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(54) **FULLY AUTOMATIC COLD STAMPING MACHINE OF ROTATING WHEEL TYPE**

(57) The utility model relates to the technical field of surface special printing equipment, and in particular to a cylinder type fully automatic cold foil machine. The cylinder type fully automatic cold foil machine according to the utility model comprises a machine frame body, a seal box, an infrared preheater, a vacuum suction mechanism, a conveyor belt mechanism, a pre-curing device, a stamping foil mounting device, a stamping foil rewinding device, an in-printing curing device, a post-curing device, and a cold foil rubber roller mechanism composed of a rotating main cylinder and two foil pressing rollers, wherein the conveyor belt mechanism is composed of a front-stage conveyor belt and a post-stage conveyor belt; and the pre-curing device, the stamping foil mounting device, the stamping foil rewinding device, the in-printing curing device, the post-curing device and the cold foil rubber roller mechanism are respectively located in the seal box. The foiling portion of the utility model adopts a structure form of matching the rotating main cylinder with the two foil pressing rollers, which can carry out two-side press fit transfer processing of stamping foil and a printing substrate; at the same time, glue on the printing substrate cured at different degrees in the pre-curing, in-printing curing and post-curing stages by using the three curing devices, which can effectively ensure the integrity of cold foil patterns and a cold foil effect; and the cylinder type fully automatic cold foil machine is simple and compact in structure and can ensure effects of cold foil processes

such as raised foiling, embossed, and raised cast and cure.

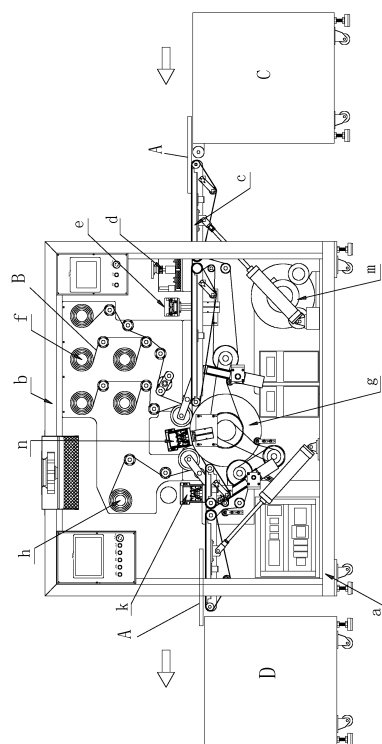


FIG. 1

Description

TECHNICAL FIELD

[0001] The utility model relates to the technical field of printing equipment for special printing on substrates and in particular to a cylinder type fully automatic cold foil machine.

BACKGROUND

[0002] As we all know, a cold foil technology is an important breakthrough in the existing printing technology. The cold foil technology combines a conventional printing technology and bonding technology, which not only increases the variability of printing design, but also can be used to produce products which have perfect effects of completing cold foil and embossing in one time. The cold foil technology is widely used in the production of packaging boxes, exquisite poster calendars, anti-counterfeit labels, various securities, and the like. The cold foil technology can not only reduce production costs and improve production efficiency, but also re-create the added value of products. Therefore, the cold foil technology has gradually become a new development trend in printing technology.

[0003] However, the conventional cold foil technology is limited by factors such as the unreasonable structure and function design of a cold foil device used, which leads to the following problems:

1. During cold foiling, since a curing lamp cannot cure the area where the printing substrate and the stamping foil are in contact, the glue in the area cannot be fully cured, so that the stamping foil cannot be completely transferred to the printing substrate, resulting in an incomplete foil pattern and a poor result.
2. After a printing device is working for a long time, the heat generated by components such as the curing lamp and a cold foil rubber roll will gradually increase, a heat-conducting component will be abnormally heated, and the high-temperature environment generated therefrom will affect the printing effect of the printing substrate, which will also affect the normal operation of the device itself in a serious situation.
3. Usually, a printed product often combines different printing patterns but the conventional printing device cannot meet the requirement for the number of printed patterns due to insufficient number of stamping foils mounting component.
4. The printing substrate or the formed printed matter is easily affected by external air movement or external force during transfer, resulting in substrate movement or positional deviation, which may result in incomplete printing of some patterns or failure to collect materials normally by a subsequent device.

