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(54) Door stop apparatus

(57) A door stop apparatus (10) comprising a blocking mechanism (12); an operating mechanism (14); and a mechanical linkage (16,18) for coupling the blocking mechanism (12) to the operating mechanism (14). The blocking mechanism (12) comprises a blocking member (20) movable between a blocking state and non-blocking state under control of the operating mechanism (14) via the mechanical linkage (16,18). The mechanical linkage (16,18) is dimensioned so that the operating mechanism (14) may be located remotely of the blocking mechanism (12). When installed, the spacing between the blocking mechanism (12) and the operating mechanism (14) is such that a person located outside the door is unable to operate the operating mechanism (14) using an unaided limb, while a person located inside the door is able to operate simultaneously both the blocking mechanism (12) and the operating mechanism (14).

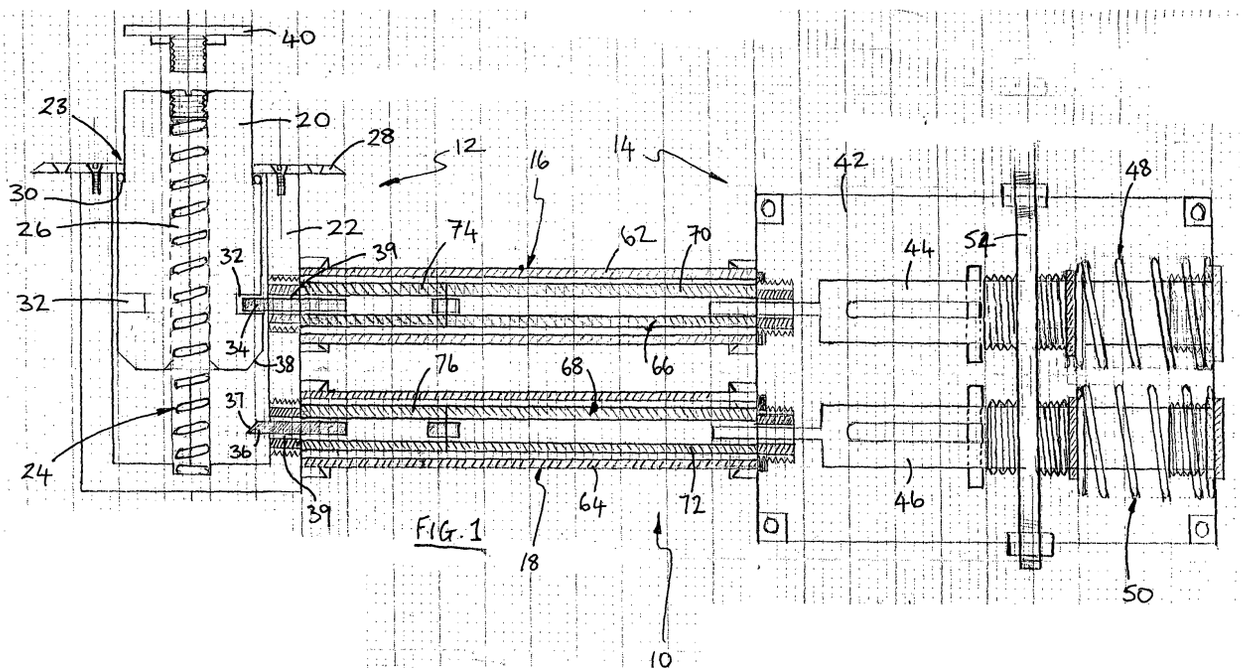

FIG. 1

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Description

Field of the Invention

[0001] The present invention relates to door stops, especially security door stops.

Background to the Invention

[0002] The purpose of a security door stop is to restrict the amount by which a door can open to the extent that a would-be intruder cannot pass through the doorway. Such door stops are therefore located on, or immediately adjacent, the door. Commonly, a door stop includes a blocking mechanism which, when in a blocking state, is adjacent, but spaced-apart from, a door and is located in the path of the door as the door moves from a closed to an open state. Hence, the blocking mechanism allows the door to open only partially but prevents it from opening fully by engaging with the door as it opens. A problem with conventional door stops is that they can be disengaged by a persistent intruder because of their proximity to the door.

