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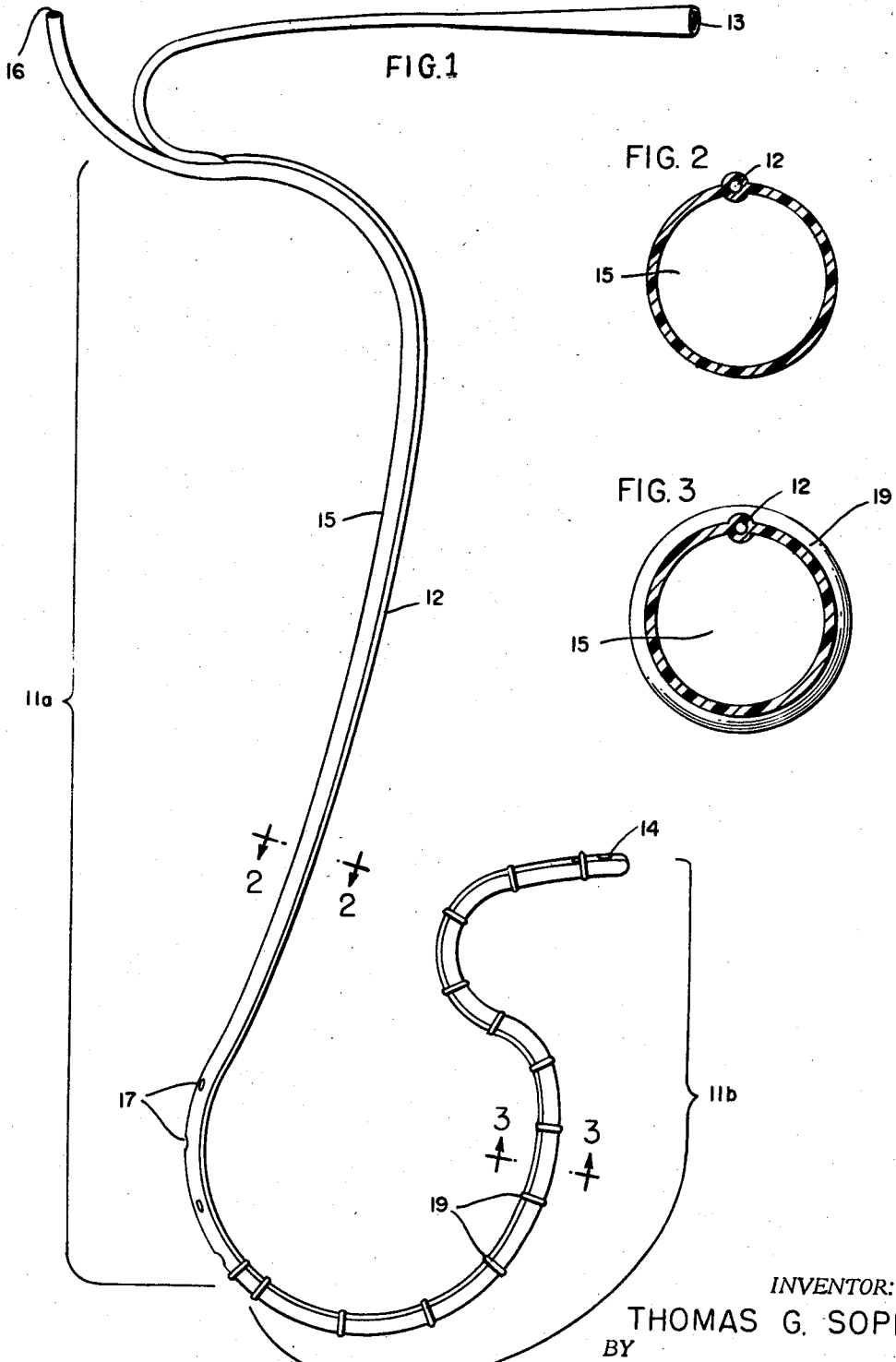
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3,495,595

