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(54) Monochannel device for control, storage and collection of coins.

(57) The device of the invention is prepared for mounting in paystation telephones and is of the monochannel type through which the coins (5-5'-5"..) slide to be collected one after the other. The device is so designed that, without any need to separate the coins, it is capable of controlling, storing and collecting, at least, two of these, regardless of the type and of the order in which they have been inserted, with no requirement for the use of motors or movable stores and having suppressed the problem of jamming.

To achieve this, the device is based on having the coins (5-5'-5"..) retained separately in the monochannel (4) by means of corresponding retractable levers (9-9'-9"..), each of which is associated with its respective energising coil (10-10'-10"..). There are also sensors to detect the presence of coins (12-12'-12"..) inside the monochannel (4) and a sensor to detect the passage of collected coins (15) situated at the outlet of the monochannel device (4) and at the entrance (6) of the collection box.

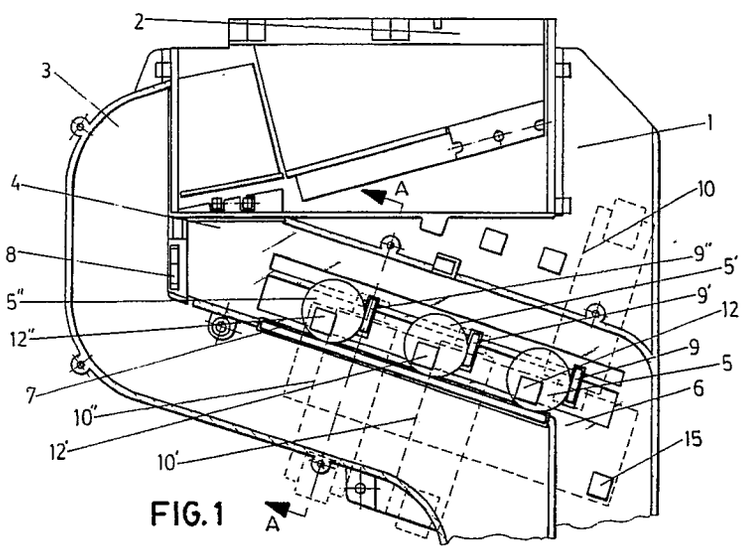

FIG.1

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OBJECT OF THE INVENTION

The invention refers to a device for the control, storage and collection of coins, employing a monochannel through which the coins travel from the point where they are inserted to the point where they are collected or returned.

The device is generally applicable to all types of coin-operated machines, and especially to paystation telephones which clearly require the insertion of coins of any type and/or value for their operation.

BACKGROUND TO THE INVENTION

The Spanish Patent Applications numbers P-8700582 and P-8700583, of the company Azkoyen Industrial, S.A., both claim mechanisms for the reception and collection of coins, mainly applicable to paystation telephones, in which the coins are handled by being separated from each other, which is achieved by means of a compartmentalised carriage which moves forwards and backwards, the entire process being controlled and driven by commands from a microprocessor.

The telephone instruments that incorporate this type of mechanism are very voluminous since they have to have guides for the motion of the carriage, drive motors, transmission mechanisms, etc.

In Great Britain, the company RATHDOWN INDUSTRIES Ltd. manufactures a paystation telephone instrument which incorporates a monochannel arrangement through which the coins travel one after the other, each coin resting on its edge and so retaining the following one in a tangential manner.

In this device, collection is made in such a way that once the corresponding command is received, a retainer of the first coin is activated, which then leaves the channel and drops into the collection box, while the second coin, which was resting on the first, is fed by gravity into the position that was occupied earlier by the first coin and where it is brought to a stop by the retainer.

Although the mechanism is very simple, it suffers from a serious problem, that it only accepts a determined type of coin, i.e. with a single thickness. As a result, the mechanism cannot be used with coins having different thicknesses. The reason for this is that, as the coins are resting against one another on its edge, if there are coins that are less thick, overriding of coins can and, in fact, does occur. This results in a blockage that leaves the paystation telephone out of service until it is cleared by the person in charge.

