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(56) Documents Cited:
GB 2177749 A **US 2413782 A**
US 2213171 A

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INT CL **E05B, E05C**
Other: **WPI, EPODOC**

(54) Abstract Title: **Foot operated bolt assembly**

(57) A foot operated bolt assembly includes a casing 3 and a bolt 1 slidably mounted therein for movement between an upper, retracted, position and a lower, extended, position. A resilient biasing means 6 biases the bolt 1 into the upper, retracted, position and a mechanism 4,5 is linked to the bolt 1 such that the bolt can be pressed down into the lower, extended, position by the pressing down of a foot and the bolt 1 can be moved from the lower, extended, position into the upper, retracted, position by a further pressing down and subsequent release of a foot, the bolt 1.

When the bolt is in its upper position foot pressure causes the bolt to move down against bias. Member 5 which is rotatably mounted on the bolt has formations 14 which can pass through channels 17 inside member 4. When the formations 14 on the fully depressed member 5 engage formations 20 on a lower member 7 the member 5 is rotated so that the formations 14 are not aligned with the channels 17 and the bolt is retained in the lower position. Subsequent depression of the bolt causes a further rotation of member 5 so that formations 14 re-align with the channels 17 and allow the bolt to rise under bias.

FIG. 1

FIG. 4

FIG. 5

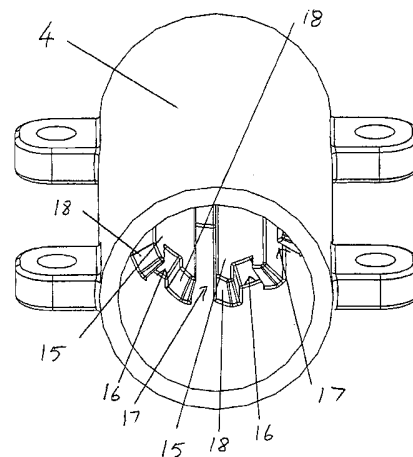
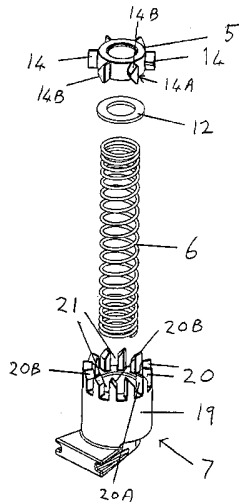
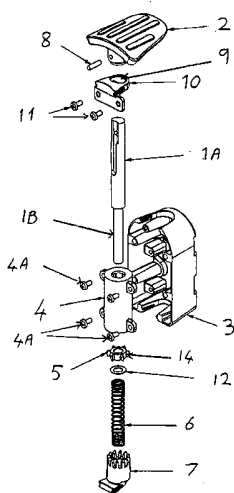


