

No. 612,724.

Patented Oct. 18, 1898.

J. R. HAMILTON.
THERMAL DILATOR.

(Application filed June 4, 1897.)

(No Model.)

Fig. 1.

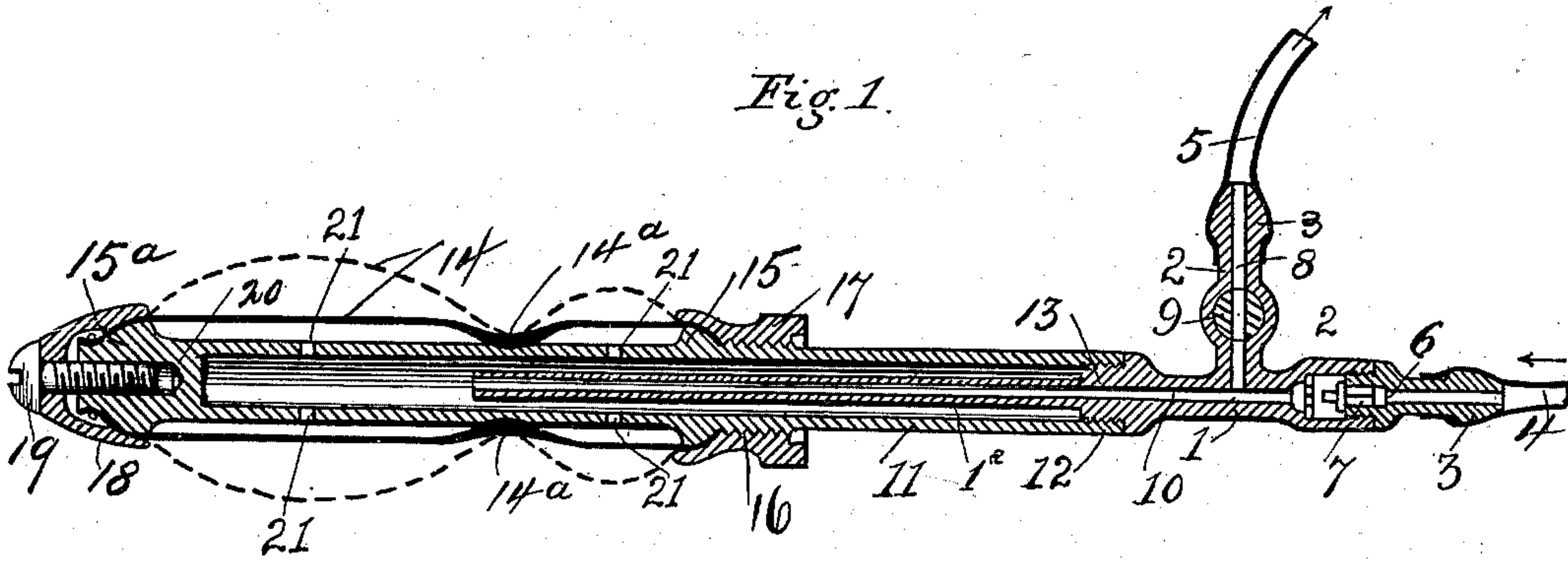


Fig. 2.

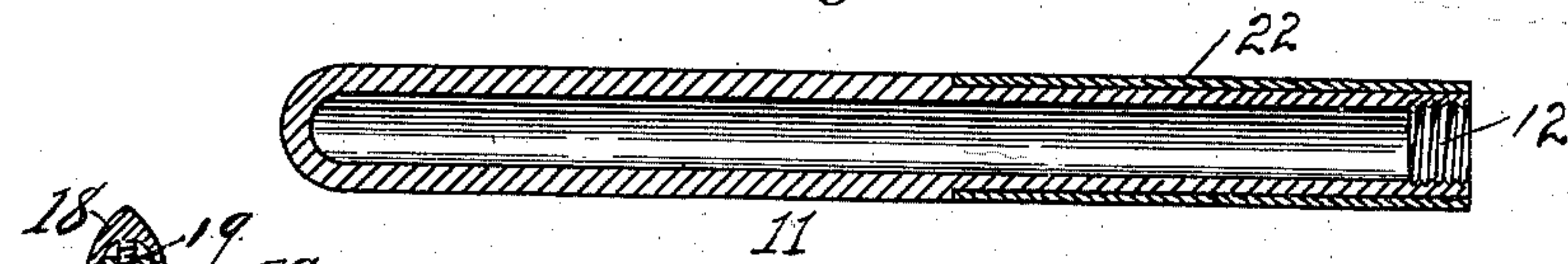


Fig. 3.

