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(54) **TARGET MARKER BUOY**

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(57) **ABSTRACT**

A marker buoy and system for using the same is disclosed. The marker buoy includes an anchor line and a plurality of panels spaced along the anchor line. The panels are configured to provide a guiding illustration to a user of a sonar imaging device.

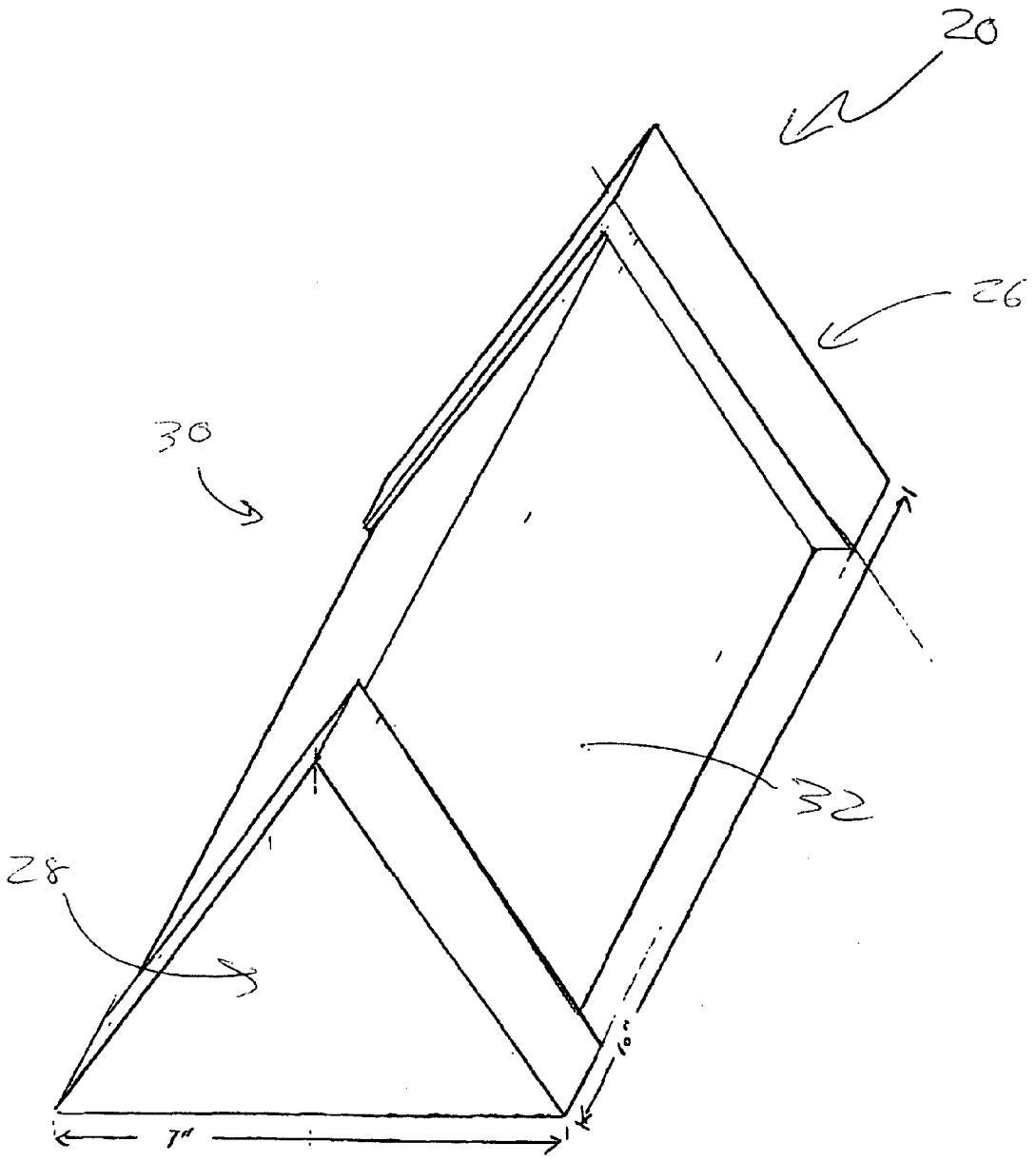
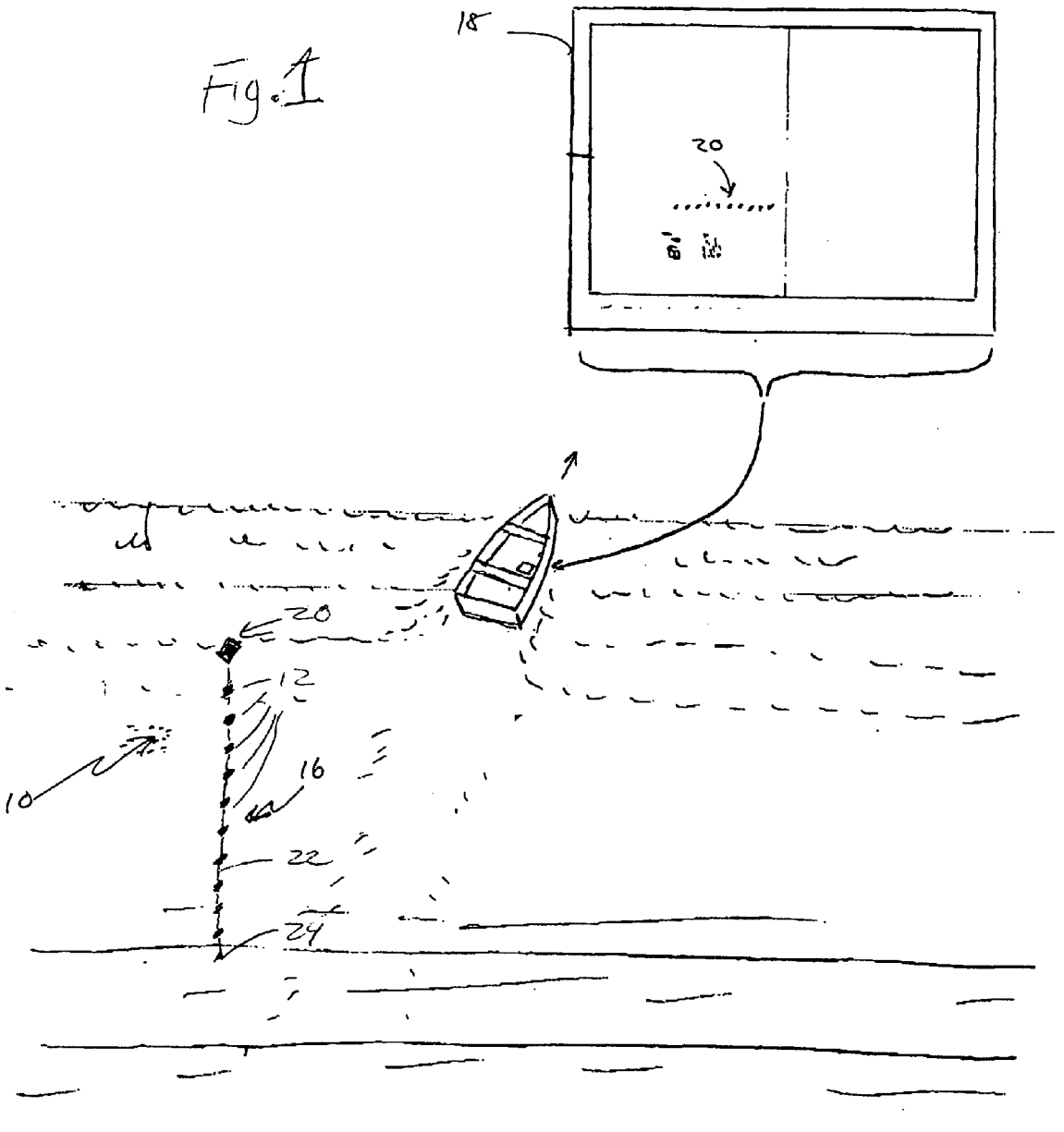