Summary of the Invention

[0003] Accordingly, a first aspect of the invention provides a door stop apparatus comprising a blocking mechanism; an operating mechanism; and means for coupling the blocking mechanism to the operating mechanism, the blocking mechanism comprising a blocking member movable between a blocking state and non-blocking state under control of the operating mechanism via the coupling means, wherein the coupling means comprises mechanical linkage means dimensioned so that the operating mechanism may be located remotely of the blocking mechanism.

[0004] In the preferred embodiment, the arrangement is such that the operating mechanism may be spaced-apart from the blocking mechanism such that it is located beyond the reach of a person located beyond the door with respect to the blocking means. In particular, the spacing is such that said person cannot reach the operating mechanism with an unaided limb, especially an arm.

[0005] Advantageously, the spacing between the operating mechanism and the blocking mechanism is such that a person may step on the blocking mechanism with one foot while operating the operating mechanism with the other foot. The operating mechanism and blocking mechanism may be spaced-apart by at least 0.5 metres and more preferably at least 0.6 metres, but preferably less than 1.2 metres. Typically, the spacing is between 0.6 and 1.0 metres.

[0006] Preferably, the apparatus further includes means for biasing the blocking member into the blocking state; and retaining means operable between a retaining state, in which the retaining means retains the blocking member in the non-blocking state against the bias of the biasing means, and a non-retaining state, said retaining means being operable by said mechanical linkage means.

[0007] Advantageously, said retaining means comprises a retractable member operable by said mechanical linkage means between an extended state and a retracted state, the blocking member including means for engaging with the retractable member when in the extended state thereby retaining the blocking member in the non-blocking state. The retractable member may take the form of, for example, a bar or pin and the engaging means may take the form of, for example, a recess or groove formed in the blocking member.

[0008] Preferably, the blocking member and the retractable member include respective co-operable surfaces that are arranged to engage when the blocking member moves from the blocking state to the non-blocking state, the surfaces being shaped such that said engagement and movement causes the retractable member to be moved to the retracted state. To this end, a portion, for example the base or underside, of the blocking member may be chamfered to provide a surface that is oblique with respect to the direction of movement of the blocking member. The end or tip of the retractable member may be correspondingly chamfered.

[0009] Preferably, the apparatus further includes maintaining means operable between a maintaining state, in which the maintaining maintains the blocking member in the blocking state, and a non-maintaining state, wherein said maintaining means is operable by said mechanical linkage means.

[0010] Advantageously, said maintaining means comprises a retractable member operable by said mechanical linkage means between an extended state and a retracted state, the blocking member including means for engaging with the retractable member when in the extended state thereby maintaining the blocking member in the blocking state. The retractable member may take the form of, for example, a bar or pin and the engaging means may take the form of, for example, a recess or groove formed in the blocking member.

[0011] In a preferred embodiment, a recess or groove is formed in the blocking member and serves as the engaging means for both the retractable member of the retaining means and the retractable member of the maintaining means.

[0012] In the preferred embodiment, the respective retractable members are spaced apart in a direction substantially parallel with the direction of movement of the blocking member. Typically, the blocking member is housed in a housing, the housing including two spaced apart apertures though which a respective of the retractable members may project into the housing.

[0013] In preferred embodiments, said mechanical linkage means includes at least one linkage assembly comprising a sleeve and a movable member located inside the sleeve, the movable member being movable in

a direction generally parallel with the longitudinal axis of the sleeve, and wherein the sleeve and the movable member are formed at least partially from flexible material. The movable member may for example take the form of a rod or tube disposed generally coaxially with the sleeve. The movable member preferably comprises at least two sections, at least one section being more flexible than another section.

[0014] In the preferred embodiment, the mechanical linkage means includes a respective linkage assembly for each of the retaining means and the maintaining means.

