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(12) **United States Patent**  
**Shapiro et al.**

(10) **Patent No.:** **US 6,266,569 B1**  
(45) **Date of Patent:** **Jul. 24, 2001**

- (54) **METHOD AND SYSTEM OF COMPUTING SIMILAR TO A TURING MACHINE**
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- (73) Assignee: **Zephyrien International N.V.**, Curacao (AN)
- (\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: **09/184,178**
- (22) Filed: **Nov. 2, 1998**

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(List continued on next page.)

**Related U.S. Application Data**

- (60) Provisional application No. 60/098,502, filed on Aug. 31, 1998.
- (51) **Int. Cl.<sup>7</sup>** ..... **G05B 15/00**
- (52) **U.S. Cl.** ..... **700/1**
- (58) **Field of Search** ..... 435/4

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(74) *Attorney, Agent, or Firm*—Irah H. Donner; Hale and Dorr LLP

**ABSTRACT**

(57) A Brownian Turing machine includes a multiplicity of alphabet elements, multiple state transition elements and a single enzymatic unit. The alphabet elements define a plurality of different types of information. The state transition elements define how the machine can change state. The enzymatic unit receives dimers one at a time, wherein each dimer is comprised of one state transition element combined to one alphabet element. The enzymatic unit determines if a dimer is an allowable next dimer and, if it is, connects the state transition element of the allowed dimer to a history tape of the history of at least one change of state. The enzymatic unit also modifies an alphabet tape, comprising at least two alphabet elements connected together, with the alphabet element of the allowed dimer in accordance with the state transition defined by the state transition element of the allowed dimer. The alphabet elements, state transition elements and enzymatic unit can be mechanical, chemical or biological elements.

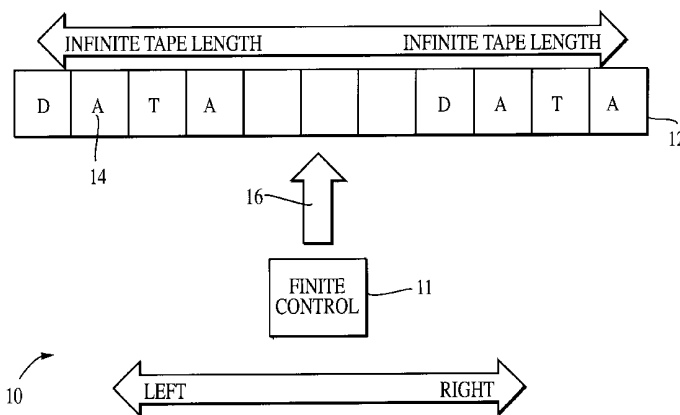
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**8 Claims, 78 Drawing Sheets**



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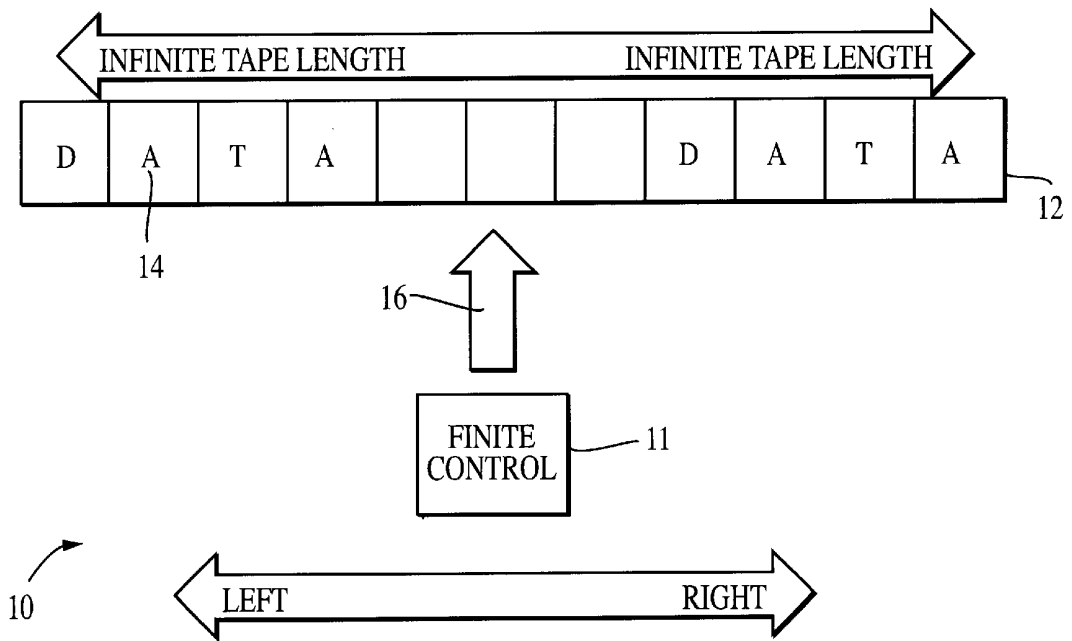


