

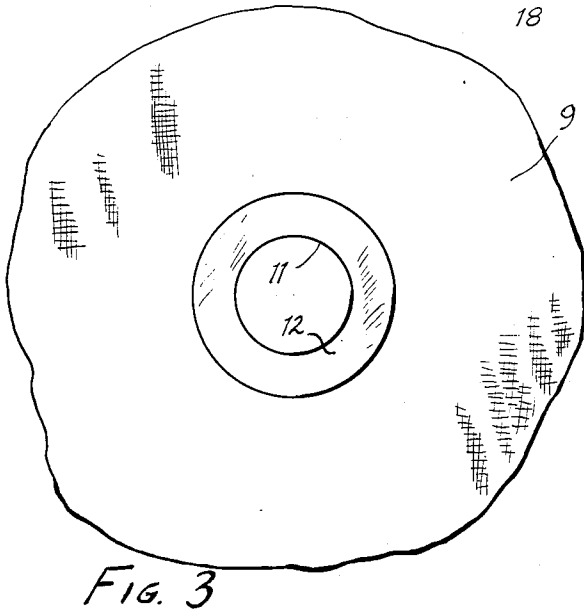
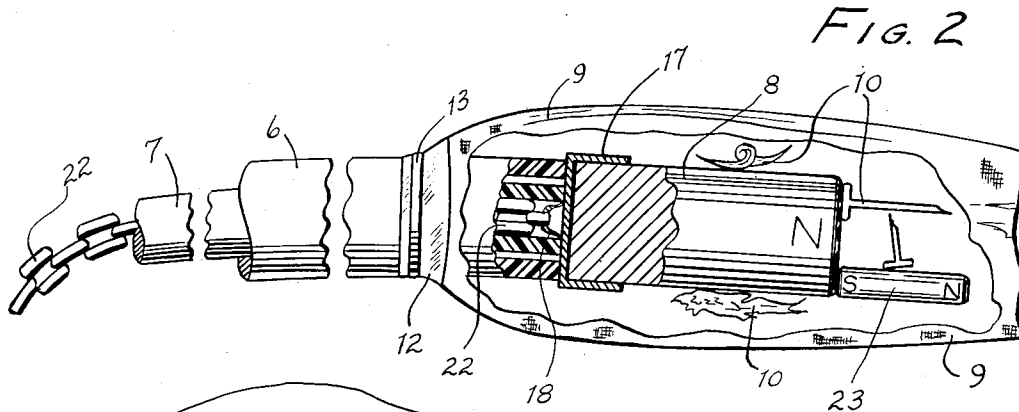
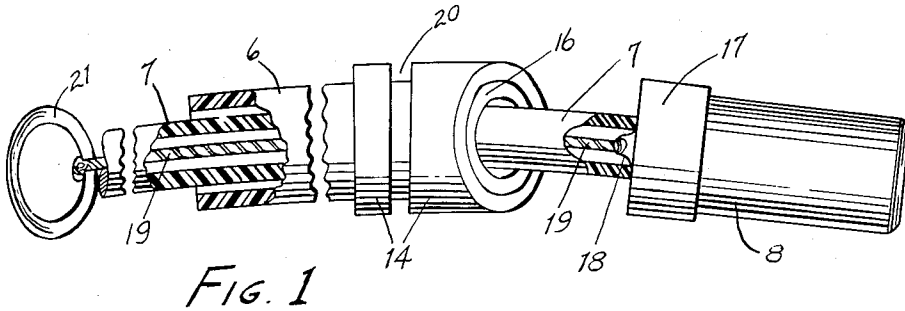
July 10, 1956

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2,753,870

INSTRUMENT FOR PROBING THE RETICULUM

Filed March 15, 1955



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INSTRUMENT FOR PROBING THE RETICULUM

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Application March 15, 1955, Serial No. 494,325

9 Claims. (Cl. 128—356)

This invention relates to an instrument for removing metal objects of magnetic character from the first and second compartments of the stomachs of ruminants, especially 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 with 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 contents 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. 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 which is 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 in the United States alone as a result of the hardware disease.

The symptoms of the disease are easily detected by the veterinarian, the most important being failure to take feed, arching of the back and treading lightly on the front feet. Heretofore, the only effective treatment has been a difficult surgical operation upon the reticulum necessitating the services of a surgically qualified veterinarian. 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 without regard to injury of the tender lining of the esophagus.

