FEEDING MECHANISM AND DOCUMENT INVALIDATION DEVICE

TECHNICAL FIELD

The present disclosure relates generally to a technical field of document transport mechanism, and more particularly, to a feeding mechanism and a document invalidation device.

BACKGROUND

Document, which is stored and managed in the document management device, has a valid period of use. When the valid period of the document expires, the old document needs to be invalidated by a document invalidation device. That is, the identifiable identity information recited in the document should be invalidated. The administrator takes the document to be invalidated out of the document management device and puts it into the document invalidation device for invalidation. At this time, a feeding mechanism is required to transport the document located at a feeding position of a document invalidation device to a target invalidation position of the document invalidation device. Usually, the document transport is completed by a manipulator. The clamping component of the manipulator automatically clamps the document located at the feeding position and transport it to the target invalidation position. The whole transport process is mechanical, and document surface may be pinched. In addition, it is difficult to flexibly adjust the transport state during the transport process, resulting in poor stability and security of the document transport and affecting the transport efficiency of the document.

SUMMARY

The object of the present application is to provide a feeding mechanism and a document invalidation device, aiming at the technical problems in the prior art that the document surface may be easily pinched, the stability and security of the document transport are poor and the efficiency of the document transport is low as it is difficult to flexibly adjust the transport state during the transport process, when transporting the document through clamping the same by the manipulator.

In a first aspect, a feeding mechanism, which is configured inside an installation frame and reciprocates between a feeding position and a target invalidation position inside the installation frame; wherein the feeding mechanism includes a transport structure which is installed at a top of the installation frame, a displacing component which is in slidable connection with the transport structure, and a drive apparatus which is in drive connection with the displacing component, wherein the drive apparatus drives the displacing component to move in a horizontal direction, the displacing component includes a feeding structure and a gripping structure, the feeding structure is arranged along the feeding position, and the gripping structure moves upward and downward relative to the feeding structure in a vertical direction.

As an optional embodiment of this disclosure, the installation frame includes a connection plate and at least one support plate which enclose to form a through transport cavity.

As an optional embodiment of this disclosure, the installation frame is provided with a document identification apparatus which is arranged along the transport cavity to identify document information of a document passing through the transport cavity.

As an optional embodiment of this disclosure, the feeding structure includes a feeding frame with at least one feeding channel and an adaptive switching mechanism which is located at the feeding frame; wherein the adaptive switching

mechanism adjusts the feeding frame to move in the vertical direction to switch each feeding channel.

As an optional embodiment of this disclosure, the adaptive switching mechanism includes a switching drive source which is arranged at the feeding frame and a switching guide piece which is located at both sides of the feeding frame.

As an optional embodiment of this disclosure, the gripping structure includes a gripping fixation frame which is connected with the transport structure, a gripping mechanism which moves upward and downward along the gripping fixation frame in the vertical direction, and a gripping power source with one end fixed at the gripping fixation frame and the other end fixed at the gripping mechanism.

As an optional embodiment of this disclosure, the gripping mechanism includes a transmission frame which is in drive connection with the gripping power source, a gripping piece which is arranged inside the transmission frame, and a guide apparatus which is arranged at both ends of the transmission frame; wherein the guide apparatus is embedded into the gripping fixation frame, one end of the gripping power source is fixed at the gripping fixation frame, and the other end of the gripping power source is in drive connection with the transmission frame.

As an optional embodiment of this disclosure, the gripping structure includes a gripping fixation frame which is connected with the transport structure, a gripping mechanism which is embedded into the feeding frame and can moves upward and downward along the gripping fixation frame in the vertical direction, and a gripping power source with one end fixed at the gripping fixation frame and the other end fixed at the gripping mechanism.

As an optional embodiment of this disclosure, the gripping mechanism includes a transmission frame which is embedded into the feeding frame, a gripping piece which is arranged inside the transmission frame, and a guide apparatus with one end penetrates through and is arranged at the transmission frame and with the other end

penetrates through and is fixed at the gripping fixation frame, one end of the gripping power source is fixed at the gripping fixation frame, and the other end of the gripping power source is in drive connection with the transmission frame.

As an optional embodiment of this disclosure, the gripping piece includes a transport component which is rotationally arranged at the transmission frame, a drive part which is fixed inside the transmission frame and in drive connection with the transport component, and a gripping part which is fixed at a side of the transmission frame which is opposite to the drive part.

As an optional embodiment of this disclosure, the transport structure includes a slide component which is arranged at the top of the installation frame, the slide component includes a slide rail which is arranged at the top of the installation frame and a slide block which is clamped at a top of the gripping fixation frame.

As an optional embodiment of this disclosure, the transport structure includes a slide component which is arranged at the top of the installation frame and a slide sensing switch which is fixed at a top of the slide component.

As an optional embodiment of this disclosure, the slide component includes a slide rail which arranged at the top of the installation frame and a slide block which is clamped at a top of the gripping fixation frame, and the slide sensing switch is arranged at a top of the slide block.

As an optional embodiment of this disclosure, the drive apparatus includes a drive support which is fixed at the installation frame, a drive motor which is installed at the drive support, and a drive shaft with an end which is rotatably connected with the drive motor and penetrates through the gripping fixation frame.

