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A Lock Element for a Lock Cylinder

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Abstract

The present invention relates to a lock cylinder for a lock and a lock element. The lock cylinder includes a plurality of first apertures. Each of the apertures is adapted to receive the locking element movable between a retracted position and a projecting position. The locking element includes a column, a key engaging surface, a biasing means engaging surface and a code carrying portion. The key engaging surface projects in a first direction with respect to the column. The biasing means engaging surface is spaced from the key engaging surface and projecting in a second direction with respect to the column. The code carrying portion is adapted to engage a corresponding bit of a key and extends in a third direction with respect to the column.

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A Lock Element for a Lock Cylinder

Technical Field

This invention is concerned with a lock element for a lock cylinder, particularly a wafer lock cylinder.

Background Art

Conventionally, customised keys have to be used to operate different types of locks. It is generally inconvenient to have to keep a large number of keys for different locks, for example, of the windows, doors, cupboards, garages, gates, etc. of a dwelling.

It is therefore desirable for the lock industry to provide a locking element adapted to cooperate with a wafer lock cylinder or barrel which may be operable by a key which may also be used to operate a pin tumbler lock barrel.

Summary of the Invention

According to one aspect of the present invention, there is provided a locking element for a lock cylinder, the locking element including:

a single column with an open top surface and an open bottom surface;

a key engaging surface projecting in a first direction with respect to the column;

a biasing means engaging surface being spaced from the key engaging surface and projecting in a second direction with respect to the column; and

a code carrying portion adapted to engage a corresponding bit of the key, the code carrying portion extending in a third direction being parallel to the column;

wherein the column is open-ended with nothing extending from or joined to its top or bottom surface.

According to another aspect of the present invention there is provided a lock cylinder for a lock, the cylinder including:

a plurality of apertures each of which being adapted to receive a locking element movable between a retracted position and a projecting position;

wherein the locking element includes a single column with an open top surface and an open bottom surface; a key engaging surface projecting in a first direction with respect to the column; a biasing means engaging surface being spaced from the key engaging surface and projecting in a second direction with respect to the column; and a code carrying portion adapted to engage a corresponding bit of a key, the code carrying portion extending in a third direction being parallel to the column; wherein the column is open-ended with nothing extending from or joined to its top or bottom surface.

Preferably, the locking element includes a reinforcing portion configured to strengthen a section of the column. When the locking element is in the projecting position, the section together with the reinforcing portion are adapted to enter a recess or aperture provided in a housing adapted to house the lock cylinder, thereby preventing the lock cylinder from rotating within the housing. More preferably, the reinforcing portion projects from the column in the first direction.

In a preferred embodiment, the key engaging surface forms an integral part of a wall projecting from the column in the first direction. The key engaging surface may include a first slanting face adapted to facilitate engagement with one or

more bits of the key as the key enters and advances in a key slot. In a preferred embodiment, the key engaging surface includes a second slanting face which mirrors the first slanting face. The wall in this embodiment may include the code carrying portion. The code carrying portion is configured such that it has a specifically selected height to suit the corresponding bit of the key. Once the key is inserted into the key slot, the code carrying portion in combination with the corresponding bit or serration of the key may be adapted to provide a clear shear line thereby permitting rotational movement of the lock cylinder inside a housing to be effected by the key.

Preferably, the housing includes a pair of recesses adapted to receive the section (of the column) and reinforcing portion when the locking element is biased to the projecting position by the biasing means. In this embodiment, the biasing means includes a spring. The housing may include a line of symmetry dividing the housing into two halves. The pair of recesses are preferred to be offset to opposing sides of the line of symmetry, respectively. The biasing means engaging surface in a preferred embodiment is a face of a branch projecting in the second direction.

The apertures are preferred to be arranged in a series being equally spaced and parallel to each other. Each aperture preferably has upper and lower portions. The upper portion in this embodiment is an F-shaped portion so configured to receive an L-shaped end portion of each locking element. The lower portion in this embodiment is a substantially T-shaped portion having a cylindrical section adapted to accommodate the biasing means.