Fig. 1



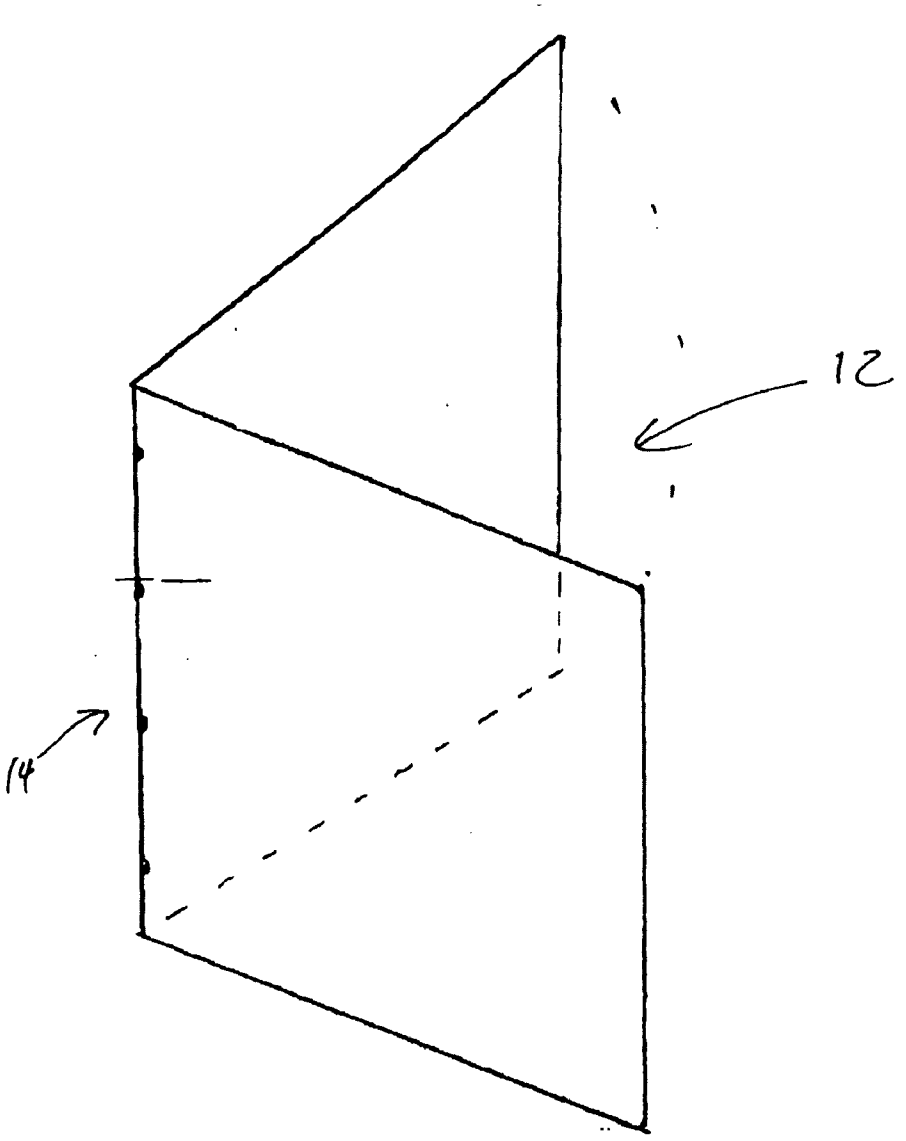


Fig. 2

Fig. 3