FIG. 2

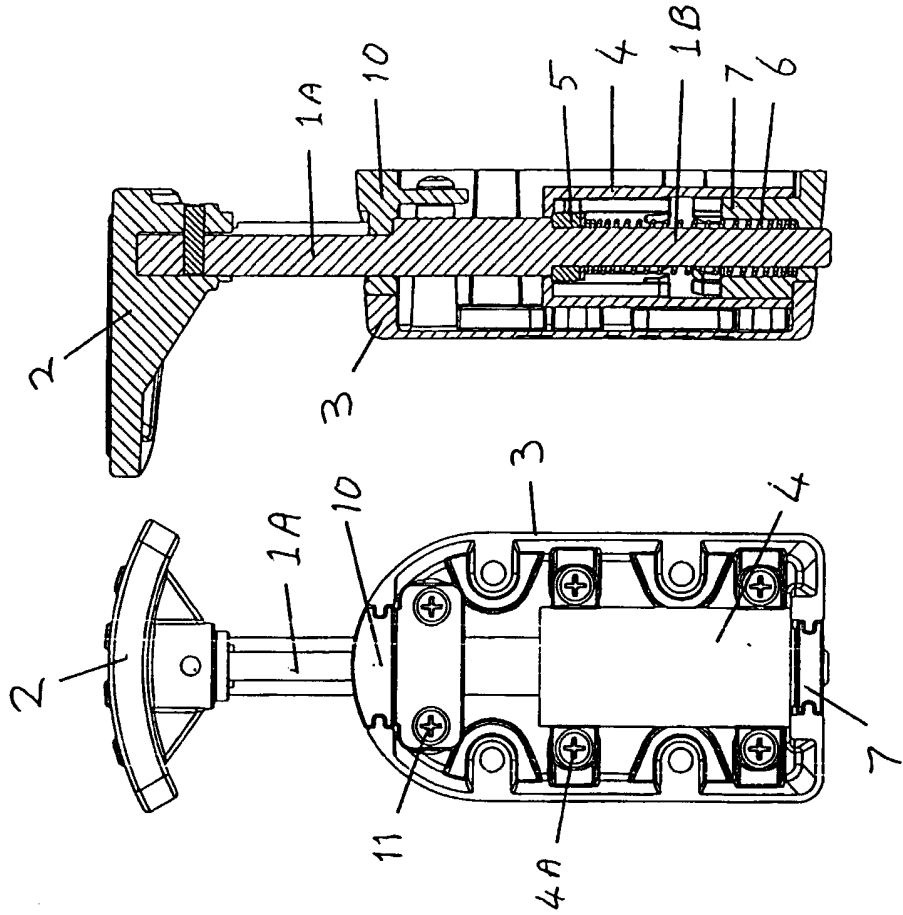


FIG. 1

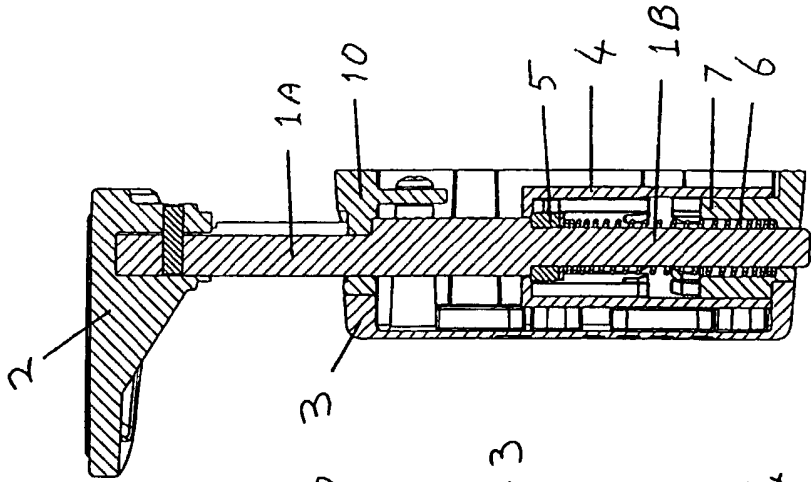
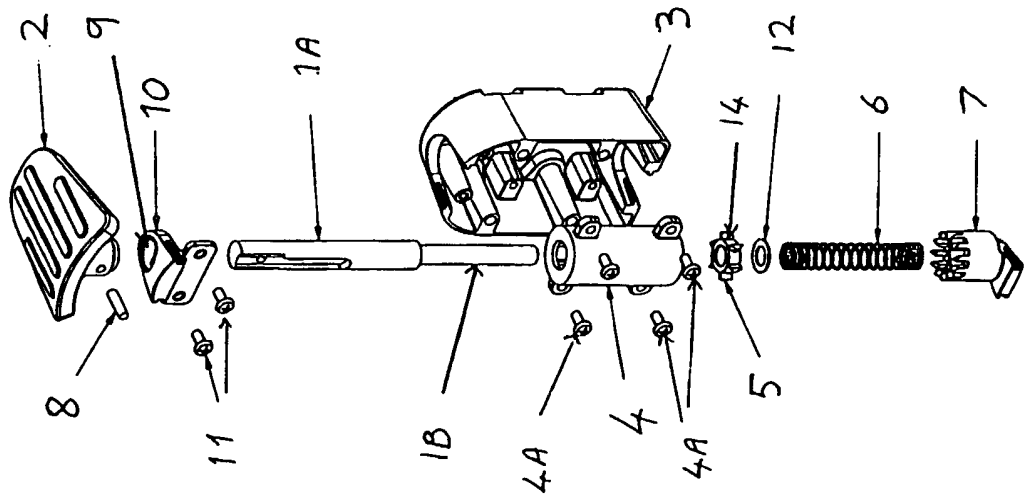


