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(54) Improvements in automatic feeders of multiple documents, with copy, for printing systems.

(57) The improvements in automatic feeders of multiple documents with a copy, for printing systems, to which this Patent of Invention refers are intended to obtain a group of elements perfectly synchronized in between so that, in an automatic mode, it may send to the printer of a computer, multiple or simple documents, with or without a copy, in a continuous way and without the lower copy sheets be moved with respect to the original. They consist in the placement of a storage (1) of situation for the documents to be printed, over which acts by gravitation a drag and ejection system made up by a motor (4) and pulleys wheel (7) which carry the upper document towards a hopper (10) which centers and directs the document towards the roller of the printer (21) by means of a second drag system (12 and 13), and once printed, be extracted by a third similar system (24) towards the storage area of printed documents.

At the introduction hopper (10) there is a hole (14) and a slot (15) provided with sensors, as well as in the area below the last drag system (24), all of them interconnected with the connection system of computer and printer in order to, according to the position of the document with respect to them, regulate the movements of the drag sysstems, duly controlled, so that at every time there exists a continuation in the feed, printing and ejection of the documents.

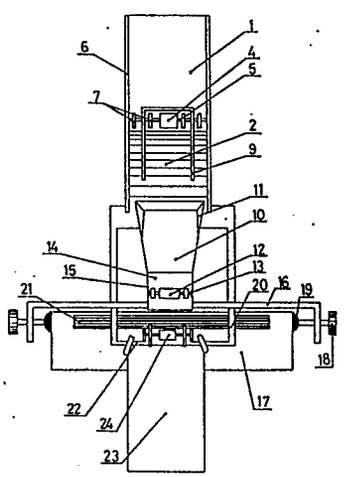


Fig.1

EP 0 241 401 A2

Description

The feeding of documents to the various printing systems existing in the market, coupled to computers, is generally made in a manual mode, or by means of automatic systems, when dealing with simple documents, that is, of one sheet only, but when dealing with documents of multiple sheets, such as triptics provided with copies, these automatic systems present remarkable inconveniences, which up till date have not been eliminated, which inconveniences, in general, are centered in that the dragging element or elements of documents causes the upper sheet to move over the lower ones, which comes to produce a lack of coincidence at the time of the printing, between the first sheet and the copies which correspond to the lower sheets. This serious inconvenience causes that these automatic systems are not used, leading therefore, to the manual and unitary introduction of the multiple documents.

On the other hand, in the existing automatic feeders, for a perfect synchronization, between the feeding and the printing it is necessary that the feeder, the computer and the printer be provided with common elements which require a special conformation in the computer and the printer, playing a role in the internal circuits of the latter.

All the inconveniences cited, as well as many others which are usually presented, have been fully eliminated by means of the improvements to which the present specification refers, thanks to which one obtains a feeder fully independent from the computer and the printer, therefore, applicable to any type of them, one obtains the right feeding of multiple documents, without the possibility of slide of some sheets over the others, and one always obtains a total and perfect placing of the document in the printer, with an absolute precision, and at the same time, with a feeding speed in accordance with the printing speed presented by the system to which it is adapted.

In essence, these improvements come to be made up by a feeding system formed by a deposit or storage of documents to be printed, in the mode of a vertical box with the dimensions adequate to the document to be dealt with, open at its front face, and provided at its side internal faces with some anti-slide friction elements to keep the documents always at their right place, and at its fore edges, some guide rails, for the insertion of the ends of a horizontal axle, in which are mounted some pulleys wheel of an elastic material moved by a small electric motor, located between them, providing besides some guide rods which overlap to the outside, so that this group of motor, pulleys wheel and rods, be supported on the document which is located at the first place of the cited storage, pressing on it by its own weight, so that, at the time in which the electric motor is activated, the pulleys wheel cause the sliding towards the external and open face of the box which makes up the storage of documents, to the cited upper document, and only to it, as the rest, due to the action of the side friction elements are unmoving. The extracted document is directed by the guide rods, towards a second element of the feeder, made up by a surface with a maximum slide, provided with a pickup funnel on its upper area, and with an area of direction and exact positioning of the document towards the roller of the printer to be dealt with.

In this second element, there exists as well a second motor with drag pulleys wheel, to pick up the document and direct it to the roller of the printer at the due time, being it provided at the area of positioning of the document a couple of electronic elements, intended to procure the synchronization between the movement of the storage drag motor and the moment of of introduction of the document at the roller of the printer, whilst the second element allows to synchronize with full precision the time in which the printer must start its action.

The document is collected from the roller of the printer by means of a third group of motor and pulleys wheel, which directs the cited document towards a storage area of the document already printed, being it provided in this third drag elements another electronic system which, when the document passes before it, provides the adequate signal so that the printing of a new document starts.