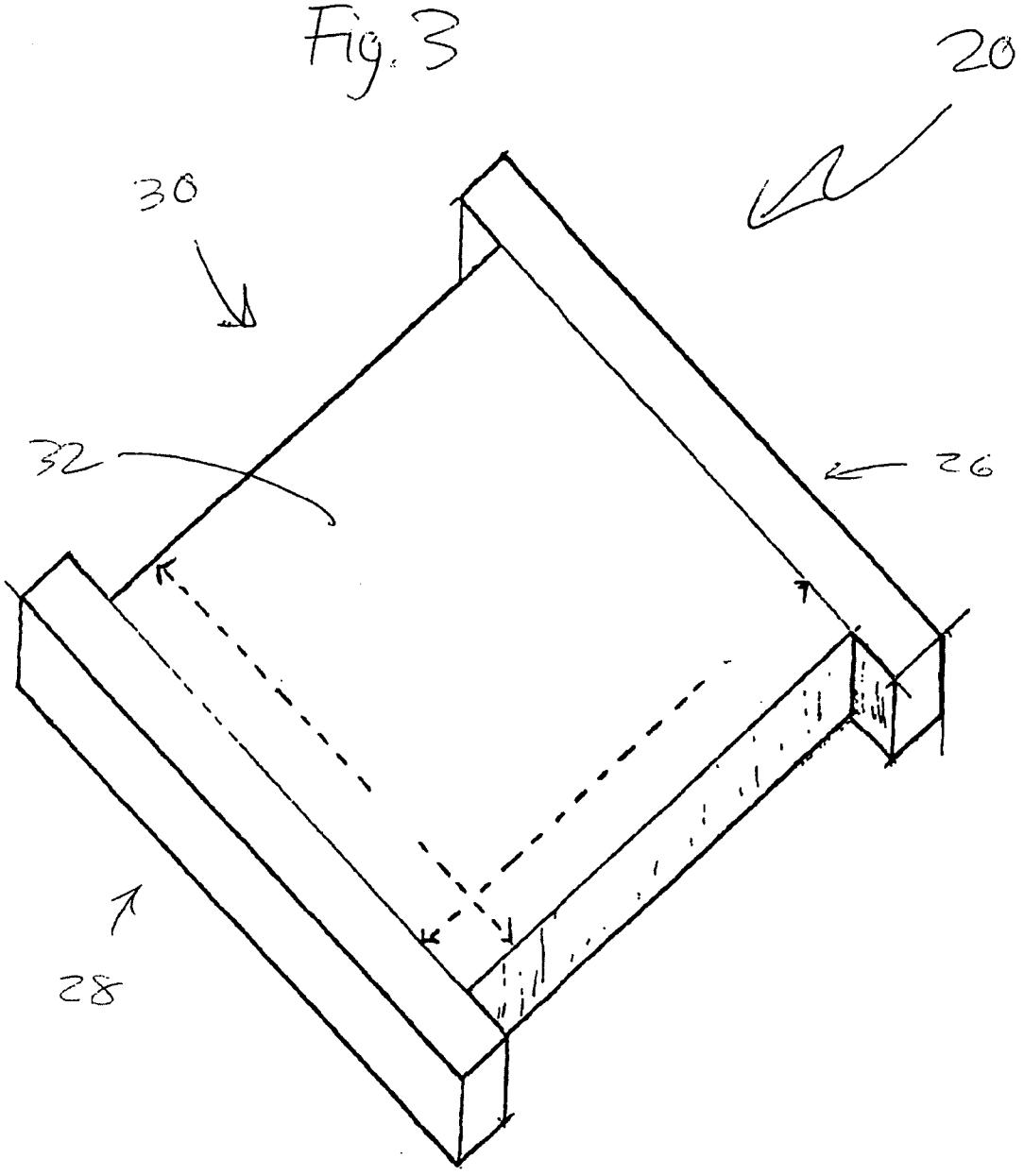
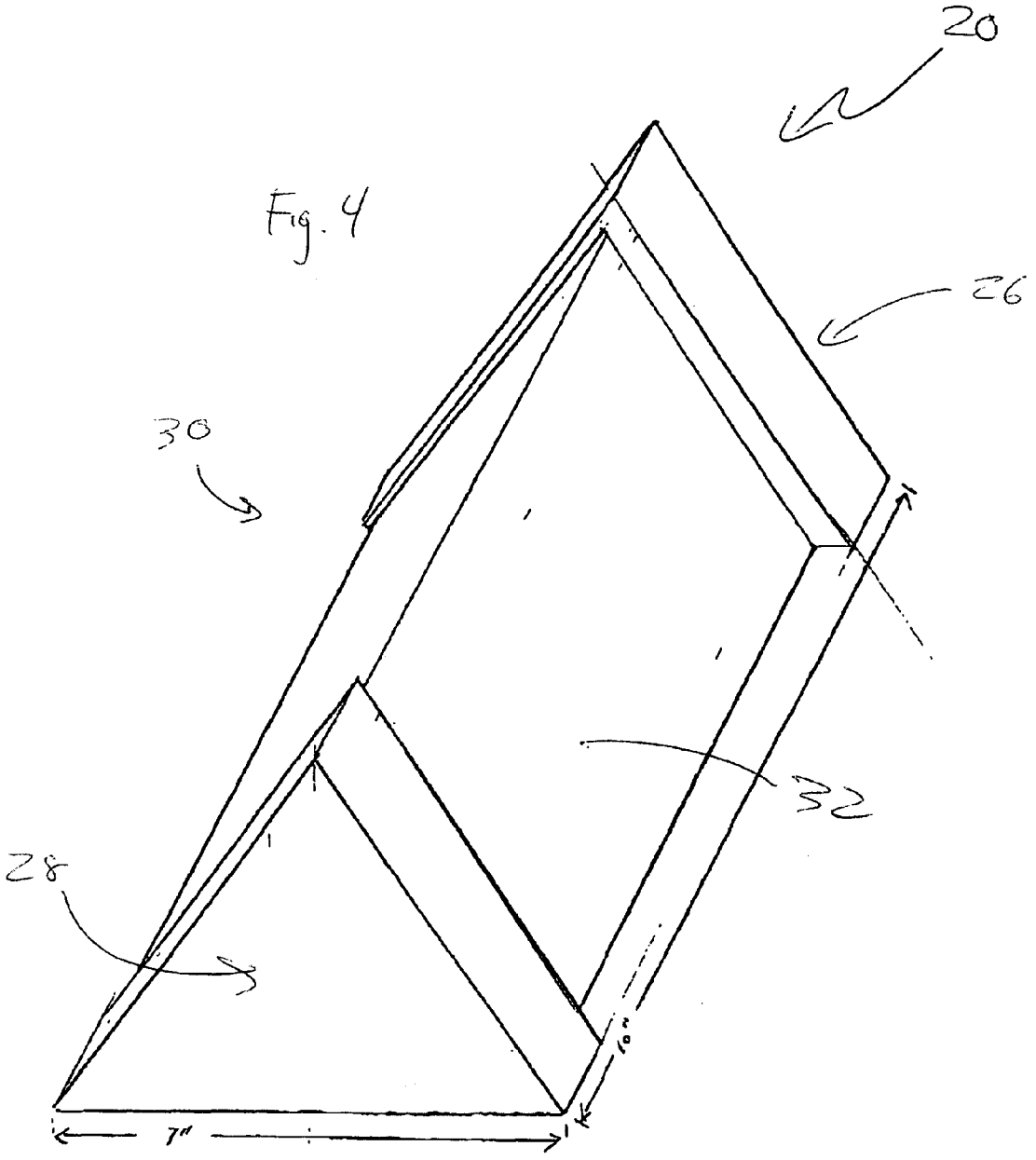