FIG. 5

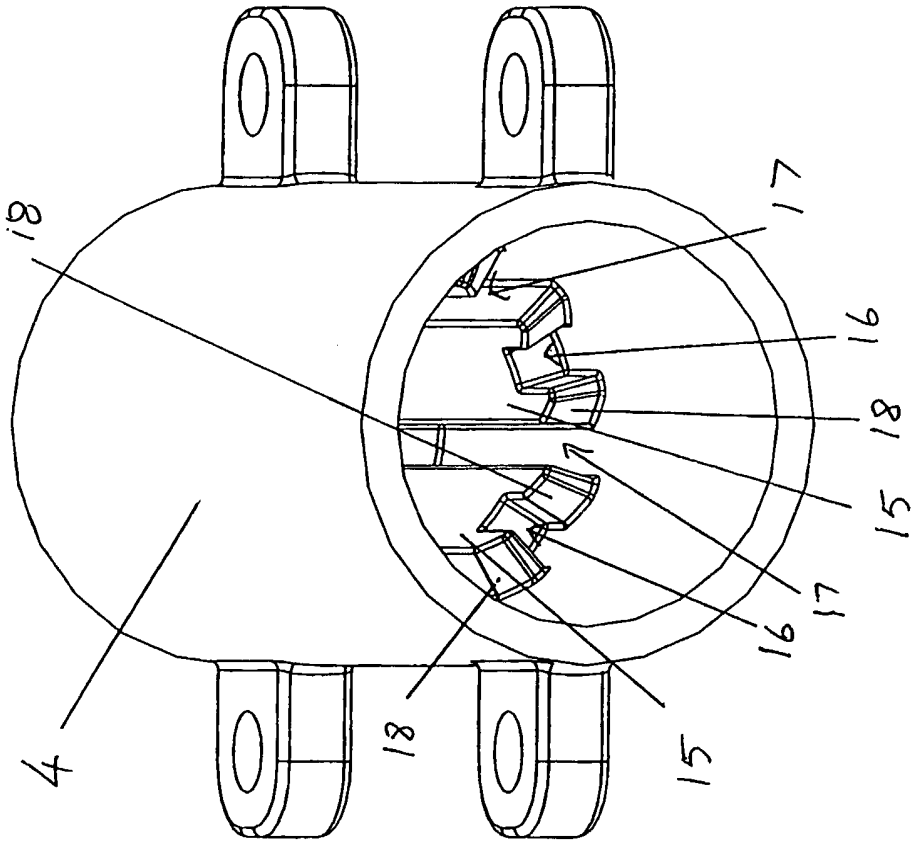
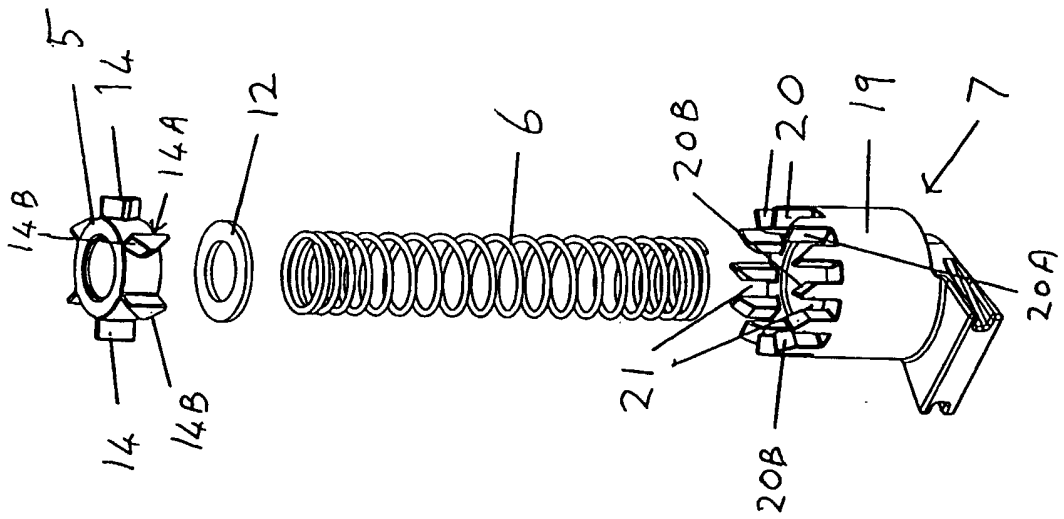


FIG. 4



Foot Bolt Assembly

This invention relates to a foot operated bolt assembly. Such an assembly may be provided, for example, at the bottom of a door to provide added security, with the bolt of the assembly being able to be inserted into an opening in the ground.