FIG. 1

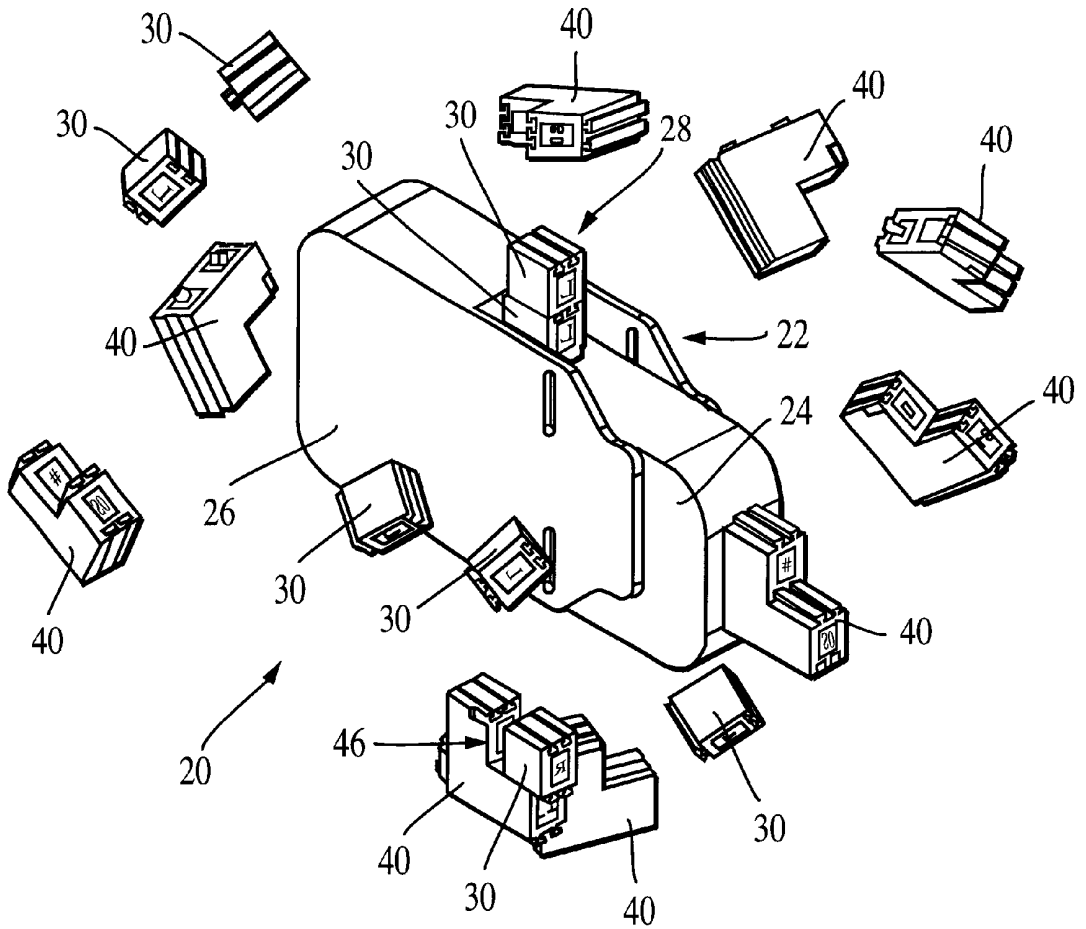


FIG. 2

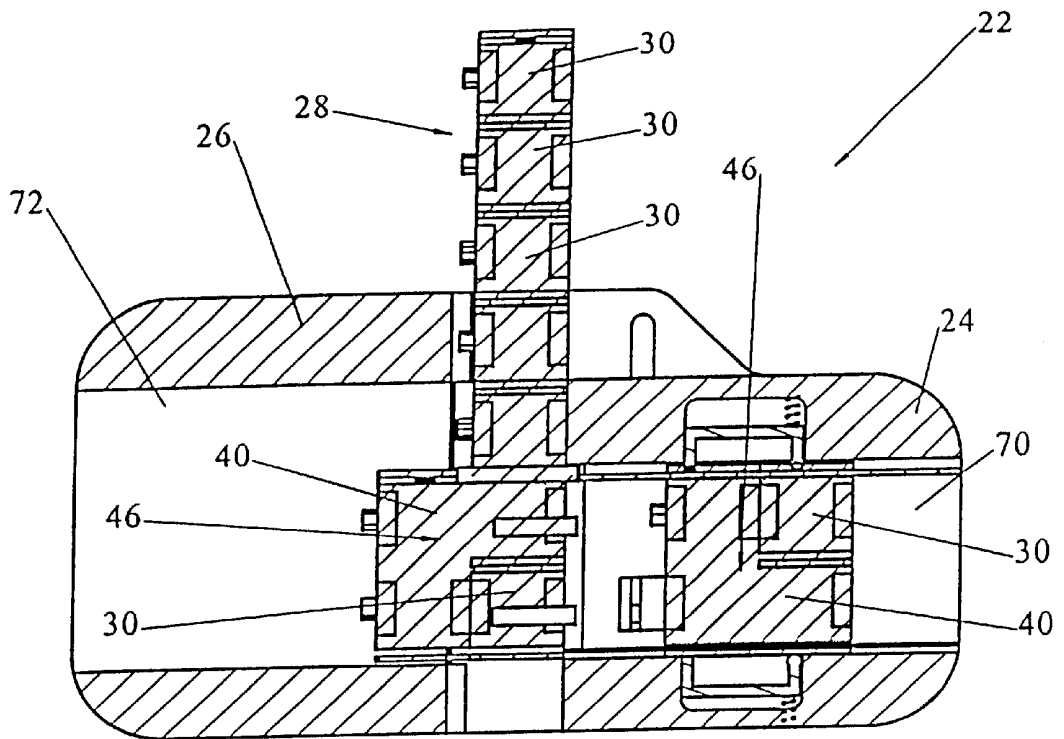


Fig. 3

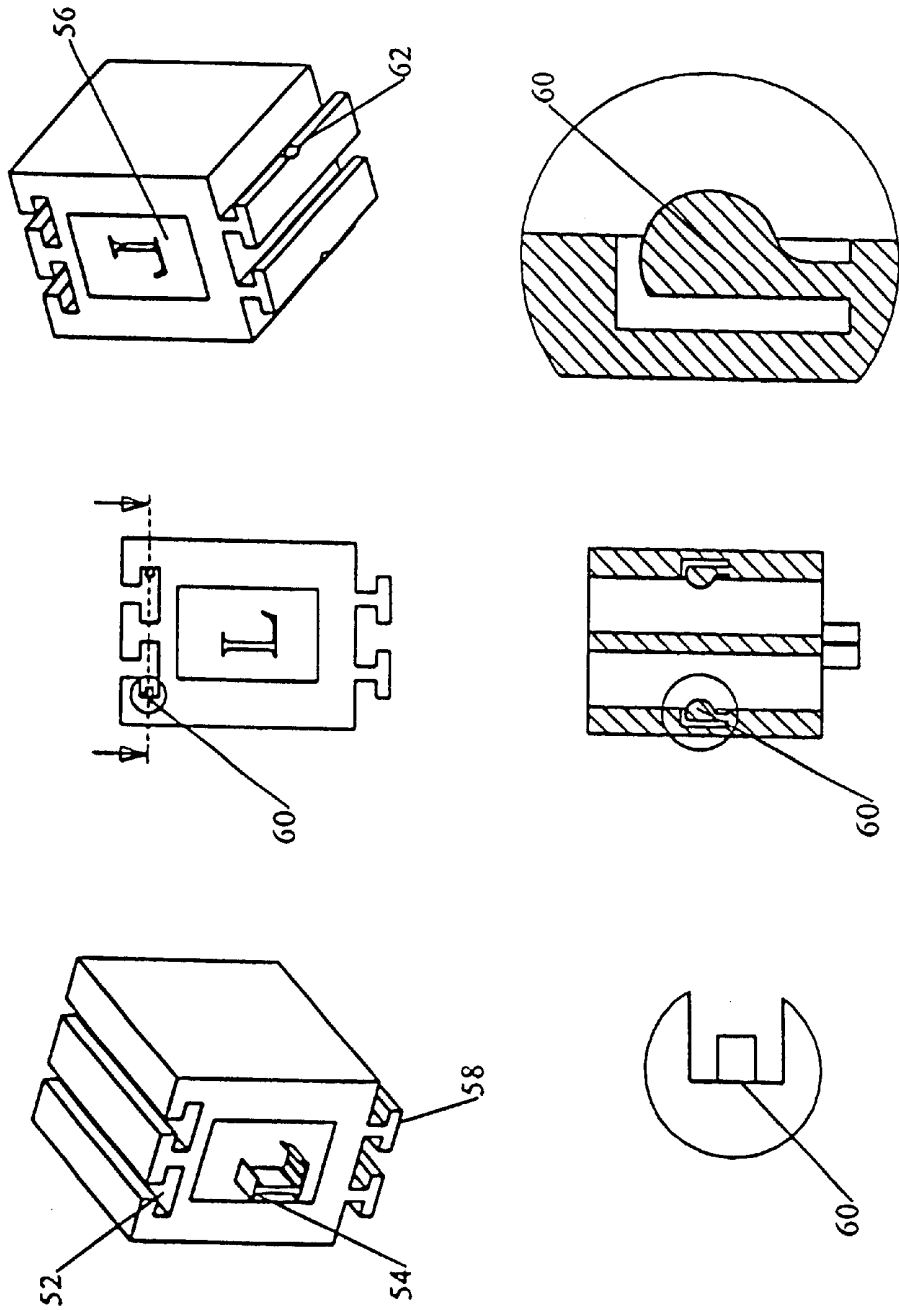


Fig. 4

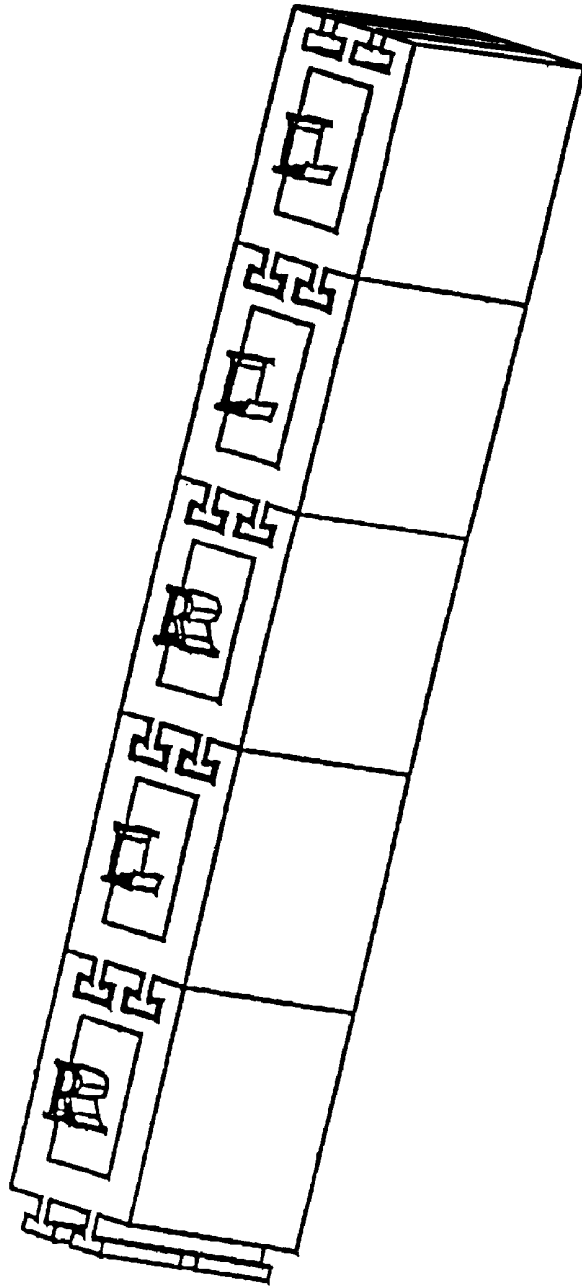


FIG. 5

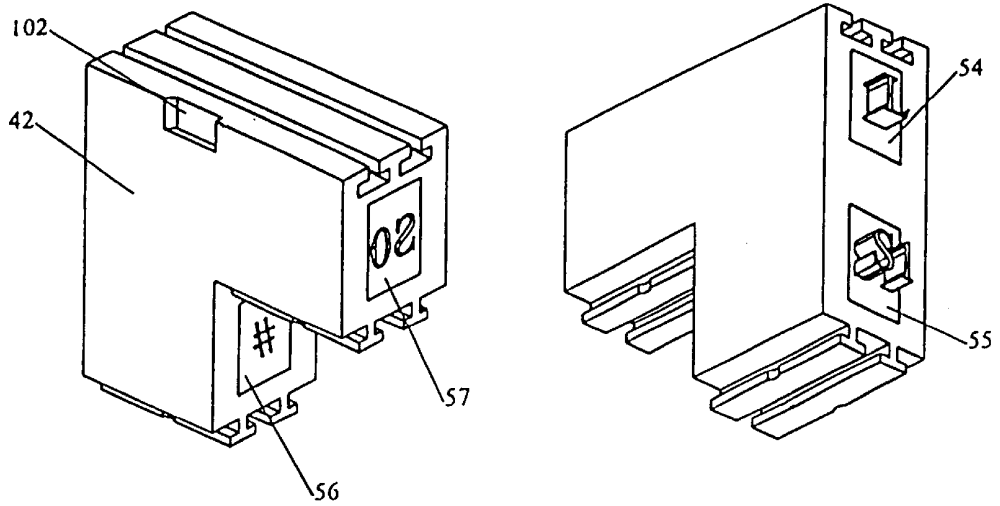


