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[54] CODED SECURITY VAULT

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- [52] U.S. Cl. 235/61.1, 235/61.11 R, 109/23
 [51] Int. Cl. G06k 1/18, G06k 7/01, E05g 3/00
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 235/61.12 R, 61.12 M, 61.12 N, 61.12 C, 61.7 B,
 0.11 R, 0.11 C, 0.11 A, 0.11 D, 0.11 H; 340/149 A

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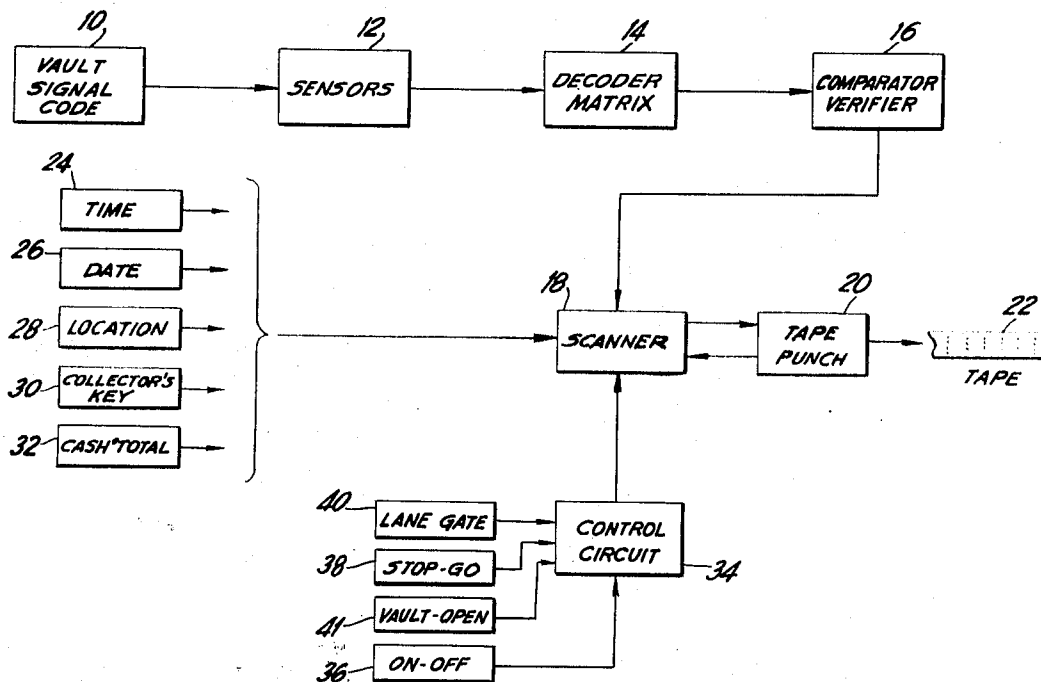
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[57]

ABSTRACT

A vault into which cash, such as coins and tokens are deposited, is provided with a self-locking enclosure to be opened only by authorized personnel in preferably supervised facilities at which the contents are counted and accounted for. The vault is generally of a parallelepiped form adapted for slidable insertion in a drawer provided with an access port for conveying the cash therein. Mechanical, magnetic, optical or electronic means are provided as an adjustable code for identification of the vault. Means to sense the identification code on the vault are provided in the drawer housing and are so arranged as to prevent access by unauthorized personnel. A control circuit responsive to signals representative of the coded vault are processed by appropriate scanning and comparator circuits and, depending upon the code used, conversion matrices to develop a print-out of the identified vault at a remote location upon the occurrence of certain actions such as the insertion, removal of the vault from the drawer or at some programmed interval on the hour or the like. In a preferred application the coded self-locking vault is included in a toll collection system for toll roads and toll bridges wherein the output is punched into a tape for translation at accounting centers in any desired printed form.