Preferably, the lock cylinder has a chamfered section preventing it from rolling when not placed inside the housing.

Brief Description of the Invention

The various aspects of the invention will now be described in connection with a non-limiting example thereof as illustrated in the accompanying drawings, in which:

Figure 1 is an exploded perspective view of a lock cylinder together with a plurality of locking elements in accordance with a preferred embodiment of the present invention;

Figure 2a is a magnified perspective view (from the top) of one of the locking elements of Figure 1;

Figure 2b is a magnified perspective view (from the bottom) of the locking element of Figure 2a;

Figure 3a is a plan view of the lock cylinder of Figure 1, assembled with the locking elements;

Figure 3b is a side elevation of the assembled lock cylinder of Figure 3a;

Figure 3c is a bottom view of the assembled lock cylinder of Figure 3a;

Figure 4 is a magnified perspective view of the lock cylinder of Figure 3a, illustrating a chamfered section;

Figure 5 is a side view of a section of a housing for the lock cylinder of Figure 1; and

Figure 6 is a cross section view of the housing of Figure 5 having the lock cylinder therein and taken from the line A-A.

Detailed Description of the Invention

Referring to Figure 1, a lock cylinder 20 for a lock assembly (not shown) includes a series of apertures 22. Each of the apertures 22 is configured to receive a locking element 10 which is movable between a retracted position and a projecting position.

Turning now to Figures 2a and b, the locking element 10 includes a column 24, a key engaging surface, a biasing means engaging surface 26 and a code carrying portion 38. The key engaging surface projects in direction A with respect to the column 24. It includes a slanting face 28 which engages the cuts or serrations 32 of a key 34 as the key 34 enters and advances in a key slot 36. The key engaging surface also includes another slanting face 30 which mirrors the slanting face 28. The slanting face 30 engages the cuts and serrations 32 when the key 34 is inserted through from the key slot 36.

The biasing means engaging surface 26 is spaced from the slanting faces 28 and 30. It projects in direction B with respect to the column 24. The biasing means engaging surface 26 is the face of an arm 40 extending in direction C and having a rounded corner 42.

The code carrying portion 38 is configured such that it has a specifically selected height to suit a corresponding bit or serration of the key 34. Once the key 34 is inserted into the key slot 36, the code carrying portion 38 in combination with the corresponding bit or serration 32 of the key 34 provide a clear shear line thereby permitting rotational movement of the lock cylinder 20 inside a housing 76 to be effected by turning the key 34. The code carrying portion 38 extends in a direction B with respect to the column 24. The slanting faces 28 and 30 form an integral part of an L-shaped wall 44 projecting from the column in direction A. The code carrying portion 38 is associated with the slanting faces 28 and 30 via the L-shaped wall 44 with a rounded corner 46.

The locking element 10 also includes a reinforcing portion 48 projecting from the column 24 in direction A. The reinforcing portion 48 is provided and designed to strengthen an end section 50 of the column 24. When the locking element 10 is in the projecting position, the end section 50 together with the reinforcing portion 48 enter one of a pair of recesses 78 or 80(refer to Figures 5 and 6) provided in the housing 76 which houses the lock cylinder. As a result, the lock cylinder 10 is prevented from rotating within the housing.

The pair of recesses 78 and 80 is provided in the housing 76 to receive the end section 50 together with the reinforcing portion 48 when the locking element 10 is lined up with one of the recesses and hence allowed to move to the projecting position by a biasing means in the form of a coil spring 52 (refer to Figures 1 and 3c). Referring to Figures 5 and 6, the housing 76 has a line of symmetry 82 dividing the housing 76 into two halves and the pair of recesses 78 and 80 are offset to opposing sides of the line of symmetry 82, respectively. The recesses 78 and 80 are configured such that the reinforcing portion 48 and code carrying portion 38 can snugly fit into them.