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. It is a further object to provide an instrument which in operation is capable of protecting the tender lining of the esophagus from rupture.

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In the drawings:

Figure 1 is a right elevation of an instrument, with sections thereof cut away, incorporating the features of the present invention, but with the skirt removed.

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.

Figure 3 is a plan view of the skirt, illustrating the general configuration of this essential element of the instruments of the present invention.

Referring to the drawings in detail, and particularly to Figures 1 and 2, it is seen that these embodiments of the invention are not dissimilar. The instrument comprises an outer tube 6 of sufficient length to permit access from in front of the mouth of the rumen of the animal to be treated. This outer tube is fairly stiff and is desirably curved to conform generally to the esophagus. Positioned within the outer tube 6 is an inner tube 7 which is sufficiently longer than the outer tube to permit access to the reaches of the reticulum when the end of the outer tube 6 is at the esophageal-gastric opening, i. e., the opening of the rumen, and also permitting a working length exterior of the other end of the outer tube. The inner tube 7 is very flexible as compared with the outer tube, and is easily slidable within the outer tube. The tubes 6 and 7 are preferably formed of commercially available rubber or plastic hose, bearing in mind the relative rigidity required of outer tube 6.

A magnet 8 is positioned adjacent one end of inner tube 7 as shown in Figures 1 and 2. The magnet is preferably elongated, as a bar magnet, with one of its ends adjacent one end of the inner tube.

A skirt 9 of thin, durable material is positioned near one end of outer tube 6, with its waist 11 about the outer tube. The skirt 9 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 the sharp metal objects adhering to the magnet 8 as the magnet is withdrawn up the esophagus. In this respect, dentaldam rubber is entirely satisfactory. The skirt 9 may also be fashioned from thin, durable, closely-woven fabrics of natural, synthetic, or mixed fibers of the requisite resistance to piercing. However, a rubber skirt is generally preferred. As indicated, the purpose of the skirt 9 is to shield the metal objects 10 attached to the magnet 8, and prevent rupture of the esophagus as the instrument is withdrawn, see Figure 2. With this in mind, the skirt 9 is most conveniently generally circular as shown in Figure 3. When positioned at its waist about and near one end of outer tube 6, the radial dimension of skirt 9 is at least of sufficient length to completely envelope magnet 8 and metal objects adhering thereto as the instrument is withdrawn. The waist 11 is desirably circular and of diameter no greater than the outside diameter of outer tube 6. The skirt is also preferably reinforced about its waist as at 12. In the case of a rubber or other elastic skirt, this reinforcement is rubber of increased thickness, and the waist is then stretchably positioned on the outer tube. In the case of a fabric skirt, the reinforcement 12 may be a metal ring. The waist 11 is maintained in a fixed position about the outer tube as by ring clamp 13 about reinforcement 12 in the embodiment illustrated in Figure 2. In the embodiment of Figure 1, the waist is positioned in the space 20 intermediate sleeves 14, the sleeves themselves being nonmagnetic and rigidly affixed about outer tube 6 as by shrinking, or being integral parts of the outer tube.

With particular reference now to the embodiment of the invention illustrated in Figure 1, it will be seen that

one end of outer tube 6 is cut back obliquely as at 16, the obliquity traversing the complete end of the tube and being on the right side. The thus cut back end serves to aid in directing the magnet 8 and inner tube 7 into the reticulum, as will be seen from a description of the operation of the instrument set forth hereinafter. Still referring to Figure 1, one end of magnet 8 is rigidly enclosed within a cap 17 which serves as magnet connecting means, and which is positioned adjacent one end of inner tube 7. The cap 17 is secured to retrieving line 19 by any suitable means such as eye 18. The retrieving line 19 is either of cordage, wire, wire rope, or small chain, which in this embodiment of the invention is of diameter less than the inside diameter of inner tube 7. When a metallic retrieving line is employed, it is of non-magnetic metal. In said embodiment, the length of the retrieving line 19 is at least equivalent to the length of the inner tube, and the other end of the retrieving line adjacent the corresponding end of inner tube 7 is attached to securing or control means illustrated as ring 21. In the same embodiment, the retrieving line is normally taut, but not under sufficient tension to cause curvature of those portions of the inner tube 7 extending beyond the ends of outer tube 6 greater than the normal curvature of the outer tube. In operation of this embodiment, the curvature of the extended magnet-end of inner tube 7 may be controlled by increasing tension in retrieving line 19.