[0015] Preferably, the operating mechanism includes means for actuating the movable member of said at least one linkage assembly, said actuating means being coupled to at least one operating device at least part of which is exposed by the operating mechanism for operating by a user. In preferred embodiments, the actuating means is coupled to one end of the movable member, the other end of the movable member being coupled to a respective one of the retractable members. In the preferred embodiment, a respective operating device is provided for each linkage assembly and may comprise, for example, a pedal or handle.

[0016] The retractable members are preferably biased, for example spring biased, to adopt the extended state. Biasing means, for example a respective spring, may be provided in, for example, the operating mechanism. The biasing means may be coupled to the actuating means, said at least one operating device serving to actuate the actuating means against the bias of the biasing means.

[0017] A second aspect of the invention comprises a door stop installation comprising said door stop apparatus, wherein the blocking mechanism is at least partially embedded in a floor adjacent a door and the operating mechanism is at least partially embedded in the floor beyond the blocking mechanism with respect to the door, the spacing between the blocking mechanism and the operating mechanism being such that a person located outside the door is unable to operate the operating mechanism using an unaided limb, while a person located inside the door is able to operate simultaneously both the blocking mechanism and the operating mechanism.

[0018] Further advantageous aspects of the invention will become apparent to those ordinarily skilled in the art upon review of the following description of a specific embodiment of the invention and with reference to the accompanying drawings.

Brief Description of the Drawings

[0019] An embodiment of the invention is now described by way of example and with reference to the accompanying drawings in which like numerals are used to indicate like parts and in which:

Figure 1 presents a sectioned view of a door stop apparatus embodying the invention;

Figure 2 presents a sectioned side view of an operating mechanism of the apparatus of Figure 1;

Figure 3 presents a plan view of a blocking mechanism of the apparatus of Figure 1;

Figure 4 presents a plan view of a preferred embodiment of the operating mechanism;

Figure 5 presents a side view of part of the operating mechanism of Figure 4, including two pedals;

Figures 6A and 6B show the pedals in side view; and

Figures 6C and 6D show the pedals in plan view.

Detailed Description of the Drawings

[0020] Referring now to Figure 1 of the accompanying drawings, there is shown, generally indicated as 10, a door stop apparatus embodying the invention. The apparatus 10 comprises a blocking mechanism 12 and an operating mechanism 14 mechanically interlinked by coupling means comprising a first and a second linkage means in the form of linkage assemblies 16, 18. The operating mechanism 14 and blocking mechanism 12 are spaced-apart from one another, the distance between the two depending on the length of the linkage assemblies 16, 18. The arrangement is such that the blocking mechanism 12 may be operated remotely by the operating mechanism 14 as is described in more detail hereinafter.

[0021] The blocking mechanism 12 comprises a blocking member, or bar 20, housed within a housing 22 which has an open mouth 23. The blocking bar 20 is actuatable between a non-blocking state (not illustrated), in which the bar 20 is located substantially within the housing 20, and a blocking state (as shown in Figure 1) in which at least a portion of the bar 20 protrudes from the housing 22 through the mouth 23. In the preferred embodiment, the bar 20 is resiliently or spring biased to adopt the blocking state, for example under the action of biasing means in the preferred form of a spring 24 located within the housing 22. The spring 24 may be provided in any suitable manner but, in the preferred embodiment, the bar 20 is provided with a spring-receiving bore 26 in which the spring 24, which is preferably a compression spring, is seated. One end of the spring 24 engages with an internal surface of the housing 22, the other end engaging with the bar 20 from within the bore 26.

[0022] A flange 28 is preferably provided wholly or partially around, and projecting inwardly of, the mouth 23 of the housing 22. A co-operating shoulder 30 is pro-

vided on the bar 20. In the blocking state, the shoulder 30 engages with the flange 28 to limit the extent of the travel of the bar 20 outwardly of the housing 22. Preferably, a washer or O-ring is seated on the shoulder 30 (or under the flange 28) to absorb some of the impact generated by the engagement of the flanges 28, 30.