Referring to Figures 1 and 3a to c, the apertures 22 are arranged in a series being equally spaced and parallel to each other. As best shown in Figure 3b and c, the apertures 22 extend through the entire width (ie. the diameter) of the lock cylinder 20. Each aperture 22 has an F-shaped upper portion 54 so configured to receive an L-shaped end portion 56 of each locking element 10. Each aperture 22 also has a substantially T-shaped lower portion 58 having a cylindrical section 60 which is configured to accommodate the spring 56. Although not visible from Figures 3a to c, a shoulder is provided at the end of the cylindrical section. During assembly, coil springs 52 are first fed into the respective cylindrical sections 60 through the respective lower portions 58. The locking elements 10 are then inserted into the respective apertures 22 through the respective lower portions

58. This means that one end of each spring 62 abuts the shoulder whilst the opposing end 64 abuts the biasing means engaging surface 26.

As the key 34 enters the key slot 36, the bits or serrations 32 engage the slanting faces 28 of the respective locking elements 10. This causes the locking means 10 to move to the retracted position thereby providing a clear shear line which allows the lock cylinder 20 to rotate. When a wrong or non-customised key is inserted into the key slot 36, one or more of the code carrying portions 38 will project out of the lock cylinder 20 into one of the two recesses provided in the housing thereby restricting any rotational movement of the lock cylinder 20.

As shown in Figures 1, 3b and 4, the lock cylinder 20 also includes a slot 68 which receives a wafer 70 having a return 72 for engaging a coil spring 74. The wafer 70 functions to engage a rear end of the housing so as to secure the lock cylinder 20 to the housing. The wafer 70 is movable between a retracted position which facilitates insertion of the lock cylinder 20 into the housing during assembly and a projecting position which effects engagement of the wafer 70 with the lock cylinder 20 upon completion of the assembly process.

Referring to Figure 4, the lock cylinder 20 has a chamfered section 66 preventing it from rolling when not placed inside the housing.

It will be appreciated by person skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the illustrated embodiment without departing from the spirit or scope of the invention as broadly described. The present embodiment is, therefore, to be considered in all aspects as illustrative but not restrictive.

Claims

1. A locking element for a lock cylinder, the locking element including:
a single column with an open top surface and an open bottom surface;
a key engaging surface projecting in a first direction with respect to the column;
a biasing means engaging surface being spaced from the key engaging surface and projecting in a second direction with respect to the column; and
a code carrying portion adapted to engage a corresponding bit of the key, the code carrying portion extending in a third direction being parallel to the column;
wherein the column is open-ended with nothing extending from or joined to its top or bottom surface.

2. The locking element of claim 1, which includes a reinforcing portion configured to strengthen a section of the column.

3. The locking element of either claim 1 or 2, wherein the key engaging surface forms an integral part of a wall projecting from the column in the first direction.

4. The locking element of any one of the preceding claims, wherein the key engaging surface includes a first slanting face adapted to facilitate engagement with one or more bits of the key as the key enters and advances in a key slot.

5. The locking element of claim 4, wherein the key engaging surface includes a second slanting face which mirrors the first slanting face.

6. The locking element of any one of claims 3 to 5, wherein the wall includes the code carrying portion.

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7. The locking element of any one of the preceding claims, wherein the code carrying portion is configured such that it has a selected height to suit the corresponding bit of the key.

8. The locking element of any one of claims 4 to 7, wherein the code carrying portion in combination with the corresponding bit or serration of the key is adapted to provide a clear shear line, once the key is inserted into the key slot.

9. A lock cylinder for a lock, the cylinder including a plurality of first apertures each of which being adapted to receive a locking element movable between a retracted position and a projecting position;
wherein the locking element includes:
a single column with an open top surface and an open bottom surface;
a key engaging surface projecting in a first direction with respect to the column;
a biasing means engaging surface being spaced from the key engaging surface and projecting in a second direction with respect to the column; and
a code carrying portion adapted to engage a corresponding bit of a key, the code carrying portion extending in a third direction being parallel to the column;
wherein the column is open-ended with nothing extending from or joined to its top or bottom surface.

10. The lock cylinder of claim 9, wherein the locking element includes a reinforcing portion configured to strengthen a section of the column.

