(12) EUROPEAN PATENT APPLICATION

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(54) Security container

(57) A security container (2) comprising a security device (20) for protecting at least one item being transported, wherein the security device is arranged upon initiation of transport to enter a first mode where at times a first period, and if the security device has not received a signal before the end of the first period indicating that it can relinquish responsibility, the security device enters a second mode where it times a second period, and at the end of the second period enters an alarm mode if the security device detects that it is moving.
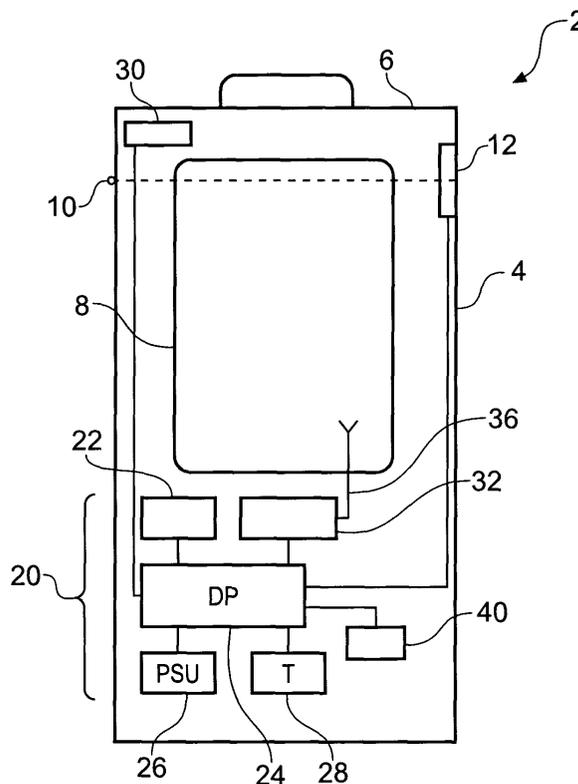
Fig. 1

EP 1 566 513 A2

Description

[0001] The present invention relates to a security container. Such a container is, without limitation, suitable for the transport and delivery of valuable items.

[0002] There is often a risk of theft when delivering high value items, such as bank notes, to financial institutions such as banks, or when delivering cash cassettes to automatic teller machines (ATM). An automatic teller machine may contain a significant amount of money once it has been replenished, and indeed even a nominally empty cash cassette removed from an automatic teller machine may still contain substantial amounts of cash as the cassettes are often changed before they are strictly empty in order to ensure continuity of service.

[0003] Automatic teller machines are generally provided with antitheft protection, such as a strong box or safe immediately surrounding the machine. Furthermore delivery of cash from a central secure facility to the automatic teller machine is generally performed by way of a high security delivery van having armoured sides and restricted access to the contents of the van. Nevertheless it is still generally necessary for the cash cassette to be walked from the van to the bank or ATM by a security guard, and this transportation by a man carrying the cash cassette represents a weak link in the security.

[0004] It is known that the delivery from the security van to the bank or ATM machine should involve the use of a portable security container which typically encloses the cash cassette. The security container is provided with an internal spoiling system to spoil the contents of the cash cassette and a control system which monitors the progress of the container and which can activate the spoiling system in the event that it determines that a delivery has been interfered with.

[0005] EP 0235103 discloses a cash cassette transport arrangement in which a timer within a cash-in-transit box is started when the cash-in-transit box is removed from its storage position within a cash delivery vehicle. At the end of the predetermined time period the timer initiates a spoiling mechanism or an alarm.

