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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : G07F 5/24, 3/04	A1	(11) International Publication Number: WO 91/07735
		(43) International Publication Date: 30 May 1991 (30.05.91)

(21) International Application Number: PCT/EP90/01952

(22) International Filing Date: 15 November 1990 (15.11.90)

(30) Priority data:
68032 A/89 22 November 1989 (22.11.89) IT

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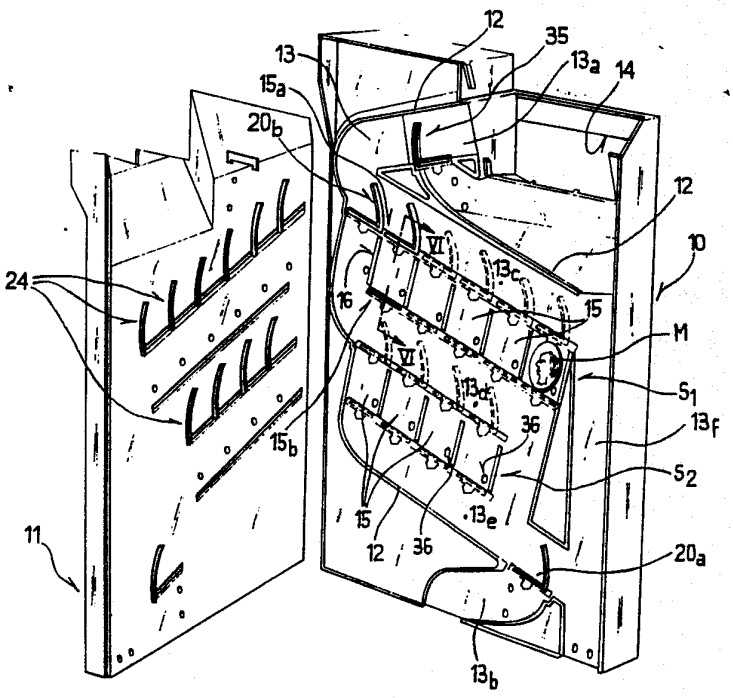
(81) Designated States: AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), HU, IT (European patent), LU (European patent), NL (European patent), SE (European patent), SU.

Published
With international search report.

(54) Title: DEVICE FOR SELECTIVELY STORING, FOR PROGRAMMED COLLECTION AND RETURN, COINS AND TOKENS PARTICULARLY FOR PUBLIC TELEPHONY



(57) Abstract

A coin and token selective storing device comprises a plurality of static compartments (15) for respective individual coins, extending from a channel (19) defining, on a planar support, a falling coin path, and arranged side by side along at least one row, and each comprising an entry opening (15a) controlled by first actuated flaps (20) for deflecting the coins and closing the opening and an exit opening (25) controlled by second actuated flaps exclusively for closure, a plurality of bistable relays being associated with the first and second flaps of the compartments in order to move, upon a programmed actuation, each flap to a stable closure position or respectively to a coin passage stable position.

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DEVICE FOR SELECTIVELY STORING, FOR PROGRAMMED COLLECTION AND RETURN, COINS AND TOKENS PARTICULARLY FOR PUBLIC TELEPHONY

Technical field

The present invention relates to a device for selectively storing, for programmed collection or return, coins and tokens for enabling generic apparatuses for public use.

Background art

The following description refers to the use of the device in the field of public telephony, in which the device is particularly advantageous due to the reasons which will become apparent hereinafter, but said use is not limitative for the present invention, since the operation of said device is independent of the structural characteristics of the enabled apparatus.

Telephone sets for public use, operated with coins of different values and with tokens, provided with a single insertion opening which can receive and select a plurality of coins and tokens though they are different in value and geometric characteristics and can optimize their collection on the basis of a criterion of minimum rounding between the available credit, which is the result of the total of the inserted coins and tokens, and the debit become due during the telephone call, are already known.

Static or dynamic devices for the storage or accumulation of the coins and tokens are used for this purpose.

