

[54] **SPECULUM INSTRUMENT AND ISOLATED LIGHT MEANS THEREFOR**

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[58] Field of Search 128/6, 4, 5, 7, 8, 9, 10, 11

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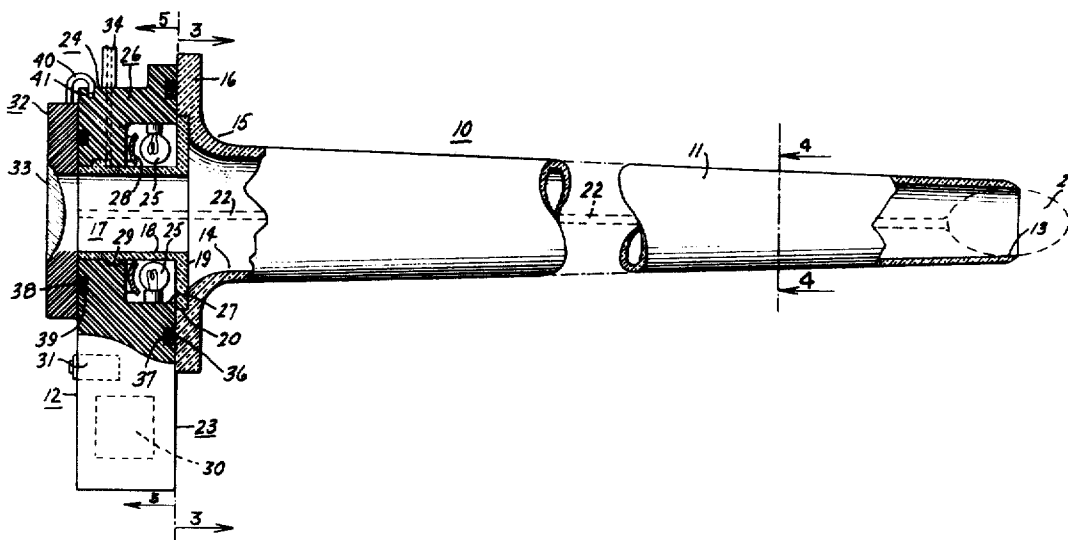
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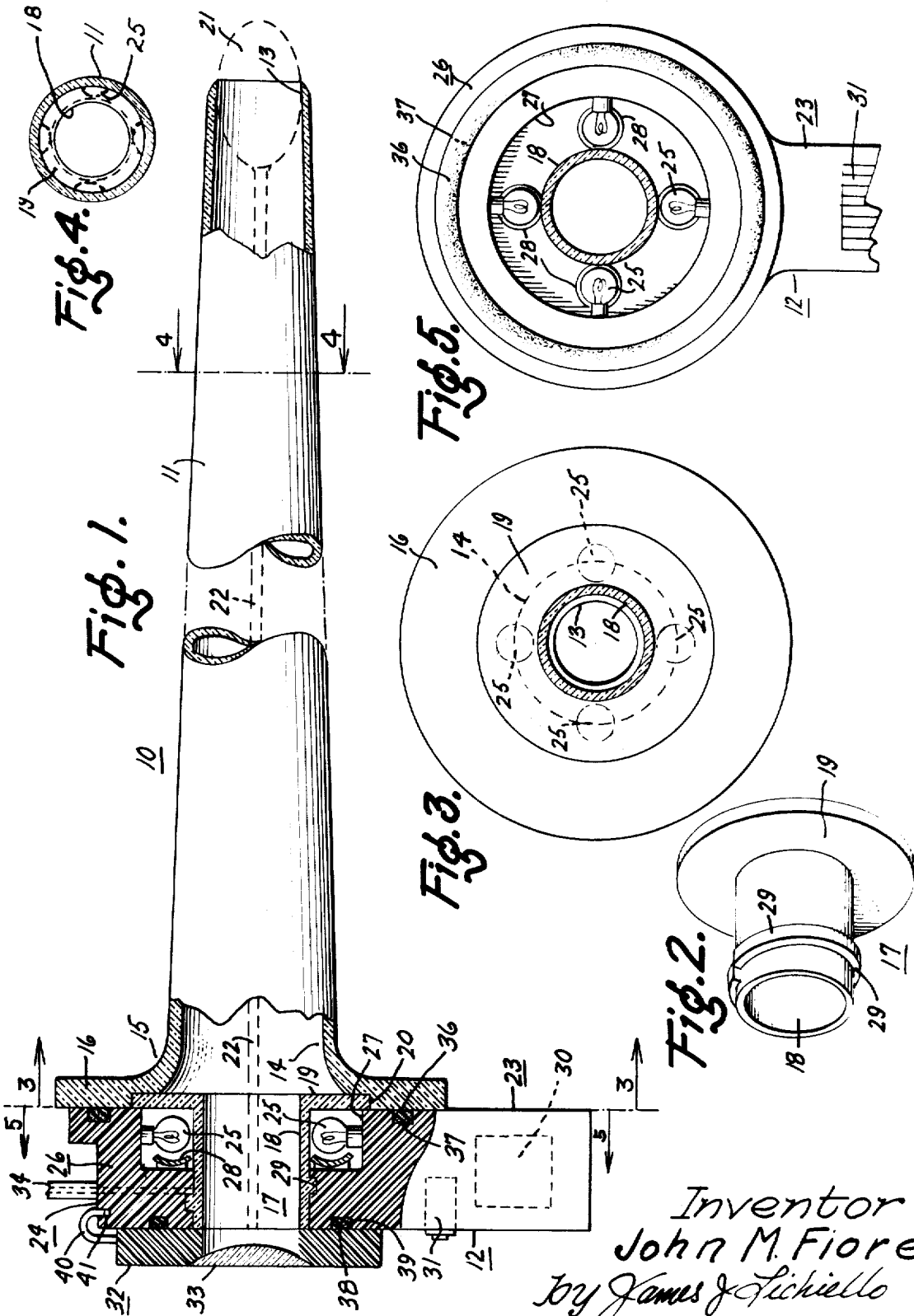
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[57] **ABSTRACT**

