adjacent the outer disc **210** while maintaining the proper trench depth. Seed tube assembly **100** preferably includes a fertilizer knife **120** mounted to the seed tube guard **110** and configured to cut a cavity **1440** into the soil adjacent a trough **1405** of the trench **1500**.

The trench **1500** created by the opener discs is best illustrated in FIG. **14**B. The outer discs **210** create an angled sidewall **1420** in the soil. The inner discs **220** create a substantially vertical sidewall **1430** in the soil. The trench **1500** includes a trough **1405**, where a seed **1400** is preferably deposited after the trenched is opened. Excess soil **1415** removed to form the trench **1500** is preferably deposited adjacent the outer disc **210**. Soil **1425** adjacent the angled sidewall **1420** is compacted due to the load imposed by gauge wheel **52**. Soil **1435** adjacent to the vertical sidewall **1430** is not substantially compacted by the operation of row unit **10**. A liquid applicator (not shown) mounted to the seed tube assembly **100** preferably injects fertilizer or other liquid or crop input into or near the cavity **1440** created by the fertilizer knife **120**. The cavity **1440** preferably extends into the relatively loose soil **1435** because seedling roots of seed **1400** will tend to grow away from the compacted soil **1425** and toward the relatively loose soil. Thus the fertilizer knife **120** preferably extends downward and away from the outer disc **210**.

After the seed **1400** and any liquid fertilizer have been placed, the closing wheel **35** presses all or a portion of the excess soil **1415** back into the trench **1500**, covering the seed **1400** as illustrated in FIG. **14**C. While the closing wheel **35** further compacts the soil **1425**, the soil **1435** adjacent the inner disc **220** remains relatively loose.

Fertilizer or other liquids may be deposited on the soil after the trench is closed as illustrated in FIG. **15**. An applicator nozzle **1550** preferably deposits the soil atop the relatively loose soil **1435** because seedling roots of seed **1400** will tend to grow away from the compacted soil **1425** and toward the relatively loose soil. Thus the applicator **1550** is preferably mounted inboard from the inner disc **220**, i.e., opposite the outer disc **210** on the closing assembly **30** as illustrated in FIG. **3**.

Row Cleaners

As illustrated in FIG. **17**, a row cleaner assembly **1700** may preferably be incorporated into row unit **10**. The row cleaner assembly **1700** may include a single row cleaner **1710** leading each opener disc assembly **200**. Each row cleaner **1710** preferably comprises a row cleaner arm **1730** having a first end and a second end. The first end of row cleaner arm **1730** is preferably pivotally mounted to the row unit **10** for pivoting about an axis substantially transverse to the direction of travel. A ground-engaging blade **1720** is preferably pivotally mounted to the second end of row cleaner arm **1730**. The ground-engaging blade **1720** associated with the row cleaner **1710** is preferably oriented at an angle with respect to the direction of travel and preferably extends across the area to opened by opener disc assemblies **200** in order to clear debris and crop residue from the path of the opener disc assemblies.

The foregoing description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the preferred embodiment of the apparatus, and the general principles and features of the system and methods described herein will be readily apparent to those of skill in the art. Thus, the present invention is not to be limited to the embodiments of the apparatus, system and methods described above and illustrated in the drawing figures, but is to be accorded the widest scope consistent with the spirit and scope of the appended claims.

The invention claimed is:

1. An agricultural row unit, said row unit comprising:
a first opener disc, said first opener disc being substantially vertically oriented, said first opener disc having a leading edge and a trailing edge; and
a second opener disc disposed to contact a perimeter of said first opener disc, said second opener disc disposed at an offset angle from said first opener disc, wherein the agricultural row unit is configured to travel along a travel direction, wherein said leading edge of said first opener disc lies in a vertical plane substantially parallel to said travel direction, and wherein said trailing edge of said first opener disc lies in said vertical plane.

2. The agricultural row unit of claim **1**, wherein said first opener disc includes a bevel at a perimeter of said first opener disc, said bevel oriented toward said second opener disc.

3. The agricultural row unit of claim **1**, further including:
a third opener disc, said third opener disc being substantially vertical; and
a fourth opener disc disposed to contact a perimeter of said third opener disc, said fourth opener disc disposed at an offset angle from said third opener disc.

4. The agricultural row unit of claim **3**, wherein said third opener disc includes a bevel at a perimeter of said first opener disc, said bevel oriented toward said fourth opener disc.

5. The agricultural row unit of claim **4**, wherein said third opener disc includes a bevel at a perimeter of said third opener disc, said bevel oriented toward said fourth opener disc.

6. The agricultural row unit of claim **1**, further including:
a seed meter configured to dispense seeds; and
a seed tube disposed beneath said seed meter and disposed to receive seeds from said seed meter, said seed tube disposed between said first opener disc and said second opener disc.

7. The agricultural row unit of claim **1**, wherein said first opener disc contacts said second opener disc at a contact area, said contact area being forward of a center of said first opener disc.

8. The agricultural row unit of claim **1**, further including:
a first gauge wheel disposed adjacent to said second opener disc opposite said first opener disc.

9. The agricultural row unit of claim **8**, further including:
a third opener disc, said third opener disc being substantially vertical;
a fourth opener disc disposed to contact a perimeter of said third opener disc, said fourth opener disc disposed at an offset angle from said third opener disc;
a second gauge wheel disposed adjacent to said fourth opener disc opposite said third opener disc;
a first gauge wheel arm supporting said first gauge wheel, said first gauge wheel arm being pivotally mounted to the row unit;
a second gauge wheel arm supporting said second gauge wheel, said second gauge wheel arm being pivotally mounted to the row unit; and
a rocker pivotally mounted to the row unit and disposed to limit a path of travel of said first gauge wheel arm and said second gauge wheel arm.

10. The agricultural row unit of claim **8**, further including:
a closing wheel disposed behind said first gauge wheel and disposed to move soil behind said first gauge wheel toward said first opener disc.

11. The agricultural row unit of claim **1**, further including:
a knife disposed adjacent the perimeter of said first opener disc, said knife extending downward and away from said second opener disc.