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(54) AUTOMATIC BANKNOTE HANDLING SYSTEM

(57) Automatic banknote handling system intended to be incorporated preferably in any type of bank agencies wherein withdrawals and deposits are current operations. The system consists of a machine (1) which comprises the upper mouth (2) for depositing the banknotes in no special order, means for conveying the banknotes from the deposit mouth (2) to an intermediary mouth (3) accessible from the outside by the operator, means for actuating the stop (4) on which the banknotes bear, in the intermediary mouth (3), means for gathering the banknotes according to their value, means for the provisional storage of banknotes according to their values, means for removing the banknotes for withdrawals, and means for definitive deposits of the banknotes.

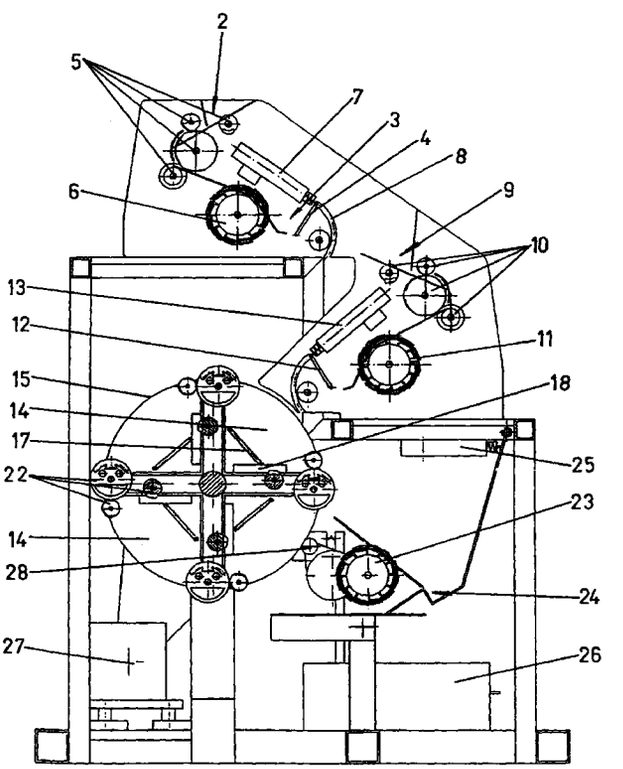

Fig. 2

EP 0 892 372 A1

Description

OBJECT OF THE INVENTION

The following invention, as it is expressed in the title of the present specification, comprises an automatic banknote handling system, which is specially for use in agencies of banking entities, wherein money withdrawals and deposits are current operations, in such a way that by means of the system integrated into the corresponding machine which is proposed, the counting up of the money, the checking of its authenticity, its compilation in relation to the value of the banknotes, its provisional storage and the removal of banknotes according to the amount desired by the operator, as well as its definitive storage are carried out automatically.

In this way, by means of a small machine, it is possible in only one operation to count up the money and to previously check its authenticity before it is introduced inside the machine, so that in the case that there is not a coincidence between the amount denoted by the client for his deposit and the one counted up by the machine, or if the later detects any false or unrecognizable banknote, all the money may be directly recuperated in order that the operator and the client will be able to verify the cause of desagreement with real certainty, since no banknote has gone into the inside of the machine, and the money having always been in view of the client.

Furthermore, the automatic banknote handling system enables, starting from any amount of banknotes of different values, deposited totally in disorder, to carry out the separation thereof according to their value, as well as their provisional storage into the inside of the machine and their further removal from the said provisional store to the withdrawal receptacle, by the operator who has applied for the withdrawal, according to the amounts ordered by him.

Since the entire operation is performed by automatic means, without the manual intervention of the operator, a total reliability is achieved on the operation which is taking place, preventing the unavoidable human errors which in a greater or lesser extent occur, both when counting the money, as well as when checking, in a routinary way, the authenticity of the banknotes.

The banknote handling system has incorporated some improvements which are essentially based on the provisional storage drum of the banknotes, the banknotes being able of being removed, and on the device which removes them, according to the amount ordered.

Also, the system may be used as a banknote dispenser means, for which purpose the system will be lack of the banknotes counting, authentification and classification means, the system being basically formed by the storage drum and the removing device.

Thus, the improvements are based on the fact that the removal and counting mechanism of the banknotes to be removed, which are stored in the different compartments of the provisional storage drum according to the value of the banknotes, in stead of being disposed in each one of the drum compartments as it was described in the main Patent, it is disposed on a cart which can move by some guides which will convey the banknotes perfectly arranged towards the casing for withdrawal by the operator.

In this way, with independance of the number of compartments of the storage drum of the banknotes according to their values, the system does only need one removal and counting mechanism, mounted on the movable cart, with the economic savings which this represents, and furthermore, in this case the storage drum reduces the size as it only comprises the corresponding banknotes holding clamp.

The separation platforms which define the different compartments of the drum operate as the base of the corresponding compartments, presenting a pair of radial cuttings which enable the passage of the banknotes removal wheels so as to be positioned under them and pull them up to the counting and conveying mechanism towards the receiving casing, so that once the banknotes related to the corresponding compartment are removed, the cart moves back enabling again the rotation of the drum for a new positioning in which the cart will be moved so as to be able to remove banknotes once again, as it has been pointed out.

FIELD OF APPLICATION

The automatic banknote handling system which is presented, has a preferred application in agencies of banking entities, being used to carry out the deposit operations and withdrawal of money automatically, avoiding the manual intervention, which means avoiding the human errors produced in a greater or lesser extent both when counting the money as well as when checking the authenticity thereof.

In this way, the operator handling the machine carries out the deposit and withdrawal operations in a totally automatic way, thus avoiding possible errors.

BACKGROUNDS OF THE INVENTION

Conventionally, the cashiers of a bank have been carrying out the money counting operations and the checking of the authenticity of the banknotes, in a manual way, so whereby in a greater or lesser extent, it is unavoidable to commit errors. Furthermore, since each time higher banknotes amounts must be used to carry out numerous operations, when handling a bigger number of banknotes it is easier to commit errors, with the further difficulty that the operations which are performed need a lot of time.

Thus, usually, the cashiers, with the purpose of counting the money which is to be deposited or withdrawn, the first thing he must do is to separe the banknotes according to the values thereof so as to count,

afterwards, the banknotes of each one of the values, finally adding up the different partial amounts so as to find out the total amount.

It is evident that the said operation needs an investment of much time, so that in the deposits of money, in the case that the obtained amounts do not coincide with those marked by the client, the counting up thereof must be performed once again.

With time, to make the banknotes counting operations easy for the cashiers, simple machines were introduced by means of which it is easier to count up the number of banknotes disposed thereon, with the possibility of making packages of a certain number of banknotes.

In this way, since the machine does only count the banknotes, the cashier previously, has to select the banknotes according to their values, since if in banknotes bundle of a certain value, if banknote any different value is included, does not distinguish that effect, but it counts it as another one, being this one an obvious disadvantage.

On the other hand, the detection of the false banknotes is made by the cashier, mainly, on the basis of his own experience, in a way that, if there is any doubt, he makes use of a simple device of rays to detect false banknotes, carrying out the said operation only for certain banknotes related to which there is some doubt about its validity, and one by one. All of this, has the disadvantage that in the case that the counting up of a great deal of banknotes is taking place, it is easy that between them there is some false one which will not be detected.

Thus, when checking up the banknotes with the rays system, the false banknotes as well as any other manipulation which has taken place upon any other document, like in checks manufactured on a special paper can be detected.

This general embodiment is performed on the mayority of the agencies of banking entities, trying to make more profitable and to speed up the operations, while in the central offices a more exhaustive examination takes place with the inconvenience that even though at that moment any false banknote is detected, the lost is irremediable.

DESCRIPTION OF THE INVENTION

In the present specification an automatic banknote handling system is presented, which can be useful for its incorporation preferably in any type of agencies of banking entities, due to its small volume which makes its installation easy in small places, facilitating all the operations of deposits and withdrawal, being constituted by a machine, the system of which is integrated into it, presenting on its upper side a mouth for depositing the banknotes to be handled, without any need for the banknotes to be in a especial order, means for conveying the banknotes from the upper deposit mouth to an intermediary mouth accesible from the outside by the operator, means for actuating the stop on which the banknotes bear, in the intermediary mouth, means for gathering the banknotes according to their values, means for the provisional storage of the banknotes according to their values, means for removing the banknotes for withdrawals, and means for definitive deposit of the banknotes.

The banknotes deposited on the upper mouth in no special order, are conveyed to the intermediate mouth at the view of the client himself who makes the deposit, by means of four wheels which convey them unitarily to a wheel provided of a set of arched projections on its side surface, which deposits while rotating the counted banknotes, after checking that they are authentic, upon a stop of the intermediary mouth accesible from the outside by the operator.

If the system detects any false banknote or any banknote not recognizable by the system, the operation is stopped and the operator may check its cause, the system not counting the false or not recognizable banknote and in this way, if the amount counted by the system does not correspond with the one noted by the client, all of the banknotes which have been in his presence may be picked up by the operator from the intermediary mouth so as to check the dephasing which has been produced.

