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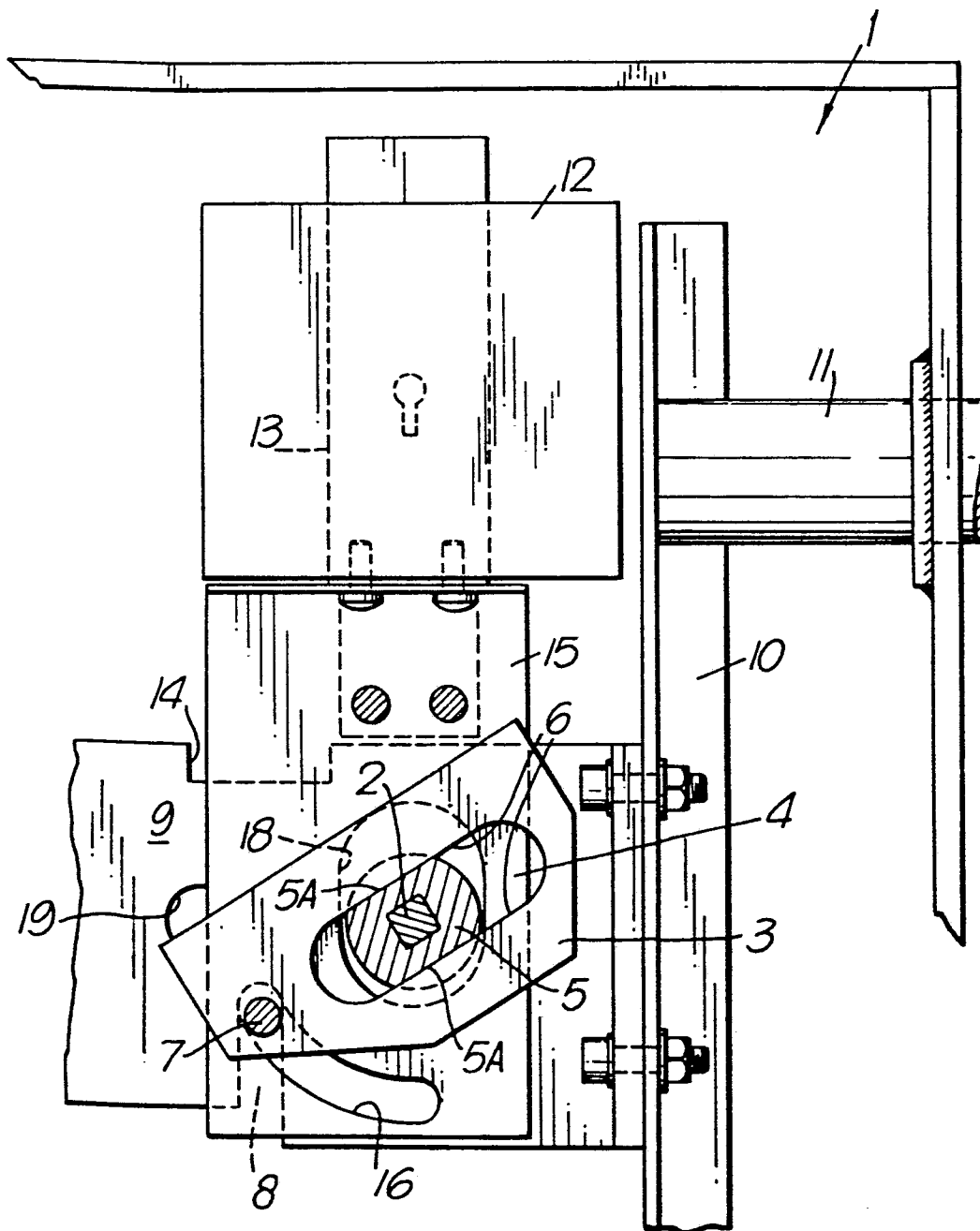
(54) **Bolt mechanism, and security enclosure having such a bolt mechanism.**

