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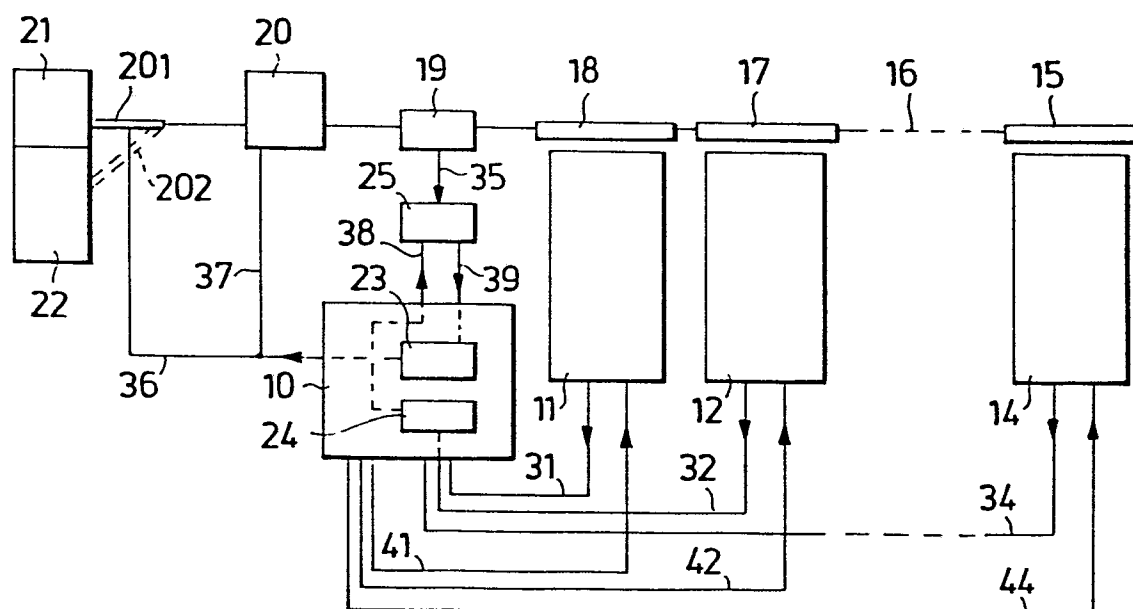
54 Apparatus for dispensing documents from a plurality of stores of said documents.

57 For the purpose of dispensing documents from a store (11, 12..14) there is provided a dator processor (10) for controlling said dispensing operation, a document conveyor path (15, 16, 17, 18, 19, 201-202) arranged to pass said documents to an outfeed compartment; a detecting means (19) for checking the documents; and switching means for switching the conveyor path to the outfeed compartment (21) or to a return compartment (22). The dator processor is provided with information concerning a first signal which is individual for documents from respective stores, and the detector means (19) is arranged to deliver a second signal in dependence on a document passing said means. The dator processor (10) has a memory (24) to which information concerning the first signal is fed and which is connected either to a control circuit (25) connected between the detecting means (19) and a comparison circuit (23), or to said comparison circuit (23). The comparison circuit compares the second signal with a value in the circuit (23), whereat both the signal and the value in the circuit are dependent on the first signal and control the switching means in response to the result of the comparison made.

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Fig. 1



Apparatus for dispensing documents from a plurality of stores of said documents.

TECHNICAL FIELD

The present invention relates to an apparatus for dispensing documents from a plurality of stores of documents of differing value, e.g. banknotes from stores of banknotes of different denominations.

BACKGROUND ART

Apparatus are known which in addition to accommodating different kinds of documents also comprise data processing means for controlling the dispensment of documents from said stores, a conveyor path controlled by said processor for conveying documents from said stores to an outfeed compartment, checking means for checking documents at a given location on the conveyor path, and switching means arranged in said conveyor path for switching said path to a selected one of two transport part paths, of which one leads to the outfeed compartment and the other leads to a return compartment. An apparatus of the aforescribed kind is described and illustrated in the US Patent specification 4 066 253.