MEDICOSURGICAL TUBE AND METHOD

Filed Nov. 2, 1966

2 Sheets-Sheet 1



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FIG. 4

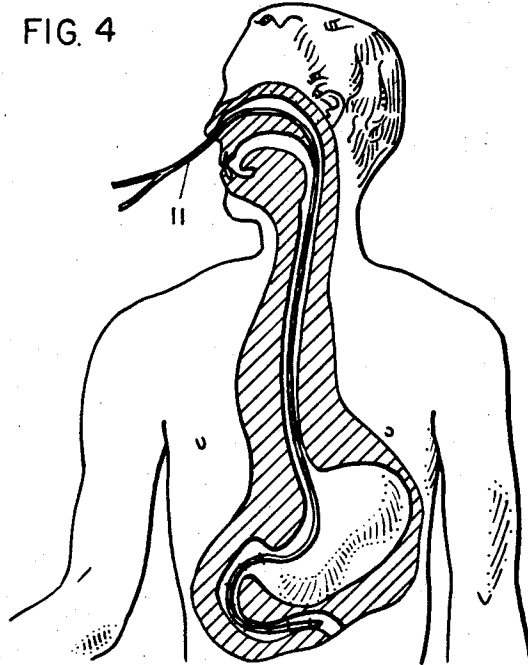
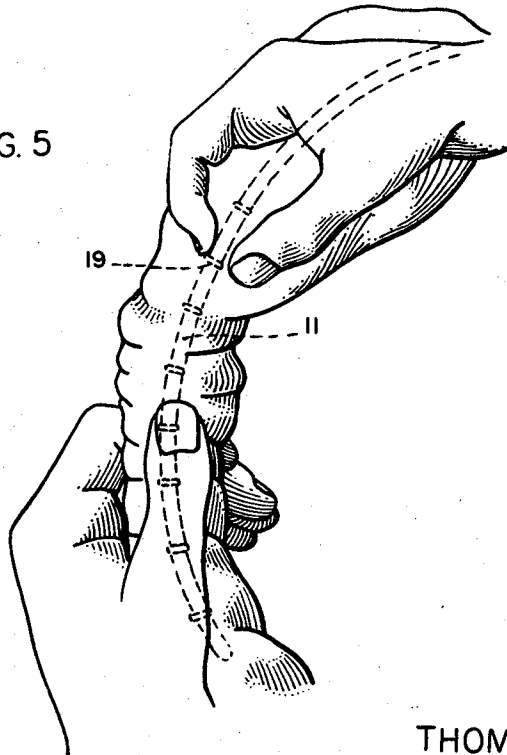


FIG. 5



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**MEDICOSURGICAL TUBE AND METHOD**

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1 Claim

**ABSTRACT OF THE DISCLOSURE**

A device and method for use in administering intraduodenal fluids or jejunal fluids to a patient and simultaneously draining gastric fluids from that patient. The device comprises a flexible tube having a distal portion adapted to be inserted into the duodenum of a patient and a proximal portion adapted to extend through the patient's stomach. The tube has a first lumen extending through the distal and proximal portions and a second lumen extending through the proximal portion, and is provided with openings at the tube's proximate end for both the first and second lumens. A discharge opening for the first lumen is disposed adjacent the distal end of the tube and at least one inlet opening for the second lumen is located in the proximal portion adjacent the merger of the proximal and distal portions. A plurality of annular ribs or projections are spaced longitudinally along the outer surface of the distal portion and, in inserting the tube, a surgeon grips the stomach wall or duodenum at two points to hold the ribbed portion of the tube and then advances the end portion of the tube through the stomach by collapsing the portion of the stomach or duodenum between the two hands.

This invention relates to a medicosurgical tube and method and, more particularly, to a tube and method which allows simultaneous gastric decompression and injection of intraduodenal or jejunal fluids.

After almost all laparotomies, minerals and fluids lost by the patient during and after the operation must be replaced by intravenous injections. Disadvantages of such intravenous injections are that the patient frequently suffers the discomforts of phlebitis, arm boards, and repeated vene-punctures; that an inadvertently speeded-up bottle of injection fluids might suddenly overload the cardiovascular tree; and that sterile, non-pyrogenic solutions, sterile tubing, needles, and intravenous catheters are necessary.

A stomach tube is also normally necessary after a laparotomy in order to keep the stomach decompressed. Swallowed air and stomach secretions and saliva frequently in excess of several liters per day must be removed by this tube.