Fig. 6



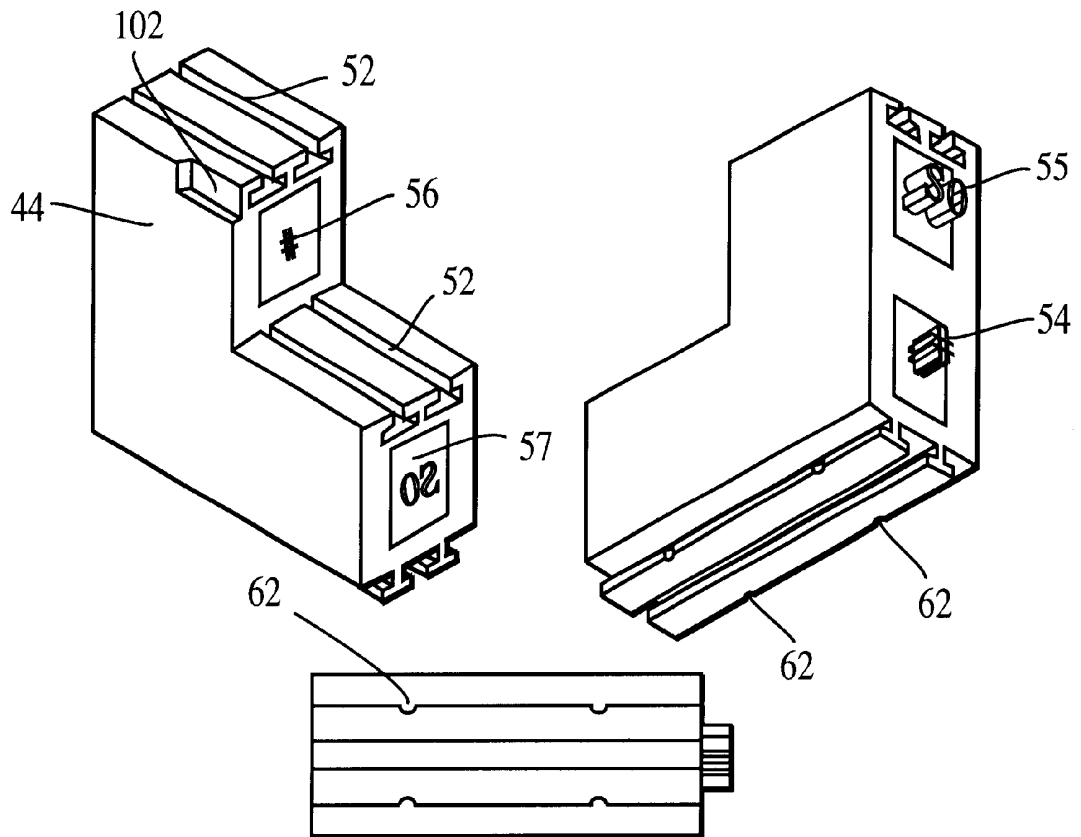


FIG. 7

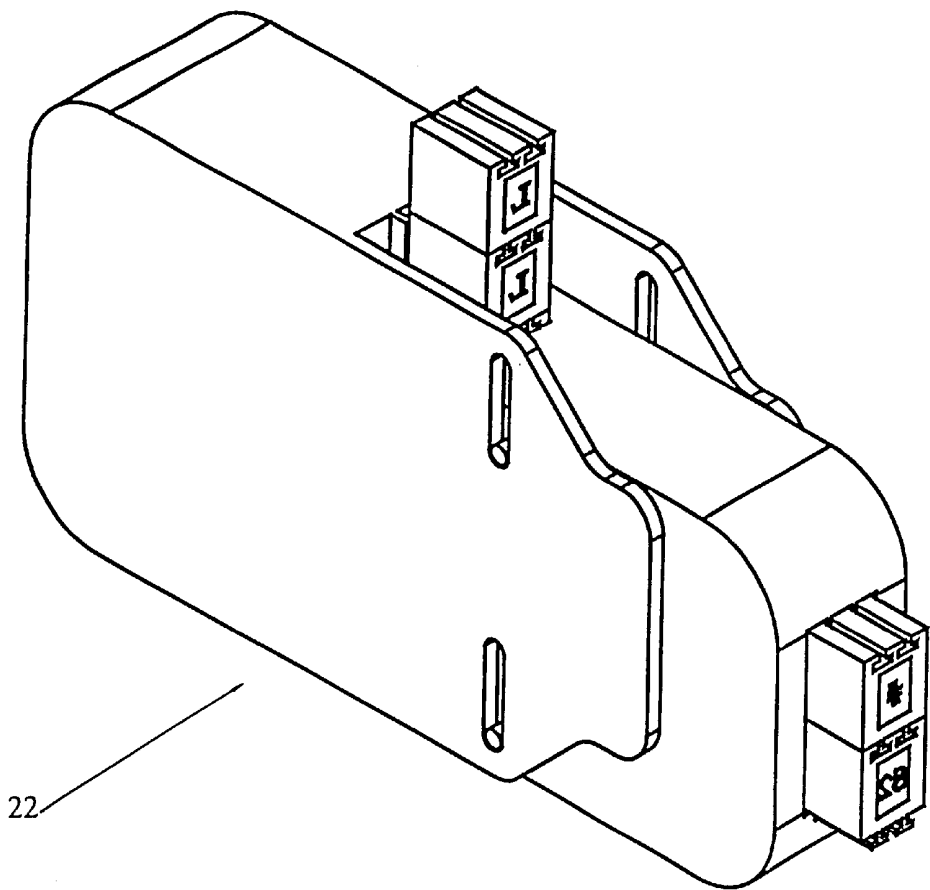


Fig. 8

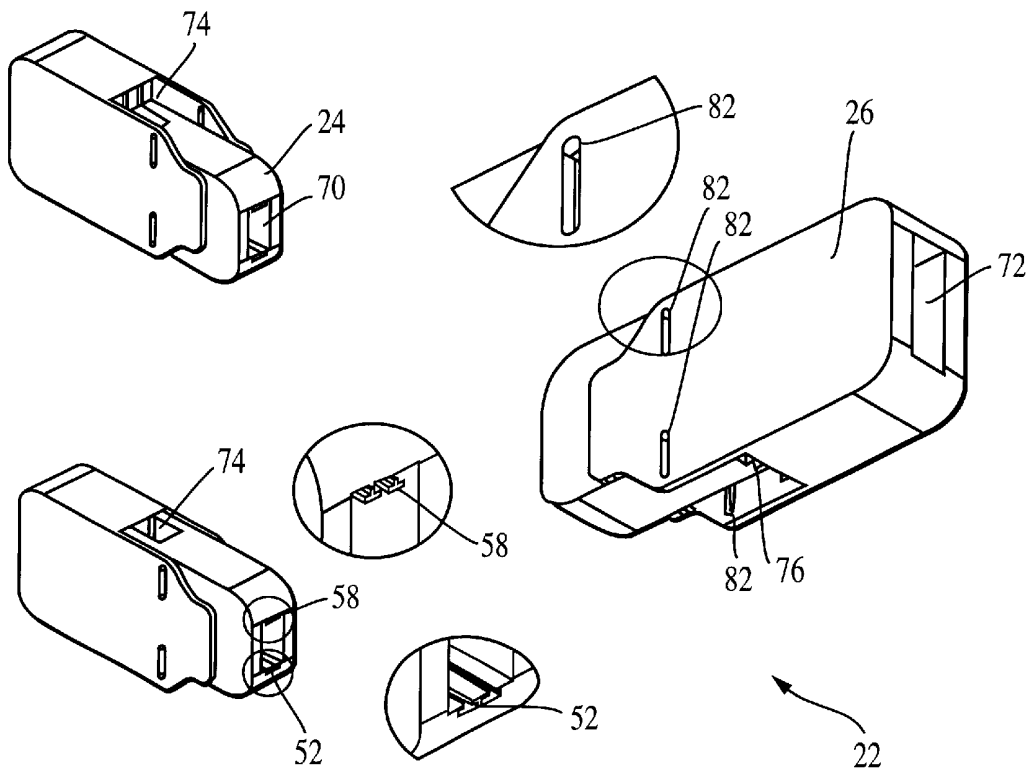


FIG. 9

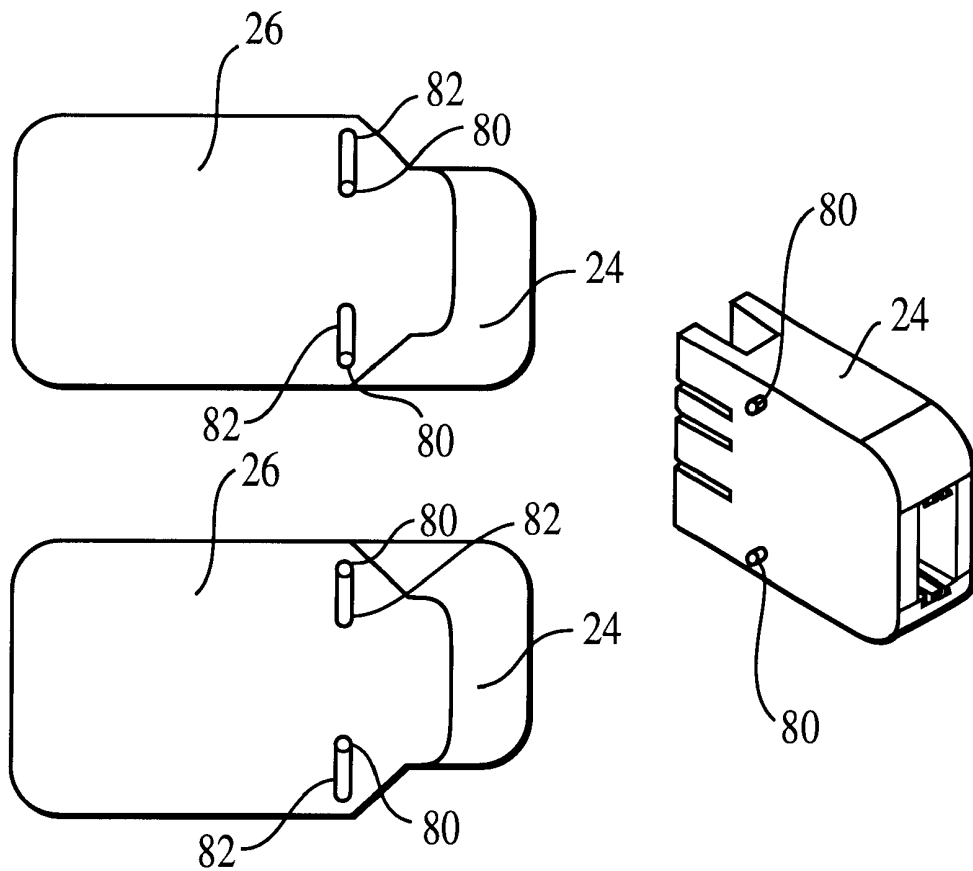
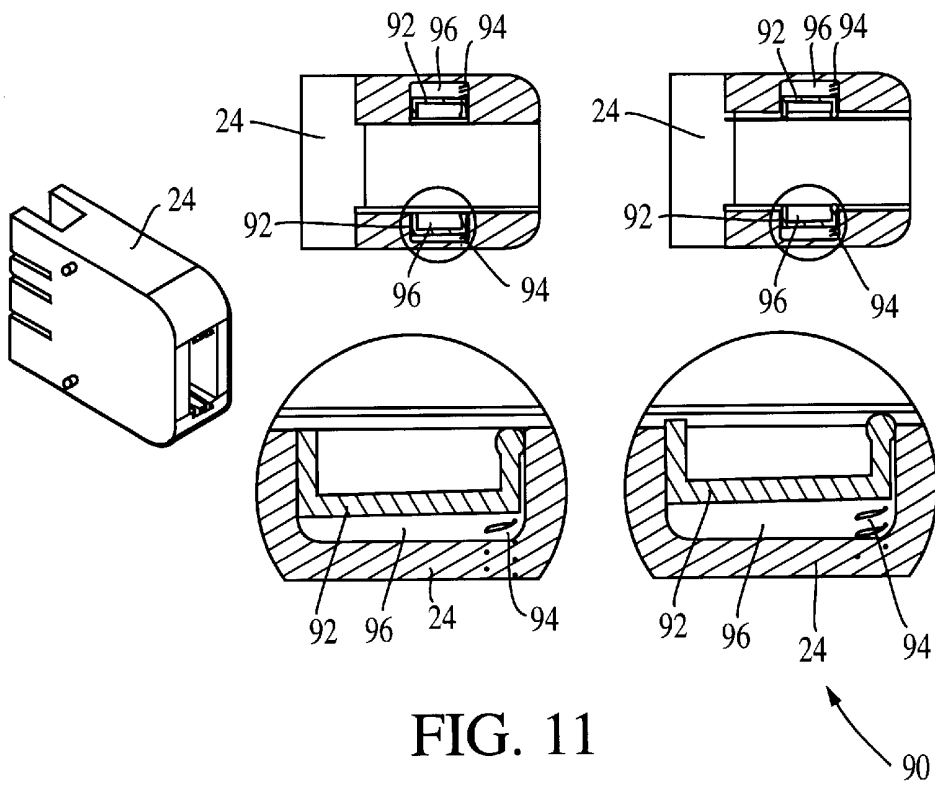