Fig. 4



TARGET MARKER BUOY

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application Ser. No. 61/023,852 filed Jan. 26, 2008.

BACKGROUND OF THE INVENTION

[0002] Fresh and salt water fishing, underwater salvage and navigation in general are undergoing a revolution because of side imaging (SI) sonar which draws pictures of what is on the bottom and what is in the water column in the area scanned by the SI sonar. SI works similar to Magnetic Resonance Imaging (MRI) technology used in medicine in that thin slices are scanned as either the area being scanned moves or the sonar's transducer (which sends and receives signals) moves. SI allows the user to see a virtual image of the bottom and what is in the water even in less-than-clear water.

[0003] One of the problems with non-SI products using sonar technology (known commonly as "fish finders") is that many non-SI transducers shoot sonar signals in a cone-shaped fashion. As a result, the cone-shaped sonar signal increases in size as the depth of the water (or distance from the transducer) increases. The undesirable consequence is that an object that that might be, for example, 30 feet or more to the left, right, front or rear of the transducer in 50' of water may appear to be directly beneath the transducer. Further, if the fisherman throws out a marker buoy at exactly the spot he believes the sonar target to be, he could be 30 feet or more "off" his target. In most fishing circumstances just a few feet off is as good as a mile.

[0004] A significant hindrance to fish finders is the fact that game fish (what the fishermen want to catch) are typically attracted to the "cover" that objects in the water may offer. Such cover could be rocks, boulders, a drop off, sunken objects, stumps, trees, etc., and may be located anywhere in the water, including on the bottom of the body of water. Still other objects may appear in a fish finder's results, such as schools of fish or predatorial fish.

[0005] Other fish-finder manufacturers have developed multi-transducer and multi-signal fish-finders that can send out multiple (i.e. 3, 4, or 5) signals. This format allows fishermen to narrow down the possible locations of detected objects, but usually only after multiple passes by the boat. This has the disadvantage of requiring additional time and fuel.

[0006] Side imaging (SI) fish-finders tend to draw a more accurate picture of what's on the bottom and in the water column on each side of the boat. However, it is still almost impossible for the fisherman to translate what appears on the SI display with where the target exactly is from the fisherman's surface view. In short, the fisherman knows a lot more about what's down there, but he is still guessing exactly where his target is in relation to his view of the water's surface.

[0007] One known way to assist in locating an item seen via sonar is to throw out one or two portable buoys in the general area and then cast a weight on the end of a line. In this method, the fisherman tries to feel for the object "seen" with the sonar. When the fisherman believes he feels (he may or may not be correct) the object, he can try to judge its approximate position in relation to the buoys he has thrown out. However, due to the possible deflection of the buoy line(s), the angle of the "feel" line, the depth, and possible current affecting all measures, considerable geometric calculations are needed. Moreover, this estimate is still not always accurate and is time consuming.

SUMMARY OF THE INVENTION

[0008] The present disclosure relates to one or more of the following features, elements or combinations thereof. A system and method for "connecting the dots" between the sonar, buoys, and the fisherman's targeted location.

[0009] A marker buoy and system for using the same is disclosed. The marker buoy includes an anchor line and a plurality of panels spaced along the anchor line. The panels are configured to provide a guiding illustration to a user of a sonar imaging device.

