

SPECIFICATION

Title of the Invention:

ROTARY CYLINDER POWER FEEDING APPARATUS

Background of the Invention

Field of the Invention:

This invention relates to rotary cylinder power feeding apparatus to be used for such magnetic recording and reproducing apparatus as, for example, video tape recorders (which shall be mentioned as VTR hereinafter) and more particularly to a rotary cylinder power feeding apparatus which is formed by facilitating the work of assembling a commutator forming a rotary cylinder power feeding apparatus and integrating such conductive members as the above mentioned commutators and brushes for feeding a power to an electronic circuit within the rotary cylinder from the body so that such assembling efficiency, electric performance and reliability as of the apparatus may be improved.

Description of the Related Arts:

Generally, in such magnetic recording and reproducing apparatus as a VTR, there is used a helical scanning system wherein a head is rotated to make a magnetic memory or reproduction.

In a VTR of such helical scanning system, for example, in the process of the reproduction in the

apparatus, when at least two heads fitted on a rotary drum are rotated to slide helically against the running direction on a magnetic memorizing medium in which a signal has been magnetically memorized, the signal will be obtained from this magnetic memorizing medium, will be amplified to a predetermined level by such electronic circuit as of a reproducing amplifier and will be fed to a reproducing circuit through a contactless rotary transformer (which shall be mentioned as a rotary transformer hereinafter) so as to be reproduced. Also, in the case of recording in the above mentioned apparatus, the signal to be memorized will be fed through the rotary transformer, the voltage and current required for the recording will be fed to the above mentioned head by a electronic circuit such as a recording amplifier and the head will rotate to slide helically on the above mentioned recording medium to magnetically memorize the signal.

In a VTR, as the rotary transformer is interposed between the magnetic head and the circuit feeding the signal to be recorded to this magnetic head or amplifying the signal reproduced by the head, the signal transmitting loss will be large. Various suggestions have been already made as to how this loss should be reduced. One of the suggestions is, as described above, to arrange such electronic circuit as of the reproducing amplifier or recording amplifier between the rotary transformer and magnetic head.

Now, in case such electronic circuit as of the reproducing amplifier or recording amplifier is provided

between the rotary transformer and magnetic head as mentioned above, when a signal is reproduced or recorded, naturally, in order to amplify the reproduced signal or recorded signal from the magnetic head, it will be necessary to feed a power driving the above mentioned reproducing amplifier or recording amplifier. However, in such case, the above mentioned reproducing amplifier or recording amplifier will be arranged within the rotary cylinder and will rotate together with the rotary cylinder and, therefore, in order to always securely feed the power, there will be necessary an apparatus provided with a function of feeding a power source from the body to such electronic circuit as of the above mentioned preamplifier within the rotary cylinder, that is, a so-called rotary cylinder power feeding apparatus.

Such rotary cylinder power feeding apparatus generally comprises a commutator as a conductive member which has two positive and negative pole devices connected through lead wires with such electronic circuits as of the reproducing amplifier and recording amplifier provided within the rotary cylinder, is axially fitted to the shaft of the above mentioned rotary cylinder through a connecting and fixing member (which shall be mentioned as a coupling hereinafter) and rotates together with the above mentioned rotary cylinder and positive pole and negative pole conductive members (which shall be mentioned as conductive brushes or merely brushes hereinafter) which are arranged to correspond respectively to the positive and negative poles of this

rotating commutator and will feed the power from the body when they contact the respective outer peripheries of the commutator.

The above mentioned commutator is generally formed of a stay and a cylindrical conductive member fitted to this stay. This cylindrical conductive member is arranged to contact the above mentioned positive and negative pole brushes on the outer periphery of the above mentioned stay and is formed by pressing. When the stay of this commutator is fitted with a coupling fixed on the upper surface of the rotary cylinder to rotate coaxially with the above mentioned rotary cylinder, it will be positioned coaxially with the above mentioned rotary cylinder.

The above mentioned brush is generally formed by having the positive and negative pole conductive members fitted to a supporting member. This brush supporting member is made to contact the above mentioned rotating positive and negative commutators with a predetermined contact pressure by an arm fixed to a main base and is held in a predetermined position.

The above mentioned commutators and such electronic circuit as of the preamplifier arranged within the rotary cylinder are connected with each other generally through lead wires. The connecting method is that the above mentioned commutators are connected with a connector through lead wires from the lower ends of the commutators and this connector is connected to a connector connecting hole provided on the upper surface of the above mentioned rotary cylinder. On the other hand, this

connector connecting hole on the upper surface of the above mentioned rotary cylinder is provided with a connecting device connected with such electronic circuit part as of the preamplifier provided within the rotary cylinder. When the above mentioned connector is inserted into this connecting device, the power from the body will be fed to such electronic circuit part as of the preamplifier through the above mentioned brush, commutator and connector.

However, in such rotary cylinder power feeding apparatus as of the conventional art, as the commutator used for the rotary cylinder power feeding apparatus is formed by inserting a usually cylindrically formed commutator into the commutator shaft fixed as axially fitted to the rotary cylinder shaft and pressing it simultaneously, there are such disadvantages that the assembling work is complicated and the cost is high. Also, in order to cylindrically form the commutator, the conductive member to be used for the material will be limited. It must be formed by a special producing method and therefore its productivity will be greatly influenced.

Also, the above mentioned commutator shaft has been fixed to the rotary cylinder directly or by using such connecting member as a coupling so as to be axially fitted to the rotary cylinder. However, in the case of this fixing and fitting work, the commutator shaft will have to be coaxially fitted to the above mentioned rotary shaft and, at the same time, the contact position in the vertical direction with the above mentioned brush will have to be determined and, as a result, the

assembling work will be complicated and the productivity will be greatly influenced.

Further, the above mentioned commutator and such electronic circuit as of the preamplifier arranged within the rotary cylinder have been connected with each other by means of a connector connecting them through the above mentioned commutator and lead wires. However, in such connecting method, the vicinity of the connector connecting hole on the upper surface of the rotary cylinder is so precisely formed that the fitting work will be complicated, the fitted lead wire type connector will rotate at a high speed together with this rotary cylinder, therefore, such secondary trouble as the contact or entanglement with the rotary cylinder or break of the lead wires will occur and the lead wires will have to be kept bound to prevent such trouble. Also, in case the connection between the wire type connector arranged in the above mentioned connecting hole and such electronic part as of the preamplifier is made by using another connector, as the above mentioned lead wire type connector is used simultaneously, there will be two connections and the connecting and assembling works will be complicated. As the above mentioned commutator shaft is fixed as fitted to the rotary cylinder on the upper surface directly or by providing a coupling, there will be a disadvantage that it will be inconvenient in the maintenance service.

Summary of the Invention

An object of the present invention is to

provide a rotary cylinder power feeding apparatus wherein the commutator assembling work can be made easy.

Another object of the present invention is to provide a rotary cylinder power feeding apparatus wherein the position of the commutator for the rotary cylinder shaft and brush can be determined by a simple formation.

Another object of the present invention is to provide a rotary cylinder power feeding apparatus wherein the commutator can be connected to such electronic circuit as of the preamplifier without increasing the number of the component parts and losing the reliability.

Another object of the present invention is to provide a rotary cylinder power feeding apparatus wherein, in case the power feeding apparatus is formed separately from the rotary cylinder, the rotary cylinder rotating operation will be transmitted to the power feeding apparatus so that the power may be securely fed.

Another object of the present invention is to provide a rotary cylinder power feeding apparatus wherein a countermeasure against noise is applied to the rotary power feeding by the commutator and brush.

The rotary cylinder power feeding apparatus according to the first invention comprises:

a rotary cylinder provided with a magnetic head and an electronic circuit to be connected to this magnetic head;

a columnar rotor rotating integrally with this rotary cylinder;

conductive members each comprising a plurality

of conductors arranged as divided in the peripheral direction on the outer peripheral surface of this rotor and electrically connected to the above mentioned electronic circuit;
and

conductive brushes fitted to contact these conductive members and feeding a power to the above mentioned electronic circuit through the above mentioned conductive members.

According to the first invention, when the conductive member arranged on the outer peripheral surface of the columnar rotor rotating integrally with the rotary cylinder is separated into a plurality of parts, for example, three parts, in said conductive member assembling work, the above mentioned separated conductive member parts will be able to be assembled, for example, by being pasted to the above mentioned columnar rotor from the side without being fitted in so that the conductive member assembling work may be easy.

The rotary cylinder power feeding apparatus according to the second invention comprises:

a rotary cylinder provided with a magnetic head and an electronic circuit to be connected to this magnetic head;

a rotary driving member rotating integrally with this rotary cylinder;

a columnar rotor supported by a supporting member coaxially with the above mentioned rotary driving member, independently of the above mentioned rotary driving

member and rotatably;

conductive members provided on the outer peripheral surface of the above mentioned rotor and electrically connected to the above mentioned electronic circuit;

conductive brushes provided on the above mentioned supporting member, contacting the above mentioned conductive members and feeding a power to the above mentioned electronic circuit; and

a rotation transmitting means provided between the above mentioned rotary driving member and the above mentioned rotor and transmitting the rotation of the above mentioned rotary driving member to the above mentioned rotor.

According to the second invention, when the rotation transmitting member fitted between the columnar rotor forming the rotary shaft of the above mentioned electric conductive member and the rotary driving member and the rotary driving member rotating integrally with the rotary shaft of the rotary cylinder are engaged with each other, the rotary cylinder rotating operation will be able to be securely transmitted to the columnar rotor and the relative positions in the vertical direction of the above mentioned conductive member and conductive brush will be able to be well determined.

The rotary cylinder power feeding apparatus according to the third invention comprises:

a rotary cylinder provided with a magnetic head and an electronic circuit to be connected to this magnetic head and rotated and driven as rotatably

provided for a fixed cylinder fixed to the chassis;

a supporting member removably fitted at one end to a fitting member provided in the above mentioned chassis and supporting at the other end the rotor so as to rotate integrally with the above mentioned rotary cylinder;

conductive members provided on the outer peripheral surface of the above mentioned rotor and electrically connected with the above mentioned electronic circuit when the above mentioned supporting member is fitted to the above mentioned chassis;

conductive connecting terminals arranged at one end of the above mentioned supporting member and electrically connected with a power feeding terminal provided opposite the above mentioned chassis when the above mentioned supporting member is fitted to the above mentioned chassis; and

conductive brushes arranged at the other end of the above mentioned supporting member, contacting the above mentioned conductive members as electrically connected with the above mentioned conductive connecting terminals and feeding the power to the above mentioned electronic circuit.

According to the third invention, as the rotor rotating integrally with the rotary cylinder is rotatably fitted to the supporting member, the conductive member is arranged on the outer peripheral surface of this rotor, the conductive connecting terminal connectable with the power generating part is arranged at one end of the supporting member and the conductive brush for feeding a voltage from the power generating part

to the electronic circuit through the above mentioned conductive member is arranged at the other end of the supporting member, without using such means as the lead wires and soldering, by only fitting the supporting member to the chassis, the supply source voltage from the power generating part will be able to be fed to the electronic circuit within the rotary cylinder through the conductive brush and the conductive member connected with the conductive brush and the power feeding apparatus will be able to be very easily fitted to the rotary cylinder.