[0006] EP 0699328 relates to a cash-in-transit container in which a timer is provided, and the timer is initiated when the container is removed from a cash-in-transit vehicle. However, rather than counting real time, the timer counts "movement time", which amounts to the time that the container is being carried. Once the end of the predetermined "movement time" has been reached the spoiling mechanism is operated. This arrangement has the advantage that inadvertent detonation of the spoiling mechanism can be inhibited merely by placing the security container on a stationary surface. A problem with the arrangement described in EP 0699328 is that the "movement time" needs to be set sufficiently long to allow the delivery guard to complete their walk and also to deal with any legitimate delays that might be encoun-

tered. Legitimate delays may, for example, arise because of road works or parking congestion in the vicinity of the delivery point which results in the cash delivery vehicle having to park further away than was originally intended. This however means that the "movement time" may need to be significantly longer than is strictly necessary and hence the container is still vulnerable to an attack carried out promptly after it has been removed from the delivery vehicle. There may still be sufficient time on the timer to enable the thief to move the container to a concealed location where more sophisticated attempts to open it may be performed.

[0007] According to a first aspect of the present invention there is provided a security device for the transport of at least one item, where the security device is arranged upon initiation of transport to enter a first mode where it times a first period and if the security device has not received a signal indicating it can relinquish responsibility, the security device enters a second mode where it times a second period and at the end of the second period enters an alarm mode if the security device detects that it is moving.

[0008] It is thus possible to provide a security device, such as a cash-in-transit container, which counts down a predetermined time period following initiation of a delivery, and at the end of that time period enters a second mode, thereby indicating to a delivery guard that the first period has ended. If, at the end of the second period the security device detects that it is moving it then enters an alarm mode. This enables the "walk time" which is the time that it is expected that the delivery will take, to be set to a value which does not include significant amounts of extra time to cope with additional distance or other contingencies within the delivery path from the cash-in-transit vehicle to the intended destination. Once this time has elapsed, a warning is given to the guard who can then place the container on a stationary surface thereby inhibiting entry into the alarm mode.

[0009] Advantageously if at the end of the second period the security device has stopped moving, it may re-enter the first mode. However, the security device preferably enters the third mode in which it times a third period. If the security device remains unmoved during the third period it preferably re-enters the first mode, whereas if motion is detected it re-enters the second mode.

[0010] It is thus possible to provide a security device which automatically re-enters the first mode, that is the mode where the guard should be carrying it between the cash-in-transit vehicle and the delivery destination, after the expiry of a preceding first time period provided that the container has been immobile for a while. Such a system allows flexibility for the guard who knows and understands that in the event of some unexpected but legitimate delay he would still be able to complete his delivery without a spoiling mechanism within the security container operating, whilst at the same time giving protection against theft because during a theft the thief would periodically have to stop moving and place the

container on the ground whilst the second and/or third modes timed out. This repeated interruption during the theft and escape with the container would severely hamper the thief's progress and render him much more vulnerable to capture by the authorities or alternatively force him to flee without taking the security container.

[0011] Preferably at least one counter is provided to count the number of times that the security device enters the first, second or third modes during any delivery and once a respective limit is reached the security device can either immediately initiate the alarm mode or alternatively initiate the alarm mode as soon as it detects motion. Such an arrangement prevents the security container from being carried away in a theft where the thief has managed to conspire to perform the theft in a location where he has the opportunity to place the container on the ground and wait for it to time out the second and/ or third periods before continuing with the removal of the security container to another location.

[0012] Preferably the security device is programmable such that the time periods in the first mode, second mode and third mode together with the limits for the number of times that those nodes can be entered in a given delivery can be set by a suitably authorised person prior to use of the container for delivering valuable items.

[0013] Preferably the security device comprises, or is included within, a cash-in-transit container.

[0014] Preferably the alarm mode causes operation of a spoiling system for spoiling the valuable items protected by the security device. Thus, if the security device is within a cash-in-transit container for delivering bank notes the spoiling system may comprise a dye pack such that ink can be delivered onto the bank notes in order to render them unusable.

