CLAIMS

What is claimed is:

1. A flexible high pressure fluid cleaning lance positioning and drive apparatus comprising:

a guide rail having a portion adapted to be inserted into a heat exchanger water box and having a longitudinal axis;

a hose guide conduit mounted parallel to the guide rail via a tractor drive module mounted on the guide rail for movement of the hose guide conduit and tractor drive module along the guide rail into and out of the water box;

a high pressure fluid hose drive module connected via the hose guide conduit to the tractor drive module on the guide rail operable to propel a flexible high pressure fluid lance hose through the hose guide conduit along an axis parallel to the guide rail longitudinal axis; and

an angle guide rotator module.

2. The apparatus according to claim 1 further comprising a hose take-up drum module proximate the guide rail and spaced from the hose drive module operable to collect and dispense the high pressure fluid hose from and to the hose drive module.

3. The apparatus according to claim 1 wherein the angle guide rotator module is mounted on the guide rail and connected to the tractor drive module separately from the hose guide conduit operable to guide the flexible high pressure fluid lance hose into and through one end of an angle guide tube in registry with a tubular object accessible from the water box to be cleaned and guiding the flexible high pressure fluid lance hose through the angle guide tube into the tubular object to be cleaned.

4. The apparatus according to claim 3 wherein the rotator module includes a rotatable sleeve aligned with the hose drive module and removably connected to one end of the angle guide tube and a drive motor connected to the rotatable sleeve for rotating the connected arcuate right angle guide tube about an axis through the rotatable sleeve.

5. The apparatus according to claim 1 wherein the tractor drive module is rollably supported on the guide rail.

6. The apparatus according to claim 5 wherein the rotator module is rollably supported on the guide rail.

7. The apparatus according to claim 1 wherein each of the rotator and tractor drive modules are rollably supported on the guide rail by two rollers riding on one rib of the guide rail and one roller riding on a parallel rib of the guide rail.

8. The apparatus according to claim 1 wherein the rotator module rotates a tubular sleeve receiving therein the hose guide conduit fastened to both the tractor drive module and the hose drive module.

9. The apparatus according to claim 8 wherein the rotator module is connected to the tractor drive module by an elongated link separate from the tubular sleeve.

10. A flexible high pressure fluid cleaning lance positioning and drive apparatus comprising:

an elongated guide rail having a longitudinal axis, a portion adapted to be inserted into a heat exchanger water box and a top wall defined by two parallel ribs extending parallel to the longitudinal axis of the guide rail;

a tractor drive module mounted on the ribs of the guide rail;

a high pressure fluid hose drive module on the guide rail operable to propel a flexible high pressure fluid lance hose along an axis parallel to the guide rail longitudinal axis;

a high pressure fluid hose guide conduit clamped between the tractor drive module and high pressure fluid hose drive module and aligned parallel to the guide rail longitudinal axis; and

an angle guide rotator module.

11. The apparatus according to claim 10 wherein the tractor drive module has a spur gear engaging notches in the top wall of the guide rail to propel the tractor drive module along the guide rail.

12. The apparatus according to claim 10 further comprising a hose take-up drum module mounted on the guide rail and spaced from the hose drive module operable to collect and dispense the flexible high pressure fluid lance hose from and to the hose drive module.

13. The apparatus according to claim 10 wherein the angle guide rotator module is mounted on the ribs of the guide rail and connected to the tractor drive module, via a separate link, for rotatably positioning an angle guide tube in registry with a tubular opening accessible from the water box into which the high pressure fluid lance hose is to be inserted.

14. The apparatus according to claim 13 wherein the rotator module includes a tubular sleeve axially aligned with the lance hose, wherein the angle guide tube is removable from the tubular sleeve and has an open end directed at an angle from the tubular sleeve, and a drive motor connected to the tubular sleeve for rotating the tubular sleeve and the angle guide tube about the tubular sleeve.

15. The apparatus according to claim 10 wherein the tractor drive module is rollably supported on the guide rail.

16. The apparatus according to claim 13 wherein the rotator module is rollably supported on the guide rail.

17. The apparatus according to claim 13 wherein each of the rotator and tractor drive modules are rollably supported on the guide rail by two rollers riding on one rib of the guide rail and one roller riding on a parallel rib of the guide rail.