detaching an outer circumferential portion of a syringe and a flange portion.

Summary

[0006]

As a means for solving the above problems, the present disclosure is provided, in an aspect, a syringe fixing mechanism for a syringe pump, comprising: a mounting base having a receiving surface for receiving an outer circumferential portion of a syringe, a clamp that moves in a rotational motion along the receiving surface between a clamped position at which the outer circumferential portion of a syringe can be clamped against the receiving surface and an unclamped position at which the outer circumferential portion of the syringe cannot be clamped, a support shaft that supports the clamp; a rotating shaft that fixes the clamp to one end side while having the other end side inserted with the ability to rotate with respect to the support shaft; a rotating cam provided so as to move in association with rotation of the rotating shaft ~~the clamp~~ and rotate in two directions, and a clamping member that moves toward and away from the mounting base through engagement with the rotating cam, and the clamping member clamps a flange portion of the syringe in the thickness direction between the mounting base by moving toward the mounting base through engagement with the rotating cam moving in association with the rotation of the clamp toward the clamped position side, and releases the flange portion by moving away from the mounting base through engagement with the rotating cam moving in association with the rotation of the clamp toward the unclamped position side.

EFFECT OF THE INVENTION

[0007]

Because the present invention is configured as described above, it can prevent looseness in the forward and backward direction of a mounted syringe, and it has favorable operability because the outer circumferential portion of the syringe and the flange portion are fixed by an operation that rotates the clamp.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

FIG. 1 is a perspective view illustrating one example of the syringe fixing mechanism according to the present invention. FIG. 1A illustrates a state where the clamp is in a clamped position, FIG. 1B illustrates a state where the clamp is raised, and FIG. 1C illustrates a state where the clamp is rotated and is in an unclamped position.

FIG. 2 is a cross-sectional view of main parts along the line II-II in FIG. 1A.

FIG. 3 is a cross-sectional view of main parts illustrating the raised state of the clamp in the cross-section of FIG. 2.

FIG. 4 is a bottom view of the same syringe fixing mechanism, FIG. 4A illustrates a state where the clamping member is closed, and FIG. 4B illustrates a state where the clamping member is open.

FIG. 5 illustrates a process in which a syringe is installed in a normal position, FIG. 5(a) illustrates a state before a flange portion is clamped between a mounting base and a clamping member, and FIG. (b) illustrates a state after the flange portion is clamped between the mounting base and the clamping member.

FIG. 6 illustrates a process in which the syringe is installed in an incorrect position, FIG. 6(a) illustrates a state where a long section of the flange portion is inserted between the mounting base and the clamping member and a protrusion of the clamping member is about to ride onto the long section, and FIG. 6(b) illustrates a state where the protrusion of the clamping member is on top of the long section.

FIG. 7 is a perspective view illustrating one example of a syringe pump that uses a syringe fixing mechanism according to the present invention.

What is Claimed is:

1. A syringe fixing mechanism for a syringe pump, comprising:

a mounting base having a receiving surface for receiving an outer circumferential portion of a syringe;

a clamp that moves in a rotational motion along the receiving surface between a clamped position at which the outer circumferential portion of a syringe can be clamped against the receiving surface and an unclamped position at which the outer circumferential portion of the syringe cannot be clamped;

a support shaft that supports the clamp;

a rotating shaft that fixes the clamp to one end side while having the other end side inserted with the ability to rotate with respect to the support shaft;

a rotating cam provided so as to move in association with ~~the clamp~~ rotation of the rotating shaft and rotate in two directions; and

a clamping member that moves toward and away from the mounting base through engagement with the rotating cam; wherein

the clamping member clamps a flange portion of the syringe in the thickness direction between the mounting base by moving toward the mounting base through engagement with the rotating cam moving in association with the rotation of the clamp toward the clamped position side, and releases the flange portion by moving away from the mounting base through engagement with the rotating cam moving in association with the rotation of the clamp toward the unclamped position side.

2. The syringe fixing mechanism for a syringe pump according to claim 1, comprising ~~a support shaft that supports the clamp; and~~ a guided portion provided on one of either the clamp or the support shaft; and a guide portion provided on the other to guide the guided portion in a direction to move toward or away from the receiving surface; wherein when the clamp is moved a predetermined distance away from the receiving surface, the guided portion separates from the guide portion so that the clamp can rotate toward the unclamped position side.

3. The syringe fixing mechanism for a syringe pump according to claim 2, comprising biasing means for biasing the clamping member in the clamping direction.

4. The syringe fixing mechanism for a syringe pump according to claim 3, comprising: ~~a rotating shaft that fixes the clamp to one end side while having the other end side inserted with the ability to rotate with respect to the support shaft; and~~ gears provided on the other end side of the rotating shaft; wherein the rotation of the clamp is transferred to the rotating cam via the rotating shaft and the gears.

5. The syringe fixing mechanism for a syringe pump according to claim 4, comprising a protrusion on a clamping surface on the clamping member, wherein, when a long section, longer in the radially outward direction than other portions on the flange portion of the syringe, is inserted between the protrusion and the mounting base, the protrusion rides up onto the long section.

6. The syringe fixing mechanism for a syringe pump according to claim 5, comprising a position sensor for detecting the position of the clamping member.