What is claimed is:

1. A gravel packing apparatus comprising:

first and second joints each including a sand control screen assembly having a filter medium positioned exteriorly of a base pipe and a slurry delivery subassembly positioned exteriorly of the sand control screen assembly, the slurry delivery subassembly including at least one transport tube extending longitudinally along at least a portion of the sand control screen assembly;

at least one jumper tube coupled to and extending between the at least one transport tube of the first joint and the at least one transport tube of the second joint; and

a jumper tube protection assembly extending between the first and second joints and positioned exteriorly of the at least one jumper tube.

2. The apparatus as recited in claim 1 wherein the jumper tube protection assembly further comprises a cage assembly.

3. The apparatus as recited in claim 1 wherein the jumper tube protection assembly further comprises a cage assembly having a plurality of circumferentially distributed plate members having gaps therebetween.

4. The apparatus as recited in claim 1 wherein the jumper tube protection assembly further comprises a cage assembly having a plurality of circumferentially distributed ribs having a wrap wire positioned therearound.

5. The apparatus as recited in claim 1 wherein the jumper tube protection assembly further comprises a cage assembly having a plurality of circumferentially distributed ribs having a sheet member helically positioned therearound.

6. The apparatus as recited in claim 1 wherein the jumper tube protection assembly further comprises a plurality of circumferentially distributed plate members.

7. The apparatus as recited in claim 1 wherein the jumper tube protection assembly further comprises a cage assembly having a plurality of circumferentially distributed bowsprings having gaps therebetween, the bowsprings having an outer diameter greater than an outer diameter of the first and second joints.

8. The apparatus as recited in claim 1 wherein the jumper tube protection assembly further comprises a housing assembly having a plurality of circumferentially distributed blades, the blades having an outer diameter greater than an outer diameter of the first and second joints.

9. The apparatus as recited in claim 1 wherein each joint further comprises an outer shroud positioned around the slurry delivery subassembly and the sand control screen assembly.

10. The apparatus as recited in claim 1 wherein the slurry delivery subassembly of each joint further comprises at least one packing tube having nozzles.

11. A gravel packing apparatus comprising:

first and second joints each including a sand control screen assembly having a filter medium positioned exteriorly of a base pipe and a slurry delivery subassembly positioned exteriorly of the sand control screen assembly, the slurry delivery subassembly including at least one transport tube extending longitudinally along at least a portion of the sand control screen assembly;

at least one jumper tube coupled to and extending between the at least one transport tube of the first joint and the at least one transport tube of the second joint; and

a jumper tube protection assembly extending between the first and second joints and positioned exteriorly of the at least one jumper tube, jumper tube protection assembly having an outer diameter greater than an outer diameter of the first and second joints.

12. The apparatus as recited in claim 11 wherein the jumper tube protection assembly further comprises a cage assembly having a plurality of circumferentially distributed bowsprings having gaps therebetween, the bowsprings having an outer diameter greater than an outer diameter of the first and second joints.

13. The apparatus as recited in claim 11 wherein the jumper tube protection assembly further comprises a housing assembly having a plurality of circumferentially distributed blades, the blades having an outer diameter greater than an outer diameter of the first and second joints.

14. The apparatus as recited in claim 11 wherein the jumper tube protection assembly further comprises a pair of hinged collars.

15. A method for assembling a gravel packing apparatus, the method comprising:

providing first and second joints each including a sand control screen assembly having a filter medium positioned exteriorly of a base pipe and a slurry delivery subassembly positioned exteriorly of the sand control screen assembly, the slurry delivery subassembly including at least one transport tube extending longitudinally along at least a portion of the sand control screen assembly;

threadably coupling the sand control screen assembly of the first joint to the sand control screen assembly of the second joint;

coupling at least one jumper tube between the at least one transport tube of the first joint and the at least one transport tube of the second joint; and

positioning a jumper tube protection assembly exteriorly around adjacent end portions of the first and second joints and the at least one jumper tube.

16. The method as recited in claim 15 wherein positioning the jumper tube protection assembly exteriorly around adjacent end portions of the first and second joints and the at least one jumper tube further comprises forming a cage assembly by circumferentially distributing a plurality of plate members having gaps therebetween exteriorly around the at least one jumper tube.

17. The method as recited in claim 15 wherein positioning the jumper tube protection assembly exteriorly around adjacent end portions of the first and second joints and the at least one jumper tube further comprises circumferentially distributing a plurality of plate members exteriorly around the at least one jumper tube.

18. The method as recited in claim 17 wherein circumferentially distributing the plurality of plate members exteriorly around the at least one jumper tube further comprises bolting the plate members to the sand control screen assemblies of the first and second joints.

19. The method as recited in claim 15 wherein positioning the jumper tube protection assembly exteriorly around adjacent end portions of the first and second joints and the at least one jumper tube further comprises forming a cage assembly by circumferentially distributing a plurality of bowsprings having gaps therebetween exteriorly around the at least one jumper tube, the bowsprings having an outer diameter greater than an outer diameter of the first and second joints.

