

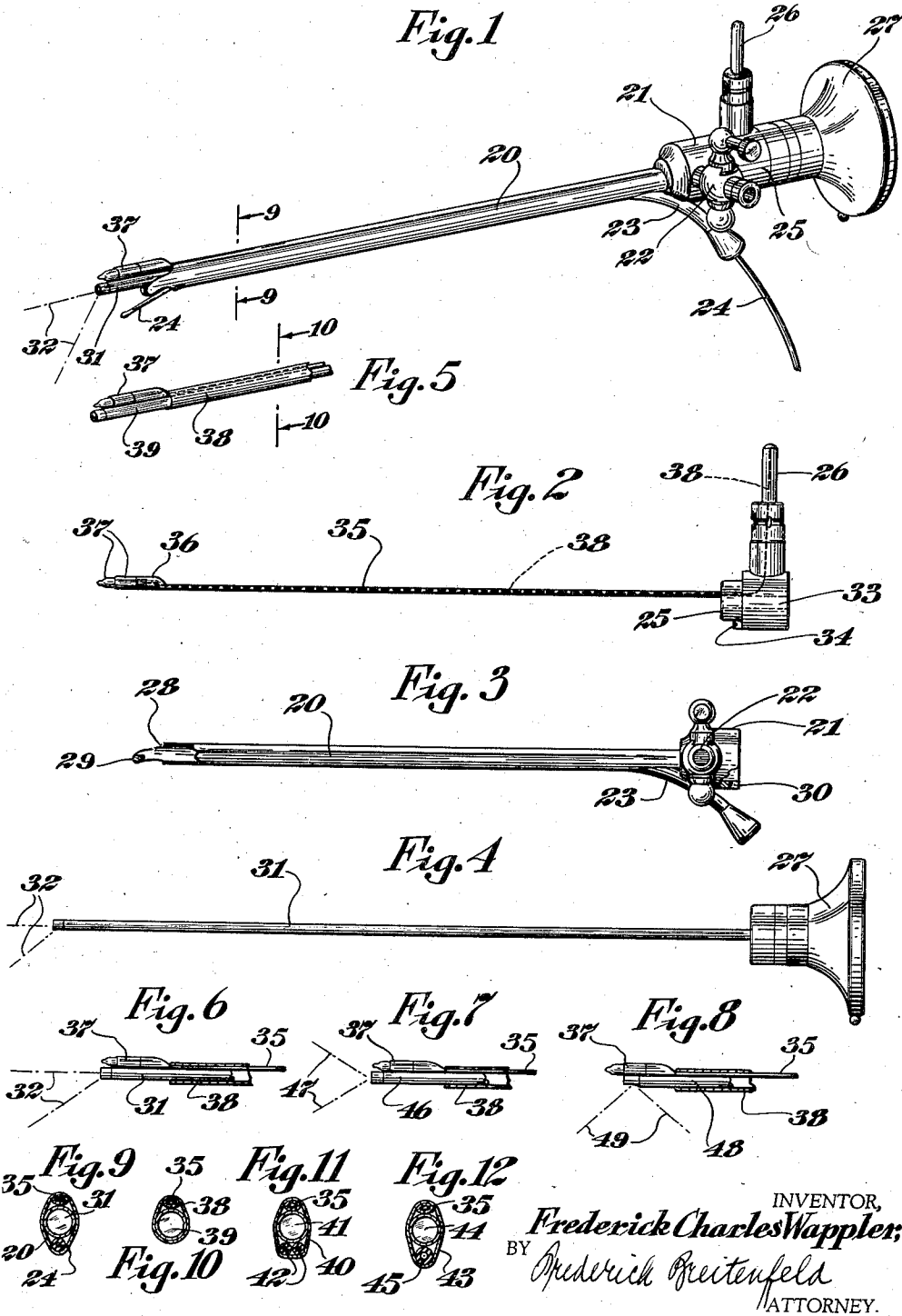
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F. C. WAPPLER

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CYSTOSCOPIC ARMAMENTARIUM

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CYSTOSCOPIC ARMAMENTARIUM

Frederick Charles Wappler, New York, N. Y.