[0010] Additional features of the disclosure will become apparent to those skilled in the art upon consideration of the following detailed description of preferred embodiments exemplifying the best mode of carrying out the invention as presently perceived.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. **1** is a schematic view of a target marker buoy system according to the present invention;

[0012] FIG. **2** is a perspective view of a panel associated with the target marker buoy system of FIG. **1**;

[0013] FIG. **3** is a float associated with the target marker buoy system of FIG. **1**; and

[0014] FIG. **4** is another embodiment of a float associated with the target marker buoy system of FIG. **1**.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0015] In one embodiment of the invention, shown in FIG. **1**, a target marker buoy ("TMB") **10** is disclosed. TMB **10** illustratively includes a plurality of panels **12** that are fixed along an anchor line **16**. In the illustrative embodiment, panels **12** are comprised of a material that is detectable by sonar equipment. For example, panels **12** may comprise a thin, opaque plastic panel **12** that may or may not have a coating to improve its "visibility" to sonar equipment.

[0016] Panels **12** could be, for example, in the range of about 2 mm or 1/16" thick (i.e. for a shallow, fresh water buoy system) to greater than 1/2" thick for deeper, salt-water use. In one embodiment, panel **12** are thick enough to maintain a reasonably flat "target" for the sonar despite the stresses placed upon it by the buoy, joining line, other targets and the anchor. About 1/16' thick should meet 95% of freshwater needs.

[0017] Panel **12** may be flat, or may be formed into a number of other shapes. For example, panel **12** may be formed into a "V"-shape, as shown in FIG. **2**, wherein the panel **12** is bent about a middle portion **14**.

[0018] In the embodiment shown in FIG. **1**, a plurality of panels **12** is positioned along anchor line **16** to form TMB **10**. Each panel **12** can illustratively be attached at approximately two or three feet distances (or any other metric measurement that would approximate such a distance) from adjoining panels **12**. The plurality of panels **12** cooperates to form a sonar-detectable "dotted line" that extends along a selected length of anchor line **16**.

[0019] The dotted line created by the plurality of panels **12** is illustratively visible in sonar screen **18**, as shown in FIG. **1**. Such a dotted line image **20** assists a fisherman in detecting

where a boat is in relation to a target. For example, the dotted line image **20** may represent to the fisherman the direction of drift, and the location of the bottom of a body of water relative to a target and the boat itself.

[0020] Deflection in anchor line **16** may also be detected using the present invention. Such deflection may occur, for example, because of water currents or wind acting upon the boat. By positioning panels **12** at substantially equal distances along anchor line **16**, a fisherman can easily view the relative deflection in anchor line **16** via sonar screen **18**.

[0021] Adding a second TMB (not shown) can provide additional information for a user. For example, additional TMBs permit a fisherman to use several reference points when locating a target or the bottom of a body of water.

[0022] A number of benefits for the TMB technologies exist:

[0023] 1. Provides a fisherman with a plurality of reference points on the sonar screen **18**. This provides the advantage, among others, of enabling a fisherman to "see" certain reference points as they relate to the bottom of the body of water and/or as they relate to an intended target.

[0024] 2. Enables a fisherman to better judge current and wind conditions. Notably, the shape of panels **12** could be modified as desired to provide for more or less influence from current. In other words, the panels **12** could be shaped to either twist in strong currents, or hold steady so as to point in the direction of the current, or anything in between.

[0025] 3. Provides a comparative measure for the distance to targets in the water or on the bottom of the body of water.

[0026] 4. Enables a fisherman to better position his boat, allowing him to keep his bait or lure in the strike zone for the maximum amount of time. This would theoretically result in more fish being caught and allow the fisherman to position the boat so that the lure or bait is retrieved towards the fishes' heads, which also results in more fish being caught.

[0027] 5. Enables the user of underwater live video equipment to tell from the surface whether a camera is positioned on the bottom. This is in contrast to previous technologies, which may not have been able to tell where a camera was located due to drifts and currents.

[0028] 6. Allows the underwater salvage industry to better locate salvage items, saving time and fuel costs.

[0029] 7. Benefits navigation efforts by reducing costs to the Corps of Engineers and the Coast Guard, which collectively spend hundreds of millions of dollars in maintaining navigation buoys in navigable waters offshore, inshore and in fresh water bodies annually.

[0030] In another embodiment, a ready-to-use kit may be provided. In such an embodiment, a buyer may have the option of buying a basic kit with, for example, a preselected number of panels **12**. Such a kit may have a nylon connecting cord **22** and a weight or anchor **24** by which a fisherman can space panels **12** by the distance he desires. Extra panels **12** may also be sold in combination with the kit in, for example, packs of **10**. Extra cords and extra weights may be combined with such a pack, or may be sold separately. Such extra weights could be designated for extra depth and fewer issues with drift and deflection.

