

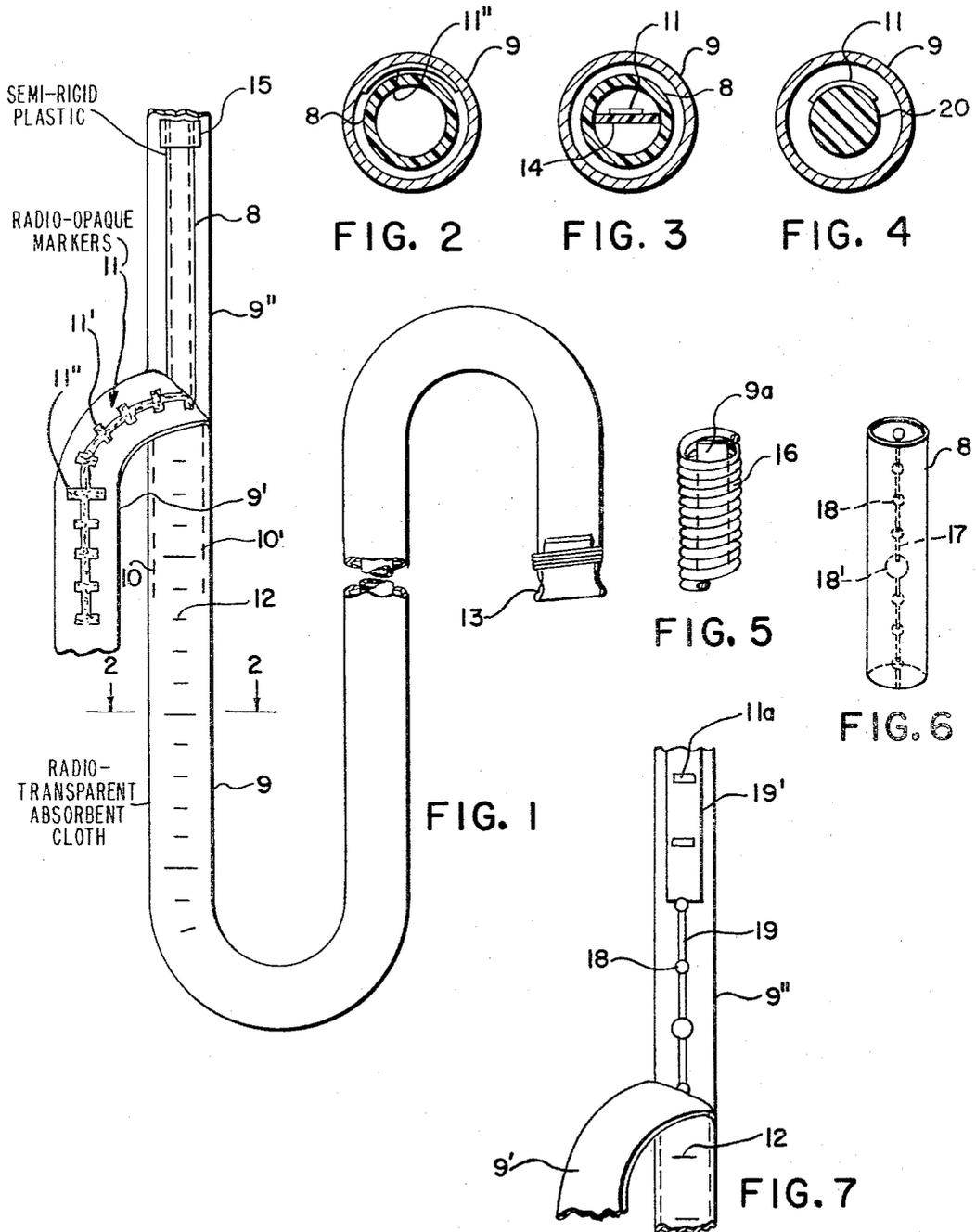
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SEMI-RIGID DEVICE FOR MARKING INTERNAL BLEEDING

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**SEMI-RIGID DEVICE FOR MARKING  
INTERNAL BLEEDING**

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This invention relates to a semi-rigid device to be passed orally into the upper gastro-intestinal tract of a patient with gastro-intestinal bleeding to localize the area in the upper gastro-intestinal tract in which bleeding is taking place. More specifically, it deals with a device comprising a flexible, but semi-rigid tube or solid monofilament or cord, transparent to X-rays, and surrounded or coated with a similarly-X-ray-transparent blood-absorbent material, and having X-ray opaque markings thereon or therewith for identifying the position of the device in the upper gastro-intestinal tract so that the bleeding area may be localized.