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My present invention relates generally to surgical instruments, and has particular reference to an improved cystoscopic armamentarium.

In the examination and treatment of interior portions of the human body, differing conditions require instruments of differing capabilities. All modern instruments of the cystoscopic variety embody a means for illumination, and a telescopic means for viewing the illuminated region. However, under certain circumstances, a directly forward visibility is called for; under other conditions a view in a forwardly oblique direction is preferable; and in many instances a purely lateral, or even a retrograde, field of vision is required. In order that the desired field be adequately illuminated to a maximum extent, it is usually necessary to provide different arrangements for mounting the lamp. Furthermore, depending upon whether the instrument is to be used for purely diagnostic purposes or for differing types of treatment, sheaths of different characteristics and capabilities are called for.

In view of the foregoing, a surgeon desiring to be fully equipped with instrumentalities of maximum efficiency is called upon to have available a considerable quantity of equipment.

A general object of my present invention is to provide improvements in cystoscopic instruments, whereby a minimum number of selectively interchangeable elements may be made to constitute an armamentarium having a large variety of differing capabilities. Thus, an armamentarium of the present character furnishes, at relatively reduced expense, the equivalent of a far more extensive array of conventional instruments, enabling an operator under all circumstances, and without the necessity for a large array of equipment, to employ an assembled instrument of minimum calibre having exactly the capabilities and qualities that may be called for.

The successful production of the present improved armamentarium is predicated upon a novel mode of separable assembly of sheath, telescope, and lamp carrier. In accordance with my invention, a sheath is employed having a rear socket and an open front or distal end; and a lamp carrier is used which comprises a plug cooperable with the sheath socket, an extremely thin stem projecting from the plug, and a lamp larger than the stem and mounted on its forward end. The stem has a length at least as great as the rear wall of the sheath, and the stem is eccentrically mounted with respect to the plug, so that when the parts are assembled the stem lies closely alongside of the rear wall of the sheath,

thereby permitting the lamp to project from the forward end of the sheath in a laterally offset position.

The plug of the lamp carrier is further provided with an axial bore adapted to accommodate a telescope therethrough; and the sheath has a lumen just sufficient to accommodate the telescope and the stem, combined, or just sufficient to accommodate the telescope, the stem, and an operating tool, if any.

The structural improvements referred to permit the production of a highly efficient armamentarium consisting essentially of a series of sheaths having differing cross-sections, but having several features in common; a series of telescopes having differing objectives, but of common cross-section; and a single lamp carrier of novel character capable of interchangeable and selective employment with any chosen sheath and any chosen telescope.

I achieve the foregoing objects, and such other objects as may hereinafter appear or be pointed out, in the manner illustratively exemplified in the accompanying drawing, wherein—

Figure 1 is a perspective view of an assembled cystoscopic instrument constructed in accordance with my present invention;

Figure 2 is a side view of the lamp carrier by itself;

Figure 3 is a side view of the sheath of Figure 1 by itself;

Figure 4 is a side view of the telescope of Figure 1 by itself;

Figure 5 is a perspective view of the forward end of a modified cystoscopic instrument capable of assembly by the elements of the present armamentarium;

Figure 6 is a cross-sectional view showing the possibility of using a telescope of one type;

Figure 7 is a view similar to Figure 6, showing the possibility of using a telescope of another type;

Figure 8 is a view similar to Figure 6, showing the possibility of using a telescope of a third type;

Figure 9 is a cross-sectional view taken substantially along the line 9—9 of Figure 1;

Figure 10 is a cross-sectional view taken substantially along the line 10—10 of Figure 5;

Figure 11 is a cross-sectional view similar to Figures 9 and 10, showing the possibility of using a different sheath; and

Figure 12 is a cross-sectional view similar to Figure 9, showing the possibility of using another type of sheath.