(57) A bolt mechanism for the door (1) of a safe has bolts (11) which are thrown by a crank arm (3) turned by a spindle (2) connected to an external handle, the crank arm carrying a pin (7) which runs in a drive slot (8) in a bar (9) connected to the bolt strap (10). A plate (15) is carried by the bolt (13) of a lock (12) so that when the safe bolts (11) are thrown and the lock operated the plate (15) carries the crank pin (7) clear of the drive slot (8), the crank arm (3) being slidable transversely on the spindle for this purpose. This operation isolates the connecting bar (9) from the spindle to prevent the application of force to the boltwork through the spindle in the sense tending to withdraw the boltwork.

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Fig. 1.



TITLE MODIFIED
see front page

1.

Bolt Mechanisms.

The present invention relates to bolt mechanisms, and more particularly is concerned with bolt mechanisms for safes, vaults, strongrooms and the like security enclosures.

It is common for the bolts on the door of a safe or the like to be thrown into engagement with the body of the safe by means of a handle on the outside of the door, and then to be locked in the thrown condition by a separate key or combination lock. The throwing mechanism typically comprises a crank attached to a spindle turned directly or indirectly by the handle. The crank-pin operates on the bolts via a scotch-yoke (i.e. the pin slides in a slot extending at right angles to the required direction of motion) of a connecting bar attached to the bolt strap. The same mechanism is also used to withdraw the boltwork from its thrown condition, and moreover is liable to be used in an attack on the safe to put force on the boltwork. Specifically, there is the disadvantage that force can be applied through the handle in the sense to tend to withdraw the boltwork from its thrown condition against the action of the locking mechanism.

It is an aim of the invention to provide a form of bolt mechanism that may be used to overcome the above disadvantage, and accordingly in one aspect the invention resides in a bolt mechanism for the door of a security enclosure comprising a manually operable member accessible from without the enclosure; mechanical transmission

2.

means for coupling said member to the boltwork of the door for throwing and withdrawing the same; and means for selectively disengaging the coupling of said member to the boltwork when the boltwork is in its thrown condition, at least to the extent of preventing the transmission of force from said member to the boltwork to tend to withdraw the same.

Preferably the disengaging means are operatively associated with a lock for selectively locking the boltwork when in its thrown condition, whereby operation of the lock acts to disengage the coupling of the manually operable member to the boltwork as aforesaid. This need not necessarily be the case, however, and it is also possible, for example, for the disengaging means to be embodied as an independent key or combination operated mechanism, separate from any such lock.

In a preferred embodiment the mechanical transmission means comprise a crank arm rotatable by the manually operable member and carrying a crank pin which is engageable in a drive slot in a linearly movable transmission member operatively associated with the boltwork, so that when engaged rotation of the crank arm and pin in either sense imparts linear motion to the transmission member in a corresponding sense to throw or withdraw the boltwork; and the disengaging means are operable to disengage the crank pin from the drive slot at least in the sense of force transmission from the pin to the transmission member tending to withdraw the boltwork. The disengagement of the crank pin from the drive slot may be effected by a movement of the crank arm and pin in a direction transverse to the rotational axis thereof, in which case the crank arm may be provided with a slot within which is received a flat-sided rotary drive member operatively associated with the manually operable member, thereby to permit both the transmission of rotary motion from the drive member to the crank arm upon manipulation of the manually operable member and motion of the crank arm relative to

3.

the drive member in a said transverse direction upon operation of the disengaging means.

In another embodiment the mechanical transmission means comprise a rotary drive member operatively associated with the manually operable member and adapted to rotate a crank arm to throw and withdraw the boltwork, and the disengaging means are operable to disengage the crank arm from the drive member to the extent of preventing the transmission of rotary motion therebetween.

The invention also provides, per se, a safe, vault, strongroom or the like security enclosure of which the door comprises a bolt mechanism in accordance with the foregoing.