Foot bolt assemblies are already known but they are often awkward to operate. Sometimes, locking of the assembly by lowering the bolt can be easily accomplished by a user employing their foot but it is commonly not so simple to raise the bolt to unlock the assembly. According to the invention there is provided a foot operated bolt assembly including a casing, a bolt slidably mounted in the housing for movement between an upper, retracted, position and a lower, extended, position, resilient biasing means for biasing the bolt into the upper, retracted, position, and a mechanism linked to the bolt such that the bolt can be pressed down into the lower, extended, position by the pressing down of a foot and the bolt can be moved from the lower, extended, position into the upper, retracted, position by pressing down and subsequent release of a foot, the bolt moving into the upper, retracted, position under the bias of the resilient biasing means following the release of the foot.

By providing an assembly in which the bolt is both extended and retracted by the action of a user pressing

down with a foot, it becomes very simple to operate the assembly both for extending and retracting the bolt.

The bolt may include upper and lower portions, the lower portion for effecting a latching action when the bolt is in the lower, extended, position and the upper portion including an upwardly directed face for receiving a user's foot, the upper and lower portions being in fixed relationship to one another. With such an arrangement when the bolt is pressed into the extended position the force on the bolt is applied directly and therefore a substantial upward or downward force can readily be transmitted between the upper and lower portions of the bolt.

Preferably the upper portion of the bolt is arranged to allow a user to apply an upwardly directed force on the bolt. For example, the upper portion of the bolt may include a portion that projects laterally outwardly, for example in the form of a pedal, to provide a top surface for receiving a user's foot and also a surface underneath on which an upward lifting force may be applied, either by a user's hand or foot. The ability to provide such an upwardly directed force is useful in the event that the bolt becomes held in the ground for some reason (for example, in the case of a door bolt, because the door has become deformed); in that case the resilient bias alone may not be sufficient to raise the bolt.

Preferably, the mechanism includes a motion limiting member which is linked to the bolt in such a way that downward movement of the bolt relative to the motion

limiting member beyond a predetermined limit position is prevented. Preferably, upward movement of the bolt relative to the motion limiting member from the predetermined limit position is allowed. Such movement will not normally take place, however, simply because of the gravitational force on the bolt.

The motion limiting member preferably comprises a ring shaped member through which the bolt passes and the predetermined limit position of the bolt relative to the ring shaped member is defined by engagement of a shoulder on the bolt with the ring shaped member. The motion limiting member is preferably biased upwardly by the resilient biasing means. The resilient biasing means may be a spring, for example a compression spring and may be located around the bolt.

The mechanism is preferably arranged to provide a series of alternating upper, retracted, and lower, extended, positions for the bolt and to move from one position to the next upon each cycle of movement of the bolt. The series of alternating positions are preferably defined by a slotted cylindrical member which has alternating deep and shallow slots around its periphery. The motion limiting member is preferably provided with radially projecting parts which are engagable in the slots of the slotted cylindrical member. The motion limiting member preferably rotates in steps as the bolt moves from one position to another and is preferably rotatably mounted on the bolt while the bolt is mounted in the casing for

linear translational movement without rotation. Such mechanisms are known *per se* and are already used in a different way in other applications, for example in a ball point pen.

5 By way of example, an embodiment of the invention will now be described with reference to the accompanying drawings, of which:

Fig. 1 is an exploded view of a foot operated bolt assembly;

10 Fig. 2 is a rear view of the assembly of Fig. 1;

Fig. 3 is a sectional side view of the assembly of Fig. 1;

Fig. 4 is an exploded perspective view to a larger scale of some of the parts of the assembly of
15 Fig. 1; and

Fig. 5 is a perspective view from below to a still larger scale of one of the parts of the assembly of Fig. 1.

The foot operated bolt assembly shown in the drawings
20 generally comprises a bolt member 1, a pedal 2, a casing 3, a cylindrical member 4, a spinner 5, a compression spring 6 and an end cap 7.

