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a plurality of predetermined positions and means for comparing the determined mass flow at each of the predetermined positions from the passage of a first interface to the passage of a second interface to determine if a leak has occurred.

61. The apparatus recited in claim 39, further comprising means for computing an expected absolute temperature of each section intermediate to the first and second predetermined positions using the computed change in temperature of each section and means for comparing the second digital temperature with the computed temperature at the second predetermined position, and means for correcting the model temperatures computed for each of the sections based on a difference between the computed temperature and the second digital temperature.

62. The apparatus recited in claim 61, further comprising means for optimizing thermodynamic equations defining the liquid temperature change for each section in accordance with said means for comparing the second digital temperature and computed liquid temperature at the second predetermined position.

63. The apparatus recited in claim 50, wherein the clamp-on flowmeter comprises a multi-path sonic meter to minimize flow profile effects due to bends in the pipeline.

64. The apparatus recited in claim 40, further comprising means for transferring data from each predetermined position to a master station via a high speed data communications link.

65. The apparatus recited in claim 64, further comprising means for polling the predetermined location from the master station.

66. The apparatus recited in claim 40, further comprising means for identifying the liquid at at least one of the first and second predetermined positions by determining the sonic propagation velocity of the liquid and the temperature of the liquid at the at least one of the predetermined positions, said sonic propagation velocity and temperature defining a unique curve for each liquid allowing identification of the liquid, said means for identifying comprising means identifying the liquid based on the unique curve corresponding to the determined sonic propagation velocity and temperature.

67. The apparatus recited in claim 66, further comprising

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means for determining an appropriate liquid expansion coefficient once the liquid is identified for determining the change in liquid volume based on the change in temperature of each section.

68. The apparatus recited in claim 66, further comprising means for storing in advance parameters relating to a plurality of different liquids carried by said pipeline, and means using said prestored parameters to identify the liquid in the pipeline by comparing said prestored parameters to actuate measured parameters.

69. The apparatus recited in claim 68, wherein the measured and prestored parameters include sonic propagation velocity versus temperature.

70. The apparatus recited in claim 68, wherein the prestored parameters include density and/or viscosity versus temperature.

71. The apparatus recited in claim 41, further comprising means for identifying the presence of a pig in the pipeline at one of the predetermined positions comprising means for identifying the interruption of the sonic beam for a period of time defined by a dimension of the pig in the longitudinal extent of the pipeline.

72. The apparatus recited in claim 41, further comprising means for identifying the presence of water in the liquid at one of the predetermined positions comprising means for measuring a defined change in sonic propagation velocity from that of the liquid to that of water at the site station.

73. The apparatus recited in claim 41, further comprising means for measuring the sonic propagation velocity of the liquid in the pipeline at the first and second predetermined positions, means for determining if a change in sonic propagation velocity has occurred at between the first and second predetermined positions and means for recording the time of such change at the first and second predetermined position, and means for using a difference in the recorded times determine the location of a leak.

74. The apparatus recited in claim 45 further comprising means for determining the effect of prior temperature history of each section disposed in soil on current and future ambient temperatures.

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