These and other features of the invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates a bolt mechanism in accordance with the invention installed within a safe door, being shown in the condition which pertains when the safe bolts are withdrawn;

Figure 2 illustrates the mechanism of Figure 1 in the condition which pertains when the safe bolts are thrown and the lock operated;

Figure 3 illustrates a modification to the mechanism of Figures 1 and 2, being shown in the condition which pertains when the safe bolts are withdrawn; and

Figure 4 illustrates the mechanism of Figure 3 in the condition which pertains when the safe bolts are thrown and the lock operated.

Referring to Figure 1, a handle (not shown) is mounted externally of the door 1 and has a spindle 2 that extends through the door to be coupled to a crank arm 3. More particularly the spindle 2 extends into a slot 4 in the arm 3 and is there fitted with a bush 5 that has flats 5A which contact the opposite walls 6 of the slot 4. The arm 3 accordingly turns with the spindle 2 under torque applied to the

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handle, but can slide transversely with respect to the rotational axis of the spindle 2.

The arm 3 carries a crank pin 7 to engage in a drive slot 8 of a scotch-yoke coupling to a connecting bar 9. The connecting bar is
5 mounted to slide longitudinally and is coupled to a strap 10 that carries the safe bolts 11 (only one of which is shown in part). Turning of the spindle 2 accordingly turns the crank arm 3 and moves the pin 7 up or down the slot 8. This movement of the pin 7 drives the bar 9 to and fro and thereby throws the bolts 11 or
10 withdraws them in dependence upon the sense in which the external handle is rotated.

Referring now to Figure 2, when the bolts 11 have been thrown into engagement with the body of the safe they are locked there in the normal manner by key-operation of a lock 12, the bolt 13 of the lock
15 being thrown to engage in a notch 14 in the bar 9. Such operation in this case, however, also serves to disengage the coupling of the crank pin 7, and hence also of the external handle, to the boltwork in the bolt-withdrawing sense. To this end a plate 15 is connected to the lock bolt 13, and lies between the arm 3 and the connecting bar 9.
20 This plate has an arcuate slot 16 into which the crank pin 7 extends and along which the pin runs during its normal operation when throwing the safe bolts 11. When the bolts have been thrown but before the lock 12 has been operated the crank pin is in the position indicated in broken line in Figure 2. When the lock is then operated,
25 however, the plate 15 moves with the lock bolt 13 to carry the pin 7, engaged in slot 16, to the position indicated in full line in Figure 2, the arm 3 sliding on the spindle bush 5 to permit this operation. In this condition the rotary connection between the spindle 2 and arm 3 is still effective but, as will be appreciated from the Figure, the
30 crank pin 7 is now isolated from the flank 8A of the drive slot 8 so force cannot be applied to the connecting bar 9 via the spindle in the sense to withdraw the safe bolts 11.

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Preferably, provision is also made in the mechanism for blocking rotational movement of the crank pin in this disengaged condition, such as by the inclusion of a fixed locking block 17 which lies in the path of the pin (but being offset from the arm 3, plate 15 and bar 9). Also, if the opposing flank 8B of the drive slot 8 is extended in comparison with flank 8A, as shown in the Figure, so that the pin 7 does not become isolated from this longer flank, the blocking of the rotational movement of the pin will provide an additional positive locking action against the withdrawal of the safe bolts.

The unlocking operation of the lock 12 withdraws the bolt 13 and plate 15 so that the pin 7, still engaged in the slot 16, is pulled towards the spindle 2 with the arm 3 sliding on the bush 5, to re-establish coupling with the drive slot flank 8A. Turning of the external handle in the appropriate sense will therefore now be effective to withdraw the safe bolts 11.

It will be noted that a longitudinal slot 18 is provided in the plate 15 to clear the bush 5 as the plate moves to and fro with the lock bolt 13, and similarly a longitudinal slot 19 is provided in the connecting bar 9 to clear the spindle 2 during its to and fro movement as the safe bolts are thrown and withdrawn.