All this group of elements cited is mounted over a bridge adaptable to any type of printer, through side screws provided with elastic means for dampering of vibrations, and with enough amplitude so that it may be placed on any model, because as the assembly is fully independent from the computer and the printer, it is susceptible of being adapted to any type of them.

Only the dragging element of the storage of documents to be printed is independent from the assembly, as it simply slides through the side guide rails, in which it enters the ends of its horizontal axle and the rest remains mounted on the bridge adapted to the printer and by means of simple couplings by hand driven screws and throttles, for its perfect location, opposite to each of the elements that are necessary in each case.

The electronic interconnection between the automatic feeder and the computer and printer is made by means of a serial interlinked box at the wire from the computer to printer which plays a role in the circuits of the various dragging motors of the feeder, of the injector and of the collector, as well as the different orders originated by the electronic elements, made up by emitters of infrared light and an optosensor especially located to order the time of the beginning of the printing of the document to deal with.

All these elements and electronic circuits existing at the box interlinked between the computer and printer are absolutely independent from the ones of said computer and printer, for which it is not necessary to intervene in them for the placing of this automatic system of feeding cited.

Hereunder we will make a detailed description of the improvements preconized, with reference to the drawings enclosed in which it is represented, merely as an example, non limit ative, a preferent mode of performance, susceptible of all those variations of shape and detail which do not mean a fundamental alteration of the essential characteristics of same.

At said drawings, it is illustrated:

In figure 1: general elevation front schematic view of the automatic feeder, coupled to a printer system.

In figure 2: side elevation view of same, with an open detail of the storage of documents, for a better exposure of its internal faces.

In figure 3: ground-plan detail of the feed dragging element.

In figure 4: side elevation view of the same feed dragging element.

In figure 5: side front view of the sliding surface for documents, towards the printer, with a detail of location of the electronic elements of adjustment and synchronization.

In figure 6: side elevation view of the system of extraction of documents from the printer, to the outside, with a view of guide elements, and situation of electronic elements of adjustment and synchronization.

In figure 7: diagram in blocks of the electronic system which commands the computer and printer, as well as the dragging elements, for the perfect synchronization of the assembly.

As per the example of performance represented, the improvements in automatic feeders of multiple documents which are preconized are made up by the use of various elements, perfectly conjugated and synchronized in between, from which the first one is a storage (1) or deposit of documents to be printed, in the mode and sizes of the cited documents (2) which are piled in its inside, presenting this deposit, its front open face, and the upper one, to allow the loading, whilst on the side faces there exist some longitudinal strips (3) of anti-slide material to allow that the group of documents be perfectly sticked to the walls and that only the one at the upper part of the pile be susceptible of being dragged to wards the outside, by the ejection mechanism, made up by an electric motor (4) coupled to a horizontal axle (5) which overlapping ends are included in some guide rails (6) existing at the fore edge of the side walls of the deposit (1).

On this axle (5), some pulleys wheel (7) of elastic material have been mounted, which are supported over the upper document of the pile (2) of same, and joined by their rear end to a crossbar (8) there are some guide rods (9) arched downwards, to direct the document which be dragged in each case by the pulleys wheel (7) when they rotate actuated by the electric motor (4).

As a second element of the assembly, there exists a surface (10) which on its upper area presents a trapezoid shape and on its lower area a rectangular one covered at its front face by a transparent material (11) which at the trapezoid area takes the shape of a funnel to facilitate the introduction of the document dragged by the previous element and guided by the rods (9) whilst at the same time forces it to enter the lower rectangular area of dimensions the same as the document dealt with, with which it remains in the position of entrance to the printer.

At the lower area of this surface (10) there exists a mounting of another motor (12) with pulleys wheel (13) similar to the ones previously cited which pick up the document on said surface and make it advance towards the outlet, directing it to the roller of the printer.

At points provided at distances in accordance with the sizes of the document dealt with, there exist at the surface (10) a hole (14) and a lower slot (15) in which are coupled respectively at their rear face, in the hole (14) a couple of sensors by infrared, one on each side, to let the document pass in between, and in the lower slot (15) optionally a sensor by reflection which analyzes the light reflected by the document, in order that when it coincides with the mark of the document which corresponds, the effect pursued of ins tructing the beginning of the printing be produced, in case it is necessary a high precision at the exact place to be printed.

The sliding surface (10) of rigid material and of a very high slide characteristic, so that the document may not remain stopped in it, as well as its dragging elements (12 and 13) are mounted on a stand in the shape of a bridge (16) with an amplitude superior to the width of the printer (17) to which the system is coupled, and provided with passing holes at its elbowed ends, for the passing of screws (18) provided in their internal part with elastic stops (19) for the taking of contact with said printer and keep a stable fixation and with absorbtion of the very vibrations of the printer, without transmitting them to the assembly described.

