Sept. 4, 1934. W. E. MORSE 1,972,391

SURGICAL INSTRUMENT

Filed July 11, 1932 2 Sheets-Sheet 1

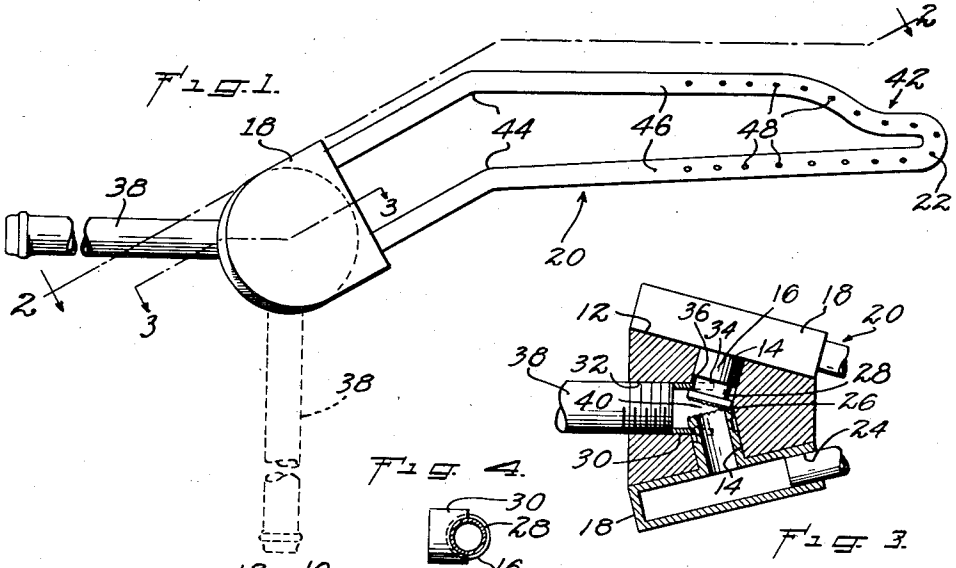

FIG. 1.

FIG. 3.

FIG. 4.

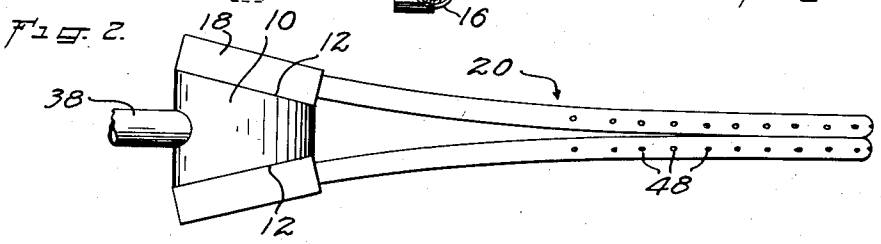

FIG. 2.

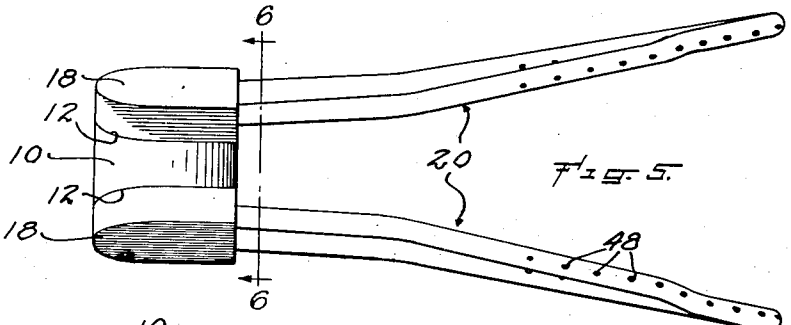

FIG. 5.

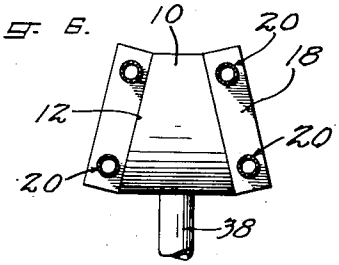

FIG. 6.

