

SELF-LUBRICATING TOOL MAGAZINE REVERSING DEVICE AND DISC TYPE TOOL MAGAZINE

TECHNICAL FIELD

[0001] The present invention relates to the field of disc type tool magazine technology, in particular to a self-lubricating tool magazine reversing device and a disc type tool magazine.

BACKGROUND

[0002] Tool magazine system is a device that meets the needs of tool storage and tool change required in the automatic machining process. Tool change is carried out through computer program control to meet different machining needs, thereby greatly shortening the machining time. It generally includes disc type, bamboo hat type, chain type tool magazines, etc. FIG. 1 illustrates the structure of the disc type tool magazine, comprising a plurality of pockets 3 evenly arranged along the circumference of the disc 1, each of the pockets 3 equipped with a corresponding tool. The disc 1 is rotated for tool selection, and the pocket 3 is pushed the downwards by a tool reversing cylinder unit, so that the pocket 3 is turned down and the tool change operation is carried out to perform tool reversing operation. After the tool change is completed, the pocket 3 is pulled back and upturned and reset by the tool reversing cylinder unit to collect the tool.

[0003] As shown in FIG. 2, during the tool reversing process, when the corresponding pocket 3 rotates to the reversing position, the roller 3a at the end of the pocket 3 will be clamped with the tool reversing jaw 4. At this time, the reversing cylinder 2 takes in the gas and pushes the roller 3a to drive the pocket 3 to turn down to complete the tool reversing operation. Due to the long-term tool changing action, the position of the roller 3a and the tool reversing jaw 4 will produce mechanical friction, which inevitably causes corrosion and jamming. It is necessary for the operator to regularly apply lubricating grease to the tool reversing jaw and roller to ensure lubrication. However, the roller and the tool reversing jaw are disposed inside the housing of the tool magazine, making it difficult for the staff to apply the grease and ensure the quality of the application.

[0004] The information disclosed in this background section is only intended to deepen the understanding of the overall background of the present invention, and should not be regarded as an acknowledgment or any form of suggestion that the information constitutes the prior art known to those skilled in the art.

SUMMARY

[0005] The technical problem to be solved by the present invention is to provide a self-lubricating tool magazine reversing device and a disc type tool magazine, which realizes self-lubrication of the pocket during the tool reversing process.

[0006] To this end, the present invention provides self-lubricating tool magazine reversing device, comprising: a tool reversing cylinder and a tool reversing jaw, the tool reversing jaw being formed with an opening adapted to a roller provided at the end a pocket, and the tool reversing cylinder driving the tool reversing jaw to move reciprocally to drive the pocket to flip and reset;

[0007] wherein the top of the tool reversing jaw is hollow to form a cavity, the cavity being sealed and located on one side of the opening for receiving grease, wherein a communication groove and an abutting groove are provided between the cavity and the opening, the communication groove connecting the cavity and the side wall of the abutting groove and formed with a feeding end through which the grease enters the communication groove and a discharging end, the abutting groove being provided with a piston therein, wherein the piston remains stationary when the roller provided at the end of the pocket rotates into the opening and protrudes from the inner wall surface of the opening to block the discharging end, wherein the piston moves into the abutting groove by the reaction force of the roller during the downward movement of the tool reversing jaw driven by the tool reversing cylinder to press the roller, and releases the blocking of the discharging end after moving to a set distance, and wherein the piston is reset along with the reset of the tool reversing jaw and re-blocks the discharging end in the latter part of the resetting process.

[0008] Further, the end of the piston located in the cavity is connected to a pressure plate abutting against the side wall of the cavity to provide a sealing effect, wherein when the piston moves toward the side where the opening is located, the pressure plate exerts force on the gas in the cavity to generate pressure, extruding the lubricating grease in the cavity into the communication groove from the feeding end and into the opening from the discharging end.

[0009] Further, one end of the cavity away from the opening is provided with an end cover and a reset spring, with a reset space formed between the end cover, the pressure plate and the inner wall of the cavity, in which space the reset spring is positioned in such a manner that both ends thereof are in contact with the end cover and the pressure plate respectively.