5. The device is too complicated in structure, poor in flexibility, large in occupied space and poor in use and maintenance convenience, cannot be adjusted according to the specific environment in a workshop or production needs, and cannot form a production line with other devices in a cold foil technology, so that the printing substrate cannot be printed in one go, which increases the printing processes and the manufacture cost and reduces the production efficiency.

SUMMARY

[0004] Against the above deficiencies of the prior art, an objective of the utility model is to provide a cylinder type fully automatic cold foil machine.

[0005] In order to achieve the above objective, the utility model adopts the following technical solutions:

A cylinder type fully automatic cold foil machine, comprising:

a machine frame body, the machine frame body being provided with an electrical control assembly that functions as a core control;

a seal box, the seal box being mounted on the machine frame body, and the seal box is provided with a fresh air port and an air outlet;

a conveyor belt mechanism for conveying a printing substrate, wherein the conveyor belt mechanism being mounted on the machine frame body and distributed in a manner of passing through the seal box in the left-right direction;

an infrared preheater for preheating the printing substrate and flatten the glue on the printing substrate, the infrared preheater being mounted above the feeding end of the conveyor belt mechanism in the front-rear direction;

a pre-curing device for semi-curing the glue on the printing substrate, the pre-curing device being mounted above the conveyor belt mechanism in the front-rear direction and located on the discharging side of the infrared preheater;

a stamping foil mounting device for mounting several rolls of stamping foils, guiding and unwinding the foils, the stamping foil mounting devices being mounted above the conveyor belt mechanism in the front-rear direction and located on the discharging side of the pre-curing device;

a stamping foil guiding device for guiding and discharging several rolls of different stamping foils, the foil guiding device being mounted above the conveyor belt mechanism in the front-rear direction and located on the discharging side of the pre-curing device;

a cold foil rubber roller mechanism for transferring to the stamping foil, unwinded from the foil mounting device, to the printing substrate.

a stamping foil rewinding device for drawing the

stamping foil from the stamping foil unwinding units and collecting the used foils, the stamping foil re-winding device being mounted above the discharging end of the conveyor belt mechanism and located on the discharging end of the cold foil rubber roller mechanism;

a post-curing device for performing reinforced curing processing on glue between the stamping foil and the printing substrate, the post-curing device being mounted above the conveyor belt mechanism in the front-rear direction and located on the discharging side of the cold foil rubber roller mechanism;

and
a vacuum suction mechanism for sucking the printing substrate on the conveyor belt mechanism, the vacuum suction mechanism being disposed below the conveyor belt mechanism and connected with the conveyor belt mechanism;

the conveyor belt mechanism comprises a front-stage conveyor belt disposed under the infrared pre-heater, the pre-curing device and the stamping foil mounting device in the left-right direction and a post-stage conveyor belt disposed under the stamping foil rewinding device and the post-curing device in the left-right direction; relative to the horizontal plane, the installation position of the front-stage conveyor belt on the machine frame body is higher than that of the post-stage conveyor belt on the machine frame body;

the cold foil rubber roller mechanism comprises a rotary main cylinder located between the front-stage conveyor belt and the post-stage conveyor belt and respectively connected with the front-stage conveyor belt and the post-stage conveyor belt through a synchronous belt set; a front foil pressing roller placed above the discharging end of the front-stage conveyor belt and tangential to the rotary main cylinder, and a rear foil pressing roller placed above the feeding end of the post-stage conveyor belt and tangential to the rotary main cylinder;

the cylinder type fully automatic cold foil machine further comprises an in-printing curing device disposed on the machine frame body and located between the front foil pressing roller and the rear foil pressing roller to cure the glue while the printing substrate and the stamping foil is on contact and pressed; and

the infrared preheater, the pre-curing device, the stamping foil mounting device, the front-stage conveyor belt, the cold foil rubber roller mechanism, the post-stage conveyor belt, the post-curing device and the stamping foil rewinding device are located inside the seal box.

[0006] Preferably, the stamping foil mounting device comprises at least one multi-stage guiding roller set located above the front-stage conveyor belt in the front-rear direction, each of the multi-stage guiding roller sets

comprises a slip-type air shaft on top for mounting a roll of stamping foil and a bottom slip-type air shaft, and the bottom slip-type air shaft is located under the top slip-type air shaft; the top slip-type air shaft and the bottom slip-type air shaft are each correspondingly provided with a tension guide roller for performing tension and guiding control on the stamping foil, and a discharging guide roller is disposed between the tension guide roller corresponding to the bottom slip-type air shaft and the front foil pressing roller;

the stamping foil on the top slip-type air shaft is drawn to be between the rotary main cylinder and the front foil pressing roller through the tension guide roller corresponding to the top slip-type air shaft, the tension guide roller corresponding to the bottom slip-type air shaft and the discharging guide roller; and the stamping foil on the bottom slip-type air shaft is drawn to be between the rotary main cylinder and the front foil pressing roller through the tension guide roller corresponding to the bottom slip-type air shaft and the discharging guide roller.