The rotary cylinder power feeding apparatus according to the fourth invention comprises:

- a rotary cylinder provided with a magnetic head and an electronic circuit to be connected to this magnetic head;

- a tape-like recording medium running as wound on this rotary cylinder and having information signals recorded or reproduced by the above mentioned magnetic head;

- a columnar rotor rotating integrally with the above mentioned rotary cylinder;

- a conductive member comprising a plurality of conductors arranged as divided in the peripheral direction on the outer peripheral surface of this rotor and electrically connected to the above mentioned electronic circuit;

- a connecting means electrically connecting this conductive member and the above mentioned electronic circuit with each other; and

- a conductive brush fitted to contact the above

mentioned conductive member and feeding a power to the above mentioned electronic circuit through the above mentioned conductive member,

and is characterized in that:

the center angle of one conductor of the plurality of conductors divided in the peripheral direction and forming the above mentioned conductive member is formed to be larger than the tape winding angle when the above mentioned tape-like recording medium is wound on the rotary cylinder ;

the above mentioned connecting means is arranged near the above mentioned magnetic head; and,

in a rotating position in which the above mentioned magnetic head does not detect a signal from the above mentioned tape-like recording medium, the above mentioned plurality of conductors are arranged on the outer peripheral surface of the above mentioned columnar rotor so that the joint part between the plurality of conductors forming the above mentioned conductive member may contact the above mentioned conductive brush.

According to the fourth invention, as the center angle of one conductor of the plurality of conductors forming the above mentioned conductive member is formed to be larger than the tape winding angle on the rotary cylinder, such connecting means as the lead wires and connector are arranged near the magnetic head and, in a rotating position in which the magnetic head detects a signal from the tape-like recording medium, the above mentioned plurality of conductors are arranged on the outer peripheral surface of the above mentioned columnar

rotor so that the joint part between the above mentioned plurality of conductors may not contact the above mentioned conductive brush, the electric noise generated when the joint part between the conductors contacts the conductive brush will not influence the recorded and reproduced signals of the magnetic head and the recording and reproducing quality in the recording and reproducing apparatus will be able to be improved.

The rotary cylinder power feeding apparatus according to the fifth invention comprises:

- a rotary cylinder provided with two magnetic heads arranged as opposed to each other on the rotary peripheral surface and an electronic circuit to be connected to these magnetic heads;

- a tape-like recording medium running as wound on this rotary cylinder and having information signals recorded or reproduced alternately by the above mentioned two magnetic heads;

- a columnar rotor rotating integrally with the above mentioned rotary cylinder;

- a conductive member comprising a plurality of conductors arranged as divided in the peripheral direction on the outer peripheral surface of this rotor and electrically connected to the above mentioned electronic circuit;

- a connecting means electrically connecting the above mentioned electronic circuit with this conductive member; and

- a conductive brush fitted to contact the above mentioned conductive member and feeding a power

to the above mentioned electronic circuit through the above mentioned conductive member,

and is characterized in that:

the center angle of one conductor of the plurality of conductors forming the above mentioned conductive member and divided in the peripheral direction is formed to be larger than the tape winding angle when the above mentioned tape-like recording medium is wound on the rotary cylinder;

the above mentioned connecting means is arranged near the first magnetic head of the above mentioned two magnetic heads; and

in a rotating position in which the above mentioned first magnetic head does not detect a signal from the above mentioned tape-like recording medium, the above mentioned plurality of conductors are arranged on the outer peripheral surface of the above mentioned columnar rotor so that the joint part between the plurality of conductors forming the above mentioned conductive member may contact the above mentioned conductive brush.

According to the fifth invention, as the center angle of one conductor of the plurality of conductors forming the conductive member is formed to be larger than the tape winding angle on the rotary cylinder, such connecting means as lead wires and connectors are arranged near the first magnetic head of the two magnetic heads and, in a rotating position in which this first magnetic head detects a signal from the tape-like recording medium, the above mentioned plurality of conductors are arranged on the outer peripheral surface

of the above mentioned columnar rotor so that the joint part between the above mentioned plurality of conductors may not contact the above mentioned conductive brush, therefore the electric noise generated when the joint part between the conductors contacts the conductive brush will not influence the recorded and reproduced signals of the magnetic head and the recording and reproducing quality in the recording and reproducing apparatus provided with two or more magnetic heads will be able to be improved. In this case, as the other magnetic head than the first magnetic head is in a position separate from the connecting means which is a noise generating source, when the other magnetic head detects a signal, even if an electric noise is generated, the electric noise will be hard to mix into the other magnetic head than the first magnetic head.

Brief Description of the Drawings

Fig. 1 is a general formation view showing the general formation of a VTR using a rotary cylinder power feeding apparatus according to the present invention.

Fig. 2 is a block diagram showing the principle of the rotary cylinder power feeding apparatus shown in Fig. 1.

Figs. 3 and 4 show the first embodiment of the rotary cylinder power feeding apparatus according to the present invention.

Fig. 3 is a side view of a VTR main part showing the formation of the rotary cylinder power

feeding apparatus.

Fig. 4 is a perspective view for explaining the formation of a commutator of the rotary cylinder power feeding apparatus.

Figs. 5 and 6 show the second embodiment of the rotary cylinder power feeding apparatus according to the present invention.

Fig. 5 is a sectioned view of a VTR main part showing the formation of the rotary cylinder power feeding apparatus.

Fig. 6 (a) is a plan showing a plate spring member having functions of transmitting the rotary cylinder rotating operation and holding the commutator positioning.

Fig. 6 (b) is a plan showing a coupling to be engaged as opposed to a plate spring member shown in Fig. 6 (a).

Figs. 7 and 8 show the third embodiment of the rotary cylinder power feeding apparatus according to the present invention.

Fig. 7 is a perspective view showing the formation of the rotary cylinder power feeding apparatus.

Fig. 8 is a sectioned view of a VTR main part fitted with the rotary cylinder power feeding apparatus.

Fig. 9 is a comparative sectioned view showing an example of the rotary cylinder power feeding apparatus provided with a lead wire connecting system and for explaining the rotary cylinder power feeding apparatus

shown in Fig. 8.

Figs. 10 to 15 are to explain the fourth embodiment of the rotary cylinder power feeding apparatus according to the present invention.

Fig. 10 is a perspective view showing the formation of a commutator.

Fig. 11 is a plan of the rotary cylinder power feeding apparatus using the commutator in Fig. 10.

Fig. 12 is a side view of Fig. 11.

Fig. 13 is a plan showing a rotary cylinder power feeding apparatus in which an electric noise will be generated in a commutator depending on the rotating position of the rotary cylinder.

Fig. 14 is a plan showing a rotary cylinder power feeding apparatus in which an electric noise will be generated in a commutator depending on the rotating position of the rotary cylinder.

Fig. 15 (a) to Fig. 15 (d) are phase relation diagrams of a head detected signal, synthesized signal and electric noise generating position.

Fig. 15 (a) is a diagram showing the detected signal of a head 5a.

Fig. 15 (b) is a diagram showing the detected signal of a head 5b.

Fig. 15 (c) is a diagram showing the detected signal of a synthesized signal.

Fig. 15 (d) is a diagram showing an electric noise.

Detailed Description of the Preferred Embodiments

The embodiments shall be explained with reference to the drawings.

Figs. 1 to 4 show the first embodiment of a rotary cylinder power feeding apparatus according to the present invention. Fig. 1 is a general formation view showing the formation of a VTR using a rotary cylinder power feeding apparatus. Fig. 2 is a block diagram showing the principle of the rotary cylinder power feeding apparatus shown in Fig. 1. Fig. 3 is a side view of a VTR main part showing the formation of a rotary cylinder power feeding apparatus according to the present invention. Fig. 4 is a perspective view showing the formation of a commutator.

As shown in Fig. 1, a VTR 1 is provided with a cassette holder 2 which carries in a cassette tape (not illustrated) and carries the cassette tape to a predetermined position as a preparing step for loading the tape. The cassette tape carried by this cassette holder 2 is set in a predetermined position within the VTR 1 and is then loaded by an S (supply reel side) slider 3 and T (take-up reel side) slider 4. As a result, the tape pulled out of the cassette tape will be wound at a predetermined angle on the outer peripheral surfaces of a rotary cylinder 5 and fixed cylinder 6.

Now, for example, in the case of the reproduction, a video signal will be detected out of the tape sliding on the outer peripheral surface of the rotary cylinder by a plurality of magnetic heads provided on the rotary cylinder 5, will be fed to such electronic circuit (not illustrated) as of a preamplifier arranged

within the rotary cylinder 5 and will be amplified at a predetermined amplification rate. Therefore, at a better S/N ratio, the video signal will be put out of such electronic circuit as of the above mentioned preamplifier and will be fed to the fixed cylinder side through a rotary transformer. Then, the video signal will be processed by a signal processing circuit (not illustrated) provided on the main substrate of the body and will be able to be obtained as a video image and sound output.

Now, in order to feed the power from the body to such electronic circuit as of the above mentioned preamplifier, as shown in Fig. 1, a rotary cylinder power feeding apparatus 7 in this embodiment is fitted to the rotary cylinder 5 on the upper part and is pivoted with the shaft of the above mentioned rotary cylinder 5 through a coupling.

For example, as shown in Fig. 2, such rotary cylinder power feeding apparatus 7 is an apparatus for feeding a power from the body to such electronic circuit as of a preamplifier 5c arranged, for example, within the rotary cylinder 5, is provided with conductive brushes 7a and 7b having positive and negative poles connected with the power source apparatus of the body. When these brushes 7a and 7b contact respectively commutators 7c and 7d as conductive members provided with positive and negative poles connected with a preamplifier 5c arranged within the rotary cylinder 5, the power will be fed to such electronic circuit as of the above mentioned preamplifier 5c and, as a

result, the electronic circuit will be driven. Thereby, the video signal detected from the sliding tape (not illustrated) by the magnetic head 5a (or 5b) arranged on the outer periphery of the rotary cylinder 5 will be amplified by such electronic circuit as of the above mentioned preamplifier 5c, will be transmitted to the fixed cylinder 6 side through a magnetically connected rotary transformer 56 and will be able to be fed to a signal processing circuit (not illustrated) provided in the main substrate.

Therefore, in Fig. 3 is shown an example that, in order to eliminate the problems as of the conventional technique, the working of assembling commutators in the rotary cylinder power feeding apparatus has been improved.

As shown in Fig. 3, the rotary cylinder power feeding apparatus 7 in this embodiment is fixed by an arm 15 fixed to a main base 20 forming a chassis of the VTR 1. The arm 15 performs a function as of a supporting member. On the other hand, within the rotary cylinder 5, for example, as described above, such electronic circuit as of the preamplifier 5c is arranged and is connected to the commutators 7c and 7d of the above mentioned rotary cylinder power feeding apparatus 7 through lead wires 13 connected with this electronic circuit. The commutators 7c and 7d corresponding respectively to these positive and negative poles rotate together with the rotary cylinder 5 but, when a brush supporting member 14 holding the brushes 7a and 7b of the rotary cylinder power feeding apparatus 7 is fixed in a

predetermined position by the above mentioned arm 15, these brushes 7a and 7b will be able to contact the above mentioned rotating commutators 7c and 7d under a predetermined contact pressure. Therefore, there will be no influence of the friction by the contact with the sliding commutators 7c and 7d and the conducting state will be able to be always securely held. Thereby, the power from the body will be able to be fed to such electronic circuit as of the preamplifier 5c arranged within the above mentioned rotary cylinder 5.

By the way, the rotary cylinder power feeding apparatus 7 in this embodiment is provided with a cabinet part 7e (which shall be mentioned as a shield cover hereinafter) shielding the rotary cylinder power feeding apparatus 7. In the case of Fig. 3, this shield cover is removed.