FIG. 10



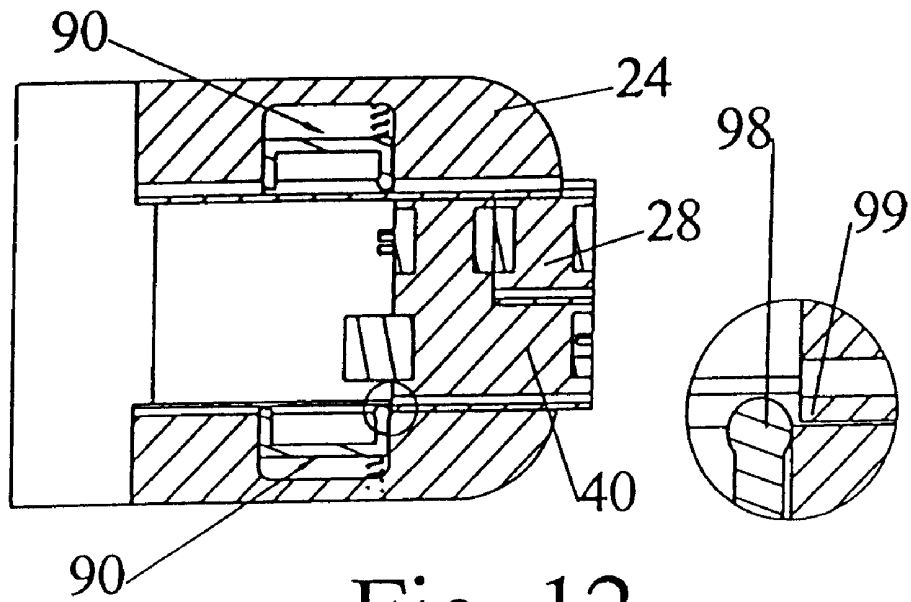


Fig. 12

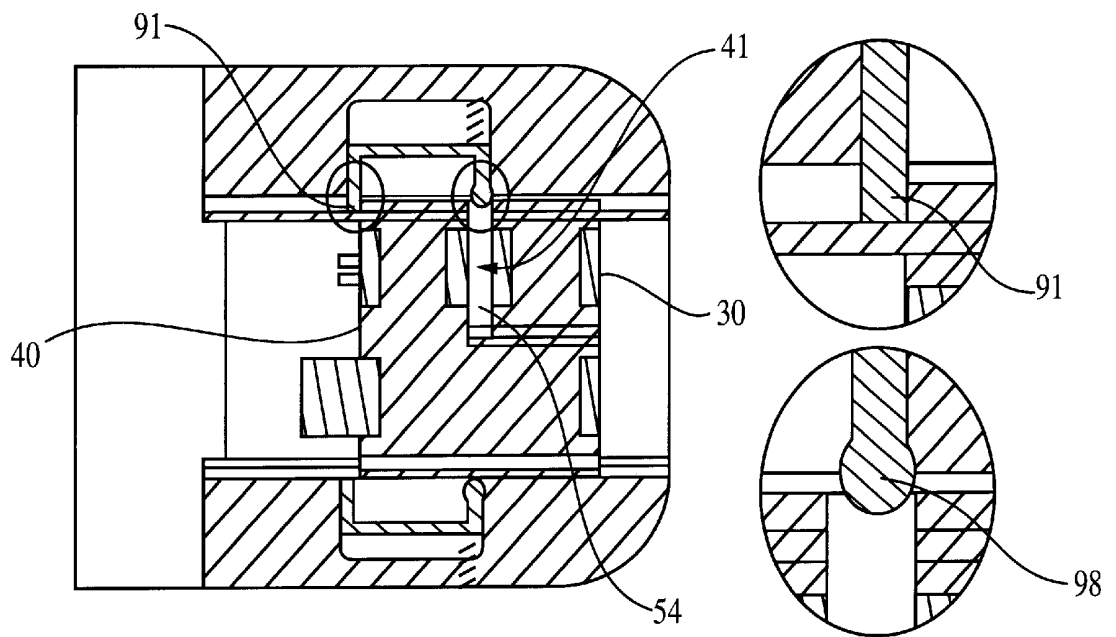


FIG. 13

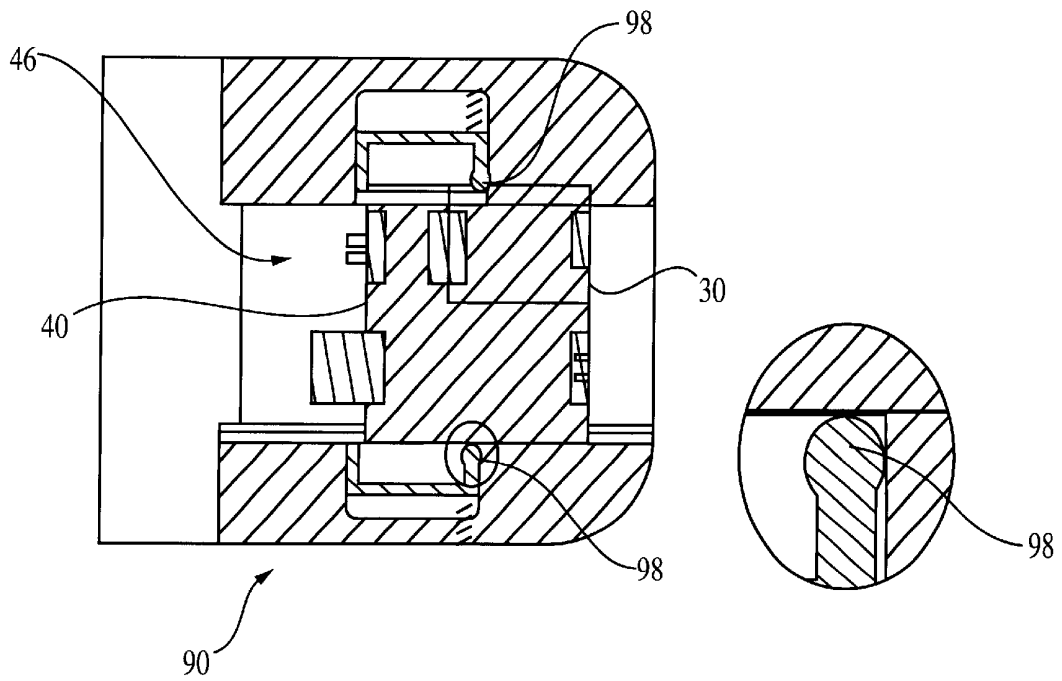


FIG. 14



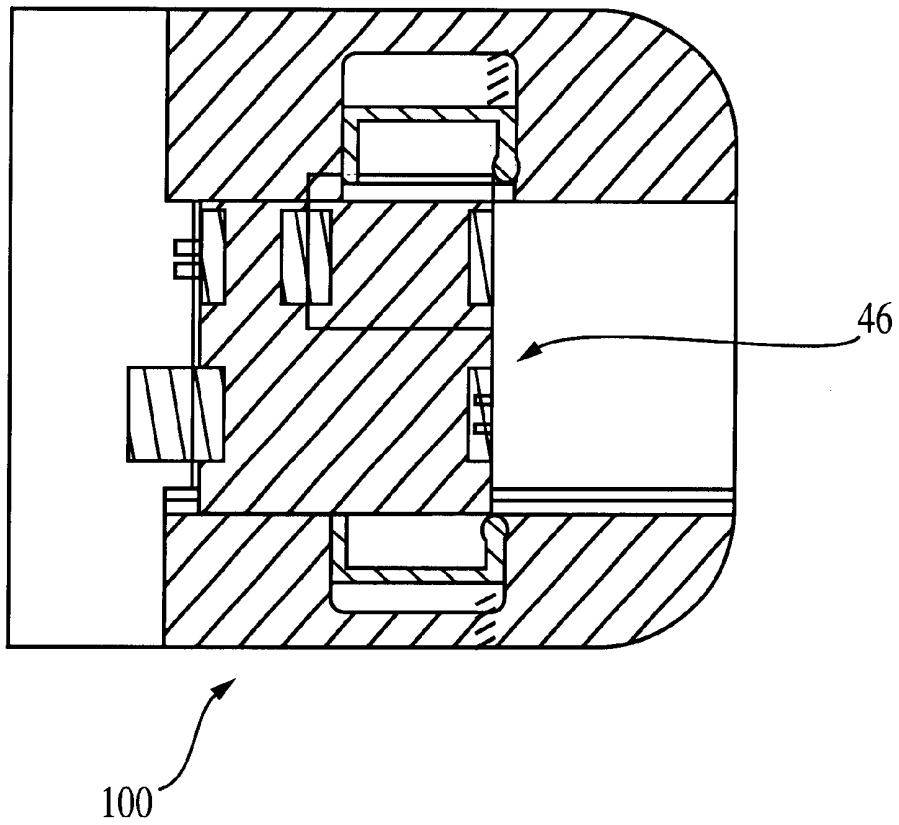


FIG. 15

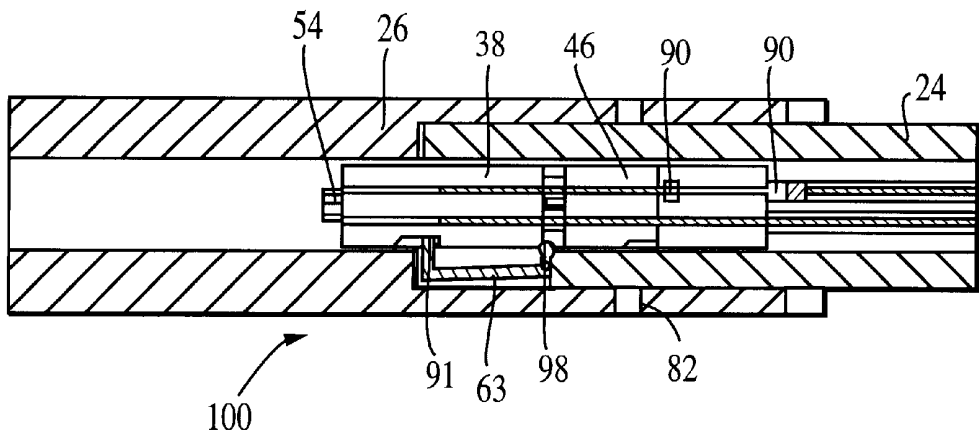


FIG. 16

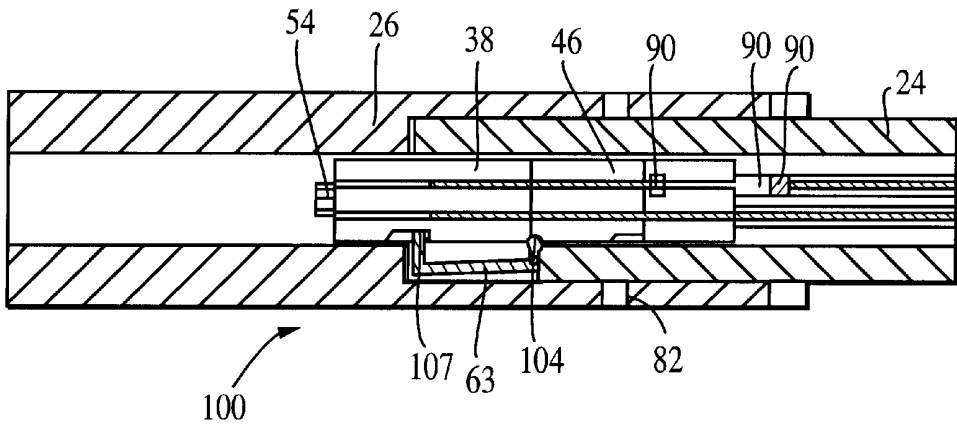


FIG. 17

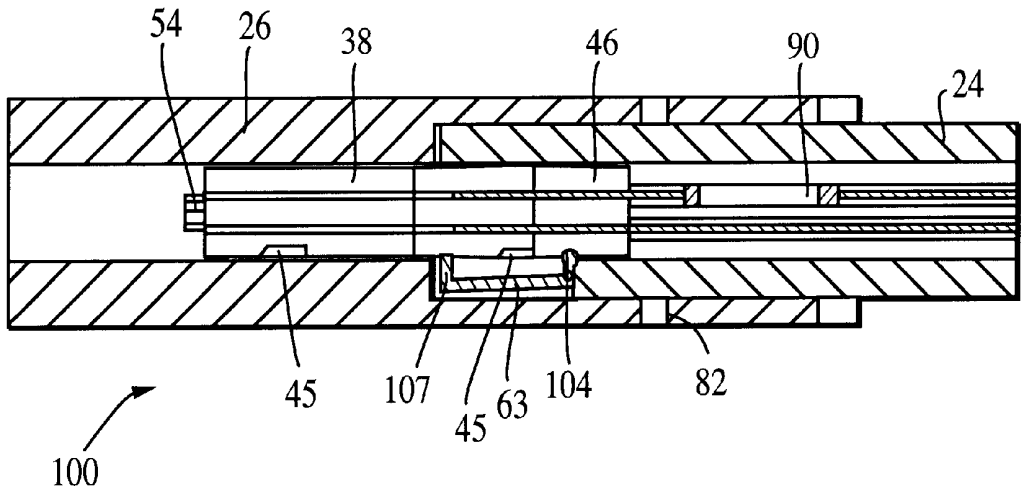