A speculum instrument with improved lighting means therefore is disclosed wherein the speculum barrel, which may be a single use disposable material, tapers to become increasingly larger at its proximal end. A smaller cylindrical sleeve member having a light transmitting flange or wall at one end, has the flange affixed into the larger proximal end of the barrel with the sleeve extending therefrom, to define an annular contamination isolated area with the flange directed towards the distal end of the barrel. A handle member containing a light source releasably engages the speculum barrel and provides lamp means in the isolated area to direct light through the barrel. An obturator in the barrel may be withdrawn through the sleeve.

13 Claims, 7 Drawing Figures





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Fig. 7.

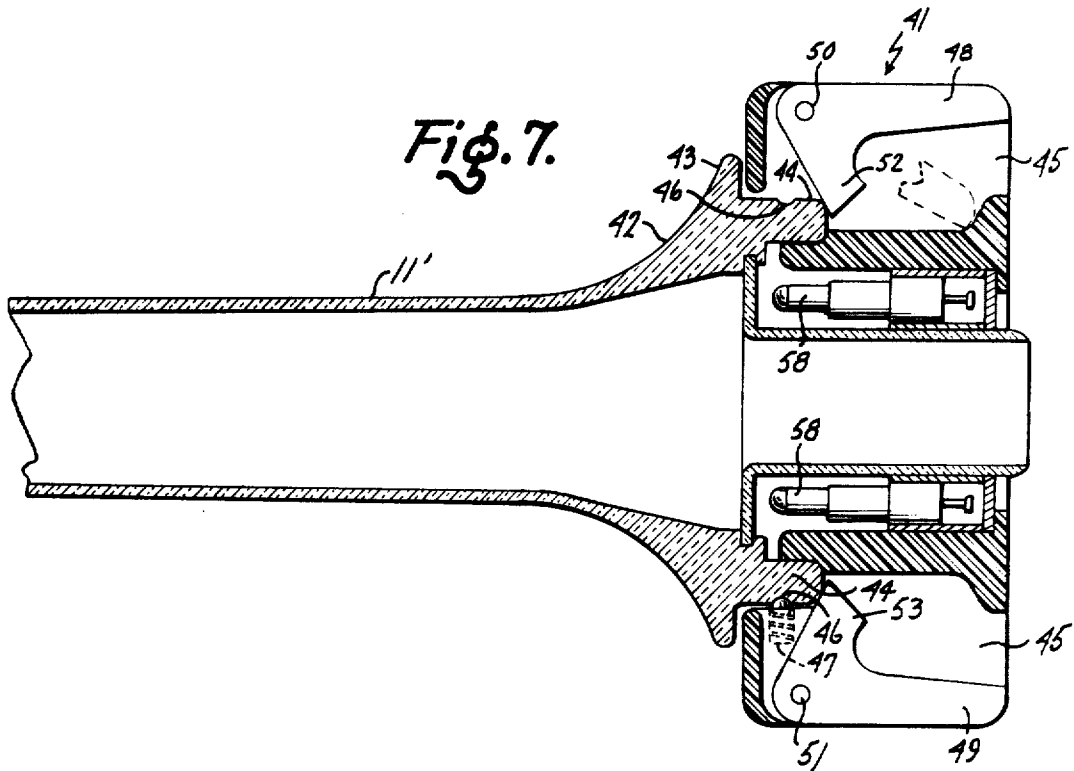
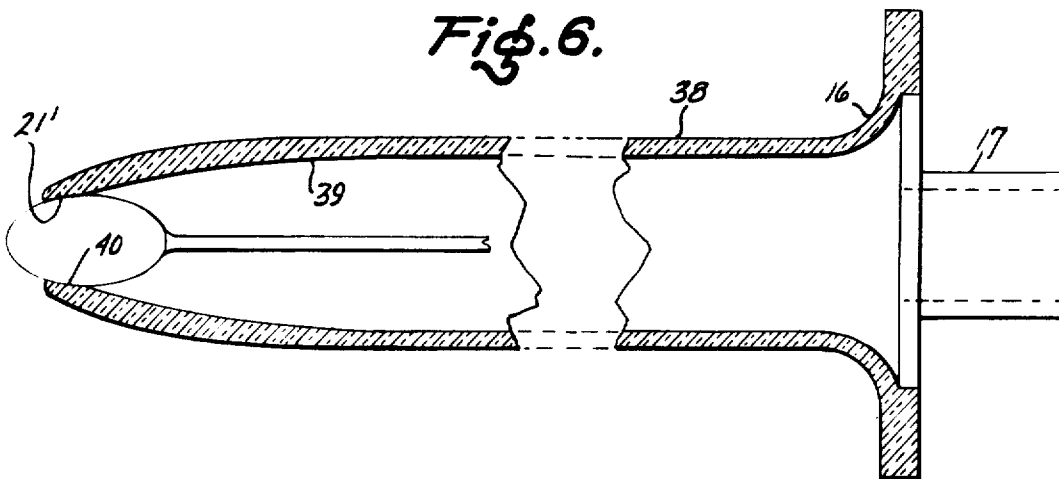