A modification to the mechanism is illustrated in Figures 3 and 4. In this there is an arm 3', pin 7', plate 15' and slot 16' equivalent to the components identified by the same unprimed reference numerals in Figures 1 and 2. In this case also there is a flat-sided spindle 2' (or an equivalent bush) which engages between the flats 6' of a slot 4' in the arm 3' to drive the latter in rotation when the safe bolts are thrown or withdrawn, but the throw of the lock bolt to which the plate 15' is connected is such that when the plate is moved on operation of the lock the crank pin and arm are carried down into a position in which the spindle 2' lies in an end 4A' of the slot 4' which is opened out to a diameter not less than the

6.

greatest cross-sectional dimension of the spindle. Consequently, in this condition the spindle and the external handle to which it is connected can rotate without restraint, the thus free wheeling handle now being completely isolated from the rest of the bolt-throwing mechanism. Only when the spindle is correctly aligned by the external handle will it be possible to unlock the safe bolts, raising the plate 15' and crank arm 3' so that the spindle re-engages between the flats 6'. As will be appreciated, the handle-isolating action of this mechanism may be provided as an addition or as an alternative to the above-described isolation of the crank pin from its driving slot in the connecting bar.

CLAIMS

1. A bolt mechanism for the door (1) of a security enclosure comprising a manually operable member accessible from without the enclosure and mechanical transmission means (2, 5, 3, 7, 9; 2', 3', 7')
5 for coupling said member to the boltwork (10, 11) of the door for throwing and withdrawing the same; characterised by means (15; 15') for selectively disengaging the coupling of said member to the boltwork when the boltwork is in its thrown condition, at least to the extent of preventing the transmission of force from said member to
10 the boltwork to tend to withdraw the same.
2. A mechanism according to Claim 1 wherein said disengaging means (15; 15') are operatively associated with a lock (12) for selectively locking the boltwork (10, 11) when in its thrown condition, whereby operation of the lock acts to disengage the coupling of the
15 manually operable member to the boltwork as aforesaid.
3. A mechanism according to Claim 1 or Claim 2 wherein said mechanical transmission means comprise a crank arm (3) rotatable by the manually operable member and carrying a crank pin (7) which is engageable in a drive slot (8) in a linearly movable transmission
20 member (9) operatively associated with the boltwork (10, 11), so that when engaged rotation of the crank arm and pin in either sense imparts linear motion to said transmission member in a corresponding sense to throw or withdraw the boltwork; and wherein said disengaging means (15) are operable to disengage the crank pin
25 from said drive slot at least in the sense of force transmission from the pin to the transmission member tending to withdraw the boltwork.
4. A mechanism according to Claim 3 wherein said disengagement of said crank pin (7) from said drive slot (8) is effected by a movement of the crank arm (3) and pin (7) in a direction transverse
30 to the rotational axis thereof.

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5. A mechanism according to Claim 4 wherein said crank arm (3) is provided with a slot (4) within which is received a flat-sided rotary drive member (5) operatively associated with the manually operable member, thereby to permit both the transmission of rotary motion from the drive member to the crank arm upon manipulation of the manually operable member and motion of the crank arm relative to the drive member in a direction transverse to the rotational axis thereof upon operation of said disengaging means (15).

6. A mechanism according to Claim 4 or Claim 5 wherein said disengaging means comprise a linearly movable disengaging member (15) provided with an arcuate slot (16) into which said crank pin (7) extends and along which the crank pin runs when rotated to throw or withdraw the boltwork (10, 11), but whereby movement of said disengaging member acts to disengage the crank pin from said drive slot (8) as aforesaid.

7. A mechanism according to any one of Claims 3 to 6 comprising means (17) for blocking rotational movement of said crank pin (7) when disengaged from said drive slot (8) as aforesaid.

8. A mechanism according to any one of Claims 3 to 7 wherein said disengaging means (15) are operable to disengage said crank pin (7) from that flank (8A) of said drive slot (8) which is effective in the transmission of force from the pin to said transmission member (9) in the sense tending to withdraw the boltwork (10, 11), but not from the opposing flank (8B).