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Fig. 7.

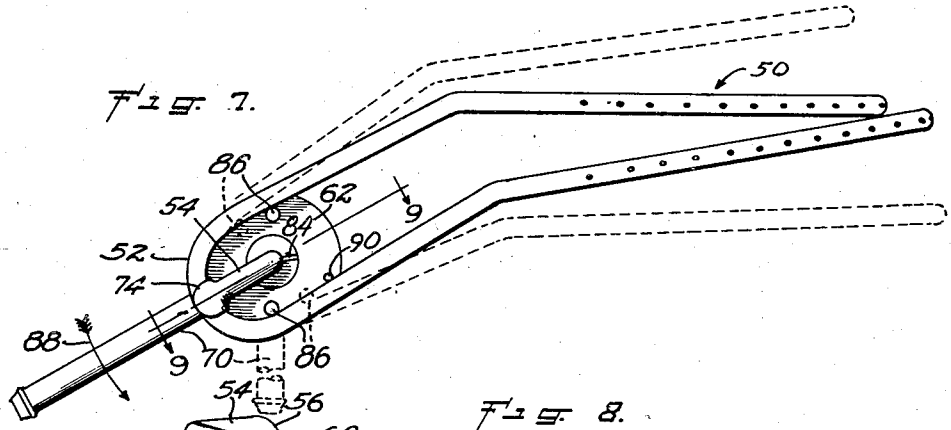

Fig. 8.

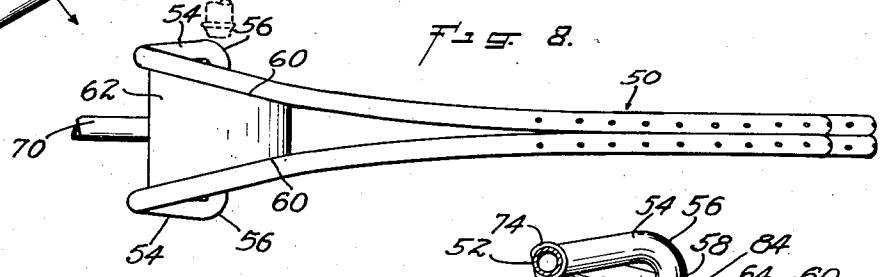

Fig. 9.

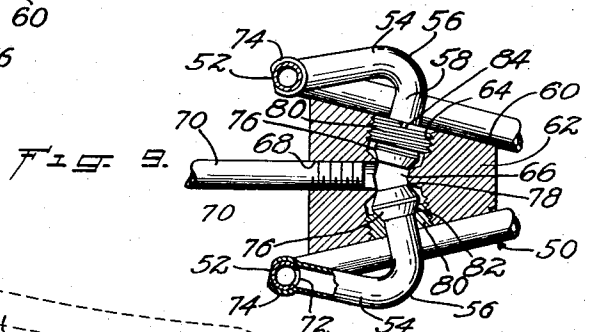

Fig. 10.

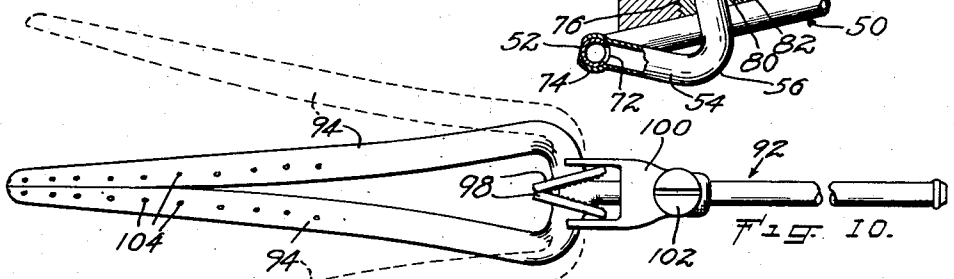

Fig. 11.