9 Claims, 5 Drawing Figures



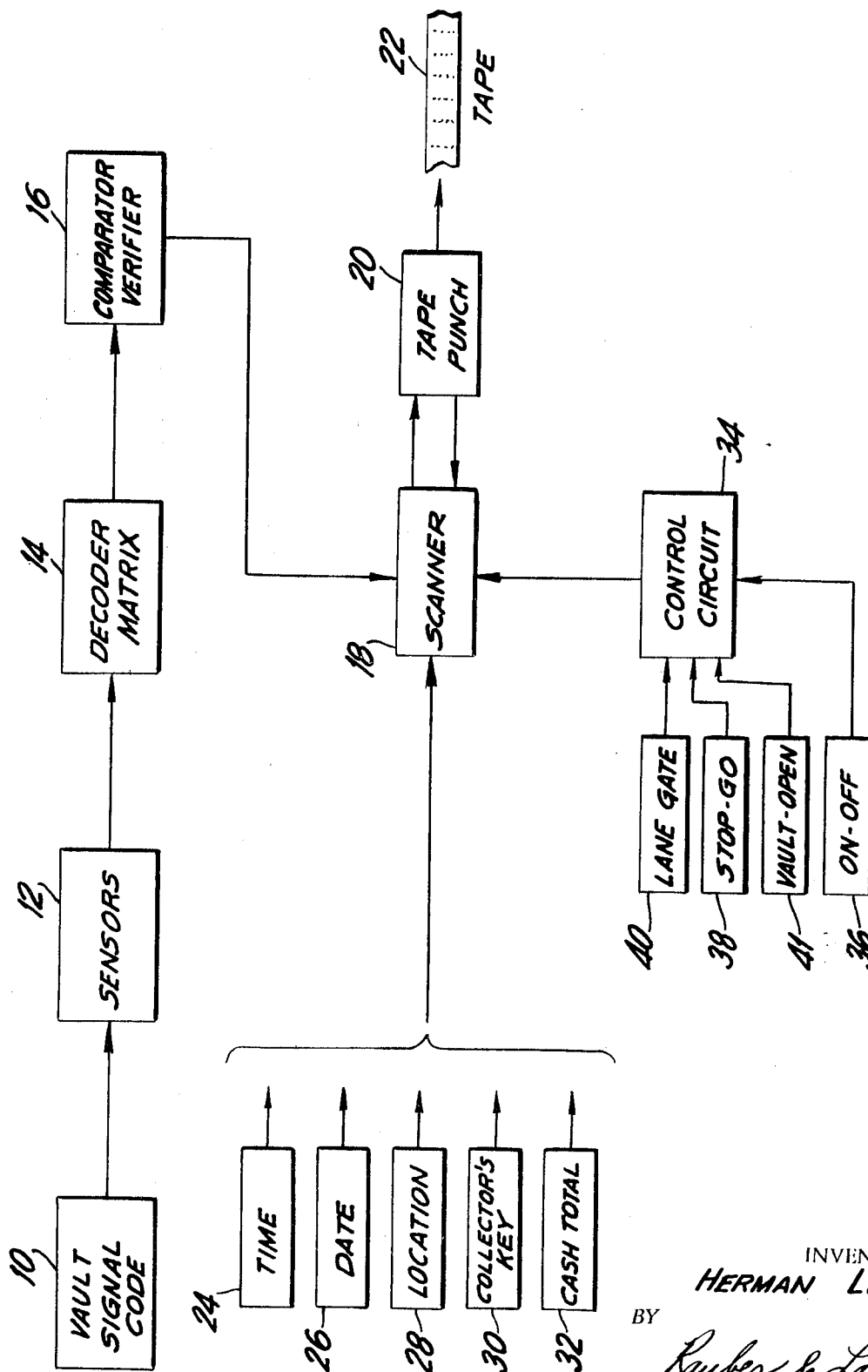


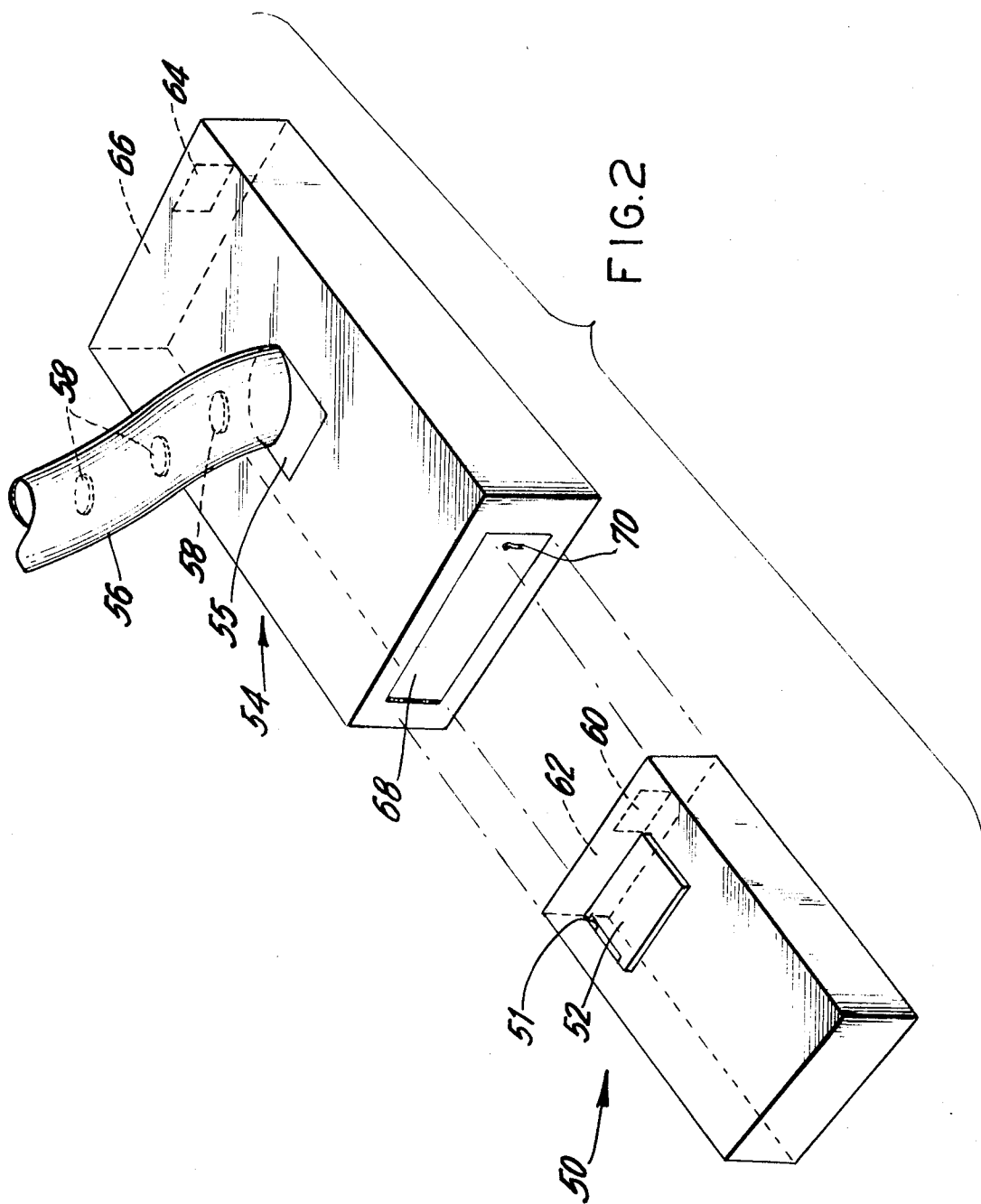
FIG. 1

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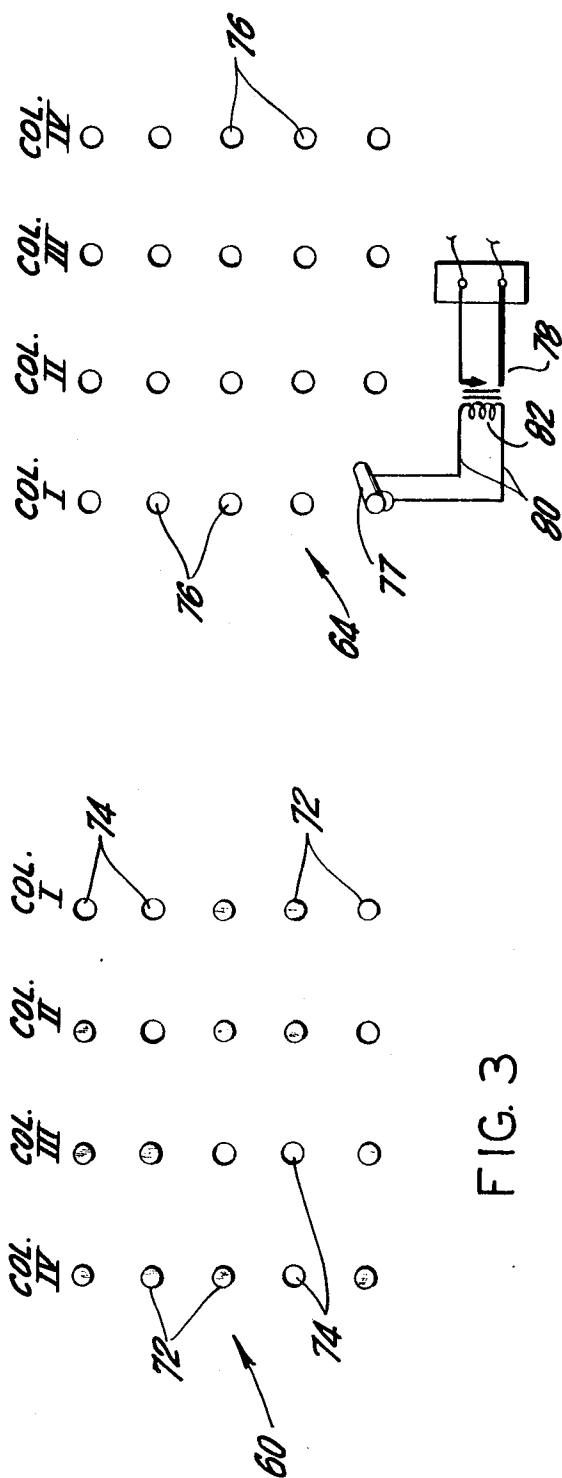
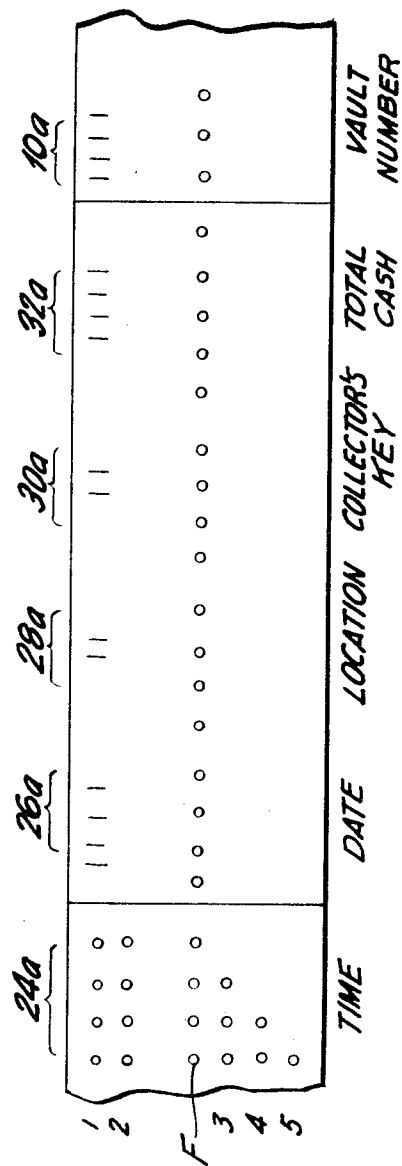


FIG. 4



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CODED SECURITY VAULT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to coded security vaults and more particularly to such vaults in toll collection systems.

Description of the Prior Art

Heretofore, in facilities in which cash is collected in the form of specie or tokens that are deposited at toll barriers a certain amount of security control to prevent unauthorized tampering with the contents has been utilized. Vaults for use in drawer facilities are provided with key-operated locks operated only by authorized personnel. With the vast increase of the use of toll collection facilities the problems of assuring absolute security not only in the handling of vaults containing money is causing serious problems of preventing unauthorized tampering if not outright confiscation of such vaults. In addition, because of the substantial increase in the amounts of facilities and individual vaults that are being used to collect monies the problem of accurate and simplified accounting is critical.

Although the vaults are known with security provision and systems are in operation that attempt to minimize pilfering with funds collected and deposited in such vaults, no system has solved the total problem of assuring a totally secured vault and means to determine the status of the vault at all times.

It is a general objective of the present invention to provide a vault and associated system for processing data identifying that vault. It is a further object of the invention to provide a cash vault having self-locking means so that during the transportation of the vault from the collection point to the accounting point the personnel are not authorized to open the vault while at the accounting facility a second and different group of personnel are provided with means to open the vault.