[0010] Further, the piston is formed with an arc-shaped surface on one side toward the opening,

the middle of the arc-shaped surface is convex toward the opening by a height greater than the distance between the discharging end and the opening.

[0011] Further, a gas guide check valve is provided on the side wall of the cavity, wherein the gas outlet of the gas guide check valve is provided towards the inside of the cavity at an installation height higher than the grease level in the cavity.

[0012] Further, a feed pipe is connected to the side wall of the cavity close to the communication groove, with a feed guide check valve provided at the connection between the feed pipe and the cavity, wherein the feed pipe is in communication with a reservoir from which the grease enters the cavity in one way through the feed pipe under the control of the feed guide check valve.

[0013] Further, the communication groove comprises a main channel provided in parallel to the abutting groove, and an auxiliary channel in communication with the main channel and having an obtuse angle with the main channel.

[0014] Further, at least two communication grooves are provided.

[0015] Further, a reciprocating mechanism is provided between the tool reversing jaw and the tool reversing cylinder, wherein the reciprocating mechanism comprises a guide rod, a first support block and a second support block, wherein the tool reversing cylinder is fixed on the first support block and the output end thereof passes through the second support block to connect to the end of the tool reversing jaw, wherein the guide rod connects the first support block and the second support block, and the axis of the guide rod is parallel to the straight line where the extension and contraction direction of the tool reversing cylinder is located.

[0016] The present invention further provides a disc type tool magazine comprising the self-lubricating tool magazine reversing device described above.

[0017] The advantages of the present invention are described below. The present invention provides a cavity for receiving grease on the tool reversing jaw. As the tool reversing cylinder drives the tool reversing jaw to move downward to press the roller, the piston performs relative movement in the abutting groove to open the discharging end of the communication groove, so that the grease can enter the opening from the discharging end and is coated between the roller and the tool reversing jaw, thereby realizing the self-lubrication of the pocket in the tool reversing process, eliminating the need for manual coating operation, and ensuring the coating effect of grease.

BRIEF DESCRIPTION OF DRAWINGS

[0018] In order to more clearly illustrate the embodiments of the present invention or the

technical solutions in the prior art, the accompanying drawings to be used in the description of the embodiments or prior art will be briefly described below. It is obvious that the accompanying drawings in the following description are only some of the embodiments recorded in the present invention, and other accompanying drawings can be obtained according to these accompanying drawings without creative work for those of ordinary skill in the art.

[0019] FIG. 1 is a schematic structural diagram of the disc type tool magazine described in the background part;

[0020] FIG. 2 is a schematic diagram of the position of the tool reversing jaw and the pocket described in the background part;

[0021] FIG. 3 is a schematic structural diagram of the self-lubricating tool magazine reversing device according to an embodiment of the present invention;

[0022] FIG. 4 is a schematic structural diagram of the tool reversing jaw according to an embodiment of the present invention;

[0023] FIG. 5 is a front view of the tool reversing jaw according to an embodiment of the present invention;

[0024] FIG. 6 is a cross-sectional view at A-A in FIG. 5;

[0025] FIG. 7 is a side view of the tool reversing jaw according to an embodiment of the present invention;

[0026] FIG. 8 is a sectional view at B-B in FIG. 7;

[0027] FIG. 9 is a cross-sectional view at C-C in FIG. 7;

[0028] FIG. 10 is a partially enlarged view at A in FIG. 7;

[0029] FIG. 11 is a schematic diagram of the connection relationship between the cavity and the reservoir according to an embodiment of the present invention; and

[0030] FIGS. 12-15 are schematic diagrams of the working process of the self-lubricating tool magazine reversing device according to an embodiment of the present invention.