In Figure 1 I have shown the general type of

crystoscopic instrument to which my invention relates. A sheath 20 is provided at its rear or proximal end with a socket 21. Depending upon the purposes for which the sheath is intended, an irrigation petcock 22 may be provided, and I have illustratively shown only one such petcock. I have also shown a sheath having a rear inlet end 23 for a tool such as the catheter 24. Assembled with the sheath in a manner presently to be described in greater detail is a lamp carrier having a rear plug 25 and carrying an electric terminal 26, and a telescope of which the ocular 27 is shown in Figure 1.

The exact nature of the instrument of Figure 1, and the general nature of the invention as a whole, will best be appreciated by referring to Figures 2, 3, and 4. In Figure 3 I have shown the sheath 20 by itself. This particular sheath has a cross-sectional configuration of somewhat elliptical character, as shown in Figure 9. It has an open front end 28 and a transverse deflector bar 29 positioned a small distance in advance of the front end 28. For a purpose presently to be described, the socket 21 has a notch 30, or its equivalent.

The telescope shown in Figure 4 has the cylindrical body portion or barrel 31 and is provided with an objective at its forward end. The particular telescope shown in Figures 1 and 4 (and also in Figure 6) commands a forwardly oblique field of vision substantially defined by the dot-and-dash lines 32.

The lamp carrier, shown most clearly in Figure 2, has an axial bore 33 extending through the plug 25. It will be observed that the plug has a forward portion of somewhat reduced diameter. It is this portion which is adapted to fit snugly into the socket 21 of the sheath. To insure a proper positioning of the plug, it carries a projection 34, or its equivalent, adapted to cooperate and interengage with the notch 30 in the sheath socket.

The bore 33 is of a size which snugly yet slidably accommodates the barrel 31 of the telescope. Extending forwardly from the plug 25, and, more particularly, from a point directly alongside of the bore 33, is a stem 35; and mounted on the forward end of the stem, preferably in the offset relationship shown, is the lamp socket 36 and the miniature electric lamp 37. An insulated electric conductor, indicated by the dotted line 38, extends through the stem 35 from the terminal 26 to the lamp 37. The details of the electrical connections have not been shown because these are known per se in the art. I wish to point out, however, that the stem 35 is purposely of a size which is just large enough to accommodate the insulated conductor 38. One method of forming the stem is to employ an extremely fine piece of tubing, such as that which enters into the manufacture of hypodermic needles.

The stem 35 is purposely of a length which is at least as great as the length of the rear wall of the sheath. By the term "rear wall" I intend to refer to the wall which is uppermost in Figure 3, i. e., furthest removed from the field of vision or area of operation.

The sheath of Figures 1 and 3 is intended to be used with a single small-sized catheter 24, and reference to Figure 9 will make it apparent that the sheath has a lumen, i. e., an internal shape and capacity, just sufficient snugly to accommodate the telescope 31, the stem 35, and the catheter or tool 24. It is further to be noted

that the lamp (by which term I refer to the parts 36 and 37 collectively) has a calibre, i. e., an exterior shape and girth, which is no larger than that of the telescope.

The reasons for the various specific relationships of sizes, as hereinbefore described, will be more fully appreciated by describing the manner in which the instrument of Figure 1 is assembled.

The lamp carrier of Figure 2 is first inserted into the sheath of Figure 3. During the process of insertion, the bore 33 will be out of alignment with the axis of the sheath, because of the eccentric arrangement of the stem 35 and the lamp. The lamp having a calibre no greater than that of the telescope, it will pass readily through the sheath. Also, since the length of the stem 35 is at least as great as that of the rear wall of the sheath, the lamp will ultimately protrude from the open front end 28 of the sheath. As soon as this protrusion of the lamp has been effected, the plug of the lamp carrier may be axially aligned with the socket of the sheath, and may be inserted into the socket and interengaged therewith by means of the cooperable parts 30 and 34. This preliminary assembly having been effected, the stem 35 will lie closely adjacent to the rear wall of the sheath (see Figure 9), and the lamp will project forwardly from the sheath in a laterally offset position, as shown most clearly in Figure 1. The final step in the assembly is to insert the telescope of Figure 4. This telescope will pass through the bore 33, and will then pass axially through the sheath and will project at the forward end, as shown in Figure 1. The subsequent insertion and use of the catheter 24 will be obvious to those skilled in the art. The forward end of the catheter will pass under the bar 29 and will thus be directed into the illuminated field of vision.