Therefore, the above mentioned commutator 7c or 7d of the rotary cylinder power feeding apparatus 7 in this embodiment is characterized by being formed, as shown in Fig. 4, of a commutator core 70 provided coaxially with the rotary cylinder 5 and fitted to a fixed shaft 12, a plurality of, or, for example, three metal pieces 71 as conductive members to be fitted to the outer periphery of this commutator 70, connecting terminals 73 to be connected to these metal pieces 71 and a disc member (washer) not illustrated to press and fix in the above mentioned commutator core 70 the above mentioned plurality of metal pieces 71 as fitted and exposing the connecting terminals 73.

The above mentioned metal piece 71 can be

easily made by pressing, for example, one metal plate and, at the same time, in case the above mentioned shaft 12 is fixed through a coupling 8 on the upper surface of the rotary cylinder 5, the commutator core 70 will be first fitted to the above mentioned shaft 12, then the divided metal pieces will be jointed to the outer peripheral surface of the above mentioned commutator core 70 from the horizontal direction and therefore the fitting work will be easy.

Therefore, according to such formation, when the outer peripheral surface member as a conductive member forming the above mentioned commutators 7c and 7d is formed, for example, to be three metal pieces, for example, if the commutator core 70 is fitted in advance to the shaft 12 of the rotary cylinder power feeding apparatus, in the following assembling work, the above mentioned metal pieces 71 will be able to be respectively bonded, the commutator assembling work will be easy and the productivity will be able to be clearly expected to improve. By the way, the metal pieces 71 will be electrically connected with each other and will be connected with the electronic circuit through common lead wires 13.

Also, as described above, as the above mentioned metal piece 17 can be easily formed, for example, by pressing a flat plate, needless to say, no special material member may be used, a cheap material may be used, the surface may be specially worked with a precious metal and the electric connecting part material may be extensively utilized. As a result, the

reliability will be able to be improved.

By the way, in this embodiment, there has been explained the case that the rotary cylinder power feeding apparatus 7 is formed with the shield cover e for shielding it. However, a conventional rotary cylinder power feeding apparatus not provided, for example, with a shield cover may be also formed.

Figs. 5 and 6 show the second embodiment of a rotary cylinder power feeding apparatus according to the present invention. Fig. 5 is a formation view of a VTR main part showing the formation of a rotary cylinder power feeding apparatus. Fig. 6 (a) is a lower surface view of a plate spring member engaged with a coupling fixed to a rotary cylinder and having functions of transmitting the rotary cylinder rotating operation and holding the positioning of a commutator. Fig. 6 (b) is an upper surface view of a coupling engaged with the above mentioned plate spring member. By the way, the lower surface of the plate spring member shown in the above mentioned Fig. 6 (a) and the upper surface of the coupling shown in the above mentioned Fig. 6 (b) are to be opposed to each other. Also, in these drawings, the same components as in the above mentioned first embodiment shall bear the same reference numerals.

The rotary cylinder power feeding apparatus 7 in this embodiment comprises, as shown, for example, in Fig. 5, commutators 7c and 7d formed of positive and negative conductive devices, brushes 7a and 7b contacting the positive and negative poles respectively of these commutators 7c and 7d and a holder 14 providing and

supporting these brushes 7a and 7b with a predetermined width, is characterized in that the rotary cylinder power feeding apparatus 7 is formed as one package by shielding all the outside surface of this formed rotary cylinder power feeding apparatus 7 with the shield cover 7e and, even in case the rotary cylinder power feeding apparatus 7 is formed as one package, the rotary cylinder 5 rotating operation will be securely transmitted through the coupling 8 as a rotating driving member and the above mentioned respective commutators 7c and 7d will be always positioned in a predetermined position.

As shown in Fig. 5, for example, the rotary cylinder power feeding apparatus 7 is provided with a shaft 12 coaxially with the rotary cylinder 5 and this shaft 12 is fitted in the upper part through a metal member 16 and is made slidable vertically with respect to the metal member 16. On the lower surface of this metal member 16, a washer 17 is provided as loosely fitted to the above mentioned shaft 12. The respective commutators 7c and 7d of the positive and negative poles are bonded and fixed respectively to disc members 18a and 18b and are rotatably fitted to the above mentioned shaft 12. By the way, in this case, the above mentioned disc member 18a is arranged so as to be below the above mentioned washer 17 and the above mentioned disc member 18b is arranged on the rotary cylinder side.

These commutators 7c and 7d are positioned and contacted so as to correspond respectively to the positive and negative poles of the brushes 7a and 7b. The above mentioned brushes 7a and 7b are supported by a

holder 14 and are packaged by a shield cover 7e enclosing this holder 14, the above mentioned metal member 16 fitted to the upper part of the above mentioned shaft 12 and the commutators 7c and 7d fitted to the shaft 12 and brushes 7a and 7b . The above mentioned holder 14 is fixed to the main base through an arm 15.

Here, on the lower surface of the above mentioned disc member 18b to which the negative pole commutator 7d is fitted, for example, as shown in Fig. 6 (a), an engaging member 19 worked to form at least two plate springs 19a and 19b as resilient pieces of a metal plate is fitted. The engaging member 19 forms a rotation transmitting means together with a later described groove 8a. These plate springs 19a and 19b are formed to project toward the rotary cylinder 5 side and is energized in the vertical direction for the engaging member 19. In the outer peripheral end part of this engaging member 19, the lead wires 13 connected with the above mentioned commutators 7c and 7d and a connector 21 at the tips of these lead wires 13 are led out through the disc member 18b.

On the other hand, on the rotary cylinder 5 side, a coupling 8 is provided on the upper surface of the rotary cylinder 5 and is fitted to the shaft of the rotary cylinder 5 to rotate together with the rotary cylinder 5. On the upper surface of the coupling 8, for example, as shown in Fig. 6 (b), a plurality of grooves 8a engaging with the two plate springs 19a and 19b of the above mentioned engaging member 19 are formed to form a rotation transmitting means together with the above

described engaging member 19. Near the center of the upper surface, an axial hole 8b is formed to be of a predetermined depth and to be tapered in the upper part, is to bear the shaft 12 of the above mentioned rotary cylinder power feeding apparatus 7 in contact at the lower end in case the above mentioned rotary cylinder power feeding apparatus 7 is fitted by the arm 15 and is to make easy the work of contacting the above mentioned shaft 12 by being tapered.

The lead wires 13 projecting out of the above mentioned disc member 18b are fitted at the tips to a connector 21 and will be connected when the above mentioned connector 21 is inserted into a connector inserting hole (not illustrated) connected with such electronic circuit as of the preamplifier arranged within the rotary cylinder 5.

Now, the operation of the thus formed rotary cylinder power feeding apparatus shall be explained in detail with reference to Fig. 5.

First of all, the rotary cylinder power feeding apparatus 7 is lowered from the upward direction of the coupling 8 borne on the upper surface of the rotary cylinder 5 as illustrated, is arranged so that the shaft 12 of the above mentioned rotary cylinder power feeding apparatus 7 and the bearing hole 8b of the above mentioned coupling 8 may joint with each other and is fixed and fitted to the main base by means of the arm 15.

In this case, in the relative positions of the brushes 7a and 7b and the commutators 7c and 7d of the rotary cylinder power feeding apparatus 7, by the

vertically upward energizing force by the plate springs 19a and 19b of the engaging member 19 bonded to the lower surface of the disc member 18b, the above mentioned disc member 18b will be always pushed up, therefore the washer 17 loosely fitted to the shaft 12 will joint with the metal member 16 fixed to the shield cover 7e and thereby a fixed height will be able to be held. Thereby, the brushes 7a and 7b of the commutators 7c and 7d within the rotary cylinder power feeding apparatus 7 will be always stably positioned, that is to say, a positive contact state will be able to be held and therefore a power will be able to be effectively fed.

Therefore, in such case as, for example, of the reproduction, naturally, the rotary cylinder 5 will rotate but, in case this rotary cylinder 5 rotates, the plate springs 19a and 19b projecting out of the engaging member 19 on the above mentioned rotary cylinder power feeding apparatus 7 side will be engaged with the plurality of grooves 8a of the coupling 8 fitted to the shaft of the rotary cylinder 5 and will be linked in the case of rotating. That is to say, the rotary cylinder 5 rotating operation will be able to be transmitted to the shaft 12 of the commutators 7c and 7d through the grooves 8a of the coupling 8 and the plate springs 19a and 19b linked with these grooves 8a, that is to say, the torque will be able to be transmitted to the rotary cylinder power feeding apparatus 7.

Thereby, when the rotary cylinder power feeding apparatus 7 is arranged to engage with the couplings 8 of the rotary cylinder 5 and is only fitted to the arm 15

fixed to the main base, the rotary cylinder 5 rotating operation will be able to be easily transmitted, the commutators 7c and 7d will be able to be easily positioned with respect to the brushes 7a and 7b and further the power from the body will be able to be securely fed to such electronic circuit as of the preamplifier arranged within the rotary cylinder 5.

Therefore, in this embodiment, when the plate springs 19a and 19b are used as rotating power transmitting means, without using the member for positioning the relative positions of the commutators 7c and 7d and the brushes 7a and 7b and the member for transmitting the rotary cylinder 5 rotating power, the relative positions of the commutators 7c and 7d and the brushes 7a and 7b will be able to be positioned and the rotary cylinder 5 rotating power will be able to be easily transmitted. Also, when the rotary cylinder power feeding apparatus 7 is packaged, not only the assembling work will become easy but also the productivity will be able to be improved.

By the way, in the above explained embodiment, the engaging member 19 is provided in the disc member 18b and the plurality of grooves 8a are provided in the coupling 8. However, the plurality of grooves may be formed in the disc member 18b and the engaging member 19 may be provided in the coupling 8.

Also, the plurality of grooves engaging with the plate springs of the above mentioned coupling 8 may be radially provided so as to be easily meshed and engaged, for example, in assembling.

Fig. 7 shows an improved example of directly connecting the rotary cylinder power feeding apparatus 7 and such electronic circuit as of the preamplifier within the rotary cylinder 5 with each other without using the lead wires and connectors.

Figs. 7 and 8 show the third embodiment of a rotary cylinder power feeding apparatus according to the present invention. Fig. 7 is a perspective view showing the formation of the rotary cylinder power feeding apparatus. Fig. 8 is a sectioned view of a VTR main part fitted with the rotary cylinder power feeding apparatus. Fig. 9 is a comparative sectioned view for explaining the rotary cylindrical power feeding apparatus shown in Fig. 8 and showing an example of the rotary cylinder power feeding apparatus provided with a lead wire connecting system.

By the way, in Figs. 7 to 9, the same components as in the above mentioned embodiments shall bear the same reference numerals and shall not be explained and only the different parts shall be explained.

First, as shown in Fig. 9, the rotary cylinder power feeding apparatus 7 is usually fixed by means of screws 40 to an outsert molded stay 28 fixed to the main base 20 through an arm 15c. In order to feed a power to such electronic circuit (not illustrated) as of the preamplifier arranged within the rotary cylinder 5 through the rotary cylinder power feeding apparatus 7 from the power source apparatus (not illustrated) arranged on the body or so-called main substrate 30, it is necessary that the positive and negative pole lead

wires 29a and 29b connected respectively with the brushes 7a and 7b of the above mentioned rotary cylinder power feeding apparatus 7 should be connected with the main substrate 30 side by means of the main substrate connector 30b and the lead wires 13 connected with the commutators 7c and 7d of the above mentioned rotary cylinder power feeding apparatus 7 should be connected with the preamplifier substrate 26 side within the rotary cylinder 5 by means of the connector 21.