At this same bridge, and through a rectangular fork (20) which is fastened by means of screws with throttle for hand action, is located the third element which makes up the automatic feeder, which element is made up by a first track (22) of sliding surface, inclined upwards from the roller (21) of the printer towards the outside, and a second area or track (23) being fastened on the edge that both tracks form, a third dragging element similar to the previous ones, made up by a motor (24) and pulleys wheel (25) of elastic material, being it provided some guide surfaces (26) in arch, going from the area of ejection of the roller (21) of the printer to the lower area of the dragging pulleys wheel (25) and it has been besides provided on this guide the placing of a couple of sensors by infrared (27) which let pass in between the document in its sliding of outlet from the roller (21) to the pulleys wheel (25) on the first track of surface (22). From the second track (23) the document, already printed, falls to the deposit or storage of printed documents located at the end of this extraction surface.

All the connection elements of the corresponding dragging motors (4, 12 and 24) of the sensors by infrared (14 and 27) as well as the sensor by reflection (15) are united to a box of connections (28) connected in series between the computer (29) and the printer (17) at which box there exists a system (30) which intervenes in all the instructions

from computer to printer, and a second system (31) of a circuit in digital electronics which performs the whole control of the motors of the dragging systems, through the signals it receives from the corresponding sensors previously cited so that, when receiving and analyzing the signals coming from the computer, it proceeds to decodify them and to allow, through a programme, the control of the time of introduction of the document in the roller (21) of the printer, analyzing the position of this document, in accordance with the signals received by the sensor (14) and (15), following the next phases:

-- the computer sends a control signal to the printer, which is decodified at (30) by the circuit in digital electronics, which signal said circuit understands, but not the printer for its normal process, as this signal, by means of (31) activates the motor (4) for dragging of documents towards the funnel (11).

-- the computer, through the cited signal, receives in turn the detection that a document is on the right position, when same is interposed between the sensors (14) with which the beam is interrupted, at which time the motor is disconnected (4) so that it does not send a new document, and simultaneously causes the lower motor (12) to be connected, towards the printer, where it is trapped by the roller (21) of the same until the time in which it lets the sensor free (14) again, at which time the motor (12) is stopped, and the movement of the document continues by the action of the roller of the printer (21). This movement continues until the time in which before the sensor by reflection (15) there appears the corresponding signal, which causes the beam to be reflected, at which time the computer is instructed that the document is in the exact position for the printing to start, sending to the computer the corresponding signal to the printer to start the printing set forth. This exact position is foreseen previously, with the first document, through a mechanic adjustment in the placing of the surface (10) in height and direction, actuating on the corresponding fastening screws (18) which operation is not necessary to repeat in the future, as the assembly remains perfectly coupled.

-- when the document has been printed, it gets to the sensor (27) with its fore edge, which sensor is located before the outlet drag motor (24) at which time at (31) is received the corresponding signal, which causes said motor to act, collecting the document on extracting it to the outside, at the same time allowing to send another signal to be ready to repeat the cycle cited, entering a new document as per what is previously described.

This way organized the automatic feeder described, the operation of same is simple and of a total accuracy, not only with respect to the speed of introduction of documents, but also with regard to the precision in the placing of same, no matter which it be the number of sheets of which each document is made up.

This operation is the following:

- Being placed a certain number of documents (2) inside the upper deposit (1) duly piled and picked up on their side faces, it is located on the upper document the assembly of the drag motor (4) with pulleys wheel and guides (7 and 9) fastening the edges of the axle at the guides (6) of the fore edge of the deposit (1). The weight of this assembly is the one which provides a constant pressure on the documents.

- At the time in which the corresponding signal of the computer has been decodified by (30 and 31) the motor is started, with which the pulleys wheel (7) drag the first document, and only the first one, by the friction action of these over the surface of same, whilst the rest, by the action of the anti-slide strips (3) remain included in the deposit.

- This extracted document falls to the funnel (11) sliding over the surface (10) until entering the lower rectangular area, where it gets under perfect conditions of placement in the whole assembly. At the time in which the fore edge of said document gets to the sensors (14) of infrared, the corresponding signal is produced, so that in principle the motor (4) be stopped and a second document is not sent, and in the second place, but simultaneously in practice, the movement of the second motor (12) be produced to carry the document towards the roller (21) of the printer.

- This signal continues whilst the document in total crosses the sensors (14), as at the time the rear edge overlaps these, a new signal is produced which advises the computer that the document is in the correct position, and stops the motor (12), as the dragging of the document as from this moment is produced by the very roller (21) of the printer. At this moment, this signal causes the motor (4) to get in action again and the fall of a second document in the funnel (11) be produced.