Fig. 6.



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SPECULUM INSTRUMENT AND ISOLATED LIGHT MEANS THEREFOR

BACKGROUND OF INVENTION

1. Field of Invention

This invention relates to speculum instruments generally, and more particularly to proctoscopic speculums having enclosed, contamination isolated light directing means at the proximal end of the barrel through which an obturator may be withdrawn.

2. Description of Prior Art

Speculum instruments may be defined broadly as instruments adaptable for insertion into a body opening, human or animal, in order to medically observe or treat an inner portion. In particular rectal speculums, defined generally as proctoscopic speculums, including anosopes and sigmoidoscopes, have become increasingly important in routine and preventative medical examinations as well as for medical treatment. More specifically, there is increased use of sigmoidoscopes for examination and treatment of the upper reaches of the colon, and disposable sigmoidoscopes for this purpose are very desirable. However, a notable limitation of these proctoscopic devices such as sigmoidoscopes relates to the lack of optimum lighting means employed therewith.

In the use of medical speculum devices generally a light source is desirable to increase the accuracy of more precise types of diagnostic examinations, and also to facilitate various treatment processes carried on through the device. Ordinarily such a light source may be one which is generally external to the instrument, or one which is attached thereto at the proximal end, and arranged in either instance, to have light directed into or through the speculum. These and other similar arrangements suffice for short-length speculum devices where relatively low lighting power of the light source is sufficient. However, in the longer speculum instruments such as a sigmoidoscope, where the effective length may be on the order of 25 centimeters or more, and where the instrument is of necessity an enclosing cylinder, more lighting power is necessary because of distance involved and the nature of the parts to be examined. Because of this notable requirement, it is usual design practice in sigmoidoscopes to have the light source placed inside the instrument and adjacent the distal end thereof. In this position, however, the light source is subject to contamination from contact with the patient directly or indirectly so that without means for maintaining the light source in a sterile or sanitary condition, impending reuse for other patients without intervening cleansing is prohibited. Therefore, the highly desirable disposability concept of the sigmoidoscope is limited by its being combined and employed with a lighting means which is not disposable or immediately reusable.