11. The lock cylinder of claim 10, wherein the reinforcing portion projects from the column in the first direction.

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12. The lock cylinder of either claim 10 or 11, wherein when in the projecting position, the section together with the reinforcing portion are adapted to enter a recess or second aperture provided in a housing adapted to house the lock cylinder, thereby preventing the lock cylinder from rotating within the housing.

13. The lock cylinder of either claim 11 or 12, wherein once the key is inserted into the key slot, the code carrying portion in combination with the corresponding bit or serration of the key is adapted to provide a clear shear line thereby permitting rotational movement of the lock cylinder inside the housing to be effected by the key.

14. The lock cylinder of any one of claims 11 to 13, wherein the housing includes a pair of recesses adapted to receive the section and reinforcing portion when the locking element is biased to the projecting position by the biasing means.

15. The lock cylinder of any one of claims 9 to 14, wherein the biasing means includes a spring.

16. The lock cylinder of any one of claims 11 to 15, wherein the housing includes a line of symmetry dividing the housing into two halves.

17. The lock cylinder of any one of claims 14 to 16, wherein the pair of recesses are offset to opposing sides of the line of symmetry, respectively.

18. The lock cylinder of any one of claims 9 to 17, wherein the biasing means engaging surface is a face of a branch projecting in the second direction.

19. The lock cylinder of any one of claims 9 to 18, wherein the first apertures are arranged in a series being equally spaced and parallel to each other.

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20. The lock cylinder of claim 19, wherein each first aperture has upper and lower portions.

21. The lock cylinder of claim 20, wherein the upper portion is an F-shaped portion so configured to receive an L-shaped end portion of each locking element.

22. The lock cylinder of either claim 20 or 21, wherein the lower portion is a substantially T-shaped portion having a cylindrical section adapted to accommodate the biasing means.

23. The lock cylinder of any one of claims 9 to 22, which has a chamfered section preventing it from rolling when not placed inside the housing.

