cap 32 is unscrewed and with the plunger 34 released from the curette, the curette and trocar may be withdrawn directly from the cannula. The two parts of the trocar may then be easily separated at the joint 21 for thorough cleansing and sterilization. The curette 26 is detachably connected to the tube 25 at the shoulder 27. As shown in Fig. 4, when the curette and trocar head are locked in the outer end of the cannula, forming an airtight closure therefor, the rod 20<sup>b</sup> and tube

25 are preferably both unscrewed from their corresponding head parts so as to be out of the way during the drainage period. To insure that the trocar head 20<sup>a</sup> will not rotate during the screwing or unscrewing of the nipple 21, the groove 28 is provided preferably with indentations, into which the plunger drops, as shown in Fig. 6.

I claim:

10 1. The combination of a cannula, a trocar carried by the cannula, and comprising two separable parts, means to adjust the trocar so as to project the point thereof beyond the point of the cannula for making an incision, 15 means to clamp the cannula to the patient for drainage operation, and means to secure one part of the trocar wholly within the outer end of the cannula when the other part is separated therefrom during said drainage 20 operation.

2. The combination of a cannula, a trocar carried within the cannula and comprising a rod and a head detachably connected together, means to adjust the trocar longitudinally of the cannula to cause the point thereof to project beyond the point of the cannula for introducing the cannula, and means carried by the outer end of the cannula to lock the head of the trocar wholly 30 within the outer end of the cannula when the rod is detached during drainage operation.

3. The combination of a cannula having a smooth cylindrical bore, a curette slidably 35 fitted in said bore, a trocar slidably fitted within the curette, and means to adjust the trocar and curette independently of each other longitudinally of the cannula.

4. The combination of a cannula having a 40 smooth cylindrical bore, a curette slidably fitted in said bore, means connected to the curette to move it longitudinally of the cannula, means to limit such movement of the curette, and a trocar slidably fitted within 45 the curette and adjustable lengthwise thereof independently of the adjustments of the curette.

5. The combination of a cannula having a smooth cylindrical bore, a curette slidably fitted in said bore and movable outwardly 50 along said bore, means carried by the outer end of the cannula to limit the outward movement of the curette, means carried by the cannula to prevent all movement of the curette when in its outer position, and a tro- 55 car carried within the curette and adjustable longitudinally thereof.

6. The combination with a cannula having a lateral outlet arranged intermediate its ends, of means carried by the cannula to 60 facilitate the introduction of the point thereof into the patient, said means being movable thereafter outwardly to occupy a position between the outer end of the cannula and said outlet, and means projecting radi- 65 ally through the cannula to hold the last mentioned means in such outer position so as not to obstruct the drainage passageway.

7. The combination of a cannula having a smooth bore, a tube movably mounted with- 70 in the bore and having an enlarged end constituting a curette fitted for snug slidable movement in said bore, said curette having a radial hole formed therein, means to draw the tube and curette outwardly, and a plun- 75 ger carried adjacent the outer end of the cannula adapted to enter said hole to lock the curette in the outer end of the cannula.

8. The combination of a cannula having a straight smooth bore, a curette slidably fit- 80 ted in said bore and having a radial hole therethrough, a trocar slidably fitted within the curette and having a depression therein adapted in one position to register with said hole, means to manipulate the curette and 85 trocar independently of each other and both with respect to the cannula, a plunger carried by the cannula adapted to enter said hole and depression to lock the curette and trocar from longitudinal movement, and 90 means to lock the plunger from accidental withdrawal from locking position.

HERMAN B. PHILIPS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."