[0031] Reference signs: 1. Disc; 2. Tool reversing cylinder; 3. Pocket; 3a. Roller; 4. Tool reversing jaw; 4a. Opening; 01. Cavity; 02. Grease; 03. Communication groove; 03a. Feeding end; 03b. Discharging end; 04. abutting groove; 05. Piston; 05a. Arc-shaped surface; 06. Pressure plate; 07. End cover; 08. Reset spring; 09. Reset space; 10. gas guide check valve; 11. Feed pipe; 12. feed guide check valve; 13. Reservoir; 14. Guide rod; 15. First support block; 16. Second support block.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0032] The technical solutions in the embodiments of the present invention will be described clearly and completely in conjunction with the accompanying drawings in the embodiments of the present invention. Obviously, the described embodiments are only a portion of the embodiments of the present invention, rather than all the embodiments.

[0033] It should be noted that when an element is referred to as being "fixed to" another element, it can be directly on the another element or an intermediate element may also be present. It should be noted that when an element is referred to as being "connected to" another element, it can be directly on the another element or an intermediate element may also be present. The terms "vertical", "horizontal", "left", "right" and similar expressions used herein are for illustrative purposes only and do not mean that they are the only mode of implementation.

[0034] Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by those skilled in the art of the present invention. The terms used herein are for the purpose of describing specific embodiments only and are not intended to limit the invention. The term "and/or" as used herein includes any and all combinations of one or more of the related listed items.

[0035] FIGS. 3-15 illustrate a self-lubricating tool magazine reversing device comprising a tool reversing cylinder 2 and a tool reversing jaw 4. The tool reversing jaw 4 is formed with an opening 4a adapted to a roller 3a provided at the end a pocket 3, and the tool reversing cylinder 2 drives the tool reversing jaw 4 to move reciprocally to drive the pocket 3 to flip and reset.

[0036] The top of the tool reversing jaw 4 is hollow to form a cavity 01. The cavity 01 is sealed and located on one side of the opening 4a for receiving grease 02. A communication groove 03 and an abutting groove 04 are provided between the cavity 01 and the opening 4a. The communication groove 4a connects the cavity 01 and the side wall of the abutting groove 04 and is formed with a feeding end 03a through which the grease 02 enters the communication groove 03 and a discharging end 03b. The abutting groove 04 is provided with a piston 05 therein. The piston 05 remains stationary when the roller 3a provided at the end of the pocket 3 rotates into the opening 4a and protrudes from the inner wall surface of the opening 4a, and blocks the discharging end 03b. The piston 05 moves into the abutting groove 04 by the reaction force of the roller 3a during the downward movement of the tool reversing jaw 4 driven by the tool reversing cylinder 2 to press the roller 3a, and releases the blocking of the discharging end 03b after moving to a set distance. The piston 05 is reset along with the reset of the tool reversing jaw 4, and re-blocks the discharging end 03b in the latter part of the resetting process.

[0037] The present invention provides a cavity 01 for receiving grease 02 on the tool reversing jaw 4. As the tool reversing cylinder 2 drives the tool reversing jaw 4 to move downward to press the roller 3a, the piston 05 performs relative movement in the abutting groove 04 to open the discharging end 03b of the communication groove 03, so that the grease 02 can enter the opening 4a from the discharging end 03b and is coated between the roller 3a and the tool reversing jaw 4, thereby realizing the self-lubrication of the pocket 3 in the tool reversing process, eliminating the need for manual coating operation, and ensuring the coating effect of grease 02.

[0038] It should be noted that the opening 4a should be sized to allow smooth passage of the roller 3a. When the disc 1 is rotated to perform the tool selection operation, the roller 3a at the end of the pocket 3 will rotate into the opening 4a. At this time, the piston 05 remains stationary and its end protrudes from the inner wall surface of the opening 4a to block the discharging end 03b. When the roller 3a at the end of the pocket 3 corresponding to the selected tool is rotated into the opening 4a, the tool reversing cylinder 2 drives the tool reversing jaw 4 to move downwards and the roller 3a exerts a pressing effect on the end of the cylinder, causing the tool reversing jaw 4 to clamp the roller 3a. At the same time, the end of the piston 05 is moved into the abutting groove 04 by the reaction force of the roller 3a until the discharging end 03b is opened, so that the grease 02 inside the communication groove 03 can enter the opening 4a through the discharging end 03b and contact the end roller 3a of the pocket 3. When the end of the piston 05 passes the position of the discharging end 03b, with the reset action of the piston 05, it scrapes the excess grease 02 at the discharging end 03b and further presses the side wall leaving the communication groove 04, whereby the discharging end 03b is blocked again. In this way, the amount of grease 02 applied in a single time is guaranteed to ensure the application effect of grease 02. The accumulation of grease 02 on the inner wall of the communication groove 04 is avoided, and the blocking effect of the piston 05 on the discharging end 03b is guaranteed.