According to a second aspect, a document invalidation device is provided, including the above feeding mechanism, a document invalidation mechanism which is connected with the feeding mechanism, and a waste recycling mechanism which is located below the document invalidation mechanism.

By using the feeding mechanism, the document is gripped by the gripping structure after entering along the feeding structure at the feeding position, and then the document is horizontally transported backward and forward along the transport structure through the gripping structure driven by the drive apparatus, such that the gripped document is transported to the target invalidation position for subsequent invalidation. This replaces the existing transport method of the manipulator. On the one hand, the transport state of the document can be flexibly adjusted during the transport process, which improves the accuracy and stability of document transport. On the other hand, the possibility that the manipulator may pinch or scratch the document during the transport process can be avoided, and the security and reliability of document transport can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to more clearly illustrate the technical solution in the embodiment of the present disclosure, the drawings used in the embodiments or prior arts will be briefly introduced. It is obvious that the drawings in the following description are only some embodiments of the present application. For ordinary technicians in the present art, they can also obtain other drawings without paying creative labor according to these drawings.

Fig. 1 is an overall structure diagram of a feeding mechanism provided by a first embodiment of this disclosure.

Fig. 2 is a first partial structure diagram of a feeding mechanism provided by a first embodiment of this disclosure.

Fig. 3 is a second partial structure diagram of a feeding mechanism provided by a first embodiment of this disclosure.

Fig. 4 is a third partial structure diagram of a feeding mechanism provided by a first embodiment of this disclosure.

Fig. 5 is an overall structure diagram of a feeding mechanism provided by a second embodiment of this disclosure.

Fig. 6 is a first partial structure diagram of a feeding mechanism provided by a second embodiment of this disclosure.

Fig. 7 is a second partial structure diagram of a feeding mechanism provided by a second embodiment of this disclosure.

Fig. 8 is a structural diagram of a gripping piece of a feeding mechanism provided by a first embodiment and a second embodiment of this disclosure.

Fig. 9 is a fourth partial structure diagram of a feeding mechanism provided by a first embodiment of this disclosure.

Fig. 10 is a partial explosion diagram of a feeding mechanism provided by a second embodiment of this disclosure.

Fig. 11 is a fifth partial structure diagram of a feeding mechanism provided by a first embodiment of this disclosure.

Fig. 12 is an overall structure diagram of document invalidation device provided by an embodiment of this disclosure.

The reference number for each component in the drawings are as follows.

Feeding mechanism	10	Installation frame	100
Feeding position	11	Target invalidation position	12
Displacing component	20	Transport structure	300
Drive apparatus	400	Feeding structure	201
Gripping structure	200	Connection plate	111
Support plate	112	Document identification apparatus	500
Feeding frame	203	Adaptive switching mechanism	204
First feeding channel	2021	Second feeding channel	2022
First feeding inlet	2061	Second feeding inlet	2062
Switching drive source	2041	Switching guide	2042
Gripping fixation frame	21	Gripping mechanism	22
Gripping power source	23	Transmission frame	221
Gripping piece	222	Guide apparatus	223
Feeding channel	202	Groove-type sensing switch	30

Sensing substrate	31	Sensing sheet	32
Avoidance groove	2031	Transport component	224
Drive part	225	Gripping part	226
Drive shaft	2251	Driving wheel	2241
Driven wheel	2242	Synchronous belt	2243
Gripping roller	2261	Transmission shaft	2262
Slide component	301	Slide rail	3011
Slide block	3012	Slide sensing switch	302
Slide groove	104	Drive support	401
Drive motor	402	Drive shaft	403
Document invalidation device	1	Document invalidation mechanism	80
Waste recycling mechanism	90		

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In order to make the object, technical scheme and advantages of the present application clearer, the present application will be further described in detail in combination with the drawings and the embodiments. It should be understood that the specific embodiments described herein are only used to explain the present application and are not used to limit the present application.

It should be noted that when an element/component is mentioned as being "fixed" or "arranged" on another element/component, it can be directly on another element/component or it may be indirectly fixed or arranged on another element/component through a third element/component. When an element/component is mentioned as being "connected" with another element/component, it may be directly connected with another element/component or it may be indirectly connected to another element/component through a third component.

It should be noted that the technical terms, such as “length”, “width”, “upper”, “lower”, “front”, “back”, “left”, “right”, “vertical”, “horizontal”, “top”, “bottom”, “inner”, “outer”, indicating the orientation or position relationship are based on the orientation or position relationship shown in the attached drawings. They are just for the description convenience and simplifying, rather than indicating or implying that the device or element referred to must have the specific orientation, or be constructed and operated in the specific orientation, and cannot be understood as the limitation of the present application.

In addition, the terms "first" and "second" are used for descriptive purposes only and cannot be understood as indicating or implying the relative importance or implicitly indicating the number of technical features. Thus, the features defined with "first" and "second" can explicitly or implicitly include one or more of these features. In the description of the present application, “several” or “a plurality of” means two or more, unless otherwise is specifically defined.