In Patent No. 3,097,636, issued to William F. Haynes and Fred E. Pittman, there is described a string for marking internal bleeding, consisting of an absorbent tape having a weighted, orally-insertable end, and carrying radio-opaque markers. This tape, which is non-fluorescing under ultra-violet light, is swallowed by the patient (after being soaked in ice-water), with an aid of sips of water. Once the weighted end reaches the stomach, the patient is instructed to continue swallowing segments of the tape, until the required length of tape has entered his gastro-intestinal tract. Thereafter, a roentgenogram of the upper abdomen is taken to clearly outline the characteristic "C-loop" of the abdomen. Then, while the patient is lying on the X-ray table, fluorescein is injected into an antecubital vein, and the dye is allowed to circulate for four minutes before the string is pulled out of the patient's mouth. Gloves are worn prior to withdrawal of the string in order to reduce the danger of dye-contaminated fingers touching it. After the string is removed, it is examined for fluorescence under ultra-violet light. If the patient has been bleeding actively at the time of the test, both blood and fluorescence will be located readily on the tape. The dye is visible as a yellow spot on the tape when examined under ultra-violet light. The situs of the bleeding is pin-pointed by counting back the number of markers from the weighted end and comparing this with the roentgenogram. Use of such a string has been successful in locating the bleeding site within a distance of one or two inches.

Although the aforesaid string has been used with great success, it possesses a difficulty with children, elderly people, or patients who are bleeding massively, in that it requires their cooperation in swallowing the highly limp tape combination. For this reason, also, the introduction of the tape is a slow procedure in some cases. Due to the upper abdominal "C-loop," already referred to, the string must be flexible enough to transverse readily this curved or crooked area without injury to the body tissue and without impeding the progress of the string to the desired terminal gastro-intestinal area and its painless withdrawal therefrom.

By use of the device of the present invention, very little patient cooperation is required, and speedier introduction of the device is possible, so that the aforesaid difficulties are overcome and even additional advantages are acquired, such as the elimination of the weight to be swallowed.

The invention will be more readily understood by reference to the accompanying drawing in which a preferred embodiment is described, and in which FIGURE 1 presents a side view, with upper portion partly torn away, of a device of the present invention containing an elongated

semi-rigid flexible element. FIGURE 2 depicts an enlarged cross-sectional top view along line 2—2 of FIGURE 1. FIGURES 3 and 4 illustrate similar cross-sectional views of other embodiments of the invention. FIGURE 5 shows an enlarged side view of a flexible helical coil core as the semi-rigid flexible element of the device of the present invention, while FIGURE 6 presents a similar view of another type of core. A side view, with the upper portion partly torn away, a still different embodiment employing the invention is illustrated in FIGURE 7. Similar numerals refer to similar parts in the various figures.

Referring again to the drawing, numeral 8 represents a semi-rigid flexible tube of radio-transparent material, such as polyethylene, polyvinyl chloride, fluoropolymer, or the like, around which is tightly woven an absorbent radio-transparent cover 9 of cloth, or similar material which is radio-transparent and free of fluorescence under ultra-violet light. Instead of weaving the cloth around the tube, it is also possible to sew two radio-transparent cloth tapes 9' and 9'' at the edges 10—10' to cover semi-rigid flexible plastic tube 8 with the absorbent material cover. The inside surface of tape 9' may have cemented, or otherwise attached, thereon radio-opaque distance markers 11, consisting of short horizontal markers 11' which are one inch or two inches apart, and longer horizontal markers 11'' which may be 6 inches or one foot apart. The outside surface of tape 9' also may be marked with visible markings 12 (not fluorescent or toxic), corresponding to and in juxtaposition with the inside markers 11.

End 13 of the device has the cloth overlapped and securely fastened onto the tube end to insure against dislodgment of the latter. The held end 14 of the devices can have a plastic sleeve 15 cemented onto the tube 8 and to the cloth cover, to avoid independent movement thereof.

When the device is to be swallowed, the covering 9 is wetted with cold water and the end 13 is inserted in the mouth and passed into the esophagus and into the stomach. Patient cooperation is not required for this initial maneuver. After this, the patient is told to continue swallowing the device for the required distance. The X-ray-opaque markers 11 serve to show the position of the various portions of the device on the roentgenogram, while the outside markers 12 make it easier to read off the bleeding area on the string.

The device generally may be 30-inch or 50-inch lengths, although there is no practical limitation thereon in this respect. For example, the device may be made in two sizes of tubing. One having a wall of about 0.004" and an outer diameter of about  $\frac{3}{32}$ ", and a larger size having a tube with a wall of about 0.0064" and an outer diameter of  $\frac{7}{32}$ ", the tube material being flexible polyvinyl chloride.