A known device of the first type is described in the prior Italian patent No. 1,179,554 and consists of a single

channel in which the coins and tokens, in short the coinage, arrange themselves edge-on tangent to one another. Electronic means classify, in terms of storable information, the value of each inserted coin and the spatial address assigned thereto inside the channel, and actuation means, activated by a collection optimization program, provide discriminated collection and return pulses for each coin identified by the related spatial address and selected by said program on the basis of its value.

The second type, the dynamic one, includes known devices in which each coin is stored individually in the corresponding compartment of a movable accumulation means which has a rotary or reciprocating motion. The spatial address of the coin corresponds to the angular or respectively rectilinear movement of the accumulation means with respect to a generic reference, and collection or return occur by aligning each individual compartment with respective collection or return channels.

Though static devices of the first type are advantageous due to their structural simplicity, they have two considerable disadvantages, namely a limited accumulation capability with acceptable dimensions and the limitation of the range of coin thicknesses which can be processed simultaneously. The transverse size of the channel must in fact be greater than, or equal to, the corresponding dimension of the thickest coin which the system can process, and this excludes the use of coins one of which is twice as thick as the other, since such coins could jam and overlap.

Dynamic devices, of the second type, with individual storage, eliminate these disadvantages but require high

energy for movement, with consequent consumptions which, in the case of telephone applications, make it troublesome to supply them with power directly from the exchange.

Due to the inertia of the moving parts, their response is furthermore generally slow, and this complicates their automated management on the part of collection optimization programs.

Finally, in dynamic devices of the described type the scanning order of the compartments of the individual coins is fixed; the coins can be accessed only in the same order in which the user inserted them.

Disclosure of the Invention

The aim of the present invention is essentially to eliminate the disadvantages of both of the above described known types of storage device while combining their advantages.

In particular, an important object of the present invention is to provide a selective storage device with separate compartments for the individual coins which however has no movable accumulation means and is therefore such as to not require the above mentioned high energy for the movement of said means, said device being particularly advantageous in telephone applications by virtue of the possibility of being powered directly with current fed by the exchange.

Another important object of the present invention is to provide a storage device with individual compartments for the coins, in which the scanning order for said compartments can be fully generic both during the step of reception and accumulation of the coins and during the step of emptying

for collection and/or return. This gives the device great flexibility, since it is for example possible to exclude a compartment which is temporarily put out of service without requiring additional movements and/or variations of the program for the handling of the collection and return means.

It is furthermore possible to adopt any type of device management aimed at various purposes, for example minimum energy consumption or minimum wear, or at other purposes as will become apparent from the following description.

A further important object of the present invention is to provide a structurally simple device with high accumulation capabilities and modest dimensions which is highly reliable in operation and is substantially free from jammings due to fraudulent attempts.

In order to achieve this aim, these objects and others which will become apparent from the following detailed description, the present invention relates to a device for selectively storing, for programmed collection and return, coins and tokens, characterized in that it comprises a plurality of static compartments for respective individual coins, said compartments extending from a channel which defines, on a planar support, a falling path for coins, said compartments being arranged side by side along at least one row, each compartment comprising an entry opening which is controlled by first actuated means for deflecting the coins and closing said opening, and an exit opening which is controlled by second actuated means exclusively for closure; a plurality of bistable relays which are associated with said first and second means of the compartments to move, upon a programmed actuation, each said means to a closure

position or respectively to a passage position, both positions being stable; the exit opening of the compartments leading into a common gathering channel which ends with a collection branch and a return branch for the coins, said branches being selectively closed by program-controlled deflection means.

According to the invention, said first deflection and closure means comprise a deflection flap and a shutter for closing the entry opening of the respective compartment; said flap and said shutter are rigidly coupled and arranged in such a mutual relationship that when the flap is in the active deflection position the shutter frees the opening and vice versa. The movements of the flap and of the shutter occur perpendicularly to the plane of arrangement of the compartments, and the extent of the movement is such that in the idle position each deflection flap is spaced from the delimiting wall of the respective coin channel by an amount which is at least equal to the maximum thickness of the coins which can be processed by the device.