On the contrary, if the system does not detect any false banknote and the counted amount corresponds to the one indicated by the client, an electromagnet which moves in a rotatory way the support stop of the banknotes in the intermediary mouth, making the banknote to be housed in a nearly compartment, for their further gathering according to the values thereof.

Means for the gathering the banknotes according to the value of the same, are defined by a quartet of wheels which convey the banknotes unitarily from the provisional housing in which they are located towards a wheel provided with a set of arched projections in entire its surface, in such a way that due to the fact that the system knows in all moment where and how the banknotes are disposed, the same deposits upon a stop all of those consecutive banknotes with the same value, at the same time that the drum which acts as a provisional storage is positioned so that the suitable compartment is disposed for the reception of the gathered money.

Once the banknotes have been gathered upon the said stop and the drum is suitably positioned, an electomagnet which will cause the rotation of the stop is operated, and that the banknotes are accumulated in the compartment of the drum that corresponds to their value.

If the banknotes are found to be in disorder in such a way that there is only one banknote of a certain value, this one will be deposited in its corresponding compartment of the drum and if there is more than one consecutive banknote of the same value, they are gathered to be conveyed jointly to the compartment of the drum

which corresponds to the value thereof.

For this purpose, each one of the compartments of the drum comprises a holding clamp of the bundles of accumulated banknotes, the clamps being rotatably by rotation to a lever related to connecting rod exterior to one of the basis of the drum, and loaded by an spring, upon which an electromagnet acts independently according to the direction of rotation of the drum in its positioning for the reception or removal of the banknotes.

Thus, while acting upon the connecting rod, with the corresponding electromagnet, the rotation of the lever and the consequent raising of the clamp is produced, related to the compartment disposed for the reception of the banknotes, the base of the banknotes seat being in horizontal position, in such a way that on releasing the clamp, the banknotes do not move.

Also, in relation to each one of the compartments of the drum of provisional storage of the banknotes, according to their value, it presents a trio of wheels which enable the unitary removal of the banknotes so as to be conveyed towards the receptacle withdrawal by the operator or towards the lower definitive deposit.

Thus, if the corresponding operator wishes to remove a certain amount of money, it will be enough to write on the keyboard the said data for recuperating the money from the drum of provisional storage, according to the amount expressly requested by the operator in the banknotes of the same or different value which he requested previously or alternatively the machine may be the one to bring the amount of money requested, in a random way or according to its programming, giving the required amount of baknnotes of identical or different values.

In this way, the banknotes removed from the compartment of the drum are conveyed towards a wheel provided with a set of arched projections according to the whole of its side surface, so as to be deposited by the wheel upon the receptacle for withdrawal through the corresponding side mouth of the machine.

If what is desired is to deposit the money on the lower definitive deposit, the operator can write on keyboard the said order so that the desired compartment or compartments are totally or parcially emptied. In this way, the system itself may be the one which carries out the operation of partial or total emptied of some of the machine compartments, at the moment it detects that there is an excesive amount of banknotes thereon.

Definitively, the machine which incorporates the described banknote handling system, may be handled by two operators and due to its reduced dimensions it is easy to set up in all of the agencies of banking entities obtaining a total reliability at the moment of counting up the money as well as at the moment of checking their authenticity.

On the other hand, the system incorporates some improvements which are relative to the provisional storage means of the banknotes according to the values thereof, to the banknotes removal means to carry out withdrawals, to the means of positioning for collection of the removed banknotes by the operator and being able of being adapted as a banknotes dispenser for which purpose it incorporates means for the direct introduction of the banknotes towards the provisional storage, in which case the machine lacks the banknotes counting, authentification and clasification means.

The means for a provisional storage of the banknotes, according to their values, are defined by a drum, which represents some angular, axially divided compartments, whose seat base of the banknotes, formed by the spacer strips, present a pair of radial cuttings from their outside free side and a strip with a position ortogonal to the said platform or seat base, which limits the positioning of the banknotes towards the inside, gathered on it, avoiding their movement towards the rotational axial axis and the banknotes being held by the corresponding clamp, when it is necessary.

Furthermore, related to the outside side of the drum compartments, there are respective lift-up strips which work as a stop for the banknotes towards the outside, avoiding a possible liberation during the time interval which passes from their deposit of the compartment until the holding clamp acts on them, in such a way that the said strip will be activated by the said removing cart while it advances.

The banknotes removing means for carrying out withdrawals, are defined by a movable cart, positioned in some guides facing the drum compartment which is positioned so as to remove the corresponding banknotes thereof.

In this way, when the drum is positioned to remove the banknotes of the corresponding compartment, the cart is moved trough the guides towards the drum, penetrating through the radial cuttings of the base platform, which keeps apart the compartments and upon which the banknotes are seated, a pair of wheels for removing the banknotes which when rotating make the banknotes move towards two banknote unfoliation and counting pair of wheels which, the banknotes are conveyed one by one between some facing straps disposed between pulley pairs, towards the casing of withdrawal by the operator.

At an embodiment variant, the movable cart which removes the banknotes from the drum compartment, presents a pair of banknotes removing wheels, the pair of banknotes unfoliation and counting wheels and a pair of facing wheels which convey the banknotes towards a pair of wheels provided with a serie of projections which form corresponding receptacles in which the banknotes are to be disposed so as to be conveyed to the withdrawal casing upon the rotation of the mentioned wheel.

Once the corresponding banknotes are removed from a compartment of the drum, the movable cart moves back liberating the drum so that it can rotate to a new position, since the bearing structure of the pair of banknotes removal wheels is retracted with regard to

the drum.

The means for positioning the banknotes so as to be picked up by the operator, are defined by a casing to which they are conveyed from the corresponding compartment of the drum, in such a way that when the cart backs up, backing up related to the value of the removed banknotes, the same runs slightly up against them on the receiving casing, arranging them against the access door causing, on the last removal and backing up a greater movement which will cause the slightly output of the package of banknotes related to the rotatory door making its withdrawal easy for the user.

Also, the banknotes withdrawal casing by the operator is defined by a simple casing slightly protruding from the machine edge, once the cart has been moved to the outside, opening the access door, during the definitive delivery.

This way, the system incorporates a single banknotes remover, which enables having a smaller drum and with more compartments, reducing considerably the economic cost at the same time it increases its reliability by the drastic reduction of the remover elements.

On the other hand, the system may be used as a simple banknotes dispenser, in which case the handling system lacks the devices of counting, authentification and clasification of the banknotes, in such a way that the machine presents a trap-door in which the counted banknotes are manually deposited by the operator and when giving the appropriate order to the machine, the drum is positioned for the feeding of the banknotes in the corresponding compartment, where they enter from the input through the corresponding trap-door.

With the purpose of complementing the description which will be made afterwards, and with the object of helping to better understand its characteristics, there is a set of drawings accompanying the present specification, in which figures, in an ilustrative and non limitative way, the most significant details of the invention described in the present specification are represented.

BRIEF DESCRIPTION OF THE DESIGNS

Figure 1 shows a perspective view of the machine which embodies the banknote handling system, being possible to observe the upper mouth of banknotes deposit, as well as the intermediary mouth close to it and one of the side mouths for withdrawal of the banknotes, removed from the provisional storage drum.

Figure 2 shows a side view of the different mechanisms composing the banknotes handling system, from the point of view of the deposit thereof, so as to be counted and to check their authenticity until the storage thereof in different compartments of the drum, as well as the banknotes removal mechanism for their withdrawal and for their passage towards a definitive lower deposit thereof.

Figure 3 shows another schematic side view of the handling system, in which the electromagnet pair, operating upon the clamp opening connecting rod which materializes the holding of the banknote bundles stored in the corresponding drum compartments is observed.

Figure 4 shows a plan view of the compartimented provisional storage drum for the banknotes according to their values, being possible to observe the securing body of the deposited banknotes, as well as the different wheels which enable the contribution and control of the banknotes to be issued.

Figure 5 shows a view according to the cross view A-A of the preceding figure, being possible to observe the inner elements of the drum corresponding to the different compartments thereof, for holding the banknotes as well as the conventional elements for bringing the banknotes one by one while removing them.

Figure 6 shows a side elevation view of the drum, related to the side in which connecting rods are found which are related to the levers of rotatory joint to the banknotes holding clamps, the said connecting rods being able to be activated by an electromagnet pair, which enable their operation in relation to the rotation in both directions of the drum, what enables to reduce the positioning time thereof.

Figure 7 shows a general side view of the machine, where the different mechanisms represent components related to the introduced improvements, based on the banknotes storage drum and on the removing movable cart thereof, which will convey the banknotes perfectly arranged towards a casing for withdrawal by the operator.

Figure 8 shows a side elevation view of the movable cart, the banknotes remover when it is disposed under the banknotes of the corresponding compartment of the drum, and the pair of removal wheels which pass through respective cuttings of the base, so as to move the banknotes towards the pairs of wheels which unfoliate the pulled banknotes and count them so that they pass to the conveying mechanism towards the receiving casing.

Figure 9 shows a plan view of the movable cart which removes the banknotes represented on the precedent figure, observing the disposition of the pair of removal wheels, the pairs of unfoliation wheels.

Figure 10 shows a side elevation view of a diametral cutting of the drum, with the cart moved so as to carry out the removal and counting of the banknotes of the corresponding compartment with the clamp elevated, observing how the pair of removal wheels will pass through respective radial cuttings of the base platform and separating the compartment so as to be able to gain access to the banknotes.