In apparatus of the aforementioned kind it is , of course, important that the documents are dispensed in the manner intended. When the apparatus is intended to dispense banknotes, it is important, for example, that not more than one banknote is dispensed at a time. Further, it is desirable that one and the same apparatus is able to dispense, for example, banknotes of different denomination and therewith, perhaps, of different thickness, and that a given apparatus is capable of dispensing a mixture of foreign banknotes without it being necessary to modify said apparatus to any great extent. An object of the present invention is to simplify the necessary control of the dispensment of documents from an apparatus containing

a store of documents of mutually different kind.

The characteristic features of an apparatus according to the invention are disclosed in the accompanying claims.

By means of the invention the dispensment of documents, such as banknotes, is controlled in a rapid and positive manner. In addition there is provided an apparatus of simple construction and reliable operation.

BRIEF DESCRIPTION OF THE DRAWINGS

So that the invention will be more readily understood and further features thereof made apparent an exemplary embodiment of the invention will now be described in more detail with reference to the accompanying schematic drawing, in which

Figure 1 illustrates a banknote dispensing apparatus in accordance with the invention, and

Figures 2 and 3 illustrate mutually different control means for checking the dispensment of banknotes from the apparatus illustrated in Figure 1.

PREFERRED EMBODIMENT OF THE INVENTION

The apparatus illustrated in the drawing comprises a plurality of banknote stores 11, 12 ... 14 each arranged to co-operate with an individual pickup device or feeder 18, 17 15; a data processor 10 for controlling the dispensment of banknotes from said stores; detector means 19 for checking the possible double-feed of banknotes; a collecting compartment 20; a switching means 201-202; an outfeed compartment 21; and a return compartment 22.

The stores 11, 12, ..., 14 are intended to accommodate banknotes of

different denomination , for example swedish banknotes ranging in value from 5 Swedish crowns , 10 Swedish crowns to 1000 Swedish crowns. When a store, such as the store 11, is inserted in the apparatus , information referring to a first signal is automatically transmitted to the data processor 10, more specifically to a memory store 24 incorporated in the data processor , where the information of said signal is accessible provided that the store 11 remains in the apparatus. This information may, for example, relate to the mean thickness of a banknote in said store. In a similar manner there is stored in the memory 24 information relating to the banknotes contained in the store 12 14. It is assumed that the banknotes in respective stores are of the correct kind. Transmission of information to the individual addresses of respective stores in the memory 24 is effected, for example, in binary form.

The individual feeders 15, 17, 18 cooperating with said stores , together with the detecting means 19, the collecting compartment 20 and the switching means 201-202 , form a conveyor path for banknotes from said stores to said outfeed compartment 21 or , in the event of two banknotes being dispensed at the same time, to the return compartment 22.

The detecting means 19 is arranged to deliver to a control circuit 25, via a line 35, a signal (which is hereinafter referred to as the second signal) whose amplitude is determined by the thickness of a single document, or in an exceptional case to the thickness of several documents, during passage of said document or documents through said means. As will be understood, the detecting or sensing means 19 may be so arranged that the passage of a banknote to the value of, e.g. 5 Swedish crowns may give rise to a signal with an amplitude of 7 volts, while two banknotes of the same denomination which overlap

or which are dispensed together may give rise to a signal with an amplitude of 4 volts etc.

When a banknotes passes the detecting or sensing means 19, there is sent to the control circuit 25 a first signal originating from the information which has been supplied to the memory 24 in respect of the store of banknotes in question, and a second signal originating from the sensing means 19 with information about the banknote which has just passed said means. The data process actuates the memory store 24 in conjunction with controlling the outfeed of a banknote from said store. If the banknote dispensed is of the correct denomination and has the correct thickness, the control circuit 25 sends a signal to a comparison circuit 23, via a line 39, which compares said signal with a given value incorporated in the circuit. When the comparison made agrees with the value of said signal and said given value, a control signal is transmitted to the switching means 201-202. The switching means are then switched to a position in which the banknote (or optionally a bundle of banknotes collected in the collecting compartment 20) is fed to the outfeed compartment 21. On the other hand, if the compared signals do not coincide with one another, as the result of two banknotes being dispensed simultaneously for example, the control signal transmitted by the comparison circuit will cause the switching means 201-202 to be moved to a position such that the banknote (or the bundle of banknotes) is passed to the return compartment 22. In Figure 1, the reject position of the switching means 201-202 is illustrated in dash lines. As will be understood, however, the arrangement may be such that when the correct dispensing sequence takes place the amplitude of the control signal is equal to zero, and that the switching means 201-202 remain in the position shown by full lines.