Another type of device which is suitable for the purposes of this invention, is the one depicted in FIGURE 3, wherein the spacing between the elements is exaggerated. In this case, the transparent plastic tube 8 covered by cloth coating 9 has inserted in it a narrow plastic radio-transparent ribbon 14 carrying cemented thereon the radio-opaque markings 11. A still further design of a suitable device is the one illustrated in FIGURE 4 in which the cloth cover 9 is woven over a solid monofilament of radio-transparent semi-rigid flexible plastic, onto which are cemented the radio-opaque markers 11. In this case, the solid monofilament may be only about  $\frac{1}{8}$ " (more or less) in diameter.

A very suitable material serving as the semi-rigid core of the device is a plastic helical cord, such as coil 16 in FIGURE 5. Such a coil has much more flexibility than a solid tube, while it still retains adequate rigidity. This

type of coil may be substituted for the tube 8 in FIGURE 1, or, it may be used as such, as a device, wherein the cotton tape 9a (carrying the necessary radio-opaque markers cemented thereto) is carried in the central portion of the coil or helix 16.

Instead of the cemented markers 11 in FIGURE 1, there may be inserted axially in tube 8 a monofilament string or strand 17 carrying spaced radio-opaque beads such as smaller beads 18 and larger beads 18'. In this case, the axially-disposed marker strip can be removed out of the tube after removal from the patent, and placed alongside the outside of the device as a ruler to locate the bleeding area.

FIGURE 7 shows a device of sewn tapes 9' and 9'' between which may be inserted a semi-rigid flexible rod 19 carrying spaced radio-opaque markers 18, or a flat continuous semi-rigid flexible plastic strip 19' carrying radio-opaque markers 11a painted or cemented thereon, said strip being cemented or otherwise attached to said tape. The tape disclosed in FIGURE 7 has the advantage of easy manufacture, and the tape may be printed with juxtapositioned lines 12 on the outside of the tape, as in FIGURE 1.

It is to be understood that the word "cord" used herein shall include a single monofilament, a rod, or a multiplicity of filaments. Also, the present device can be introduced through the rectum (using a somewhat more rigid tube, rod or cord), for locating bleeding in the colon and lower intestine.

I claim:

1. In a blood-absorbent device adapted to be introduced into the gastro-intestinal tract for locating bleeding, said device being provided with radio-opaque markers along the length thereof; the improvement comprising, a continuous, radio-transparent, semi-rigid, flexible elongated core serving as the central element of said device, and an absorbent radio-transparent cloth cover disposed tightly and completely over the outer surface of said core.

2. A blood-absorbent device according to claim 1 in which the core comprises a helical coil.

3. In a blood-absorbent device adapted to be introduced into the gastro-intestinal tract for locating bleeding, said device being provided with radio-opaque markers along the length thereof; the improvement comprising, a continuous, radio-transparent, semi-rigid, flexible tube serving as a core for said device, an absorbent permanently affixed radio transparent cloth cover disposed tightly and completely over the outer surface of said tubing, and

said markers comprising a series of radio opaque markers applied to the inside surface of said cover.

4. A blood-absorbent device according to claim 3 in which a series of visible markers are applied to the outside of said cover in juxtaposition with said radio-opaque markers.

5. In a blood-absorbent device adapted to be introduced into the gastro-intestinal tract for locating bleeding, said device being provided with radio-opaque markers along the length thereof; the improvement comprising, a continuous, radio-transparent, semi-rigid, flexible tube serving as a core for said device, an absorbent permanently affixed radio-transparent cloth cover disposed tightly and completely over the outer surface of said tube, and

said markers comprising a continuous strip carrying a series of radio-opaque markers thereon, said strip being disposed inside the length of said tube.

6. In a blood-absorbent device adapted to be introduced into the gastro-intestinal tract for locating bleeding, said device being provided with radio-opaque markers along the length thereof; the improvement comprising, a continuous, radio-transparent, semi-rigid, flexible cord serving as the core for said device, and an absorbent permanently affixed radio-transparent cloth cover disposed tightly and completely over said rod.

7. In a blood-absorbent device adapted to be introduced into the gastro-intestinal tract for locating bleeding, said device being provided with radio-opaque markers along the length thereof; the improvement comprising, a continuous, radio-transparent semi-rigid, flexible rod serving as a core for said device, an absorbent permanently affixed radio-transparent cloth cover disposed tightly and completely over said rod, and a spaced series of radio-opaque beads attached to said rod and serving as markers.

#### References Cited by the Examiner

##### UNITED STATES PATENTS

2,949,910	8/1960	Brown et al. ....	128—2.05
3,060,972	10/1962	Sheldon .....	128—2 X
3,097,636	7/1963	Haynes et al. ....	128—2
3,155,091	11/1964	Nissenbaum .....	128—2
3,217,705	11/1965	Dillings .....	128—2

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