[0031] In yet another embodiment, a float **20**, cord **22** and weight **24** without panels could be packaged as an upgradable kit without the electronics, such that a fisherman can upgrade his buoys when he upgrades his electronics.

[0032] As mentioned above, a number of differences in float and panel sizes are contemplated in the present invention. For example, according to the invention, one kit may include a shallow (i.e. up to 60 feet) version for freshwater fishermen with an approximately 9" wide "H" type flip float **20**, as shown in FIG. **3**. In such an embodiment, the center of float **20** may provide a space of approximately 6.5"×6.5" for the associated panels **12** to lie. In yet another embodiment, an 8"×8" float may be provided, such that it can accommodate flat panels **12** of about 6"×6". Yet another freshwater size might have an approximate 12"×12" float with approximately 10"×10" panels **12**. In each case, a sufficient amount of anchor weight **24** will prevent the marker buoys from drifting away from their designated and/or desired locations. Each embodiment may also provide a system for taking up the "slack" in the line and locking the line in place.

[0033] In yet another embodiment, a three-sided float such as that shown in FIG. **4** may be provided. In such an embodiment, the three-sided float may have, for example, 6" by 6" by 6" sides with 120 degree angles therebetween. Furthermore, "V"-shaped panels **12**, such as those seen in FIG. **2**, may characterize such an embodiment. In this example, an anchor line **16** connecting panels **12** would connect along the apex (i.e. the fold) of the "V"-shaped panel **12** so that the target panel would always present a good target for the SI unit from any direction in which it is viewed. This would also minimize resistance to fast retrieval out of the water.

[0034] Such embodiments could also provide more consistent views on the SI display and a more visible buoys in the water for a distinct advantages in low current, low wind conditions.

[0035] As set forth above, an "H" style float **20**, such as that shown in FIG. **3**, could be used. In such an embodiment, a hollow two-piece, injection molded item that is approximately 1"-3" thick at the ends **26**, **28** and 1" thick in the center section **30** could be used. In this embodiment, approximately 1" of space on each side of the center section is provided for panels **12**.

[0036] Side portions **32** could also illustratively be sealed with heat, as shown in FIG. **4**, such that three compartments are formed—one center hollow section to be filled with non-water-logging foam to provide flotation even if broken, cracked or allowed to leak by some other means, and two hollow end sections center barriers molded on the inside center line to hinder the flow of spherical weights in the chambers.

[0037] In such an embodiment, weights could be placed inside the end sections such that the weights fill approximately one quarter of the inside volume of the end pieces. This illustrative embodiment would allow float **20** to flip with the descent of the anchor line **16**, whereas the weights inside each end section stop the flipping of the float and the release of further cord or target panels.

[0038] Along each side of the center section and adjacent to each end section could be a separate line-winding section and a cinch-type line lock (not shown) molded into the inside edge of each corner of the center section to allow the line slack to be taken out and the line cinched tightly.

[0039] In the contemplated embodiments, a float **20** could be opaque and decorated in a high-visibility color such as fluorescent orange or fluorescent chartreuse. Reflective tape could also be applied. It is contemplated that recyclable materials, such as recycled plastic, may also be used.

[0040] The sizing of float **20** and panels **12** may depend upon the size of the sonar targets, the distance between line holes in the sonar targets, and the desired center-to-center spacing such that when the targets are wound back onto the float, the targets fit against the sides of the float.

[0041] Panels **12** can be constructed, for example, of any reasonably hard plastic that will reflect sonar and bear the weight of the pull of the anchor, anchor line and other attached panels. The material is punched to accommodate the

passing through of anchor line **16** and any knots required by the construction or the embodiment. It is contemplated that holes could be punctured so that they are at least ¼" in diameter and at least ¾" from a rounded corner with about a 1" radius and punched along one side and also diagonally.

[0042] Anchors **24** are illustratively made of a low cost metal, but may be constructed of more weight than usual for marker buoys. Anchor lines **16** are illustratively manufactured from a nylon cord with a metallic clip at the end (like the twisted spring clips used on low-cost bottom fishing rigs). The clip would illustratively have enough eye space to accommodate two or three anchors. Such a metal clip is frequently used in fishing for a quick connection of a line. One manufacturer is identified as SAMPO. However, the typical swivel that is associated with SAMPO is not needed in this case, just the clip.

