

[21] Appl. No.: 182,731

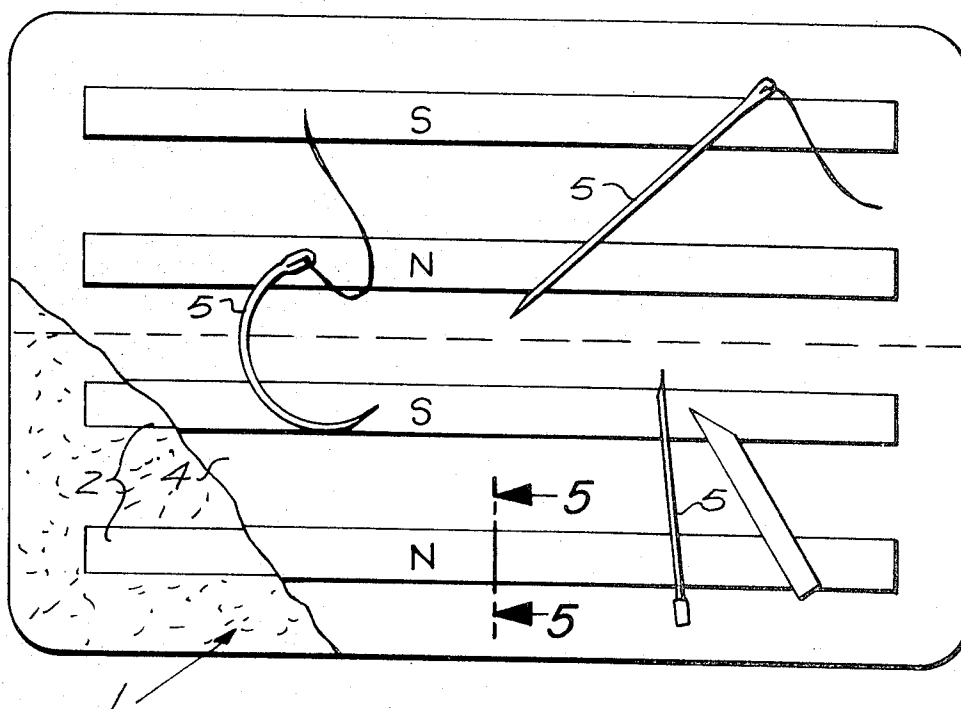
[58] **Field of Search**..... 150/52 R;
206/DIG. 33, 63.2 R; 128/132 D; 335/302,
303, 306; 248/206 A

3,483,494 12/1969 Cromie.....335/303

[57] ABSTRACT

A receiver for surgical implements which includes a backing sheet of a foamed elastomer, the back side of which is exposed to provide frictional contact with an underlying surface. A plurality of magnetic bars are disposed on the upper surface of the pad backing sheet to receive and retain surgical implements. An impervious plastic cover sheet, coextensive with the backing sheet, conforms to the magnetic bars and adheres to the upper surface of the backing sheet between the magnetic bars. The receiver is capable of being folded to entrap discarded surgical implements between the folded portions of the receiver. The receiver may also be rolled to entrap discarded surgical instruments, or the implements may first be removed to permit the rolled receiver to be sterilized for reuse.

