

21

second direction by said second spring, the first direction being generally opposite of said second direction; and

a member including a hole;

wherein a portion of said pin passes through the hole after said first spring is heated, said thermoelectric heating element is in contact with one end of said first spring, and wherein said thermoelectric heating element has an inner diameter that is greater than the outer diameter of said first spring, and a portion of said thermoelectric heating element surrounds a portion of said first spring.

2. The apparatus of claim 1 wherein said first spring is a compression coil spring.

3. The apparatus of claim 1 wherein said first spring is a tension coil spring.

4. The apparatus of claim 1 wherein said second spring is made from a shape-memory material, and which further comprises a second heating element for heating said second spring.

5. The apparatus of claim 4 wherein said second spring is a compression coil spring.

6. The apparatus of claim 4 wherein said second spring is a tension coil spring.

7. An apparatus for displaying a braille character comprising:

a member defining at least six holes;

at least six actuators, each said actuator including a pin, a shape-memory spring for urging the pin in a direction, and a thermoelectric heater to heat said spring; and an electrical circuit for receiving an input electrical signal, said electrical circuit being in electrical communication with said heaters, said heaters being operable to heat in response to an output signal from electrical circuit;

wherein said pin of each said actuator is aligned with a hole, a portion of said pin being capable of passing through a hole in response to heating by one of said heaters.

8. The apparatus of claim 7 wherein said springs are compression coil springs.

9. The apparatus of claim 8 which further comprises at least eight actuators configured and adapted to display a braille character.

10. The apparatus of claim 7 wherein each said actuator includes a supporting mechanism for fixedly supporting said pin in a first position wherein a portion of said pin extends beyond the surface of said member.

11. The apparatus of claim 7 wherein said shape-memory spring urges a pin in the first direction, and wherein each actuator includes a second spring for urging the pin in a second direction opposite to the first direction.

12. A system comprising:

a processor operating a program with a user interface, said processor having an output electrical signal corresponding to the user interface; and

a haptic display comprising a plurality of actuators, each said actuator including a pin capable of extending and retracting, a shape-memory spring for urging the pin in a direction, and a thermoelectric heater to heat said spring, said display including an electrical circuit for receiving the output electrical signal, said electrical circuit being in electrical communication with said heaters and operable to cause said heaters to heat said springs in response to the output signal;

wherein some of said pins of said display are in a pattern in response to the output signal, the pattern corresponding to the user interface.

22

13. The system of claim 12 which further comprises a clock, wherein the user interface is the time or the date.

14. The system of claim 12 which further comprises an automated teller machine, wherein the user interface includes financial data.

15. The system of claim 12 wherein said actuator includes a supporting mechanism for maintaining said pin in the extended position.

16. The apparatus of claim 12 wherein said shape-memory spring urges a pin in the first direction, and wherein each actuator includes a second spring for urging the pin in a second direction opposite to the first direction.

17. The apparatus of claim 12 wherein each said actuator includes a supporting mechanism for fixedly supporting said pin in an extended position.

18. An apparatus comprising:

a first pin having a first position;

a second pin having two ends and a projection intermediate of the two ends;

a first spring constructed and arranged for biasing said first pin and said second pin toward the first position, said first spring being fabricated from a shape-memory material;

a member defining a guide slot for said projection, said guide slot including a first rest for supporting said projection such that the first rest supports said projection when said first pin is in the first position; and a heater for heating said first spring;

wherein said first spring urges said first pin toward the first position in response to a first heating of said first spring.

19. The apparatus of claim 18 which further comprises a second spring constructed and arranged for biasing one of said first pin or said second pin in a direction away from the first position.

20. The apparatus of claim 18 which further comprises a capacitive discharge electrical power supply for providing electrical power to said heater, wherein said electrical power supply provides a variable voltage including a first voltage for quickly heating said first spring followed by a second voltage less than the first voltage.

21. The apparatus of claim 18 wherein said heater is a thermoelectric heating element using the Peltier effect for heating said first spring.

22. An apparatus comprising:

a pin having a first position;

a spoked member having a plurality of long sections;

a first spring for biasing said pin toward the first position, said first spring being fabricated from a shape-memory material;

a member defining a hole and including a rest and a channel arranged around the circumference of the hole, said channel permitting passage of a long section therethrough, said rest supporting a long section when said pin is in the first position; and

a heater for heating said first spring;

wherein said first spring urges said first pin toward the first position in response to a first heating of said first spring, and said spoked member supports said pin in the first position.

23. The apparatus of claim 22 wherein said spoked member includes a first plurality of teeth, and which further comprises a contact member with a second plurality of teeth, urging of said contact member toward the first position results in engagement of the first plurality of teeth with the second plurality of teeth.