Directing attention now to Figure 2 and the embodiment of the invention illustrated thereby, it is seen that both ends of outer tube 6 are normal to its sides. In this embodiment, the retrieving line is illustrated as a chain 22, the links of which are in close frictional association with the interior wall of inner tube 7. This frictional association is sufficient to prevent relative movement between the chain and inner tube in normal operation, thus maintaining magnet 8 and its connecting means 17 in contact with the end of inner tube 7. The chain 22 is conveniently although not necessarily longer than inner tube 7. Cordage, wire or wire rope may be substituted for chain 22, provided the diameter is sufficient to afford the necessary close frictional association with the inner tube as described for chain 22.

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 magnetic materials present, thus localizing the offending material, prior to the surgical operation. In some cases where the instrument of the present invention is to be employed, introduction of such a free magnet may be desirable, although it is by no means a necessary preliminary treatment. Such a free magnet 23 is being retrieved in Figure 2.

The reticulum is located to the right, below, and anterior of the esophageal-gastric opening. The reticulum is a chamber in front of the rumen, partially separated therefrom by the rumino-reticular fold. As a preliminary matter, the animal is taken off feed for a few days, only being allowed to drink. Just prior to treatment with the present instrument warm water is pumped into the rumen, thus distending the rumen and reticulum and making their contents as fluid as possible. A hard rubber or plastic tube about one and one-half to two feet long and of diameter greater than outer tube 6 is placed in the animal's mouth, and the instrument of the present invention is passed therethrough. This hard tube protects the outer and inner tubes of the instrument when the animal closes its jaws. The magnet 8 is first positioned as close as possible to the end of outer tube 6 as illustrated in the cut-away section of Figure 2. The skirt 9 is directed rearwardly about the outer tube, leaving the magnet and end of the outer tube free thereof. The free end of the magnet together with the end of the outer tube are passed through the aforementioned hard tube in the mouth into

the esophagus. The magnet is forced downwardly by insertion of the outer tube. The skirt assumes a trailing position about the outer tube. Insertion of the outer tube is continued until its end is at the lower end of the esophagus. The magnet 8 is then inside the rumen. The outer tube is not introduced into the rumen at this time, and thus the skirt also remains in the esophagus. The magnet is inserted farther by paying out the inner tube. Due to its flexibility and the weight of the magnet at its end, the magnet-end of inner tube 7 curves downwardly and passes into the reticulum. The inner tube is inserted, withdrawn partially, and inserted again several times to permit its magnet end to probe the reaches of the reticulum and collect magnetic objects. The magnet is then withdrawn to the end of the esophagus. The outer tube is now inserted into the rumen a sufficient distance to permit access of the entire skirt to the rumen. Tension is then taken on the inner tube, and the apparatus is slowly withdrawn up the esophagus. The esophageal-gastric opening causes the skirt to completely surround the magnet and metal objects attached thereto. As the magnet is withdrawn, the skirt acts as a protective shield, preventing rupture of the tender lining of the esophagus by the sharp metal objects being recovered.

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

In some cases it may be desirable to modify the above described technique by employing a powerful electro-magnet exterior of the animal, and so magnetically attract the magnet of the instrument from the rumen to the reticulum. Such an electro-magnet is placed against the animal between the sixth and eighth ribs on the left side, opposite the reticulum.

In the embodiment illustrated in Figure 1, the outer tube 6 has an oblique end which is on the right side as the instrument is passed into the esophagus. It has been found that such an oblique end often facilitates direction of the magnet rightwardly in its downward path in the rumen and toward the reticular opening. In this embodiment it is also possible to control the degree of curvature of the inner tube within the rumen and reticulum by varying the tension in the retrieving line.

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 an outer tube adapted to be inserted through the esophagus into the rumen, a flexible inner tube of greater length than said outer tube slidably positioned within said outer tube, a magnet secured at one end of said inner tube, and a flexible skirt of thin material secured at its waist about the exterior of said outer tube near the magnet end of the apparatus adapted to envelope said magnet and any adhering objects when said magnet is in withdrawing position.

2. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising an outer tube adapted to be inserted through the esophagus into the rumen, a flexible inner tube of greater length than said outer tube slidably positioned within said outer tube, a retrieving line within said inner tube, a magnet secured at one end of said retrieving line adjacent one end of said inner tube, and a skirt of thin material secured at its waist about the exterior of said outer tube near the magnet end of the apparatus adapted

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to envelope said magnet and any adhering objects when said magnet is in withdrawing position.

3. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising an outer tube adapted to be inserted through the esophagus into the rumen, a flexible inner tube of greater length than said outer tube slidably positioned within said outer tube, a retrieving line within said inner tube in close frictional association with the interior wall thereof, a magnet secured at one end of said retrieving line, and a flexible skirt of thin material secured at its waist about the exterior of said outer tube near the magnet end of the apparatus adapted to envelope said magnet and any adhering objects when said magnet is in withdrawing position.

4. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising an outer tube, a flexible inner tube of length greater than said outer tube slidably positioned within said outer tube, a retrieving line within said inner tube terminating at one end of said inner tube, control means secured to the other end of said retrieving line adjacent the corresponding end of said inner tube, an elongated magnet secured to the terminal end of said retrieving line, and a skirt of thin, durable material secured at its waist about the circumference of said outer tube near the magnet end of the apparatus adapted to completely envelop said magnet and any adhering objects when said magnet is in withdrawing position.

5. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising an outer tube curved to conform generally to the esophagus of cattle and terminating obliquely at one end, said obliquity being on the right as said end is passed into the esophagus, a flexible inner tube longer than said outer tube and slidably positioned within said outer tube, a retrieving line within said inner tube terminating at one end of said inner tube, control means securing the other end of said retrieving line adjacent the corresponding end of said inner tube, an elongated magnet secured at one end to the terminal end of said retrieving line, and a skirt of thin rubber sheet material of increased thickness about its waist, stretchably positioned at its waist about the exterior of said outer tube near the oblique end thereof, adapted to envelope said magnet and any adhering objects when magnet is positioned adjacent the oblique end of said outer tube and said skirt is directed thereabout in withdrawing position.

6. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising an outer tube adapted to be inserted through the esophagus into the rumen, a flexible inner tube of increased length slidably positioned within said outer tube, a retrieving line within said inner tube in close frictional association with the interior wall of said inner tube terminating at one end of said inner tube, an elongated magnet secured

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to the terminal end of said retrieving line, and a generally circular skirt of thin, durable material secured at its waist about the circumference of said outer tube near the magnet end of the apparatus adapted to envelope said magnet and any adhering objects when said magnet is in withdrawing position.

7. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising an outer tube curved to conform generally to the esophagus, a flexible inner tube of increased length slidably positioned within said outer tube, a chain within said inner tube in close frictional association with the interior wall of said inner tube, said chain having a terminal link at one end of said inner tube, an elongated magnet secured to the terminal link of said chain, and a skirt of thin, durable rubber secured at its waist about the circumference of said outer tube near the magnet end of the apparatus adapted to envelope said magnet and any adhering objects when said magnet is in withdrawing position.

8. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising an outer tube curved to conform generally to the esophagus and terminating obliquely at one end, said obliquity being of the right as said end is passed into the esophagus, a flexible inner tube longer than said outer tube slidably positioned within said outer tube, a chain within said inner tube in close frictional association with the interior wall thereof, said chain having a terminal link at one end of said inner tube, an elongated magnet secured at one end to said terminal link, whereby said magnet is adjacent the end of said inner tube, and a skirt of thin rubber sheet material of increased thickness about its waist stretchably secured at its waist about the circumference of said outer tube near the oblique end thereof, adapted to envelope said magnet and any adhering objects when said magnet is in withdrawing position.

9. An instrument for removing metal objects of magnetic character from the stomachs of cattle comprising an outer tube curved to conform generally to the esophagus, a flexible inner tube longer than said outer tube and slidably positioned within said outer tube, a chain within said inner tube extending at least the length thereof in close frictional association with the interior wall of said inner tube and having a terminal link at one end of said inner tube, a bar magnet secured to the terminal link of said chain, a pair of sleeves secured about said outer tube in space apart relationship adjacent the magnet end thereof, and a generally circular skirt of thin, durable rubber having a stretchable reinforcing ring about the waist thereof, said skirt stretchably positioned at its waist about the circumference of said outer tube intermediate said sleeves, the shortest radial dimension of said skirt being at least sufficient to envelope said magnet and any adhering objects when said magnet is in withdrawing position.

No references cited.