TECHNICAL PROBLEM TO BE OVERCOME

The device of the invention has been designed to perform the control, storage and collection of coins, in paystation telephones or in machines that are coin-operated, And to do that without the possibility of jams occurring, and without any need for movable carriages, drive motors, etc., regardless of the size, thickness or value of the coins.

CHARACTERISATION OF THE INVENTION

The device of the invention, which is based on a structure in which a monochannel exists that is accessible to all coins accepted by the respective coin selector, the said channel having a slight downwards slope from the point of entrance to the point of exit to permit the coins to roll down a slipway, is characterised in that one of the sides of the monochannel device has a number of slots through which emerge the extremities of an equal number of retractable levers which, in their outermost position set points of retention for the respective coins as they proceed down the slipway.

The device is also characterised in that the retractable levers are mechanically linked to energising coils, the activation of one of them producing the tilting and retraction of the corresponding lever, with the object of having each coin roll towards the next point of retention or into the coin collection channel in the case of the first coin. Activation of the energising coils, and consequently the operation of the retractable levers, is effected by means of pulses that come from a control circuit which receives signals from a series of sensors that detect the presence of coins and from a sensor that detects the passage of collected coins.

An additional characteristic of the device is that the slipway is mounted in an articulated manner to a shaft around which it can turn, making it possible for the slipway to occupy two positions, one which exits into the monochannel, constituting the actual coin slipway, and the other for coin return, which corresponds to a tilting and retraction of this slipway, permitting the coins at that moment located in the monochannel to fall directly into a coin return channel.

The device is also characterised in that each of the retractable levers can tilt around a shaft and has an associated restoring spring which, one the energising of the corresponding coil has concluded, produces the reinsertion of the corresponding retractable lever into the monochannel device.

An additional characteristic of the device object of the invention, is that the sensors that detect the presence of coins are located opposite the retention positions of the coins when the coins are being retained by their respective retractable levers.

Finally, the device is characterised in that the sensor that detects the passage of collected coins

is situated opposite the outlet of the monochannel device and at the entrance to the coin collection box.

By means of this device, based on the concepts stated above, it is possible to have perfect control over any number of coins inserted in any order, providing the control circuit with complete information on the different coins present at any given moment so that this circuit can decide on possible options depending on how the call is progressing. All this control process is carried out without motors and with no need for sources of power other than from the telephone line itself.

On the other hand, since the coins are held in modules individually, there will be no jams produced through the indiscriminate insertion of coins.

Summarising, the device is reliable, efficient, simple and cheap, as well as occupying little space, making it possible to have a compact paystation telephone.

To complement the description that is given below and in order to better understand the characteristics of the invention, a set of drawings is provided which make it easier to comprehend the characteristics and advantages of the invention.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a side elevation of a cross-section of the device of the invention, including the wall of the monochannel device through which the coin-retaining levers can be retracted, including also the slipway and, in dashed lines, the coils that act the retractable levers.

Figure 2 shows a cross-sectional view of the device in which can be seen one of the retractable levers for the retention of the respective coin, as well as the coil associated with this lever and the corresponding sensor for detecting the presence of a coin.

DESCRIPTION OF AN IMPLEMENTATION OF THE INVENTION

In the light of the figures, and specifically figure 1, the device can be seen in an application for a general instrument 1, which could be a paystation telephone instrument with coin entrance 2 that will include, logically, its corresponding coin selector, such that the coins rejected have access to a coin return channel 3, while those admitted as valid are gravity-fed to a monochannel module 4 where control, storage and collection of the coins take place. The monochannel module 4 has a slight slope so that the coins 5, 5', 5", .. can slide towards the exit of the monochannel module, which corresponds to the entrance 6 of the collection box.

In the implementation being described, it can be seen that the monochannel module 4 can store three coins, in such a way that the coin 5 is situated in the lowest part of the monochannel module or "collection zone", while the coins 5' and 5" are located above it in the two "waiting zones". Depending on the necessary storage capacity and on the size of the instrument in which it is held, the device could have more waiting zones.