The bolt member 1 has an upper portion 1A and a lower portion 1B of smaller diameter than the upper portion 1A,
25 with a shoulder 1C defined at the interface of the upper and lower portions. The pedal 2 is fixed to the top of the upper portion 1A of the bolt member by a pin 8. The upper portion 1A of the bolt member is of non-circular cross-

section and is slidably received in an opening 9 of the same non-circular cross-section in a bolt guide 10 that is fixed by screws 11 to the casing 3 and mounts the bolt member 1 for sliding vertical movement relative to the casing 3 whilst preventing rotary movement of the bolt member 1.

The lower portion 1B of the bolt member 1 carries the spinner 5 at its upper end with the compression spring 6 surrounding the lower portion 1B and being sandwiched between a washer 12 adjacent to the spinner 5 and the bottom of the casing 3, in which there is an aperture to allow the bottom of the lower portion 1B of the bolt member to extend downwardly from the casing 3. In Fig. 3 the bolt member is shown in its upper retracted position with the spinner 5 in its uppermost position inside the cylindrical member 4 and at the top of the cylindrical member 4, which is fixed to the casing 3 by screws 4A.

The spinner 5 is provided with radially extending fins 14 which, as shown in Fig. 4, have vertical faces 14A on one side and inclined faces 14B on their other side. As shown in Fig. 5, the cylindrical member 4 is provided internally with longitudinal ribs 15 which are shaped to provide shallow slots 16 and deep slots 17 around the interior of the member 4. The shallow slots 16 and deep slots 17 alternate around the interior of the member 4. The slots are dimensioned to receive the fins 14 on the spinner 5. In Fig. 3, the fins 14 are received in the deep slots 17, allowing the spinner 5 to rise up to the top of

the interior of the member 4. The ribs 15 are also shaped to provide a vertical side to one side of each slot 16, 17 and an inclined side 18 to the other side of each slot.

The end cap 7 includes a cylindrical portion 19 through which the lower portion 1B of the bolt member 1 passes. The top of the cylindrical portion 19 is formed with upstanding parts 20 which define grooves 21 therebetween, the grooves 21 being dimensioned to receive the fins 14 on the spinner 5. As shown in Fig. 4, the upstanding parts 20 are each formed with a vertical face 20A on one side and an inclined face 20B at the top of the opposite side.

The operation of the assembly will now be described, starting from the position of the parts shown in Fig. 3, with the bolt member 1 in its upper, retracted, position. A user presses with his foot on the top of the pedal 2 moving the bolt member downwardly, which in turn moves the spinner 5 down, against the bias of the spring 6. As the spinner 5 moves down, the fins 14 become disengaged from the slots 17 and the inclined faces 14B on the spinner engage the inclined faces 20B on the cylindrical portion 19 of the end cap 7, causing the spinner to rotate slightly and move down into the grooves 21 in the end cap 7. When the fins 14 on the spinner 5 reach the bottoms of the grooves 21 in the end cap 7, further downward movement of the spinner 5 is prevented and, by virtue of the engagement of the shoulder 1C of the bolt member on the spinner 5, further downward movement of the bolt member 1 is also

prevented. When a user then releases his foot pressure from the pedal 2, the spinner 5 and the bolt member 1 are moved upwards under the bias of the spring 6. As the fins 14 of the spinner 5 reach the cylindrical member 4, then as a result of the rotation of the spinner 5 during its downward movement, the inclined faces 14B of the spinner engage the inclined sides 18 of the ribs 15, causing further rotation of the spinner 5 and causing the fins 14 on the spinner 5 to enter the shallow slots 16. Thus the upward movement of the spinner 5 is limited and the bolt member does not return to its original retracted position. This position of the bolt member 1, corresponding to the fins 14 on the spinner 5 engaging in the shallow slots 16 represents the lower, extended, position of the bolt member and in this position the lower portion 1B of the bolt member projects from the casing 3 into a hole in the ground to lock, for example a door, to the bottom of which the casing 3 is attached.