[0039] The cavity 01 and the communication groove 03 and the abutting groove 04 inside the cavity can be formed simultaneously with the tool reversing jaw 4. Alternatively, it is possible to form the tool reversing jaw 4 first and then machine the tool reversing jaw 4 so as to form structures such as the cavity 01 on the tool reversing jaw 4, which facilitates processing and manufacturing and reduces the production cost.

[0040] On the basis of the above-described embodiment, the discharging end 03b should be provided on the inner wall of the abutting groove 04 close to the opening 4a. The communication groove 03 comprises a main channel and an auxiliary channel. The main channel is arranged vertically and communicates with the cavity 01 receiving the grease 02, so that the grease 02 can enter the main channel more smoothly. The auxiliary channel is in communication with the main

channel, with an obtuse angle between the channels. On the one hand, the grease 02 can be extruded from the discharging end 03b through the auxiliary channel relatively smoothly, and on the other hand, the grease 02 can be prevented from rushing out of the discharging end 03b at once and accumulating at the discharging end 03b, so as to avoid the occurrence of uneven coating, waste of grease 02, etc., and ensure the uniformity of coating of grease 02. The communication groove 03 should be arranged as close as possible to the position of the abutting groove 04, so as to shorten the length of the auxiliary channel to ensure that the grease 02 can be smoothly extruded for uniform coating.

[0041] On the basis of the above-described embodiment, in order to ensure that the grease 02 can smoothly enter the communication groove 03 from the cavity 01, the end of the piston 05 positioned within the cavity 01 is connected with a pressure plate 06 that abuts against the side wall of the cavity 01 to form a sealing effect. When the piston 05 moves toward the side where the opening 4a is located, the pressure plate 06 exerts force on the gas in the cavity 01 to generate pressure, extruding the grease 02 inside cavity 01 into the communication groove 03 from the feeding end 03a and into the opening 4a from the discharging end 03b. Since the pressure plate 06 abuts the side wall of the cavity 01, a confined space is formed within the cavity 01. As the piston 05 resets, the pressure plate 06 moves toward the side where the bottom wall of the cavity 01 is located, reducing the volume of the space inside the cavity 01 and thus increasing the pressure, exerting an extrusion effect on the grease 02 in the cavity 01. This allows the grease 02 to further enter the conductive groove 03 and be extruded out from the discharging end 03b, ensuring that the coating of the grease 02 can be carried out smoothly.

[0042] It should be noted that in order to ensure that the piston 05 remains stationary when the roller 3a at the end of the pocket 3 rotates into the opening 4a, a limiting structure should be provided in the cavity 01 to prevent the pressure plate 06 from moving unrestricted during the resetting process of piston 05, ensuring that the end of 05 protrudes from the inner wall surface of the opening 4a after the piston is reset, achieving the blocking of the discharging end 03b without affecting the storage of residual grease 02 in the cavity 01.

[0043] The grease 02 in the cavity 01 can also be replaced with other forms of lubricant, such as lubricating liquid, lubricating oil, etc. The viscosity of the lubricating liquid and lubricating oil is relatively low compared to grease 02 and therefore can naturally flow out when the discharging end 03b opens and enter the opening 4a.