Brief description of the drawings

Further purposes, characteristics and advantages of the invention will become apparent from the following detailed description and with reference to the accompanying drawings, which are given by way of non-limitative example and wherein:

figure 1 is a perspective view of the device disassembled into its structural elements, illustrating the essential components of said device;

figure 2 is a similar perspective view, from another side, of a structural element of the device;

figure 3 is an enlarged-scale view of a detail of figure 1;

figure 4 is a perspective detail view of the first deflection and closure elements;

figure 5 is a perspective view of the second closure elements;

figure 6 is an enlarged-scale schematic sectional view taken along the line VI-VI of figure 1;

figure 7 is a schematic plan view of the possible paths of the coins.

Ways of carrying out the invention

The device according to the invention is substantially constituted by a box-like structure, advantageously made of polymeric material, which comprises a base plate 10 and a cover 11 which is juxtaposed with respect to the plate and is connected thereto in a preferably removable manner.

A channel 13 which defines a main falling path for the coins and the tokens, generally indicated by M, is delimited by means of raised ridges 12 on the inner face of the base plate 10. Said path has an entry section 13a which receives the coins from a corresponding known selection and validation device (not illustrated) which is preferably accommodated in a seat 14 of the plate 10, a section for the collection exit 13b and two or more intermediate channel branches as indicated by 13c-13d-13e.

A return channel 13f is also formed on the same internal face as the plate 10 and extends from the entry section 13a; all or part of the intermediate channel branches merge into said return channel.

A first row S1 and a second row S2 of static

compartments or pockets 15 are arranged as ramifications of the intermediate channel branches, are suitable for containing respective individual coins, are laterally delimited by raised parallel ridges 16 of the plate 10 and are arranged side by side on a common plane of arrangement. The number of rows of compartments 15 can naturally be greater or smaller than two; the choice depends exclusively on the overall dimensions of the device.

An upper entry opening 15a for the coins and a lower exit opening 15b are defined in each compartment 15. The upper and lower openings are connected to respective intermediate branches of the path of the coins. Each entry opening 15a is controlled by a respective first actuated element 20 for deflecting the coins and closing said opening.

The element 20 is substantially composed of a curved deflection flap 21 and a blade-like shutter 22 for closing the upper opening 15a which is movable so as to retract into a respective slot 23 defined on the base plate 10.

The flap 21 extends toward the respective intermediate coin path branch and can assume an active position, in which it is in contact with the plate 10 so as to catch and deflect the coin in transit within the coin path, and an idle position in which it is spaced from the plate 10 by an amount which is equal to the maximum thickness of the coins which can be processed by the device so as to allow the free passage of said coins.

A plurality of slots 24 shaped complementarily with respect to the flaps is defined on the cover 11 to allow the free movement of said flaps and their passage from the

active position to the idle position. Each flap 21 is rigidly connected to the respective shutter 22 in such a mutual relationship that when the flap moves to the active position the shutter retracts into the respective slot 23 and opens the entry opening of the related compartment 15, and vice versa; in the closure position, the shutter is suitable for restoring the continuity of the raised ridges 12.

Each exit opening 15b is in turn controlled by a second closure element 25 constituted by a blade-like shutter which is also movable so as to retract into a corresponding slot 26 of the plate 10 and can assume an active closure position, in which it protrudes from the respective slot, and an open position in which it retracts into said slot.

According to the present invention, both positions of the flaps 21 and of the shutters 22-25 are stable, and for this purpose the first and second deflection and closure elements are moved by respective bistable relays 27. A plurality of retention and containment seats 28 delimited by ridges 29 is provided on the rear face of the base plate 10 for the snap-together accommodation and retention of the relays 27. Each relay comprises a polarized armature 30 which can oscillate about a central pivot 31 and has its opposite ends subjected to the flux which circulates in two facing yokes 32-33 which are excited by an interposed coil 34 with switchable polarity.

As clearly shown in the figures, the device is completed by an entry deflector 35 which, following a signal emitted by the coin validator, sorts said coins to the region of the compartments 15 or directly to the return

channel 13f, by a first additional deflection element 20a which is suitable for selectively deflecting the coins into the collection channel 13b or into the return channel 13f, and by a second additional deflector 20b which is suitable for sorting the coins to the branches 13c and 13d. The movements of the coins are furthermore preferably monitored by appropriate sensors 36, for example constituted by photodiode-transistor optical pairs, distributed in strategic points of the path and in particular in each compartment 15 and at each secondary and main path branch.