Another problem associated with the above described and other lighting means incorporated with the speculum, relates to the requirement of ease of assembly and detachability of the lighting means to the speculum so that the speculum may be of a single use disposable type and the lighting means readily and easily detached therefrom without requisite skill. A further problem with proctoscopic devices employing an obturator relates to some provision for removing the obturator while the lighting means is in position, without changing the circumferential configuration of the sigmoidoscope or obturator, to minimize assembly steps prior to use. Reference is made to U.S. Pat. No. 3,373,736—Fiore et al. and British Pat. Nos. 1,034,222; 1,947,140; 1,048,600 and 1,081,849 for further description of a disposable sigmoidoscope and lighting means therefore.

OBJECTS OF THE INVENTION

Accordingly, it is an object of this invention to provide an improved speculum instrument and lighting means therefore.

It is another object of this invention to provide an improved single use disposable proctoscopic instrument with separate isolated lighting means therefore.

It is a further object of this invention to provide an improved single use disposable proctoscopic instrument with separate isolated lighting means incorporated at the proximal end thereof.

It is a still further object of this invention to provide an improved single use disposable sigmoidoscope having a separable lighting means incorporated in the proximal end thereof in enclosed, protected, and contamination isolation relationship thereto.

It is yet another object of this invention to provide an improved single use disposable sigmoidoscopic instrument with separate protective lighting means in the proximal end thereof through which an obturator may be withdrawn.

It is another object of this invention to provide a single use disposable sigmoidoscope where the barrel tapers from proximal to distal end to provide a walled area behind which lighting means are isolated, and through which the obturator may be withdrawn.

It is another object of this invention to provide an improved single use disposable sigmoidoscopic barrel which tapers to provide a larger proximal end in which a separate annular walled insert defines a protected lighting means area directly viewable from the distal end, and through which an obturator may be withdrawn.

BRIEF DESCRIPTION

This invention in one of its preferred forms includes a single use disposable sigmoidoscopic barrel having a tapered bore to provide an enlarged proximal end. A smaller sleeve member having a clear plastic flange is concentrically attached to the enlarged end of the barrel with the flange providing an annular window radially within the enlarged end of the barrel and the sleeve projecting axially therefrom. A handle lighting unit is fitted coaxially over the sleeve so that light from a lamp therein is directed through the annular window and down the barrel. The sleeve aperture is slightly larger than the opening of the distal end of the barrel so that an obturator may be withdrawn through the sleeve, and the sleeve protects the lighting means from contamination.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention will be better understood when taken in connection with the following description and drawings in which

FIG. 1 is a side elevational view of one preferred embodiment of this invention.

FIG. 2 is an illustration of a separate sleeve means for this invention.

FIG. 3 is a cross-section and axial view from the proximal end of the embodiment of FIG. 1 along line 3—3.

FIG. 4 is a cross-section and axial view from the distal end of the embodiment of FIG. 1 along line 4—4.

FIG. 5 is an illustration of a detachable handle and light assembly for FIG. 1 along line 5—5.

FIG. 6 is a side elevational view of a modified barrel member of FIG. 1.

FIG. 7 is a side elevational view of a modified proximal end arrangement of the FIG. 1 embodiment.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIG. 1 the speculum instrument 10 is preferably a proctoscopic instrument, which in an exemplary embodiment, is a sigmoidoscope. Instrument 10 is best described as incorporating two separable structures, e.g. a barrel member 11 which is preferably a single use disposable item, and a handle lighting unit 12 which is usually of a permanent or semi-permanent nature.

Barrel member 11 may be expeditiously manufactured from a material which is readily and economically single use disposable. The material must be one which is ordinarily sterilizable and which retains sufficient rigidity without brittleness. In one preferred form of this invention the material for barrel 11 may be a moldable and extrudable synthetic resin

such as linear polyethylene and polypropylene as noted in the aforementioned U.S. patent and the applications referred to therein.

It is a salient and foremost feature of this invention that barrel 11 includes a tapering or gradual enlargement preferably from the distal end 13 to the proximal end 14 thereof. A tapered barrel is one that is generally frusto conical or flared over its effective length, i.e., the length of barrel 11 which is inserted in a body opening. This tapering or flaring provides an opening or diameter of the enlarged proximal end 14 which is significantly larger than the distal end 13 opening. It is preferred that the taper retain the circular cross-section of barrel 11, and that the taper commence at or very close to the distal end 13 of barrel 11. The defined taper may be linear, as frusto conical, or it may be curvilinear, such as being flared or bell mouthed, i.e. inwardly bowing, or slightly convex or domed, i.e. outwardly bowing. Under some conditions the tapering may commence at a point between the proximal and distal ends of barrel 11. The proximal end of barrel 11 may include a more abruptly flaring or radial part 15, which may also extend sharply radially to define an end shield or hand guard 16.