[0007] Preferably, the conveyor belt mechanism further comprises a single-stage roll matching one of the multi-stage roll sets for use; the single-stage roll comprises a single-stage slip-type air shaft parallel to the top slip-type air shaft in a left-right mode; the single-stage slip-type air shaft is correspondingly provided with at least one single-stage tension guide roller; and stamping foil on the single-stage slip-type air shaft is drawn to be between the rotary main cylinder and the front foil pressing roller through the single-stage tension guide roller, the tension guide roller corresponding to the bottom slip-type air shaft and the discharging guide roller.

[0008] Preferably, the front foil pressing roller and the rear foil pressing roller each comprise a roller pneumatic lifting cylinder mounted in the machine frame body and located below the conveyor belt mechanism, a pressing rubber roller placed above the conveyor belt mechanism and tangential to the rotary main cylinder, and a lifting swing arm that is connected to the machine frame body through a shaft, with the bottom end connected with the rubber roll lifting cylinder and the top end connected with the pressing rubber rollers.

[0009] Preferably, the conveyor belt mechanism further comprises a front connecting conveyor belt that has the left end connected to the machine frame body through a shaft and is located on the feeding side of the front-stage conveyor belt and a rear connecting conveyor belt that has the right end connected to the machine frame body through a shaft and is located on the discharging side of the post-stage conveyor belt; the synchronous belt set comprises a first front-stage synchronous belt, a second front-stage synchronous belt, a first front-stage synchronous wheel, a second front-stage synchronous wheel, a front-stage tensioning wheel, a first post-stage synchronous belt, a second post-stage synchronous belt, a third post-stage synchronous belt, a first post-stage synchronous wheel, a second post-stage synchronous wheel, a third post-stage synchronous wheel, and a post-

stage tensioning wheel;
the front-stage tensioning wheel and the second front-stage synchronous wheel are sequentially distributed from top to bottom below the feeding end of the front-stage conveyor belt, the first front-stage synchronous wheel is disposed below the front-stage conveyor belt, the first front-stage synchronous belt integrates the rotary main cylinder with the first front-stage synchronous wheel in a sleeved manner, and the left end of the second front-stage synchronous belt is wound around the first front-stage synchronous wheel; the right end of the second front-stage synchronous belt is simultaneously wound around the second front-stage synchronous wheel, a rotating shaft at the left end of the front connecting conveyor belt, and a rotating shaft at the right end of the front-stage conveyor belt, and the front-stage tensioning wheel is pressed on the second front-stage synchronous belt; the post-stage tensioning wheel and the third post-stage synchronous wheel are sequentially distributed from top to bottom below the discharging end of the post-stage conveyor belt, the first post-stage synchronous wheel is disposed below the right end of the rotating main cylinder, the second post-stage synchronous wheel is disposed below the post-stage conveyor belt, the first post-stage synchronous belt integrates the rotating main cylinder with the first post-stage synchronous wheel in a sleeved mode, the second post-stage synchronous belt integrates the first post-stage synchronous wheel with the second post-stage synchronous wheel in a sleeved mode, and the right end of the third post-stage synchronous belt is wound around the second post-stage synchronous wheel; the left end of the third post-stage synchronous belt is simultaneously wound around the third post-stage synchronous wheel, a rotating shaft at the right end of the rear connecting conveyor belt, and a rotating shaft at the left end of the post-stage conveyor belt, and the post-stage tensioning wheel is pressed on the third post-stage synchronous belt.

[0010] Preferably, the machine frame body is internally provided with a front-stage overturning cylinder and a post-stage overturning cylinder, a power shaft of the front-stage overturning cylinder is connected to the bottom surface of the front connecting conveyor belt, and the front-stage overturning cylinder drives the front connecting conveyor belt to perform a 90-degree overturning movement relative to the front-stage conveyor belt; a power shaft of the post-stage overturning cylinder is connected to the bottom surface of the rear connecting conveyor belt, and the post-stage overturning cylinder drives the rear connecting conveyor belt to perform a 90-degree overturning movement relative to the post-stage conveyor belt.