Figure 11 shows a general side view of the machine, having represented the counting, authen-

tification and classification mechanisms, as well as the compartments of the drum provided with the corresponding banknotes holding clamp, the pair of stop strips of the banknotes and the remover cart according to an embodiment variant in which it presents a wheel perimetrically provided with a series of projections by means of which it will receive the banknotes so as to convey them to the receiving casing.

Figure 12 shows a side elevation view of a diametral cutting of the drum, with the cart moved, so as to carry out the banknotes removal and counting of the corresponding compartment with the clamp upon the banknotes, observing how the banknotes are directed on a wheel provided with a series of projections, in which receptacles the banknotes are deposited so as to be conveyed by it to the withdrawal casing while it is rotating.

Figure 13 shows a side elevation view of the machine in its use as banknotes dispenser in which the whole estructure and counting, authentification and clasification devices of the banknotes have been removed, the machine comprising an input of the banknotes in which they are deposited counted by the operator and when the data corresponding to the number and value of the banknotes is introduced on the machine, the drum is positioned to receive them through the trap-door existing on the said deposit input.

DESCRIPTION OF A PREFERRED EMBODIMENT

In view of the commented figures and according to the adopted numeration, we can observe how the machine I which embodies the banknote handling system, has on its topside the deposit mouth 2 of the banknotes which are to be handled, and close to it, the intermediary mouth 3 in which the banknotes are bearing upon the stop 4, being able to be removed from the intermediary mouth by the operator before the banknotes pass to the inside of the machine, in the case there is not an exact coincidence between the amount determined by the client to be deposited and the amount counted by the system, or in the case of detecting a false or not recognizable banknote.

In this way, in the case of having to perform a new counting or to detect a false or not recognizable banknote, the money may be recovered before it passes to the inside of the machine, without any doubt about what has been performed before the client, since he has all the time the money in view, as well as the display in which the amount which has been counted appears.

This way, the banknotes deposited upon upper mouth 2 of machine 1, are conveyed by the quartet of wheels 5 towards wheel 6 of a bigger diameter, provided in relation to its entire side surface with a series of arched projections, between which each one of the banknotes are independently positioned, in such a way that in the said conveyance the value and the relative position of each one of the banknotes, as well as if they are authentis, are detected.

The rotation of the wheel 6 upon which the banknotes are deposited in a unitary form between its arched projections, causes the movement of the banknotes towards the stop 4 of the intermediary mouth 3.

If all the banknotes are authentic and the amount indicated to be deposited is the same as the one counted by the system, the electromagnet 7 is actuated, the stop 6 being moved through the frame groove 8, sliding the banknotes to the housing 9 from which they are in a unitary form collected by identical order to the order of input by the quartet of wheels 10 which dispose them unitarilly upon the housing defined by the arched projections of the side surface of the rotatory wheel 11, from which they are positioned upon the stop 12 gathering those which have the same value, so that once the different consecutive banknotes of the same value are gathered, the electromagnet 13, which moves the stop 12 by rotation, is activated and enables the drop of the gathered banknotes of the same value on the corresponding compartment 14 of the drum 15 which is rotatory with regard to the shaft 29.

Since the machine at each moment has each one of the banknotes perfectly under control, at the moment those are disposed upon the stop 12, the drum 15 rotates so as to position the compartment 14 relative to the banknote or banknotes gathered on the stop 12, reducing the handling time.

Logically, with the suitable positioning of the drum 15 to receive the banknote or banknotes in the corresponding compartment 14, the operation of one of the two electromagnets 16 upon one of the connecting rods 19 takes place, raising the lever 17 bonded to it, as well as the clamp 18, enabling the gathering of the banknotes moved when rotating the stop 12 in the said compartment, so that once they are gathered, with the consequent rotatory movements the drum 15 in the one or in the other direction, the electromagnet 16 and consequently the corresponding lever 17 is released, causing the clamp 18 to apply again a pressure upon the banknotes bundle.

The electomagnets 16 stay in ortogonal position towards the side base of the compartment, its plunger attacking directly upon the connecting rods 19 in such a way that the said electromagnets 16 act the one or the other one, according to the direction of rotation of the drum, upon each one of the connecting rods arms 19, always causing the raising of the lever which carries the corresponding clamp 18.

It can be seen from figure 6, schematically, that the operation connecting rods of the corresponding levers related to each one of the drums compartments, which are joined in a rotatory way to each one of the banknotes holding clamps 18 on the compartments 14 of the drum 15, the said connecting rods 19 being tractioned by corresponding torsion springs 20 which tend

to push them to their starting position, in which the clamps stay putting pressure upon the banknotes bundles deposited on the respective compartments of the provisional storage drum.

Up to the present, the process through which the banknotes have been counted, its authenticity checked, and stored in the corresponding compartments 14 of the drum 15 according to their values has been described, the drum 15 being able to be defined with as many compartments as it is desired.

Another important advantage presented by the automatic banknote handling system is based on the fact that the operator may apply for the amount of money desired for its withdrawal, in such a way that they may be removed according to the banknotes combination desired by the operator, or it may be made easy in an random way by the same machine, for what the amount of money is finally removed through the corresponding side mouth 21 of the machine 1.

That is so, because the machine 1 may be handled by two operators, in such a way that it is controling all the time the handling of each one of them so as to be activated at the appropriated way, each operator gaining access to one of the side mouths 21.

For that, each one of the compartments 14 of the drum 15 comprises a wheel upon which the banknotes bundles are deposited and a pair of facing wheels on the output of each one of the compartments, in such a way that the said wheels trio 22 colaborate on removing thebanknotes from each one of the comparments 14, the pass of each one of the banknotes being perfectly controled.

In this way, the banknotes removed from the corresponding compartments 14 are conveyed towards a wheel 23, provided with arched projections in the some way as the described wheels 5 and 11, between which respective banknotes are housed, in such a way that the banknotes are used to carry out a withdrawal since they are disposed on the housing 24 to which is gained access through the side mouths 21 of the machine 1.

In case it is desired to finally store certain amounts of money, the operation may be controlled by the operator, by introducing the desired data, wherefore the electromagnet 25 is activated and the banknotes removed from the corresponding compartment 14 towards the wheel 23, are deviated towards the lower deposit 26, since the movement of the electromagnet 25 has moved the receptacle 24 leaving free way to the banknotes for their falling by gravity towards the definitive deposit 26.

This same operation may be automatically performed by the machine itself when one of the compartments has a certain amount of money stored in it.

By means of the use of the described system, it is achieved that the same may be used in all kind of agencies of banking entities, as a consecuence of its reduced size and efficiency, with the great advantage of being able to be simultaneously used by the two operators by reducing the time of performance since it may perform different operations at the same time, this is, that while it performs, for example, a money removing operation for a withdrawal, it may be simultaneously performing a money counting and authenticity checking operation.

The machine includes the engine 27 which activates the drum 15 on its positioning, being able to rotate in both directions to reduce the positioning times, and the engine 28 which activates the wheel 23 form removing and storage in the lower deposit 26, as well as the corresponding controller, keyboard and display for the information presentation.

The engine 28 houses on its shaft a rubber wheel, which by friction activates another similar wheel housed on the shaft of the pulling wheels 22. This friction causes the rotation of the said shaft in its banknotes removing function from the compartment 14.

Since the banknote handling system is totally automatic, it presents a total reliability in all the performed operations, because the operator's manual control is obviated.

The described system is able of presenting a serie of embodiment variants, which basically refer to the banknotes provisional storage drum and to the banknotes removing mechanism from the drum, with the posibility of using the machine 1 as a simple banknotes dispenser, by eliminating the counting, authentification and clasification banknotes mechanisms and incorporating a deposit mouth of the banknotes to be introduced, previously counted by the operator, which will be stored in the corresponding drum compartment.

Thus, the machine 1 incorporating the automatic banknotes handling system, presents a drum 30 in which a series of compartments 31 are defined, by means of some platforms which form the compartments and which act as a seat base of the banknotes, which present an inside strip 32, in ortogonal position to the base, of stop of the banknotes for avoiding displacement towards the inside part, and which are secured by respective clamps 33 which are activated at the moment when the corresponding compartment 31 is positioned for the introduction of the banknotes, being rotated, and releasing the banknotes from the pressure it exerts upon them.

Likewise, drum 30 is able of incorporating in relation to each one of its compartments 31, respective strips 34 related to its outside side of the base, which acts as a stop to avoid the fact that the banknotes are able to go out of the compartment in the time interval of performance of the clamp, once the banknotes have been introduced in the compartment. The said strip 34 presents a shaft 35 of rotation so that at the moment in which it is depressed, it leaves on the bottom a free space on which the banknotes at their removal are pulled, the strip 34 being activated by the same cart 36 on its advance.

In the same way, the compartments 31 of the drum 30 in which the banknotes are stored in accordance to

the values thereof lack unitary removing mechanisms of the banknotes, and they only incorporate the strip 32 in the stop ortogonal position of the banknotes, the holding clamp 33 and the external stop strip 34, in such a way that the removal of the banknotes of all the drum compartments 31 is carried out by means of a single removal mechanism mounted on a chart 36 which may be moved by some lower guides.