The dispensment of banknotes, or documents, may be effected in a manner such that subsequent to ordering a given number of banknotes of a certain kind, e.g. by means of a keyboard not shown, the banknotes are dispensed sequentially to the outfeed compartment 21; in this case the collecting compartment 20 is thus omitted. One variation is that the ordered banknotes are first collected in the collecting compartment 20 into a bundle, whereafter the whole bundle is fed to the outfeed compartment 21. If, subsequent to collecting a bundle of banknotes in the compartment 20 two banknotes are dispensed instead of one, it may be advantageous not only to reject the double-feed of said banknotes to the reject compartment, but also the bundle of banknotes already present in the compartment 20. To this end, as illustrated in Figure 1, the circuit includes a line 36 connected to the data processor 10 and a line 37 which is connected to said line 36 and to the collecting compartment 20. The control signal is sent from the processor 10 to the line 36 and is conducted therefrom to the compartment 20 via the line 37.

Conveniently the data processor may be arranged to control the control circuit 25 not only in dependence on from which store a banknote arrives but also in dependence upon any small deviation between the given value in the comparison circuit and the value of the second signal, provided that said deviation is small in comparison with those deviations caused by the incorrect dispensment of a banknote. In this way there is obtained a self-regulating system which eliminates any deviations within a narrow predetermined range about the correct value.

The relationship between data processor 10 and sensing means 19 can

be established in different ways.

One way is , as before described, to permit the data processor 10 to control the outfeed of a banknote from stores 11, 12 ...14 by means of pulses on line 41,42 ... 44 while the data processor is permitted, via line 38, to activate the control means 25 in a manner such that said second signal on line 38 is independent of the thickness of an individual, correct banknote (providing that said banknote arrives from the correct store) but dependent upon the correct or incorrect outfeed of a banknote. This means that the control signal on line 36 will cause the means 201-202 to switch when two banknotes are dispensed simultaneously from a correct store with respect to the denomination of the banknotes ordered, and also when a single banknote is dispensed from an incorrect store with respect to the denomination of the banknote ordered, namely when the difference in thickness between the two kinds of banknotes is sufficiently great.

With the detecting means 19 connected directly to the comparison circuit 25 and the memory store 24 connected to the same circuit, while the dispensment of a banknote is controlled by the data processor, another method is to permit said value incorporated in the comparison circuit to be dependent on the value of the first signal, i.e. dependent on from which store a document or banknote shall be dispensed, whereat the control signal from the comparison circuit is thus dependent on the difference between two values which are not constant during the procedure of dispensing two different kinds of banknotes.

When no banknote passes the detecting means 19, said means should operate at a constant basic level so that the signal levels in the

case of the dispensment of single banknotes from different stores, and the signal levels in the possibility of two banknotes being dispensed simultaneously from the same store, have at least approximately the pre-determined values (the set values). Should the aforementioned signal levels be displaced considerably due to aging or other mechanical/electrical phenomena, the data processor is conveniently arranged to compensate for such displacements in levels by controlling the control circuit. If, when dispensing the banknote from a given store, the signal on the line 35 differs substantially from the expected value, the data processor causes the banknote to be passed to the return compartment 22, and that the control circuit 25 is switched to compensate the change occurring in the detecting means 19 (or perhaps the control circuit 25). Immediately thereon there is discharged from the same store a further banknote and if the expected signal level is now obtained this indicates that the first banknote or dispensing operation was in itself correct, and the change (step-up) in the control circuit 25 caused by the data processor is maintained for the subsequent dispensing operations. This implies a considerable expansion in the ability of the system to be self-regulating, thereby avoiding in many cases the provision of a special service on the apparatus.

It has been mentioned previously in the description that the requisite information concerning banknotes contained in an individual store is fed to the data processor as the store is inserted into the apparatus. In connection with a mode in which the data processor compensates possible mechanical/electrical changes another method of obtaining this information will now be described.