9. A mechanism according to Claim 1 or Claim 2 wherein said mechanical transmission means comprise a rotary drive member (2') operatively associated with the manually operable member and adapted to rotate a crank arm (3') to throw and withdraw the boltwork, said disengaging means (15') being operable to disengage the crank arm from the drive member to the extent of preventing the transmission of rotary motion therebetween.

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10. A mechanism according to Claim 9 wherein said disengagement of the crank arm (3') from the drive member (2') is effected by a movement of the crank arm in a direction transverse to the rotational axis thereof.
- 5 11. A mechanism according to Claim 10 wherein the drive member (2') has a pair of opposed flat sides and is received within a slot (4') in the crank arm (3'); said slot having a first portion with sides (6') complementary to the flat sides of the drive member and an adjoining second portion (4A') of a cross section to permit the drive
10 member to rotate freely therein; said disengaging means (15') being operable to move the crank arm from a position in which the drive member lies within said first portion of its slot to a position in which the drive member lies within said second portion.
12. A security enclosure with a door (1) characterised by a bolt
15 mechanism in accordance with any preceding claim.

7.

AMENDED
CLAIMS

1. A bolt mechanism for the door (1) of a security enclosure comprising a manually operable member accessible from without the enclosure, and a crank arm (3;3') rotatable in either sense by the manually operable member carrying a crank pin (7;7') which is engageable in a drive slot (8) in a linearly moveable transmission member (9) operatively associated with the boltwork (10,11) of the door whereby rotation of the crank arm and pin in either sense by the manually operable member imparts linear motion to said transmission member in a corresponding sense to throw or withdraw the boltwork; characterised by means (15;15') for selectively disengaging the crank pin (7;7') from said drive slot (8) of the transmission member (9) when the boltwork is in its thrown condition, at least in the sense of force transmission from the pin to the transmission member in the direction to withdraw the boltwork.
2. A mechanism according to Claim 1 wherein said disengaging means (15;15') are operatively associated with a lock (12) for selectively locking the boltwork (10,11) when in its thrown condition, whereby operation of the lock acts to disengage the crank pin (7;7') from the drive slot (8) as aforesaid.
3. A mechanism according to Claim 1 or Claim 2 wherein the disengagement of the crank pin (7;7') from the drive slot (8) is effected by a movement of the crank arm (3;3') and pin (7;7') in a direction transverse to the rotational axis thereof.
4. A mechanism according to Claim 3 wherein said crank arm (3;3') is provided with a slot (4;4') within which is received a flat-sided rotary drive member (5;2') operatively associated with the manually operable member, thereby to permit both the transmission of rotary motion from the drive member to the crank arm upon manipulation of the manually operable member and motion of the crank arm relative to the drive member in a direction transverse to the rotational

8. *Amended claims*

axis thereof upon operation of said disengaging means (15;15').

5 5. A mechanism according to Claim 3 or Claim 4 wherein said disengaging means comprise a linearly moveable disengaging member (15;15') provided with an arcuate slot (16;16') into which the crank pin (7;7') extends and along which the crank pin runs when rotated to throw or withdraw the boltwork (10,11), but whereby movement of said disengaging member acts to disengage the crank pin from the drive slot (8) as aforesaid.

6. A mechanism according to any one of Claims 1 to 5 comprising means (17) for blocking rotational movement of the crank pin (7;7') when disengaged from the drive slot (8) as aforesaid.

15 7. A mechanism according to any one of Claims 1 to 6 wherein said disengaging means (15;15') are operable to disengage the crank pin (7;7') from that flank (8A) of the drive slot (8) which is effective in the transmission of force from the pin to said transmission member (9) in the direction to withdraw the boltwork (10,11), but not from the opposing flank (8B).