However, in such connecting method by using the lead wires 13, 29a and 29b and connectors 21 and 30b, as there are at least two connected parts, for example, by the connectors, the assembling work will be complicated and, in case the rotary cylinder 5 rotates, as it is connected by the lead wires, such secondary trouble that the lead wires will be contacted or entangled with the rotary cylinder or will be broken will be likely to occur.

Therefore, in order to eliminate such problem, this embodiment is characterized in that the components can be connected without using lead wires and the assembling work is made easy. An example of such rotary cylinder power feeding apparatus is shown in Fig. 7.

In the drawing, in order to make it unnecessary to use two lead wire connections as described above, the rotary cylinder power feeding apparatus 7 is improved in the connecting structures to the main substrate 30 and to the preamplifier substrate 26 (See Fig. 8) within the rotary cylinder 5. Therefore, first, the connecting

structure to the main substrate 30 shall be explained.

The arm 15 fixing the rotary cylinder power feeding apparatus 7 in a predetermined position is formed to be L-shaped and is extended at the lower end to be of a predetermined length so as to be engaged with a main substrate connector 30a arranged on the main substrate 30. Within the arm 15, a conductive member (not illustrated) connected from the brushes 7a and 7b of the above mentioned rotary cylinder power feeding apparatus 7 is laid. The positive pole conductive connecting terminal 15a and the negative pole conductive connecting terminal 15b corresponding respectively to the above mentioned brushes 7a and 7b are fitted to the base end of this conductive member, that is, to the base end of the above mentioned arm 15.

In the main base 20, there is provided a through hole for the above mentioned arm 15 to engage at the base end with the main substrate connector 30a as a power feeding terminal of the main substrate 30. An outsert molded guide 20a as an arm fitting member for guiding and holding the above mentioned arm 15 in a predetermined position is fitted to this through hole.

On the other hand, the connecting structure to the preamplifier substrate 26 (See Fig. 8) within the rotary cylinder 5 is provided on the lower surface of the negative pole commutator 7d of the rotary cylinder power feeding apparatus 7 with a connecting terminal 25 to be connected with this commutator 7d and is fitted with a shaft cap 22 which can be fitted and pivoted to the rotary shaft 51 of the rotary cylinder 5. This shaft cap

22 is provided at the lower end with a positive pole connecting terminal 24 to be connected with the commutator 7c. These connecting terminals 24 and 25 are extended by a predetermined length, for example, in the downward direction and are inserted through a flange cut hole 53 provided in the rotary cylinder 5 through a cut of a plate 23 secured to the lower surface of this shaft cap 22. The plate 23 is designed to be of a diameter size entering a hole 5d formed in the upper part of the rotary cylinder 5. As shown in Fig. 8, at the lower end of the above mentioned shaft cap 22 and in the plate 23, a concave hole 22a to be fitted and pivoted to the rotary shaft 51 of the rotary cylinder 5 is formed and, in order to positively lock the rotation, for example, of the rotary cylinder 5, a locking hole 22b is formed as connected to the above mentioned concave hole 22a. That is to say, in case the above mentioned shaft cap 22 is fitted to the rotary shaft 51 of the rotary cylinder 5, the above mentioned locking hole 22b will be fitted in the locking part 51a provided near the rotary shaft 51 of the rotary cylinder 5, that is, near the above mentioned rotary shaft 51 on the cylinder flange 52 and, when the rotary cylinder 5 rotates, the rotary shaft 51 and, plate 23 and shaft cap 22 will be able to be locked (to stop rotating).

As shown in Fig. 8, when the plate 23 secured to the lower end of the above mentioned rotary cylinder power feeding apparatus 7 is inserted into the hole 5d of the above mentioned rotary cylinder 5 and is mounted on the upper surface of the cylinder flange 52, the plate 23 and shaft cap 22 will be inserted and fixed in the

rotary shaft 51. In case the above mentioned plate 23 is fitted on the upper surface of this cylinder flange 52, the outer peripheral surface of the above mentioned plate 23 and the inner peripheral surface of the above mentioned rotary cylinder 5 will be in close contact with each other. In this case, the thrust will be received by the bottom surface of the above mentioned rotary cylinder 5 and the upper surface of the cylinder flange 52 and the radial force will be received, as described above, by the outer peripheral surface of the above mentioned plate 23 and the inner peripheral surface of the above mentioned rotary cylinder 5. Therefore, such fitting members as, for example, fitting screws for fixing the above mentioned plate 23 will be able to be made unnecessary.

On the preamplifier substrate 26 fitted within the rotary cylinder 5, a preamplifier land 27 in direct contact with the above mentioned connecting terminals 24 and 25 is provided in a predetermined position. In case the above mentioned rotary cylinder power feeding apparatus 7 is fitted, the connecting terminals 24 and 25 made integral with this rotary cylinder power feeding apparatus 7 will contact the above mentioned preamplifier land 27 and will be able to be electrically connected. The above mentioned preamplifier land 27 is connected with such electronic circuit as of the preamplifier not illustrated by a printed wiring on the preamplifier substrate 26.

Now, the method of fitting the rotary cylinder power feeding apparatus of such formation shall be explained in detail with reference to Fig. 7 and 8.

First of all, as shown in Fig. 7, the arm 15 of the rotary cylinder power feeding apparatus 7 is inserted along the outsert guide 20a provided on the main base 20 and the positive and negative pole connecting terminals 15a and 15b at the tip of the above mentioned arm 15 are connected respectively to the main substrate connector 30a provided on the main substrate 30.

On the other hand, simultaneously with the connecting working of the above mentioned arm 15, the connection is made to the rotary cylinder 5 which is a main part of this rotary cylinder power feeding apparatus 7. In this case, the positive and negative pole connecting terminals 24 and 25 projecting out of the end of the rotary cylinder power feeding apparatus 7 are inserted first from the diagonal direction into the cylinder cut hole 53 provided in the cylinder flange 52 within the rotary cylinder 5, are lowered toward the preamplifier substrate 26 fitted within the rotary cylinder 5 and are connected in contact with the preamplifier land 27 provided on the above mentioned preamplifier substrate 26 as shown in Fig. 8. Also, simultaneously with it, the plate 23 and shaft cap 22 of the rotary cylinder power feeding apparatus 7 are fitted to the rotary shaft 51 of the rotary cylinder 5 and the plate 23 is fixed on the upper surface of the cylinder flange 52 to complete the rotary cylinder power feeding apparatus fitting working.

By the way, when the above mentioned connecting terminals 24 and 25 are connected, the plate 23 of the rotary cylinder power feeding apparatus 7 will be in

close contact with the cylinder flange 52 of the rotary cylinder 5 and, when this plate and the shaft cap 22 are fitted to the rotary shaft 51 of the rotary cylinder 5, a predetermined contact pressure will be given and the contact will be able to be positively held.

Thereby, the power from the body will be fed, as shown in Fig. 8, to the main substrate connector 30a through the main substrate 30 from the power source apparatus (not illustrated) provided, for example, on the main substrate 30, then will be fed to the brushes 7a and 7b of the rotary cylinder power feeding apparatus 7 through the conductive member (not illustrated) within the arm 15 from the connecting terminals 15a and 15b of the arm 15 connected with this main substrate connector 30a, then will be fed to the connecting terminals 24 and 25 extended into the rotary cylinder 5 through the commutators 7c and 7d contacting these brushes 7a and 7b while rotating and will be able to be fed to such electronic circuit as of the preamplifier through the printed wiring (not illustrated) on the preamplifier substrate 26 from the preamplifier land 27 connected with these connecting terminals 24 and 25.

By the way, when such electronic circuit as of the preamplifier is driven by the power fed by the above mentioned rotary cylinder power feeding apparatus, at the time of the reproduction, the video signals detected from the magnetic heads 5a and 5b will be amplified and will be fed to the fixed cylinder 6 side, that is, to the signal processing circuit (not illustrated) provided on the main base 30 through the magnetically connected rotary

transformer 56.

Therefore, according to this embodiment, in case the power from the body is to be fed, for example, to such electronic circuit as of the preamplifier within the rotating rotary cylinder, the main base substrate provided with the power source apparatus will be able to be connected to the preamplifier substrate on which such electronic circuit as of the preamplifier within the rotary cylinder is arranged without using lead wires so that the rotary cylinder power feeding apparatus assembling work may be made easy. As no lead wire is used in the connecting structure, such secondary trouble that the lead wire contacts or is entangled with the rotary cylinder or is broken can be prevented.

Further, as the brushes, commutators, shaft cap, plate and connecting terminals are integrated to form the rotary cylinder power feeding apparatus, the fitting work is easy and the number of the parts can be reduced and therefore it is evident that the cost can be also reduced.

The rotary cylinder power feeding apparatus to which a countermeasure against noise is applied shall be explained in the following.

Figs. 10 to 15 are to explain the fourth embodiment of a rotary cylinder power feeding apparatus according to the present invention. Fig. 10 is a perspective view showing the formation of a commutator. Fig. 11 is a plan of a rotary cylinder power feeding apparatus using the commutator. Fig. 12 is a side view

of Fig. 11.

The commutator shown in Fig. 10 comprises two conductors 72a and 72b but, as different from Fig. 4, the connecting terminals at the lower ends of the conductors are omitted. These two conductors 72a and 72b are of forms obtained by dividing a cylindrical form into two parts. When assembled, these two conductors will be pasted on the outer peripheral surface of a commutator core 70 to be fitted into a rotary shaft 12. At this time, between the conductors 72a and 72b pasted around the commutator core 70, as shown in Fig. 11, two slits will be formed as joint parts. The center angle of the conductor 72a of the two conductors 72a and 72b arcuate in the cross-section is set to be an angle larger than the tape 40 winding angle (about 190 degrees) on the rotary cylinder 5. Here, the center angle of the conductor 72a is made about 270 degrees and the center angle of the conductor 72b is made about 90 degrees. The magnetic tape 40 is used as a tape-like recording medium to record and reproduce such information signal as a video signal.

As shown in Fig. 11, the magnetic tape 40 is wound on the rotary peripheral surface of the rotary cylinder 5 by using loading posts 41 and 42. Usually, the tape 40 is wound in a little excess of 180 degrees around the rotary cylinder 5. The angle connecting the two loading posts 41 and 42 and the center of the rotary shaft 12 is about 5 degrees larger on the respective loading post sides than the line of 180 degrees to be about 190 degrees. As shown in Fig. 12, the conductive

brushes 7a and 7b are fixed to the supporting arm 15 and the commutators 7c and 7d fitted to the rotary shaft 12 rotate together with the rotary cylinder 5 and slide with the brushes 7a and 7b. A power is to be fed to the brushes 7a and 7b through the lead wires 29a and 29b from the power source apparatus arranged on the main substrate not illustrated. The commutators 7c and 7d are connected with a relay lead 21a through the lead wires 13 and connector 21. The relay lead 21a is connected with such electronic circuit as of the preamplifier of the preamplifier substrate 26. Therefore, the power source apparatus not illustrated is electrically connected to the electronic circuit within the rotary cylinder 5 through the brushes 7a and 7b.

In such formation, as the commutators 7c and 7d comprise respectively two conductors 72a and 72b, slits as joint parts will be made between the conductors 72a and 72b and between the conductors 72b and 72a, when these slit parts contact the brushes 7a and 7b, the contact resistance will become unstable and an electric noise will be generated. The generated electric noise will be transmitted to an electronic circuit noise removing device mounted on the preamplifier substrate 26 through the lead wires 13, connector 21 and relay lead 21a, will generate electromagnetic waves around the noise removing device and will plunge into the nearby magnetic head 5a. However, in this embodiment, as shown in Figs. 13 and 14, when the slit part of the commutator contacts the brushes 7a and 7b (when an electric noise is generated), the head 5a likely to be influenced by the

electric noise will not contact the tape 40 having recorded an information signal and will not detect the signal and therefore the head 5a will not be influenced by the electric noise. At this time, the head 5b hard to be influenced by the electric noise and on the side opposed by 180 degrees to the head 5a will be in contact with the tape 40 to detect the signal. As a result, no noise will be mixed in the signal obtained by synthesizing the respective signals detected by the heads 5a and 5b.