In order to define an isolated and protected light position or chamber, an end sleeve member 17 is positioned adjacent flare part 16 of barrel 11 and suitably attached thereto. Ordinarily, sleeve member 17 is considered a part of barrel member 11. As illustrated in FIG. 2, the sleeve member 17, in one preferred embodiment includes a generally cylindrical section 18 and a flange or wall section 19. In one form of this invention, flange section 19 is press fitted into a locking shoulder 20 on flaring part 16 of barrel 11. A number of other suitable joining means may be gainfully employed to secure flange 19 to flare part 16. For example, direct locking means may take the form of mating screw threads on each part, a snap fit, or a suitable interlock. Indirect means may take the form of cementing of the parts or a press fit of the parts. Alternatively sleeve 17 may be molded as an integral part of barrel 11, or may in fact be a separate device attached to handle unit 12.

Because of the defined taper of barrel 11, the flange or wall 19 defines an inwardly projecting annular window wall, which in combination with cylindrical section 18 defines an area remote from or isolated from the main channel through barrel 11. Flange wall 19 projecting inwardly, as it does, has an unobstructed view of the distal end opening 13 of barrel 11, and for this reason flange 19 is made of a transparent material such as a clear synthetic resin, or has suitable clear sections or lenses therein. Therefore, a lighting means in handle lighting unit 12, and behind wall 19, will transmit light down barrel 11 to the distal end. Cylindrical section 18, however, is of limited transparency and preferably non-transparent, either because of the material from which it is produced, or by reason of suitable coloring or coatings.

An obturator assembly (shown in dashed line outline) includes a smooth ovate tip portion 21 whose maximum diameter closely approximates the internal diameter of the smooth rounded distal end opening 13 of barrel 11. A stem means 22 extends from the tip portion 21 through barrel 11 to project from the proximal end thereof. An obturator is employed primarily to facilitate insertion of a speculum 10 or barrel 11 into a body orifice such as the rectum, and this use is an accepted and established practice. After insertion of the barrel a short distance into the rectum, just beyond the sphincter muscle, the obturator is withdrawn. Thereafter, in accordance with present well known sigmoidoscopes, a lighting means would be inserted into barrel 11, such as for example the lighting means of U.S. Pat. Nos. 3,373,736 or 3,032,031.

In the noted present practice the lighting means in the barrel is exposed to contamination by being near the open distal end and because withdrawal of the obturator ordinarily contaminates the inside of the barrel. Additionally when certain instruments are passed into the barrel, or where swabbing practices take place, the inside of the barrel as well as the

lighting means therein are further contaminated. Accordingly, the lighting means must be of a stringent design so as to be of a readily sterilizable or sanitizable nature, or suitably protected. There are a number of problems associated with each facet noted. Sterilization of the lighting means or the barrel is an undesirable and uneconomical process which is subject to error. The protective sleeve and other protective arrangements are usually cumbersome and lacking in handling as well as lighting efficiency.

It has been discovered that the noted problems are significantly overcome by the use of tapered barrel 11, as illustrated in FIG. 1, which, in combination with a sleeve means 17 provides for obturator removal with lighting means remaining in position and not being contaminated. For example, in the illustrated arrangement of FIG. 1, sleeve 17 has an internal bore diameter larger than the maximum diameter of distal end opening 13 so that an obturator tip may easily pass therethrough. Suitable guiding ramps may be provided as extensions on sleeve 17 into barrel 11 or as raised surfaces on the inner surface of barrel 11 to facilitate withdrawal of the obturator. Contact of sleeve 17 with obturator tip 21 is not a problem since sleeve 17 is disposed of with barrel 11.

The handle lighting unit 12 comprises generally, a handle part 23 and a lighting head 24 which connects to barrel 11 and contains the lamps 25. The lighting head 24 comprises an annular part 26 having a distal end facing recess 27 therein. Recess 27 which may be annular or suitably compartmentalized is next adjacent annular flange 19, and closed off by cylinder 18 so as to be an isolated chamber containing therein a plurality of usually equally circumferentially spaced lamp means 25. As illustrated in FIG. 1 four such lamp means are utilized, and while a single lamp may provide some degree of lighting, two or more are preferred. A single ring or pair of half ring lamps may also be used to good advantage. The important concept, however, is to have the lamp means not only isolated and remote from the main channel of barrel 10 but yet to remain in exposed or viewing relationship to the distal end of barrel 11. By this means the main channel of barrel 11 remains open for the unobstructed passage of various instruments, swabs, and the obturator without danger of contamination of the lighting means.