Referring Figs.1-12, the present application has provided a feeding mechanism 10, which is configured inside an installation frame 100 of a document invalidation device 1, and can reciprocate between a feeding position 11 and a target invalidation position 12 inside the installation frame 100. The feeding mechanism 10 can transport documents between the feeding position 11 and the target invalidation position 12. Of course, the transport target of the feeding mechanism 10 is not limited to documents, but also can be other materials. Specifically, the feeding mechanism 10 includes a transport structure 300 which is installed at a top of the installation frame 100, a displacing component 20 which is in slidable connection with the transport structure 300, and a drive apparatus 400 which is in drive connection with the displacing component 20. The drive apparatus 400 drives the displacing component 20 to move in a horizontal direction. Wherein, the displacing component 20 includes a feeding structure 201 and a gripping structure 200. The

feeding structure 201 is arranged along the feeding position 11, and the gripping structure 200 can move upward and downward relative to the feeding structure 201 in a vertical direction.

Please refer to Figures 1 to 2, simultaneously. Specifically, the document enters the installation frame 100 along the feeding structure 201 which is located at the feeding position 11. At this time, the gripping structure 200 grips the document. The drive apparatus 400 drives the displacing component 20 to drive the gripping structure 200 to move along the transport structure 300 towards the target invalidation position 12. Therefore, the gripped document can be moved to the target invalidation position 12. When the invalidation is completed, the drive apparatus 400 drives the gripping structure 200 to move along the transport structure 300 towards the feeding position 11, thus completing a feeding stroke. With this arrangement, by combining the slide connection of the transport structure 300 and the gripping structure 200, the stability of the document transport is improved, the position deviation occurs during the transport process is effectively reduced, and the accuracy of the document transport is improved.

Please refer to Figures 1 to 2, simultaneously. As an optional embodiment of this disclosure, the installation frame 100 includes a connection plate 111 and at least one support plate 112, which enclose to form a through transport cavity. Specifically, the installation frame 100 includes a connection plate 111 which is arranged at the top of the feeding mechanism 10 for installing the transport structure 300, and two support plates 112 which are respectively arranged at left and right sides of the feeding mechanism 10 and located between the connection plate 111. In addition, in order to reduce the overall weight of the installation frame 100, the two support plates 112 are internally hollow. It should be noted that the connection plate 111 and each support plate 112 can be disassembled and connected for assembly and production. In this embodiment, the transport cavity inside the installation frame 100

has several cavity openings. One cavity opening of the transport cavity is opposite to the feeding position 11, so that the document enters the feeding position 11 along the cavity opening, while the other cavity opening of the transport cavity is opposite to the target invalidation position 12, so that the document enters the target invalidation position 12 along this cavity opening. Optionally, the installation frame 100 is provided with a document identification apparatus 500 along the transport cavity, which is configured to identify document information of the document passing through the transport cavity. In this embodiment, a document identification apparatus 500 is arranged along an opposite side of the connection plate 111 inside the installation frame 100 to identify the document information of the document passing through the transport cavity.

Please refer to Figures 1 to 3, simultaneously. As an optional embodiment of this disclosure, the feeding structure 201 includes a feeding frame 203 with at least one feeding channel 202 and an adaptive switching mechanism 204 which is located at the feeding frame 203. The adaptive switching mechanism 204 drives the feeding frame 203 to move and switches each feeding channel 202 in the vertical direction. Specifically, since the document that can be transported by the feeding mechanism 10 include card-type documents, such as Singapore ID card, Hong Kong and Macao ID card, social security card, bank card and so on, as well as book-type documents, such as passport, residence booklet and so on. And the two types of documents are different in size, thickness and other characteristic parameters, it is necessary to configure different feeding channels 202 to achieve document feeding, and such different feeding channels 202 should be switched through the adaptive switching mechanism 204. Specifically, in this embodiment, the feeding channel 202 includes a first feeding channel 2021 for the book-type document feeding and a second feeding channel 2022 for the card-type document feeding, respectively. In addition, the feeding inlets 206 are arranged at entrances of each feeding channel 202, wherein

the feeding inlets 206 include a first feeding inlet 2061 arranged at the entrance of the first feeding channel 2021 and a second feeding inlet 2062 arranged at the entrance of the second feeding channel 2022. In this embodiment, since the size of the book-type document is greater than that of the card-type document, the second feeding inlet 2062 is embedded into the first feeding inlet 2061, and the corresponding second feeding channel 2022 is embedded into the first feeding channel 2021. Simultaneously, there is a height difference between the first feeding channel 2021 and the second feeding channel 2022. The switching between the first feeding channel 2021 and the second feeding channel 2022 can be realized through the adaptive switching mechanism 204. Specifically, the adaptive switching mechanism 204 includes a switching drive source 2041 which is arranged at the feeding frame 203 and a switching guide piece 2042 which is located at both sides of the feeding frame 203. The switching drive source 2041 can use an electric drive cylinder or a linear motor to drive the feeding frame 203 to move upward and downward in the vertical direction by acting on the feeding frame 203 to achieve the switching of the feeding channel 202. In order to guarantee that the feeding frame 203 never displaces during its movement, the switching guide piece 2042 plays a guidance role, which improves the accuracy and reliability of switching, guarantees fast feeding of different types of documents, and improves the feeding efficiency.