When a user again presses with his foot on the top of the pedal 2, the bolt member 1 and the spinner 5 move down against the bias of the spring 6 and the fins 14 on the spinner engage the inclined faces 20B on the cylindrical portion 19 of the end cap 7, again causing the spinner to rotate slightly and move down into the grooves 21 in the end cap 7. When a user then releases his foot pressure from the pedal 2, the spinner 5 and the bolt member 1 are moved upwards under the bias of the spring 6 and, as the fins 14 of the spinner 5 reach the cylindrical member 4

then, as a result of the further rotation of the spinner 5 during its downward movement, the inclined faces 14B of the spinner engage the inclined sides 18 of the ribs 15, causing further rotation of the spinner 5 and causing the fins 14 on the spinner 5 to enter the deep slots 17 so that the parts return to the position shown in Fig. 3 and one cycle of operation is complete. It will be appreciated that with further cycles of operation the spinner 5 is further rotated and the movement of the bolt member 1 to an extended position and then back to a retracted position is repeated.

A further feature of the assembly described above avoids the bolt member 1 becoming stuck in an extended position. If, for example, the door on which the assembly is mounted becomes warped, the bolt member 1 may become wedged in an opening in the floor and the force of the spring 6 may not itself be sufficient to raise the bolt member 1. In that case, a user may apply an upward force to the pedal 2 and that is transmitted directly to the lower portion 1B of the bolt member 1.

Claims:

1. A foot operated bolt assembly including a casing, a bolt slidably mounted in the housing for movement between an upper, retracted, position and a lower, extended, position, resilient biasing means for biasing the bolt into the upper, retracted, position, and a mechanism linked to the bolt such that the bolt can be pressed down into the lower, extended, position by the pressing down of a foot and the bolt can be moved from the lower, extended, position into the upper, retracted, position by pressing down and subsequent release of a foot, the bolt moving into the upper, retracted, position under the bias of the resilient biasing means following the release of the foot.
2. An assembly according to claim 1, in which the bolt includes upper and lower portions, the lower portion for effecting a latching action when the bolt is in the lower, extended, position and the upper portion including an upwardly directed face for receiving a user's foot, the upper and lower portions of the bolt being in fixed relationship to one another.
3. An assembly according to claim 2, in which the upper portion of the bolt includes a pedal.
4. As assembly according to claim 2 or 3, in which the upper portion of the bolt is arranged to allow a user to apply an upwardly directed force on the bolt.
5. An assembly according to any preceding claim, in which the mechanism includes a motion limiting member which is linked to the bolt in such a way that downward movement of

the bolt relative to the motion limiting member beyond a predetermined limit position is prevented.

6. An assembly according to claim 5, in which upward movement of the bolt relative to the motion limiting member
5 from the predetermined limit position is allowed.

7. An assembly according to claim 5 or 6, in which the motion limiting member comprises a ring shaped member through which the bolt passes and the predetermined limit position of the bolt relative to the ring shaped member is
10 defined by engagement of a shoulder on the bolt with the ring shaped member.

8. An assembly according to any of claims 5 to 7, in which the motion limiting member is biased upwardly by the resilient biasing means.

15 9. An assembly according to any preceding claim, in which the mechanism is arranged to provide a series of alternating upper, retracted, and lower, extended, positions for the bolt and to move from one position to the next upon each cycle of movement of the bolt.

20 10. An assembly according to claim 9, in which the series of alternating positions are defined by a slotted cylindrical member which has alternating deep and shallow slots around its periphery.

11. An assembly according to claim 10, when dependent upon
25 any of claims 5 to 8, in which the motion limiting member is provided with radially projecting parts which are engagable in the slots of the slotted cylindrical member.

12. An assembly according to claim 11, in which the motion limiting member rotates in steps as the bolt moves from one position to another.

13. An assembly according to claim 12, in which the motion
5 limiting member is rotatably mounted on the bolt and the bolt is mounted in the casing for linear translational movement without rotation.

14. A foot operated bolt assembly substantially as herein described with reference to the accompanying drawings.

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Examiner: Philip Silvie

Claims searched: 1-13

Date of search: 19 October 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6, 9 at least	GB 2177749 A (SUGATSUNE) see figs. 3,4
X	1-4, 9 at least	US 2413782 A (PUMPHREY) see figs. 1-4
X	1-3, 9 at least	US 2213171 A (PUTNAM) see figs. 1-3

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

E2A

Worldwide search of patent documents classified in the following areas of the IPC

E05B; E05C

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
E05C	0017/44	01/01/2006