The particular instrument illustrated in Figure 1, and heretofore described, thus constitutes a cystoscope which commands a forwardly oblique field of vision, and which is equipped for the employment of a single small-sized catheter.

In the event that the operator desires merely a diagnostic instrument, i. e., one which is used solely for inspection purposes, he would choose from the armamentarium a sheath 38 shown in Figures 5 and 10. This sheath has a sort of oval or egg-shaped cross-section, having a lumen just sufficient to accommodate the telescope 39 and the lamp carrier stem 35. The resultant instrument, when assembled in the manner hereinbefore described, will have a forward end as shown in Figure 5. The advantage of this resultant instrument over that shown in Figure 1 is obviously its reduced calibre.

Similarly, if the operator desires to assemble an instrument capable of using a pair of small-sized catheters, he will choose from the armamentarium a sheath 40 (Figure 11) which has a lumen just sufficient to accommodate the telescope 41, the lamp carrier stem 35, and the catheters 42.

If the operator desires to use an instrument capable of passing a larger catheter, or possibly an electrode or the like, he will choose from the armamentarium a sheath 43 (Figure 12) having a lumen just sufficient to accommodate the telescope 44, the lamp carrier stem 35, and the tool 45.

The operator also has available besides the telescope shown in Figures 4 and 6 and commanding a forwardly oblique field of vision, a

telescope 46, shown in Figure 7, commanding a directly forward field of vision indicated at 47, and a telescope 48, shown in Figure 8, commanding a purely lateral field of vision indicated by the lines 49. Telescopes having other objective capabilities may also be available.

In each of Figures 6, 7, and 8 I have, for illustrative purposes, shown a sheath which is identical with the sheath of Figure 5; and for this reason I have designated the sheath of Figures 6-8 with the reference numeral 38. It will be understood, however, that any selected sheath may be employed.

Also, it will be understood that the telescopes designated 31, 39, 41, and 44 in Figures 9-12 may be of any selected type, as illustrated in Figures 6-8.

It should be noted that the telescope 43 has a somewhat shorter length than the other telescopes. This avoids the production of a shadow in the lateral field of vision.

Summarizing, the present improved armamentarium lays at the disposal of the operator a series of sheaths (illustratively designated 20, 38, 40, and 43), a series of telescopes (illustratively designated 31, 46, and 48), and a lamp carrier of the improved character illustrated in Figure 2. The sheaths, while differing in lumen, have in common the fact that they all have rear walls of equal lengths, and end sockets of standardized character. The telescopes, while differing in objectives, and possibly differing slightly in lengths, have in common the fact that they are all of uniform cross-section, permitting them to be interchangeably inserted through the bore 33. The improved lamp carrier is a single element common to all of the various instruments that may be assembled. The catheters or equivalent tools are well known per se and readily available to any surgeon, and are referred to in the appended claims by the generic term "tool".

An outstanding advantage of the present invention lies in the fact that any instrument which is assembled has a calibre of the smallest possible character. The extra space which is taken up by the lamp is at the extreme tip of the instrument, where the added size is unobjectionable, because of the fact that this end of the instrument is disposed within the body cavity, e. g., the bladder. The separable nature of the instrument permits the insertion and removal of the same without requiring that the relatively large forward end of the instrument be inserted or withdrawn, with accompanying pain, irritation, and possible injury, through the extremely constricted passage leading to the bladder or other interior cavity.