Please refer to Figures 1 to 4, simultaneously. As an optional embodiment of this disclosure, the gripping structure 200 includes a gripping fixation frame 21 which is connected with the transport structure 300, a gripping mechanism 22 which moves upward and downward along the gripping fixation frame 21 in the vertical direction, and a gripping power source 23 with one end fixed at the gripping fixation frame 21 and the other end fixed at the gripping mechanism 22. The gripping power source 23 can drive the gripping mechanism 22 to move upward and downward relative to the gripping fixation frame 21 in the vertical direction, so that the gripping

mechanism 23 is away from or adjacent to each feeding channel 202, thus realizing the gripping or release of documents.

Please refer to Figures 1 to 4, simultaneously. In this embodiment, the gripping fixation frame 21 is provided with a plurality of installation parts, each of which is used to contain other components and for internal wiring. Each installation part can be integrally formed or separately jointed into the gripping fixation frame 21. On the one hand, this guarantees the installation accuracy of the gripping fixation frame 21, on the other hand, it is convenient for production and assembly, and improves the installation efficiency.

Please refer to Figures 1 to 4, simultaneously. Furthermore, in this embodiment, the gripping power source 23 is in drive connection with the gripping mechanism 22, and drives the gripping mechanism 22 to move. Specifically, in this embodiment, when a sensing apparatus at the bottom of the gripping mechanism 22 senses that a document has arrived, the gripping power source 23 drives the gripping mechanism 22 to move downward in the vertical direction along the gripping fixation frame 21, and the gripping mechanism 22 can just grip the document that enters the installation frame 100 along the feeding position 11, and the drive apparatus 400 drives the gripping mechanism 22 to move along the transport structure 300 toward the target invalidation position 12 and finally moves the document to the target invalidation position 12. At this time, the gripping power source 23 drives the gripping mechanism 22 to move upward in the vertical direction along the gripping fixation frame 21 to restore the initial state. When the document is invalidated, the gripping power source 23 drives the gripping mechanism 22 to move downward in the vertical direction along the gripping fixation frame 21. The gripping mechanism 22 can just grip the document at the target invalidation position 12, and the drive apparatus 400 drives the gripping mechanism 22 to move the document along the transport structure 300 towards the feeding position 11 and finally moves the document to the

feeding position 11. At this time, the gripping power source 23 drives the gripping mechanism 22 to move upward in the vertical direction along the gripping fixation frame 22 to restore the initial state. This completes a complete feeding stoke. This feeding method guarantees the accuracy and reliability of document transport.

Please refer to Figures 1 to 4, simultaneously. Optionally, in this embodiment, the gripping power source 23 can adopt one of an electric cylinder, a motor or a hydraulic cylinder, and there is no specific restriction for this.

Please refer to Figures 1 to 4, simultaneously. Furthermore, in this embodiment, the gripping mechanism 22 includes a transmission frame 221 which is in drive connection with the gripping power source 23, a gripping piece 222 which arranged inside the transmission frame 221, and a guide apparatus 223 which arranged at both ends of the transmission frame 221. The guide apparatus 223 is embedded into the gripping fixation frame 21, one end of the gripping power source 23 is fixed at the gripping fixation frame 21, and the other end of the gripping power source 23 is in drive connection with the transmission frame 221, so that the transmission frame 221 can vertically move upward and downward relative to the gripping fixation frame 21 in the vertical direction. In this embodiment, the gripping power source 23 drives the transmission frame 221 to move upward and downward in the vertical direction, and drives the gripping piece 222 to move upward and downward in the vertical direction, thus realizing the gripping or releasing of the document. In addition, in order to guarantee that the transmission frame 221 never shakes or displaces when it moves upward and downward in the vertical direction, the guide apparatus 223 which penetrates through both ends of the transmission frame 221 includes a guide column which penetrates through one installation part of the gripping fixation frame 21 and plays a guidance role, so that the transmission frame 221 can move upward and downward in the vertical direction relative to the gripping

fixation frame 21 in a relatively stable and reliable manner, thus ensuring the stability and accuracy of the gripping piece 222 for gripping the document.

Please refer to Figures 1 to 4, simultaneously. Furthermore, the transmission frame 221 is formed by a plurality of installation plates which form a frame body with a plurality of installation cavities. The transmission frame 221 further includes a connection part for connecting the gripping power source 23. The guide apparatus 223 is located inside one installation cavity, and the gripping piece 222 is located inside another installation cavity.

Please refer to Figures 5 to 6, simultaneously, as another optional embodiment of this disclosure, the gripping structure 200 includes a gripping fixation frame 21 which is connected with the transport structure 300, a gripping mechanism 22 which is embedded into the feeding frame 203 and moves upward and downward along the gripping fixation frame 21 in the vertical direction, and a gripping power source 23 with one end fixed at the gripping fixation frame 21 and the other end fixed at the gripping mechanism 22. The gripping power source 23 can drive the gripping mechanism 22 to move upward and downward relative to the gripping fixation frame 21 inside the feeding frame 203 in the vertical direction, so that the gripping mechanism 22 is away from or adjacent to each feeding channel 202. In this way, the gripping mechanism 22 is embedded into the feeding frame 203, thus simplifying the structure of the gripping structure 200. This structure design is compact, which saves the material cost, and also facilitates the testing before delivery and later maintenance of the device.