The apparatus is adapted to dispense banknotes from a particular country, e.g., American dollars. The various banknote stores are inserted into the apparatus and a first banknote from one of

said stores is fed to the conveyor path, e.g. by ordering said banknote through a keyboard or by dispensing said banknote manually. If the correct (expected) level is obtained on the line 35 and in the circuit 25, the adjustment made to the apparatus is correct, and a first banknote is then dispensed from one of the remaining stores. This process is then repeated. If, however, the signal level is not that which is expected, or deviates outside the limits of the aforementioned "small deviation", the apparatus will return the banknote to the return compartment 22 and the obtained signal level is stored and a further banknote from the same store is dispensed. If the same signal level is again obtained, this means that the signal level is representative of banknotes from said store, and this reference value is retained in the data processor for future dispensing operations from that particular store.

The system can be made even more sophisticated by providing the detecting means/control circuit with a very wide working range, and by programming the data processor in a manner such that said processor itself establishes and stores the levels for correct dispensment of banknotes from the different stores and for the rejection of said banknotes in the case of two banknotes being dispensed simultaneously. In this way the apparatus is updated, suitably by means of special standard banknotes.

Figure 2 illustrates the mutual co-operation between the detector 19, the control circuit 25, the comparison circuit 23 and the memory 24 in a more detailed manner. When inserting, for example, a cassette 11 into the apparatus a value (e.g. 8) representative of an address associated with said cassette is read into the memory. The address may be read in binary code. When ordering a banknote

from the cassette 11 , via a keyboard for example, the aforementioned value 8 is fed to the control circuit 25 , via the line 38, as "the first signal". When the banknote passes the detector 19, said detector transmits a signal , via the line 35, to the control circuit 25 , on whose output there is obtained a signal which, via the line 39, is applied to the comparison circuit 23, and there compared with a pre-determined value. If said signal lies within a given range around the pre-determined value, said signal is read into the memory 24, via the line 40, and the value for the cassette 11 is adjusted on its address in the memory. The adjusted value (the value 8. has been adjusted to, for example, 7 or 9) is then the basis of "the first signal" on the line 38. If, on the other hand, the signal lies outside said interval, this is understood as a dispensing error and a signal passes on the line 36 to the switching means 201-202. In this case the value (8) is, of course, not changed.

Figure 3 illustrates in more detail the mutual corporation of the detector 19, the comparison circuit 23 and the memory 24 in a modified apparatus. A banknote is fed, optionally by hand, past the detector 19 and a signal is sent to the comparison circuit 23 and, via a closed contact 45, to the memory 24 at an address similar to the cassette which contains the banknotes from which said banknote was dispensed. When the next banknote in line is dispensed, "the first" signal is fed , via line 46, to the comparison circuit 23, to which is also sent a signal from the detector 19 via line 47. A comparison is made , and normally the resultant signal lies within a pre-determined range about a pre-determined value. A certain percentage (e.g. 5 %) of any difference is re-fed to the memory 24 via line 48 and is permitted to influence the infed

value on the address in question in the memory 24. If the resultant signal, on the other hand, lies outside the pre-determined range, this is understood as an error in dispensment, i.e. some adjustment of the value in the memory 24 must be made.

CLAIMS:-

1. An apparatus for dispensing documents from a plurality of stores (11,1214) of documents of mutually different kinds, e.g. documents of different denominations, comprising a dator processor (10) for controlling the dispensment of documents from said stores; a conveyor path (15, 16, 17, 18, 19, 20, 21, 201-202) controlled by said dator processor (10) for conveying documents from said stores to an outfeed compartment; a detector means (19) for checking a document at a given location on said conveyor path; and switching means (201-202) incorporated in said conveyor path for switching said path to one of two part paths of which one part path leads to said outfeed compartment (21) and the other leads to a reject compartment ; characterized in that means are arranged for progressively generating a first signal representative of documents belonging to respective stores; that detector means (19) are arranged to transmit to the data processor (10) a second signal (e.g. via 35,39) in response to a document passing said detector means (19); and in that the data processor (10) includes a comparison circuit (23) arranged firstly to compare , for each document passing said detector means (19), said second signal received from said detector means (19) with a value in the comparison circuit (23), said second signal or said value being dependent upon said first signal , representative of said supply (e.g. 11) from which the document in question arrives, and secondly to deliver a control signal (via 36) dependent on said comparison , for controlling the switching means (201-202).