[0043] A three sided float such as that shown in FIG. **4** may be made similarly to the "H" float with three chambers. It may be made with a three-piece design having weights in one of the end chambers (i.e. end **26**) and line grabbers to manually secure the line from releasing once the anchor hits bottom. As used herein, a "line grabber" is one or more tapered slots in the inside shoulder of buoy, such that after the anchor hits bottom, the buoy quits flipping and the line quits being deployed. The line will naturally slide along the edge of the buoy to either shoulder where it will enter the tapered slot and bind itself in place at the point where the tape in the slot is slight less than the line diameter; the motion of the water will naturally tighten the line in place. Illustratively the tapered slot is V-shaped.

[0044] The plastic used is not critical, except that it can not be brittle; ideally it would be reasonably stiff to retain its shape, and a thermoplastic, that can be injection molded. Think of the side of a gallon, plastic jug, but about 1/16" thick. Opaque plastic is not critical, but adds visibility of targets near the surface to the naked eye in reasonably clear water. The metal clips are similar to safety pins and come in a wide variety of sizes and means of construction. They are universally used in fishing for a quick connection of a line (which they are tied to on one end and then the open "clip" end is attached to say a hookeye and then the clip is closed to secure the connection. SAMPO is well-know for attaching a small ball bearing swivel to its metal clips. Any fisherman should know what a SAMPO swivel clip is. However, no swivel is needed in this case, just the clip. The "line grabber" is simply one or more tapered slots in the inside shoulder of the buoy, such that after the anchor hits bottom, the buoy quits flipping and the line quits being deployed the line will naturally slide along the edge of the buoy to either shoulder where it will enter the tapered slot and bind itself in place at the point where the tape in the slot is slight less than the line diameter; the motion of the water will naturally tighten the line in place. Think of a "V" shaped slot.

[0045] While the disclosure is susceptible to various modifications and alternative forms, specific exemplary embodiments thereof have been shown by way of example in the drawings and have herein been described in detail. It should be understood, however, that there is no intent to limit the disclosure to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the disclosure as defined by the appended claims.

[0046] A plurality of advantages arises from the various features of the present disclosure. It will be noted that alternative embodiments of various components of the disclosure may not include all of the features described yet still benefit from at least some of the advantages of such features. Those of ordinary skill in the art may readily devise their own implementations of a target marker buoy that incorporate one or more of the features of the present disclosure and fall within the spirit and scope of the disclosure.

What is claimed is:

1. A kit for use with sonar imaging equipment, the kit comprising:
- a float;
- a cord;
- a plurality of sonar-visible panels configured to be connected to the cord; and
- an anchor configured to be connected to the end of the cord.

2. The kit of claim **1**, wherein the float is formed in an "H" shape.

3. The kit of claim **2**, wherein the panels are configured to fit within the "H" shape of the float such that the panels and float are stackable.

4. The kit of claim **1**, wherein the float is formed in a three-sided shape.

5. The kit of claim **4**, wherein the panels are formed in a V-shape and configured to fit over the three-sided float such that the panels and float are stackable.

6. The kit of claim **1**, wherein the panels comprise an opaque plastic material.

7. The kit of claim **1**, wherein the panels comprise a material having a sonar-visible coating.

8. The kit of claim **1**, further comprising a second float, a second cord, and a second plurality of sonar-visible panels configured to be connected to the second cord.

9. A target marking system comprising:
- a plurality of sonar-visible panels; and
- a plurality of connectors, each of the connectors permitting one of the panels to be connected to a cord;
- wherein the sonar-visible panels are formed such that they can be stacked upon each other.

10. The target marking system of claim **9**, further comprising a float configured to be connected to the cord.

11. The target marking system of claim **10**, wherein the panels and float are stackable.

12. The target marking system of claim **9**, wherein the panels are formed in a flat shape.

13. The target marking system of claim **9**, wherein the panels are formed in a V-shape.

14. The target marking system of claim **9**, wherein the panels comprise an opaque plastic material.

15. The target marking system of claim **9**, wherein the panels comprise a material having a sonar-visible coating.

16. The target marking system of claim **9**, wherein the connectors comprise an aperture formed in each panel.

17. The target marking system of claim **9**, wherein the connectors comprise a clip configured to attach to the cord and secure the panel to the cord.

18. A target marking system comprising:
- a cord
- a plurality of stackable sonar-visible panels configured to be securely connected to the cord; and
- an anchor configured to be secured to an end of the cord.

19. The target marking system of claim **18**, further comprising a float configured to be connected to the cord.

20. The target marking system of claim **19**, wherein the panels and float are stackable and the float has a weight mounted thereon.

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