[0011] Preferably, the vacuum suction mechanism comprises a vacuum pump, a vacuum accumulator, and a plurality of air suction pipes; the vacuum pump and the vacuum accumulator are mounted in the machine frame body and located below the conveyor belt mechanism; the vacuum accumulator is connected with the vacuum

pump, the tail end of each of the air suction pipes is connected with the vacuum pump, the head end of each of the air suction pipes is respectively correspondingly connected to the bottom surfaces of the front connecting conveyor belt, the front-stage conveyor belt, the post-stage conveyor belt, and the rear connecting conveyor belt.

[0012] Preferably, the cylinder type fully automatic cold foil machine further comprises a cooling pipe assembly for supplying a cooling medium, the cooling pipe assembly comprises cooling pipes distributed by passing through the rotating main cylinder

, the pre-curing device, the in-printing curing device and the post-curing device, and cooling supporting plates disposed above or below the front-stage conveyor belt and the post-stage conveyor belt; and the pre-curing device and the post-curing device are located within the contour coverage of the corresponding cooling supporting plates respectively.

[0013] Due to the adoption of the above technical solution, a foiling portion of the utility model adopts a structure form of matching the rotating main cylinder with the two foil pressing rollers, which can carry out two-side press fit transfer processing of stamping foil and a printing substrate; at the same time, glue on the printing substrate cured at different degrees in the pre-curing, in-printing curing and post-curing stages by using the three curing devices, which can effectively ensure the integrity of foil patterns and a foiling effect; and the rotary cylinder type fully automatic cold foil machine is simple and compact in structure and can ensure effects of foiling processes such as cold foil, raised cold foil, cast and cure and raised cast and cure. In addition, the entire machine can be seamlessly connected to other printing devices and can implement on-line running-form one-time printing of printed products such as sheets, films, and paper, without the need for additional process settings, thereby effectively improving production efficiency. The machine has a strong practical value and marketing value.

BRIEF DESCRIPTION OF DRAWINGS

[0014]

FIG. 1 is a schematic view showing a planar structure of an embodiment of the utility model in a use state; FIG. 2 is a schematic front plan view (I) of an internal structure of an embodiment of the utility model; FIG. 3 is a schematic front plan view (I) of an internal structure of an embodiment of the utility model; FIG. 4 is a schematic vertical view showing a planar structure of an embodiment of the utility model; and FIG. 5 is a schematic view showing a planar structure of an embodiment of the utility model in a folded state.

[0015] In the figure:

A. printing substrate; B. stamping foil; C. front-end proc-

ess processing device; D. post-stage process processing device;

a. machine frame body; b. seal box; c. conveyor belt mechanism; d. infrared preheater; e. pre-curing device; f. stamping foil mounting device; g. cold foil rubber roller mechanism; h. stamping foil rewinding device; k. post-curing device; m. vacuum suction mechanism; n. in-printing curing device

1. operation panel; 2. control box; 3. fresh air port; 5. front-stage conveyor belt; 6. post-stage conveyor belt; 7. rotating main cylinder; 8. front foil pressing roller; 9. rear foil pressing roller; 10. top slip-type air shaft; 11. bottom slip-type air shaft; 12. tension guide roller; 13. discharging guide roller; 14. single-stage slip-type air shaft; 15. single-stage tension guide roller; 16. rubber roll lifting cylinder; 17. lifting swing arm; 18. front connecting conveyor belt; 19. rear connecting conveyor belt; 200. first front-stage synchronous belt; 201. second front-stage synchronous wheel; 202. first front-stage synchronous wheel; 203. second front-stage synchronous wheel; 204. front-stage tensioning wheel; 205. first post-stage synchronous belt; 206. second post-stage synchronous belt; 207. third post-stage synchronous belt; 208. first post-stage synchronous wheel; 209. second post-stage synchronous wheel; 210. third post-stage synchronous wheel; 211. post-stage tensioning wheel; 21. front-stage overturning cylinder; 22. post-stage overturning cylinder; 23. vacuum pump; 24. negative pressure air pipe; 25. cooling pipe; 26. cooling supporting plate.

DESCRIPTION OF EMBODIMENTS

[0016] The embodiments of the utility model are described in detail below with reference to the accompanying drawings, but the utility model can be implemented in various different ways as defined and covered by the claims.