- As the dragging movement of the document continues, it is intercepting the beam of light which the sensor (15) emits up to that time, when, before it, there appears the red signal which the document bears, and which causes that the instruction to the computer be produced, so that the program planned out, starts to be printed in the document, as it is found in the exact position so that this printing be made with full precision at the corresponding place.

- When the printing is ended, the fore edge of the document coincides with the interposition between the sensors (27) provided in the outlet guide, with which the corresponding signal is produced so that the motor (24) of the dragging system for the extraction of the document be started at the same time as it instructs the start of the printing of the next document, which is already situated at the correct position previously indicated.

The process is repeated as many times as necessary, according to the number of documents to be printed, without interruptions of any kind, and at a very high speed, getting to be printed as if it were continuous paper, as the fall of documents and insertion of same is produced at the printer in a continuous way and practically without a solution of continuity.

These improvements described are especially designed for the printing of such types of documents like triptics, with copy, used in the tickets for the Benefic Bids, Hippic Bids, Primitive Lotto, etc. as well as in every type of documents requiring a

printing in accordance with a computer program, and provided with a multiple number of sheets with copies, as the cited feed system allows at every time that the document gets to the printer with all its sheets perfectly located with no slides between them, with which not only the original but also the copies are printed without error in the situation of the corresponding signs.

It should be noted that these improvements, as deducted from the description made, is fully independent from the type of computer and printer used, and that it is not necessary any mechanic or electronic intervention in same, as the whole system, not only mechanic but also electronic, is only used in the elements provided in the feeder and never in the computer nor on the printer.

The shape, materials and dimensions may be variable, and in general, whichever be accessory and secondary, provided it does not alter, change or modify the essentiality of the improvements that have been described.

Claims

1.- Improvements in automatic feeders of multiple documents, with copy, for printing systems, characterized in that they provide a storage of documents to be printed, with shape and dimensions adequate to the corresponding type of document, open at its fore and upper faces, for loading and outlet of same, being provided on the side faces with some strips of antislide material which allow the fastening of the group of documents at their place of storage, whilst the upper one is formed to leave by the effect of an extraction system made up by a small electric motor, coupled to the axle of some wheels of elastic material which support over the upper document and which, when rotating, extract it from the assembly, directing it towards the corresponding collector, by means of some guide rods solidary to the extraction system which slides through guide rails existing at the internal edge of the open face of the storage, attaining, through the very weight of the assembly, the existence at every time of a uniform and regular pressure over the whole of documents.

2.-Improvements in automatic feeders of multiple documents, with copy, for printing systems, as per claim 1, characterized in that the collector of the extracted document is made up by a smooth surface, of utmost slide, inclined towards the printing system dealt with, and provided at its upper area of a trapezoid area, of a funnel open upwards which directs the document towards the lower area, rectangular, and of the size which corresponds to the documents, so that same remains perfectly situated with respect to the printer, to be collected by it, existing at the lower area and before this surface, a second drag system made up by an electric motor and elastic wheels, to prosecute the introduction of the document towards the printer, until the roller of same collects it.

3.- Improvement in automatic feeders of multiple documents, with copy, for printing systems, as per claims 1 and 2, characterized in the fact that at the outlet of the roller of the printer it has been provided the coupling of some guides which collect the document and carry it to a third system of motor and elastic wheels, which extracts the document from the printer, and by means of some slide surfaces, direct it to the place of storage of printed documents.

4.- Improvements in automatic feeders of multiple documents, with copy, for printing systems, as per claims 1 to 3, characterized in the fact of the provision of an electronic system, interlinked in series, between the computer and the printer, and some drive means in the slide elements of the document, made up by sensors by infrared and sensors by reflection, duly situated, in accordance with the dimensions of the document, so that, in each case, start or stop the corresponding dragging motor, as well as instruct the printing of the document, in accordance with the programme planned out.

5.- Improvements in automatic feeders of multiple documents, with copy, for printing systems, as per claim 4, characterized in that on the sliding surface which collects the document that comes from the storage, it has been provided, at an adequate distance, a hole, in which, on its rear face, is mounted a sensor of infrareds, in order that at the time it remains hidden by the document, it sends the corresponding signal to stop the upper dragging motor, avoiding the falling of a second document, whilst at the same time it starts the lower dragging motor, to carry said document towards the printer, and as soon as the cited documents has passed before the sensor, the new order for operation of the upper dragging motor be produced, for the sending of a second document, whilst at the same time stops the lower one, as it already remains dragged by the roller of the printer, and it remains waiting for a new order coming from the computer and which rules a programme previously set forth.