[0015] Preferably the security device includes a user interface to enable a delivery guard and/or a member of staff or a further security system at an intended destination to authenticate with the security device. Thus, a delivery guard may be in possession of a "guard tag" which he can place against a suitable reader within the security system to cause the security system to immediately re-enter the first mode of operation. This enables the guard to communicate to the system that all is well and allows him to continue his delivery of the cash-in-transit container without necessarily having to place it on the ground and wait for the second and third periods to time out. Similarly, when the security device reaches its destination it is necessary to be able to signal to it that it is no longer responsible for protecting the valuables. This can be achieved by a suitably authorised member of personnel introducing a "destination tag" into the vicinity of the security device or alternatively automatic authentication and negotiation may be performed by a security system at the destination, such as a security system embedded within an automatic teller machine.

[0016] According to a second aspect of the present invention there is provided a method of protecting valuable items during transport of the items, the method comprising the steps of placing the valuable items within a space protected by a security device, and where the security device is arranged to time a first period, and at the end of the first period to indicate that the first period has elapsed and then to time a second period, and at the end of the second period to enter an alarm mode if the security device detects that it is moving.

[0017] The present invention will further be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic illustration of a cash-in-transit container incorporating a security device constituting an embodiment of the present invention;

Figure 2 is a flow chart illustrating part of the operation of the security device shown in Figure 1;

Figure 3 is a flow chart illustrating a further part of the operation of the security device shown in Figure 1; and

Figure 4 is a further flow chart illustrating part of the operation of the security device shown in Figure 1.

[0018] Figure 1 schematically illustrates a cash-in-transit security container, generally designated 2, which comprises a base portion 4 and a lid 6 which co-operate together to define a protected volume 8 in which valuable items to be transported, such as an ATM cash cassette carrying money, are placed. The lid 6 can be secured to the base 4 such that the container is locked shut. This is schematically illustrated by the provision of a hinge 10 and an electrically controllable lock 12. However it should be appreciated that these components are shown for illustration only and that other closure mechanisms are well known to the person skilled in the art and can be used without the exercise of inventive merit.

[0019] The cash-in-transit container 2 has a security system, generally designated 20, disposed within it. The security system includes a motion detector 22, a data processor 24, a power supply 26, timer 28 and a communications interface 40. The data processor 24 is also responsive to a user input device 30 and is arranged to control the operation of a spoiling system 32 and the electronic lock 12.

[0020] The motion detector 22 is typically an accelerometer arranged to determine whether the cash-in-transit container is being carried from the vertical motion each time the guard takes a step or from any inadvertent swinging motion which may also occur when the guard carries the security container. The accelerometer 22 is preferably a three axis accelerometer as this provides enhanced security against the thief trying to defeat the accelerometer by holding the cash-in-transit container the wrong way up. Suitable technologies for implementing the motion detector are well known and need not be described further here. The data processor 24 is typi-

cally a programmable data processor which has non-volatile program memory associated with it together with either a scratch pad memory or some random access memory provided in order hold its working calculations. The memory can either be provided as separate modules or indeed may be implemented within the data processor. The power supply 26 comprises a battery with sufficient life time to ensure that the maximum permitted delivery time can be accommodated, together with time spent on the secure premises and the return from the premises to the cash-in-transit delivery vehicle will not result in discharge of the battery 26. Typically the battery will be able to power the security container for several days. A timer 28 is provided for counting the various time periods under the control of the data processor, although it will be appreciated that typically the counter 28 will be implemented within the data processor. Furthermore, the data processor may also include any analogue to digital or digital to analogue converters that it requires to interface with the accelerometer 22. The spoiling system 32 typically comprises a reservoir of ink which can be ejected under pressure along a delivery conduit 36 into the protected space 8. Typically a canister of compressed gas is closed by an electrically detonatable valve such that gas pressure from the container of gas can be rapidly applied to the ink reservoir in order to cause ejection of the ink. Such systems are well known to the person skilled in the art.

[0021] Finally, it is necessary for the guard to be able to communicate with the data processor.