[0023] The bar 20 is provided with engaging means in the preferred form of a groove or recess 32 which is shaped and dimensioned to receive first retractable member in the preferred form of a locking bolt 34 or a second retractable member in the form of a release bolt 36 as is described in more detail hereinafter. The bar 20 is also shaped to define a chamfered portion, or cam surface 38 for engagement with a compatibly shaped or chamfered portion 37 of the release bolt 36 as is described in more detail hereinafter. It is preferred that both the recess 32 and the cam surface 38 extend around substantially the whole periphery of the bar 20 in a plane that is substantially perpendicular to the direction of movement of the bar 20 between the blocking and non-blocking states. The housing 22 comprises one or more apertures 39 for receiving the locking and release bolts 34, 36 and through which the bolts 34, 36 may enter the housing 22.

[0024] In the preferred embodiment, the bar 20 and the housing 22 (or at least the portion of the housing 22 that houses the bar 20) are substantially cylindrical in shape. It is also preferred that the bar 20 is provided with an adjustable end piece 40 on its, in use, upper end. The end piece 40 is adjustable with respect to the bar 20 such that the effective length of the bar 20 is adjustable. This may, for example, be achieved by providing the end piece 40 with a threaded portion and the end of the bar 20 with a corresponding threaded portion. During use, the height of the end piece 40 with respect to the upper end of the bar 20 may be adjusted to suit the level of the floor (not shown) in which the blocking mechanism 12 is mounted. This allows the end piece 40 to be substantially flush with the floor when in the non-blocking state. If desired, a portion of flooring, e.g. carpet, tile or floorboard (not shown), may be located on the in use upper surface of the end piece 40.

[0025] The preferred embodiment of the operating mechanism 14 comprises a housing 42 in which there is provided actuating means in the preferred form of a first and a second actuator 44, 46. Each actuator 44, 46 is coupled to a respective one of the locking or release bolts 34, 36 via a respective one of the linkage assemblies 16, 18. Each actuator 44, 46 is resiliently, or spring, biased to urge the respective bolt 34, 36, via the respective linkage assembly 16, 18, into a respective engaged, or extended, state. To this end, in the illustrated embodiment, each actuator 44, 46 is provided with a respective compression spring 48, 50, although other biasing means may be used. Each actuator 44, 46 is actuatable against the bias of the spring 48, 50 to move the respective locking or release bolts 34, 36, via the respective linkage assembly, into a respective retracted state (not illustrated).

[0026] In the preferred embodiment, each actuator 44, 46 is coupled to a respective operating device in the preferred form of an operating pedal 52 (only one shown-Figure 2) so that operation of either of the pedals causes the respective actuator 44, 46 to move against the bias of the respective spring 48, 50 thereby causing the respective bolt 34, 36 to adopt its retracted state. By way of example, each pedal may be pivotably mounted on a rod 54 disposed substantially perpendicularly to the direction of movement of the actuators 44, 46 and coupled to the respective actuator 44, 46 by means of a respective pin-and-slot mechanism 56 (only one shown — Figure 2). For example, each actuator 44, 46 may carry a respective pin 58 (only one shown) which may be located in a respective closed slot (not illustrated) or open-ended recess 60 (only one shown), the slot or recess 60 being formed in an extension to the respective pedal 52 which is located beyond the rod 54 with respect to the pivot point. The arrangement is such that pivoting movement of the respective pedal 52, and therefore of the slot/recess 60, causes generally linear movement of the respective actuator 44, 46.