The inventive tube obviates the necessity of post-operative intravenous injections in nearly all patients undergoing laparotomy. The tube allows for simultaneous gastric decompression and injection of intraduodenal or jejunal fluids and electrolytes. Its insertion does not require a duodenotomy or gastrotomy, and thus, it may be used for a variety of abdominal procedures such as right or left colectomy, hiatus hernia repair, cholecystectomy, aortic aneurysm repairs and splenectomy, as well as with gastrectomy or vagotomy with an emptying procedure.

It is therefore, an object of this invention to allow introduction of intraduodenal fluids into a medical patient following laparotomy without the discomforts of phlebitis, arm boards, and repeated venepunctures.

Another object of the invention is to provide for the simultaneous introduction of intraduodenal fluids and gastric decompression.

Still another object of the invention is to provide an

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inexpensive method of introducing intraduodenal fluids by obviating the need for sterile, non-pyrogenic fluids and sterile tubing and needles.

Yet another object of the invention is to prevent the possibility of overloading the cardiovascular tree by inadvertently speeding up the rate at which nutritive fluids are introduced intravenously into the body.

Other objects and advantages of the invention may be seen in the details of construction and operation set down in this specification.

The invention is described in conjunction with the accompanying drawing, in which:

FIG. 1 is a plan view of the inventive tube;

FIG. 2 is a sectional view of the cross section of the tube taken along the sight line 2—2;

FIG. 3 is a sectional view of the cross section of the tube taken along the sight line 3—3;

FIG. 4 is an illustrative view of the inventive tube inserted through a patient's nose and into the patient's stomach and duodenum; and

FIG. 5 is an illustrative view of the method of inserting the tube into the patient's duodenum.

In the embodiment illustrated in the drawings, the numeral 11 generally designates a tube structure having a proximal portion 11a and a distal portion 11b. A first lumen 12 extends through both portions of the tube and is adapted to be connected by means of lumen opening 13 at proximal end of the tube to a suitable fluid administration device. At the distal end of the tube, lumen 12 terminates in a discharge opening 14.

A second lumen 15, of a diameter substantially larger than lumen 12, also extends through the tube for the purpose of withdrawing fluids and air from a patient's stomach. At the tube's proximate end, the lumen 15 terminates in an opening 16 which may communicate with the intake passage of any suitable suction pump (not shown). Adjacent the zone of merger between the proximal and distal portions of the tube, lumen 15 communicates with a multiplicity of axially and circumferentially spaced intake openings 17 in the proximal portion. While a plurality of such openings is important to insure proper operation of the tube, the particular number is not critical.

In the illustration given, the tube 11 is of substantially uniform cross section throughout its entire extent. The uniform cross section simplifies construction and facilitates insertion of the tube into the stomach and duodenum of the patient. However, the portion of the lumen 15 which extends into the tube's distal portion is non-functional for the purpose of withdrawing body fluids when the device is in use, since this lumen has no outlet in the distal portion. It is thus apparent that the lumen 15 may be terminated at the juncture of the proximal and distal portions, thereby providing the distal portion as a single-lumened tube of reduced cross section. Alternatively, the non-functional portion of lumen 15 may be separated from the remainder of the lumen by a suitable plug positioned at the juncture of the proximal and distal portions.

The outer surface of distal portion 11b is provided with gripping means in the form of outer surface deformations. In the illustration given, the deformations constitute axially-spaced and circumferentially-extending enlargements or ribs 19 arranged in a series which extends substantially the full length of distal portion 11b. While annular ribs 19 have been found particularly effective in the placement and use of the tube, many other suitable means for allowing frictional engagement of the distal portion. For example, annular arrangements of projections or indentations or merely a roughened surface might alternatively be provided.