2. An apparatus according to claim 1, characterized in that said means comprises a sequential arrangement of said stores (e.g. 11) in combination with circuits in said dator processor (10) in an arrangement such that said first signal is generated when a respective supply (11) is inserted into said apparatus.

3. An apparatus according to claim 1, characterized in that said means comprises an arrangement of said detector means (19) in combination with circuits in said dator processor (10) in an arrangement such that said first signal is generated when a first document is dispensed from a respective store (e.g. 11).

4. An apparatus according to any one of claims 1-3, including a collecting compartment (20) incorporated in said conveyor path, for collecting a number of documents ordered through said data processor (10), which documents are to be conveyed together to said outfeed compartment, characterized in that said switching means (201-202) are incorporated in said conveyor path behind the collecting compartment (20) but in front of the outfeed compartment (21), and in that when the detector means (19) detects that a document has been dispensed incorrectly, e.g. two documents have been dispensed at the same time, the control signal, in addition to switching the switching means (201-202) to the other conveyor path, also causes the documents located in the collecting compartment (20) to be fed to the return department (22).

5. An apparatus according to claim 2 or claim 3, characterized by a memory store (24) incorporated in the dator processor (10) and arranged for storing the first signal when a respective store (e.g. 11) is inserted in the apparatus and when a first document is dispensed from a respective store, said memory being connected to the comparison circuit (23) during the dator control of the dispensment of a document from said stores (11, 12 ... 14) so that said value in the comparison circuit is dependent on the first signal representative of the store (e.g. 11) from which the document in question arrives.

6. An apparatus according to claim 2 or claim 3, characterized by a memory store (24) incorporated in the dator processor and arranged for storing the first signal when a respective store (e.g. 11) is inserted into the apparatus and when a first document is dispensed from a respective store, said memory being connected to a control signal (25) which is connected between the detector means (19) and the comparison circuit (23) and which acts on the signal from the detecting means (19) in conjunction with the control of said dator (10) of the dispensment of a document from said stores (11,12 ...14) and in dependence of from which store (e.g. 11) a document shall arrive, so that the signal from the control circuit (25) is solely dependent on the correct or incorrect dispensment of a document, but independent of from which store (e.g. 11) of said stores (11,12 ...14) a respective document is dispensed.

7. An apparatus according to claim 6, characterized in that in the event of a deviation in the comparison circuit (23) between said value and said second signal, said deviation being small in comparison with deviations caused by incorrect dispensment, the dator (10) is arranged to influence the control circuit (25) for eliminating said deviation.