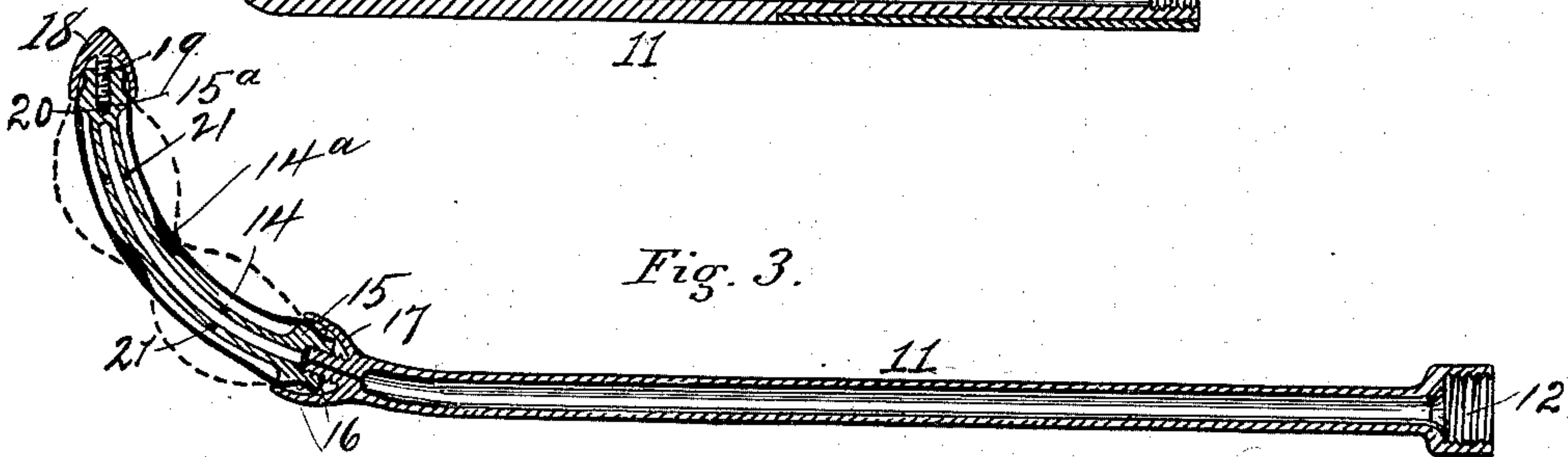
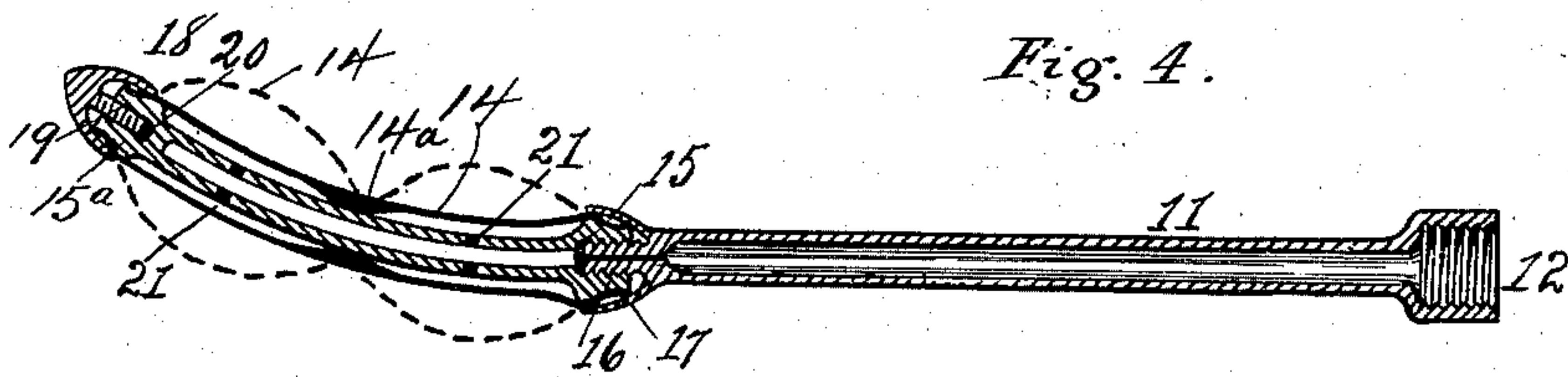