Please refer to Figures 5 to 6, simultaneously. In this embodiment, the gripping fixation frame 21 is also provided with a plurality of installation parts, each of which is used to accommodate other components and for internal wiring. Each installation part can be integrally formed or separately jointed into the gripping fixation frame 21. On the one hand, this guarantees the installation accuracy of the gripping fixation

frame 21, on the other hand, it is convenient for production and assembly, and improves the installation efficiency.

Please refer to Figures 5 to 6, simultaneously. Furthermore, in this embodiment, the gripping power source 23 is in drive connection with the gripping mechanism 22, and drives the gripping mechanism 22 to move. Specifically, in this embodiment, when a sensing apparatus at the bottom of the gripping mechanism 22 senses that a document has arrived, the gripping power source 23 drives the gripping mechanism 22 to move downward in the vertical direction inside the feeding frame 203 relative to the gripping fixation frame 21, and the gripping mechanism 22 can just grip the document that enters the installation frame 100 along the feeding position 11, and the drive apparatus 400 drives the gripping mechanism 22 to move along the transport structure 300 towards the target invalidation position 12 and finally moves the document to the target invalidation position 12. At this time, the gripping power source 23 drives the gripping mechanism 22 to move upward in the vertical direction relative to the gripping fixation frame 21 inside the feeding frame 203 to restore the initial state. When the document is invalidated, the gripping power source 23 drives the gripping mechanism 22 to move downward in the vertical direction relative to the gripping fixation frame 21 inside the feeding frame 203. The gripping mechanism 22 can just grip the document at the target invalidation position 12, and the drive apparatus 400 drives the gripping mechanism 22 to move the document along the transport structure 300 towards the feeding position 11 and finally moves the document to the feeding position 11. At this time, the gripping power source 23 drives the gripping mechanism 22 to vertically move upward in the vertical direction relative to the gripping fixation frame 21 inside the feeding frame 203 to restore the initial state. This completes a complete feeding stoke. This feeding method guarantees the accuracy and reliability of document transport.

Please refer to Figures 5 to 6, simultaneously. Optionally, in this embodiment, the gripping power source 23 can adopt one of an electric cylinder, a motor or a hydraulic cylinder, and there is no specific restriction for this.

Please refer to Figures 5 to 7, simultaneously. Furthermore, in this embodiment, the gripping mechanism 22 includes a transmission frame 221 which is embedded into the feeding frame 203, a gripping piece 222 which is arranged inside the transmission frame 221, and a guide apparatus 223 with one end penetrates through and is arranged at the transmission frame 221 and the other end penetrates through and is fixed at the gripping fixation frame 21. One end of the gripping power source 23 is fixed at the gripping fixation frame 21, and the other end of the gripping power source 23 is in drive connection with the transmission frame 221, so that the transmission frame 221 moves upward and downward relative to the gripping fixation frame 21 inside the feeding frame 203 in the vertical direction, thus moving the gripping piece 222 away from or towards each feeding channel 202 to achieve the gripping or release of the document. Specifically, the gripping power source 23 can drive the transmission frame 221 to move upward and downward in the vertical direction relative to the gripping fixation frame 21 in the feeding frame 203. In order to guarantee the accuracy and accuracy in the movement process, the guide apparatus 223 plays a role of guide, so as to prevent deviation or offset in the movement process. It should be noted that in this embodiment, at least a group of groove-type sensing switches 30 are arranged between the gripping mechanism 22 and the gripping fixation frame 21. The groove-type sensing switch 30 includes two sensing substrates 31 which are respectively arranged along opposite ends of the gripping fixation frame 21 which are adjacent to or away from the gripping mechanism 22, and a sensing sheet 32 which is located at the top of the gripping mechanism 22. The sensing sheet 32 reciprocates between the two sensing substrates 31 under the drive of the gripping mechanism 22. On the one hand, the sensing sheet

32 can sense position information of the gripping mechanism 22 relative to the gripping fixation frame 21 and feed it back to the control system, on the other hand, it plays a position-limiting and guidance role to avoid the movement distance of the gripping mechanism 22 relative to the gripping fixation frame 21 being too large or too small, thus improving the stability and reliability of the document gripping of the gripping mechanism 22.

Please refer to Figures 5 to 7, simultaneously. Specifically, in this embodiment, the feeding frame 203 is provided with an avoidance groove 2031, which is used to contain the gripping mechanism 22. Simultaneously, to guarantee that the gripping mechanism 22 can move upward and downward freely along the feeding frame 203 and grip the document, as the gripping piece 222 is arranged inside the transmission frame 221, it is sufficient to guarantee that the size and specification parameters of the avoidance groove 2031 are greater than the size and specification parameters of the transmission frame 221. In addition, it should be noted that the avoidance groove 2031 is hollow and its bottom passes through each feeding channel 202, so as to guarantee that the gripping piece 222 can successfully grip the book-type document or card-type document moved along each feeding channel 202.