[0044] On the basis of the above-described embodiment, in order to ensure that the piston 05 can be reset smoothly, one end of the cavity 01 away from the opening 4a is provided with an end cover 07 and a reset spring 08. A reset space 09 is formed between the end cover 07, the pressure

plate 06 and the inner wall of the cavity 01, in which space the reset spring 08 is positioned in such a manner that both ends thereof are in contact with the end cover 07 and the pressure plate 06 respectively. On the one hand, the end cover 07 ensures that the cavity 01 can always be a closed space to ensure the sealing effect, and on the other hand, it facilitates the molding of the cavity 01 on the tool reversing jaw 4. The machining process can be simplified by first machining the shape and structure of the cavity 01 and then forming a sealing effect through the end cover 07. When piston 05 is pushed upwards, the pressure plate 06 exerts a force on the reset spring 08, causing it to compress and have elastic potential energy. When moving to the limit position, the elastic potential energy of the reset spring 08 is converted into a force on the pressure plate 06, allowing the pressure plate 06 and piston 05 to move in the opposite direction, extruding the grease 02 and successfully completing the blocking of the discharging end 03b.

[0045] On the basis of the above-described embodiment, since the extrusion time of the grease 02 is limited, it is necessary to complete the coating within a very short time when the roller 3a of the pocket 3 contacts the opening 4a. The grease 02 is relatively thick in nature. In order to prolong the extrusion time of the grease 02, the piston 05 is formed with an arc-shaped surface 05a on one side toward the opening 4a. The middle of the arc-shaped surface 05a is convex toward the opening 4a by a height greater than the distance between the discharging end 03b and the opening 4a. When the piston 05 blocks the discharging end 03b, the edge of the arc-shaped surface 05a is just at the edge of the discharging end 03b. When the piston 05 moves slightly, the discharging end 03b can be controlled to open. When the piston 05 moves in the opposite direction to close, even if the convex portion of the arc-shaped surface 05a is at the same height as the position of the discharging end 03b at this time, the edge of the arc-shaped surface 05a is not in contact with the discharging end 03b, and thus the discharging end 03b is not blocked. The grease 02 can still be extruded from the discharging end 03b, so that the extrusion time of the grease 02 is prolonged, ensuring the extrusion amount of the grease 02 and the coating effect of the grease 02.

[0046] On the basis of the above-described embodiment, in order to ensure that the piston 05 can move to the appropriate position so that the discharging end 03b can be opened smoothly, and the grease 02 can fully enter the communication groove 03 from the cavity 01, a gas guide check valve 10 is provided on the side wall of the cavity 01. The gas outlet of the gas guide check valve 10 is provided towards the inside of the cavity 01 at an installation height higher than the level of the grease 02 in the cavity 01. When the roller 3a at the end of the pocket 3 corresponding to the selected tool is rotated into the opening 4a, the tool reversing cylinder 2 drives the tool reversing jaw 4 to move downwards, the piston 05 releases the blocking effect on the discharging end 03b, the gas guide check valve 10 controls the cavity 01 to be in communication with the outside to

prevent the piston 05 from causing a back-sucking effect on the grease 02 when the piston 05 moves to the inside of the abutting groove 04, ensuring that the grease 02 in the cavity 01 can smoothly enter the communication groove 03 and complete the coating operation.

[0047] On the basis of the above-described embodiment, a feed pipe 11 is connected to the side wall of the cavity 01 close to the communication groove 03, with a feed guide check valve 12 provided at the connection between the feed pipe 11 and the cavity 01. The feed pipe 11 is in communication with a reservoir 13 from which the grease 02 enters the cavity 01 in one way through the feed pipe 11 under the control of the feed guide check valve 12. When the grease 02 in the cavity 01 is consumed, the grease 02 in the reservoir 13 can enter the cavity 01 through the feed pipe 11 and the feed guide check valve 12 to replenish the grease 02 in the cavity 01 to ensure continuous application of the grease 02. At the same time, the feed guide check valve 12 can also limit the reverse flow of grease 02 in the cavity 01 to the feed pipe 11, that is, it is ensured that the cavity 01 is in a sealed state.

[0048] Both the gas guide check valve 10 and the feed guide check valve 12 can be purchased according to the assembly position and size, as long as they can realize the one-way communication function, and are not specifically limited here.