9 Claims, 10 Drawing Figures



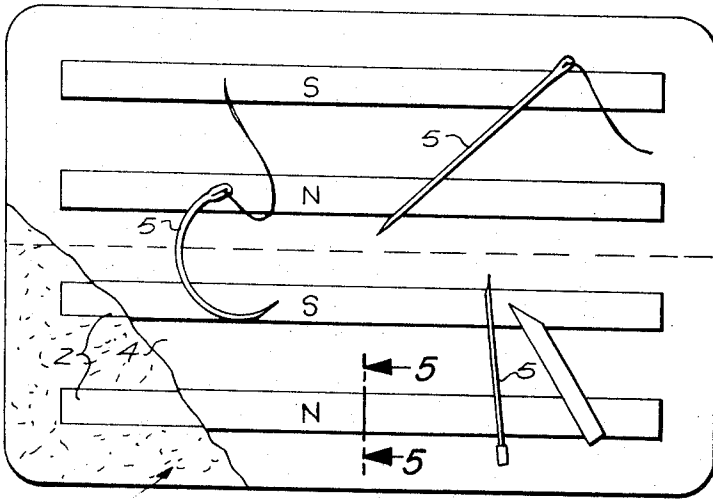


FIG. 1

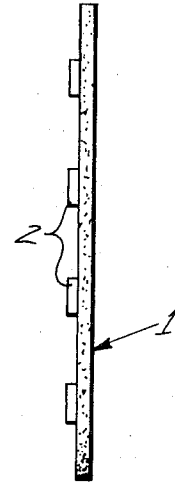


FIG. 2

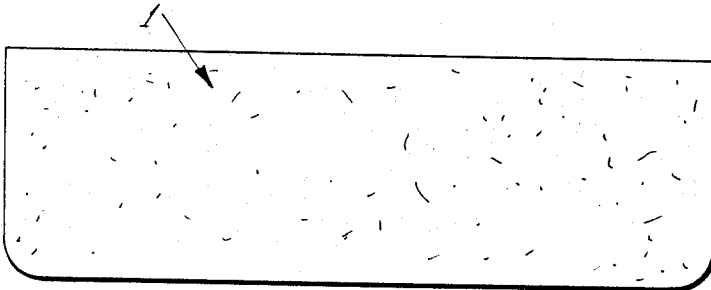


FIG. 3

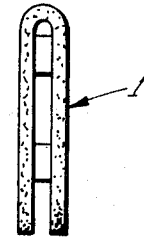


FIG. 4

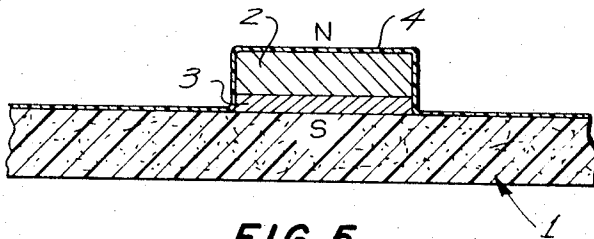
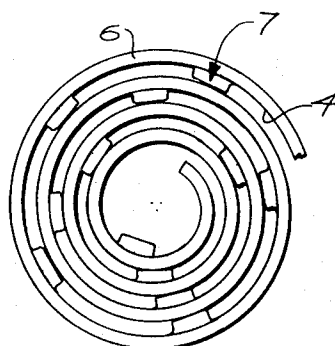
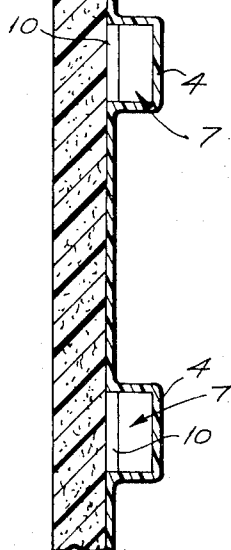
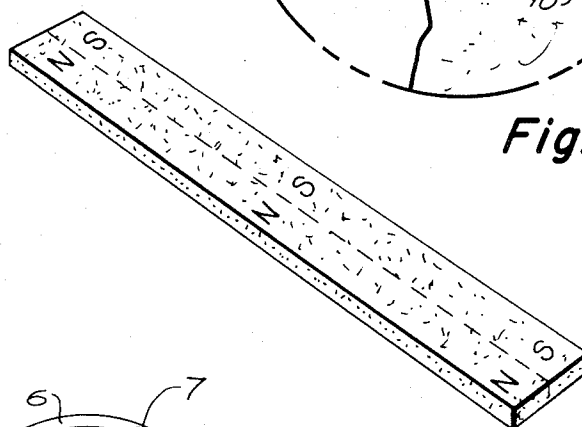
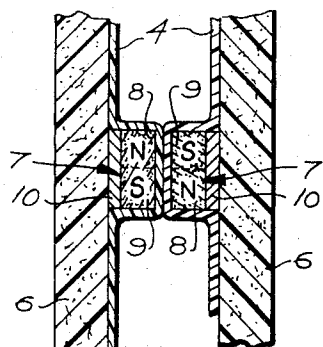
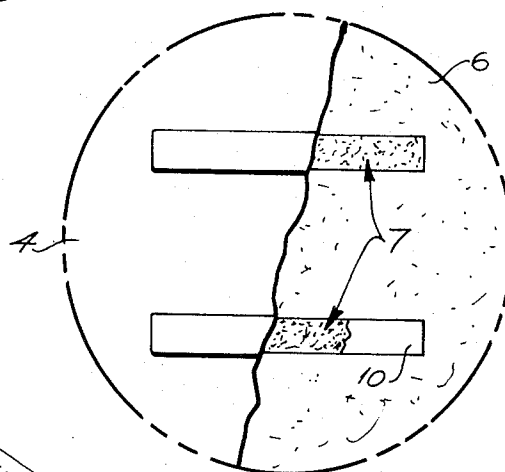
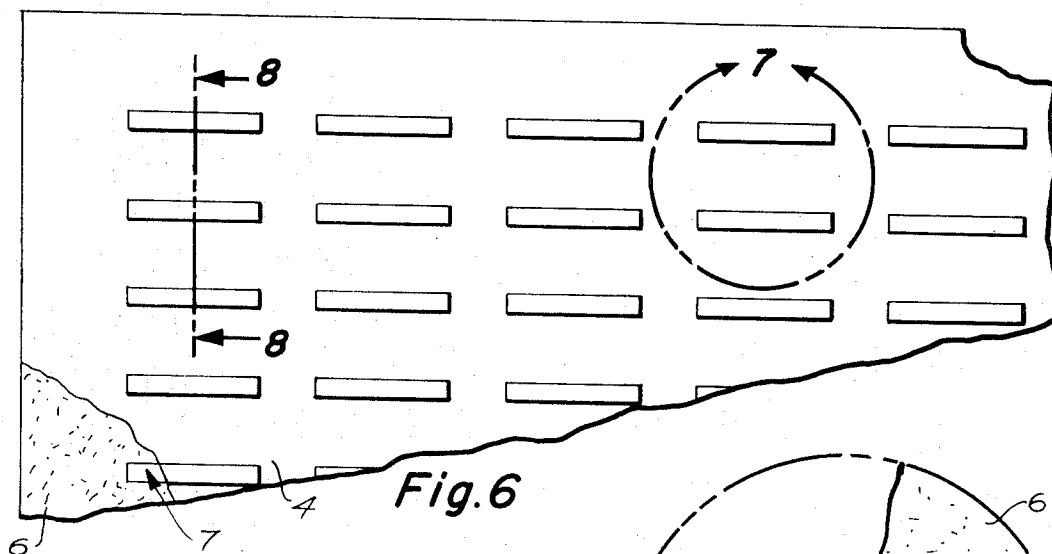


FIG. 5

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RECEIVER FOR SURGICAL IMPLEMENTS

This application is a continuation-in-part of my co-pending application Ser. No. 868,317, filed Oct. 22, 1969, now abandoned, for RECEIVER FOR DISPOSABLE SURGICAL IMPLEMENTS.

BACKGROUND OF THE INVENTION

The use of disposable surgical implements such as hypodermic needles, suture needles, knives and similar small sharp implements is increasing rapidly with the attendant increasing problem of their control. That is the increased number of implements must be carefully accounted for. If the implements are dropped or misplaced out of the sterile area, are needed for reuse, they require resterilization. In the case of an essential surgical implement the resterilization may be required prior to completion of surgery. For example, numerical control of surgical needles, both the reusable and disposable types, become mandatory. In fact, legislation now pending may require a count of all needles and related implements employed prior to surgical closure.