To this purpose, the movable cart 36 presents on its front part a carrier structure of a pair of rotatory wheels 37 which, on the advance of the cart 36 towards the drum 30 so as to carry out the removal of the corresponding banknotes 38, remain in relation to the respective cuttings 37 of the platform base of the compartment from which the money removal is to be performed, so as to stay under the banknotes, and upon rotating to move the banknotes towards the wheels pairs 40 to carry out their unfoliation and counting.

The banknotes removed from the corresponding compartment 31 of the drum 30 and counted when passing through the wheels pairs 40 are conveyed to the receiving casing 41 by the operator by means of a mechanisms of pairs of pulley 42 and 43 joined by small facing straps 13, which when rotating on the opposite directions move the banknotes centrally.

Once the desired banknotes have been removed from the corresponding compartment 31 of the drum 30, the cart 36 backs up releasing the drum so that it is able to automatically rotate to a new position, in such a way that at the controlled movement of the cart 36, according to the value of the removed banknotes, the same runs up slightly against the banknotes housed on the withdrawal casing arranging them by making a slight stop upon the access door 45.

This way, when the drum 30 is again positioned to carry out a new banknotes removal from the corresponding compartment 31, the cart 36 will go forward, as it has already been pointed out, so as to carry out the removal of the amount of accurate banknotes.

For the suitable operation of the cart 36 related to the arrangement of the banknotes which are conveyed to the withdrawal casing 41, their removal is performed in relation to their wideness in increasing order, so as to allow its gathering and that finally the cart 36 is moved a larger distance so as to cause a slight movement of the package of banknotes formed by the lower part of the door 45 which will help their reception by the operator.

In the same way, the removing device may be formed by the movable cart 36 which presents the banknotes pulling wheels 37, the pair of wheels 40 of unfoliation and counting and some pair of wheels 46 which convey the banknotes towards a pair of wheels 47 provided with some projections which define the banknotes placing receptacles so that from the same, the banknotes may be conveyed to the casing 48 on the rotation of the wheel.

Definitively, since the banknotes handling system only incorporated a removing mechanism and counter of the removed banknotes from the different compartments of the drum, costs are considerably reduced, to which also helps the fact that the drum 30, since it does not have to embody in each one of its compartments respective removing mechanisms, may reduce its size and increase, even this way, the number of compartments, which represents a lesser economic cost and a greater versatility as it is able to receive a greater variety of banknotes.

On a practical embodiment of the machine which embodies the banknotes handling system, the same may be adapted for its application as banknotes dispenser, in which case the whole system related to the checking of the banknotes authenticity, their counting and its clasification, may be eliminated, while the machine incorporates a receptacle 49 for the manual deposit of the banknotes previously counted by the operator, in such a way that while introducing in the machine the data thereof (number of banknotes and their values) the drum 30 will be positioned so that the compartment 31 corresponding to the said value of the banknotes is positioned facing the receptacle 49, passing the banknotes through the trap-door 50 towards the same, by being pulled by the wheels 51. At the same moment, as it can be seen in the drawing figure 38, the clamp 38 is raised, the banknotes which are being introduced in the compartment being stacked.

In this way, a semiautomatic banknotes dispenser of reduced cost is obtained.

On the other hand, the drum 30 may be mounted upon its fixed rotation shaft in such a way that the said shaft is fixed on one of its ends, enabling the disassembly and assembly of the drum 30 related to its rotation shaft through a side door.

Thus, if desired, the drum 30 may be detached and introduced with the money contained in its compartments on the strongbox and afterwards mounting it again, the same door which runs up against it contributing on the holding of the shaft.

Claims

1. AUTOMATIC BANKNOTE HANDLING SYSTEM, being useful for its incorporation, preferably, in any type of agencies of banking entities, wherein withdrawals and deposits of money are current operations, which must be counted manually or by means of a machine which only counts the number of banknotes independently of their value and checked their authenticity, basically by the experience of the cashier himself, characterized in that the system is integrated into a machine (1) which comprises the upper mouth (2) for depositing the banknotes in no special order, means of conveying the banknotes from the deposit mouth (2) to an intermediate mouth (3) accessible from the outside by the operator, means for actuating the support stop (4) of the

banknotes in the intermediary mouth (3), means for gathering the banknotes according to their values, means for the provisional storage of banknotes according to their values, means for removing the banknotes for withdrawal, means of location of the banknotes for the withdrawal by the operator, means of definitive deposit of the banknotes and being able of incorporating means for the direct introduction of banknotes to the provisional storage.

2. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claim 1, characterized in that the convey means of the banknotes from the deposit upper mouth (2) to an intermediary mouth (3), accessible from the outside by the operator, are defined by a quartet of wheels (5) which convey the banknotes unitarilly towards a wheel (6) provided with a series of arched projections which on its rotation deposit them upon the intermediary compartment (3), being supported by a stop (4), the banknotes being counted and their authenticity checked, in such a way that if any of the banknotes is false or not recognizable by the system, the operation is stopped.

3. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claim 1, characterized in that the means for actuating the support stop (4) of the banknotes in the intermediate mouth (3) are defined by an electromagnet (7) which moves the stop (4) in a rotatory way, the counted banknotes and all of them being authentic passing to a proximal housing (9).

4. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claim 1, characterized in that the means for the gathering of the banknotes according to their value, are defined by a quartet of wheels (10) which convey the banknotes unitarilly to a wheel (11) provided with a series of projections arched on its side surface which gathers on their rotation the banknotes according to their value upon a stop (12).

5. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claim 1, characterized in that the banknote storage means according to their values are defined by a drum (15) axially divided in a series of compartments (14) in which the banknotes are stored according to their values, when they are moved from the stop (12) actuated by the electromagnet (13) which will facilitate their drop upon the corresponding compartment, wherefore the drum (15) rotates relative to its shaft (29) so as to be suitably positioned.

6. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claims 1 and 5, characterized in that relating to each one of compartments (14) of the drum (15) a holding clamp (18) of the collected banknotes is provided, which is, in a rotatory way, attached to a lever (17) bonded to the corresponding connecting rod (19) positioned laterally to the drum and tractioned by a torsion spring (20), upon which indistinctly operate, according to the direction of rotation of the drum (15) during their positioning, a pair of electromagnets (16) in ortogonal position with regard to the base of the drum, which causes its rotation, as well as of the lever (17) bonded to it and consequently, the raising of the clamp (18), enabling the accumulation of the new banknotes to be stored.

7. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claims 1 and 5, characterized in that each one of the compartments (14) of the drum (15) presents a wheels trio (22) which enable the unitary removal of the desired banknotes.

8. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claim 1, characterized in that the banknotes removing means so as to perform the withdrawals, according to the operators order, are defined by a wheel (23) actuated by the engine (28) and provided with a series of arched projections in all its side surface between which the banknotes removed from the compartments (14) are deposited so as to be conveyed to a housing (24) accessible from the outside by both side mouths (21) of the machine (1).

9. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claim 1, characterized in that the banknotes definitive deposit means are defined by a deposit (26) to which the banknotes gain access from the compartments (14) of the drum (15) through the wheel (23), previous to the actuation of the electromagnet (25) which causes the rotation of the housing (24), enabling the passage of the banknotes housed on the wheel (23) until their free falling by gravity towards the deposit (26).

10. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claims 1 and 5, characterized in that the provisional storage means of the banknotes according to their values, are defined by a drum (30) which presents some angular compartments (31), which seat base of the banknotes is provided with a pair of radial cuttings (39) from its free side, a strip (32) in ortogonal position to the said seat base, which restricts the positioning of the banknotes during its gathering and a second strip (34) provided in relation to its outside end, upon which the banknotes are stopped and which presents a rotatory point (35) at the moment the compartment is positioned for the removal of the banknotes, and the cart (36) which tips it moves forward, the banknotes

being held by the corresponding clamp (33).

11. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claim 1, characterized in that the removing means of the banknotes to perform withdrawals, are defined by a cart (36) positioned movable on lower guides facing the compartment (31) of the drum (30) provided to remove corresponding banknotes (38) therefrom.

12. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claims 1 and 11, characterized in that when the drum (30) is positioned for removing the banknotes (38) from the corresponding compartment (31) the cart (36) is moved by displacement towards the drum, whereby a pair of banknotes extractor wheels (37), upon which the clamp (33) remains, pass through radial cuttings (39) of the seat strip, which with their rotation move the banknotes towards two pairs of unfoliation and banknotes counting wheels (40), the banknotes being conveyed one by one, between some facing straps (44) disposed between pulley pairs (42) and (43) towards the receiving casing.

13. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claims 1 and 11, characterized in that as the drum (30) is positioned for the removal of banknotes (38) of the corresponding compartment (31), the cart (36) is moved by displacement towards the drum, whereby a pair of banknotes removing wheels (37), upon which there is a clamp (33), penetrate through the radial cuttings (39) of the seat strip, which move, by rotating, the banknotes towards two pairs of banknotes unfoliation and counting wheels (40), the banknotes being conveyed one by one towards a pair of facing wheels (46) which convey them to a pair of wheels (47) provided with a series of projections which form corresponding receptacles for the positioning of the banknotes which will be deposited in its rotation on the withdrawal casing (48), which while moving back opens the door to facilitate the withdrawal of the banknotes.

14. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claims 1, 11 and 12, characterized in that once the corresponding banknotes are removed from a compartment (31) of the drum (30), the movable cart (36) moves back releasing the drum so that it may rotate to a new position.

15. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claims 1 and 14, characterized in that the positioning means of the removed banknotes are defined by a casing (41) to which the banknotes are conveyed from the corresponding compartment of the drum, in such a way that on the moving back of the cart (36), moving back related to the value of the removed banknotes, the same slightly stops with them, on the withdrawal casing, arranging them against the access door (45), causing on the last removal and moving back a bigger movement which causes the slight exit of the package of gathered banknotes with regard to the door (45), facilitating their withdrawal for the operator.

16. AUTOMATIC BANKNOTE HANDLING SYSTEM, according to claim 1, characterized in that in a practical embodiment of the invention, in which the machine lacks counting, authentification and clasification of the banknotes means, comprises means of direct introduction of the banknotes to the provisional storage, formed by the drum (30), defined by a chamber (49) in facing position upon the base of the corresponding banknotes load and unload compartment, to which the manually deposited banknotes will gain access, through a trap-door (50) while being pulled by a pair of wheels (51) upon which the banknotes have been deposited.

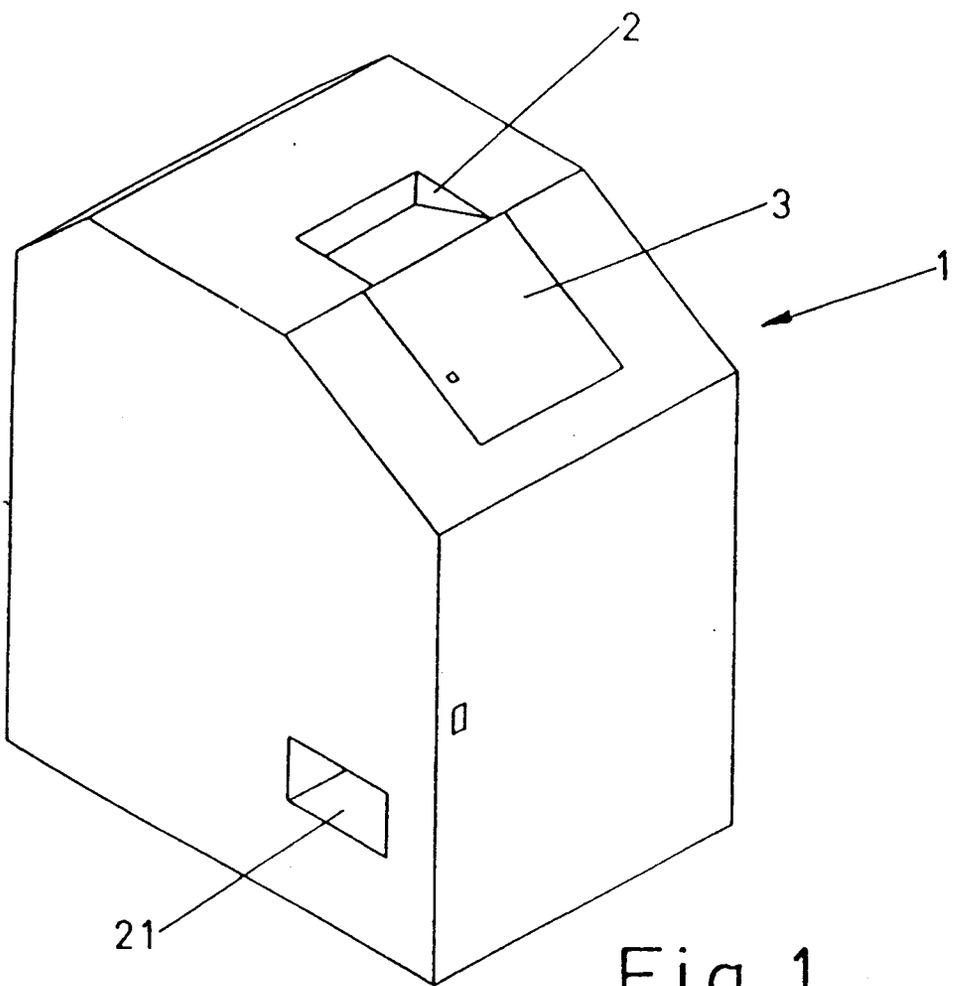

Fig. 1

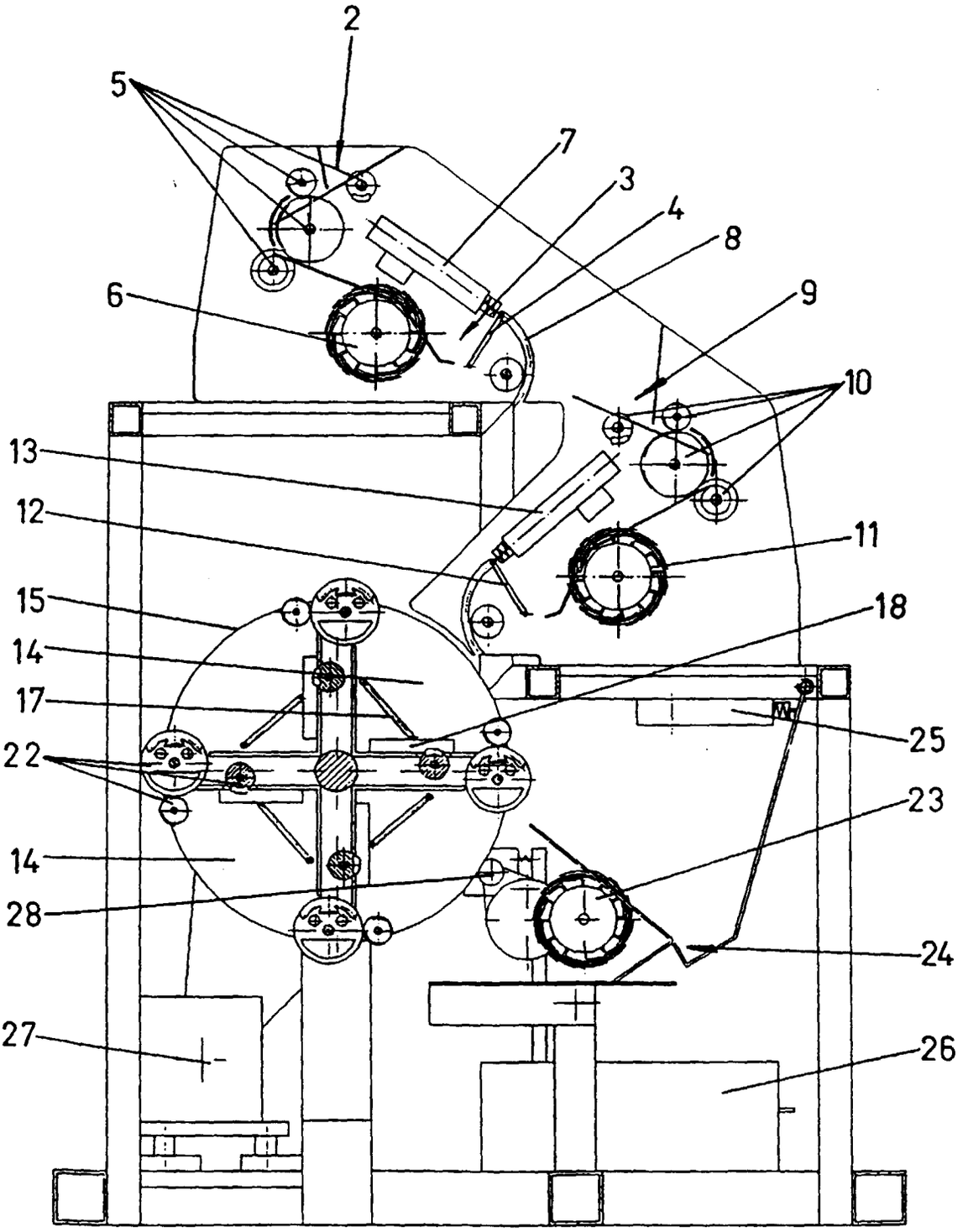

Fig. 2

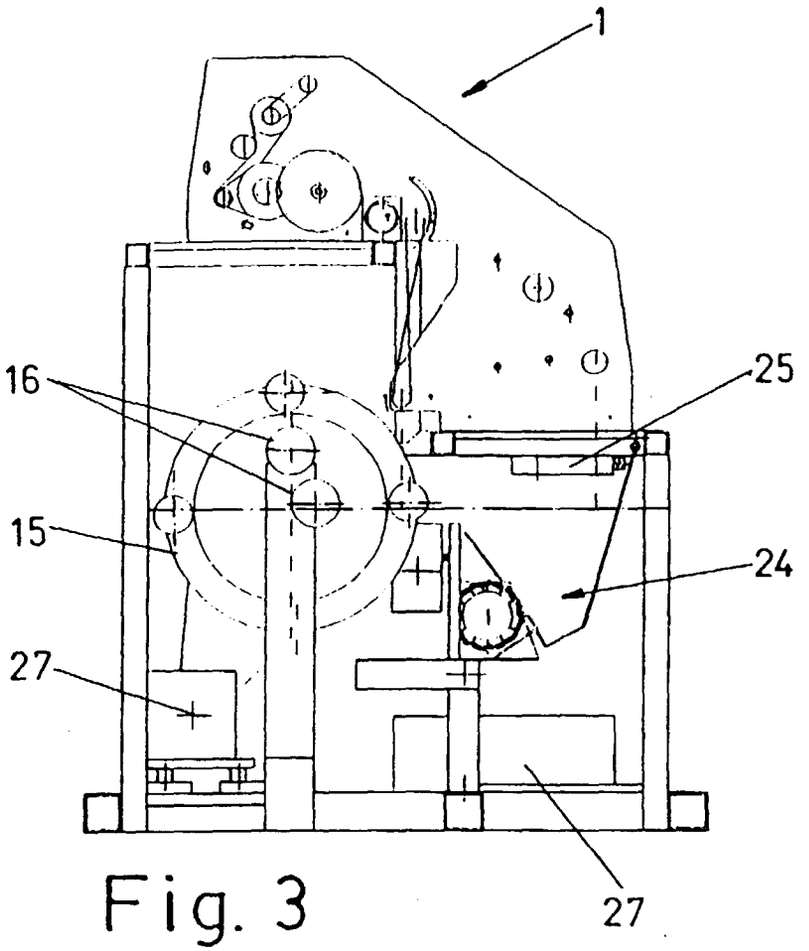

Fig. 3

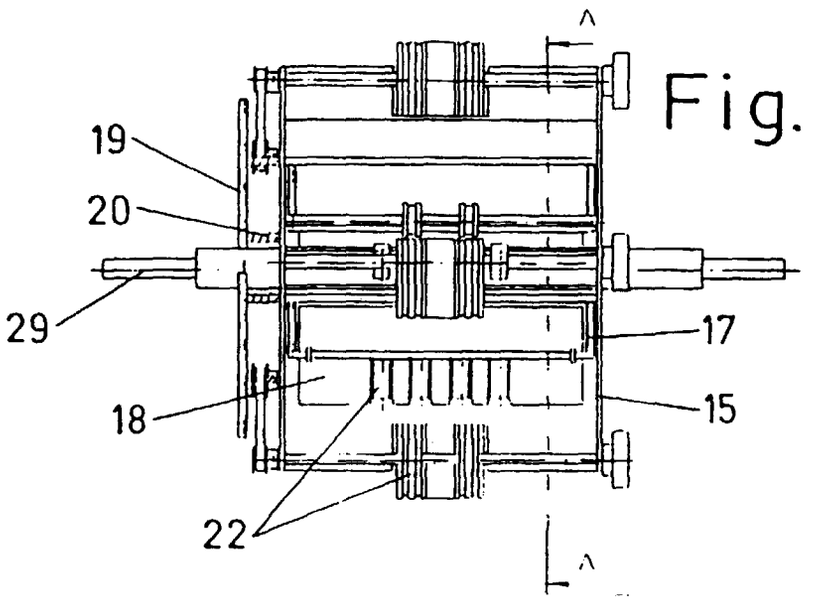

Fig. 4

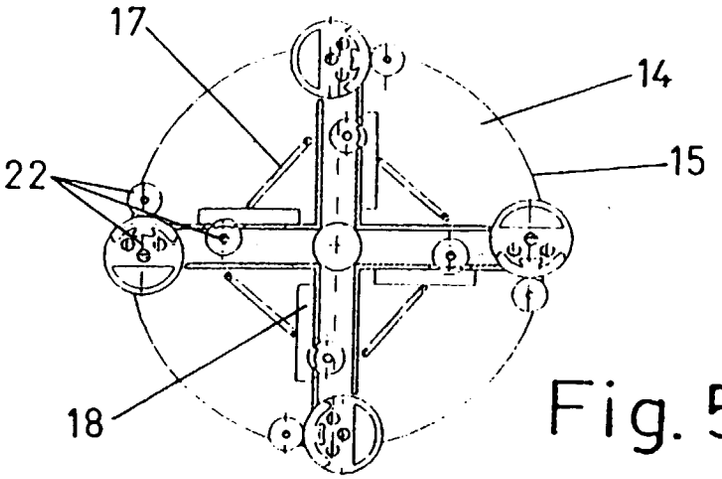

Fig. 5

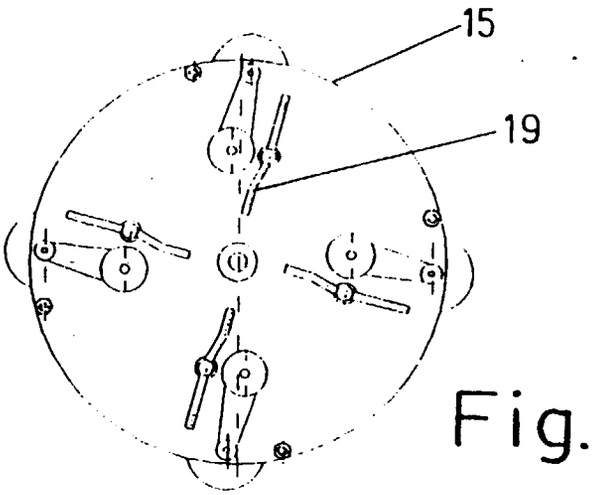

Fig. 6

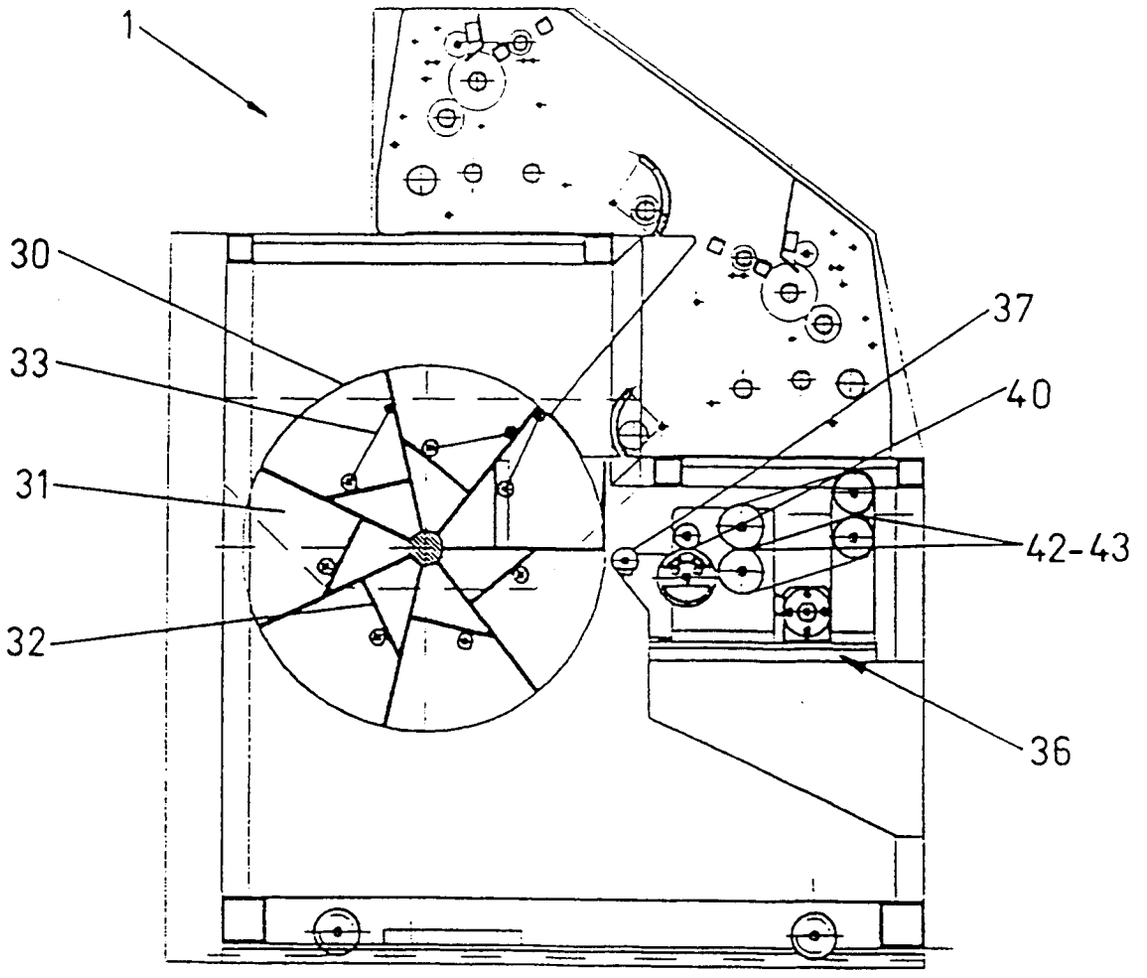