Light transmission may be further increased by the use of pre-focused lamps, lamps with an integral mirror surface, or by the use of focussing reflectors 28 in recess 27 of lighting head 24. The combination of an annular transparent flange wall 19, lamps 25, and reflectors 28 may be suitably integrated in function and effect to focus and direct a substantial amount of light at the center line of the distal end of barrel 11. This invention may also provide for a high intensity light source in handle light unit 12 which is merely reflected by a suitable mirror or other light directing and amplifying means in the space or recess 27 presently occupied by lamps 25.

Light transmission down barrel 11 and its quantity and direction is important to the practice of sigmoidoscopic examination. The lighting means as described is advantageous because it permits the use of plural lamps, or a single lamp in ring form, with greatly increased wattage and more distal end light, as compared to a single lamp in barrel 11. and in spite of the more rearward location of lamps 25.

The effectiveness of the lighting means is increased by avoiding glare in barrel 11 and, for this reason the inner surface of barrel 11 may be treated, colored, or formed so that glare is reduced, and effective light transmission increased.

The annular flange 19 has an effective light transmitting height, measured generally from the upper surface of cylindrical section 18 to the inner surface of the end of the taper of barrel 11, which is dependent on the amount of taper in barrel 11. While the taper may vary to a considerable degree, an effective light transmitting height need be no more than from about one-sixteenth to about one-eighth inch. It is most desirable to concentrate the lamp means 25 as near to the center line of barrel 11 as expedient in order to provide as much uninterrupted light transmitting down barrel 11, and for this

reason excessive taper of barrel 11 is not necessary for lighting purposes.

The lighting head 24 is provided with means to releaseably secure it to barrel 11. Releaseable securing is intended to mean those attaching or affixing devices not ordinarily intended to be of a permanent nature, and are intended to be a part of or utilized in the operation of the device. Quick disconnects, latches and the like which play a significant role in one cycle use are further examples of releaseable securing devices. One example of a convenient releaseable securing means is illustrated in FIG. 1 by the mating screw thread or camming means 29 on annular part 26 as well as on cylindrical extension 18. Other locking devices including snap acting, detent and such interlocking devices may also be utilized with good advantage not only between the annular part 26 and cylindrical extension 18, but also in lieu thereof, between or together with annular part 26 and radial part 16 of barrel 11.

In some instances it may be desirable to include a biasing or spring acting interlock between lighting head 24 and barrel 11. Such spring loading releases may forcibly eject the barrel 11 from lighting unit 12 by operation of a release mechanism by the medical practitioner. The forcible ejection as a practical matter need only move the barrel assembly a fraction of an inch to be effective. One such eject mechanism is disclosed and claimed in combination with a vaginal speculum in copending application Ser. No. 529,444—Fiore, now U.S. Pat. No. 3,532,088.

The lighting head 24 includes a handle unit extension 23 which may be separably attached or, ordinarily an integral part thereof. Handle part 23 may be of various configurations and primarily is of a generally cylindrical shape for ease in handling as well as to serve as a conveniently shaped housing for a power unit such as a battery 30 (shown in dotted lines in FIG. 1) preferably of the rechargeable type as described in the above noted U.S. patent. The battery or batteries 30 in handle part 23 may be suitably connected to a combined on-off-rheostat element 31 and then to lamps 25 so that the medical practitioner may exercise light control when needed or desirable. Battery 30 may be suitably recharged by inserting the handle part 23 in a recharger for recharging as known in the art. Alternatively, battery 30 may be removed from handle part 23 by removing an end cover and placing the battery 30 itself in a recharger as well known in the art. Provision may also be made to provide an electric extension lead connected to lamps 25, or to a transformer and then to lamps 25, to obtain electrical power from a domestic or commercial power source or outlet.

It is desirable, in the practice of sigmoidoscope examinations, to have a suitable closure member and lens assembly at the proximal end of a sigmoidoscope as well as at the same end of a host of other speculum instruments. Accordingly, in the present invention a suitable end cap unit 32 is affixed to the lighting head 24 and may be hinged as a rotary slide opening or a gate hinge type opening, as is known in the art. Alternatively the end cap unit may be a separate eyepiece which is suitably attached as desired. End cap unit 32 is usually provided with an optical lens 33 to facilitate examination. As such, the lens 33 may be a magnifying lens, or lens assembly including if desirable suitable optical adjusting means for focussing, for example.