SUMMARY OF THE INVENTION

According to the invention, there is provided a cash vault having a self-locking enclosure that is sealed upon the removal of the vault from a cash receiving facility such as at a toll collection barrier for a toll road or tunnel. Only authorized personnel at an accounting center have the facilities to open and remove the contents of the vault. The vault is provided with means for identifying it by a code that is adjustable and can be thereby rendered unintelligible even to personnel who may have knowledge of the system of coding. Such means are embodied in mechanical, magnetic, optical or electronic signal sources. A sensing device is provided in the housing and into which the vault is inserted during the cash collection phase of its use. The sensing means are arranged to appropriately transduce the sensed information to electrical circuits for decoding and processing the signal to appropriate recording equipment, such as typewritten print-outs, punched tape or magnetic tape systems. Upon the insertion or the removal of the cash vault from its housing the system is arranged to effect a read-out of the coded identification of the vault and together with other data provides a means to precisely identify the vault by a unique number and associate with it the time, location, and total of the contents of the vault. In addition, by the provision of a key identifying system the attendant who removes or inserts the vault only by the use of an authorized key would have his key identified and correlated with the other data in respect of the action he performs on the vault.

BRIEF DESCRIPTION OF THE DRAWING

Referring now to the drawing which shall be described in greater particularity in the following detailed description of several embodiments of the invention:

FIG. 1 is a block schematic of the coded cash vault and controls as used in a toll collection system;

FIG. 2 is a perspective view of a vault in sliding relation with a housing showing the relative locations of the identification means of the vault and the sensing means in the housing;

FIG. 3 shows in schematic form the arrangement of the code indicia means adapted for variable adjustment of the identification;

FIG. 4 shows in schematic form the arrangement of the array of sensing transducers;

FIG. 5 is a fragmentary portion of a tape showing the representative data punched in code form thereon.

Referring now to FIG. 1, Block 10 indicates the indicia on the vault which, depending upon the system, may be represented by slots, holes and the like if a mechanical system is to be utilized. If the system is used to utilize magnetic devices, bar magnets in the form of cylinders may be inserted into a series of holes provided in the wall of the vault. If the system is to utilize optical sensing means, the indicia may be in the form of colored inserts which may be detected by appropriate photo-electric sensing devices in appropriate matching locations within the housing containing the vault.

Block 12 indicates the sensing devices located in the housing. If a binary coded system is selected, a matrix circuit is provided as indicated by Block 14 to convert the binary signal to a decimal signal or to an appropriate code for utilization by a tape punch.

The comparator provided in Block 16 is arranged to verify the validity of the signal to assure that the code is accurate and has not been distorted by noise or the like. Thus, if a five-level (teletype) code as commonly used in tape punch systems is being utilized, the comparator circuit 16 will verify that every signal representative of a digit or a character of the code is present. Any deviation effects an appropriate control signal to indicate the error or fault in the code.

A scanner circuit contained within Block 18 is arranged to scan all of the data in the form of appropriate signals that are to be recorded or transmitted to remote locations. The scanner conveys the appropriate operating signals to the tape storage and punch shown within Block 20 from which is produced a tape 22 which has been appropriately punched corresponding to the data including the identification of the coded vault together with other data such as the time 24, the date 26, the location 28, the collectors key No. 30 and the total amount of cash 32 that has been deposited in the vault during the interval subsequent to the last recordation or print-out.

A control circuit 34 is arranged to control the operation of the scanner 18 in response to usual toll collection control signals such as the power on-off control 36, the stop-go signal 38 and the lane gate position 40. An output signal from the sensing transducer of the cash vault 12 is arranged to put the control circuit 34 in its operative state to respond to the input signals.

Referring now to FIG. 2, there is shown the cash vault 50 which is in generally box-like form and is provided with a self-locking cover 52 such as disclosed in U.S. Pat. No. 2,884,188. The self-locking cover 52 is thus arranged to be automatically opened when the vault is inserted within the housing 54 with a suitable mechanism 55. A coin chute 56 is positioned over the aperture so as to convey coins 58 into the vault 50 via coin port 51. An array of coded indicia means 60 are located preferably on the rear wall 62 of the vault. The transducer 64 is located in a mating relation on the wall 66 of the housing. The transducer is of appropriate form depending upon the signal source for the coded indicia 60 that is to be used.