This is typically by way of a user interface 30 which could for example be a key pad. However a preferred user interface comprises a RF ID tag reader as RF ID tags have become commercially commonplace, but each is a complex item containing inbuilt security and encryption features which make them very difficult to forge.

[0022] The operation of the security device, within the context of a cash-in-transit delivery container, will now be described with reference to Figures 2, 3 and 4. The delivery operation commences at step 100 where the security system of the cash-in-transit delivery vehicle signals to the data processor 24 via the communications interface 40 that the cash-in-transit container is being selected to perform a delivery and where internal counters within the security system are initialised. From step 100 control passes to step 102 where a test is made to see whether the container is open. This is because, in certain operational environments, it may be desirable to allow a guard access to the contents of the container, for example to load it with the item to be protected. Step 102 continually tests whether the container is open, and if it is, control is returned to step 102 until such time as the container is closed, when control passes to step 104. Step 104 initiates a "transit time" timer in order to count down the first time period, that is the "transit time" period which generally is set to be the period that the delivery company believe the guard should be able to complete the process of carrying the cash-in-transit container

from the cash-in-transit delivery vehicle to the destination. From step 104, control is passed to step 106 where a test is made to see whether the transit time has elapsed. If the transit time has not elapsed step 106 is repeated, whereas if it has elapsed control is passed to step 108 where an indication that the transit time has elapsed is asserted. Step 108 may cause a "transit alarm" to be activated which may cause operation of some audio or visual indicator on the cash-in-transit security container or may cause the transmission of a signal from the cash-in-transit container to a head set worn by the security guard. Such a transmission may be performed over a radio communications channel which may use any suitable technology. From step 108 control is passed to step 110 where a test is made to see whether the container is moving. If the container is moving control is then passed to step 112 where a further timer is initiated to time a time period "alarm 1" which sets up the time period in which the security system remains in its second mode of operation. During this second period as counted by the timer "alarm 1" the security system monitors whether the guard has authenticated with the container by use of the guard tag, or whether the container has stopped moving. These tests are performed at steps 114 and 116 respectively. If step 114 determines that the guard has presented his tag to the container, then control is passed immediately to step 132. However if the guard has not presented his tag, then control is passed to step 116 where the test is made to see if the container has stopped moving. If step 116 determines that the container has not stopped moving, then control is passed to step 118 which constitutes entry to the alarm mode, which in this embodiment causes the spoiling system to be operated. From step 118 control is passed to step 120 where the method ends. Returning to step 116, if it is determined that the container has stopped moving then control is passed to step 122. Similarly, returning to step 110 if it was determined that the container was not moving at this stage then control was also passed directly to step 122.

[0023] Step 122 constitutes the entry into a third mode in which a "pause extend" time is applied. Initially a "pause extend" counter 122 is incremented. This counter counts the number of times that the pause extend has been entered during this delivery. Thus this counter, and other counters or timers had been initialised at step 100. From step 122 control is passed to step 124 whether a test is made to see whether the content of the pause extend counter has now exceeded a pause extend threshold PETH which constitutes a limit on the number of times that the pause extend can be executed. If step 124 determines that the "pause extend" threshold has been exceeded then control is passed to step 126. Step 126 tests to see whether the container is moving, if it is not then step 126 is repeated, whereas if the container is moving control is passed to step 118. Optionally an intermediate step may be placed between steps 124 and 126 where the container may issue an alert to indi-

cate that further motion of it will cause operation of its spoiling system.

[0024] Returning to step 124, if it is determined that the number of pause extends has not exceeded the pause extend threshold then control is passed to step 128 where a pause extend timer is initiated in order to count a pause extend period, which corresponds to a third time period counted by the security system. During this period the data processor is arranged to monitor whether the guard has authenticated with the container or whether the container has moved during the pause extend period. These tests are performed at steps 130 and 134 respectively. Thus, from step 128 control is passed to step 130 where a test is made to see whether the guard has authenticated with the container. If step 130 determines that the guard has authenticated with the container, for example by presenting the guard tag to the tag reader then control is passed to step 132. Step 132 issues an indication that transport can proceed and then passes control from step 132 to step 104, marking the entry of the security system into its first mode.