FIG. 18

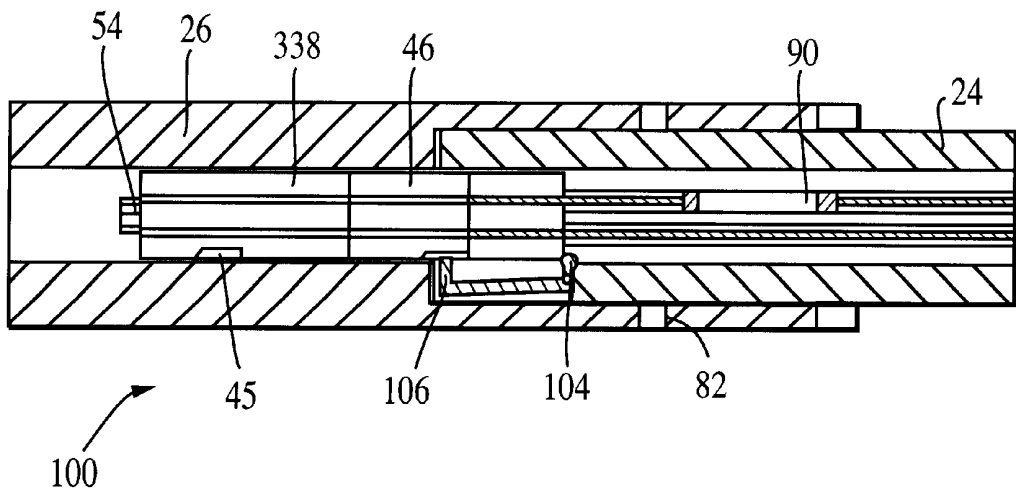


FIG. 19

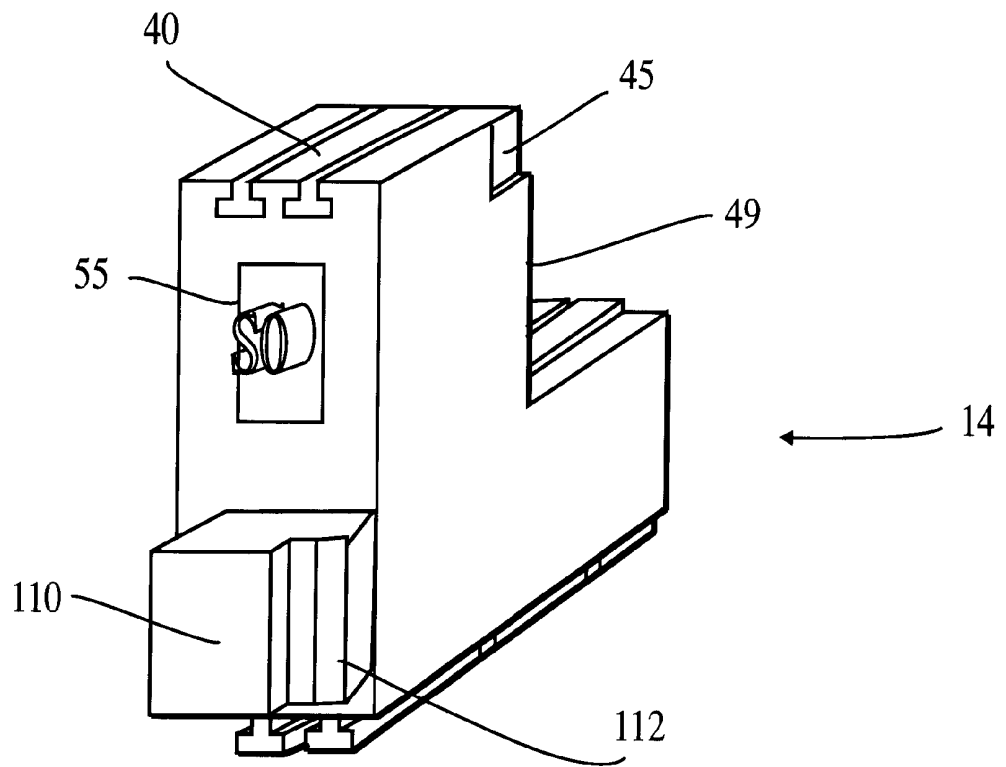


FIG. 20

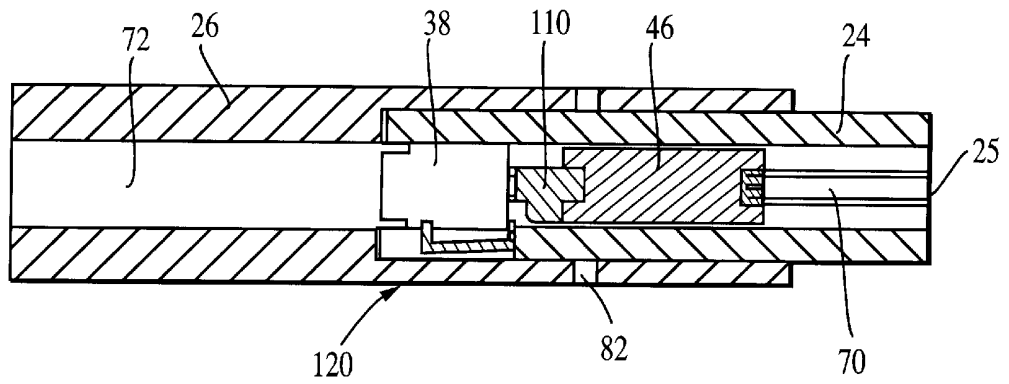


FIG. 21

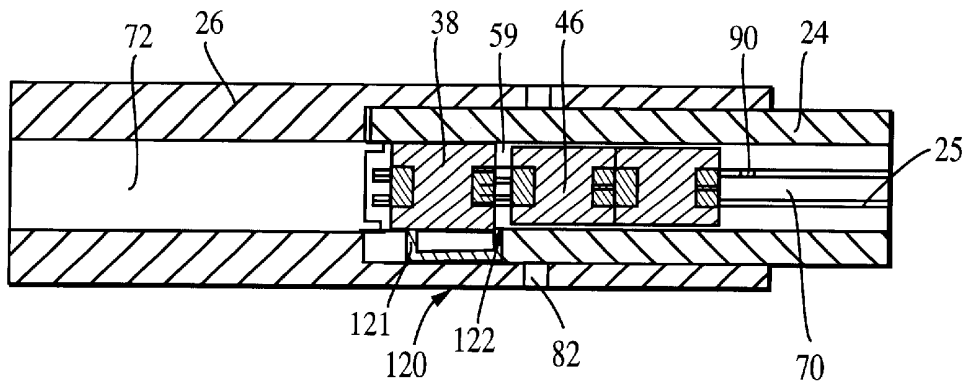


FIG. 22



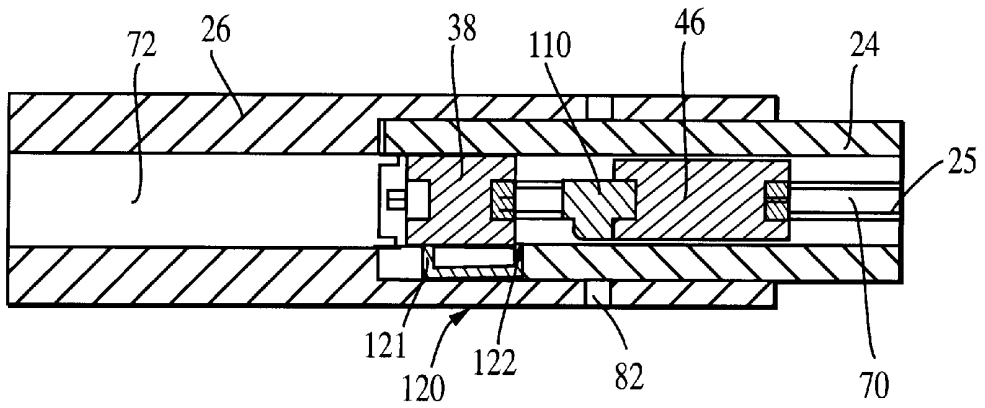


FIG. 23

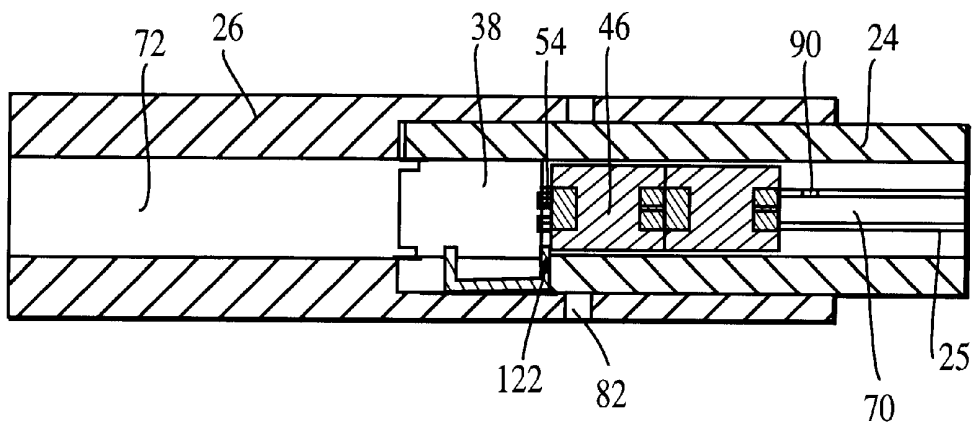
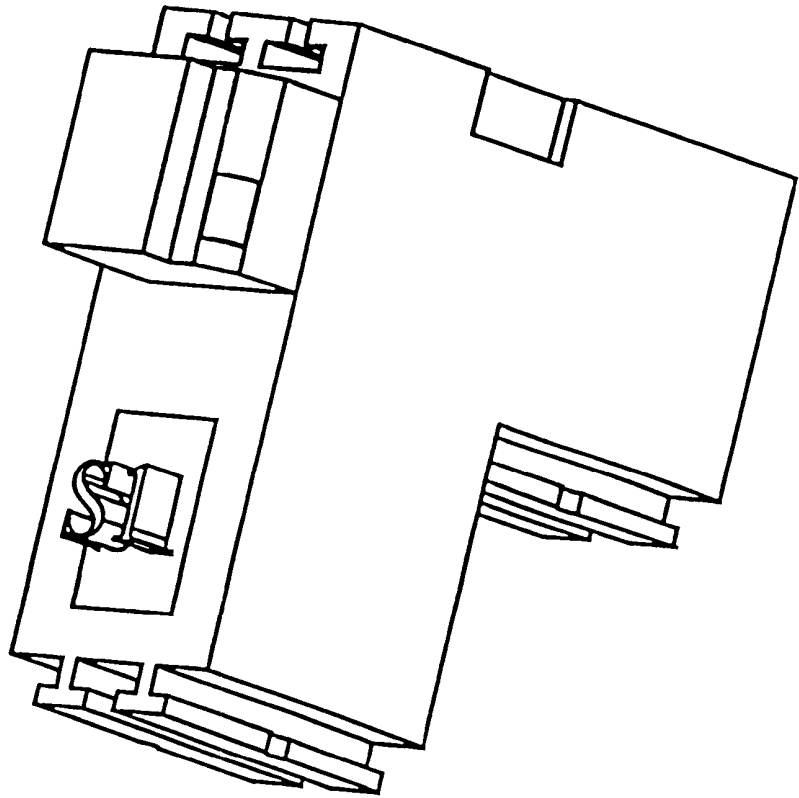