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Fig. 1

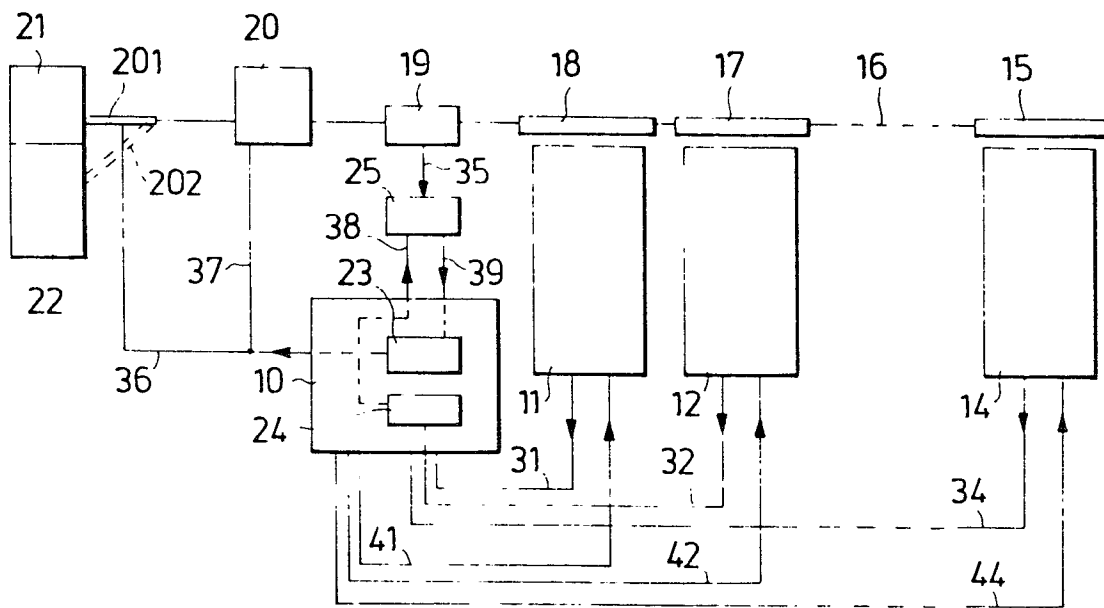


Fig. 2

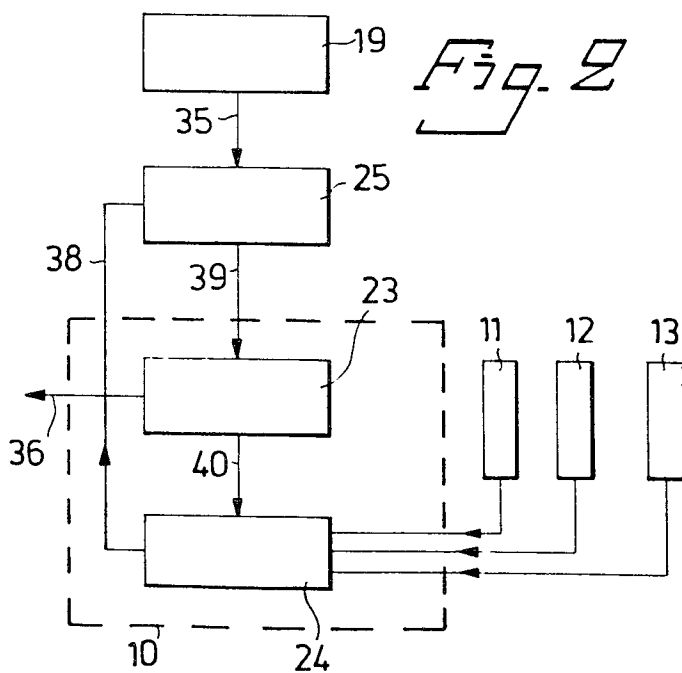
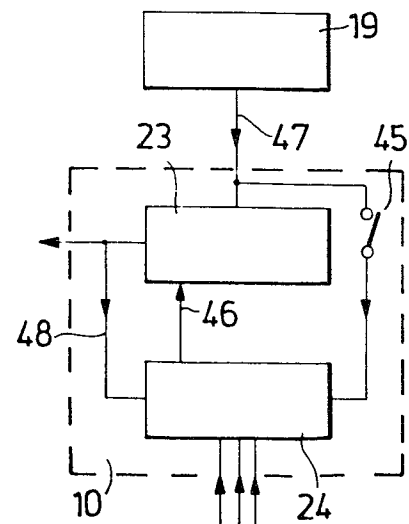


Fig. 3



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European Patent
Office

EUROPEAN SEARCH REPORT

Application number

EP 80 85 0107

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<p>GB - A - 2 001 038 (DIEBOLD)</p> <p>* Abstract; page 1, line 88, to page 3, line 89; page 13, lines 92 to 103; page 5, lines 17-31; figures *</p> <p>--</p> <p>US - A - 3 778 051 (J.H. ALLEN)</p> <p>* Abstract; figure 2 *</p> <p>--</p> <p>FR - A - 2 089 733 (XEROX)</p> <p>* Claims; figures; page 8, lines 24-40 *</p> <p>--</p> <p>A DE - A - 2 319 349 (DATA RECOGNITION)</p> <p>* Claims and figures *</p> <p>--</p> <p>P International publication WO - A - 79/01055 (NCR)</p> <p>* Abstract; figures 1,2; page 7, lines 7-31 *</p> <p>----</p>	<p>1,4</p> <p>1,3-5</p> <p>1-6</p> <p>1</p> <p>1</p>	<p>G 07 D 1/00 B 65 H 7/12</p> <p>TECHNICAL FIELDS SEARCHED (Int. Cl. 3)</p> <p>G 07 D 1/00 9/00 B 65 H 7/12 3/44</p> <p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant A: technological background O: 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</p> <p>&: member of the same patent family, corresponding document</p>
<p>b The present search report has been drawn up for all claims</p>			
Place of search		Date of completion of the search	Examiner
The Hague		10-11-1980	DAVID