In some instance either a positive air pressure or a negative air pressure (from room conditions) is desirable in connection with sigmoidoscopy. For example, a negative pressure is generated by gentle suction to remove gases, smoke from cauterization and the like. A positive pressure may be employed to slightly distend certain areas of the colon to facilitate examination. Both suction and pressure is applied through a nipple or conduit 34 which projects from lighting head 21 and communicates to the interior of barrel 11 through an appropriate opening or slot 35 (not shown) in cylindrical section 18.

Sealing means are employed to retain pressure or suction at the proximal end of the instrument 10. For example, a seal is

provided between radial part 16 of barrel 11 and the adjacent face of annular lighting head 24. Such a seal is preferably in the form of a ring type gasket 36 retained in a seal cavity 37 in the face of lighting head 24. Ring gasket 36 may be of a number of configurations and materials including relatively soft O-rings of medically serviceable materials. In one embodiment of this invention ring seal 36 is of a neoprene material and U-shaped to be expanded, by air pressure, into contact with opposed walls. A further ring seal such as a relatively soft O-ring 38 is employed between end cap unit 26 and lighting head 24. Ring seal 38 may also be disposed in a suitable recess 39 in lighting head 24. Seal 36 is compressed by engagement of lighting head 24 to the radial flange 16 in combination with screw threads 29. Seal 38 may be compressed by means of a suitable cam clip 40 engaging cam groove 41 in lighting head 24. Seals 36 and 38 effectively close off the proximal end of the speculum instrument so that gentle pressure is exerted through the distal end of barrel 11. During examination certain gaseous results of treatment are also removed by gentle suction.

The radial flange part 16 of barrel 11 may serve as a hand guard unit as employed with sigmoidoscopes generally and may be further radially extended, and also curve towards the proximal end, for this purpose. Alternately, a separate hand guard may be attached to the barrel 11 or molded integrally therewith.

The speculum instrument 10 of this invention is readily adaptable for use as other speculum type instruments particularly proctoscopes and anoscopes generally. In this connection barrel 11 may be made shorter to serve as an anoscope, for example, or of smaller diameter for smaller body openings. The handle unit 12 is further adaptable to a wide variety of uses in medical practice where a good source of light is needed. As such, it may be gainfully employed with other medical instruments, disposable or otherwise, which may be adaptable thereto including, for example, ophthalmoscopes and otoscopes.

FIG. 3 illustrates a view of the speculum 10 from the proximal end thereof along line 3—3. In FIG. 3 the lamps are shown in phantom to illustrate their position adjacent window member 19. The diameter difference between member 19 and barrel 11 is correlated to the difference in diameters of opening 13 and barrel 11. This difference which represents the taper of barrel 11 provides the direct exposure of a portion of lamp 25 to distal end opening 13. While four lamps 25 are shown, the number may be suitably varied for example by the use of two or three lamps. In some instances varying degrees of lighting might require a maximum of four lamps, and other instances a less number of lamps. The on-off switch 31 may be suitably provided with a step switching means to control the number of lamps energized.

FIG. 4 illustrates a view somewhat opposite to that of FIG. 3. The FIG. 4 view is from the distal end opening 13 along line 4—4 of FIG. 1 and assumes an angle view from the center line of FIG. 1. Accordingly that portion of flange window unit 19 which is directly exposed to distal end opening 13 is clearly shown, exaggerated slightly to show detail.

FIG. 5 illustrates the handle unit 12 of this invention separate from barrel 11 and readily adaptable for insertion into a battery charging unit or other storage device. FIG. 5 also illustrates the adaptability of handle unit 12 as a general light source alone or with other instruments.

The foregoing describes one complete embodiment of this invention. Other embodiments and modifications may also be provided, the important feature being the taper of the barrel to provide an isolated or protected lighting area without any significant change in the operation, effectiveness and use of the instrument. However, barrel 11 may be tapered externally and/or internally to provide this feature. In FIG. 1 the barrel may be described as having an external taper to provide the enlarged proximal end. Internal tapering may also provide an enlarged proximal end, as illustrated in FIG. 6.

In FIG. 6 barrel 38' is similar to barrel 11 of FIG. 1 and includes the same general dimension of the proximal end as barrel 11. Barrel 38 includes an internal taper which is provided by a wall thickness 39 which increases towards the distal end. This thick wall section at the distal end serves as a support 40 for the obturator 21'. To accommodate the internal taper the obturator 21' may be slightly smaller than obturator 21 of FIG. 1 and/or the proximal end dimensions may be somewhat larger. The internal taper may not be required over the effective length of the barrel but only need be utilized close to the distal end with the remaining wall lengths being of relatively constant thickness.

