

July 10, 1956

J. A. MUFFLY

2,753,869

INSTRUMENT FOR PROBING THE RETICULUM

Filed Aug. 16, 1955

Fig. 1.

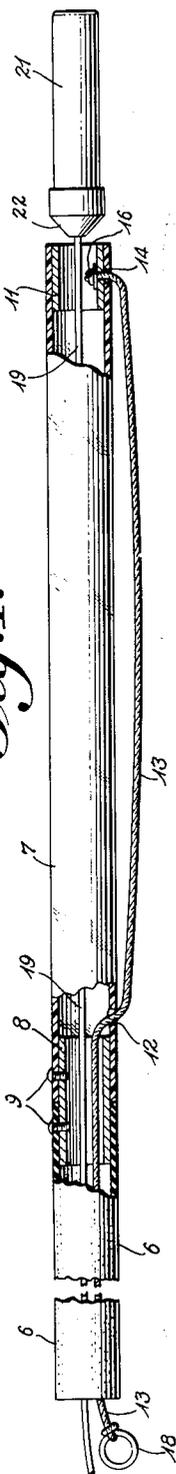


Fig. 2.

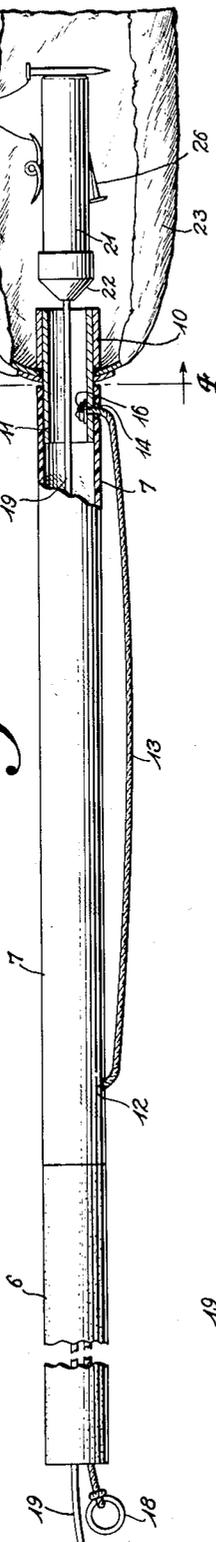


Fig. 3.

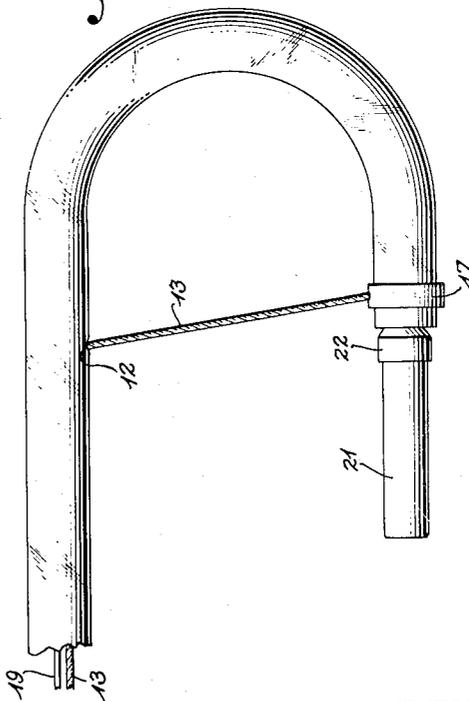
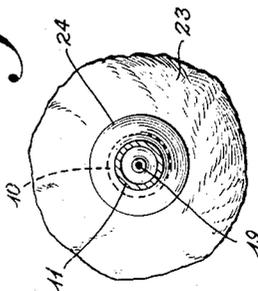


Fig. 4.



INVENTOR

James A. Muffly

BY

David M. Baker

ATTORNEY

1

2

2,753,869

## INSTRUMENT FOR PROBING THE RETICULUM

James A. Muffly, Lewisburg, Pa.

Application August 16, 1955, Serial No. 528,752

7 Claims. (Cl. 128—356)

This invention relates to an improved instrument for removing metal objects of magnetic character from the rumen and reticulum of cattle. More particularly, it relates to an instrument for removing the magnetic objects by way of the esophagus.

