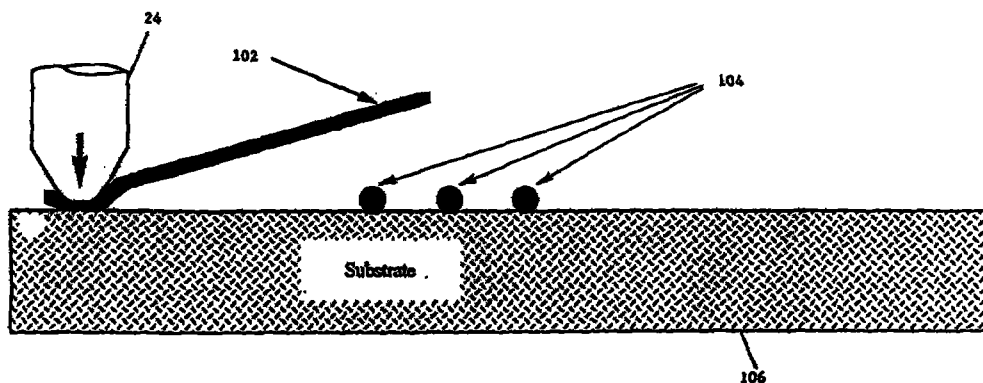




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(54) Title: **IMPROVED METHODS FOR WIRE-SCRIBING FILAMENT CIRCUIT PATTERNS WITH PLANAR AND NON-PLANAR PORTIONS; IMPROVED WIRE-SCRIBED BOARDS, INTERCONNECTION CARDS, AND SMART CARDS MADE BY THESE METHODS**



(57) Abstract

An apparatus and method of forming filament circuit patterns with planar and non-planar portions and interconnection cards, smart cards or optical fiber circuit cards formed therefrom are provided. A filament circuit path is scribed by moving a filament guide and a substrate relative to one another, and dispensing a filament on, or in the vicinity of, a surface of the substrate. The filament or the substrate or both have adhesive surface(s). The adhesive surface is capable of being adhesively actuated by application of energy. Energy is applied simultaneous with, or subsequent to, scribing. A portion of the filament circuit pattern is planar and another portion is non-planar. The non-planar portion traverses but does not contact or adhere to a pre-selected area of the substrate. The pre-selected area corresponds with a pad, a contact pattern, a hole, a slot, a raised feature, a part of the previously scribed planar portion of the pattern, and a filament termination point. Alternately, the non-planar portion may be embedded below the surface of the substrate. Another planar portion of the filament circuit traverses the non-planar portion but does not contact or adhere to a pre-selected part of the previously scribed non-planar portion. According to the above method wire-scribed circuit boards are formed including interconnection cards, smart cards or optical fiber circuit cards.