[0017] As shown in FIGs. 1 to 5, a cylinder type fully automatic cold foil machine provided by the utility model comprises:

a machine frame body a, wherein the machine frame body a is provided with an electrical control assembly that functions as a core control (the electrical control assembly is mainly composed of an operation panel 1 mounted on the machine frame body a, an electrical control box 2 mounted in the machine frame body a, corresponding electrical lines, and the like);

a seal box b, mainly used to ensure the working environment of the internal printing of the whole machine to create a relatively closed space and to block the pollution from the external environment, wherein the seal box b is mounted on the machine frame body a, and the seal box b is provided with a fresh air port 3 and an air outlet (which are mainly formed by gaps between various mechanism components of a device) to provide a structural basis for functions of fresh air feeding and automatic air draft in the seal

box b;

a conveyor belt mechanism c, mainly used for conveying a printing substrate A so that the printing substrate A can be subjected to printing, embossing, raised cast a cure, and the like in the environmental space of the seal box b, wherein the conveyor belt mechanism c is mounted on the machine frame body a and passes through the seal box b in the left-right direction;

an infrared preheater d, mainly used for preheating the printing substrate A and leveling glue on the printing substrate A to enhance the fluidity, flatness and viscosity of the glue on the printing substrate A, wherein the infrared preheater d is mounted above the feeding end of the conveyor belt mechanism c in the front-rear direction;

a pre-curing device e, mainly used for semi-curing the glue on the printing substrate A (that is, the glue on the printing substrate A satisfies the bonding requirement for stamping foil B), wherein the pre-curing device e is mounted on the conveyor belt mechanism c in the front-rear direction and located on the discharging side of the infrared preheater d; at the same time, the pre-curing device e can adopt an LED UV lamp, a mercury lamp, a halogen lamp, or the like as a core illumination element according to the specific situation, and the LED UV lamp is preferred in this embodiment;

a stamping foil mounting device f, mainly used for storing a plurality of stamping foil rolls and enabling the stamping foil B to be guided (pulled) and discharged under the cooperation of a corresponding mechanism, wherein the stamping foil mounting device f is mounted above the conveyor belt mechanism c and located on the discharging side of the pre-curing device e;

a cold foil rubber roller mechanism g, mainly used to cause the stamping foil B guided out by the stamping foil mounting device f to be in contact with the printing substrate A and generate a certain bearing pressure to transfer the stamping foil B to the surface of a pattern of the printing substrate A with the glue printed thereon.

a stamping foil rewinding device h, mainly used to draw the stamping foil B outputted by the stamping foil mounting device f and recycle a waste film of the stamping foil B formed after being processed by the cold foil rubber roller mechanism g, wherein the stamping foil rewinding h is mounted above the discharging end of the conveyor belt mechanism c and located on the discharging side of the cold foil rubber roller mechanism g;

a post-curing device k, mainly used to perform reinforced curing processing (namely complete curing processing) on glue (namely glue in the finished product, formed after being processed by the cold foil rubber roller mechanism g) between the stamping foil B and the printing substrate A, wherein the

pos-curing device k is mounted above the conveyor belt mechanism c in the front-rear direction and located on the discharging side of the cold foil rubber roller mechanism g; at the same time, the post-curing device k can adopt an LED UV lamp, a mercury lamp, a halogen lamp, or the like as a core illumination element according to the specific situation, and the LED UV lamp is preferred in this embodiment; and

a vacuum suction mechanism m, mainly used to adsorb the printing substrate A (certainly also including a finished product after the completion of a col foil process) to the conveyor belt mechanism c, to prevent the printing substrate A and the finished product from being misaligned, deformed or uneven on the surface during transportation, wherein the vacuum suction mechanism m is mounted below the conveyor belt mechanism c and connected with the conveyor belt mechanism c;