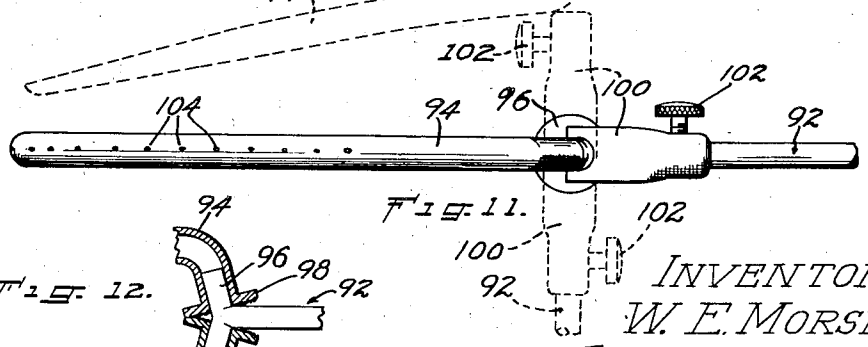

Fig. 12.

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UNITED STATES PATENT OFFICE

1,972,391

SURGICAL INSTRUMENT

William E. Morse, Rapid City, S. Dak.

Application July 11, 1932, Serial No. 621,795

7 Claims. (Cl. 128—3)

My invention relates to surgical instruments and has for its objects and advantages the provision of an improved combination speculum and irrigator embodying a simplification of the manipulation involved in use. The instrument also embodies the functions of retraction, evacuation or irrigation of body cavities to facilitate examination, cleansing or surgical manipulation.

In the accompanying drawings:

Figure 1 is a side elevation of a device according to the invention;

Figure 2 is a plan view taken along the line 2—2 of Figure 1;

Figure 3 is a sectional detail view taken along the line 3—3 of Figure 1;

Figure 4 is a detail view of a portion of the device;

Figure 5 is a view similar to Figure 2 showing the fingers in their expanded position;

Figure 6 is a sectional view taken along the line 6—6 of Figure 5;

Figure 7 is a side elevation of a different construction illustrating the fingers in both contracted and expanded positions;

Figure 8 is a top plan view of the instrument illustrated in Figure 7;

Figure 9 is a sectional detail view taken substantially along the line 9—9 of Figure 7;

Figure 10 is a plan view of another form of construction;

Figure 11 is a side elevation of the instrument shown in Figure 10; and

Figure 12 is a sectional detail view illustrating the pivotal connections for the fingers.

In the embodiment selected to illustrate my invention, I make use of a body 10 in the shape of a cylindrical member having its ends 12 arranged at an angle to each other. Referring to Figure 3, the body is provided with a pair of bores 14 perpendicular to the ends 12 and at an angle to the longitudinal axis of the body. Each bore supports a hollow pintle 16 carried by a compartment 18 supporting a tubular finger 20. These fingers are bent back upon themselves at 22 and have their ends securely fastened within openings 24 in the compartments 18. Thus it will be seen that the compartments 18 place the fingers 20 in communication with the pintles 16.

Referring again to Figure 3, the ends of the pintles 16 are provided with knurled or toothed surfaces 26 arranged at such angles that the two surfaces mesh to provide an interlocking relation between the two pintles to prevent relative rotation of the pintles about their own axes. The ends of the pintles are grooved at 28 for receiving the bifurcated end of a sleeve 30 positioned within a bore 32 in the body 10. The bifurcated end of the sleeve is shaped to conform to the contour of the grooved surface of the sleeve (see Figure 4) and has guiding contact at 34 and 36 with the edges of the grooves (see Figure 3). Thus it will be seen that the sleeve prevents longitudinal movement of the pintles 16 but permits rotation of the pintles in the bores 14.

The bore 32 is threaded for the reception of the threaded end of a tubular member 38 which, when screwed into place, abuts the sleeve 30 to hold the latter in place. The tube 38 may be connected with a fluid source and at the same time it provides a handle for operating the device. Since the pintles 16 are arranged at an angle to each other, the inner ends of the pintles are separated at 40 which places the pintles in communication with the tube 38.