20. The method as recited in claim 15 wherein positioning the jumper tube protection assembly exteriorly around adjacent end portions of the first and second joints and the at least one jumper tube further comprises positioning a housing assembly having a plurality of circumferentially distributed blades exteriorly around the at least one jumper tube, the blades having an outer diameter greater than an outer diameter of the first and second joints.

CLAIMS

1. A gravel packing apparatus comprising:

first and second joints each including a sand control screen assembly having a filter medium positioned exteriorly of a base pipe and a slurry delivery subassembly positioned exteriorly of the sand control screen assembly, the slurry delivery subassembly including at least one transport tube extending longitudinally along at least a portion of the sand control screen assembly and extending through a ring assembly positioned around the base pipe;

at least one jumper tube coupled to and extending between the at least one transport tube of the first joint and the at least one transport tube of the second joint; and

a cage assembly extending between and coupled to the ring assemblies of the first and second joints and positioned exteriorly of the at least one jumper tube, the cage assembly comprising a plurality of cage sections that are each independently connected to the respective ring assemblies of the first and second joints, the cage sections having gaps therebetween.

2. The apparatus as recited in claim 1 wherein the cage sections comprise a plurality of circumferentially distributed plate members.

3. The apparatus as recited in claim 1 wherein the cage sections comprise a plurality of circumferentially distributed ribs, the cage assembly further comprising a wrap wire positioned around the ribs.

4. The apparatus as recited in claim 1 wherein the cage sections comprise a plurality of circumferentially distributed ribs, the cage assembly further comprising a sheet member helically positioned around the ribs.

5. The apparatus as recited in claim 1 wherein the cage sections further comprise a plurality of circumferentially distributed bowsprings.

6. The apparatus as recited in claim 5 wherein the bowsprings have an outer diameter greater than an outer diameter of the first and second joints.

7. The apparatus as recited in claim 1 wherein the cage assembly further comprises a housing assembly.

8. The apparatus as recited in claim 7 wherein the housing assembly further comprises a plurality of circumferentially distributed blades forming the cage sections.

9. The apparatus as recited in claim 8 wherein the blades have an outer diameter greater than an outer diameter of the first and second joints.

10. The apparatus as recited in any one of the preceding claims wherein each joint further comprises an outer shroud positioned around the slurry delivery subassembly and the sand control screen assembly.

11. The apparatus as recited in any one of the preceding claims wherein the slurry delivery subassembly of each joint further comprises at least one packing tube having nozzles.

12. The apparatus as recited in claim 1 wherein the cage assembly has an outer diameter greater than an outer diameter of the first and second joints.

13. A method for assembling a gravel packing apparatus, the method comprising:

providing first and second joints each including a sand control screen assembly having a filter medium positioned exteriorly of a base pipe and a slurry delivery subassembly positioned exteriorly of the sand control screen assembly, the slurry delivery subassembly including at least one transport tube extending longitudinally along at least a portion of the sand control screen assembly and extending through a ring assembly positioned around the base pipe;

threadably coupling the sand control screen assembly of the first joint to the sand control screen assembly of the second joint;

coupling at least one jumper tube between the at least one transport tube of the first joint and the at least one transport tube of the second joint; and

positioning a jumper tube protection assembly exteriorly around adjacent end portions of the first and second joints and the at least one jumper tube including

forming a cage assembly extending between and coupled to the ring assemblies of the first and second joints and positioned exteriorly of the at least one jumper tube, the cage assembly comprising a plurality of cage sections that are each independently connected to the respective ring assemblies of the first and second joints, the cage sections having gaps therebetween.

14. The method as recited in claim 13 further comprising forming the cage assembly by circumferentially distributing a plurality of plate members exteriorly around the at least one jumper tube and, optionally, bolting the plate members to the sand control screen assemblies of the first and second joints.

15. The method as recited in claim 13 further comprising forming the cage assembly by circumferentially distributing a plurality of bowsprings having gaps therebetween exteriorly around the at least one jumper tube.

16. The method as recited in claim 15 further comprising selecting the bowsprings to have an outer diameter greater than an outer diameter of the first and second joints.

17. The method as recited in claim 13 further comprising forming the cage assembly by positioning a housing assembly having a plurality of circumferentially distributed blades exteriorly around the at least one jumper tube.

18. The method as recited in claim 17 further comprising selecting the blades to have an outer diameter greater than an outer diameter of the first and second joints.

19. The method as recited in claim 13, wherein forming the cage assembly further comprises circumferentially distributing a plurality of ribs having gaps therebetween exteriorly around the jumper tube.

20. The method as recited in claim 19 further comprising at least one of positioning a wrap wire around the plurality of circumferentially ribs and positioning a sheet of metal helically around the plurality of circumferentially distributed ribs.