Figs. 13 and 14 are plans showing the rotary cylinder power feeding apparatus when the brushes 7a and 7b contact the slit part of the commutator and an electric noise is generated depending on the rotating position of the rotary cylinder 5. Fig. 13 shows that the rotary cylinder 5 rotates and the slit part between the conductors 72a and 72b forming the commutator is in contact with the conductive brushes 7a and 7b. At this time, the head 5a will be in no contact with the tape 40 and will not detect the signal but the other head 5b hard to be influenced by the electric noise will be in contact with the head 5b and will detect the signal. Therefore, the electric noise generated at this time will not influence the signal detection of the heads 5a and 5b. When further rotated from this state, such electric noise as is shown in Fig. 14 will be generated by way of the contact state (See Fig. 11) of the conductor 72a larger in the center angle with the brushes 7a and 7b. Fig. 14 shows that the rotary cylinder 5 rotates from the state in Fig. 13 and the other slit part between the conductors

72b and 72a forming the commutator is in contact with the conductive brushes 7a and 7b. At this time, too, the head 5a will be in no contact with the tape 40 and will not detect the signal but the other head 5b hard to be influenced by the electric noise will be in contact with the tape 40 and will detect the signal. Therefore, the electric noise generated at this time will not influence the signal detection of the heads 5a and 5b.

Fig. 15 shows a phase relation diagram of the head detected signal, synthesized signal and electric noise generating position in the apparatus shown in Figs. 11 to 14. In Fig. 15, (a) is of a head 5a detected signal, (b) is of a head 5b detected signal, (c) is of a synthesized signal of the detected signal of (a) and the detected signal of (b) obtained by switching the heads and (d) is of an electric noise generated by the slit part of the commutator comprising the conductors 72a and 72b.

As the two slits of the commutator exist in a position which has passed a rotation angle of 270 degrees from the first slit and in a position which has further passed 90 degrees from that position, the electric noise shown in Fig. 15 (d) will be generated whenever the rotary cylinder 5 rotates by 270 and 360 degrees from the first slit position. This is a position in which the head 5a has rotated by 225 degrees (shown in Fig. 14) and 315 degrees (shown in Fig. 13) from the time point A at which the head 5a contacts the tape 40. In this position, the head 5a will be in a phase relation in which the head 5a will not contact the tape 40 (that is, will not detect the signal).

On the contrary, in the phase relation in which the head 5a will contact the tape 40 (that is, will detect the signal), no electric noise will be generated and, as shown in Fig. 15 (a), no noise will be generated in the detected signal of the head 5a. Also, as the head 5b is on the side opposed by 180 degrees to the lead wires 13, connector 21 and relay lead 21a, as shown in Fig. 15(b), no noise will be generated in the detected signal of the head 5b. Therefore, as shown in Fig. 15c, no noise will be generated in the head synthesized signal obtained by switching the heads 5a and 5b.

As in the above, as the center angle of one of the conductors of the commutator combining a plurality of conductors is formed to be larger than the tape winding angle and the position of the slit part between the conductors, the connecting positions of the lead wires connected from the conductive brushes and commutators to the electronic circuit of the rotary cylinder and the position of the magnetic head are so arranged as not to influence the head synthesized signal used finally as an output, when the brushes 7a and 7b contact the slits existing on the commutators 7c and 7d, electromagnetic waves will be generated around the lines electrically connected from the commutators 7c and 7d to the electronic circuits mounted on the preamplifier substrate 26 and, even if the electromagnetic waves plunge into the head 5a nearby these lines, as the rotation phase of the head 5a is not detecting the signal of the tape 40 then, no noise will be generated in the head synthesized signal obtained as a result. Therefore, even if the commutator

is formed of a plurality of conductors, the noise will be able to be prevented from being overlapped on the head synthesized signal by the contact resistance.

As described above, according to the present invention, the commutator assembling work in the rotary cylinder power feeding apparatus can be made easy and the commutator can be positioned with respect to the rotary cylinder shaft and brushes with a simple formation. Further, without increasing the number of parts, such electronic circuit as of the preamplifier can be connected and the rotating operation can be transmitted by the rotary cylinder, without losing the reliability, the productivity can be improved and, at the same time, the power can be securely fed to such electronic circuit as of the above mentioned preamplifier. Further, a signal noise caused by the contact noise of the conductive brushes and the commutator formed of a plurality of conductors can be prevented from being generated.

By the way, in the above described embodiments, the magnetic recording and reproducing apparatus wherein two magnetic heads are arranged as opposed to each other on the rotary surface of the rotary cylinder 5 has been explained. However, the present invention is not limited to this but can be applied to a magnetic recording and reproducing apparatus provided with one or more magnetic heads.

By the way, in the above described embodiments, the VTR has been explained as a magnetic recording and reproducing apparatus. However, the present invention is

not limited to this but can be applied also to such apparatus for recording and reproducing information signals by means of a rotary cylinder as, for example, a digital audio tape recorder (DAT).

By the way, the present invention is not limited to only the above described embodiments but can be variously modified without deviating from the subject matter of the invention.



What is claimed is:

1. A rotary cylinder power feeding apparatus for feeding a power from an outside power source apparatus to an electronic circuit of a rotary cylinder, characterized by comprising:

a rotary cylinder(5) provided with a magnetic head (5a) and an electronic circuit to be connected to this magnetic head (5a);

a columnar rotor (70) rotating integrally with this rotary cylinder (5);

conductive members (7c, 7d) each comprising a plurality of conductors (71) arranged as divided in the peripheral direction on the outer peripheral surface of this rotor (70) and electrically connected to said electronic circuit; and

conductive brushes (7a, 7b) fitted to contact these conductive members (7c, 7d) and feeding a power to said electronic circuit through said conductive members (7c, 7d);

2. A rotary cylinder power feeding apparatus for feeding a power from an outside power source apparatus to an electronic circuit of a rotary cylinder, characterized by comprising:

a rotary cylinder (5) provided with a magnetic head (5a) and an electronic circuit to be connected to this magnetic head (5a);

a rotary driving member (8) rotating integrally



with this rotary cylinder (5);

a columnar rotor (70) supported by a supporting member (15) coaxially with said rotary driving member (8), independently of said rotary driving member (8) and rotatably;

conductive members (7c, 7d) provided on the outer peripheral surface of said rotor (70) and electrically connected to said electronic circuit;

conductive brushes (7a, 7b) provided on said supporting member (15), contacting said conductive members (7c, 7d) and feeding a power to said electronic circuit; and

a rotation transmitting means provided between said rotary driving member (8) and said rotor (70) and transmitting the rotation of said rotating driving member (8) to said rotor (70).

3. A rotary cylinder power feeding apparatus according to claim 2 characterized in that:

said rotary driving member (8) is formed to rotatably support the rotary shaft (12) of said columnar rotor (70) at one end and

said rotation transmitting means is formed of resilient pieces (19a, 19b) provided on either of said rotating driving member (8) and said rotor (70) and a plurality of grooves (8a) formed radially from the shaft at regular intervals so as to engage with said resilient pieces (19a, 19b) provided on the other.

4. A rotary cylinder power feeding apparatus for feeding a power from an outside power source apparatus to an electronic circuit of a rotary cylinder,



characterized by comprising:

a rotary cylinder (5) provided with a magnetic head (5a) and an electronic circuit to be connected to this magnetic head and rotated and driven as rotatably provided for a fixed cylinder (6) fixed to the chassis (20);

a supporting member (15) removably fitted at one end to a fitting member (20a) provided in said chassis (20) and supporting at the other end the rotor (70) so as to rotate integrally with said rotary cylinder (5);

conductive members (7c, 7d) provided on the outer peripheral surface of said rotor (70) and electrically connected with said electronic circuit when said supporting member (15) is fitted to said chassis (20);

conductive connecting terminals (15a, 15b) arranged at one end of said supporting member (15) and electrically connected with a power feeding terminal (30a) provided opposite said chassis (20) when said supporting member (15) is fitted to said chassis (20); and

conductive brushes (7a, 7b) arranged at the other end of said supporting member (15), contacting said conductive members (7c, 7d) and feeding the power to said electronic circuit as electrically connected with said conductive connecting terminals (15a, 15b).

5. A rotary cylinder power feeding apparatus for feeding a power from an outside power apparatus to an electronic apparatus of a rotary cylinder, characterized by comprising:

a rotary cylinder (5) provided with a magnetic head (5a) and an electronic circuit to be connected to



this magnetic head (5a);

a tape-like recording medium (40) running as wound on this rotary cylinder (5) and having information signals recorded and reproduced by said magnetic head (5a);

a columnar rotor (70) rotating integrally with said rotary cylinder(5);

conductive members (7c, 7d) each comprising a plurality of conductors (72a, 72b) arranged as divided in the peripheral direction on the outer peripheral surface of this rotor (70) and electrically connected to said electronic circuit;

connecting means (21, 21a) electrically connecting these conductive members (7c, 7d) and said electronic circuit with each other; and

conductive brushes (7a, 7b) fitted to contact said conductive members (7c, 7d) and feeding a power to said electronic circuit through said conductive members (7c, 7d),

and characterized in that:

the center angle of one conductor (72a) of the plurality of the conductors (72a, 72b) divided in the peripheral direction and forming said conductive members (7c, 7d) is formed to be larger than the tape winding angle when said tape-like recording medium (40) is wound on the rotary cylinder (5) ;

said connecting means (21, 21a) is arranged near said magnetic head (5a); and,

in a rotating position in which said magnetic head (5a) does not detect a signal from said tape-like recording medium (40), said plurality of conductors



(72a, 72b) are arranged on the outer peripheral surface of said columnar rotor (70) so that the joint part between the plurality of conductors (72a, 72b) forming said conductive members (7c, 7d) may contact said conductive brushes (7a, 7b).

6. A rotary cylinder power feeding apparatus characterized by comprising:

a rotary cylinder (5) provided with two magnetic heads (5a, 5b) arranged as opposed to each other on the rotary peripheral surface and an electronic circuit to be connected to these magnetic heads (5a, 5b);

a tape-like recording medium (40) running as wound on this rotary cylinder (5) and having information signals recorded or reproduced alternately by said two magnetic heads (5a, 5b);

a columnar rotor (70) rotating integrally with said rotary cylinder (5);

conductive members (7c, 7d) comprising a plurality of conductors (72a, 72b) arranged as divided in the peripheral direction on the outer peripheral surface of this rotor (70) and electrically connected to said electronic circuit;

connecting means (21, 21a) electrically connecting said electronic circuit with this conductive members (7c, 7d); and

conductive brushes (7a, 7b) fitted to contact said conductive members (7c, 7d) and feeding a power to said electronic circuit through said conductive members (7c, 7d),

and characterized in that:



the center angle of one conductor (72a) of the plurality of conductors (72a, 72b) forming said conductive members (7c, 7d) and divided in the peripheral direction is formed to be larger than the tape winding angle when said tape-like recording medium (40) is wound on the rotary cylinder (5);

said connecting means (21, 21a) is arranged near the first magnetic head (5a) of said two magnetic heads (5a, 5b); and

in a rotating position in which said first magnetic head (5a) does not detect a signal from said tape-like recording medium (40), said plurality of conductors (72a, 72b) are arranged on the outer peripheral surface of said columnar rotor (70) so that the joint part between the plurality of conductors (72a, 72b) forming said conductive members (7c, 7d) may contact said conductive brushes (7a, 7b).