The fingers 20 are narrowed at 42 to facilitate insertion into the vaginal canal. I have shown the fingers 20 as being bent at 44 to position the body 10 and its associated structure out of alignment with the portions 46 of the arms. These portions define the operating length of the fingers. Thus it will be seen that the body 10 will not obstruct the sight when the instrument is used as a speculum.

At the time of insertion, the tube or handle 38 is positioned substantially parallel with the portions 46 of the fingers, which brings the free ends of the fingers together, as illustrated in Figure 2. The handle 38 rotates about the axis of the body 10, which axis is perpendicular to a line bisecting the angle between the faces 12. Since the axes of the pintles are perpendicular to the faces 12, movement of the handle from the full line position to the dotted line position illustrated in Figure 1 causes the arms to be expanded to the position of Figure 5, thereby distending the canal walls so that a thorough inspection may be made.

Ninety degrees of movement of the handle causes a maximum expansion of the fingers. In actual practice, however, the handle may be moved less than ninety degrees to effect different amounts of canal distension, depending upon requirements. The frictional relation between the pintles 16 and their bores and the compartments 18 and the cam faces 12, when the fingers are pressing against the walls of the canal, is usually sufficient to prevent relative movement between the body 10 and the fingers, regardless of the dilating position of the latter. I have designed a device which may be operated with one hand, and the expanding action is rapid, much more so

than the screw-operated devices now on the market. Rotation of the body 10 produces an effective and powerful leverage, thereby requiring very little effort to expand the fingers. At the same time, the expanding operation is completed without any longitudinal shifting of the instrument in the canal, thereby eliminating the possibility of any discomfort to the subject, which frequently happens in connection with instruments having their fingers expanded by a spreading mechanism thrust longitudinally of the instrument.

When the instrument is used as an irrigator, it is reversed so that the handle 38 is rotated upwardly for expanding the fingers. The fingers are provided with a plurality of discharge openings 48 arranged to direct jets of material in such a manner that thorough irrigation of the canal is attained. The ease and convenience with which the instrument may be operated permits the fingers 20 to be repeatedly expanded and contracted during irrigation to assist in irrigating the tract by alternately distending and relaxing the tissue folds. When the fingers are dilated, the cervix is positioned between the fingers out of contact with any part of the device, so that jets of fluid are discharged directly against it. This makes the instrument highly efficient in the application of a prophylactic material.

In Figure 7, I have shown a different construction in which the fingers 50 are bent back upon themselves at 52. The free ends of the fingers are normally in contact with each other, but the fingers remain the same in general contour as those previously described. In Figures 7 and 8, the bent portions 52 are connected with branch tubes 54 bent at 56 to provide portions 58 aligned perpendicularly with the faces 60 of the body 62.

The body 62 is provided with threaded bores 64 communicating with a smaller opening 66 which in turn communicates with a threaded bore 68 for receiving the tube or handle 70. In Figure 9, the bent portions 52 are shown as being provided with openings 72 communicating with the branches 54. Thus it will be seen that the fingers are placed in communication with the inlet tube 70. I have shown the outer ends of the branches 54 as being shaped at 74 to substantially surround the circular portions 52 and welded thereto.

Tapered members 76 are fastened to the inner ends of the portions 58 and project slightly into the opening 66. Thus it will be seen that the ends of the tapered portions will rotate against the shoulder 78 when the body 62 is rotated relatively to the fingers 50. I have shown threaded sleeves 80 mounted upon the portions 58 and bearing against the tapered members 76 for holding the branches in pivotal assembly with the body 62. These sleeves are cut away at 82 to substantially conform to the contour of the tapered portions 76 thereby providing an effective seal. The outer ends of the sleeves are slotted at 84 for the reception of a screw driver to permit the sleeves to be screwed into the threaded bore 64.