Fig. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JONATHAN R. HAMILTON, OF TOLEDO, OHIO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO CHARLES S. EMERY AND ALBERT J. MARKS, OF SAME PLACE.

THERMAL DILATOR.

SPECIFICATION forming part of Letters Patent No. 612,724, dated October 18, 1898.

Application filed June 4, 1897. Serial No. 639,473. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN R. HAMILTON, a citizen of the United States, residing at Toledo, Lucas county, Ohio, have invented certain new and useful Improvements in Catheters for Thermal Applications, of which the following is a specification.

My invention relates to urethral and rectal dilators, heaters, and coolers, and more especially to a set of instruments designed for the purposes indicated having interchangeable parts; also, to means for attaching and securing in place the dilatable parts; also, to means for controlling and adjusting the dilatation of the dilatable parts of my devices.

The objects of my invention are to furnish a set of instruments by which predetermined degrees of temperature may be utilized as therapeutic agents in connection with the proper dilatation of the parts under treatment and to provide for such dilatation both above and below strictures, sphincters, and the like without undue stress upon the contracted part. I attain these objects by means of the devices and arrangement of parts hereinafter described, and shown and illustrated in the accompanying drawings, made part hereof, in which—

Figure 1 is a central longitudinal section of a portion of my device arranged as a rectal dilator; Fig. 2, a central longitudinal sectional view of a part of my device designed to be used as a rectal heater or cooler; Fig. 3, a central longitudinal section of part of my device designed to be used as a male catheter, and Fig. 4 the same designed to be used as a female catheter.

Like numerals of reference indicate like parts throughout the drawings.

In the drawings, 1 is a head, having branches 2, each branch being provided at its extremity with a swell 3, adapted to receive and retain the end of a flexible elastic tube 4 5. In one of the arms 2 is an inlet-duct 6, having a check-valve 7, and in the other arm is an outlet-duct 8, having a cock or valve 9. The two ducts 6 8 are connected with a duct or passage 10, leading to the interior of the several instruments hereinafter to be described.

Each of the instruments is provided with a barrel or tube 11 of suitable material—such,

for instance, as nickeled steel—and is provided at one end with a threaded portion 12 to be engaged with a corresponding threaded portion 13 upon the head 1. In that form of my device which is used for both dilatation and change of temperature the barrel 11 at its outer extremity is surrounded by and inclosed in an elastic sleeve 14. (Shown in expanded state by dotted lines and as unexpanded by solid black lines.) This sleeve is formed with ends somewhat contracted and with a thickened contracted portion, as at 14^a, less elastic than the remainder of the sleeve. The elastic sleeve is secured in place against leakage as follows: Upon the barrel 11 are thickened portions 15 15^a, conical in outline, the bases of the two cones being toward each other. The elastic sleeve is stretched over the tube in such manner that the two cones rest in the end openings of the sleeve. The barrel 11 is screw-threaded, as at 16, and has screwed upon it a cup-shaped nut 17, which when screwed forward clamps between the surface of its cup-shaped cavity and the conical surface of the portion 15 one end of the flexible sleeve 14. The cup-shaped portion 17 may, if desired, be formed integral with the barrel 11, as shown in Figs. 3 and 4, and the screw connection may be made by forming the barrel 11 in two pieces, one piece having a screw-pin and the other a threaded socket to receive the same at the point where the sleeve is to be clamped, as illustrated in Figs. 3 and 4. The opposite end of the sleeve is in like manner clamped between the conical surface of the part 15^a and the cupped cavity of a cap 18, which is secured in place by means of screw 19, which takes a threaded axial bore 20 in the end of the barrel 11. The screw 19 may be either separate, as shown in Fig. 1, or integral with the cap 18, as shown in Figs. 2 and 3. Leading from the interior of the barrel 11 and communicating with the annular chambers formed by the sleeve 14 are orifices 21.