25 8. A mechanism according to any one of Claims 1 to 7 wherein said disengaging means (15') are further effective to disengage the crank arm (3') from a rotary drive member (2') operatively associated with the manually operable member and arranged normally to transmit rotary motion in either sense from the manually operable member to the crank arm, to the extent of preventing such transmission of rotary motion.

30 9. A mechanism according to Claim 8 wherein said disengagement of the crank arm (3') from the rotary drive member (2') is effected by a movement of the crank arm in a direction transverse to the rotational axis thereof.

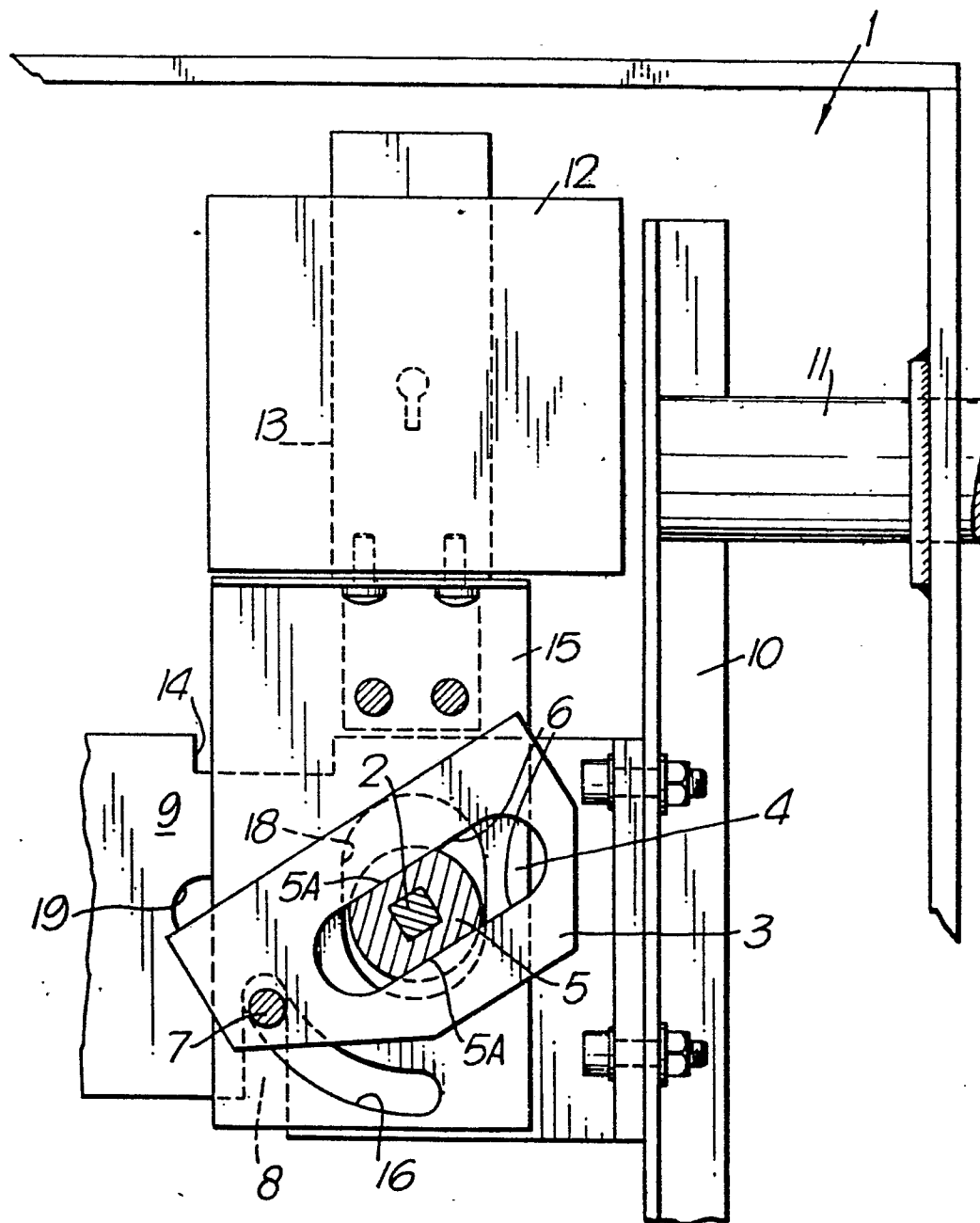
10. A mechanism according to Claim 9 wherein the rotary