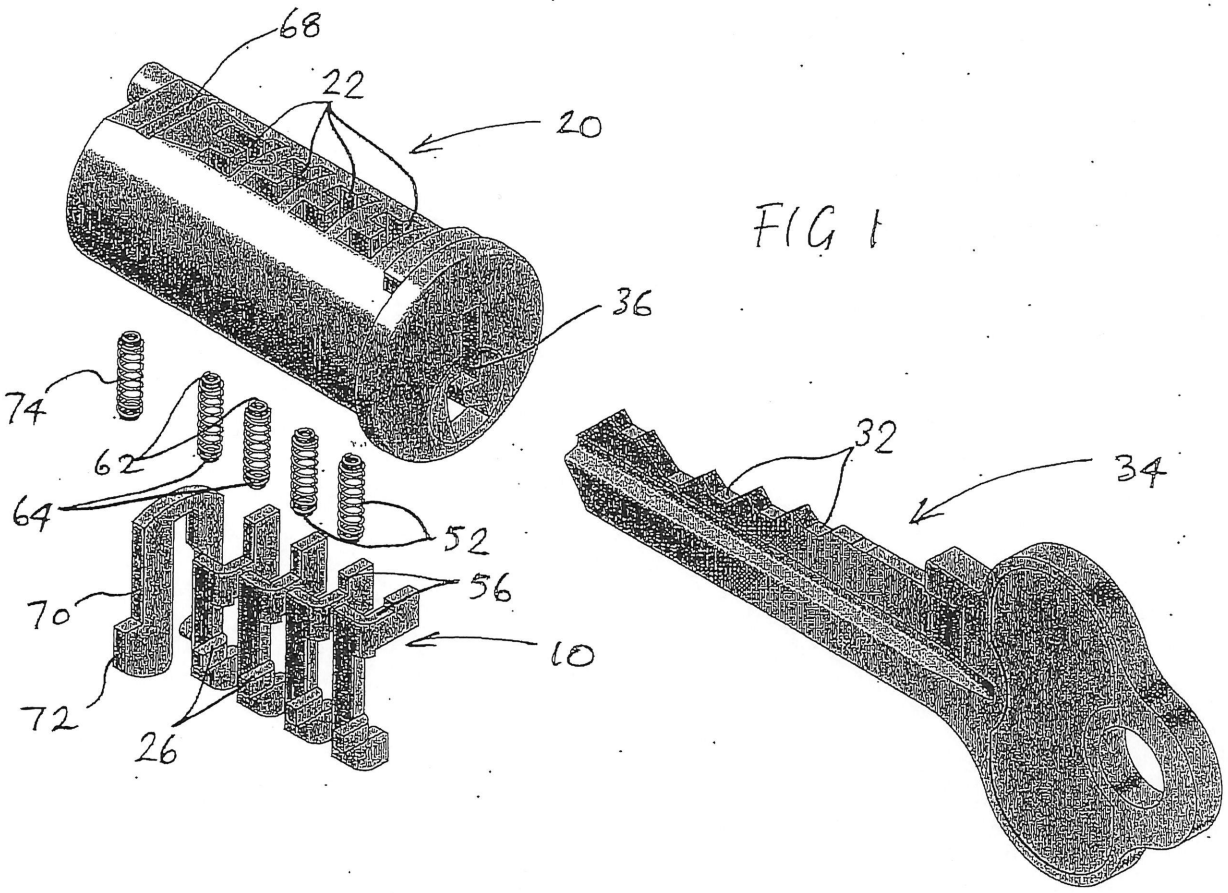
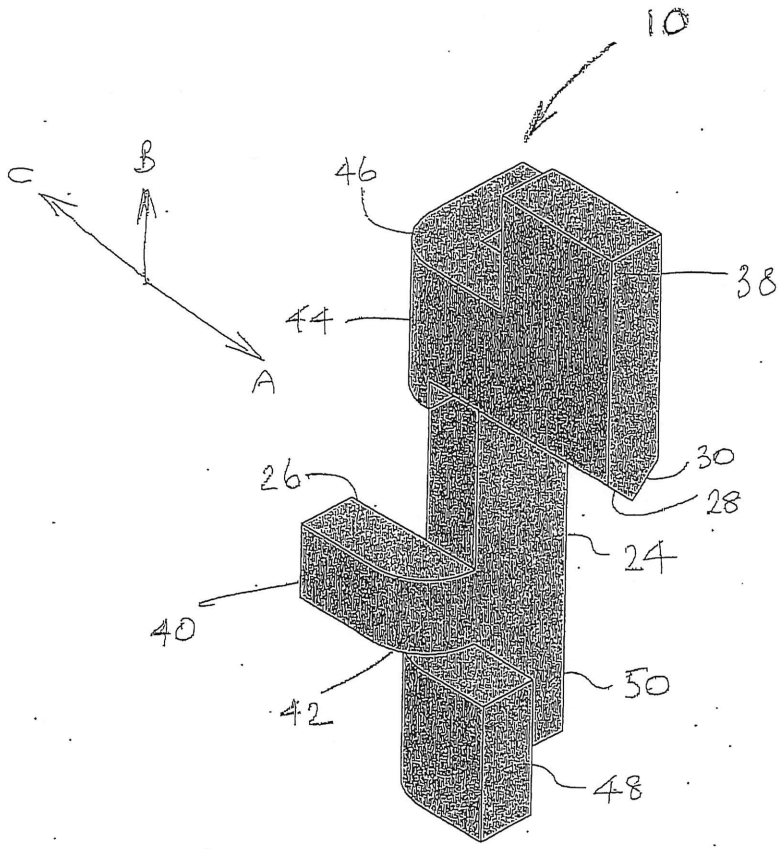