The head 1 is provided with an extension-tube 1^a, formed, preferably, integral with the head. This extension-tube is open at its extremity and is of such diameter that it will slip into the interior of the barrel 11, leaving a thin annular space between the two parts.

Each of the instruments of the set has its screw-threaded opening 12 of uniform bore and thread, so that the head 1, with its threaded pin 13 and extension-tube 15, may be used interchangeably with all the instruments.

The operation of my device thus far described is as follows: The inlet-tube 4 is connected with a supply of fluid of the desired temperature, the pressure within the tube 4 being controlled in any suitable manner—such, for instance, as the bulb of a hand-syringe or by the gravity of the column of water within the tube. The instrument is now introduced, unexpanded, to the point to be treated. The fluid is admitted or forced through ducts 6 and 10, the interior of the barrel 11, and orifices 21 to the annular chambers between the barrel and the sleeve 14. The sleeve is now distended in proportion to the pressure of its contained fluid, assuming the form outlined by the dotted lines. The pressure within the sleeve may be controlled to a nicety by means of the cock 9, which permits the waste of the fluid as rapidly as may be desired. The backward flow of the fluid is prevented by the check-valve 7.

The contracted part 14^a of the elastic sleeve 14 being thicker in cross-section than the remainder of the sleeve does not readily yield to internal pressure, and thus dilatation takes place under ordinary pressure only on either side of the part 14^a. It will be seen, therefore, that when the contracted portion 14^a is made to coincide with a stricture, sphincter, or the like it will not be deranged by the expansion of the sleeve 14. If desired, the part 14^a may be provided with a ligature, which will further contract the part and which will insure against any expansion; but under ordinary circumstances this will be found unnecessary.

It should be understood that I do not limit my invention to either the contraction or thickening or ligation of the sleeve to form the part 14^a, as obviously these devices, which are here described by way of illustration, are the equivalents of each other, and any means for providing the sleeve 14 with a zone located between the ends of the sleeve, which zone yields less readily to internal pressure than the remainder of the sleeve, is within the spirit of this part of my invention.

In case the thermal application is to be made without dilatation the instrument shown in Fig. 2, formed of non-elastic material, may be used by screwing its threaded socket upon socket 12 and upon the pin 13. This instrument at its open extremity is jacketed, as at 22, with a sleeve of low heat conductivity, such

as vulcanite, for the protection of sensitive exterior parts against undue heat.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A catheter for thermal applications comprising a head, two branches thereto, a valved inlet in one of said branches, a valved outlet in the other of said branches, a barrel or tube detachably secured to said head, a sleeve of elastic material upon said barrel or tube having a zone between its extremities which zone yields less readily to internal pressure than the remainder of said sleeve, and ducts between the interior of said barrel or tube and the annular space between said sleeve and said barrel or tube.

2. A catheter-head, two branches to said head, a valved inlet in one of said branches, a valved outlet in the other of said branches, an extension tube or pipe upon said head, a screw-threaded portion upon said head adapted to be connected to one of a series of catheter tubes or barrels, each adapted to receive said extension tube or pipe within it, and a screw-threaded portion on each of said tubes or barrels, whereby said tubes or barrels may be interchangeably secured to said head, substantially as and for the purpose specified.

3. A tube or barrel, means for supplying fluid to the interior thereof, a sleeve of elastic material upon said tube or barrel having a zone between its extremities which zone yields less readily to internal pressure than the remainder of the sleeve, and ducts leading from the interior of said barrel or tube into the annular chambers between said tube and said sleeve.

4. A tube or barrel, two thickened conical portions thereon, an elastic sleeve embracing each of said conical portions, and cup-shaped nuts on said barrel or tube adapted to clamp between the surfaces of their cup-shaped cavities and the conical surfaces of said conical portions the said elastic sleeve, substantially as and for the purpose specified.

5. A tube or barrel, an elastic sleeve thereon having a zone of greater resistance to internal pressure than the remainder of the sleeve, and openings from the barrel into the interior of the sleeve, in combination with a head detachably secured to said tube or barrel, an inlet to said head, an outlet, and an extension-tube upon said head leading into said barrel.

JONATHAN R. HAMILTON.

In presence of—

F. M. DOTSON,
L. E. BROWN.