Cattlemen and dairymen in particular are occasioned great financial losses from the so-called "hardware disease" in cattle. Cattle eat in great haste, swallowing their food the first time without chewing. In so doing, they frequently swallow pieces of bailing wire, roofing nails and other sharp metal objects which may be present in or within easy reach of their feed, or strewn about their pasture. When the animal regurgitates the content of its rumen for chewing, the metallic objects in most instances do not pass upward into the mouth affording the animal the opportunity of rejecting them. Instead, the metal objects or "hardware" pass into and lodge in the reticulum, and seldom pass through the remainder of the digestive tract of the animal. The reticulum is located to the right, below and anterior of the esophageal-gastric opening. It is a chamber in front of the rumen, partially separated therefrom by the rumino-reticular fold. In the reticulum the hardware may be dissolved in time by the stomach acids, but where the collection of metal is large, this is highly improbable. In most instances the hardware causes inflammation of the stomach, referred to as traumatic gastritis. More serious, however, is the danger that the sharp metal will pierce the walls of the reticulum, with resulting abscess, and work its way through the diaphragm, piercing the pleura, or the pericardium and ultimately the heart, causing sudden death. It has been conservatively estimated that cattle valued at between one and two million dollars die each year as a result of hardware disease in the United States alone.

The symptoms of the disease are easily detected by the veterinarian, the most important being failure to take feed, loss of weight, grunting, arching of the back and treading lightly on the front feet. The presence of metal in the stomach may be confirmed by any of several available metal detectors. Heretofore, the only effective treatment has been a rumenotomy, a difficult surgical operation. For various reasons, not the least of which is the remoteness of the stricken area from the incision, surgical techniques, while usually successful, are costly. The cost of surgery to the small farmer is very often prohibitive, and for this reason many sick cattle go untreated. Until this time attempts to enter the reticulum by way of the esophagus, thus eliminating the necessity for surgery, have not been too successful. The apparatus for such treatment heretofore has been unduly complex and of limited effectiveness.

It is therefore an object of the present invention to provide an instrument of magnetic character for removing magnetic objects from the reticulum without surgery. It is another object to provide an instrument of the character described for introduction into the reticulum by way of the esophagus.

In the drawings:

Figure 1 is an elevation of an instrument, with sections, thereof cut away, incorporating the features of the present invention.

5 Figure 2 is an elevation of an instrument being withdrawn up the esophagus (not shown) also with sections thereof cut away, incorporating the features of another embodiment of the invention.

10 Figure 3 is an elevation of an instrument illustrating the flexible end portion in position for inserting the magnet over the rumino-reticular fold from the rumen to the reticulum.

15 Figure 4 is a section on the lines 4—4 of Figure 2 illustrating the general configuration of the skirt of the instrument of Figure 2.

20 Referring to the drawings and particularly to Figures 1 and 2 it is seen that these embodiments of the invention are not dissimilar. Essentially, the instrument comprises a tube having a body portion 6 of sufficient length to permit access from in front of the mouth to the rumen of the animal to be treated. This tube has a flexible end portion 7. In Figures 1 and 2 it will be observed that the end portion 7 is of different material from the body 6 of the tube. However, in Figure 3 the tube is of unitary construction, being of flexible material. In most instances the body 6 is fairly stiff and is desirably curved to conform generally to the esophagus. This portion of the tube may be metallic, but if so, it should be capable of conforming to the curvatures encountered in operation of the instrument, for example, body 6 could be flexible steel or other metal in the form of a spring. Generally, however, the body of the tube will be a fairly rigid hard rubber or plastic. The end portion 7 is constructed of much more flexible material, for example, a soft plastic such as polyethylene, capable of being drawn into a U, but sufficiently elastic to reassume an elongated aspect. In the embodiment of Figure 3, the entire tube should have the characteristics above described for the end portion 7.

25 Referring again to the composite tube of Figures 1 and 2, end portion 7 is positioned adjacent body 6 about bushing 8. The end portion 7 is held in fixed position by shrinking upon bushing 8 which is driven into body 6, or both body and end portion may be affixed rigidly to bushing 8 as by screws 9. When end portion 7 is of soft material it is desirable to provide at its terminal end a bushing 11 or other suitable means to afford rigidity and thus reduce wear. End portion 7 is perforated as at 12 adjacent body 6 to permit passage of control line 13. In Figures 1 and 2 the end portion 7 is again perforated at 14 adjacent its terminal end to receive control line 13, which terminates adjacent perforation 14 as at knot 16. In Figure 3, control line 13 terminates exterior of the tube beneath rigid clamp 17. For most of the remainder of its length control line 13 lies within body 6 and is attached at its free end to tensioning means illustrated as ring 18. Control line 13 is preferably of non-magnetic material, as copper wire, so as not to interfere with the proper functioning of the instrument. It is desirably a non-metallic cordage line, for example, nylon.

30 A retrieving line 19 of length greater than the length of the tube is positioned within said tube and is freely movable longitudinally therein. A magnet 21 is affixed by suitable means, illustrated as 22, to one end of retrieving line 19 adjacent the terminal end of end portion 7. Magnet 21 is preferably elongated with one of its ends adjacent the terminal end of the tube, and of diameter greater than the internal diameter of the terminal end of the tube. Retrieving line 19 is necessarily of stiff, fairly rigid material as wire rope.