[0049] It should be noted that the reservoir 13 is fixed and does not move with the tool reversing jaw 4. With the feed guide check valve 12, the liquid level fluctuation of the cavity 01 during the movement does not affect the stability of the liquid level in the reservoir 13. When the tool reversing jaw 4 is still and the liquid level is stable, the grease 02 flows out and the liquid level is lowered. At this time, material replenishment from the reservoir 13 can be obtained by means of the connector principle. That is, when the single application is completed, the liquid level of the grease 02 in the cavity 01 is slightly lower than the liquid level of the grease 02 in the reservoir 13, forming a height difference Δh . Under the effect of the height difference, the grease 02 in the reservoir 13 can naturally enter the cavity 01 without backflow. Since the space in the cavity 01 is relatively small and the space in the reservoir 13 is relatively large, the height difference is small, so that the grease 02 in the reservoir 13 can meet the requirements for long-term application, and frequent manual filling is avoided, thereby ensuring the stability of the delivery of the grease 02.

[0050] On the basis of the above-described embodiment, at least two communication grooves 03 are provided. The communication grooves 03 may be provided symmetrically at both sides of the arc-shaped surface 05a, respectively, so that the grease 02 can enter the opening 4a from the discharge port of the two communication grooves 03, ensuring the uniformity of the application of the grease 02 and thus the uniformity of the coating.

[0051] On the basis of the above-described embodiment, a reciprocating mechanism is provided between the tool reversing jaw 4 and the tool reversing cylinder 2. The reciprocating mechanism comprises a guide rod 14, a first support block 15 and a second support block 16. The tool reversing cylinder 2 is fixed on the first support block 15 and the output end thereof passes through the second support block 16 to connect to the end of the tool reversing jaw 4. The guide rod 14 connects the first support block 15 and the second support block 16, and the axis of the guide rod is parallel to the straight line where the extension and contraction direction of the tool reversing cylinder 2 is located. When the disc 1 rotates until the pocket 3 of the required tool rotates to the reverse position, the roller 3a at the end of the pocket 3 is clamped with the tool reversing jaw 4, and the piston 05 of the tool reversing cylinder 2 drives the tool reversing jaw 4 to push out along the direction of the guide rod 14, so that the tool reversing jaw 4 moves downward and the pocket 3 flips to realize the tool reversing action. When the tool is collected, the tool reversing cylinder 2 drives the tool reversing jaw 4 and the pocket 3 to move in reverse direction to realize the tool collection, whereby a smooth tool changing process is ensured.

[0052] The working process of the self-lubricating tool magazine reversing device according to the present invention will be described below. The grease 02 in the reservoir 13 enters the cavity 01 through the feed pipe 11 and the feed guide check valve 12 to complete the replenishment operation. As the tool reversing cylinder 2 drives the tool reversing jaw 4 to move downward, the roller 3a and the end of the cylinder end press each other, and the piston 05 is moved into the abutting groove 04 by the reaction force of the roller 3a. At the same time, the gas guide check valve 10 is controlled to open, so that the cavity 01 is in communication with the outside, and the discharging end 03b of the communication groove 03 is opened. The piston 05 is reset along with the reset of the tool reversing jaw 4, and at the same time the gas guide check valve 10 is controlled to close to ensure that the cavity 01 is in a closed state. Under the rebound action of the reset spring 08, the pressure plate 06 drives the piston 05 to move in the opposite direction from the abutting groove 04. Due to the provision of the arc-shaped surface 05a of the end of the piston 05, even if the piston 05 moves in a opposite direction, the discharging end 03b is not sealed. The sealing effect between the pressure plate 06 and the inner wall of the cavity 01 further compresses the inner space volume of the cavity 01, increasing the pressure. Under the pressure, the extruded grease 02 enters the communication groove 03 and enters the opening 4a through the discharging end 03b. When the piston 05 moves to the position where the discharging end 03b is located, the piston 05 cooperates with the abutting groove 04 to extrude the grease 02 remaining in the abutting groove 04 into the opening 4a to complete the coating operation. As the tool selection process proceeds, the disc 1 rotates. The roller 3a of the pocket 3 rolls relative to the opening 4a, resulting

in a mechanical friction effect, so that the grease 02 at the opening 4a is uniformly applied to the roller 3a, whereby the self-lubricating effect of the pocket 3 is realized during the tool reversing process.