9. *Amended claims*

drive member (2') has a pair of opposed flat sides and is received within a slot (4') in the crank arm (3'); said slot has a first portion with sides (6') complementary to the flat sides of the drive member and an adjoining second
5 portion (4A') of a cross section to permit the drive member to rotate freely therein; and said disengaging means (15') are operable to move the crank arm from a position in which the drive member lies within said first portion of its slot to a position in which the drive member lies within
10 said second portion thereof.

11. A security enclosure with a door (1) characterised by a bolt mechanism in accordance with any preceding claim.

Fig. 1.



2/3

Fig. 2.

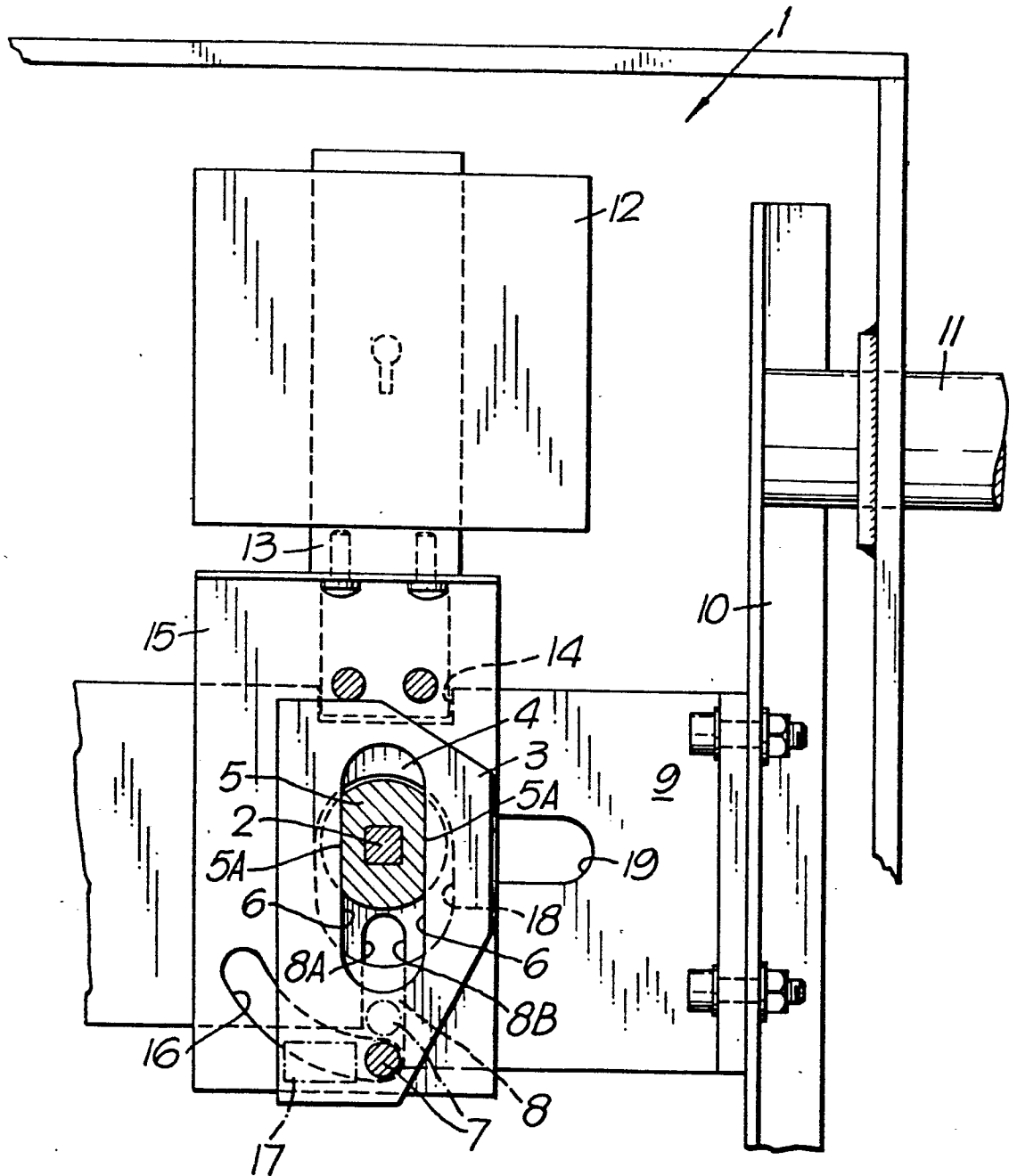


Fig. 3.

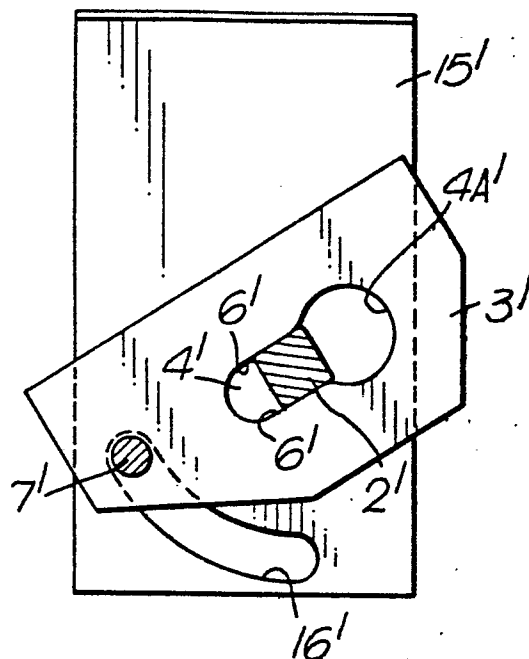
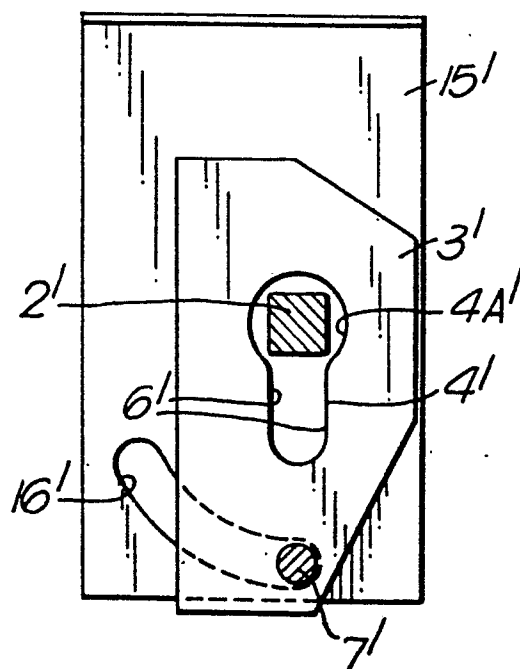


Fig. 4.



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European Patent
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EUROPEAN SEARCH REPORT

Application number

EP 80 30 0830

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC Class.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	GB - A - 936 155 (RATNER) * Whole document *	1,2,12	E 05 B x E 05 G 1/04
	DE - C - 333 657 (GRALLA) * Whole document *	1-6,8	
			TECHNICAL FIELDS SEARCHED (IPC Class.)
			E 05 B E 05 G
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background C: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
The present search report has been drawn up for all claims			X: member of the same patent family, corresponding document
Place of search	Date of completion of the search	Examiner	
The Hague	10-07-1980	V. BOGAERT	