Also, attempts have been made to provide surgical pads utilizing magnets; for example, U.S. Pat. No. 3,546,643, in which a rubber pad is perforated to provide magnet receiving pockets, and, after placement of the magnets, is covered on both sides with fabric reinforced sheets. This construction is relatively expensive and thus must be used repeatedly and be capable of withstanding repeated sterilization.

Another example is U.S. Pat. No. 3,483,494. In this case, the magnets are encased between two impervious sheets.

SUMMARY OF THE INVENTION

The present invention is directed generally to the same purpose as the cited patents, that is, to a receiver for surgical implements but which incorporates important improvements, the invention being summarized in the following objects:

First, to provide a receiver for surgical implements which includes a backing sheet of porous foamed elastomeric material on which is placed a plurality of magnetic bars covered by a vacuum formed cover sheet conforming closely to the magnets and adhering to the backing sheet therebetween; the back surface of the backing sheet being normally flat yet capable of conforming to and frictionally clinging to an underlying surface, and the magnet bars providing raised upper surfaces to provide improved access to surgical implements for removal if desired.

Second, to provide a receiver for surgical implements as indicated in the preceding object wherein the magnetic bars are formed of plastic material impregnated with magnetized particles so oriented as to provide a pair of contiguous magnetic zones of opposite polarity at their upper and lower surfaces, these being coupled by an underlying magnetically permeable metal strip, whereby a metal implement placed across a single bar completes a magnetic circuit and provides a retentive force independent of the other magnetic bars.

Third, to provide a receiver for surgical implements, which in one embodiment is intended primarily for small disposable surgical implements, and foldable to entrap the implements between magnetic bars, the

magnets tending to place the implements parallel to the planes of the folded portions of the receiver to minimize the chance of puncture of the cover sheet and backing sheet, thereby providing a discardable package.

Fourth, to provide a receiver for surgical implements in which another embodiment is intended primarily for use as a relatively large surgical drape which is placed over a patient and may be arranged for use as an expendable receiver for disposable implements or as a reusable receiver for reusable surgical implements.

Fifth, to provide a receiver for surgical implements, as indicated in the preceding objects, which is capable of being rolled into a cylindrical bundle, the magnetic bars serving to space the convolutions to expose the porous back side as well as the front side to a sterilizing media.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view showing one embodiment of the receiver for disposable surgical implements, the receiver being shown in its open position.

FIG. 2 is an edge view of the receiver in its open position.

FIG. 3 is a plan view of the receiver shown in its folded position.

FIG. 4 is an edge view of the receiver shown in its folded position.

FIG. 5 is a fragmentary substantially enlarged sectional view taken through 5—5 of FIG. 1.

FIG. 6 is a fragmentary plan view of another embodiment of the receiver.

FIG. 7 is an enlarged fragmentary plan view thereof taken within circle 7 of FIG. 6 with successive layers partially removed to illustrate the internal construction.

FIG. 8 is an enlarged fragmentary sectional view taken through 8—8 of FIG. 6 showing a portion of the receiver in its folded condition.

FIG. 9 is a perspective view of one of the magnet bars.

FIG. 10 is a fragmentary end view of the receiver in a rolled condition.

Reference is first directed to FIGS. 1 through 5. The receiver here illustrated includes a pad 1 formed of a sheet of porous foamed plastic material. In the construction shown, the plastic material may be a soft or may be a rigid foamed plastic readily foldable elastomeric material such as foamed polyurethane. For example, a polyurethane, open cell sheet with 70 to 100 pores per lineal inch has been found satisfactory. The higher the number of pores, the greater the coefficient of adhesion to the surface on which the receiver mat or pad is placed. Thickness of the foam backing pad may range between 1/16" and 1/8". Such foam material is light in weight. Example, a square foot of 1/8" foam weighs about 1/4 oz. Placed on the pad 1 is a set of magnets 2. It has been found convenient to use magnets formed of sintered magnetic particles suitably bonded together by plastic material. For example, magnets formed of nitrile rubber embedded with particles of ferromagnetic material such as barium ferrite, a material which is lighter in weight than metal magnets, has been found to be highly satisfactory. Magnets of this type may be polarized so that the undersurface

which rests on the pad constitutes one pole, whereas, the upper or exposed surface constitutes the other pole. Magnets of this type may be cut to form elongated strips and are placed on the pad in parallel spaced relation. The magnetic strength may be increased by interposing a magnetizable backing strip 3 under each magnet, as indicated in FIG. 5.