35 Turning now to the embodiment of the invention illustrated in Figure 2, a skirt 23 of thin durable material is

3

positioned near the terminus of end portion 7 forward of the end of control line 13, with its waist 24 about bushing 11. In Figure 2, the skirt is maintained in position by a piece of tubing 10 driven onto bushing 11. In another modification, the waist 24 is similarly positioned about the exterior of end portion 7 and maintained in fixed position by a ring clamp thus eliminating tubing 10.

The purpose of this embodiment of the invention is to assure protection against rupture of the esophagus when removing sharp pieces of metal from the animal's stomach. To this end, skirt 23 is desirably, although not necessarily, cut from rubber or rubber-like synthetic stock of a thickness approximating 32 gauge. The requisite thickness of the skirt is determined by its ability to prevent piercing by sharp metal objects adhering to the magnet 21 as it is withdrawn up the esophagus. The skirt may thus also be fashioned from thin, durable, flexible closely woven fabrics of natural, synthetic or mixed fibers of the requisite resistance to piercing. Figure 2 illustrates the instrument of this embodiment being withdrawn up the esophagus with skirt 23 serving its purpose. With this in mind, the skirt 23 is most conveniently generally circular as shown in Figure 4. When positioned as indicated above, the radial dimension of skirt 23 is at least sufficient to completely envelope magnet 21 and metal objects 26 adhering thereto when the instrument is being withdrawn. The waist 24 is circular, and of diameter no greater than bushing 11 or end portion 7 depending upon the method employed to assure fixed positioning of the skirt. The waist 24 is desirably reinforced as illustrated in the section of Figure 2. In the case of a rubber or other elastic skirt, this reinforcement may be rubber of increased thickness, and the waist is then stretchably positioned on the bushing or tube.

In my copending application Serial Number 494,325, filed March 15, 1955, of which the present application is a continuation-in-part, there is described an instrument similar to that of the present invention. However, the instrument of my earlier application did not possess means as control line 13 for regulating the degree of curvature of the tube at the magnet end of the instrument. When tension is applied to control line 13 the end portion of the tube curves rearwardly as illustrated in Figure 3. By placing and maintaining control line 13 in fixed tension as by fastening ring 18 to a hook (not shown) near the cephalic end of body 6, the magnet end of the tube in the rumen assumes a U-shape thus directing the magnet toward the rumino-reticular orifice. A marking (not shown) on body 6 at its cephalic end enables the operator to properly orient and cause the magnet end of the tube to curve toward rather than away from the rumino-reticular orifice.

The instrument of the present invention will be more fully appreciated from a description of its operation.

It has been a common practice in the treatment of hardware disease to feed the animal a small magnet, which passes into the reticulum and collects some or all of the ferrous materials present, thus localizing the offending material prior to a rumenotomy. In some cases where the instrument of the present invention is to be employed, introduction of a small free magnet may be desirable, although it is by no means a necessary preliminary. As a general rule, fasting the animal for 24-48 hours as far as roughage is concerned will favor performance of the instrument. When the animal is on dry feed, 3 to 5 gallons of water should be administered through a stomach tube in order to distend the rumen and reticulum and make the stomach contents fluid prior to insertion of the instrument. However, when cattle are on green pasture no water is used.

A hard plastic pipe about 20 inches long and of internal diameter greater than the external diameter of the instrument tube is placed in the mouth as a speculum and the instrument is passed therethrough. The animal's head and the speculum are held by an assistant. The magnet is positioned as close as possible to the terminal end of the tube as illustrated in Figure 1 for example, and the

4

skirt is directed rearwardly along the tube. The magnet and tube are then passed through the speculum and down the esophagus with gentle pressure on the body portion. As the dorsal sac of the rumen is reached, the tube will pass easily. When the flexible end portion of the tube, including the portion of the control line exterior of the tube, is within the rumen, tension is taken on the control line causing the end portion to flex into a U. Tension in the control line is maintained fixed at the cephalic end of the tube by suitable means. With the tube in said position the retrieving line or cable is inserted, thus extending the magnet into the reticulum. The magnet is retracted and then inserted and retracted several times in order to sweep the surfaces of the reticulum and pick up magnetic objects. Finally, with the magnet retracted, tension is released on the control line and the end portion of the tube straightens. With gentle pulling on the retrieving line and body of the tube the instrument is slowly withdrawn up the esophagus. If the skirt has not already assumed the position illustrated in Figure 2, passage through the esophageal gastric opening assures complete enveloping of the magnet and metal objects attached thereto. As the magnet is withdrawn, the skirt, when employed, serves to shield the esophagus from the sharp metal objects being recovered.