ABSTRACTROTARY CYLINDER POWER FEEDING APPARATUS

The conductive member arranged on the outer peripheral surface of the columnar rotor rotating integrally with the rotary cylinder is separated into a plurality of conductive members so that the conductive member assembling work may be easy. Also, the rotation transmitting member fitted between the columnar rotor forming the rotary shaft of the above mentioned conductive member and the rotary driving member and the rotary shaft of the rotary cylinder are engaged with each other so that the rotary cylinder rotating operation may be securely transmitted to the columnar rotor. Further, as the rotor rotating integrally with the rotary cylinder is rotatably fitted to the supporting member, the conductive member is arranged on the outer peripheral surface of this rotor, the conductive connecting terminal connectable with the power generating part is arranged at one end of the supporting member and the conductive brush for feeding the voltage from the power source generating part to the electronic circuit through the above mentioned conductive member is arranged at the other end of the supporting member, by only fitting the supporting member to the chassis without using such means as lead wires and soldering, the power source voltage from the power generating part will be able to be fed to the electronic circuit within the rotary cylinder and the power feeding apparatus will be able to be very

easily fitted to the rotary cylinder.

Further, the center angle of one conductor of the plurality of conductors forming the conductive members is formed to be larger than the tape winding angle to the rotary cylinder, such connecting means as the lead wires and connectors are arranged near the magnetic heads and, in the rotating position wherein the magnetic head detects signals from the tape-like recording medium, the above mentioned plurality of conductors are arranged on the outer peripheral surface of the above mentioned columnar rotor so that the joint part between the above mentioned plurality of conductors may not contact the above mentioned conductive brush, the electric noise generated when the joint part between the conductors contacts the conductive brush may not influence the recorded and reproduced signals and the recording and reproducing quality in the recording and reproducing apparatus may be improved.

FIG. 1

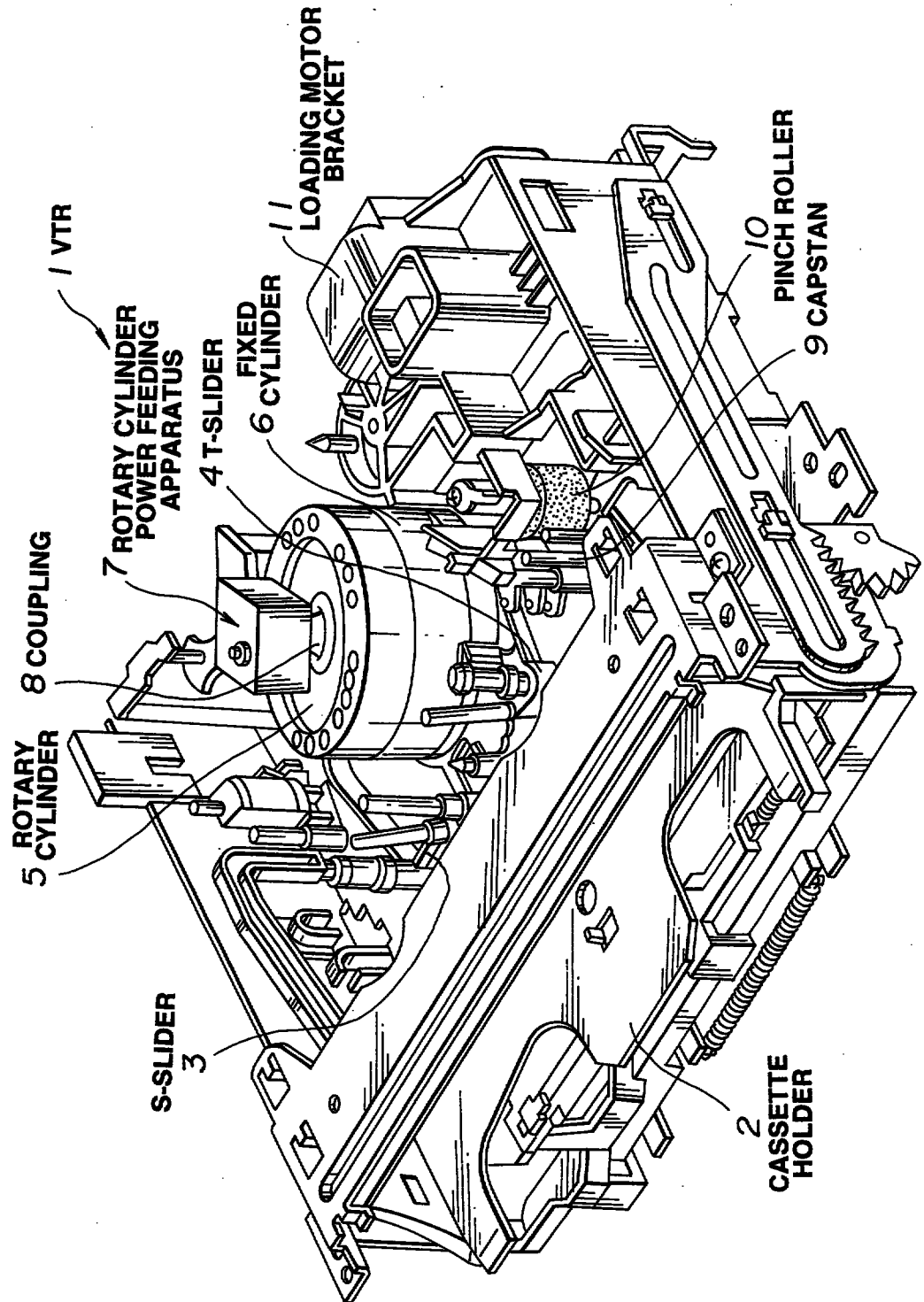


FIG.2

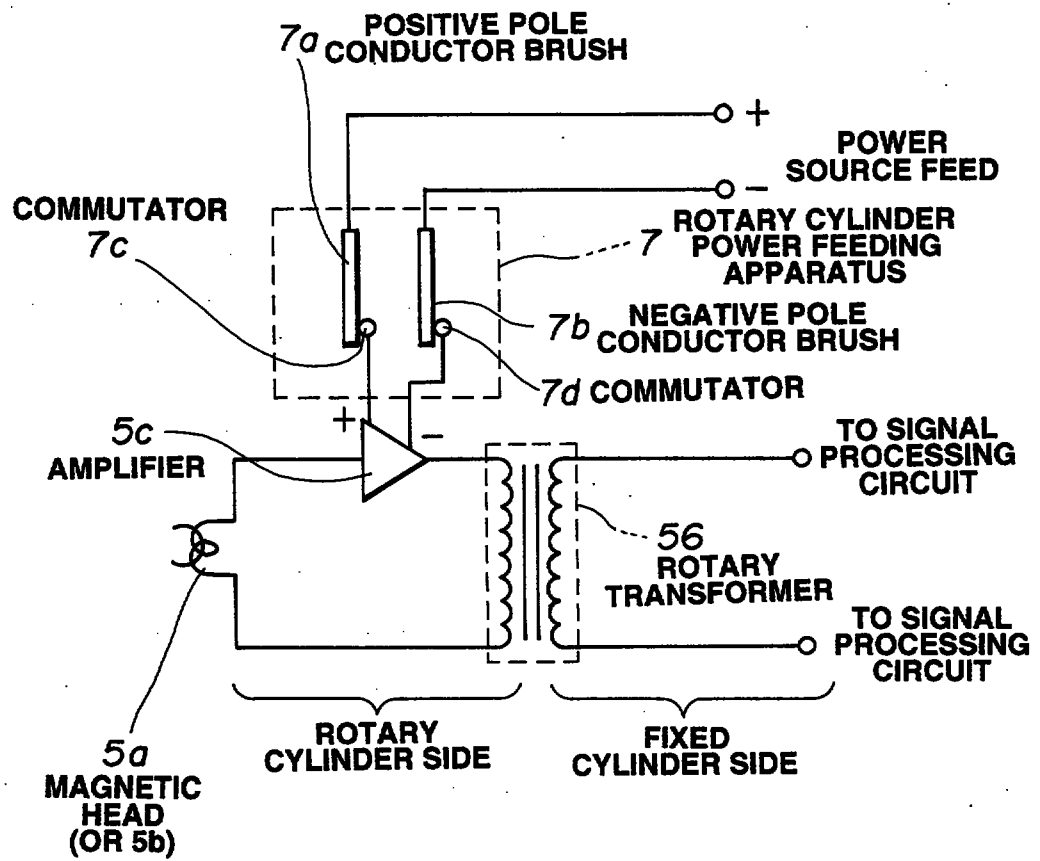


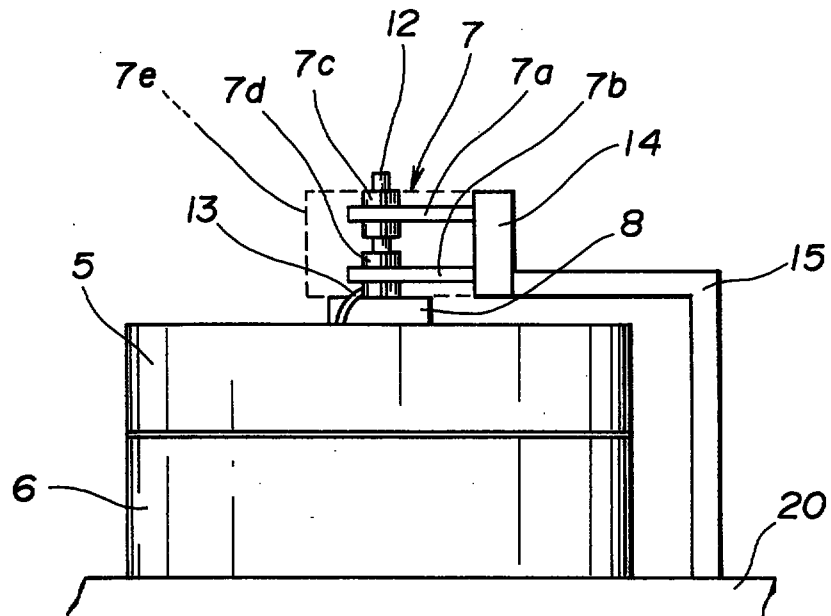
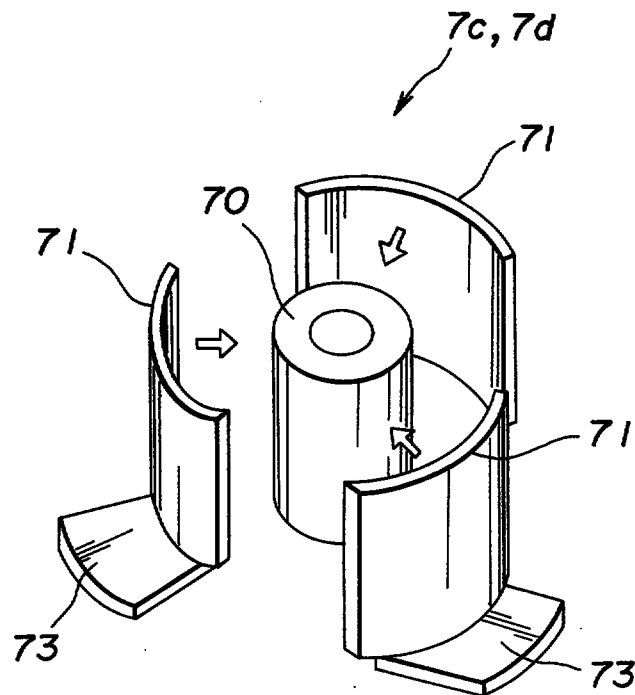
FIG.3**FIG.4**