FIG. 24



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FIG. 25

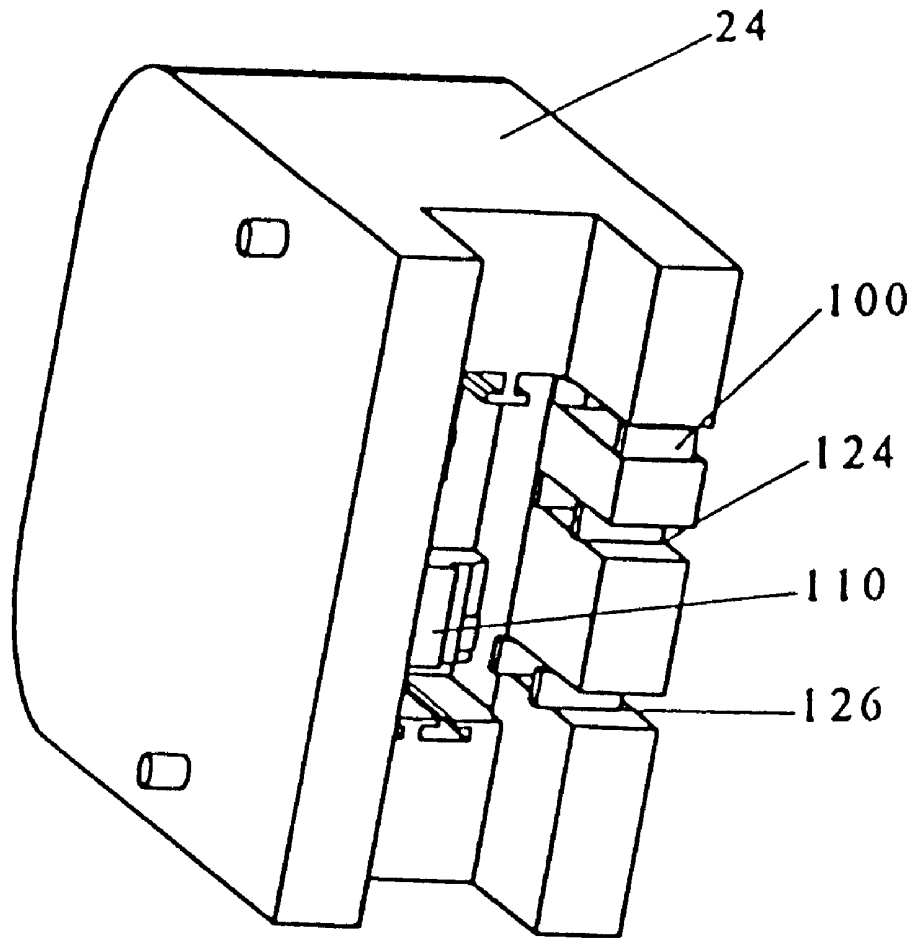


Fig. 26

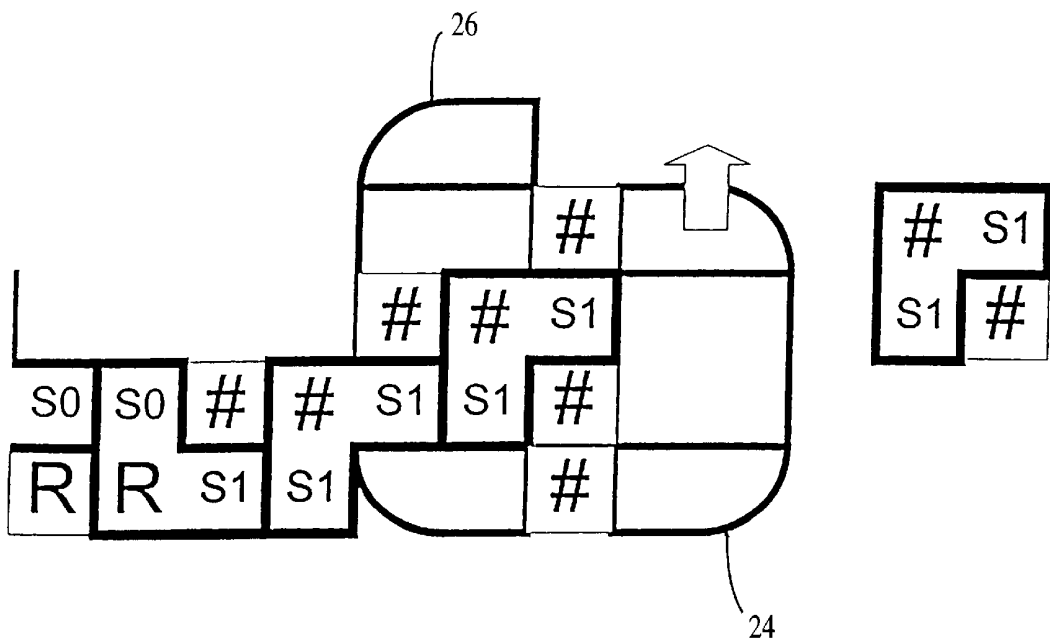


FIG. 27

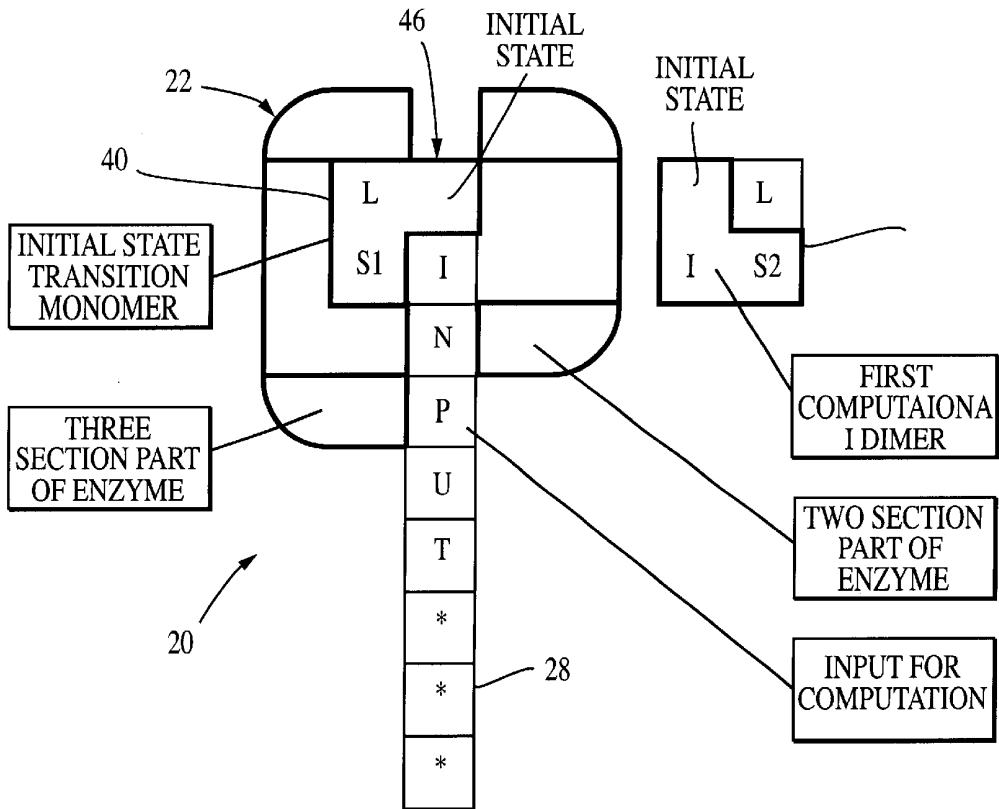


FIG. 28

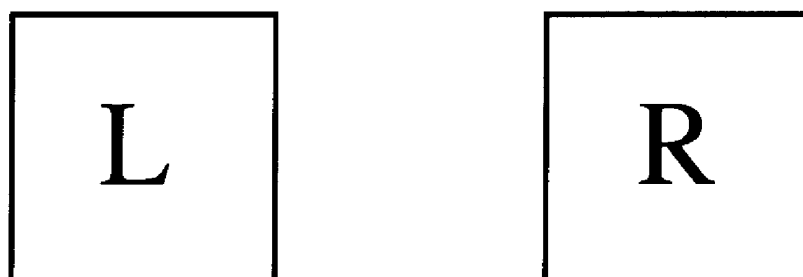


FIG. 29

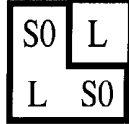


FIG. 30a

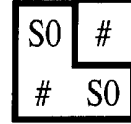


FIG. 30b

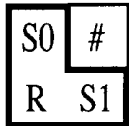


FIG. 30c

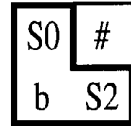


FIG. 30d

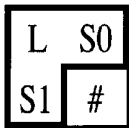


FIG. 30e