The combination of tapers, both internally and externally, may be an advantageous compromise because a slight taper is usually employed to facilitate removal of a barrel from an injection mold process, when such a process is employed. This pre-taper may be incorporated in this invention.

A further modification of this invention is illustrated in FIG. 7. FIG. 7 comprises a sectional and top view of a modified lighting head 41 similar to lighting head 24 of FIG. 1, and flare part 42 of barrel 11', similar to flared part 15 of FIG. 1. In FIG. 7, flared part 42 includes a flange portion 43, and a projecting portion 44 which projects into and engages lighting head 41. Lighting head 41 includes a recess 45 into which projecting portion 44 is positioned and retained. The retaining means includes the combination of a circumferential groove 46 in projecting portion 44 and a plurality of circumferentially spaced spring biased balls commonly known as ball detent devices, one of which is shown schematically at 47.

Lighting head 41 also includes a pair of oppositely disposed bell crank or angle members 48 and 49 which are pivoted at 50 and 51 so that the arms 52 and 53 engage the free end of projecting portion 44.

As illustrated the application of a depressing force on the exposed arms of angle members 48 and 49 will cause a pivoting action so that arms 52 and 53 bear against projection 44 and move the barrel assembly axially outwardly from lighting head 41. When the free edge of projecting portion 44 passes by the spring biased balls of detent devices 47, a camming action occurs to positively release and eject the barrel from the lighting head. Various other positive ejection, electrical or mechanical means may be employed to cause removal of the barrel assembly from the lighting head without the necessity of the practitioner touching a potentially contaminated barrel assembly. This releasing mechanism accomplishes a positive release and automatic ejecting mechanism which greatly expedites the use of this invention.

The flare part 42 of barrel 11 also provides direct lighting through the distal end of the barrel in that the circular row of lamps 58 are at least partly exposed to the distal end, as illustrated in FIG. 3, for example. Ordinarily a straight line may be drawn from a lamp through the distal end of the barrel without crossing any barrel structure which would obstruct light passage.

While other modifications of this invention and variations of apparatus may be employed within the scope of this invention and have not been described or illustrated, the invention is in-

tended to include all such modifications as may ordinarily be embraced within the following claims.

What I claim as new is:

1. A speculum instrument comprising in combination
 - a. a barrel member having a proximal and distal end and adapted for insertion into a body opening,
 - b. a handle unit releaseably secured to said barrel member at the proximal end thereof,
 - c. said barrel member tapering from a smaller distal end to a larger dimension at the proximal end thereof,
 - d. a sleeve member at said proximal end of said barrel and defining an aperture through the proximal end of said barrel of significantly less diameter than said larger barrel dimension,
 - e. radially inwardly projecting light transmitting wall means between and engaging said sleeve member and said barrel for directing light into the bore of said barrel and through said distal end and
 - f. light means in said handle unit adapted to pass light through said light transmitting means.

2. The invention as recited in claim 1 wherein said sleeve member is a separate member attached to said larger proximal end of said barrel member.

3. The invention as recited in claim 1 wherein said sleeve member includes a flange window section with the said flange window section being said light transmitting means.

4. The invention as recited in claim 1 wherein said sleeve member and said barrel member are of a single use disposable synthetic resin material.

5. The invention as recited in claim 3 wherein said flange section is attached to said larger proximal end of said barrel member and said sleeve section extends therefrom.

6. The invention as recited in claim 5 wherein the inside diameter of said sleeve member is slightly larger than the inside diameter of said barrel distal end so that an obturator in said distal end may be withdrawn through said sleeve member.

7. The invention as recited in claim 6 wherein said light means comprises a plurality of lamps positioned in said handle unit and adjacent said flange section to direct light down said barrel member.

8. The invention as recited in claim 7 wherein said handle unit is releaseably secured to said sleeve member.

9. The invention as recited in claim 8 wherein said speculum instrument is a sigmoidoscope.

10. The invention as recited in claim 9 wherein the effective length of said barrel member is of a frusto conical configuration.

11. The invention as recited in claim 10 wherein said barrel member includes an inner taper extending over a significant portion of its effective length.

12. The invention as recited in claim 10 wherein said barrel member includes an external taper extending over a significant portion of its effective length.

13. The invention as recited in claim 1 wherein said barrel member includes an outwardly flared proximal end portion, and an axially projecting portion on said flared portion adapted to be engaged by said handle unit.

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