[0025] However, if step 130 determines that the guard has not authenticated with the container then control is passed to step 134 where a test is made to see whether the container has moved during the third time period as counted by the pause extend time. If step 134 determines that movement has not occurred then control is passed to step 132 again initiating an indication that transport can be received and causing the first mode to be re-entered. However, if step 134 determines that movement did occur during the pause extend period then control is passed to step 112 causing re-entry into the second mode of operation.

[0026] It is thus possible to provide a security system which would cause a thief to have to repeatedly stop during the theft of valuables protected by such a system and hence would significantly increase the chances of capture of the thief, whilst also providing a security system which gives the guard flexibility to cope with unexpected but non-malicious delays during transportation of items between a delivery vehicle and a secure area.

Claims

1. A security device (20) for protecting at least one item being transported, wherein the security device is arranged upon initiation of transport to enter a first mode (104) where it times a first period, **characterised in that** if the security device has not received a signal before the end of the first period indicating it can relinquish responsibility, the security device enters a second mode (112) where it times a second period, and at the end of the second period enters an alarm mode (118) if the security device detects that it is moving.

2. A security device (20) as claimed in claim 1, in which

if at the end of the second period the security device does not detect that it is moving, the security device enters a third mode (128) where it times a third period, and if the security device detects that it is moving during the third period it enters the second mode (112).

3. A security device (20) as claimed in claim 2, wherein if the security device does not detect that it has moved during the third period it enters the first mode (104).

4. A security device (20) as claimed in claim 2 or 3, which is programmable to set the duration of the first, second and third periods.

5. A security device (20) as claimed in any one of the preceding claims, in which a counter counts the number of times the security device enters the first, second and/or third mode.

6. A security device (20) as claimed in claim 5, in which when the counter reaches a limit value, the security device enters the alarm mode (118).

7. A security device (20) as claimed in claim 5, in which when the counter reaches a limit value, the security device enters the alarm mode (118) if it detects that it is moving.

8. A security device (20) as claimed in claim 6 or 7, which is programmable to set the limit value.

9. A security device (20) as claimed in claim 1, in which if at the end of the second period the security device does not detect that it is moving, it enters the first mode (104).

10. A security device (20) as claimed in any one of the preceding claims, in which the alarm mode causes activation of a spoiling system (32) to spoil the at least one item.

11. A security device (20) as claimed in any one of the preceding claims, which includes a user interface (30) such that the user can instruct the security device to enter the first mode (104).

12. A security device (20) as claimed in claim 11, in which a user can use the user interface (30) to signal the security device that it can relinquish responsibility for protecting the at least one item.

13. A security device (20) as claimed in any one of the preceding claims, in which the at least one item comprises a plurality of bank notes.

14. A cash in transit container (2) including a security

device (20) as claimed in any one of the preceding claims.

15. A method of protecting items during transport of the items, the method comprising the steps of placing the items within a space (8) protected by a security device (20), and wherein the security device is arranged in a first mode to time a first period, **characterised in that** the security device is further arranged at the end of the first period to indicate that the first period has elapsed and then to enter a second mode (112) to time a second period and at the end thereof to enter an alarm mode (118) if the security device detects that it is moving.

16. A method as claimed in claim 15, in which the security device (20) is further arranged, if at the end of the second period it does not detect that it is moving, to enter a third mode (128) where it times a third period, and if the security device detects that it is moving during the third period, it enters the second mode (112).

17. A method as claimed in claim 16, in which if the security device (20) does not detect that it has moved during the third period, it enters the first mode (104).

18. A method as claimed in claim 15, in which the security device (20) counts the number of times it enters the first and/or second mode, and enters the alarm mode (118) if a limit is reached.