[0053] The present invention further provides a disc type tool magazine comprising the self-lubricating tool magazine reversing device described above, which has the same specific working mode and technical effect as those described in the above embodiments, and will not be elaborated here.

[0054] Those skilled in the industry should understand that the present invention is not limited by the foregoing embodiments. The foregoing embodiments and descriptions only illustrate the principles of the present invention. Without departing from the spirit and scope of the present invention, the present invention will have various changes and improvements, which fall within the scope of the claimed invention. The scope of protection claimed by the present invention is defined by the appended claims and their equivalents.

What is claimed is:

1. A self-lubricating tool magazine reversing device, comprising a tool reversing cylinder and a tool reversing jaw, the tool reversing jaw being formed with an opening adapted to a roller provided at the end a pocket, and the tool reversing cylinder driving the tool reversing jaw to move reciprocally to drive the pocket to flip and reset;

wherein the top of the tool reversing jaw is hollow to form a cavity, the cavity being sealed and located on one side of the opening for receiving grease, wherein a communication groove and an abutting groove are provided between the cavity and the opening, the communication groove connecting the cavity and the side wall of the abutting groove and formed with a feeding end through which the grease enters the communication groove and a discharging end, the abutting groove being provided with a piston therein, wherein the piston remains stationary when the roller provided at the end of the pocket rotates into the opening and protrudes from the inner wall surface of the opening to block the discharging end, wherein the piston moves into the abutting groove by the reaction force of the roller during the downward movement of the tool reversing jaw driven by the tool reversing cylinder to press the roller, and releases the blocking of the discharging end after moving to a set distance, and wherein the piston is reset along with the reset of the tool reversing jaw and re-blocks the discharging end in the latter part of the resetting process;

wherein the end of the piston located in the cavity is connected to a pressure plate abutting against the side wall of the cavity to provide a sealing effect, wherein when the piston moves toward the side where the opening is located, the pressure plate exerts force on the gas in the cavity to generate pressure, extruding the lubricating grease in the cavity into the communication groove from the feeding end and into the opening from the discharging end;

wherein one end of the cavity away from the opening is provided with an end cover and a reset spring, with a reset space formed between the end cover, the pressure plate and the inner wall of the cavity, in which space the reset spring is positioned in such a manner that both ends thereof are in contact with the end cover and the pressure plate respectively;

wherein a gas guide check valve is provided on the side wall of the cavity, wherein the gas outlet of the gas guide check valve is provided towards the inside of the cavity at an installation height higher than the grease level in the cavity; and

wherein a feed pipe is connected to the side wall of the cavity close to the communication groove, with a feed guide check valve provided at the connection between the feed pipe and the cavity, wherein the feed pipe is in communication with a reservoir from which the grease enters

the cavity in one way through the feed pipe under the control of the feed guide check valve.

2. The self-lubricating tool magazine reversing device according to claim 1, wherein the piston is formed with an arc-shaped surface on one side toward the opening, the middle of the arc-shaped surface being convex toward the opening by a height greater than the distance between the discharging end and the opening.

3. The self-lubricating tool magazine reversing device according to claim 1, wherein the communication groove comprises a main channel provided in parallel to the abutting groove, and an auxiliary channel in communication with the main channel and having an obtuse angle with the main channel.

4. The self-lubricating tool magazine reversing device according to claim 1, wherein at least two communication grooves are provided.

5. The self-lubricating tool magazine reversing device according to claim 1, wherein a reciprocating mechanism is provided between the tool reversing jaw and the tool reversing cylinder, the reciprocating mechanism comprising a guide rod, a first support block and a second support block, wherein the tool reversing cylinder is fixed on the first support block and the output end thereof passes through the second support block to connect to the end of the tool reversing jaw, wherein the guide rod connects the first support block and the second support block, and wherein the axis of the guide rod is parallel to the straight line where the extension and contraction direction of the tool reversing cylinder is located.

6. A disc type tool magazine comprising the self-lubricating tool magazine reversing device according to any of claims 1 to 5.