Fig. 7

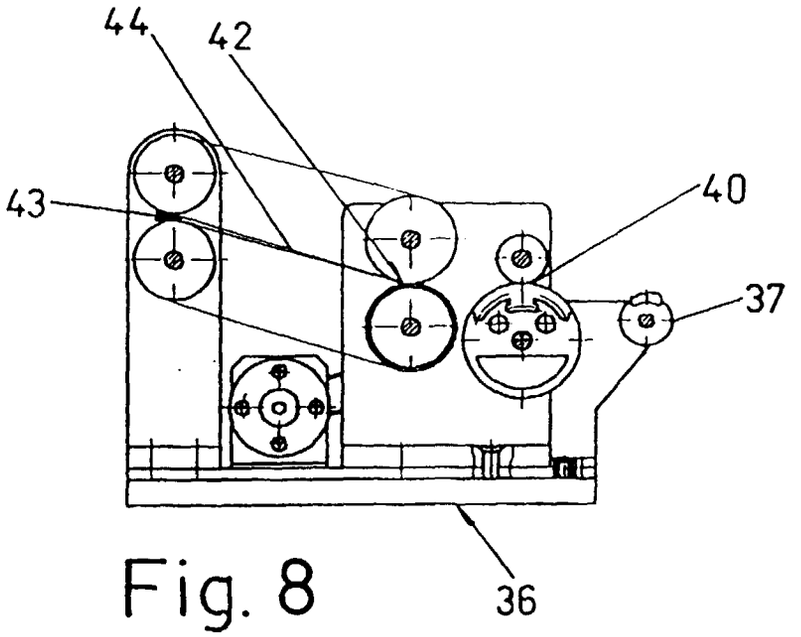

Fig. 8

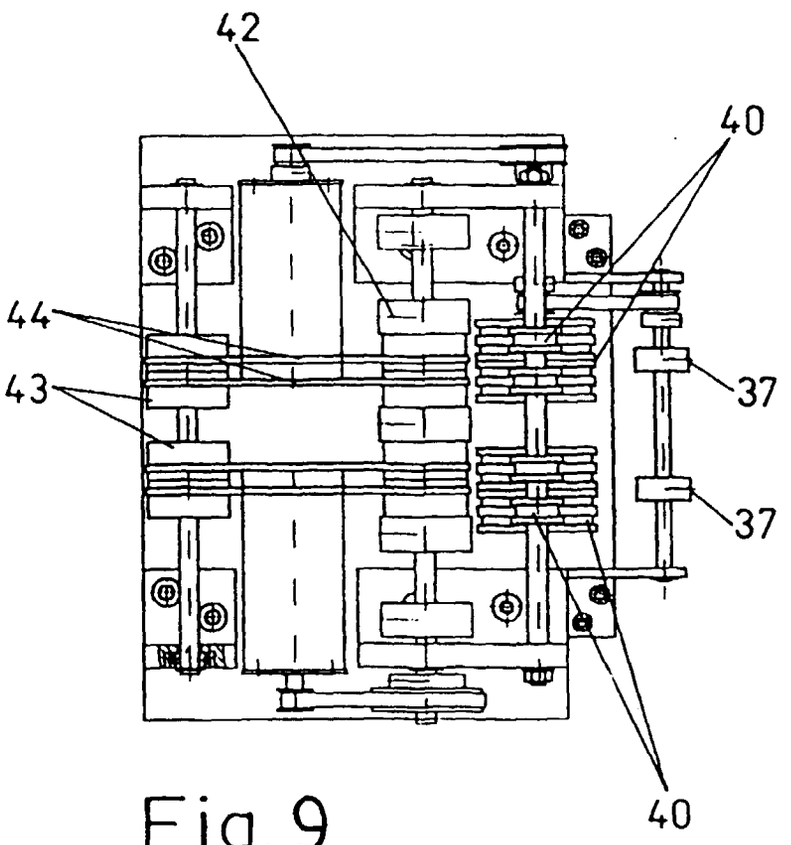

Fig. 9

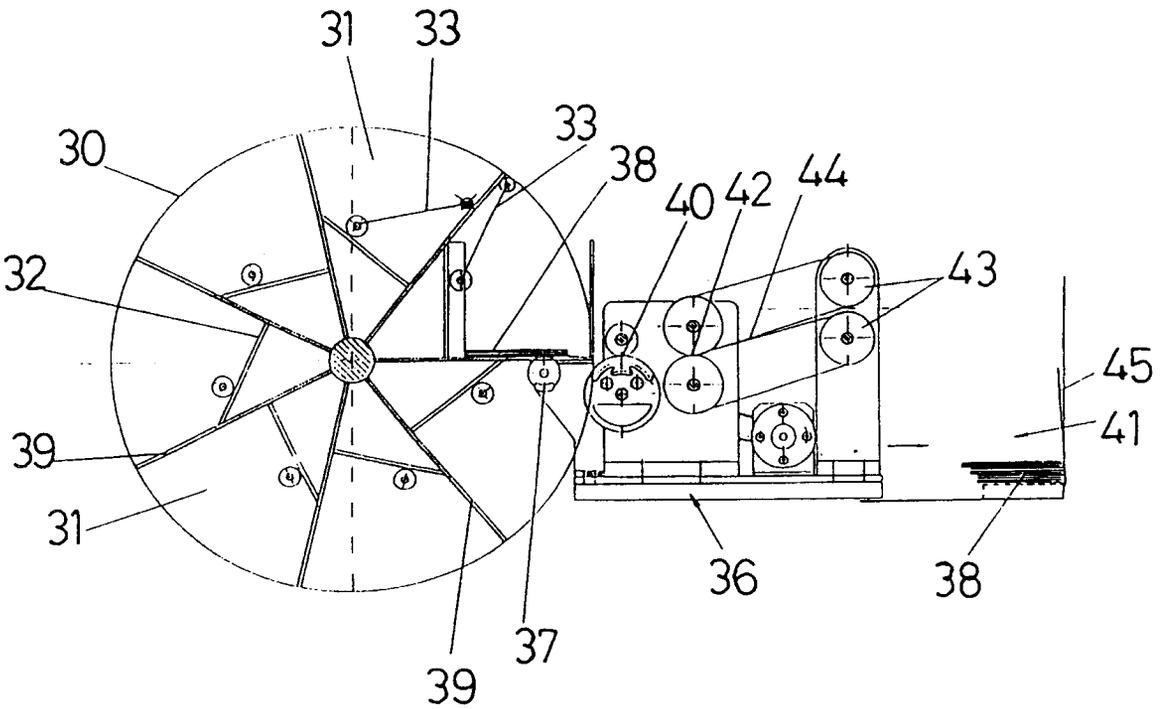

FIG.10

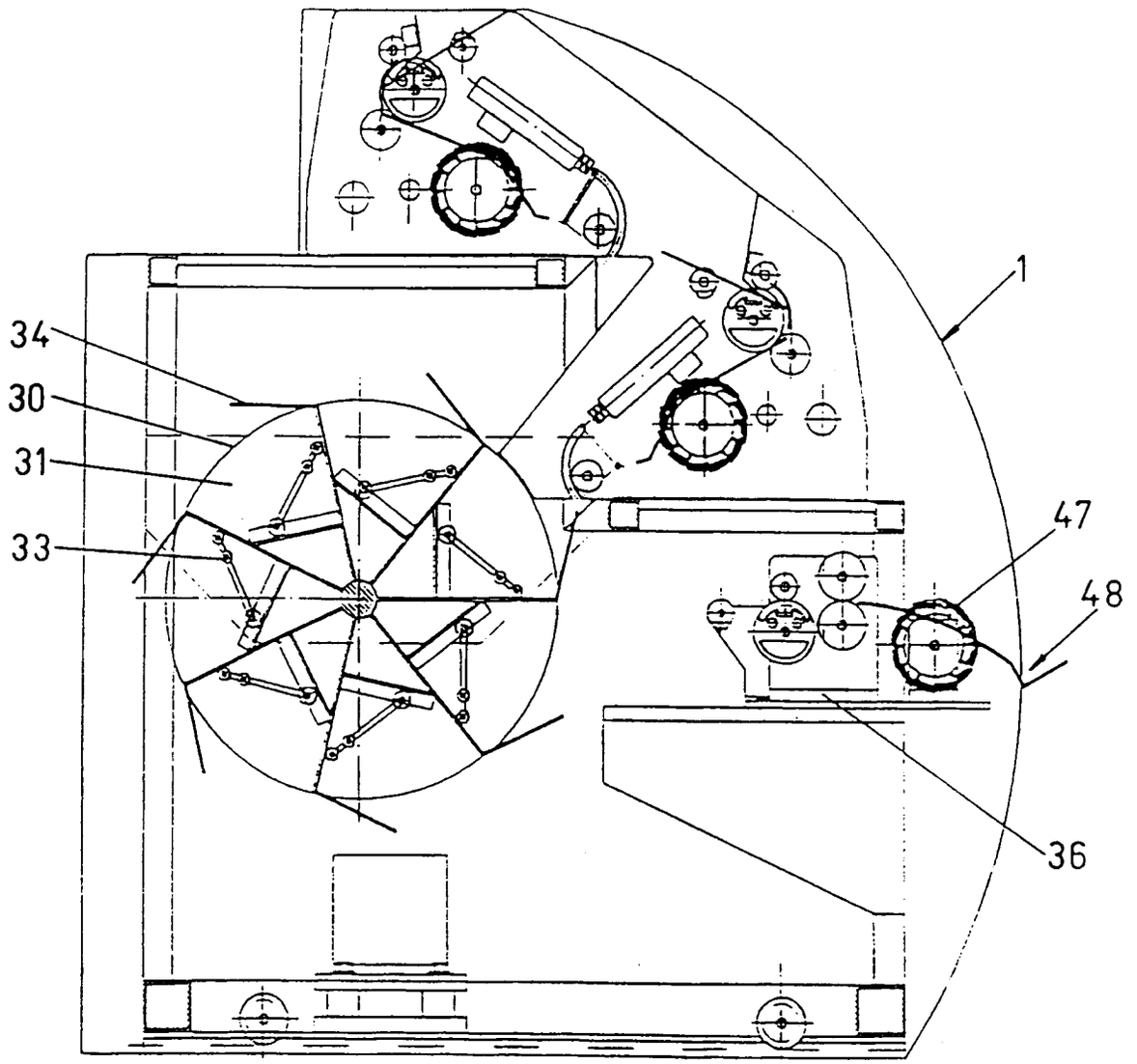

Fig. 11

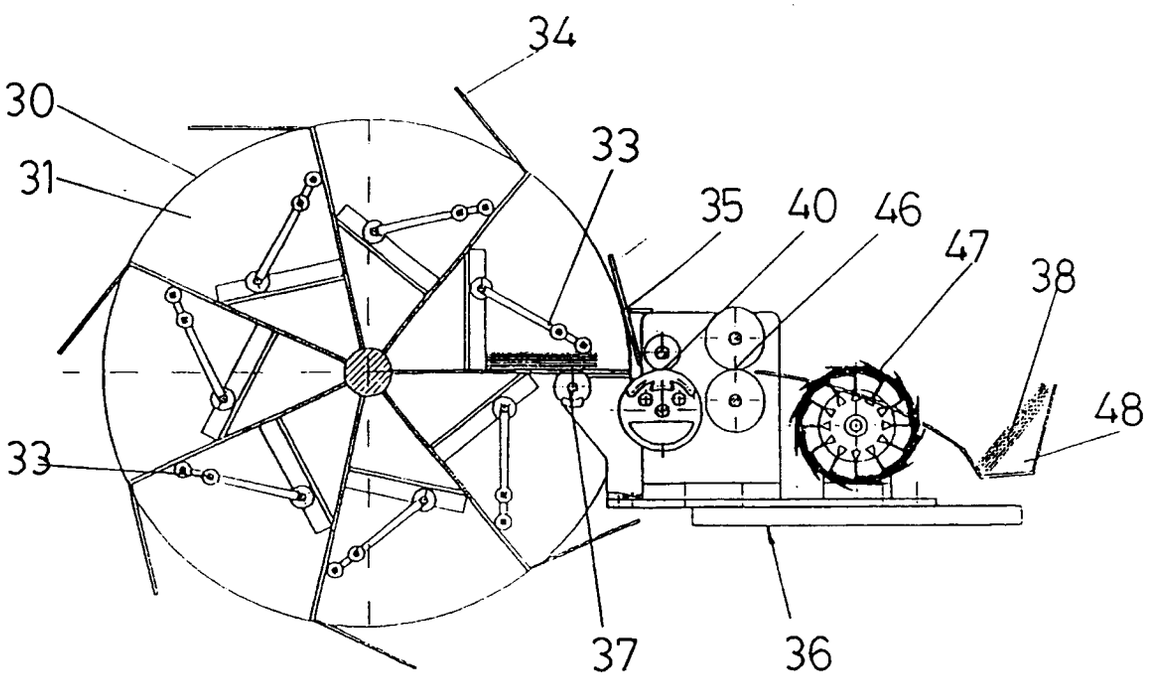

FIG.12

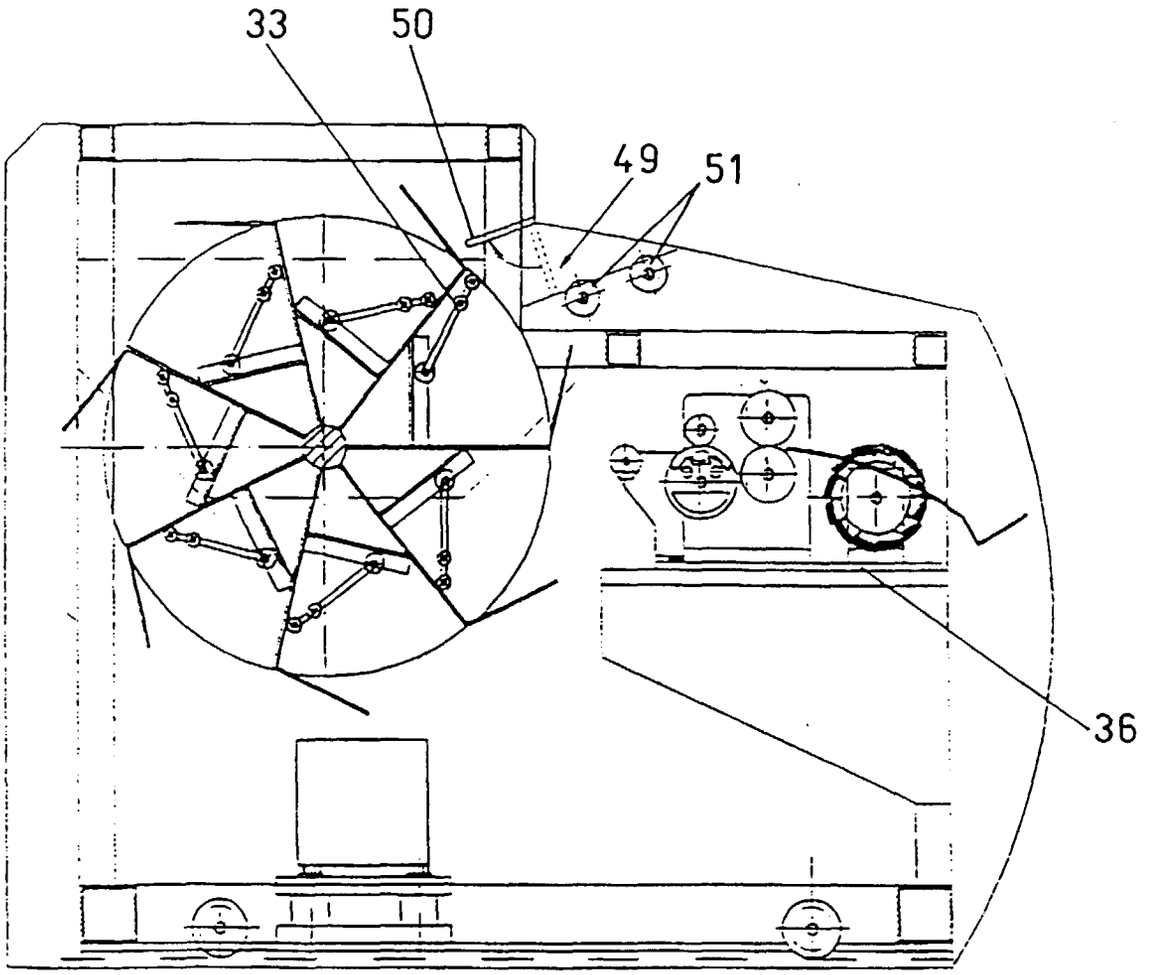

Fig. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES97/00286

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. 6 : G 07 D 11/00 G 07 F 7/10 B 65 H 29/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. 6 : G 07 D G 07 F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPIL, PAJ, CIBEPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, 4 639 582, A (ARIKAWA ET AL) 27.06.87 *Col 2, lin 51-Col 3, lin 27; Fig 1,2*	1
A	EP, 0 339 936, A (DE LA RUE SYSTEMS LTD) 02.11.89 *Col 4, lin 43-Col 5, lin 35; Fig 1*	1,2
A	US, 4 145 038, A (MOL) 20.03.79 *Col 4, lin 54-col 5, lin 29; Fig 1,2*	1,5,8,10
A	US, 5 240 245, A (ADEMMER ET AL) 31.08.93 Abstract ; Figure 1	1,5,10
A	EP, 0 686 592, A (FERAG AG) 13.12.95 Abstract ;Figure 1	10
A	WO, 8910889, A (R. FUNK &CO, INC) 16.11.89 Abstract; Figure 5	10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of parucular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 February 1998 (25.02.98)	27 February 1998 (27.02.98)
Name and mailing address of the ISA/ Facsimile No. S.P.T.O	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 97/00286

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EP 0 339 936	02/11/89	US 4 968 015 JP 2056330	06/11/90 26/02/90
US 4 145 038	20/03/79	NONE	NONE
US 5 240 245	31/08/93	WO 9114999 EP 0 472 673 DE 4008973 JP 4503727	03/10/91 04/03/92 25/07/91 02/07/92
EP 0 686 592	13/12/95	US 5 628 501 CA 2 150 886 AU 1 791 795 FI 952773 JP 8059073	13/05/97 08/12/95 14/12/95 08/12/95 05/03/96
WO 8910889	16/11/89	US 4 768 767 EP 0 412 967	06/09/88 20/02/91

Form PCT/ISA/210 (patent family annex) (July 1992)