19. A method as claimed in any one of claims 16 or 17, in which the security device (20) counts the number of times it enters the third mode, and enters the alarm (118) mode if a limit is reached.

20. A method as claimed in claim 18 or 19, in which the security device (20) enters the alarm mode (118) when the limit is reached only when it detects that it is moving.

21. A security container (2) **characterised by** including a security device as claimed in any one of claims 1 to 13.
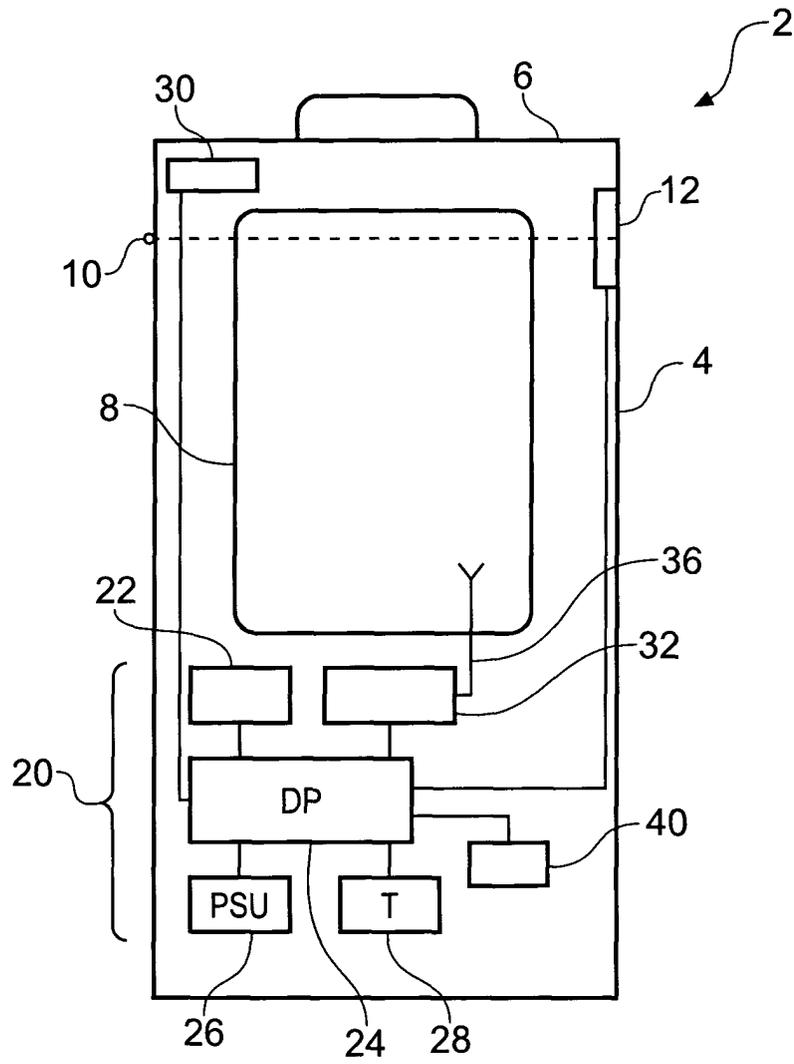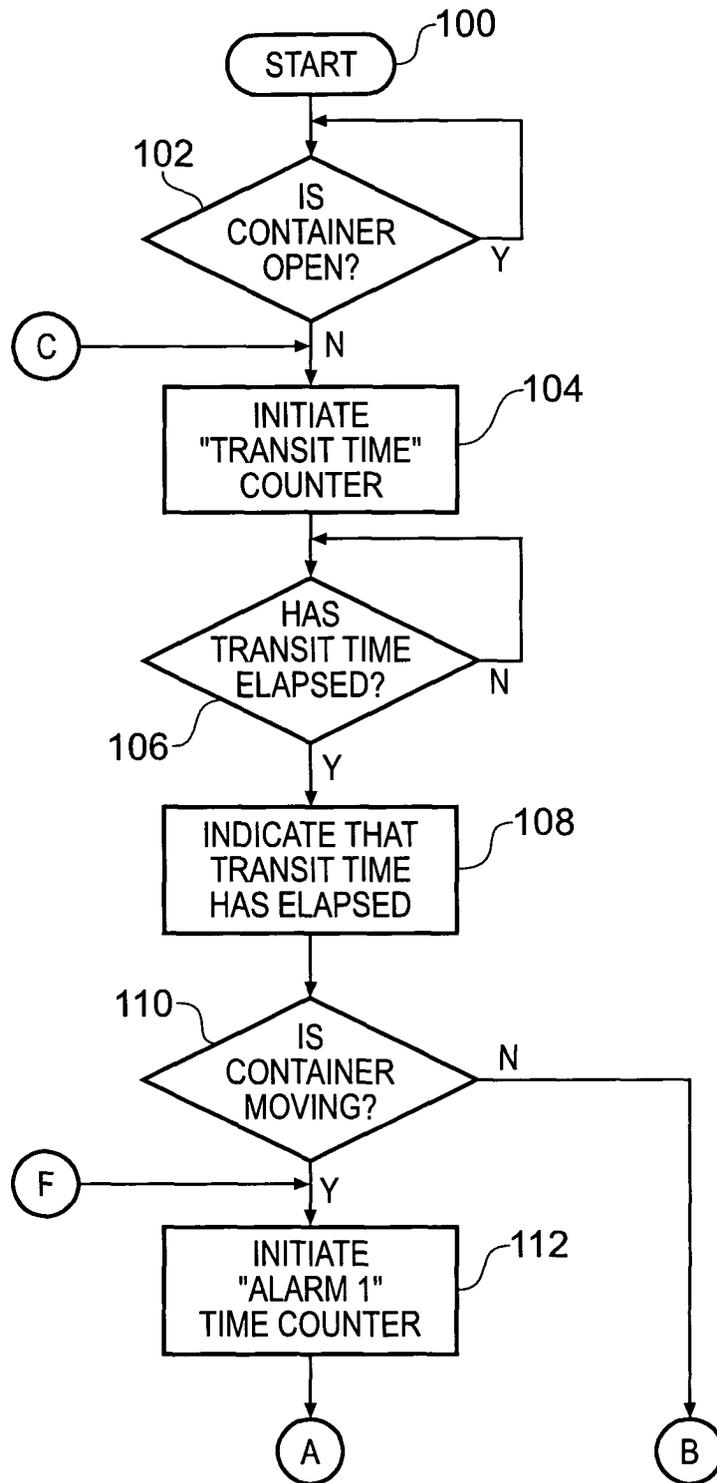
Fig. 1