The transducers 64 are suitably located on the rear wall 66 of the housing to determine from the code means 60 the particular identification of a vault 50, depending on the arrangement of the coded indicia 60 as will be described.

The housing 54 is provided with a door 68 or some other form of electro-mechanical locking device having a lock 70 arranged to receive any of a plurality of keys (not shown), each of which is provided with a particular coded identification which is associated with the holder or user of the key. Thus a collector of the vaults who both removes vaults at certain times must also replace such vaults with a replacement usually, empty vault. During such operations his key is used to

open the door 68. The control means thus positively identifies the person who is both removing a vault, the identification of which is being simultaneously recorded, and adding a new vault, the identification of which being different from the one removed and which is also being recorded after the collector has closed the door 68 and removed his key from the lock 70.

Referring now to FIG. 3 there is shown one example of an array of indicia means 60 in the form of a plurality of pegs 72 each inserted into a particular hole 74 of an array arranged in four columns each having five rows. The columns are shown as seen looking at the rear face of rear wall 62. The five holes in each column correspond to the conventional five level code that is most generally used with punched tape systems.

Although the preferred code now being described is the well-known baudot code, it will be understood that any code may be used to identify the vault whether by numerical, alphabetical or other characters provided the vaults are uniquely identified relative to each other.

Other vaults provided with the array of holes 74 will, of course, have a different arrangement of pegs 72 whereby a different four-digit number will be represented. The pegs may be permanently fixed within the holes 72 or if desired, the pegs may be arranged for removal so that a particular vault may have its identification means 60 changed from time to time so that the operating personnel may not be able to know with any degree of certainty the coded identification of any particular vault.

FIG. 4 shows in schematic form the array of sensors 64 as seen facing the rear wall 66 of the housing 54. Four columns of holes 76 are arranged in five rows each corresponding to the array of indicia 60 shown in FIG. 3. The holes 76 are arranged to receive a peg 72. A peg 72 will be guided into its mating hole 76 only when the vault 50 is fully seated in the housing 54. Each hole 76 is provided with means to actuate a relay switch 78 by a pair of leads 80 for energizing a relay coil 82. If desired, the hole 76 may be provided with a switch which is closed when the peg 72 is seated therein. It will be understood that each of the holes 76 is provided with an appropriate sensing mechanism such as the switches just described or any other sensing device suitably arranged to be responsive and thereby sense the presence or absence of a code signal bit from the array 60 on the vault, as will be apparent to those skilled in the art.

The sensing transducers 64 are arranged to provide a positive indication of the presence of a vault by the operation of the plurality of switches. The absence of the closure of a precise number of switches, in this case, 12, may, if desired, be interpreted by the comparator 16 (FIG. 1) as either the absence of a vault or an erroneous code. The comparator is arranged to render the recordation inoperative if any of the column switches means 77 have more or less than the predetermined switches closed.

The decoder matrix 14 (FIG. 1) is arranged to decode the transducer-sensing signals and translate the decoded signals into appropriate operating voltages for energizing the punch 20 to punch a tape 22 with holes corresponding to the identification of the vault. For the embodiment being described the code punched on the tape is the same as the code array shown in FIGS. 3 and 4. Accordingly, the decoder matrix 14 is not required when the punched code or read-out information is the same as the signal-source code used on the vault. For binary codes used as the vault indicia, however, a binary to punch tape code matrix would be required, the design details and mode of operation of which are well known.

In operation, the control circuit 34 (FIG. 1), when energized, causes the scanner 18 to scan the data stored in each of the signal sources 10 (vault code), 24 (time), 26 (date), 28 (location), 30 (collector's key), and 32 (cash total). As each of the signal data is scanned, the signal is in sequence, transmitted to the tape punch 20 to effect a punch on the tape corresponding to the respective data. Thus, as seen in FIG. 5 a tape 22 is shown punched with a series of rows, each row having precisely three holes of a possible five punched for infor-

mational data. Certain of the punched rows, as indicated, are control signals to the tape reader. The holes F are for teeth in the tape punch 20 to feed the tape. The time of the punch-out is indicated by the four rows 24a, the date by the four rows 26a, the location by the two rows 28a, the collector's key by the two rows 30a and the total amount of cash since the last recording by the rows 32a. The identification of the vaults is shown by the four rows 10a corresponding to the four digits of the respective vaults 50.