6.- Improvements in automatic feeders of multiple documents, with copy, for printing systems, as per claims 4 and 5, characterized in that at an adequate distance as per the document to be dealt, from the hole for the installation of the sensor by infrareds, it has been provided a slot for the installation of a sensor by reflection, with a colour beam, which analyzes the document until getting to the corresponding mark provided in same, with which by effect of the complementary colour used, it originates the adequate signal so that the computer understands that the document is under situation of starting the printing, and therefore be instructed the beginning of it in accordance with the programme previously set

forth.

7.- Improvements in automatic feeders of multiple documents, with copy, for printing systems, as per claim 4, characterized in the provision on the guides which direct the document after being printed, towards the final dragging system, of a sensor of infrareds, which when interposing at the fore edge of the documents, when leaving, originates the corresponding instruction for the starting of the drag motor of this last place, as the printing of the document has already ended and by being precise the extraction of same from the printer and its direction towards the area of printed documents.

8.- Improvements in automatic feeders of multiple documents, with copy, for printing systems, as per claims 1 to 7, characterized in that the system of collector sheet, with funnel and the one corresponding to extraction of documents, with its motors and dragging wheels, are mounted over a common stand, in the shape of a bridge that may be coupled on any type of printer, being it provided at the edges of this bridge some pressure screws, with elastic stops, for a perfect coupling of the assembly, with with lateral and horizontal slides with precision enough to carry the document to the exact place of inlet in the printing system of same.