The coins 5, 5', 5" move along a slipway 7 located between two walls that define the monochannel module 4. The slipway 7 is formed from an L-shaped profile that can tilt between two positions, one being the working position and the other for coin-return; such that in the first case, which corresponds to that shown in the figures 1 and 2, the coins 5, 5', 5" rest on the horizontal branch of the profile that forms the slipway 7, while in the coin-return position the slipway 7 tilts in order to allow all the coins to fall into the coin-return channel 3, which occurs when the telephone call being made by the user is over and he wishes to recuperate the coins still held in the monochannel module 4 and which have not been collected. The tilting action mentioned is produced by a retractable lever 8, logically linked to the slipway 7 and which is activated by the user when he wishes to recover the coins which have still not been collected.

Projecting perpendicularly from one of the walls of the monochannel module 4 are a series of retractable levers 9, 9' and 9", equidistant from one another. These levers remain perpendicular to this wall in their "out" position as is shown in figure 2. Each one serves to retain one coin and each retractable lever 9, 9', 9" is associated with a coil 10, 10', 10" which, when energised, causes the lever 9, 9', 9" to switch position and allow the respective coin 5, 5', 5" to pass. Each coil 10, 10', 10" has an associated restoring spring 11, 11', 11".

The assembly is completed with an equal number of sensors 12, 12', 12", all of which are connected to an control circuit 13. These sensors 12, 12', 12" are used to detect the presence of the coins 5, 5', 5", in order to transmit the corresponding control signals to the control circuit 13.

When the paystation telephone instrument is in an idle state, the coins that are inserted through the entrance 2 are accepted, reach the monochannel module 4 and start to roll along the slipway 7 resting against and directed by the inner wall of the two that form the monochannel module 4.

When the paystation telephone instrument is in the idle state, the coils 10, 10', 10" are unenergised and, consequently, the retractable levers 9, 9', 9" project into the monochannel module 4.

When the user inserts the first coin 5 this, once validated and accepted, starts to roll along the slipway 7, arriving at the position of the retractable lever 9" where it is stopped. The sensor 12" de-

tects the presence of the coin and transmits the corresponding signal to the control circuit. At the same time the coin-detecting sensors 12' and 12 are informing the control circuit that there are no coins being retained by the retractable levers 9' and 9.

With this information, the control circuit instructs the coil 10" to be energised; this causes the retractable lever 9" to be withdrawn and the coin 5, unimpeded, rolls into the position corresponding to retractable lever 9', where it is stopped. Next, coil 10" is deenergised and the lever 9" returns to its idle position, projecting into the monochannel module 4, because of the action of the restoring spring 11".

The presence of the coin 5 retained by the retractable lever 9' is detected by the coin-detecting sensor 12', which informs the control circuit. At the same time, the sensor 12 is informing the control circuit that there is no coin being retained by the retractable lever 9.

With this information, the control circuit instructs coil 10' to be activated, producing the withdrawal of the retractable lever 9' and coin 5, unimpeded, rolls towards the position of retractable lever 9, where it is stopped. Next, coil 10' is deenergised and the retractable lever 9' returns to its idle position, projecting into the monochannel module 4, because of the action of the restoring spring 11'.

At this stage of the process, the coin 5 is stored in the lowest part of the monochannel module 4, that is, in the collection zone.

If the user inserts a second coin 5' and it is validated and accepted, it starts to roll along the slipway 7, arriving at the position of the retractable lever 9" where it is stopped. The sensor 12" detects the presence of the coin and transmits the corresponding signal to the control circuit. At the same time the coin-detecting sensor 12' is informing the control circuit that there are no coins being retained by the retractable lever 9'.

With this information, the control circuit instructs the coil 10" to be energised; this causes the retractable lever 9" to be withdrawn and the coin 5', unimpeded, rolls into the position corresponding to retractable lever 9', where it is stopped. Next, coil 10" is deenergised and the lever 9" returns to its idle position, projecting into the monochannel module 4, because of the action of the restoring spring 11".

At this stage of the process, the coin 5 is stored in the collection zone and coin 5' is stored in the first waiting zone.

If, under these circumstances, the user inserts a third coin 5", this, once validated and accepted, would reach the position corresponding to the retractable lever 9", where it would he held up.