[0027] During use, the blocking mechanism 12 is rotated through approximately 90° with respect to the operating mechanism 14 in comparison with the relative orientation shown in Figure 1. This is because, in the preferred embodiment, the pedals 52 are arranged side-by side, while the respective bolts 34, 36 are located, during use, one above the other. Hence, the linkage assemblies 16, 18 are bent or twisted during use from a side-by-side arrangement adjacent the operating mechanism 14 to an over-and-under arrangement adjacent the blocking mechanism 12. To facilitate this, the linkage assemblies 16, 18 preferably comprise flexible components. In the preferred embodiment, each assembly 16, 18 comprises a respective outer sleeve or tube 62, 64 formed from a flexible, semi-rigid material, e.g. plastics, PVC; and a respective movable member in the form of, for example, an inner tube 66, 68 located inside the respective outer tube and coupled between a respective actuator 44, 46 and bolt 34, 36. The inner tubes 66, 68 preferably comprise a respective first section or component 70, 72 having one end coupled to the respective actuator 44, 46; and a respective second section or component 74, 76 having one end connected to the respective first component 70, 72, the other end being connected to or coupled to the respective bolt 34, 36. The first components 70, 72 may be formed from the same, or similar, semi-rigid flexible material from which the outer tubes 62, 64 are formed. The second components 74, 76 may be formed from a more flexible material or less rigid material, e.g. rubber or plastics, than that from which the tubes 62, 64 are formed, which allows force to be transmitted via the second component 74, 76 but which exhibits a relatively low resilience to being bent or twisted. The relatively high rigidity or stiffness of the first components 70, 72 allows force to be

transmitted from the actuators 44, 46 to the bolts 34, 36 relatively efficiently, e.g. without causing buckling in the first components 70, 72, while still being sufficiently flexible to allow a degree of bending or twisting. However, the relative lack of resilience in the second components 74, 76 reduces frictional forces that would otherwise arise between the inner tube 66, 68 and the outer tube 62, 64 and so allows relatively smooth movement of the respective bolts 34, 36. This tends to reduce wear on the bolts 34, 36 and surrounding components.

[0028] In use, the apparatus 10, and more particularly the bar 20, may initially adopt the non-blocking state. In this state, the release bolt 36 engages with the recess 32 and is held in this engaged state by the action of spring 50. As a result, the bar 20 is retained in its non-blocking state against the bias of spring 24.

[0029] Upon actuation of the respective pedal 52 by a user (not shown), the release bolt 36 is withdrawn from the extended or engaged state (and therefore out of engagement with the recess 32). As a result, the bar 20 is actuated into the blocking state under the action of spring 24. When the bar 20 adopts the blocking state, the locking bolt 34 is aligned with and therefore engages with the recess 32 and is held in this engaged state by the action of spring 48. The locking bolt 34 prevents the bar 20 from being returned to the non-blocking state by the application of force directly to the upper end of the bar 20 (e.g. by a would-be intruder's foot).

[0030] When it is desired to retract the bar 20 to the non-blocking state, the user first actuates the pedal associated with actuator 44 to withdraw the locking bolt 34 from its engaged state (and therefore from the recess 32). The user holds the bolt 34 in this state, typically by means of having one foot on the respective pedal 52, and simultaneously pushes the bar 20 into the housing 22 (i.e. into the non-blocking state), typically by means of his other foot. As the bar 20 is pushed into the housing 22, the chamfered portion 38 of the bar 20 engages with the chamfered portion 37 of the release bolt 36 thereby displacing the bolt 36 towards its retracted state and allowing further ingress of the bar 20 into the housing 22. When the bar 20 reaches the non-blocking state, the release bolt 36 is aligned with and therefore engages with the recess 32 to hold the bar 20 in the non-blocking state.

[0031] When installed, the blocking mechanism 12 is located adjacent the door (not shown) in order to allow only limited opening of the door and the operating mechanism 14 is located remotely from the door so that it cannot readily be operated by a would-be intruder. It is envisaged that the operating mechanism be located approximately a stride's length away from the door so that the user can operate the operating mechanism 14 with one foot while pushing in the bar 20 with the other.

[0032] Conveniently, most of the apparatus 10 may be located underfloor so that only the pedals 52 and the bar 20 (when in the blocking state) are visible. Hence, the apparatus 10 is visually unobtrusive. Advantageously, the pedals 52 may be removed, for example when the apparatus 10 is not in use, to further reduce the obtrusiveness of the apparatus 10. This is facilitated by the open ended recesses 60 on the pedals 52 which allow the pedals 52 to be readily disengaged from the pins 58. In such cases, the pedals 52 may rest on, or pivot about, the rod 54. Such an embodiment is described in more detail below with reference to Figures 4 to 6.