The operation of the device is as follows: the individual coins inserted in the slot of the validator are sent by said validator, by means of a command imparted to the deflector 35, to the main channel 13 or, if they have been rejected or if the device is already filled with coins, to the return channel 13f. The coins sent to the main channel 13 undergo, according to the position of the auxiliary flap 20b, a further deflection to be selectively sorted along the intermediate channel branches 13c or 13d and from said branches are stored in the individual compartments or pockets 15 by virtue of the actuation of the individual corresponding deflector flaps 21. The filling order of the compartments 15 can be completely generic and from right to left, or vice versa, for each row S1-S2. The filling and/or emptying order of the rows of compartments can be equally generic, and the partial filling of one or both rows is possible. The emptying of the individual compartments occurs by virtue of the opening of the respective exit shutter 25 under the actuation of the respective relay, which must be switched closed again in

order to reset the retention function of said compartment. The handling of the relays of the device is preferably assigned to a microprocessor, for which the polarized inputs of each individual relay represent an equal number of mutually identical peripheral units.

The microprocessor is advantageously programmed as described in said prior patent No. 1,179,554 and is associated with a RAM memory which is composed, in a per se known manner, of a plurality of cells, each of which contains one byte (word) which corresponds to the face value of the coin; the address of each cell corresponds to the address of each individual compartment 15 of the device. An operating circuit (not illustrated) produces the collection, return and reset pulses for which, however, no differentiation in terms of duration is necessary. Furthermore, differently from what is described in said prior patent, the pulses for the collection or return of the generic coin K do not depend on the address of said coin, since each compartment is handled and can be handled fully independently of the others.

Therefore, if the optimization program chooses to collect the k-th coin, even during the call, this can be done without the prior return or collection of other coins, as occurs in previous known static devices, and without the need to move the accumulation means, as occurs in prior dynamic devices.

Figure 7 illustrates, with respective arrows, the different paths which the coins can follow inside the device; said paths are chosen mainly in relation to the collection and return programming requirements and/or to

other requirements such as minimum consumption and/or minimum wear of the components.

The details of execution and the embodiments may naturally be varied extensively with respect to what is described and illustrated by way of non-limitative example without altering the concept of the invention and without thereby abandoning the scope of said invention.

CLAIMS

1. A device for selectively storing, for programmed collection and return, coins and tokens, particularly for public telephony, characterized in that it comprises a plurality of static compartments for respective individual coins, said compartments extending from a channel which defines, on a planar support, a falling coin path, said compartments being arranged side by side along at least one row, each compartment comprising an entry opening, which is controlled by first actuated means for deflecting the coins and closing said opening, and an exit opening which is controlled by second actuated means exclusively for closure; and a plurality of bistable relays which are associated with said first and second means of the compartments to move, upon a programmed actuation, each element to a closure position or respectively to a passage position, both positions being stable; the exit of the compartments leading into a gathering channel which ends with a collection branch and a return branch for the coins, said branches being selectively closed by program-controlled deflection means.

2. A device according to claim 1, characterized in that the falling path of the coins has an entry section which receives the coins from a selection device, a direct return branch and a collection branch with two or more intermediate branches facing the entry and exit sections of said static compartments.

3. A device according to claims 1 and 2, characterized in that said rows of compartments are arranged on a plane which is common to the falling path of the coins and are

delimited by raised ridges which protrude with respect to said plane.

4. A device according to claim 1, characterized in that the first deflection and closure means associated with each individual compartment comprise a deflector flap and a shutter for closing the entry opening of the compartment, said flap and shutter being rigidly connected and arranged in such a mutual relation that the shutter frees the opening when the flap is in an active deflection position and vice versa.