The control circuit 34 is arranged to effect such a recorded taped output for any of several control signals. When a particular lane is placed in service, the stop-go signal is energized to start the control circuit 34. However, none of the control operations can start unless the vault is fully seated and the lock 70 is closed. Each time the lock is opened or closed the control circuit 34 effects a read-out so that a precise record is kept of each action related to the vault.

The embodiment just described utilizes a mechanical means for providing a coded indicia of the vault. Other forms of code may be utilized whereby the form of the coding means must be adapted to suit the means selected. Thus if a magnetic system is to be selected, instead of pegs 72 there will be permanent magnetic slugs and the sensing device 77 will be a magnetically responsive switch, such as a reed relay.

In certain applications an optical system may be of especial advantage. One such arrangement utilizes colored, black or white, markers replacing the pegs 72 with appropriate photoelectric exciting lamps and detectors to provide a means to detect the appropriate array of code elements in the code means 60.

Other means for providing a signal source corresponding to a coded indicia and a sensing means will be apparent to those skilled in the art.

When a vault is removed from a housing at a particular location, the vault is automatically locked and sealed from access by the collector. The vault, of course, will usually contain a certain amount of cash, the precise amount of which can be determined only by an actual count. The totalizing register may or may not accurately represent the amount of cash that was deposited in the vault. Any tampering of the vault, however, during manipulations by an individual using a particular coded key will be easily determined by the authorized personnel responsible for opening the vault and counting the contents thereof.

It is now seen that we have carried out the objects of the invention. According to the invention there is provided means of double-security to prevent unauthorized tampering or access to cash vaults. The vault during the phase of its use when cash is being deposited therein is sealed within a housing which requires a special coded key to open and remove it. The vault when removed from the housing, with or without authorized personnel, it self-locked so that its contents are sealed therein. Its identification is unique, which identification has been recorded at a remote location automatically upon its removal from the housing and indeed has been recorded at a previous time when it was inserted or seated into the housing. At a central receiving depot such as a vault depository center the numbered vault is opened and its contents counted. Subsequently, the print-out produced by the tape punch is reconciled against the count at the vault collection center for verification. If discrepancies occur, appropriate action can be taken. This invention, therefore, provides a positive means to provide full-security and a tamperproof system for cash vaults.

What is claimed is:

1. Control means for preventing unauthorized access to a depository of cash comprising in combination:

- a sealed vault having an access port for depositing cash therein;
- coded means on said vault for uniquely identifying the vault;
- a housing into which said vault is inserted;
- said housing having sensing means responsive to said coded means for determining the identification means on said vault;

e. means responsive to said sensing means for recording the identification of said vault.

2. A control means according to claim 1 wherein said vault includes a self-locking cover that fully closes the vault by an automatic lock when said vault is removed from said housing to prevent access to the interior of said vault without authorized opening of said lock.

3. A control means according to claim 1 wherein said coded identification means is a series of protuberances representative of a coded identification character;

said sensing means in said housing comprising a plurality of apertures for receiving said protuberances and electric switches in said apertures which are operative when a protuberance is received in said aperture.

4. A control according to claim 3 wherein said protuberances are adjustable to any one of a plurality of different vault identification indicia.

5. A control means according to claim 1 wherein said coded identification means is an array of excitation lamps and said sensing means is an array of photo-electric cells responsive to said lamps, said array of lamps being representative of a selected code corresponding to an indicia of a unique vault.

6. A control means according to claim 1 wherein said coded identification means is an array of permanent magnetic slug members and said means is an array of magnetic-responsive

switches, said array of magnetic members being representative of a selected code corresponding to an indicia of a unique vault.

7. A control means according to claim 1 wherein said recording means is a tape punch responsive to signals from said sensor to punch holes in a tape corresponding to the identification of said vault.

8. A control means according to claim 1 including means for recording simultaneously with the recordation of the identification of the cash vault data corresponding to the location, time, date and identification of the person manipulating the vault relative to the housing.

9. Control means for preventing unauthorized access to a depository of cash comprising in combination:

a. a sealed vault having an access port for depositing cash therein;

b. coded means on said vault for uniquely identifying the vault;

c. a housing into which said vault is inserted;

d. said housing having sensing means responsive to said coded means for determining the identification means on said vault;

e. means responsive to said sensing means for generating a signal corresponding to the identification of said vault.

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