Please refer to Figures 5 to 7, simultaneously. Furthermore, in this embodiment, the transmission frame 221 is formed by a plurality of installation plates, which forms a frame body with a plurality of installation cavities. The transmission frame 221 further includes a connection part for connecting the gripping power source 23. The guide apparatus 223 is located at a top of the transmission frame 221. The other end of the guide apparatus 223 is located at an end of the gripping fixation frame 21. In addition, the sensing sheet 32 is symmetrically arranged at left and right ends of the transmission frame 221, and a bottom of the sensing sheet 32 is screwed to left and right ends of the transmission frame 221 through a fixation plate. In this way, when the gripping power source 23 drives the transmission frame 221 to move

upward and downward in the vertical direction along the feeding frame 203 relative to the gripping fixation frame 21, each sensing sheet 32 can move upward and downward in the vertical direction along each sensing substrate 31 located at the gripping fixation frame 21, so as to accurately obtain the position information of the transmission frame 221.

Please refer to Figures 5 to 7 simultaneously. Furthermore, in this embodiment, the guide apparatus 223 uses a guide column with one end penetrates through the transmission frame 221 and the other end penetrates through a top of the gripping fixation frame 21, and a guide sleeve at the top of the gripping fixation frame 21. In this way, when the transmission frame 221 moves upward and downward in the vertical direction relative to the gripping fixation frame 21 under the drive of the gripping power source 23, the guide column moves upward and downward in the vertical direction along the guide sleeve to play a guiding and position-limiting role. This guarantees the accuracy and stability of the movement of the transmission frame 221, and further guarantees the stability and reliability of the vertical movement of the gripping piece 222 located inside the transmission frame 221 relative to the gripping fixation frame 21, and guarantees the stable gripping or release of the document.

In the above two embodiments, the structure of the gripping piece 222 is the same, and the gripping piece 222 is further described below.

Please refer to Figures 1 to 8, simultaneously. In the embodiment of this disclosure, the gripping piece 222 includes a transport component 224 which is rotationally arranged at the transmission frame 221, a drive part 225 which is fixed inside and in drive connection with the transmission frame 221, and a gripping part 226 which is fixed a side of the transmission frame 221 which is opposite to the drive part 225. Specifically, when the gripping power source 23 drives the transmission frame 221 to move downward in the vertical direction relative to the

gripping fixation frame 21 to the gripping piece 222 to contact with each feeding channel 202, the drive part 225 drives the transport component 224 to drive the gripping part 226 to carry out a rolling gripping of the document in each feeding channel 202. With this arrangement, on the one hand, the gripping state can be flexibly adjusted, on the other hand, its structural design is compact, takes up less space, reduces production costs and is easy to maintain.

Please refer to Figures 1 to 8, simultaneously. Preferably, the drive part 225 is arranged inside one installation cavity of the transmission frame 221, and can employ a drive manner, such as a motor drive manner, a hydraulic drive manner or other drive manners, and there is no specific restriction for this. The drive part 225 is fixed inside the transmission frame 221 through a drive fixation base, and a drive shaft 2251 penetrates through an end of the drive part 225. The transport component 224 is arranged inside one installation cavity of the transmission frame 221, a plurality of installation holes are arranged along the installation cavity. The transport component 224 is rotationally arranged at the transmission frame 221 through each installation hole, and it can adopt the belt-pulley installation cavity mode. Preferably, the transport component 224 includes a driving wheel 2241 which is sleeved at the drive shaft 2251, a driven wheel 2242 which is arranged relative to the driving wheel 2241, and a synchronous belt 2243 which is arranged between the driving wheel 2241 and the driven wheel 2242. The driven wheel 2242 is rotationally connected with the gripping part 226, and the gripping part 226 is arranged along the opposite side of the drive part 225. The gripping part 226 includes a gripping roller 2261 which is fixed at both left and right ends of the bottom of the transmission frame 221 and a transmission shaft 2262 which penetrates through each gripping roller 2261. Simultaneously, the drive shaft 2262 penetrates through the driven wheel 2242. Since the drive part 225 can drive the driving wheel 2241 to rotate, the driven wheel 2242 rotates under the action of the synchronous belt 2243, such that each gripping

roller 2261 is driven to rotate through the transmission shaft 2262. Preferably, each gripping roller 2261 can use an annular rubber coated roller, the synchronous belt 2243 can use a toothed belt, and the driving wheel 2241 and the driven wheel 2242 both can use toothed wheels engaged with the synchronous belt 2243, which improves the efficiency and stability of transport. In this way, each gripping roller 2261 rotates to gradually grip the document located inside each feeding channel 202. The working principle simulates the working process of pressing and pushing the document by the human hand. With the gripping piece 222, on the one hand, the information at the document surface is not scratched, and on the other hand, the gripping is stable without deviation. It should be noted that in order to accurately grip the document, a gripping sensing switch is arranged along the gripping roller 2261, and configured to sense the position information of the document movement and feed the position information back to the control system, which improves the reliability of the document gripping, thus indirectly improving the accuracy of the document transport.

Of course, in other embodiments, the transport component 224 can also adopt a chain transmission, and include a driving chain wheel that is rotationally connected with the drive part 225, a chain that is sleeved outside the driving chain wheel, and a driven chain wheel that is sleeved at the chain and is oppositely arranged relative to the driving chain wheel. The driven chain wheel is rotationally connected with the transmission shaft 2262. In this way, the driven chain wheel rotates synchronously with the driving chain wheel under the drive of the chain, and the gripping roller 2261 is driven to roll by the transmission shaft 2262, so as to achieve the gripping of the document. In this embodiment, both the driving chain wheel and the driven chain wheel are engaged with the chain, which improves the transport accuracy and stability. Of course, the transport component 224 is not completely limited to the above two methods, but can also include worm transmission or

pneumatic transmission, hydraulic transmission, etc., which can also achieve fast and accurate gripping of document, and are described further for concise.