5. A device according to claim 4, characterized in that the movements of the flap and of the shutter occur perpendicularly to the plane of arrangement of the compartments and of the coin path and in that the extent of the movement is such that in an idle position each flap is spaced from the delimiting wall of the respective coin channel by an amount which is at least equal to the maximum thickness of the coins which can be processed by the device.

6. A device according to claim 1, characterized in that the second means exclusively for closure are also constituted by a shutter and in that the shutters of both the entry and exit openings of each compartment are retractably movable into corresponding slots of the surface which delimits the path channels for the coins and said compartments.

7. A device according to claim 1, characterized in that each bistable relay of each series of relays comprises a biased armature which can oscillate about a central pivot and has its opposite ends arranged in a magnetic flux which circulates through two facing yokes energized by a switching

polarity coil arranged between said facing yokes.

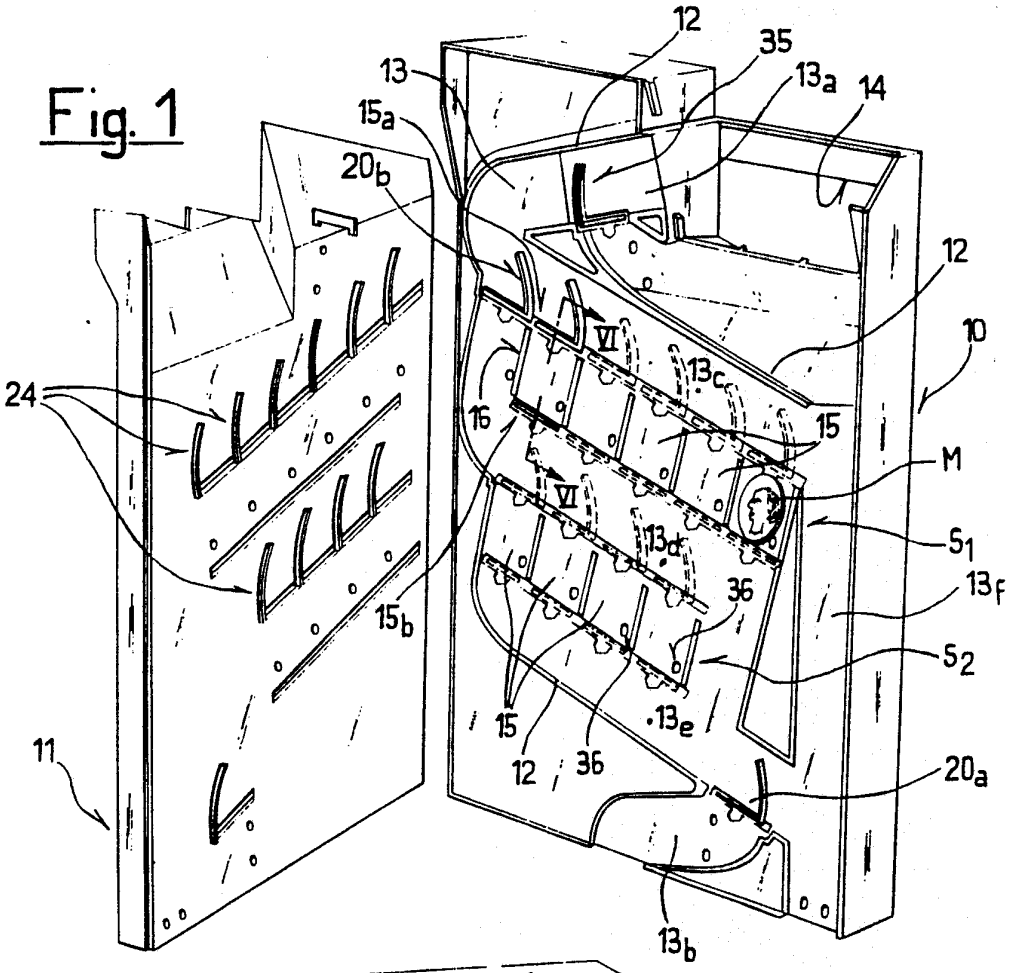
8. A device according to the preceding claims, characterized in that said device further comprises monitoring means for monitoring the movements of the coins, said monitoring means being distributed at least at the compartments of the coins and at preset points of their path.