The magnets 2 are held in place on the pad 1 by an impervious thin plastic laminate 4, which is vacuum formed around each magnet, due to the porosity of the pad or backing sheet, and is drawn into intimate contact with the pad between the magnets by the application of suction pressure under the pad. While many of the thin sheet plastics may be used, it has been found convenient to use an Ionomer; that is, a plastic sheet in which the polymer is linked by ionic forces and covalent bonds. It has been found that such a laminate bonds to the foamed plastic without the application of adhesive. However, an adhesive coating may be used if desired.

The receiver illustrated in FIGS. 1 through 5 is used as follows:

The primary application of the receiver shown in FIGS. 1 through 5 is in the operating room. The receiver is placed in its open position, as illustrated in FIG. 1, at a location convenient to the surgeon or his nurse. Each implement, indicated by 5, is discarded by placing the implement on the receiver. The magnets tend to hold the implement in place so as not to be lost. This is important for careful check of the implements is maintained and they are counted when surgery is completed. The implements may include hypodermic needles, suture stitching needles, and various expendable surgical knives.

When surgery is completed, the two halves of the receiver are folded together so that the magnets on each half of the receiver are moved into confronting relation, with the implements between the confronting pairs of magnets. The attraction between the magnets is of greater force than the attraction between an implement and the magnet. As a result, the implements are firmly held in place. Should an implement be laid over the region in which the receiver folds, the folding operation merely moves the implement to one side.

Reference is now directed to the embodiment shown in FIGS. 6 through 10. The construction here shown is intended primarily as a surgical drape or as a mat for placement on a surgical drape. This embodiment includes a backing sheet or pad 6 which, except for size, is the same as the backing pad 1 and has a strong tendency to cling frictionally to and conform with an underlying drape.

Placed on the backing pad 6 are columns and rows of magnet units 7 which individually may be smaller than the magnets 2. Each magnet unit 7 may include a pair of magnetic bars 8 and 9 which may be separate members or joined integrally along their contiguous sides. In either case, the magnetic bars 8 and 9, like the magnets 2, are formed of plastic material impregnated with permanently magnetizable particles or may be formed of the material indicated in reference to the magnet units 2. These particles are so magnetized that the bars or portions 8 and 9 have opposite polarity as indicated by N and S in FIGS. 8 and 9.

Interposed between the bars comprising portions 7 and the backing sheet 6 is a permeable magnetizable strip 10, so that with the placement of a magnetizable implement over the portions 8 and 9 a magnetic circuit is completed independently of any of the other magnetic units 7, thus maximizing the holding power.

The embodiment shown in FIGS. 6 through 10 functions essentially in the same manner as the embodiment shown in FIGS. 1 through 5. Both utilize a porous backing pad or sheet to increase the frictional contact with an underlying surface. The latter embodiment is intended primarily as a drape which can be placed over a patient and conform as well as cling to the patient to prevent slippage. Because of the larger size and its use as a drape, the embodiment shown in FIGS. 6 through 10 may be used to receive reusable surgical implements which are removed after use.

While it is intended that the drape construction be expendable with any expendable implements remaining thereon, the drape construction is capable of being rolled as indicated in FIG. 10 in which case the magnet units 7 serve as spacers to insure access of a sterilizing media to the impervious front surface of the drape as well as throughout the pores of the backing sheet 6.