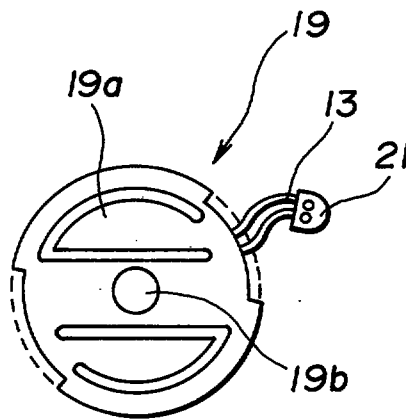
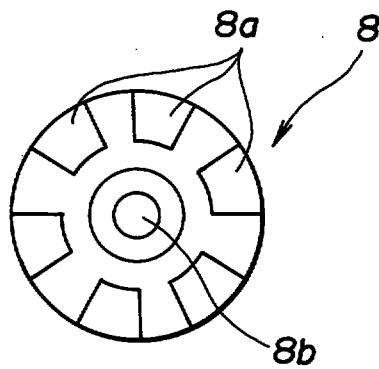
FIG.6(a)**FIG.6(b)**

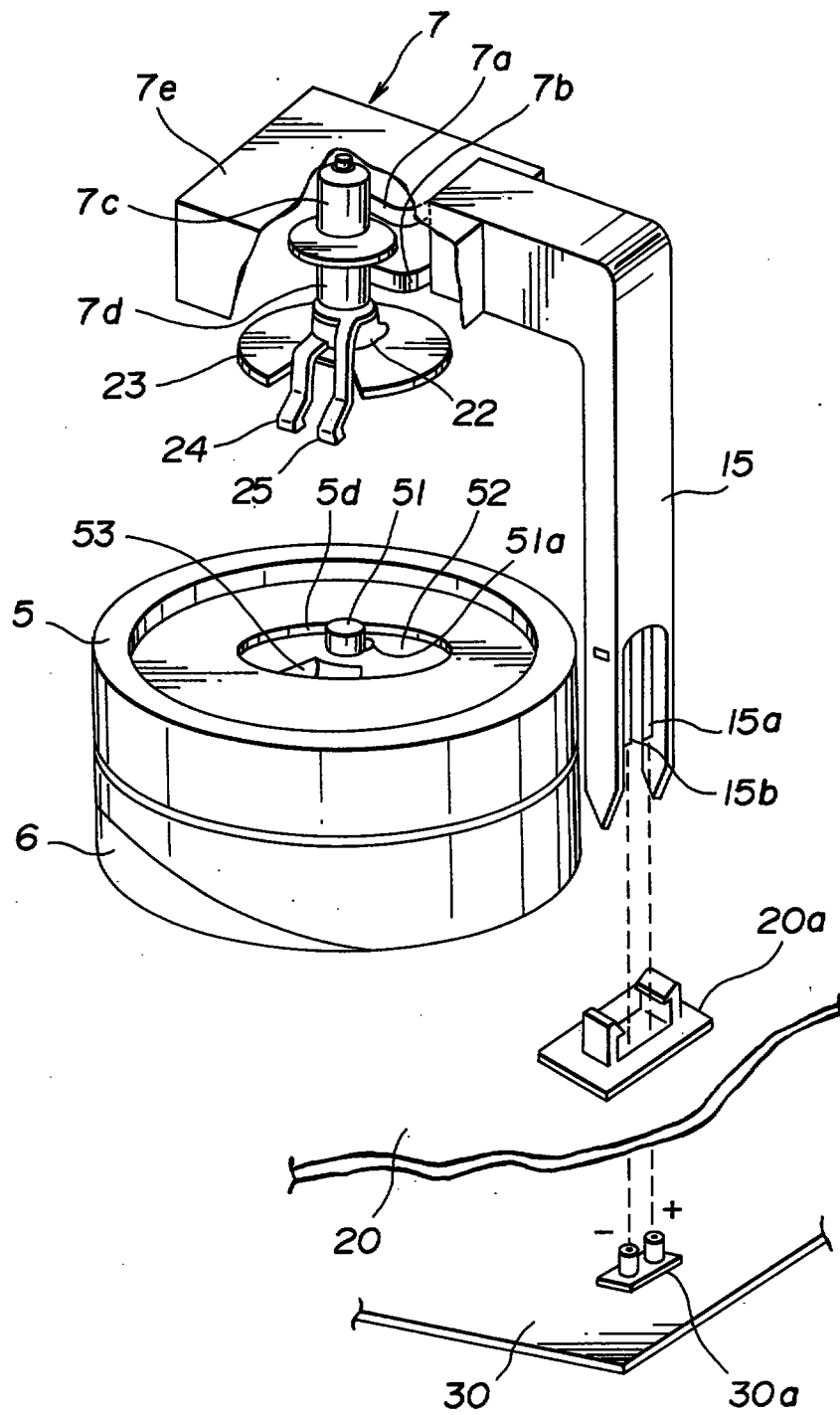
FIG.7

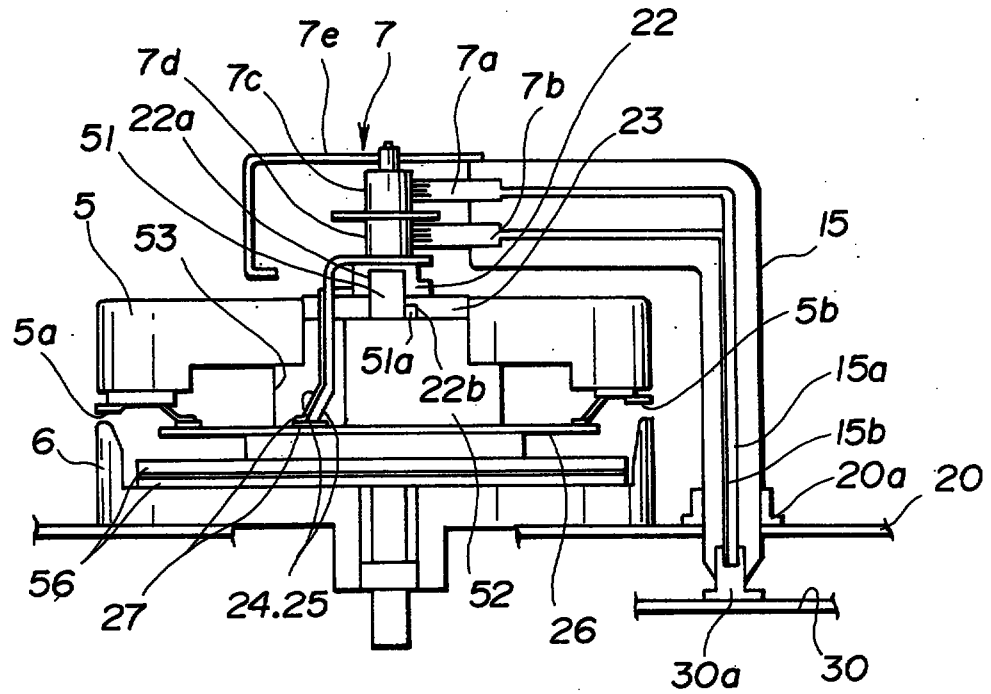
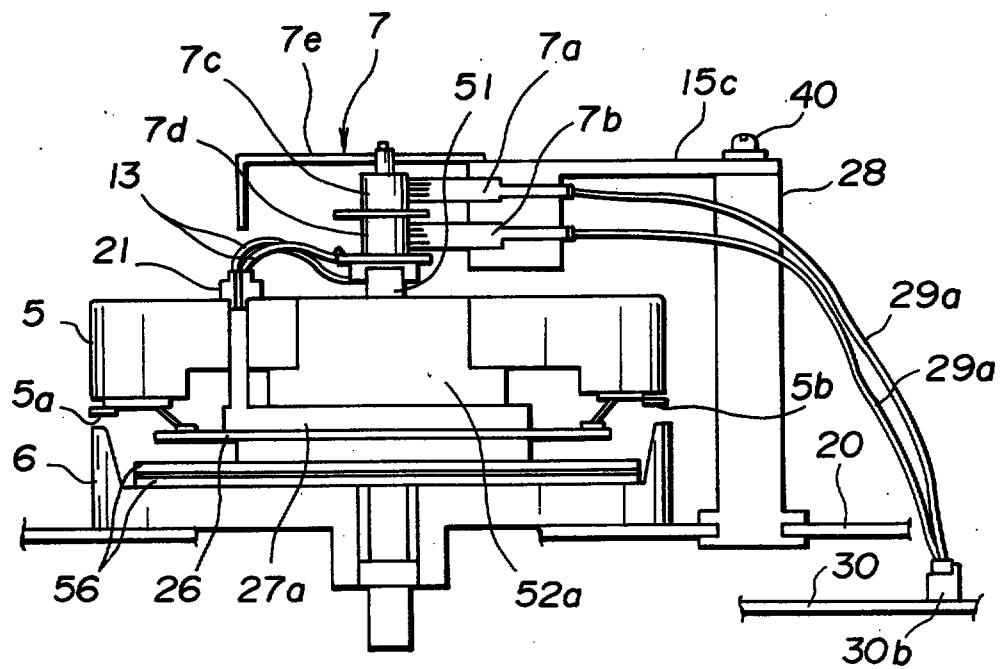
FIG.8**FIG.9**