In addition, in other embodiments, the gripping part 226 can also use a gripping block with a gripping function that is connected with the transport component 224. For example, a gripping clip, a gripping arm, or a pasting block are arranged along the bottom of the gripping block, which can realize the gripping of document. This is not described further for concise.

Please refer to Figures 2 and 9, simultaneously. As an optional embodiment of this disclosure, the transport structure 300 includes a slide component 301 arranged at the top of the installation frame 100, the slide component 301 includes a slide rail 3011 which is arranged at the top of the installation frame 100 and a slide block 3012 which is clamped at a top of the gripping fixation frame 21. Specifically, in this embodiment, the slide rail 3011 extends from the feeding position 11 to the target invalidation position 12 along the top of the installation frame 100, ensuring that the gripping fixation frame 21 can reciprocate between the feeding position 11 and the target invalidation position 12 along the slide rail 3011, thus realizing the transport of materials. In addition, an installation position for installing the slide block 3012 is arranged along the top of the gripping fixation frame 21, so that the slide block 3012 is just clamped at the gripping fixation frame 21. The slide block 3012 enables the gripping fixation frame 21 to slide along the slide rail 3011 to reciprocate between the feeding position 11 and the target invalidation position 12 of the installation frame 100, thereby improving the transport stability.

Please refer to Figures 5 and 10, simultaneously. As another optional embodiment of this disclosure, the transport structure 300 includes a slide component 301 which is arranged at the top of the installation frame 100 and a slide sensing switch 302 which is fixed at a top of the slide component 301. A slide groove 104 is arranged along the top of the installation frame 100, and a slide sensing base

is respectively arranged along the feeding position 11 and the target invalidation position 12 of the installation frame 100. Specifically, the slide assembly 301 includes a slide rail 3011 which is arranged at the top of the installation frame 100 and a slide block 3012 which is clamped at the top of the gripping fixation frame 21, while the slide sensing switch 302 is arranged at a top of the slide block 3012 and is fixedly connected with the slide block 3012 through a fixation apparatus. In this way, when the drive apparatus 400 drives the displacing component 20 to bring the gripping structure 200 to move horizontally along the transport structure 300 towards the target invalidation position 12, the slide block 3012 is clamped at the top of the gripping fixation frame 21 and drives the slide sensing switch 302 to move horizontally along the slide groove 104, and reciprocate between the feeding position 11 and the target invalidation position 12. Therefore, each slide sensing switch 302 can sense the transport position information of the gripping structure 200, and also play the role of position-limiting and guidance. This guarantees the reliability and security of document transport. It should be noted that in this embodiment, the slide groove 104 opened along the top of the installation frame 100 also has the function of facilitating the maintenance and adjustment of the internal structures of the installation frame 100, as well as facilitating the internal wiring of the internal structures of the installation frame 100, so as to prevent the appearance from being affected by the complicated wiring.

Refer to Figures 2 and 11, simultaneously. As an optional embodiment of this disclosure, the drive apparatus 400 includes a drive support 401 which is fixed at the installation frame 100, a drive motor 402 which is installed at the drive support 401, and a drive shaft 403 with an end which is rotatably connected with the drive motor 402 and penetrates through the gripping fixation frame 21. Specifically, a top of the drive support 401 is provided with an installation piece, through which the drive support 401 can be detachably connected to the installation frame 100. In addition,

a connection piece is arranged along the drive support 401, through which the drive motor 402 can be detachably installed at the drive support 401. In addition, a drive shaft 403 is arranged along the end of the drive motor 402, and a fixation hole is arranged along the side of the gripping fixation frame 21 which is opposite to the drive motor 402. The fixation hole is matched with the shaft diameter of the drive shaft 403, which guarantees that the drive shaft 403 can penetrate through the gripping fixation frame 21 along the fixation hole, and the drive shaft 403 extends to the fixation bearing which is arranged along the corresponding target invalidation position 12 in the installation frame 100, so that the drive motor 402 can drive the entire displacing component 20 to reciprocate between the feeding position 11 and the target invalidation position 12 through the drive shaft 403. Thus, the gripping structure 202 is driven to reciprocate between the feeding position 11 and the target invalidation position 12, and the document is moved back and forth between the feeding position 11 and the target invalidation position 12. It should be noted that in this embodiment, the drive motor 402 can also be replaced by a hydraulic drive module or pneumatic drive module, which is not limited and described herein for concise.

Referring to Fig. 12, this disclosure further provides a document invalidation device 1, including the above feeding mechanism 10, a document invalidation mechanism 80 which is connected with the feeding mechanism 10, and a waste recycling mechanism 90 which is located below the document invalidation mechanism 80. The feeding mechanism 10 can adopt any technical solutions of all the above embodiments, so it has at least all the beneficial effects brought by the technical solutions of the above embodiments. The document invalidation device 1 of this disclosure includes the above feeding mechanism 10, so it has all the beneficial effects brought by the technical solutions of the above embodiments, which is not repeated herein for concise.