In regard to both embodiments shown, the metal backing strip reinforces the otherwise flexible magnet strips or bars to prevent flexing, as flexure of the magnets would tend to dislodge implements held magnetically thereon. Also, the metal strips block the magnetic field from extending through the back of the mat or pad. This is important in that, when the mat or drape is rolled, the back-to-front relationship of the magnets, particularly with the arrangement shown in FIGS. 8 and 9, minimizes magnetic adherence between the magnet units. This, plus the spacing effect of the magnet units, facilitates sterilization, preferably at ambient temperature by radioactive cobalt or ethylene oxide gas. When the mat or pad is folded, high magnetic relationship may be attained as indicated in FIG. 8, to retain the implements, or for packing. Minimal magnetic relation may be attained by positioning the magnet units in offset relationship. It has been found that the impervious cover film may be quite thin and yet permit vacuum forming. A polyethylene film of 0.020 to 0.040 inches thick has been found satisfactory. Also, this material may be formulated so as to be static free.

Finally, considerable weight reduction is attained by utilizing the foamed backing sheet plastic magnets and thin metal strips, i.e., a 10" x 16" size drape weighs about 4 ounces, whereas the previous magnetic drapes of this size weigh more than 1 pound.

While particular embodiments of this invention have been shown and described, it is not intended to limit the same to the details of the constructions set forth, but instead, the invention embraces such changes, modifications, and equivalents of the various parts and their relationships as come within the purview of the appended claims.

I claim:

1. A receiver for magnetizable implements, comprising:
 - a. a supporting pad of uniform thickness including two similar portions movable between a coplanar position and a folded mutually confronting position, the portions, when in their coplanar position,

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- adapted to present an upwardly facing surface on which magnetizable implements may be deposited;
- b. a set of magnet elements mounted on each of the confronting surfaces, for mutual adhering engagement, when the pad is folded; the magnetic elements being in the form of thin strips and their poles being formed at their exposed surfaces, and their surfaces facing the pad.
2. A receiver as defined in claim 1, wherein:
 - a. each magnet element includes a pair of contiguous magnet portions of opposite polarity, and a magnetizable strip underlying and bridging between both portions to define a magnetic circuit capable of completion by a magnetizable implement placed across the contiguous magnet portions.
 3. A receiver as defined in claim 1, wherein:
 - a. the supporting pad is formed of porous elastomeric material having a frictionally clinging back surface;
 - b. and an impervious sheet covers the front surface of the supporting pad intimately enclosing the magnet units and adheres to the supporting pad between the magnet units.
 4. A receiver as defined in claim 3, wherein:
 - a. the supporting pad is rollable as well as foldable, and the magnet units form spacers, when the supporting pad is rolled for entrance of a sterilizing media.
 5. A receiver for magnetizable implements, comprising:
 - a. a backing sheet of porous foamed elastomeric material having a frictionally clinging back surface;
 - b. a plurality of spaced magnet units disposed on the front surface of the backing sheet and extending above the normal surface of the backing sheet;

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- c. and an impervious covering closely enveloping the magnet units and intimately contacting the front surface of the backing sheet between the magnet units;
- d. each magnet unit including a magnet element formed of plastic material impregnated with magnet particles and a magnetizable metal strip coextensive therewith underlying the magnet element.
6. A receiver as defined in claim 5, wherein:
 - a. each magnetic element includes two portions of opposite polarity both in contact with the metal strip and forming therewith a magnetic circuit when a magnetizable implement is placed across their outer surfaces.
7. A receiver as defined in claim 5, wherein:
 - a. the receiver is rollable into a cylindrical bundle, the magnet units forming spacers to permit access of a sterilizing media into the porous back side of the backing sheet and the front surface of the impervious covering.
8. A receiver as defined in claim 5, wherein:
 - a. the receiver is foldable to place opposing poles of pairs of magnet units in confronting relation.
9. A supporting means for surgical implements, comprising:
 - a. a supporting member having a foamed plastic lamination;
 - b. a set of magnetic elements mounted in spaced relation on the supporting member, the magnetic elements being in the form of thin strips with their poles being at their exposed surfaces and at their surfaces facing the pad;
 - c. and a thin impervious plastic lamination encasing the magnetic elements and bonded to the surface of the supporting member.

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