START ~100

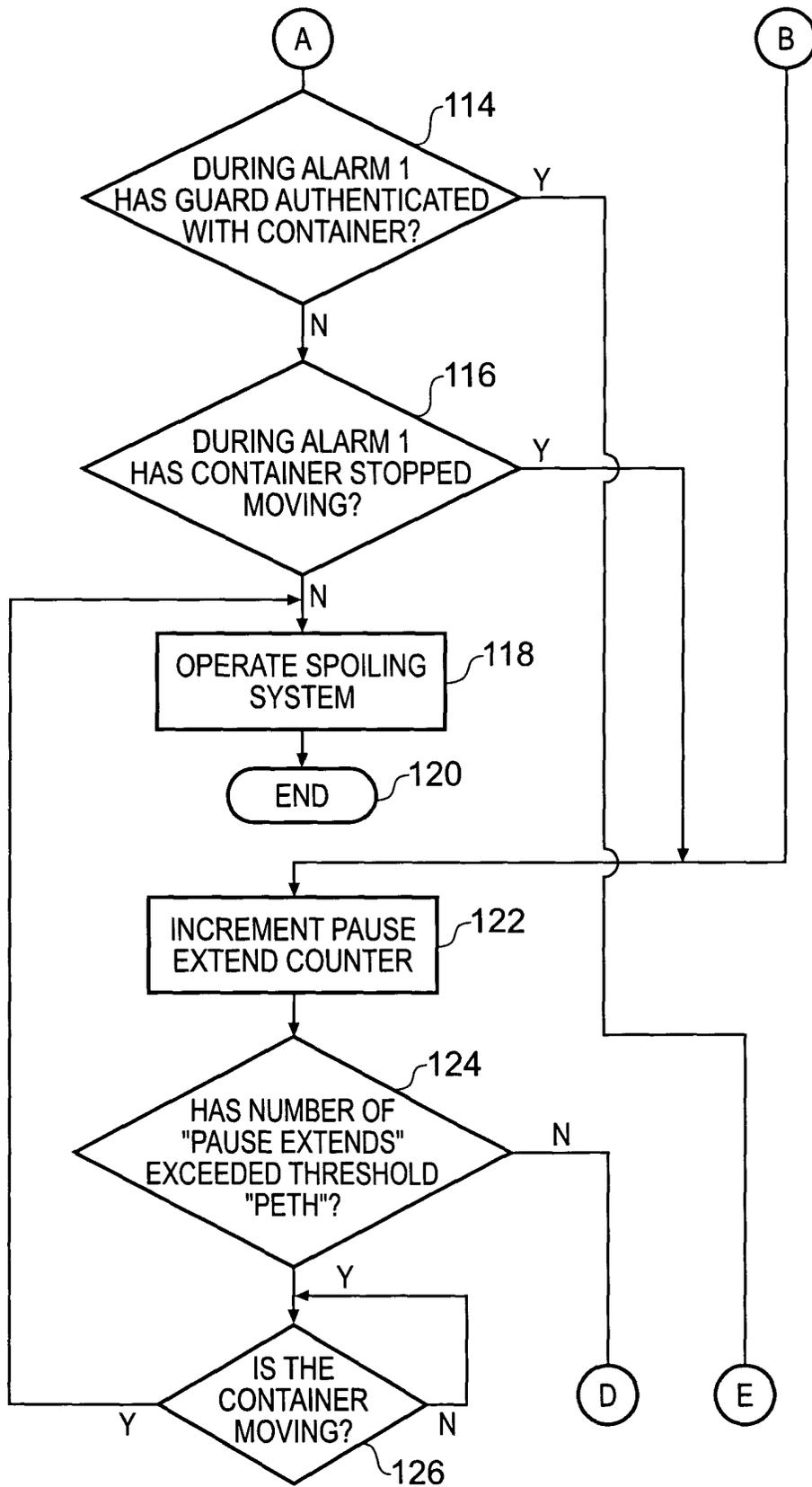102

IS
CONTAINER
OPEN?

Y

C → N

INITIATE
"TRANSIT TIME"
COUNTER ~104

HAS
TRANSIT TIME
ELAPSED?

N

106

Y

INDICATE THAT
TRANSIT TIME
HAS ELAPSED ~108

110

IS
CONTAINER
MOVING?

N

F → Y

INITIATE
"ALARM 1"
TIME COUNTER ~112

A

B

Fig. 2

(A)   (B)

114

DURING ALARM 1
HAS GUARD AUTHENTICATED   Y
WITH CONTAINER?

N

116

DURING ALARM 1
HAS CONTAINER STOPPED   Y
MOVING?

N

OPERATE SPOILING   118
SYSTEM

END   120

Fig. 3

INCREMENT PAUSE   122
EXTEND COUNTER

124

HAS NUMBER OF
"PAUSE EXTENDS"   N
EXCEEDED THRESHOLD
"PETH"?

Y

IS THE
Y   CONTAINER   N
MOVING?

126

(D)   (E)

Fig. 4