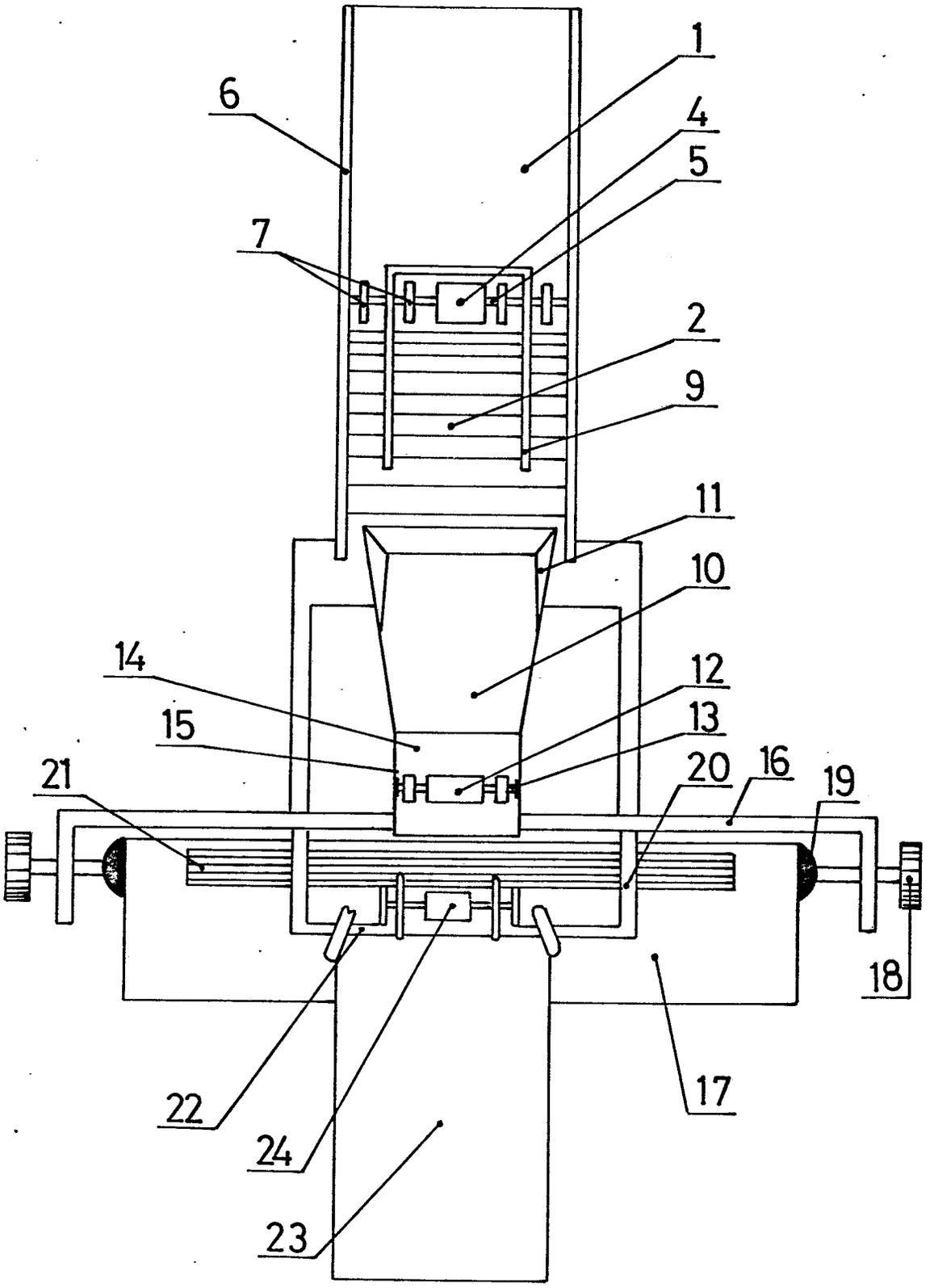
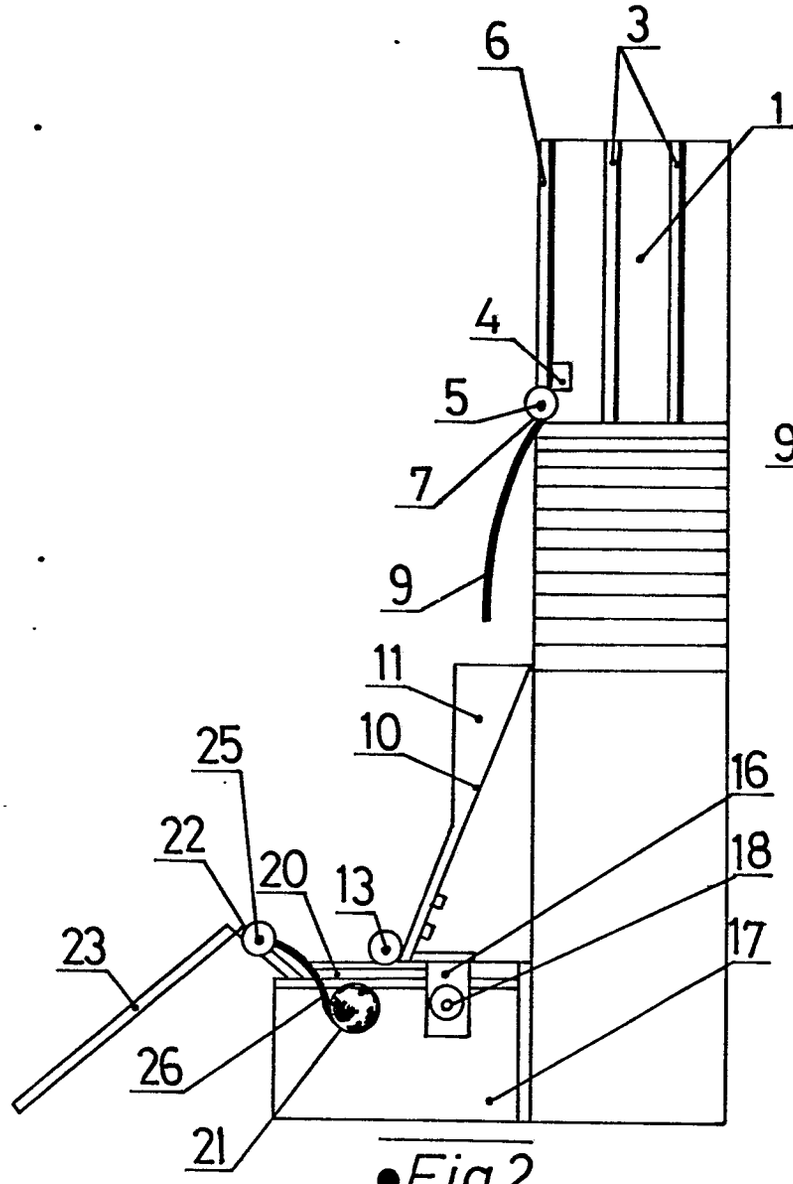
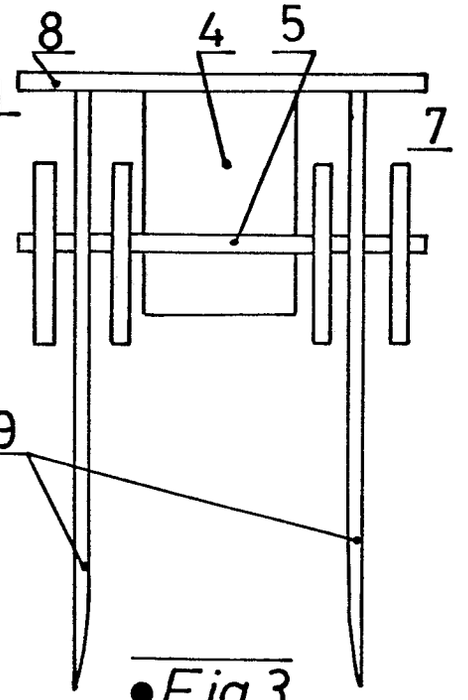