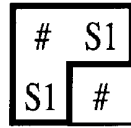


FIG. 30f

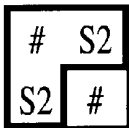


FIG. 30g

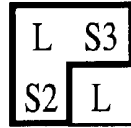


FIG. 30h



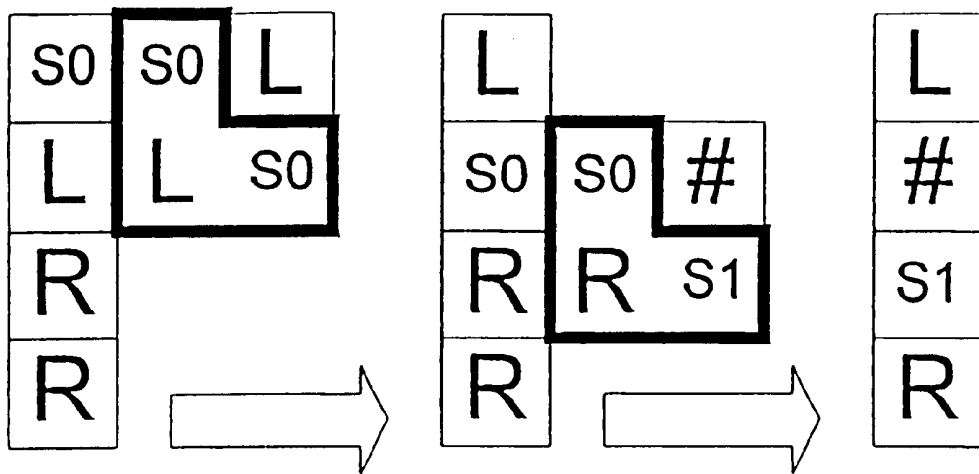


FIG. 31a

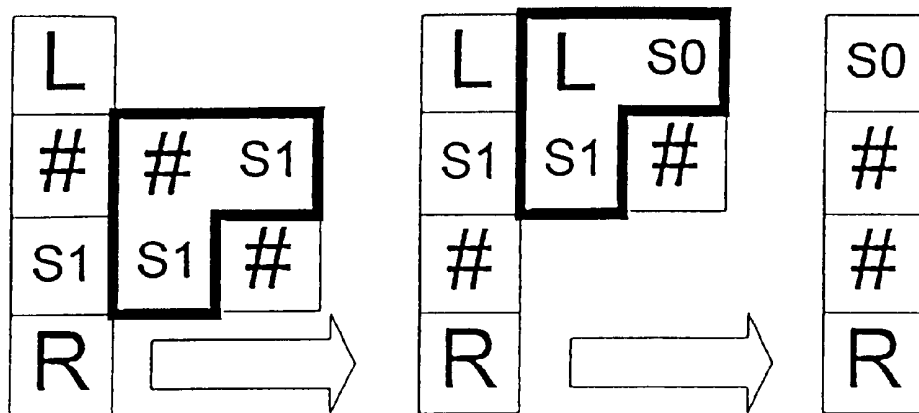


FIG. 31b

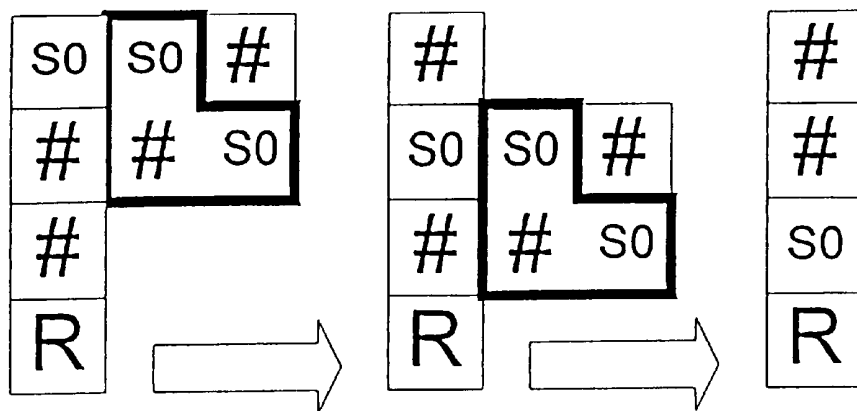


FIG. 31c

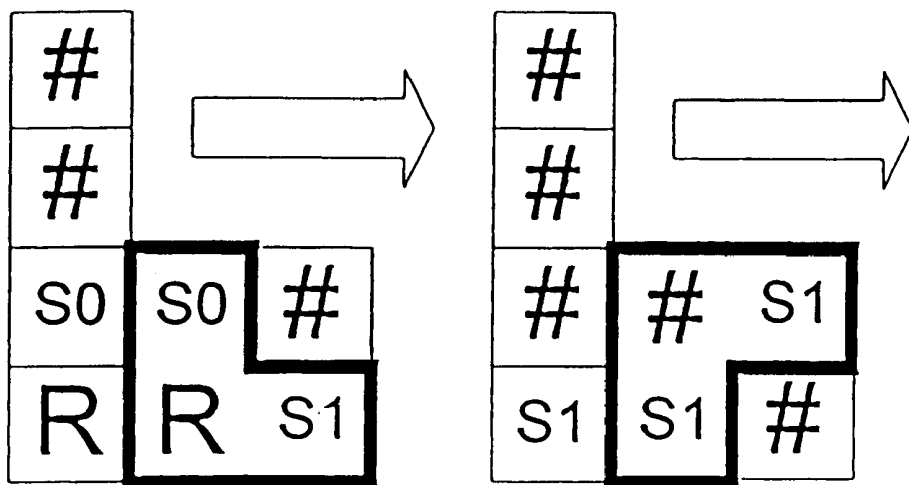


FIG. 31d

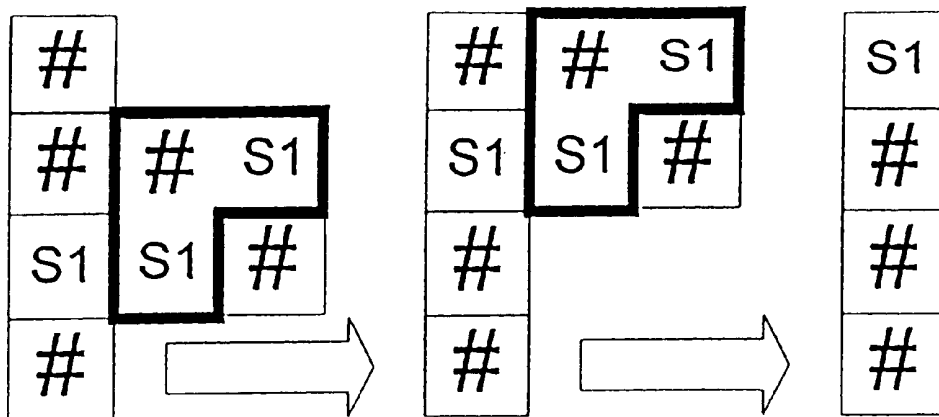


FIG. 31e

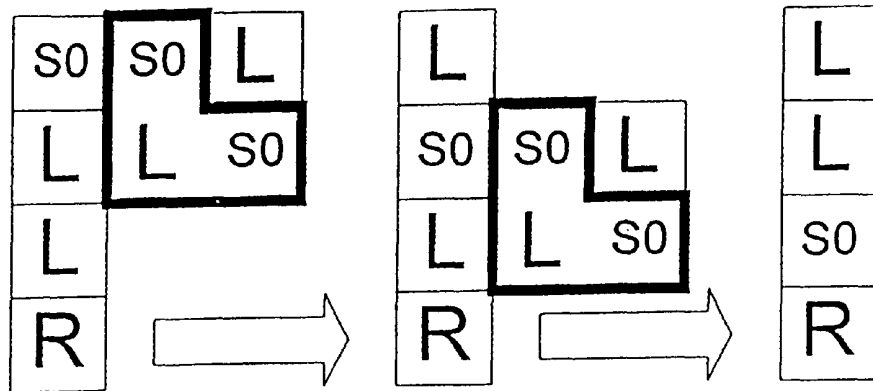


FIG. 32a

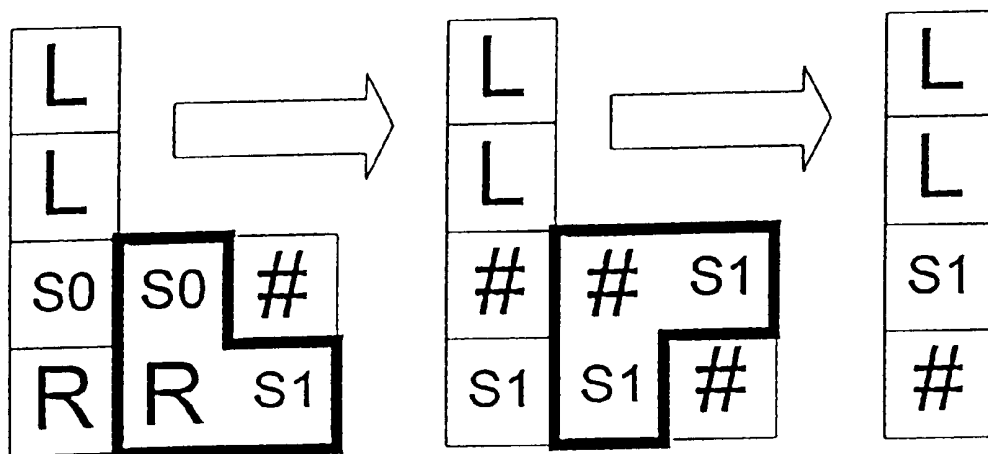


FIG. 32b

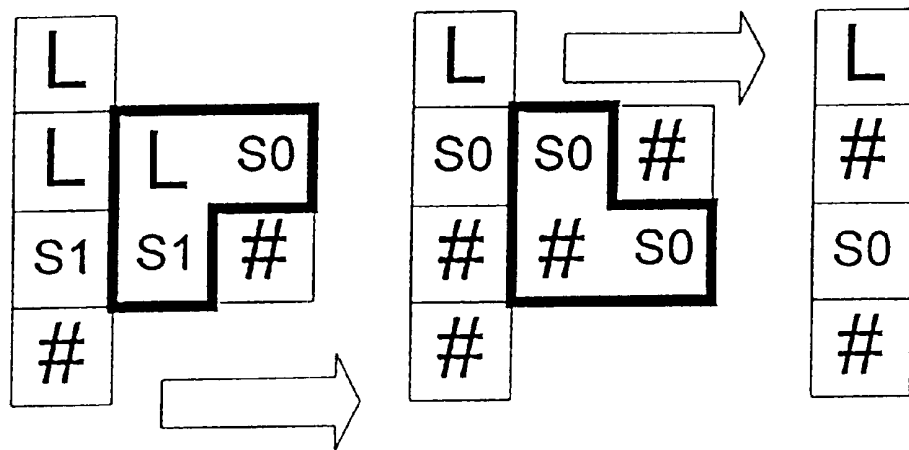


