CLAIMS

1. A gravel packing apparatus comprising:

a base pipe forming an interior fluid passageway and having at least one opening in a sidewall portion thereof;

a fluid filtration subassembly positioned exteriorly of the base pipe and in fluid communication with the interior fluid passageway of the base pipe via the at least one opening, the fluid filtration subassembly extending partially circumferentially around the base pipe having at least two circumferential terminuses defining a circumferential gap therebetween;

wherein the fluid filtration subassembly further comprises a first partially circumferentially extending filter medium and a second partially circumferentially extending filter medium;

wherein the circumferential gap is defined between a circumferential terminus of the first filter medium and a circumferential terminus of the second filter medium;

wherein the first filter medium comprises a screen layer forming an outermost layer of the first filter medium relative to the base pipe and an innermost layer of the first filter medium relative to the base pipe; and

wherein the outermost layer of the first filter medium is radially spaced from the innermost layer of the first filter medium to define an inner region of the first filter medium;

a tube accommodated in the at least one opening and extending through an opening in the innermost layer of the first filter medium to place the inner region of the first filter medium in fluid communication with the interior fluid passageway of the base pipe; and

a slurry delivery subassembly positioned exteriorly of the base pipe and at least partially within the circumferential gap.

2. The gravel packing apparatus as recited in claim 1 wherein the first partially circumferentially extending filter medium and the second partially circumferentially extending filter medium are axially distributed relative to a longitudinal axis of the base pipe.

3. The gravel packing apparatus as recited in claim 1 further comprising an outer shroud positioned exteriorly of the fluid filtration subassembly and the slurry delivery subassembly.

4. The gravel packing apparatus as recited in claim 1 wherein the slurry delivery subassembly further comprises at least one transport tube and at least one packing tube having at least one slurry delivery nozzle.

5. The gravel packing apparatus as recited in claim 4 wherein the at least one transport tube and the at least one packing tube have rectangular cross sections.

6. The gravel packing apparatus as recited in claim 4 wherein the at least one transport tube and the at least one packing tube have non-rectangular cross sections.

7. The gravel packing apparatus as recited in claim 4 wherein the at least one transport tube and the at least one packing tube have cross sections selected from the group consisting of oval, kidney and arched.

8. The gravel packing apparatus as recited in claim 1 wherein the slurry delivery subassembly further comprises at least two transport tubes and at least two packing tubes each having at least one slurry delivery nozzle.

9. The gravel packing apparatus as recited in claim 1 wherein the fluid filtration subassembly has at least four circumferential terminuses defining first and second circumferential gaps therebetween and wherein a first portion of the slurry delivery subassembly is at least partially positioned within the first circumferential gap and a second portion of the slurry delivery subassembly is at least partially positioned within the second circumferential gap.

10. A gravel packing apparatus comprising:

a base pipe forming an interior fluid passageway and having a plurality of openings in a sidewall portion thereof;

a fluid filtration subassembly positioned exteriorly of the base pipe, the fluid filtration subassembly including:

first and second partially circumferentially extending filter media each in fluid communication with the interior fluid passageway of the base pipe via at least one of the openings, the first filter medium having a first circumferential terminus and the second filter medium having a second circumferential terminus such that the first and second circumferential terminuses define a circumferential gap therebetween;

wherein the first filter medium comprises a first screen layer forming an outermost layer of the first filter medium relative to the base pipe and an innermost layer of the first filter medium relative to the base pipe;

wherein the outermost layer of the first filter medium is radially spaced from the innermost layer of the first filter medium to define an inner region of the first filter medium;

wherein the second filter medium comprises a second screen layer forming an outermost layer of the second filter medium relative to the base pipe and an innermost layer of the second filter medium relative to the base pipe; and

wherein the outermost layer of the second filter medium is radially spaced from the innermost layer of the second filter medium to define an inner region of the second filter medium;

a first tube accommodated in a first opening of the plurality of openings and extending through an opening in the innermost layer of the first filter medium to place the inner region of the first filter medium in fluid communication with the interior fluid passageway of the base pipe; and

a second tube accommodated in a second opening of the plurality of openings and extending through an opening in the innermost layer of the second filter medium to place the inner region of the second filter medium in

fluid communication with the interior fluid passageway of the base pipe;

and

a slurry delivery subassembly positioned exteriorly of the base pipe and at least partially within the circumferential gap.

11. The gravel packing apparatus as recited in claim 10 further comprising an outer shroud positioned exteriorly of the fluid filtration subassembly and the slurry delivery subassembly.

12. The gravel packing apparatus as recited in claim 10 wherein the slurry delivery subassembly further comprises at least one transport tube and at least one packing tube having at least one slurry delivery nozzle.

13. The gravel packing apparatus as recited in claim 12 wherein the at least one transport tube and the at least one packing tube have cross sections selected from the group consisting of rectangular, oval, kidney and arched.

14. The gravel packing apparatus as recited in claim 10 wherein the fluid filtration subassembly has at least four circumferential terminuses defining first and second circumferential gaps therebetween and wherein a first portion of the slurry delivery subassembly is at least partially positioned within the first circumferential gap and a second portion of the slurry delivery subassembly is at least partially positioned within the second circumferential gap.

15. A gravel packing apparatus comprising:

a base pipe forming an interior fluid passageway and having at least one opening in a sidewall portion thereof;

a fluid filtration subassembly positioned exteriorly of the base pipe and in fluid communication with the interior fluid passageway of the base pipe via the at least one opening, the fluid filtration subassembly extending partially

circumferentially around the base pipe having at least two circumferential terminuses defining a circumferential gap therebetween;

wherein the fluid filtration subassembly further comprises a first partially circumferentially extending filter medium and a second partially circumferentially extending filter medium;

wherein the circumferential gap is defined between a circumferential terminus of the first filter medium and a circumferential terminus of the second filter medium;

wherein the first filter medium comprises a screen layer forming an outermost layer of the first filter medium relative to the base pipe and an innermost layer of the first filter medium relative to the base pipe; and

wherein the outermost layer of the first filter medium is radially spaced from the innermost layer of the first filter medium to define an inner region of the first filter medium;

a tube accommodated in the at least one opening and extending through an opening in the innermost layer of the first filter medium to place the inner region of the first filter medium in fluid communication with the interior fluid passageway of the base pipe;

wherein a radial space exists between an outer surface of the base pipe and an inner surface of the innermost layer of the first filter medium;

wherein a fluid enters into the first filter medium from the radial space;

and

a slurry delivery subassembly positioned exteriorly of the base pipe and at least partially within the circumferential gap, the slurry delivery subassembly including at least two transport tubes and at least two packing tubes each having at least one slurry delivery nozzle.

16. The gravel packing apparatus as recited in claim 15 further comprising an outer shroud positioned exteriorly of the fluid filtration subassembly and the slurry delivery subassembly.

17. The gravel packing apparatus as recited in claim 15 wherein the transport tubes and the packing tubes have cross sections selected from the group consisting of rectangular, oval, kidney and arched.

18. The gravel packing apparatus as recited in claim 15 wherein the fluid filtration subassembly has at least four circumferential terminuses defining first and second circumferential gaps therebetween and wherein the transport tubes are at least partially positioned within the first circumferential gap and the packing tubes are at least partially positioned within the second circumferential gap.

19. The gravel packing apparatus as recited in claim 10,
wherein a radial space exists between an outer surface of the base pipe and an inner surface of the innermost layer of the first filter medium; and
wherein a fluid enters into the first filter medium from the radial space.