[0033] In Figures 4 to 6, there is shown an operating mechanism 114 that is generally similar to operating mechanism 14 and to which similar descriptions apply. Figure 4 shows the operating mechanism 114 in plan view including first and second pedals 52A, 52B. Pedal 52A operates, during use, actuator 44 (not shown in Figure4) and pedal 52B operates, during use, actuator 46 (not shown). The housing 142 includes a cover plate 143 in which a respective aperture 145A, 145B is formed for each pedal 52A, 52B. A respective portion 147A, 147B of each pedal 52A, 52B extends into the respective aperture 145A, 145B such that the respective recess 60 engages with the rod 54. A respective guide plate 149A, 149B (and preferably a respective pair of spaced apart guide plates) extends into the housing 142 from the respective aperture 145A, 145B adjacent the respective pedal portions 147A, 147B. During use, the guide plates 149A, 149B may guide the movement of the respective pedals 52A, 52B but, advantageously, guide the respective recess 60 into engagement with the rod 54 when the pedals are being installed. It is preferred that the foot-receiving portion 151A one of the pedals 52A extends in a direction generally perpendicular to the pivotal axis of the pedal 52A (as defined by rod 54), while the foot-receiving portion 151B one of the pedals 52B extends in a direction generally parallel with the pivotal axis of the pedal 52B. This facilitates operation of the pedals.

[0034] In alternative embodiments, the operating mechanism need not necessarily be operable by means of pedals. Other operating means, for example buttons, levers or handles, may be provided and may for example be, during use, hand operated or foot operated.

[0035] The apparatus is not limited to the embodiment described herein which may be modified or varied without departing from the scope of the invention.

Claims

1. A door stop apparatus comprising a blocking mechanism; an operating mechanism; and means for coupling the blocking mechanism to the operating mechanism, the blocking mechanism comprising a blocking member movable between a blocking state and non-blocking state under control of the operating mechanism via the coupling means, wherein the coupling means comprises mechanical linkage means dimensioned so that the operating mechanism may be located remotely of the blocking mech-

anism.

2. A door stop apparatus as claimed in Claim 1, further including means for biasing the blocking member into the blocking state; and retaining means operable between a retaining state, in which the retaining means retains the blocking member in the non-blocking state against the bias of the biasing means, and a non-retaining state, said retaining means being operable by said mechanical linkage means.

3. A door stop apparatus as claimed in Claim 2, wherein said retaining means comprises a retractable member operable by said mechanical linkage means between an extended state and a retracted state, the blocking member including means for engaging with the retractable member when in the extended state thereby retaining the blocking member in the non-blocking state.

4. A door stop apparatus as claimed in Claim 3, wherein the blocking member and the retractable member include respective co-operable surfaces that are arranged to engage when the blocking member moves from the blocking state to the non-blocking state, the surfaces being shaped such that said engagement and movement causes the retractable member to be moved to the retracted state.

5. A door stop apparatus as claimed in any one of Claims 1 to 4, further including maintaining means operable between a maintaining state, in which the maintaining maintains the blocking member in the blocking state, and a non-maintaining state, wherein said maintaining means is operable by said mechanical linkage means.

6. A door stop apparatus as claimed in Claim 5, wherein said maintaining means comprises a retractable member operable by said mechanical linkage means between an extended state and a retracted state, the blocking member including means for engaging with the retractable member when in the extended state thereby maintaining the blocking member in the blocking state.

7. A door stop apparatus as claimed in any one of Claims 3, 4 or 6, wherein said engaging means comprises a recess formed in the blocking member.

8. A door stop apparatus as claimed in any one of claims 1 to 7, wherein said mechanical linkage means includes at least one linkage assembly comprising a sleeve and a movable member located inside the sleeve, the movable member being movable in a direction generally parallel with the longitudinal axis of the sleeve, and wherein the sleeve and the movable member are formed at least partially from flexible material.