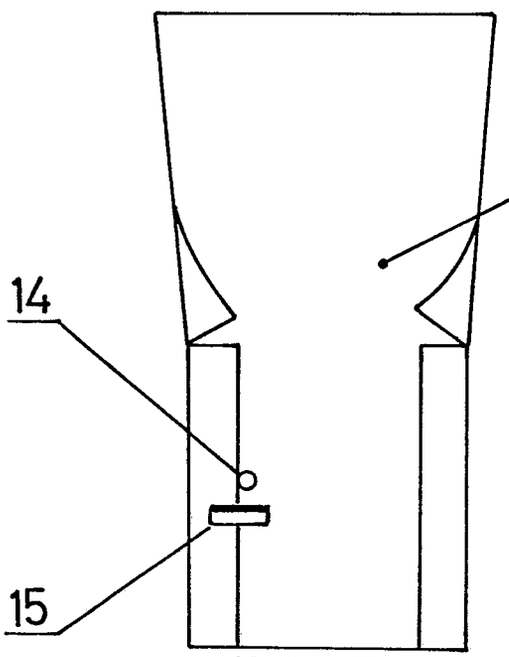
Fig.1



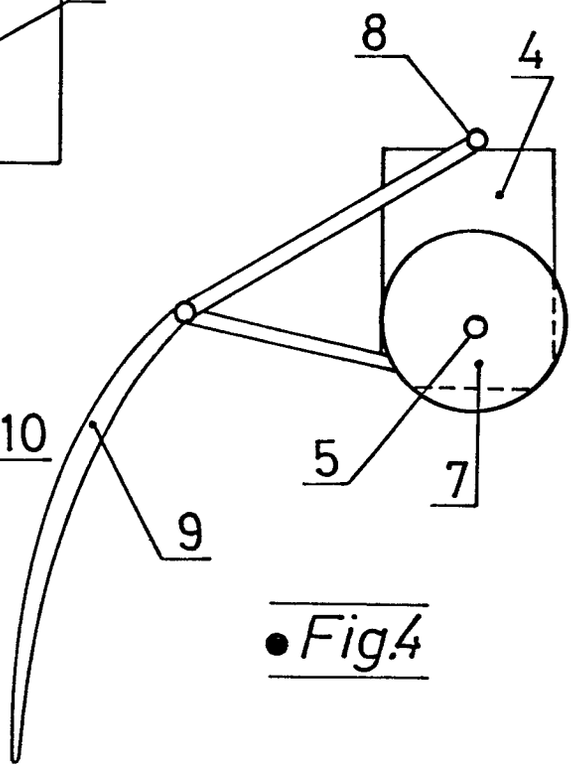
•Fig.2



•Fig.3