9. A device according to claim 8, wherein said monitoring means comprise a plurality of photodiode-transistor optical pairs.

10. A device according to claims 1, 8 and 9, characterized in that said monitoring means are supported by said bistable relays.

11. A device according to claim 1 and any claims 2 to 10, characterized in that said device comprises a box-like structure of polymeric material including a base plate and a cover juxtaposed to said plate and removably connected to said plate, in that an internal face of the base plate bears said raised ridges delimiting the compartments and the paths of the coins, and in that an outer face of said plate comprises a plurality of retention and containment seats for said bistable relays.

Fig. 1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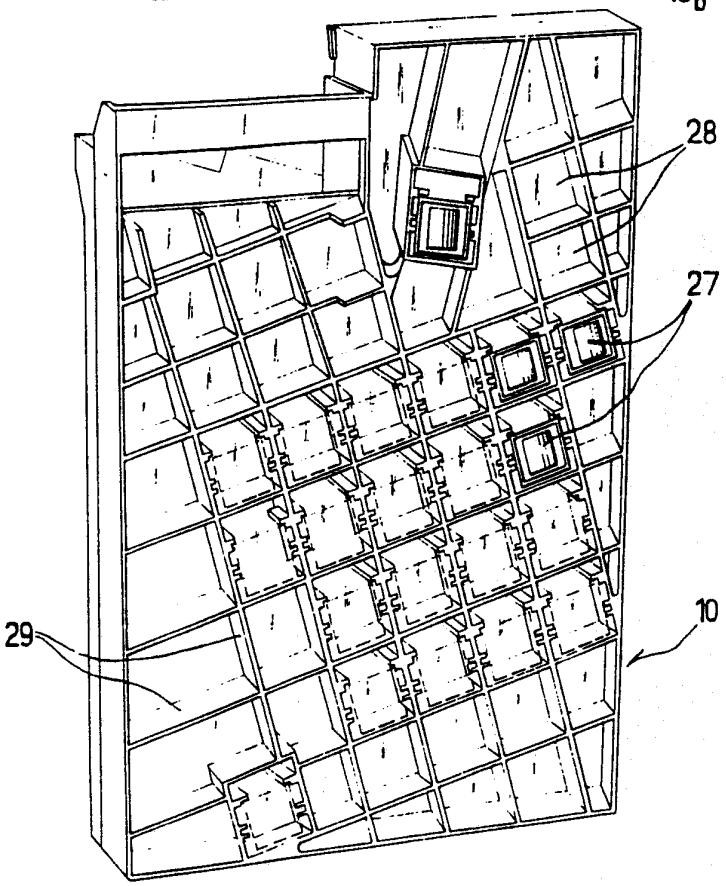
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Fig. 2