The document invalidation mechanism 80 and waste recycling mechanism 90 can employ any know technical solution of the prior art.

For ordinary technicians in the art, any obvious changes made to the above embodiments on the basis of not deviating from the technical principle of this disclosure, belong to the concept of this disclosure and the protection scope of the appended claims. Furthermore, although exemplary embodiments have been described herein, their scope includes any and all embodiments based on this disclosure that have equivalent elements, modifications, omissions, combinations (e. g., schemes crossed by various embodiments), adaptations, or changes.

The above description is intended to be illustrative rather than restrictive. For example, the above examples (or one or more of them) may be used in combination with each other. For example, those skilled in the art may use other embodiments when reading the above description.

CLAIMS

1. A feeding mechanism, which is configured inside an installation frame and reciprocates between a feeding position and a target invalidation position inside the installation frame; wherein the feeding mechanism comprises a transport structure which is installed at a top of the installation frame, a displacing component which is in slidable connection with the transport structure, and a drive apparatus which is in drive connection with the displacing component, wherein the drive apparatus drives the displacing component to move in a horizontal direction, the displacing component comprises a feeding structure and a gripping structure, the feeding structure is arranged along the feeding position, and the gripping structure moves upward and downward relative to the feeding structure in a vertical direction.

2. The feeding mechanism according to claim 1, wherein the installation frame comprises a connection plate and at least one support plate which enclose to form a through transport cavity.

3. The feeding mechanism according to claim 2, wherein the installation frame is provided with a document identification apparatus which is arranged along the transport cavity to identify document information of a document passing through the transport cavity.

4. The feeding mechanism according to claim 1, wherein the feeding structure comprises a feeding frame with at least one feeding channel and an adaptive switching mechanism which is located at the feeding frame; wherein the adaptive switching mechanism adjusts the feeding frame to move in the vertical direction to switch each feeding channel.

5. The feeding mechanism according to claim 4, wherein the adaptive switching mechanism comprises a switching drive source which is arranged at the feeding frame and a switching guide piece which is located at both sides of the feeding frame.

6. The feeding mechanism according to claim 1, wherein the gripping structure comprises a gripping fixation frame which is connected with the transport structure, a gripping mechanism which moves upward and downward along the gripping fixation frame in the vertical direction, and a gripping power source with one end fixed at the gripping fixation frame and the other end fixed at the gripping mechanism.

7. The feeding mechanism according to claim 6, wherein the gripping mechanism comprises a transmission frame which is in drive connection with the gripping power source, a gripping piece which is arranged inside the transmission frame, and a guide apparatus which is arranged at both ends of the transmission frame; wherein the guide apparatus is embedded into the gripping fixation frame, one end of the gripping power source is fixed at the gripping fixation frame, and the other end of the gripping power source is in drive connection with the transmission frame.

8. The feeding mechanism according to claim 1, wherein the gripping structure comprises a gripping fixation frame which is connected with the transport structure, a gripping mechanism which is embedded into the feeding frame and can moves upward and downward along the gripping fixation frame in the vertical direction, and a gripping power source with one end fixed at the gripping fixation frame and the other end fixed at the gripping mechanism.

9. The feeding mechanism according to claim 8, wherein the gripping mechanism comprises a transmission frame which is embedded into the feeding frame, a gripping piece which is arranged inside the transmission frame, and a guide apparatus with one end penetrates through and is arranged at the transmission frame and with the other end penetrates through and is fixed at the gripping fixation frame, one end of the gripping power source is fixed at the gripping fixation frame, and the

other end of the gripping power source is in drive connection with the transmission frame.

10. The feeding mechanism according to claim 7 or 9, wherein the gripping piece comprises a transport component which is rotationally arranged at the transmission frame, a drive part which is fixed inside the transmission frame and in drive connection with the transport component, and a gripping part which is fixed at a side of the transmission frame which is opposite to the drive part.

11. The feeding mechanism according to any one of claims 6-7, wherein the transport structure comprises a slide component which is arranged at the top of the installation frame, the slide component comprises a slide rail which is arranged at the top of the installation frame and a slide block which is clamped at a top of the gripping fixation frame.

12. The feeding mechanism according to any one of claims 8-9, wherein the transport structure comprises a slide component which is arranged at the top of the installation frame and a slide sensing switch which is fixed at a top of the slide component.

13. The feeding mechanism according to claim 12, wherein the slide component comprises a slide rail which arranged at the top of the installation frame and a slide block which is clamped at a top of the gripping fixation frame, and the slide sensing switch is arranged at a top of the slide block.

14. The feeding mechanism according to claim 6 or 8, wherein the drive apparatus comprises a drive support which is fixed at the installation frame, a drive motor which is installed at the drive support, and a drive shaft with an end which is rotatably connected with the drive motor and penetrates through the gripping fixation frame.

15. A document invalidation device comprising the feeding mechanism according to any one of claims 1-14, a document invalidation mechanism which is

connected with the feeding mechanism, and a waste recycling mechanism which is located below the document invalidation mechanism.