FIG 1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C
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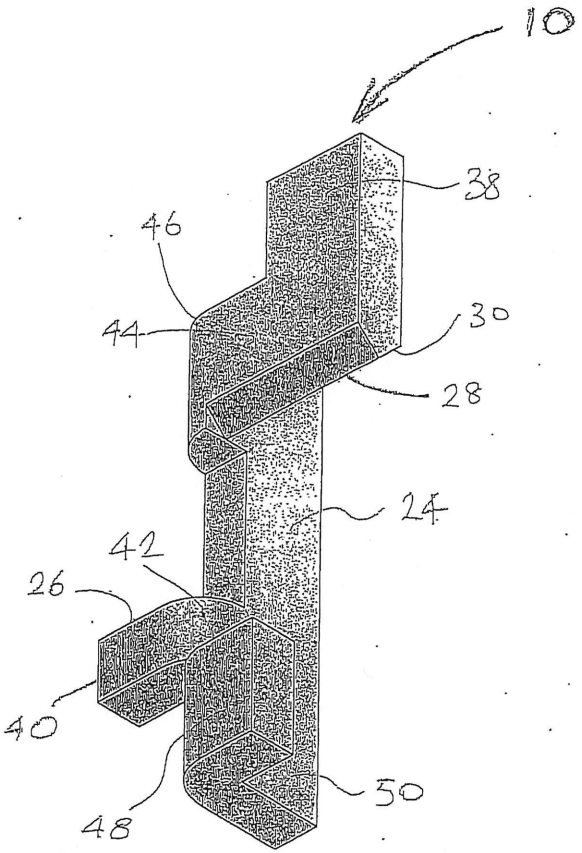
FIG 2a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48
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FIG 2b