•Fig.5



•Fig.4

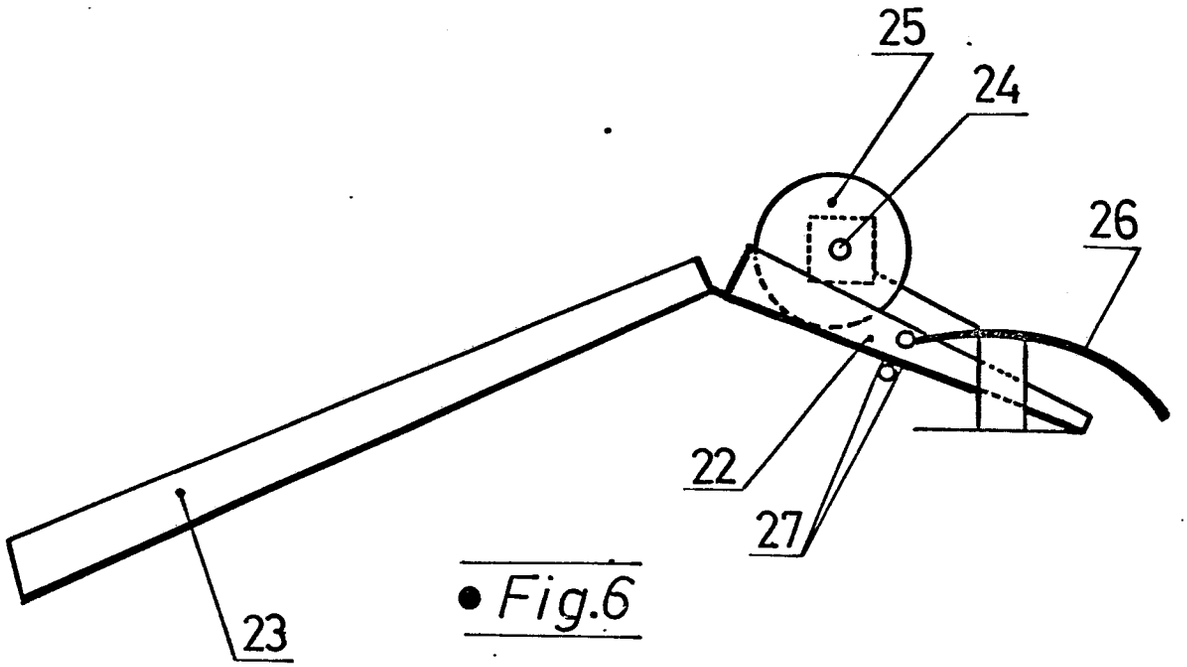


Fig.6

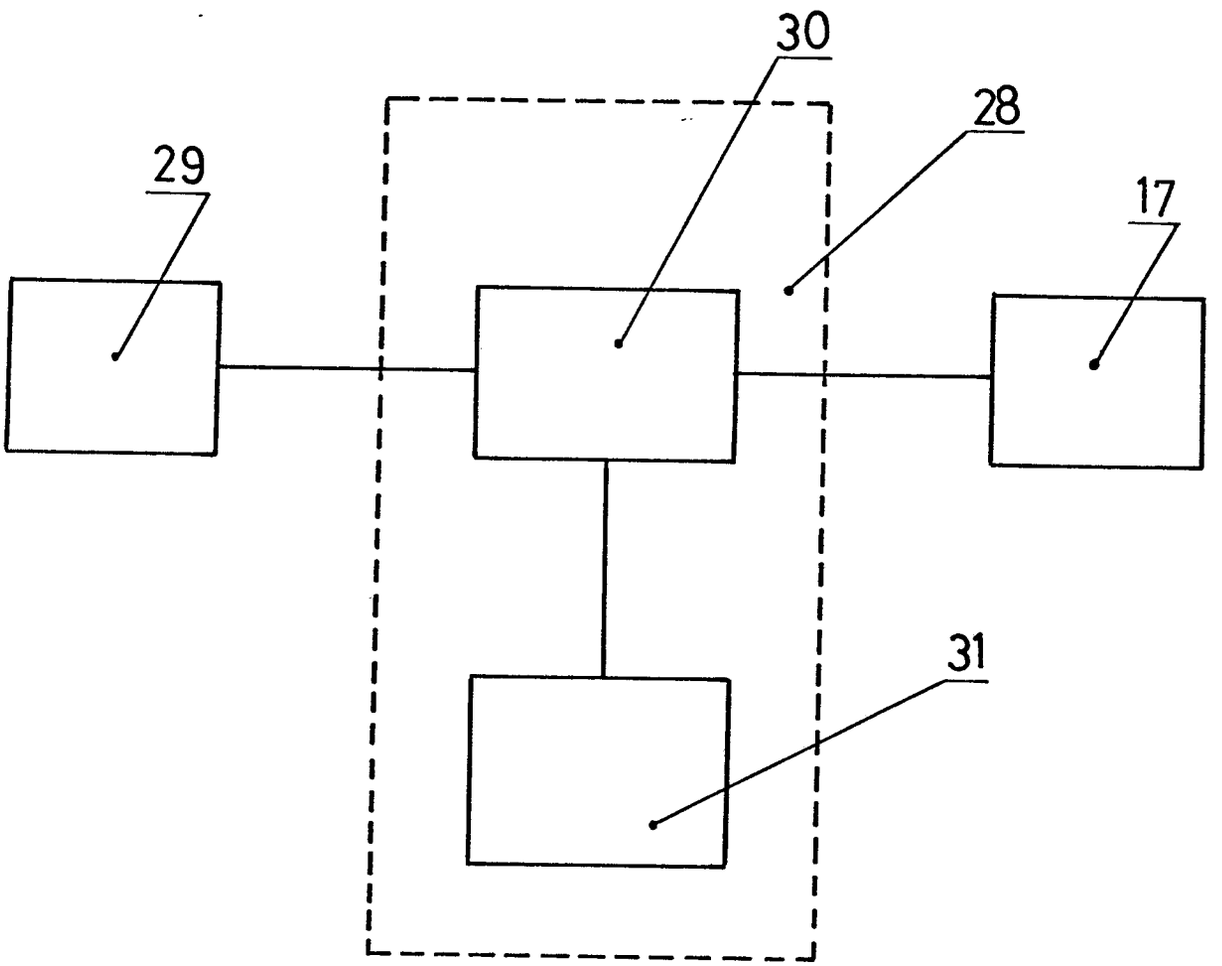


Fig.7