All that has been described above would be repeated as many times as there are waiting zones in the instrument, in each case transmitting unmistakable information on each coin to the control circuit, making available at all times an exact map with the location of each coin, such that, with this information, together with that provided by the validating element on the type of coins introduced, the control circuit has all the necessary information in order to progress the call in course.

Once the coins 5, 5' and 5", or all the coins that the device can admit have been stored, the manner in which collection is done is as follows: with the first coin 5 in the static position as is shown in figure 1, if the control circuit decides to collect it, coil 10 is activated; this produces the withdrawal of the retractable lever 9, which tilts backwards on its shaft 14, permitting the coin 5 to move unimpeded to the entrance 6 of the collection box. The coil 10 is then deenergised and, because of the restoring spring 11, the lever 9 in the collection zone returns to its idle position and closes once again the slipway.

The control circuit is sure that the first coin has been collected in two ways. First, the sensor 12 detects and communicates the situation of no coin being present, which verifies that it has been this coin that has moved. Second, it receives a pulse from the sensor 15, that detects the passage of a coin for collection, arranged at the exit, which ensures that the coin has moved into the collection box.

To complete the collection process, if the control circuit is receiving information from sensor 12' that there is a coin waiting, it activates the coil 10', causing the retractable lever 9' in the first waiting zone to withdraw, tilting backwards in the same way as the lever 9 had done before, leaving the slipway free; at this moment the second coin 5' is no longer retained and rolls forward to the next point of detention represented by retractable lever 9 pertaining to the collection zone.

This occurrence is recognised by the control circuit, since sensor 12' no longer detects the presence of the coin 5', which means that it has moved; sensor 12 then signals the presence of a new coin, which indicates that the movement in question has been into the collection position.

Had there been more waiting zones in the device, and had these had coins in them, the device would repeat all that has been described before, the final result being the displacement of all the coins into the collection position.

If it is desired to recover the coins not used, that is, those retained in the monochannel device 4, it is sufficient to act on the slipway 7 causing it to withdraw slightly and permitting all the coins 5, 5' and 5" to fall by gravity into the coin return channel 3. The tilting action of the said slipway 7 takes

place around the axis 16 which is clearly shown in the figure 2.

Under such circumstances, the control circuit is aware of what has happened because the sensors 12, 12' and 12" communicate that there are no coins presently retained by the retractable levers 9, 9' and 9".

Claims

1. MONOCHANNEL DEVICE FOR CONTROL, STORAGE AND COLLECTION OF COINS, which is based on a structure in which a monochannel (4) exists that is accessible to all coins (5-5'-5" ..) accepted by the respective coin selector of the instrument in which the actual device is mounted, the said channel (4) having a slight downwards slope from the point of entrance to the point of exit to permit the coins to roll down a slipway (7), and characterised in that one of the sides of the monochannel device (4) has a number of slots through which emerge the extremities of an equal number of retractable levers (9-9'-9" ..) which, in their outermost position set points of retention for the respective coins (5-5'-5" ..) as they proceed down the slipway (7), the said levers (9-9'-9" ..) being mechanically linked to corresponding energising coils (10-10'-10" ..), the activation of one of them produces the tilting and retraction of the corresponding lever, with the object of having each coin roll towards the next point of retention or into the coin collection (6) channel in the case of the first coin (5); and in that the activation of the energising coils (10-10'-10" ..) and consequently the operation of the retractable levers (9-9'-9" ..) is effected by means of pulses that come from a control circuit which receives signals from a series of sensors (12-12'-12" ..) that detect the presence of coins and from a sensor (15) that detects the passage of collected coins.

2. MONOCHANNEL DEVICE FOR CONTROL, STORAGE AND COLLECTION OF COINS according to claim 1, characterised in that the slipway (7) is mounted in an articulated manner to a shaft (16) around which it can tilt, making it possible for the slipway (7) to occupy two positions, one which exits into the monochannel device (4), constituting the actual coin slipway, and the other for coin return, which corresponds to a tilting and retraction of this slipway (7), permitting the coins at that moment located in the monochannel device (4) to fall directly into a coin return channel (3).

