protuberances (10) within the inverted bowl (3). This array of protuberances (10) contacts the immunobead (6) when it is drawn into the inverted bowl (3) and provides a gap between the immunobead (6) and the inverted bowl (3) so that air and liquid may continue to be drawn through the inverted bowl (3) even when it contains the immunobead (6).

In the preferred embodiment, the array of protuberances (10) defines a hollow which is materially greater in size than the immunobead (6). Accordingly, the fit between the immunobead (6) and the protuberances (10) is loose, i.e. it is not snug. The captured immunobead (6) can not simultaneously contact all of the protuberances (10) within the inverted bowl (3), i.e. the immunobead (6) must lack contact with at least one protuberance (10) within the inverted bowl (3) at any given time.

In a preferred embodiment, the array of protuberances (10) including a first segmented annulus proximal to said vacuum port (7) and a second segmented annulus distal from said vacuum port (7), i.e. proximal to the rim (9). Each of these annuluses have a radius of curvature which materially exceeds that of the immunobead (6). It is possible to adapt this configuration of protuberances (10) so as to allow the immunobead (6) to be jostled from one contact position to an other during a single aspiration procedure. When such jostling occurs, all points of contact may be freed at one time or another during a single aspiration procedure. Accordingly, the volume of trapped liquid (5) may be further reduced.

In an other preferred embodiment, the array of protuberances (10) adapted so that the contact between the immunobead (6) and the protuberances (10) may include point contacts as opposed to surface contacts. For example, FIG. 2 illustrates the immunobead (6) having tangential contact with the annular protuberances (10).

The Method

The use of an array of protuberances (10) as described above facilitates the aspiration of liquid from the vessel by reducing the amount of carry over liquid (5) which may be trapped between the immunobead (6) and the inverted bowl (3) during an aspiration procedure.

In a preferred aspiration procedure, the aspiration device is lowered into the test tube (4) or other immunoassay incubation vessel with the inverted bowl (3) facing downward, i.e. toward the liquid (5). The aspiration device is lowered until the rim (9) of the inverted bowl (3) is immersed in liquid (5). Meanwhile, the vacuum source (8) is activated. When the vacuum source (8) actived, liquid (5) is aspirated from the test tube (4). To continue the aspiration process, the aspiration device is lowered until it approaches the immunobead (6). Prior to reaching the immunobead (6), the immunobead (6) is lifted by the vacuum of the aspiration device and is captured within the inverted bowl (3). Once captured by the inverted bowl (3), the immunobead (6) makes contact with the protuberances (10) within the inverted bowl (3). The protuberances (10) prevent the clogging of the vacuum port (7) by means of the immunobead (6) and provide a a gap between the immunobead (6) and the inverted bowl (3). Accordingly, liquid (5) may continue to be aspirated into the inverted bowl (3).

Since the protuberances (10) define a hollow greater in size than the immunobead (6), the immunobead (6) will not contact all of the protuberances (10) simultaneously. Accordingly, there is less contact area between the immunobead (6) and the protuberances (10) as compared to the situation in which there was a tight fit between the immunobead (6) and the protuberances (10).

Once the immunobead (6) is lifted, the aspiration is continued with liquid (5) being drawn from the bottom of the test tube (4) and from the immunobead (6) itself. In particular, the aspirated liquid may include liquid which lies between the immunobead (6) and one or more protuberances (10) with which the immunobead (6) is not in contact.

After the aspiration is complete, the vacuum source (8) may be deactivated. Deactivation of the vacuum source (8) allows the immunobead (6) to drop from the aspiration device back into the vessel. The aspiration device may then be raised and removed from the test tube (4).

What is claimed is:

1. In a device for aspirating liquid from a vessel containing an immunobead by means of a vacuum source, the device including:
   - an inverted bowl defining a vacuum port and
   - a hollow neck connected to the vacuum port of
     - said inverted bowl and connectable to the vacuum source for providing passage for liquid and air through the vacuum port and into the vacuum source,
     - said neck for connecting to the vacuum source and extending said inverted bowl into the vessel for aspirating liquid therefrom and for capturing and lifting the immunobead therefrom into said inverted bowl during such liquid aspiration process,

   the improvement comprising:
   - an array of protuberances arising from within said inverted bowl exclusive of the vacuum port for contacting the immunobead and for providing a gap between the immunobead and said inverted bowl for aspirating liquid and drawing air from the vessel into the vacuum source while the immunobead is captured within said inverted bowl during the liquid aspiration process,
   - said array of protuberances defining a hollow greater in size than the immunobead such that the immunobead cannot contact all of the protuberances simultaneously and must lack contact with at least one protuberance at any given time,

whereby the use of said array of protuberances facilitates the aspiration of liquid from the vessel and reduces the amount of liquid which may be trapped between the immunobead and said inverted bowl during the liquid aspiration process.

2. In a device as described in claim 1 wherein,
   - said array of protuberances including a first segmented annulus proximal to said vacuum port and a second segmented annulus distal from said vacuum port,
   - said first and second segmented annuluses each having a radius of curvature greater than the immunobead.

3. In a device as described in claim 1 wherein,
   - said array of protuberances adapted to having point contact with the immunobead.

4. In a device as described in claim 1 wherein,
   - said array of protuberances adapted to having contact with the immunobead which may be jostled from one point on said array of protuberances to another.