the conveyor belt mechanism c comprises a front-stage conveyor belt 5 disposed under the infrared preheater d, the pre-curing device e and the stamping foil mounting device f in the left-right direction and a post-stage conveyor belt 6 disposed under the stamping foil rewinding device h and the post-curing device k in the left-right direction; relative to the horizontal plane, the installation position of the front-stage conveyor belt 5 on the machine frame body a is higher than that of the post-stage conveyor belt 6 on the machine frame body a; the cold foil rubber roller mechanism g comprises a rotating main cylinder 7 disposed between the front-stage conveyor belt 5 and the post-stage conveyor belt 6 and respectively connected with the front-stage conveyor belt 5 and the post-stage conveyor belt 6 through a synchronous belt set, a front foil pressing roller 8 disposed above the discharging end of the front-stage conveyor belt 5 and tangential to the rotating main cylinder 7, and a front foil pressing roller 9 mounted above the feeding end of the post-stage conveyor belt 6 and tangential to the rotating main cylinder 7; at the same time, an in-printing curing device n for curing the printing substrate A where the stamping foil B is pressed is further mounted in the front-rear direction on the machine frame body a and located between the front foil pressing roller 8 and the rear foil pressing roller 9 (the in-printing curing device n can adopt an LED UV lamp, a mercury lamp, a halogen lamp, or the like as a core illumination element according to the specific situation, and the LED UV lamp is preferred in this embodiment); and the infrared preheater d, the pre-curing device e, the stamping foil mounting device f, the front-stage conveyor belt 5, the cold foil rubber roller mechanism 7, the post-stage conveyor belt 6, the post-curing device k and the stamping foil rewinding device h are located in the seal box b.

[0018] In this way, by structurally improving the cold foil rubber roller mechanism g in the conventional cold foil machine, a structure form of matching the rotating main cylinder 7 with the two foil pressing rollers 9 is formed; by using the difference in height between the front-stage conveyor belt 5 and the post-stage conveyor belt 6, the stamping foil B can be transferred on the printing substrate A through the matching between the front foil pressing roller 8 and the rotating main cylinder 7 and one-time adhesion fixation is completed, and then the printing substrate A and the stamping foil B are closely attached to the circumferential surface of the rotating main cylinder 7 under the traction by a post-stage component; at this time, heat generated by the in-printing curing device n can further cure the glue to make the stamping foil B firmly bonded to the printing substrate A; finally, the printing substrate A and the stamping foil B having undergone one-time adhesion fixation and post-adhesion curing processing are subjected to second press fit fixation between the rear foil pressing roller 9 and the rotating main cylinder 7 to further enhance the adhesion transfer effect between the two, and the integrity of a foil pattern and the foiling effect can be further ensured through the further curing of the post-curing device k. In addition, through the cooperation of other components and mechanisms of the whole machine, the machine also has the following effects: 1. Through the arranged seal box b, not only can a relatively closed printing environment be formed on the machine to prevent pollution from the external environment, but also a printed product in the seal box b can be air-cooled through the fresh air port 3 and the air outlet 4 as needed, thereby effectively solving the problem of deformation of the printing substrate A or the final printed product easily caused by the overtemperature of the pre-curing device e, the in-printing curing device n and the post-curing device k. 2. Through the negative pressure of the vacuum suction mechanism m, the printing substrate A or the finished product can be adsorbed to the conveyor belt mechanism c, thereby effectively preventing the printing substrate A or the finished product from being deviated or deformed in the conveying process. 3. The structural design of the stamping foil mounting device f enables the whole machine to mount a plurality of different stamping foil rolls according to the number of printed patterns to meet the requirements for the number of printed patterns. 4. Components in the whole machine can be under centralized control through the electrical control assembly, which provides the hardware basis for the digital automatic control of the machine, operation smoothness, operation accuracy, and the like.

[0019] In order to be able to provide the installation positions for a plurality of different stamping foil rolls, to minimize the waste of materials while meeting the requirements that a plurality of different stamping foils B are available when the printing substrate has a plurality of printed patterns, the stamping foil mounting device f of the embodiment comprises at least one multi-stage