I deem it to be within the purview of my invention to modify the stem of the lamp carrier by constructing its rear end in the form of a tube concentrically arranged with respect to the bore 33. Such a construction may, under certain circumstances, be desirable for the purpose of imparting added strength to the stem. Where such a construction is used, the total length of the stem must be correspondingly increased to permit the parts to be brought into axial relationship in completing the assembly of any desired instrument.

Those skilled in the art will appreciate, of course, that the cross-sectional views shown in the accompanying drawing are necessarily exaggerated with respect to the relative thickness of the sheath material, of the lamp carrier stem, etc.

In general, it will be understood that changes in the details, herein described and illustrated for the purpose of explaining the nature of my invention, may be made by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is, therefore, intended that these details be interpreted as illustrative, and not in a limiting sense.

Having thus described my invention, and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. A cystoscopic instrument comprising a separable assembly of a sheath, a telescope, and a lamp carrier; said lamp carrier comprising a thin stem at least as long as the rear wall of the sheath, and a lamp mounted on its forward end; said sheath having a lumen just sufficient to accommodate said telescope and said stem; and said lamp having a calibre no greater than that of said telescope.

2. A cystoscopic instrument comprising a separable assembly of a sheath, a telescope, a lamp carrier, and a tool; said lamp carrier comprising a thin stem at least as long as the rear wall of the sheath, and a lamp mounted on its forward end; said sheath having a lumen just sufficient to accommodate said telescope, stem, and tool; and said lamp having a calibre no greater than that of the telescope.

3. A cystoscopic instrument comprising the elements set forth in claim 1, in combination with an electric terminal on the rear end of the lamp carrier, an insulated electric conductor extending through said stem from the terminal to the lamp, and said stem being just large enough in cross-section to accommodate said insulated conductor.

4. A cystoscopic instrument comprising the elements set forth in claim 2, in combination with an electric terminal on the rear end of the lamp carrier, an insulated electric conductor extending through said stem from the terminal to the lamp, and said stem being just large enough in cross-section to accommodate said insulated conductor.

5. In a cystoscopic instrument, the combination with a sheath having an open distal end and a socket at its proximal end, of a lamp carrier comprising a plug cooperable with said socket, an eccentric stem extending from said plug and having a length at least as great as the rear wall of the sheath, and a lamp mounted on the forward end of said stem, said stem being offset from the plug axis so as to lie directly alongside of said rear wall when the parts are in assembled relation, whereby the lamp will project from the sheath in a laterally offset position.

6. In a cystoscopic instrument, the combination set forth in claim 5, said plug having an axial bore adapted to accommodate a telescope therethrough.

7. In a cystoscopic instrument, the combination with the elements set forth in claim 5, of a telescope extending axially through said plug and snugly accommodated in said sheath alongside of said stem.

8. As an element of a cystoscopic instrument, a lamp carrier comprising a bored plug adapted to enter a sheath socket and to accommodate a telescope in said bore, a stem extending from a point on said plug directly alongside of said bore, and a lamp mounted on the forward end of said stem.

9. As an element of a cystoscopic instrument, a lamp carrier comprising a bored plug adapted to enter a sheath socket and to accommodate a

telescope in said bore, a stem extending from a point on said plug directly alongside of said bore, a lamp mounted on the forward end of said stem, an electric terminal on said plug, and an insulated electric conductor extending through said stem from said terminal to said lamp.

10. As an element of a cystoscopic instrument, a lamp carrier comprising a bored plug adapted to enter a sheath socket and to accommodate a telescope in said bore, a stem extending from a point on said plug directly alongside of said bore, a lamp mounted on the forward end of said stem,

an electric terminal on said plug, and an insulated electric conductor extending through said stem from said terminal to said lamp, said stem being just large enough in cross-section to accommodate said insulated conductor.

11. In a cystoscopic instrument, the combination with the elements set forth in claim 5, of cooperable means on said socket and plug for interengaging the sheath and lamp carrier only when said stem lies alongside of said rear wall.

FREDERICK CHARLES WAPPLER.