FIG. 32c



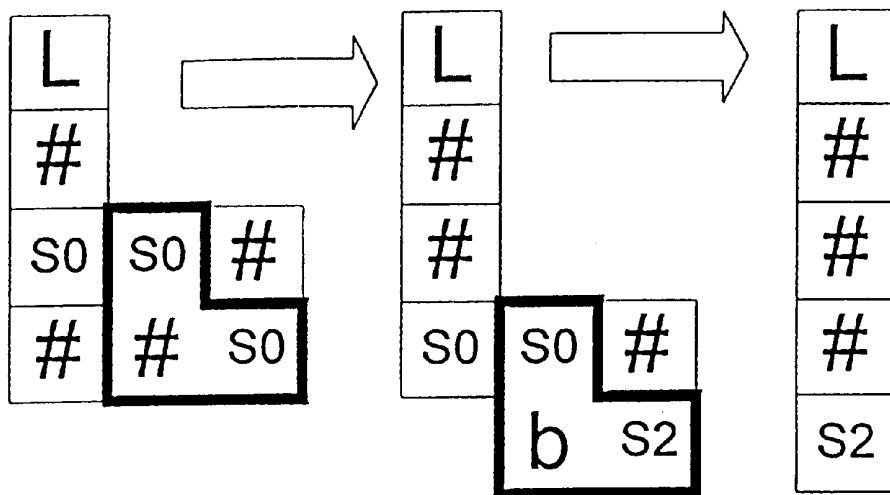


FIG. 32d

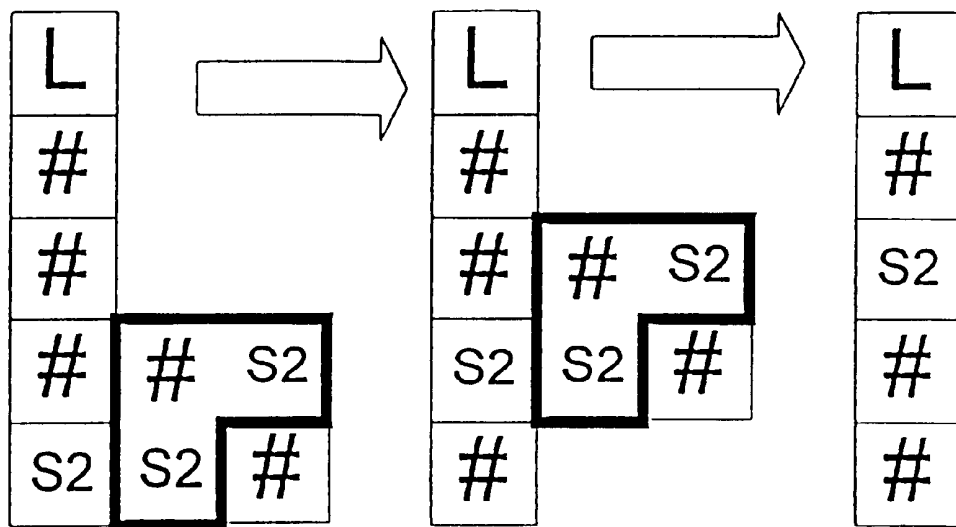


FIG. 32e

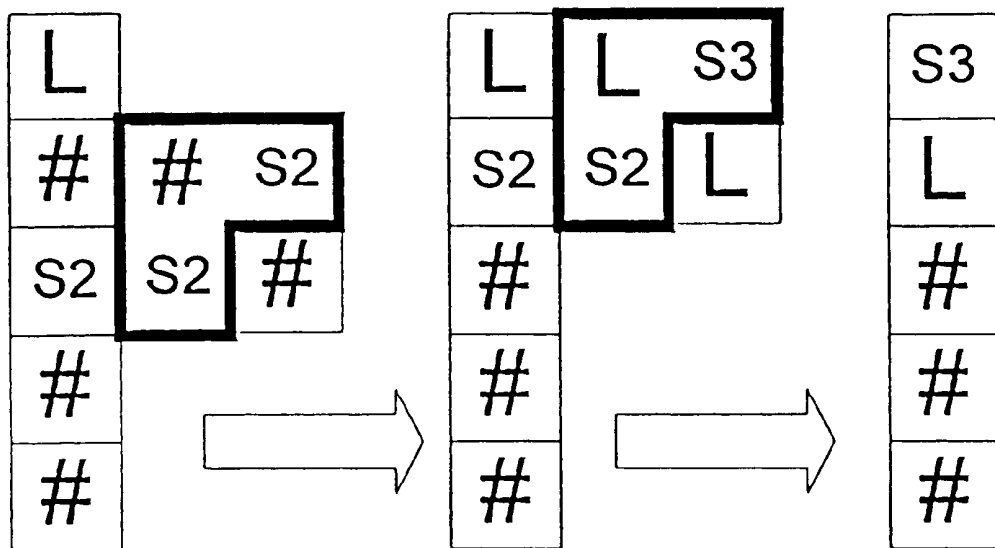


FIG. 32f

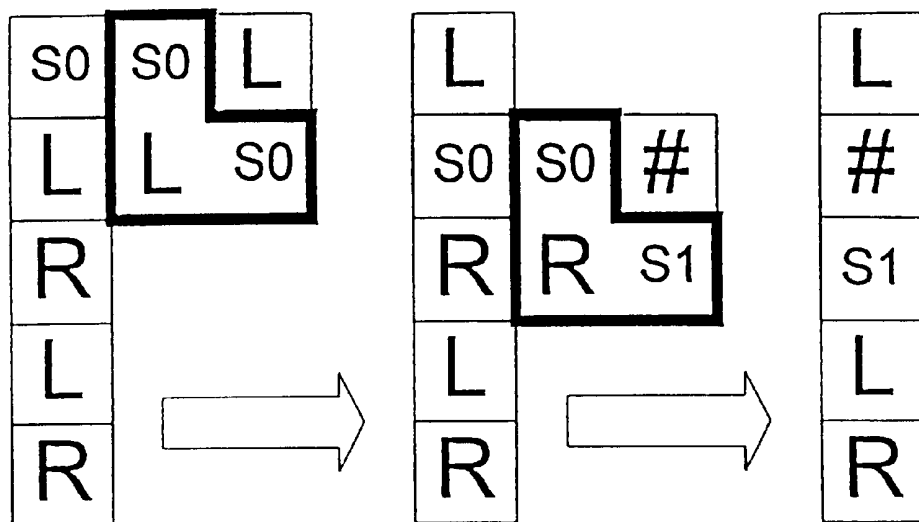


FIG. 33a

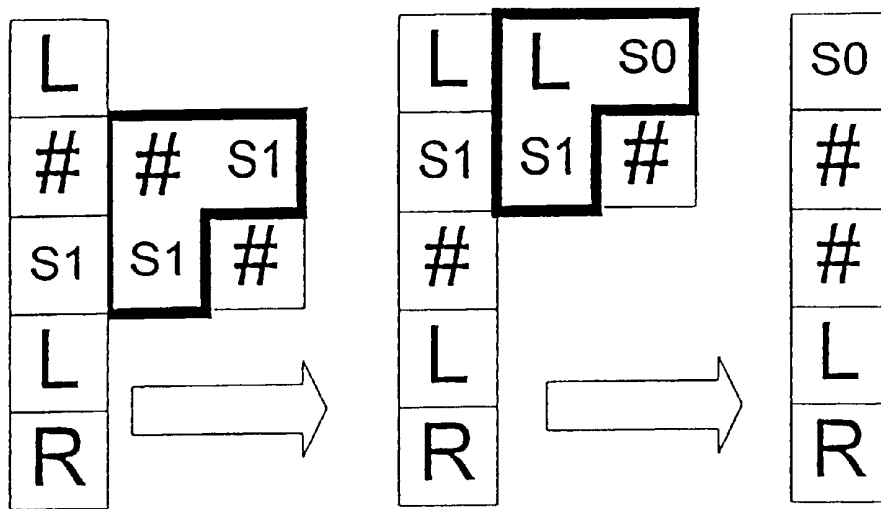


FIG. 33b

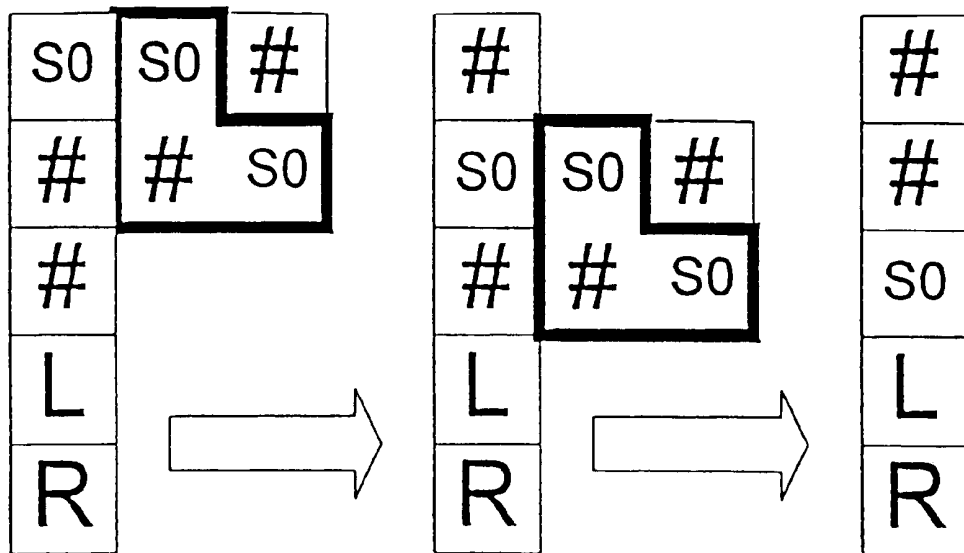


FIG. 33c

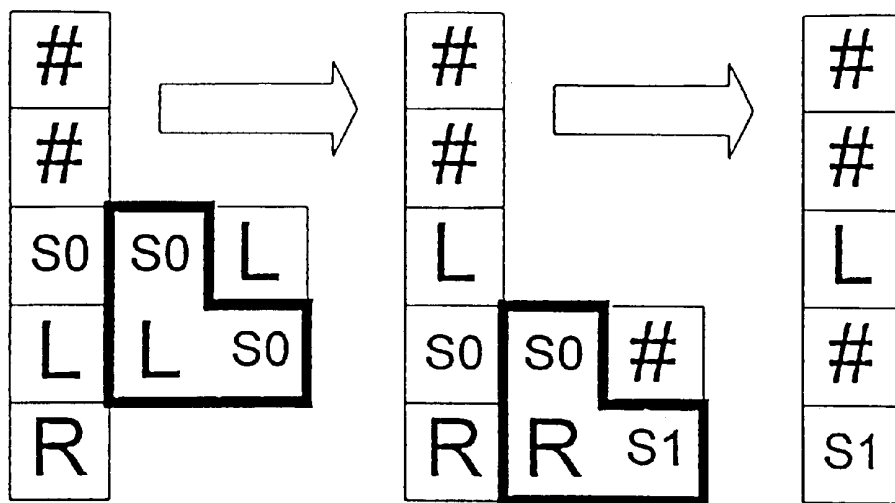


FIG. 33d

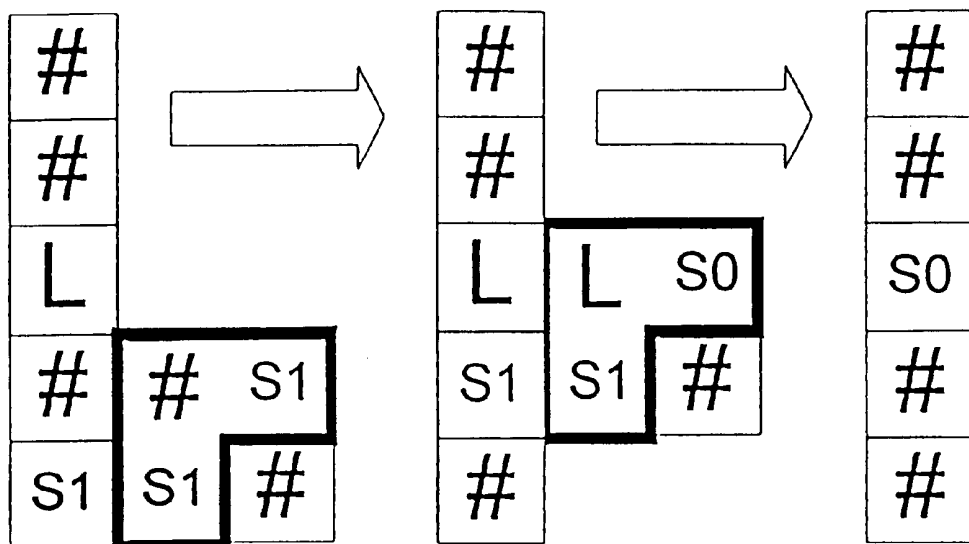


FIG. 33e



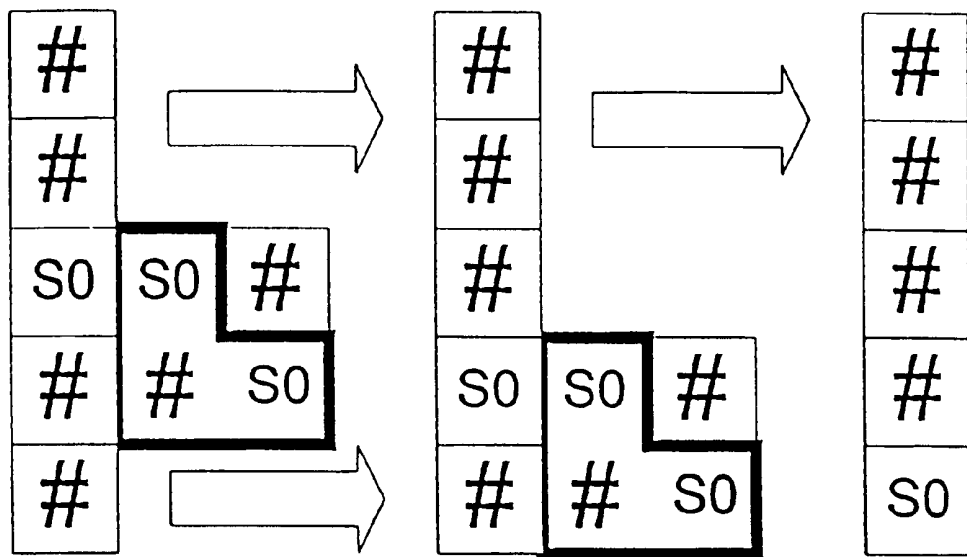


FIG. 33f

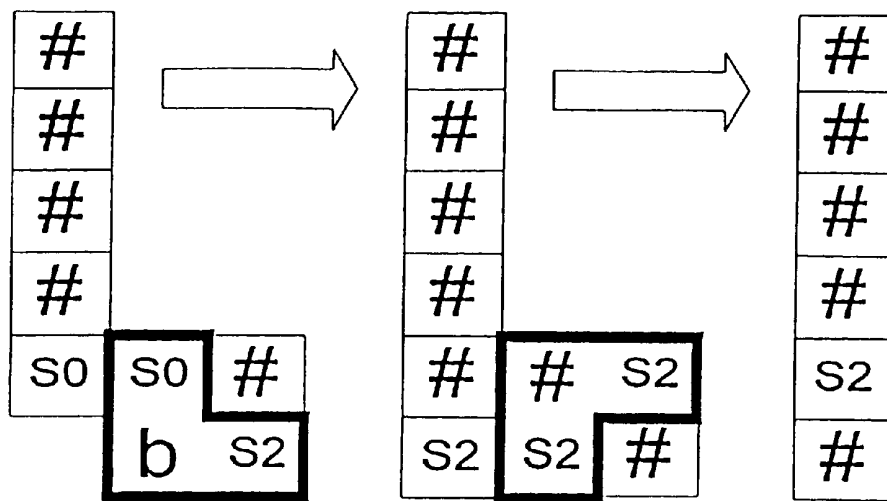


FIG. 33g