roll set disposed above the front-stage conveyor belt 5 in the front-rear direction, each of the multi-stage roll sets comprises a top slip-type air shaft 10 for storing a stamping foil roll and a bottom slip-type air shaft 11, and the bottom slip-type air shaft 11 is located under the top slip-type air shaft 10; the top slip-type air shaft 10 and the bottom slip-type air shaft 11 are each correspondingly provided with a tension guide roller 12 for performing tension and guiding control on the stamping foil B, and a discharging guide roller 13 is disposed between the tension guide roller 12 corresponding to the bottom slip-type air shaft 11 and the front foil pressing roller 8. Therefore, when the stamping foil B is pulled, the stamping foil B on the top slip-type air shaft 10 is pulled to be between the rotating main cylinder 7 and the front foil pressing roller 8 through the tension guide roller 12 corresponding to the top slip-type air shaft 10, the tension guide roller 12 corresponding to the bottom slip-type air shaft 11 and the discharging guide roller 13, and stamping foil B on the bottom slip-type air shaft 11 is pulled to be between the rotating main cylinder 7 and the front foil pressing roller 8 through the tension guide roller 12 corresponding to the bottom slip-type air shaft 11 and the discharging guide roller 13. Certainly, depending on actual needs, a plurality of slip-type air shafts may be arranged in the up-and-down direction between the top slip-type air shaft 10 and the bottom slip-type air shaft 11 (correspondingly, each of the slip-type air shafts is correspondingly provided with a tension guide roller shaft); after the stamping foil B located on the upper slip-type air shaft is guided out by the corresponding tension guide roller shaft, the stamping foil B can be guided out through the tension guide roller shaft corresponding to the lower slip-type air shaft, and is finally guided to be between the rotating main cylinder 7 and the front foil pressing roller 8 through the discharging guide roller 13.

[0020] As a preferred embodiment, the stamping foil mounting device f of the embodiment further includes a single-stage roll matching one of the multi-stage roll sets for use; the single-stage roll comprises a single-stage slip-type air shaft 14 parallel to the top slip-type air shaft 10 in a left-right mode; the single-stage slip-type air shaft 14 is correspondingly provided with at least one single-stage tension guide roller 15; and stamping foil B on the single-stage slip-type air shaft 14 is pulled to be between the rotating main cylinder 7 and the front foil pressing roller 8 through the single-stage tension guide roller 15, the tension guide roller 12 corresponding to the bottom slip-type air shaft 11 and the discharging guide roller 13. Thereby, a structural form in which a plurality of stamping foils B as shown in FIG. 5 can be simultaneously pulled and conveyed, which meets the printing requirements for the number of patterns; meanwhile, since the stamping foil mounting device f can simultaneously assemble a plurality of stamping foils with no need to perform repeated printing on the printing substrate A many times, which is favorable for improving the printing production efficiency of the entire machine.

[0021] In order to enhance the adjustability of the entire cold foil rubber roller mechanism g, and particularly to be able to adaptively adjust the bearing pressure according to actual printing requirements. The front foil pressing roller 8 and the rear foil 9 of the embodiment each comprise a rubber roll lifting cylinder 16 mounted in the machine frame body a and located below the conveyor belt mechanism c, a coining rubber roll placed above the conveyor belt mechanism c and tangential to the rotating main cylinder 7, and a lifting swing arm 17 that is connected to the machine frame body a through a shaft, with the bottom end connected with the rubber roll lifting cylinder 16 and the top end connected with the coining rubber roll. In this way, through the control of the rubber roll lifting cylinder 16, the coining rubber roll can be away from or close to the rotating main cylinder 7 by means of the swing effect of the lifting swing arm 17, so that the bearing pressure is regulated by using the coining rubber roll, and it is ensured that the stamping foil B can be transferred and adhere to the surface of a pattern of the printing substrate A.

[0022] In order to enhance the performance of regulating a space occupied by the entire machine and enable the printing substrate A to be stably conveyed within a preset stroke, the conveyor belt mechanism c of the embodiment further includes a front connecting conveyor belt 18 that has the left end connected to the machine frame body a through a shaft and is located on the feeding side of the front-stage conveyor belt 5 and a rear connecting conveyor belt 19 that has the right end connected to the machine frame body a through a shaft and is located on the discharging side of the post-stage conveyor belt 6; the synchronous belt set comprises a first front-stage synchronous belt 200, a second front-stage synchronous belt 201, a first front-stage synchronous wheel 202, a second front-stage synchronous wheel 203, a front-stage tensioning wheel 204, a first post-stage synchronous belt 205, a second post-stage synchronous belt 206, a third post-stage synchronous belt 207, a first post-stage synchronous wheel 208, a second post-stage synchronous wheel 209, a third post-stage synchronous wheel 210, and a post-stage tensioning wheel 211; the front-stage tensioning wheel 204 and the second front-stage synchronous wheel 203 are sequentially distributed from top to bottom below the feeding end of the front-stage conveyor belt 5, the first front-stage synchronous wheel 202 is disposed below the front-stage conveyor belt 5, the first front-stage synchronous belt 200 integrates the rotating main cylinder 7 with the first front-stage synchronous wheel 202 in a sleeved manner, and the left end of the second front-stage synchronous belt 201 is wound around the first front-stage synchronous wheel 202; the right end of the second front-stage synchronous belt 201 is simultaneously wound around the second front-stage synchronous wheel 203, a rotating shaft at the left end of the front connecting conveyor belt 18, and a rotating shaft at the right end of the front-stage conveyor belt 5, and the front-stage tensioning wheel 204