FIG.10

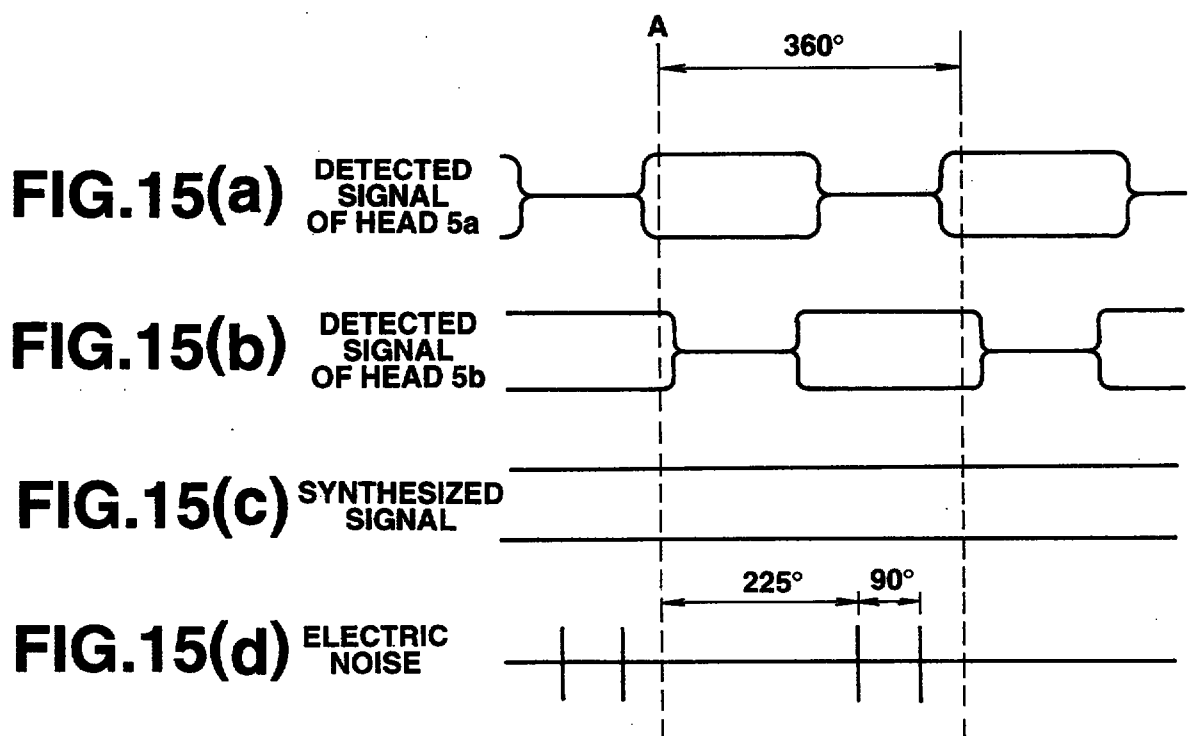
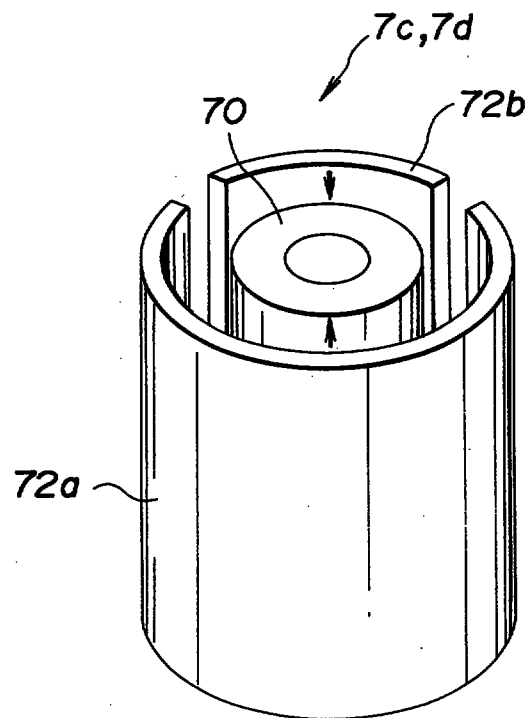


FIG.1 1

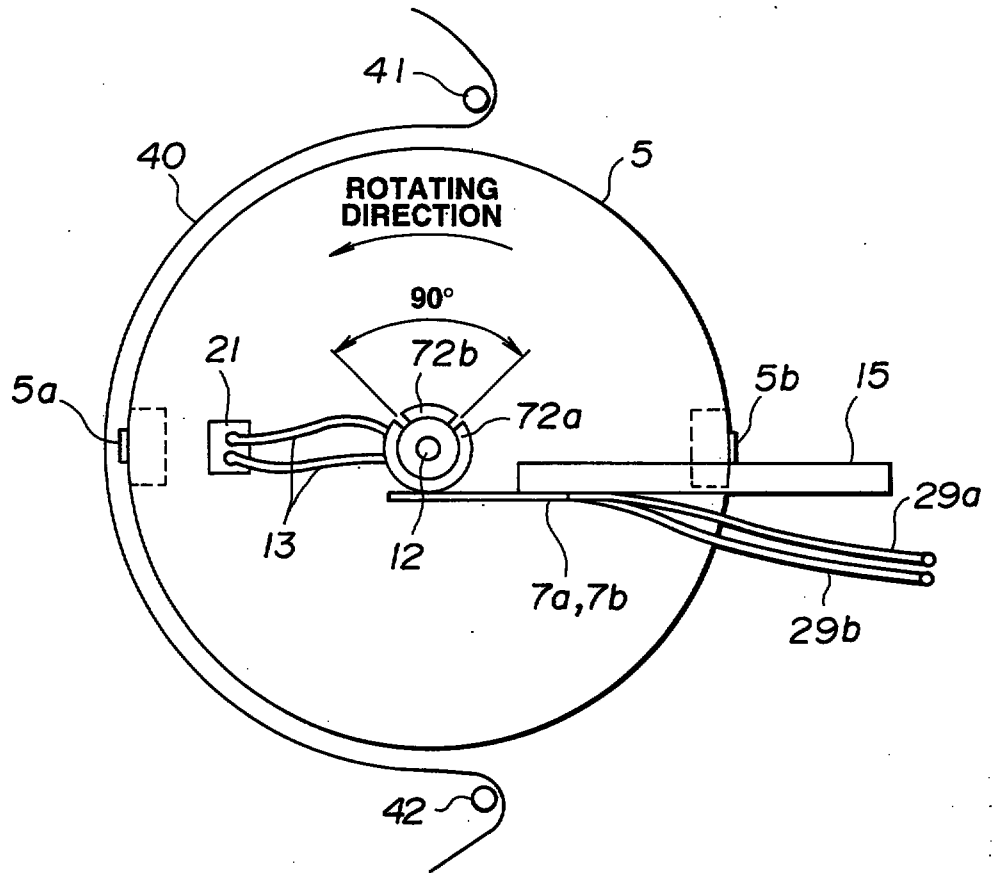


FIG.12

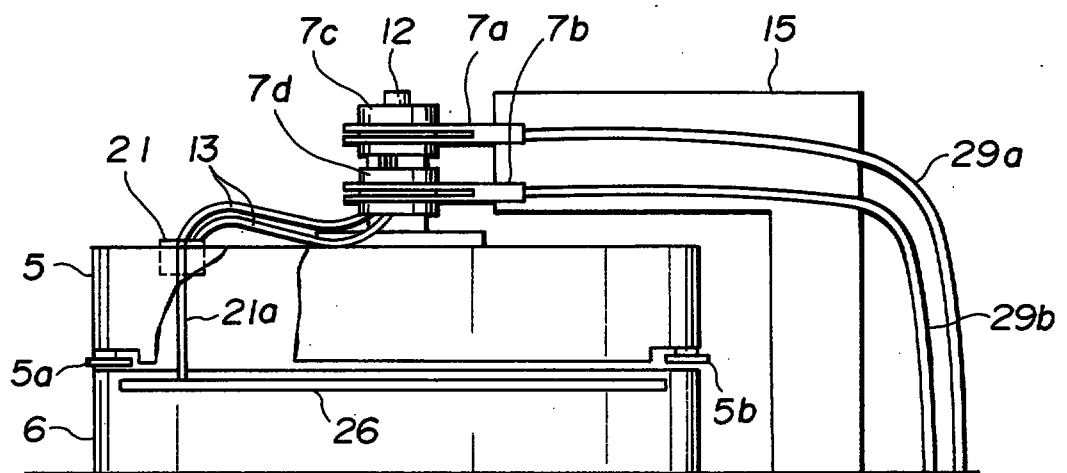
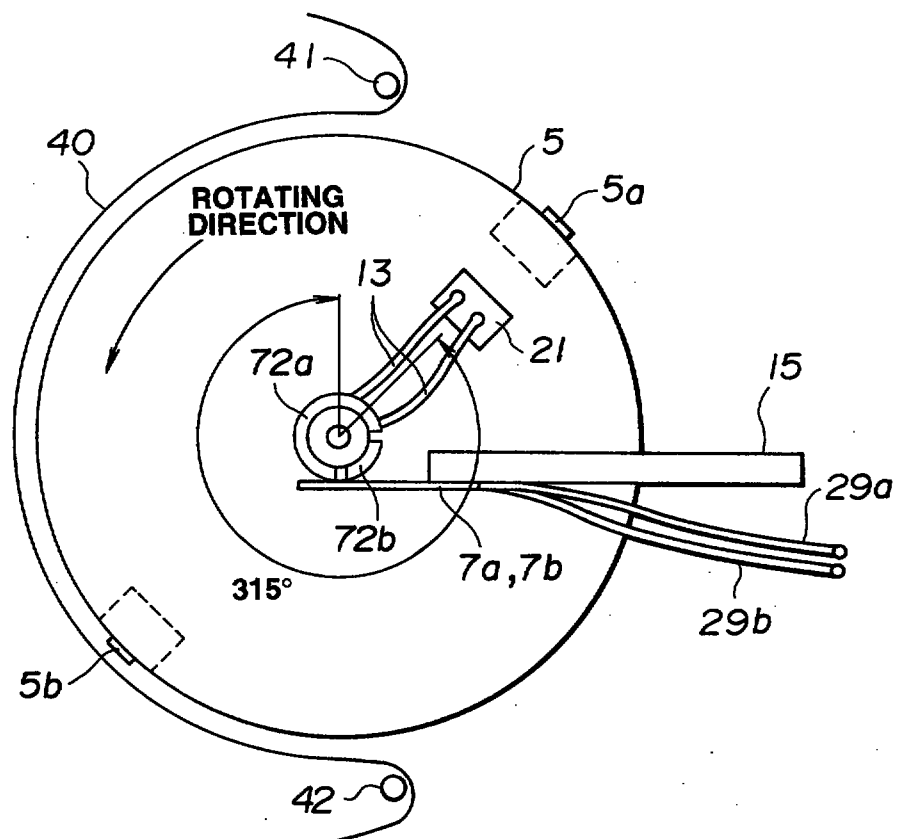
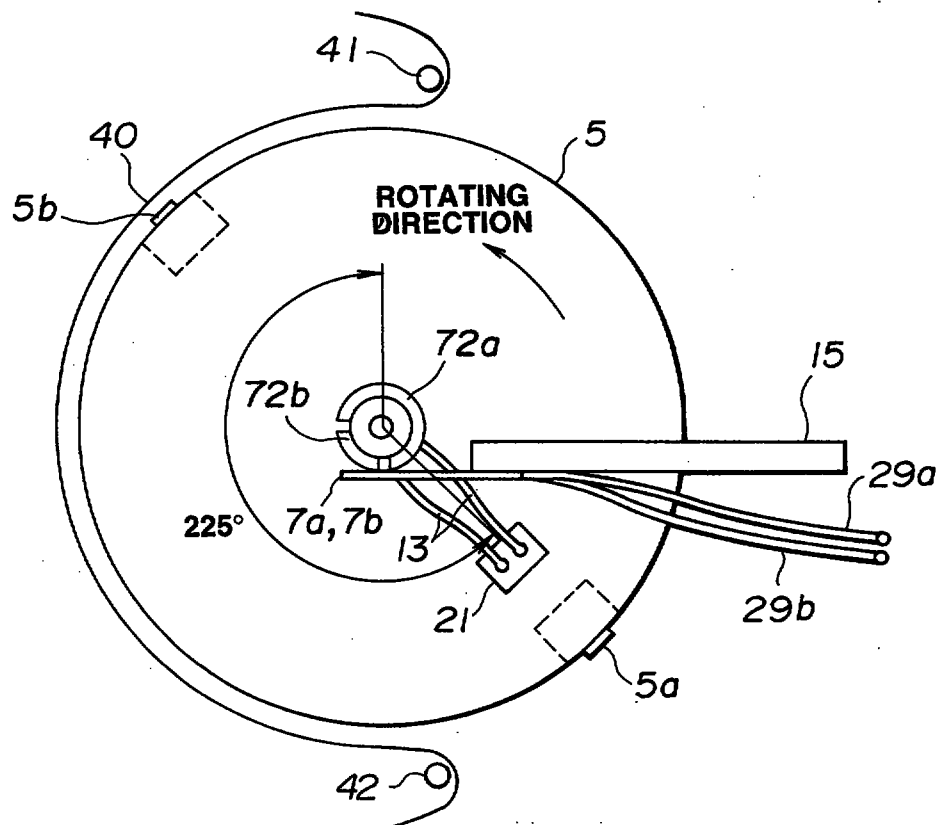


FIG.13**FIG.14**

0-881860*