3. MONOCHANNEL DEVICE FOR CONTROL, STORAGE AND COLLECTION OF COINS according to claim 1, characterised in that each of the retractable levers (9-9'-9" ..) can tilt about a shaft (14-14'-14" ..) and has an associated restoring spring (11-11'-11" ..) which, once the energising of the corresponding coil (10-10'-10" ..) has concluded, produces the reinsertion of the corresponding retractable lever (9-9'-9" ..) into the monochannel device (4).

4. MONOCHANNEL DEVICE FOR CONTROL, STORAGE AND COLLECTION OF COINS according to claim 1, characterised in that the sensors (12-12'-12" ..) that detect the presence of coins are located opposite the retention positions of the coins (5-5'-5" ..) when these are being retained by their respective retractable levers (9-9'-9" ..).

5. MONOCHANNEL DEVICE FOR CONTROL, STORAGE AND COLLECTION OF COINS according to claim 1, characterised in that the sensor (15) that detects the passage of collected coins is situated opposite the outlet from the monochannel device (4) and at the entrance (6) to the coin collection box.

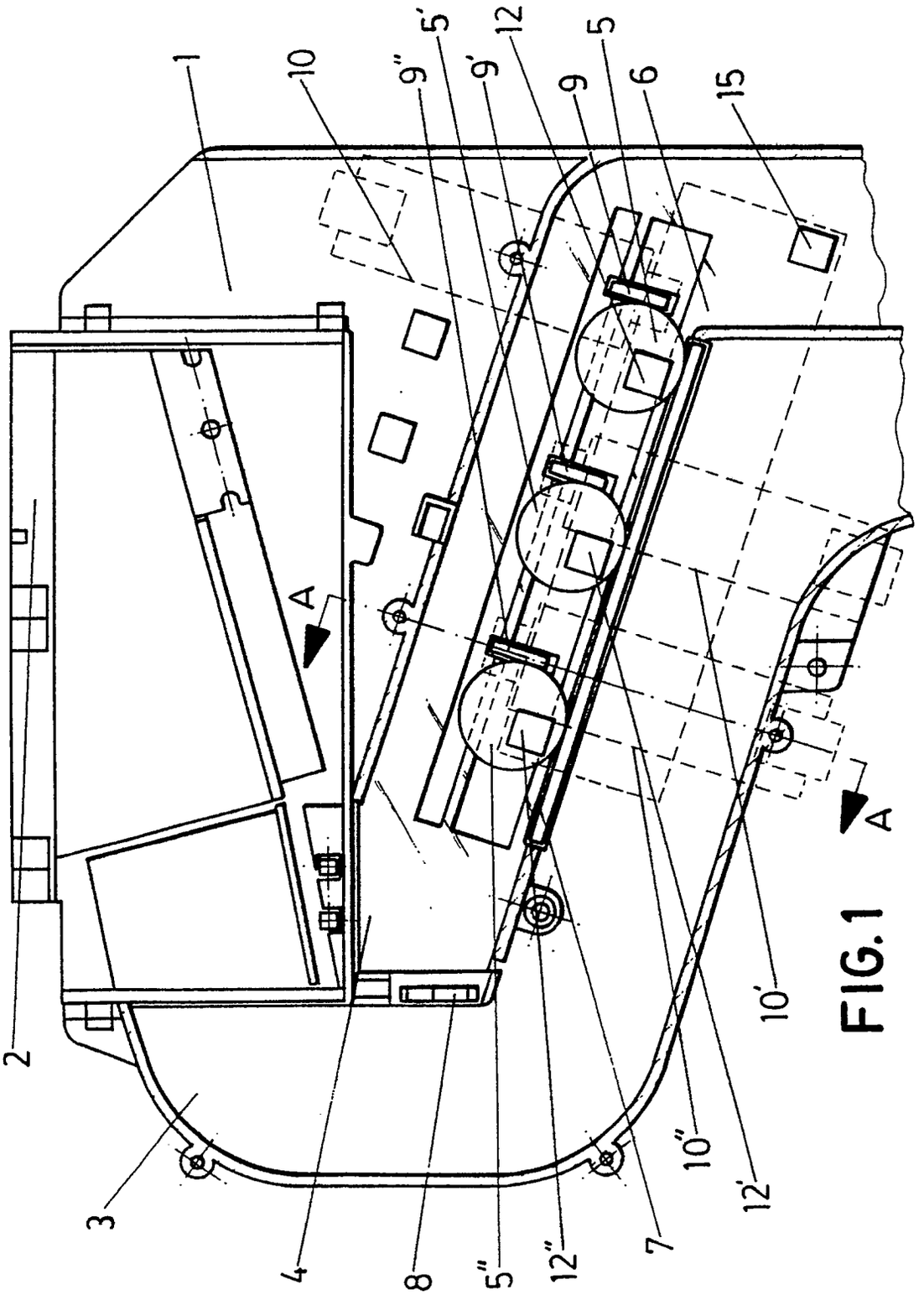

FIG.1

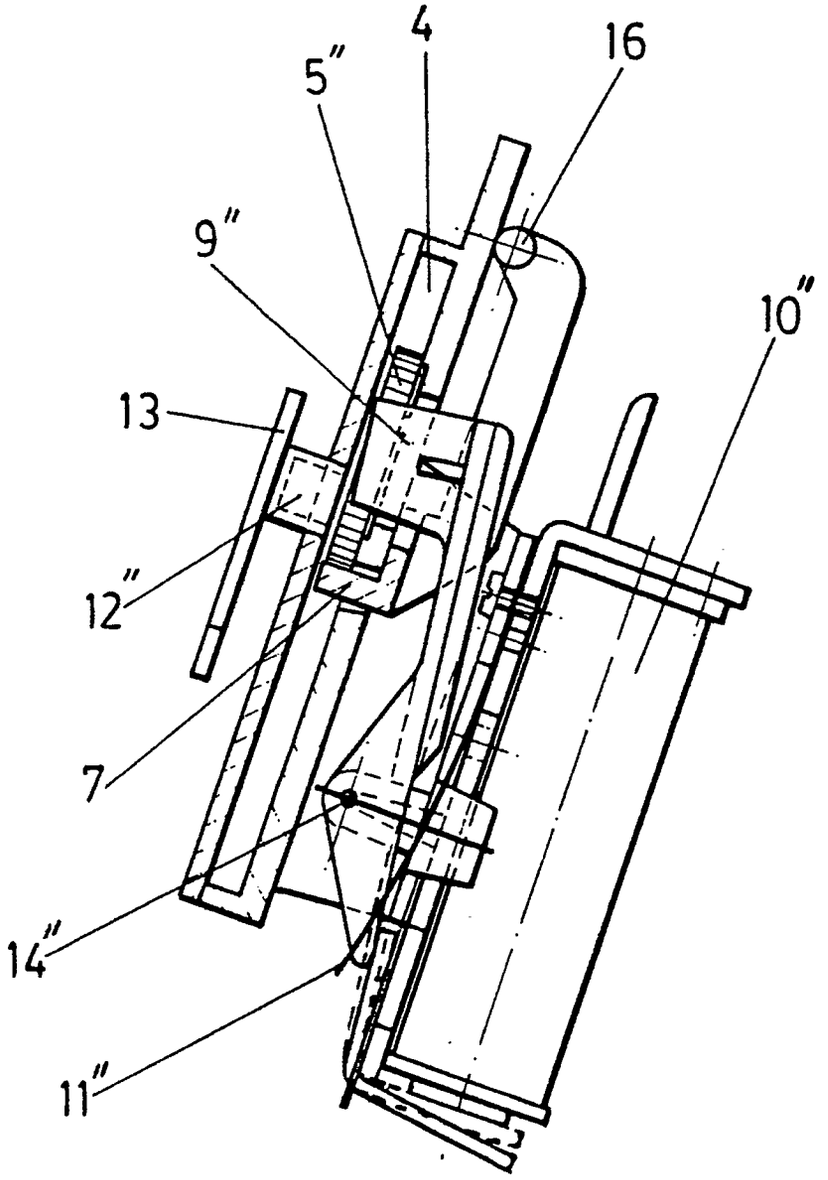

FIG. 2
A-A