Rotation of the body 62 will expand the fingers 50 in the same way as the fingers 20, but in addition to such dilation, the branches of the fingers 50 are expanded to the dotted line position shown in Figure 1 simultaneously with the expansion of the fingers in the other direction. Such expansion is accompanied by means of two cam pins 86 projecting from each of the faces 60. These pins are normally contacting with the branches of the fingers, and rotation of the body 60, 45° in the direction indicated by the arrow 88 will move the pins in the direction of the dotted line shown, thereby flexing the bent portion of the tubes sufficiently to produce the necessary expansion. The amount of rotation of the body 62 required to produce the necessary dilation of the fingers 50 will depend upon the angularity of the faces 60, the curvature of the portions 52, and the position of the pins 86. The pins 86 prevent relative movement between the two groups of fingers in one direction, and a single stop pin 90 upon each end of the body 62 prevents relative movement in the opposite direction. Thus the fingers will always be properly aligned and actuated simultaneously. Each finger is provided with a plurality of discharge openings located to function in the same way as those in the fingers 20.

The instrument illustrated in Figures 10, 11, and 12 comprises a Y-shaped tube 92 having hollow fingers 94 pivotally mounted upon the branches 96. Relative rotation between the fingers is prevented by reason of flanges 98 knurled in the same way as the pintles 16. These flanges are held in interlocking relation by a forked member 100 mounted upon the stem of the tube 92 and fastened thereto by a set screw 102. Since the branches 96 are arranged at an angle to each other and to the axis of rotation of the tube in either direction will cause the fingers 94 to be expanded, as indicated in dotted lines in Figure 10. The fingers 94 are provided with a plurality of discharge openings 104.

To facilitate entry of the instrument, I have flattened the fingers upon one side, so that the point of the instrument defines a gentle curvature of small dimension. Merely loosening the set screw and pulling the forked member 100 away from the flanges 98 permit all the parts to be disassembled.

Without further elaboration the foregoing will so fully explain my invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. A speculum comprising arms and an operating lever, and mechanical connections for expanding said arms by movement of said lever about a transverse axis, said connections including two surfaces lying on a common wedge, said arms having flat faces remaining in contact with said first-named faces throughout the movement, said arms having pintles perpendicular to said first-named faces, the inner ends of said pintles having interlocking irregularities of contour to prevent relative rotation of said pintles about their own axes.

2. A device of the type described comprising a rotatable member, a plurality of fingers pivotally connected with said body, the pivotal axes of said fingers being at an angle to each other and to the axis of rotation of said body, said fingers being grouped in pairs, rotation of said member relatively to said fingers causing said pairs of fingers to expand, and means causing a finger in each pair to move away from the other finger in that pair substantially simultaneously with the expanding action of said pairs.

3. A speculum comprising a rotatable body, dilating fingers pivotally connected with said body and projecting radially from its axis of rotation, said body being provided with cam means cooperating with the arms to expand or contract the latter when said body is rotated, each of said fingers comprising a pair of elements, and means

for moving one of said elements in each finger toward or away from the other element in that finger simultaneously with the expansion or contraction, respectively, of said fingers.

4. A device of the type described comprising a rotatable body, a plurality of dilating fingers pivotally connected with said body, said fingers being grouped in pairs, the pivotal axes of said fingers being arranged at an angle to each other and to the axis of rotation of said body, to cause the fingers in one pair to expand or contract with respect to the other pair, and means for moving one of said fingers in each pair toward or away from the other finger in that pair simultaneously with the expansion or contraction, respectively, of said pairs, said fingers being provided with conduit means and discharge ports.

5. A device of the type described comprising a hollow branched operating lever, and hollow fingers pivotally mounted upon the branches of said lever and having discharge openings.

6. A device of the type described comprising a rotatable body, a plurality of dilating fingers pivotally connected with said body, said fingers being grouped in pairs, the pivotal axes of said fingers being arranged at an angle to each other and to the axis of rotation of said body, to cause the fingers in one pair to expand or contract with respect to the other pair, and cam pins moving one of said fingers in each pair toward or away from the other finger in that pair simultaneously with the expansion or contraction, respectively, of said pairs, said fingers being provided with conduit means and discharge ports.

7. A device comprising multiple channelled elements aligned in apposition, movably attached to a cam element, said cam element provided with a channelled handle element, and channels connecting the handle element with the channels of the blade elements so that fluid may be introduced through or aspirated from the channelled blade elements.

WILLIAM E. MORSE.