Tube 11 is intended for use after a laparotomy and may be inserted into the patient's stomach either through the patient's nose, as shown in FIG. 4, or through the stom-

ach wall by performing a gastrostomy. The distal end of the tube is urged through the stomach into the duodenum by the surgeon in the manner somewhat schematically illustrated in FIG. 5. Specifically, the lower end of the stomach or duodenum is grasped at two points, the distal end portion of the tube is then grasped between the walls of the stomach with the fingers of the hand that is farther away from the duodenum, and the portion of the stomach or intestine positioned between the hands is collapsed by moving the hands together, thereby advancing the distal end portion of the tube into the duodenum. During such an operation it is important that the outer surface of the tube's distal portion may be alternately gripped between the fingers of one hand and then the other and that the tube be restrained against sliding movement with respect to the smooth surfaces of the stomach (or duodenum) held in engagement therewith by the surgeon. Gripping means 19 performs an essential function in this regard. The annular ribs permit the surgeon to grip the tube between the fingers of one hand, with the stomach or duodenal walls interposed therebetween, while at the same time another portion of the stomach or duodenum is being collapsed or extended in an axial direction with respect to the tube. Furthermore, the substantial and uniform spacing between the circumferential rib assists the surgeon in gauging the extent to which the tube is threaded into the duodenum.

Insertion of the tube is completed when the distal portion 11b extends into the duodenum a substantial distance and the openings 17 of proximal portion 11a are disposed within the patient's stomach. A suction pump is then attached to the tube in direct communication with lumen opening 16 in order to withdraw gastric fluids through openings 17 and lumen 15. Intraduodenal fluids are introduced into lumen 12 through lumen opening 13 are delivered to the duodenum through discharge opening 14.

Fluid therapy is begun by means of the tube immediately following an operation, and the operative intravenous administration is discontinued unless blood transfusions or specific intravenous medications become necessary. Such direct non-intravenous administration may be same qualitatively as though such fluids were being administered intravenously. However, unlike intravenous feeding, it is not essential to use sterile non-pyrogenic fluids or sterile tubing, intravenous plastic tubing, and needles. The result is a substantial saving in both time and expense.

In addition, discomforts and dangers to the patient are substantially reduced. In contrast to intravenous feeding, patients are not submitted to the discomforts of phlebitis, arm boards, and repeated venepuncture for infiltrated intravenous injections. The possibilities of suddenly overloading the cardiovascular tree, and the dangers in connection therewith, are eliminated.

In the preferred form of construction, the length of the tube between the proximate end and the nearest opening 17 of the longitudinal series is approximately 45 inches, the length of the series of openings 17 is approximately

4 inches, and the length of the distal portion 11b is approximately 11 inches. The inside diameter of the smaller lumen 12 is approximately .034 of an inch and the inside diameter of the larger lumen 15 is approximately .125 of an inch. The annular ribs 19 are preferably spaced apart longitudinally about one inch, and the outside diameter of such ribs is approximately  $\frac{1}{16}$  of an inch larger than the outside diameter of the tube. It is to be understood, however, that these are the preferred dimensions which have been found highly effective in use, but that considerable variation in such dimensions might be provided without loss of the functional advantages described above.

Tube 11 is made from any suitable flexible, waterproof, non-toxic material. Rubber or any of a variety of commercially available plastics may be used such as, for example, vinyl polymers, vinyl chloride polymers, polyethylene, and the like.

While in the foregoing specification a detailed description of an embodiment of the invention has been set forth for the purpose of explanation, many variations in the details herein given may be made by those skilled in the art without departing from the scope of the invention.

I claim:

1. In a medical treatment of patients, the steps comprising inserting the end portion of a single flexible tube into a patient's stomach while said stomach is exposed during surgery, said tube having a double lumen and said end portion being provided with external gripping means, gripping the stomach wall or duodenum at two points, securely holding the tube by pressing the stomach wall against the tube with the hand that is farther from the end of said end portion, and collapsing the portion of the stomach or duodenum between the two hands, thereby advancing the end portion of the tube through the stomach and into the patient's duodenum, one of the lumens of said tube terminating in a discharge opening in the end portion of the tube and the other of said lumens terminating in said intake opening at an intermediate point along the length of said tube, and thereafter introducing fluid into the duodenum through said one lumen while draining fluid from the stomach through said other lumen.

#### References Cited

##### UNITED STATES PATENTS

1,888,349	11/1932	Jacoby	128—349
2,230,218	2/1941	Asche	128—276
2,492,384	12/1949	Kaslow	128—350
2,595,086	4/1952	Larzelere	128—326
3,302,637	2/1967	Mazellan	128—2
3,144,868	8/1964	Jascalevich	128—350

##### OTHER REFERENCES

Surgery, Gynecology and Obstetrics, page 1019, May 1966.

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