This technique, with due regard to its simplicity, has proved eminently successful on more than forty cattle thus far treated. The instrument and its manipulation appeared to cause minimum discomfort to the animals, and no serious after effects.

Having thus described my invention for removing magnetic objects from the reticulum, I do not wish to be limited to the specific details of construction disclosed, since it is understood that changes may be made therein within the range of engineering skill without departing from the spirit of my invention. The scope of my invention is defined by the appended claims.

I claim:

1. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising a tube adapted to be inserted through the esophagus into the rumen, at least the insertable end portion thereof being flexible, said tube having a perforation intermediate its ends near the insertable end thereof, a retrieving line within said tube, a magnet secured to said retrieving line adjacent the insertable end of said tube, and a line for controlling the curvature of the insertable end portion of said tube secured to said tube adjacent its insertable end, passing along the exterior of said insertable end portion, through said perforation, thence along the interior of said tube toward the opposite end thereof.

2. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising a flexible tube adapted to be inserted through the esophagus into the rumen, said tube having a perforation intermediate its ends and near the insertable end thereof, a retrieving line within said tube, a magnet secured to one end of said retrieving line adjacent the perforated end of said tube, a control line partially within said tube and substantially the length thereof and means for regulating the tension in said control line adjacent the opposite end of said tube, said control line being affixed at one end to said tube adjacent the insertable end thereof, passing along the exterior of said tube to said perforation, passing there-through and along the interior of said tube and being affixed to said tensioning means.

3. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising a composite tube adapted to be inserted through the esophagus into the rumen, said tube consisting of a long body portion adapted to extend into the rumen and a short end portion more flexible than said body portion, said end portion having a perforation adjacent said body portion, a retrieving line within said tube, a magnet secured to the said retrieving line at the terminus of the end portion of said tube, and a control line for regulating the

5

curvature of the flexible end portion, said control line being affixed at one end to said end portion adjacent the terminus thereof, passing along the exterior of the end portion of said tube, through said perforation and along the interior of the body portion thereof.

4. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising a flexible tube adapted to be inserted through the esophagus into the rumen, said tube having a perforation intermediate its ends near the terminal insertable end thereof, a control line affixed thereto adjacent said terminal end of said tube, passing along the exterior of said tube through said perforation and along the interior of said tube toward the opposite end thereof, a retrieving line within said tube, a magnet secured to the retrieving line adjacent the terminal insertable end of said tube, and a flexible skirt secured at its waist about the exterior of said tube between said terminal end thereof and the point of affixation of said control line.

5. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising a flexible tube adapted to be inserted through the esophagus into the rumen, a flexible skirt of thin material secured at its waist about the exterior of said tube adjacent the terminal insertable end thereof, said tube having a perforation intermediate its ends and near said terminal end thereof, a control line affixed to said tube adjacent said terminal end but rearwardly of the waist of said skirt, said control line passing along the exterior of said tube, through said perforation and along the interior of said tube, tensioning means secured to the opposite end of said control line, a retrieving line within said tube and a magnet secured thereto adjacent said terminal end of said tube, said skirt being adapted to envelope said magnet and adhering objects when said magnet is in withdrawing position.

6. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising a composite tube adapted to be inserted through the esoph-

6

agus into the rumen, said tube consisting of a long body portion and a short end portion more flexible than said body portion, said end portion having a perforation adjacent said body portion, a flexible skirt of thin material secured at its waist about the exterior of said end portion adjacent the terminal end thereof removed from said body portion, a control line secured to the end portion of said tube adjacent but rearwardly of the waist of said skirt, said control line passing along the exterior of said end portion, through said perforation and along the interior of said body portion, a retrieving line within said tube and a magnet secured thereto exterior of said tube adjacent the terminal end of said end portion, said skirt being adapted to envelope said magnet and adhering metal objects when said magnet is in withdrawing position.

7. An instrument for removing metal objects of magnetic character from the stomachs of cattle, comprising a tube adapted to be inserted through the esophagus into the rumen and having a curvable insertable end portion, at least the insertable end portion of said tube being flexible, a retrieving line within said tube and slidable therein, a magnet secured to said retrieving line adjacent the insertable end of said tube, and a line substantially the length of said tube slidable axially with respect thereto for controlling the curvature of the insertable end portion thereof, said line being secured at its end to said tube adjacent the insertable end thereof, and from its secured end having a portion extending exteriorly of said tube and being movable relative thereto in a direction radially of the axis of the tube, said radially movable portion being at least as long as the curvable insertable end portion of said tube, said line for substantially the remainder of its length being restricted against radial movement relative to the axis of said tube, whereby when tension is applied to the control line, the insertable end portion of said tube assumes a substantially U-shaped curved aspect with the radially movable portion of said control line being a chord of the arc of said curve.

No references cited.