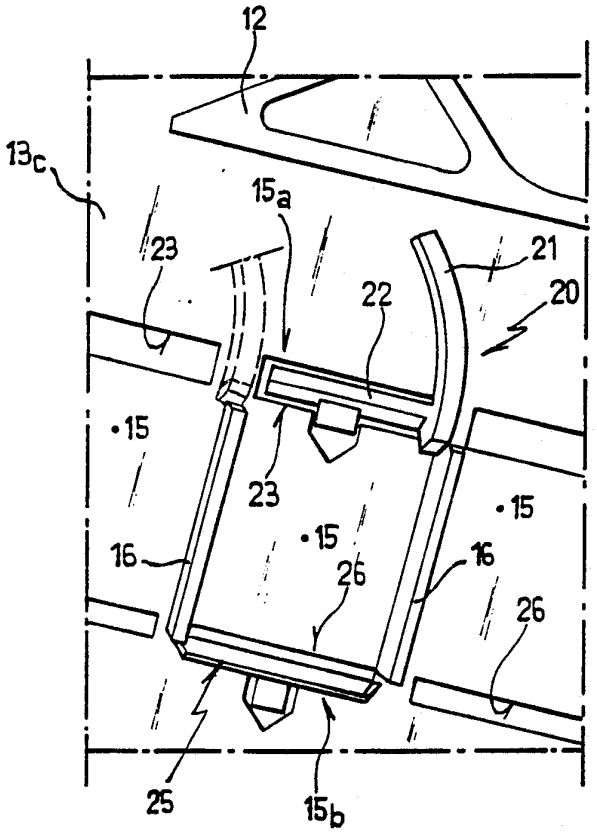


Fig. 3

Fig. 4

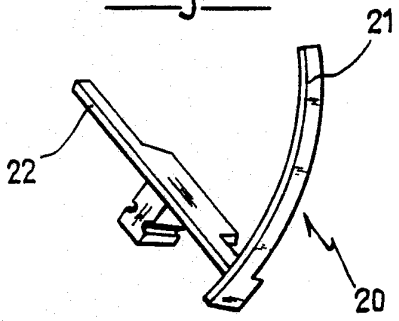
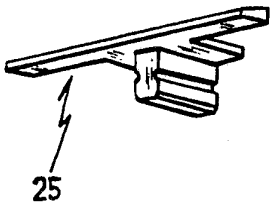


Fig. 5



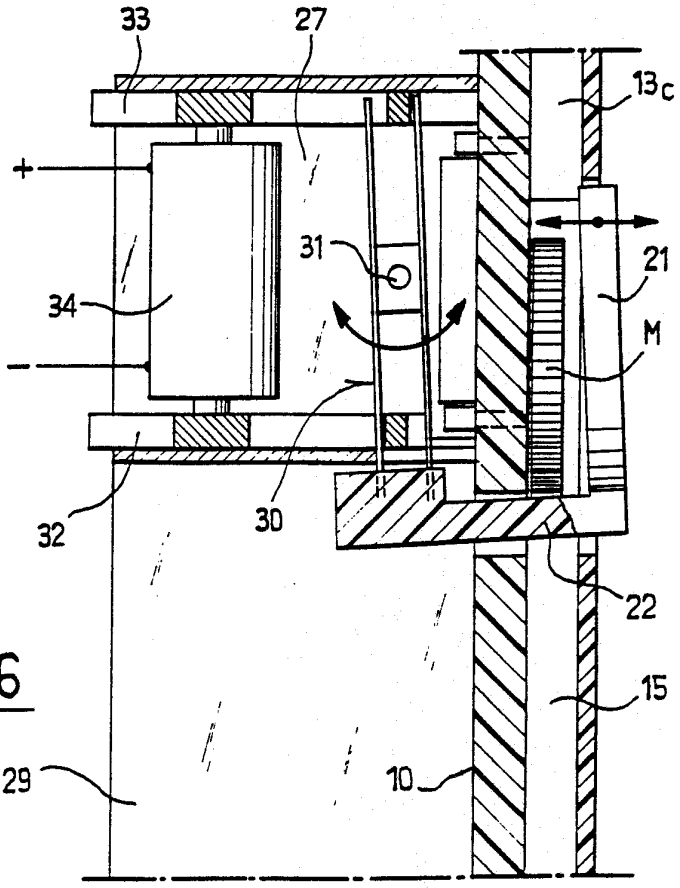
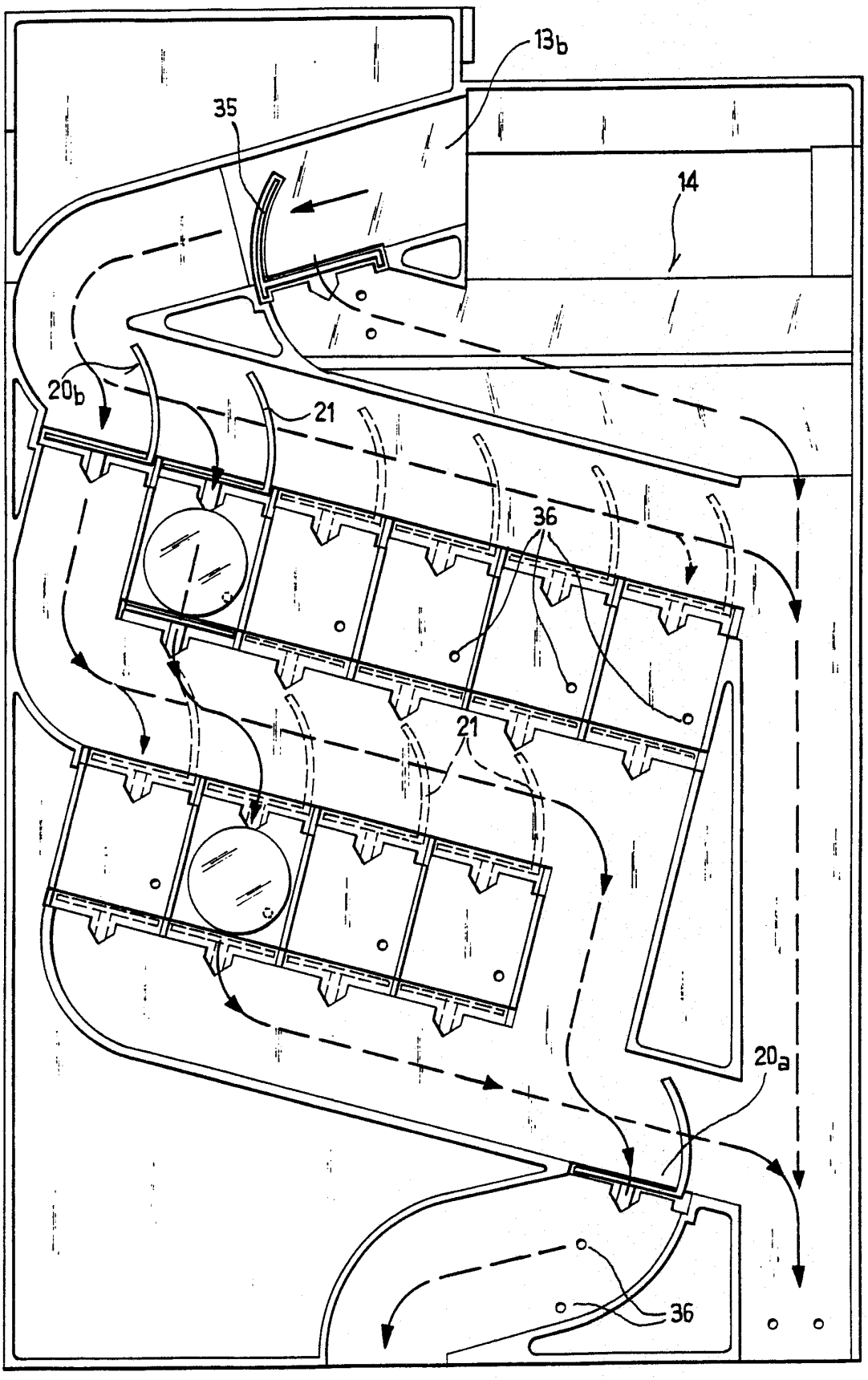


Fig. 6

Fig. 7



INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 90/01952

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 G07F5/24 ; G07F3/04

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	G07F ; G07D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
A	EP,A,92733 (GESI) 02 November 1983 see abstract see page 1, line 13 - page 2, line 16	1
A	WO,A,8303491 (KELLER) 13 October 1983 see abstract	1
A	PATENT ABSTRACTS OF JAPAN vol. 8, no. 8 (E-221)(1445) 12 October 1983, & JP-A-58 173955 (TAMURA DENKI SEISAKUSHO) 06 April 1982, see the whole document	1
A	EP,A,151761 (URMET SPA COSTRUZIONI) 21 August 1985 see abstract & IT,A,1179554 (cited in the application)	1

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IV. CERTIFICATION

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12 FEBRUARY 1991	27 FEB 1991
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	TACCOEN J-F.P.L.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. EP 9001952

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-92733	02-11-83	FR-A,B 2526188 JP-A- 59017694	04-11-83 28-01-84
WO-A-8303491	13-10-83	CH-A- 654963 AU-A- 1158483 EP-A- 0104182	14-03-86 24-10-83 04-04-84
EP-A-151761	21-08-85	None	