9. A door stop apparatus as claimed in Claim 8, wherein the operating mechanism includes means for actuating the movable member of said at least one linkage assembly, said actuating means being coupled to at least one operating device at least part of which is exposed by the operating mechanism for operating by a user.

10. A door stop installation comprising a door stop apparatus as claimed in any preceding claim, wherein the blocking mechanism is at least partially embedded in a floor adjacent a door and the operating mechanism is at least partially embedded in the floor beyond the blocking mechanism with respect to the door, the spacing between the blocking mechanism and the operating mechanism being such that a person located outside the door is unable to operate the operating mechanism using an unaided limb, while a person located inside the door is able to operate simultaneously both the blocking mechanism and the operating mechanism.

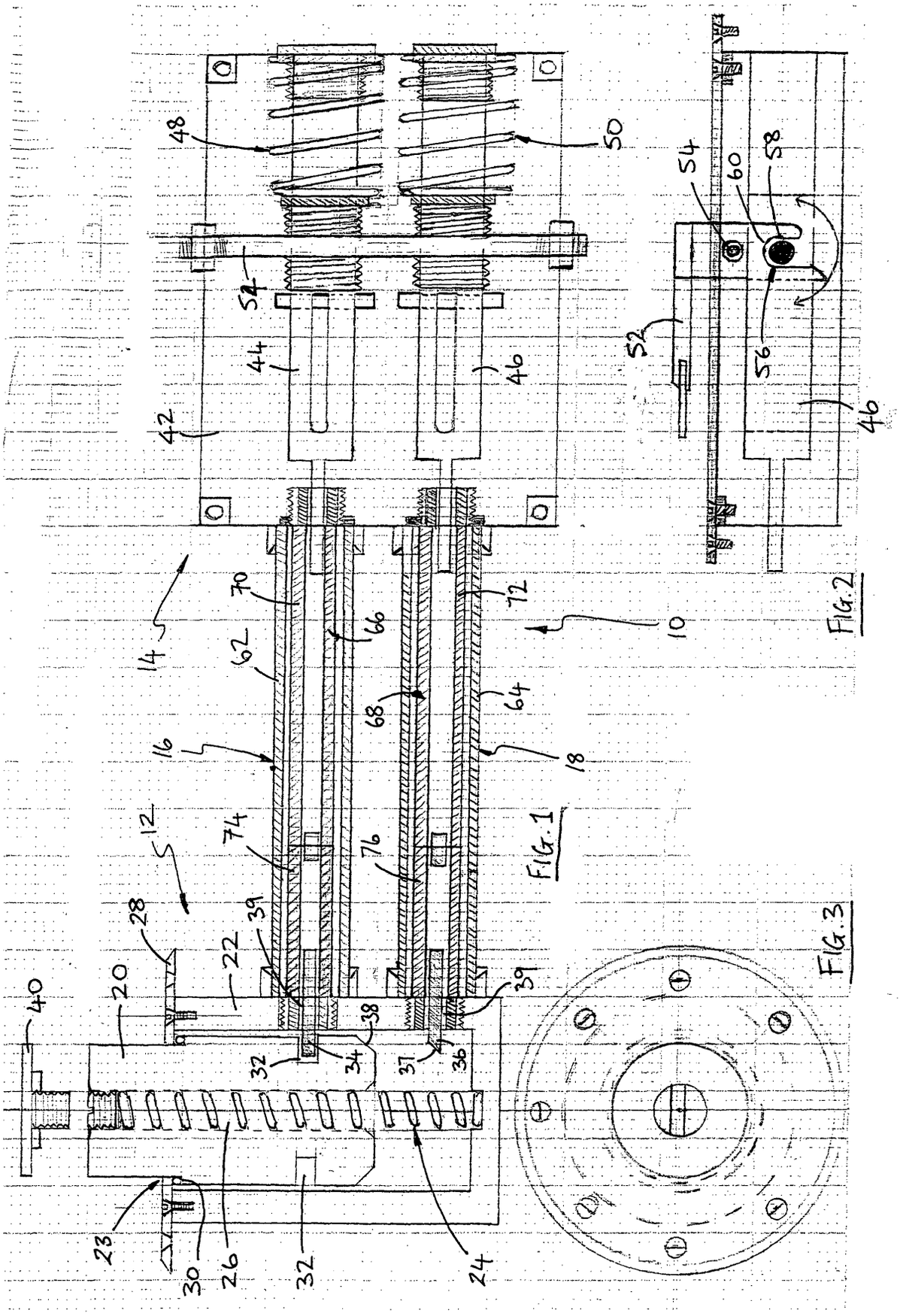

FIG. 1

FIG. 2

FIG. 3

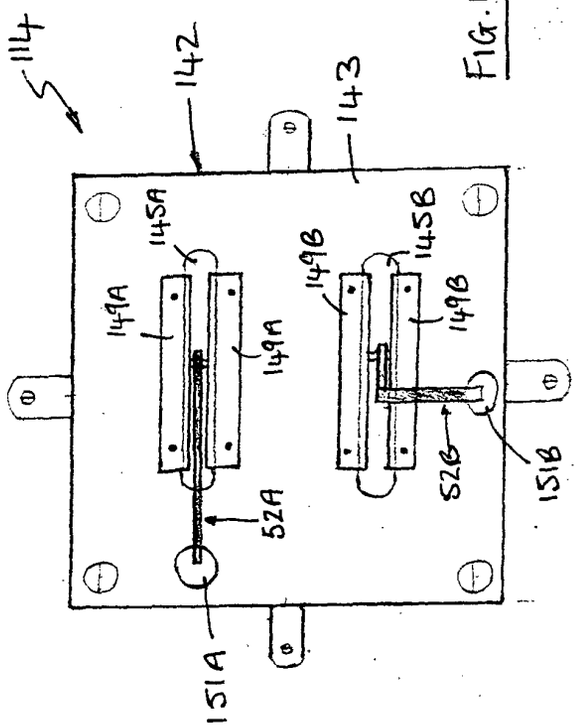

FIG. 4

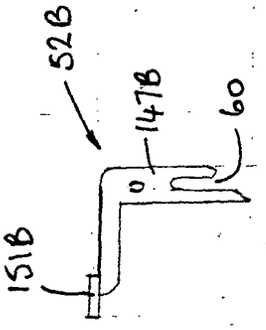

FIG. 6B

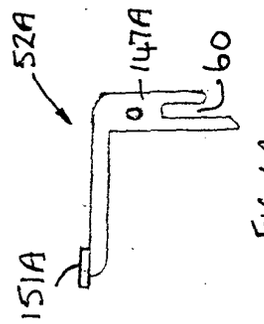

FIG. 6A

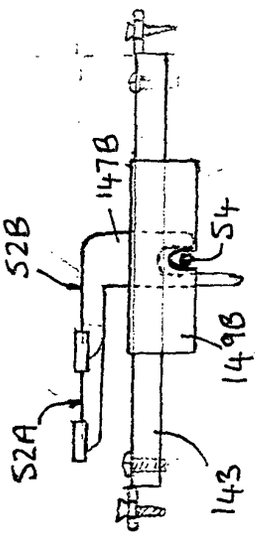

FIG. 5

FIG. 6D

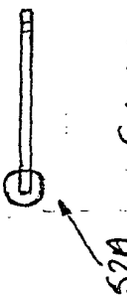

FIG. 6C

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 07 5506

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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X	US 4 303 266 A (VOLPI ET AL) 1 December 1981 (1981-12-01) * column 3, line 39 - line 63; figure * -----	1-3,5,6, 10	
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X	US 1 701 302 A (GRIFFITH CHARLES A) 5 February 1929 (1929-02-05) * page 1, line 104 - page 2, line 25; figure * -----	1,5,10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 June 2005	Pieracci, A

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82