CLAIMS

1. An extruder comprising:

(1) a barrel, wherein the barrel comprises an inner chamber comprising a feeder zone and a reaction zone, wherein the extruder is constructed and arranged such that a steam impervious plug is formed by compacting biomass in a high pressure zone separating the feeder zone and the reaction zone;

(2) a discharge valve body at a discharge end of the barrel, wherein the discharge valve body comprises a plurality of injection ports that penetrate an outer wall of the discharge valve body; and

(3) a system for introducing one or more additives into materials, the system comprising:

a. an assembly of injectors, wherein the injectors comprise internal bores of a diameter ranging from 2 to 6 mm;
b. a manifold for controlling flows of substances in said assembly of injectors;
c. valves incorporated into the manifold for each injector to independently control the flows of substances in the injector; and
d. a supply of an additive;

wherein the injectors are placed into the plurality of injection ports in the outer wall of the discharge valve body.

2. The extruder of claim 1, wherein the additive is a liquid or a steam.
3. The extruder of claim 1, wherein the additive is water.
4. The extruder of claim 1, wherein the additive is an acid.
5. The extruder of claim 1, wherein the additive is a steam and wherein the steam is at a pressure of 80-600 psi.
6. The extruder of claim 1, wherein the additive is a steam and wherein the steam is at a pressure of 150 to 300 psi.
7. The extruder of claim 1, wherein the materials comprise a biomass.
8. The extruder of claim 1, wherein the internal bores of the injectors have a diameter of 2 to 4 mm.
9. The extruder of claim 1, wherein the internal bores of the injectors have a diameter of about 2 mm.

10. The extruder of claim 1, wherein the assembly of injectors comprises 2 or more injectors.
11. The extruder of claim 1, wherein the assembly of injectors comprises 16 or more injectors.
12. A method of injecting liquid and steam into an extruder having an extruder barrel and a discharge valve body, wherein the extruder barrel comprises an inner chamber comprising a feeder zone and a reaction zone, wherein the extruder is constructed and arranged such that a steam impervious plug is formed by compacting biomass in a high pressure zone separating the feeder zone and the reaction zone, the method comprising:
    a. providing a plurality of injection ports, wherein the injection ports penetrate an outer wall of the extruder barrel and an outer wall of the discharge valve body;
    b. introducing injectors into the plurality of injection ports;
    c. injecting steam into said extruder barrel or said discharge valve body to maintain a pressure between 150 to 800 psi in said extruder barrel or said discharge valve body; and
    d. injecting liquid into said discharge valve body.
13. The extruder of claim 1, wherein the barrel further comprises a plurality of injection ports that penetrate an outer wall of the barrel; and wherein the injectors are placed into the plurality of injection ports in the outer wall of the barrel.
14. The extruder of claim 13, wherein the barrel comprises the plurality of injectors organized in spiral or circular patterns about the barrel.
15. The extruder of claim 14, wherein the plurality of injectors are perpendicular to the barrel.
16. The extruder of claim 14, wherein one or more of the injectors are predisposed to inject 30-50% steam per dry weight of materials in the barrel.