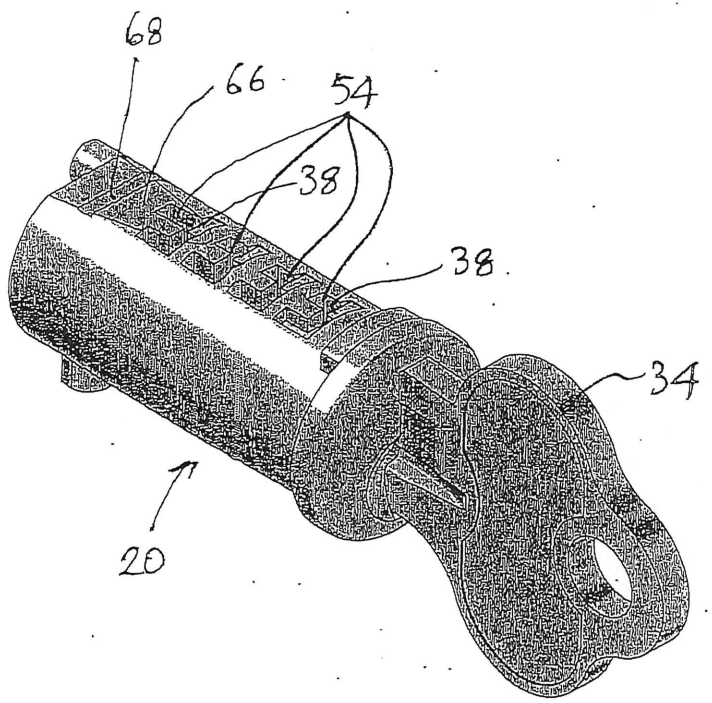

FIG 4

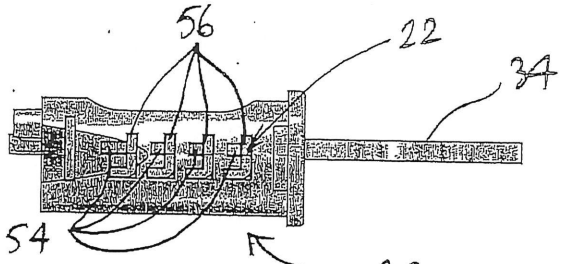

FIG 3a

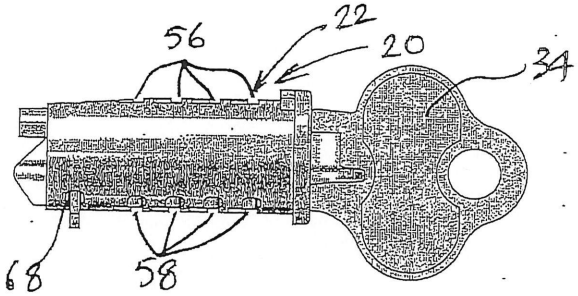

FIG 3b

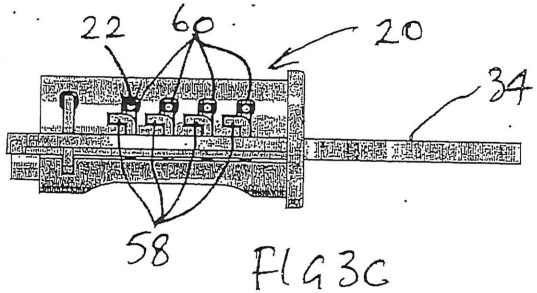

FIG 3c

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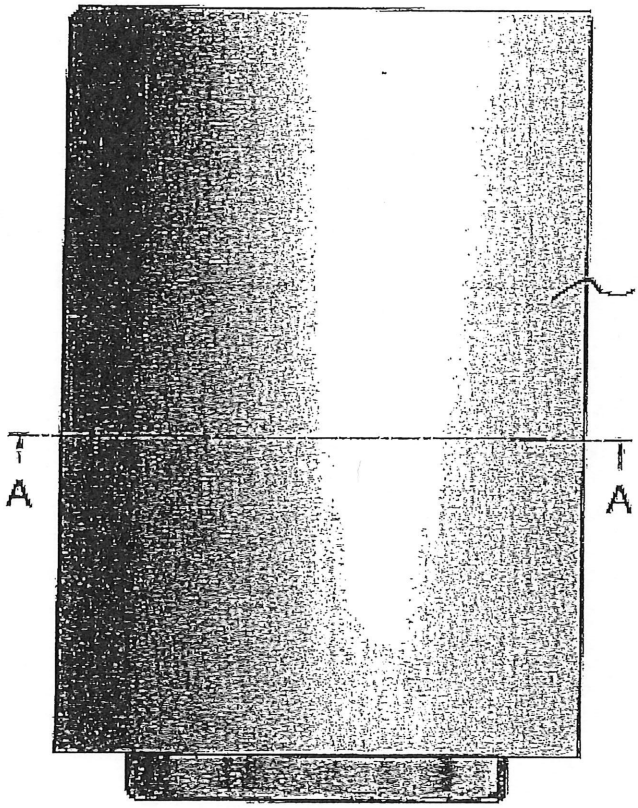

FIG 5

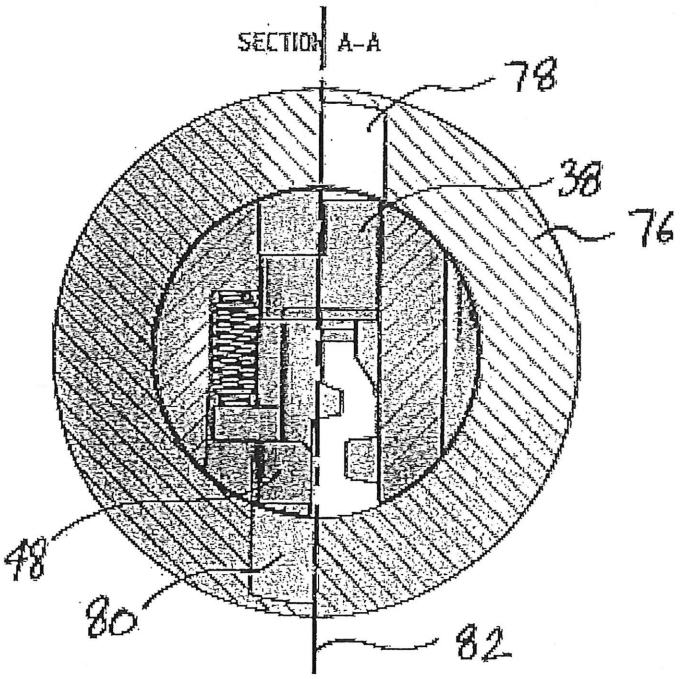

FIG 6