is pressed on the second front-stage synchronous belt 201; correspondingly, the post-stage tensioning wheel 211 and the third post-stage synchronous wheel 210 are sequentially distributed from top to bottom below the discharging end of the post-stage conveyor belt 6, the first post-stage synchronous wheel 208 is disposed below the right end of the rotating main cylinder 7, the second post-stage synchronous wheel 209 is disposed below the post-stage conveyor belt 6, the first post-stage synchronous belt 205 integrates the rotating main cylinder 7 with the first post-stage synchronous wheel 208 in a sleeved mode, the second post-stage synchronous belt 206 integrates the first post-stage synchronous wheel 208 with the second post-stage synchronous wheel 209 in a sleeved mode, and the right end of the third post-stage synchronous belt 207 is wound around the second post-stage synchronous wheel 209; the left end of the third post-stage synchronous belt 208 is simultaneously wound around the third post-stage synchronous wheel 210, a rotating shaft at the right end of the rear connecting conveyor belt 19, and a rotating shaft at the left end of the post-stage conveyor belt 6, and the post-stage tensioning wheel 211 is pressed on the third post-stage synchronous belt 207. In this way, the rotating main cylinder 7 can be used as a driving wheel of the whole synchronous belt set, the synchronous movement of each conveyor belt can be achieved by the cooperation of each of the synchronous belts and each of the synchronous wheels, thereby ensuring that the printing substrate A and the finished product are conveyed stably; meanwhile, the front connecting conveyor belt 18 can be in butt joint with a front-end process processing device C to receive the printing substrate A conveyed by the front-end process processing device C, and the rear connecting conveyor belt 19 can be in butt joint with a post-stage process processing device D to output the finished product having undergone cold foil processing. Therefore, the entire machine can be seamlessly connected to other printing devices and can implement on-line running-form one-time printing of printed products such as sheets, films, and paper, without the need for additional process settings, thereby effectively improving production efficiency.

[0023] To enhance the size of the machine itself and an occupied space, the machine frame body a is internally provided with a front-stage overturning cylinder 21 and a post-stage overturning cylinder 22, a power shaft of the front-stage overturning cylinder 21 is connected to the bottom surface of the front connecting conveyor belt 18, and the front-stage overturning cylinder 21 drives the front connecting conveyor belt 18 to perform a 90-degree overturning movement relative to the front-stage conveyor belt 5; a power shaft of the post-stage overturning cylinder 22 is connected to the bottom surface of the rear connecting conveyor belt 19, and the post-stage overturning cylinder 22 drives the rear connecting conveyor belt 19 to perform a 90-degree overturning movement relative to the post-stage conveyor belt 6. Therefore, de-

pending on the actual production needs, the corresponding conveying belt can be overturned downwards for folding and storage or overturned upwards for unfolding and connection by means of the overturning cylinders.

[0024] As a preferred solution, the vacuum suction mechanism m of the embodiment comprises a vacuum pump 23, a vacuum accumulator (not shown in the figure), and a plurality of air suction pipes (not shown in the figure); the vacuum pump 23 and the vacuum accumulator are mounted in the machine frame body a and located below the conveyor belt mechanism c; the vacuum accumulator is connected with the vacuum pump 23, the tail end of each of the air suction pipes is connected with the vacuum pump 23, the head end of each of the air suction pipes is respectively correspondingly connected to the bottom surfaces of the front connecting conveyor belt 18, the front-stage conveyor belt 5, the post-stage conveyor belt 6, and the rear connecting conveyor belt 19 (the above conveyor belts are each provided with a negative pressure air pipe 24 in butt joint with the head end of the air suction pipe). Therefore, negative pressure regions can be formed on each conveyor belt by using negative pressure power generated by the vacuum pump 23, so that the printing substrate A and even the finished product can be adsorbed to the corresponding conveyor belt, and particularly it can be ensured that the printing substrate A is not subjected to problems such as deviation or deformation in the conveying process.

[0025] Since a highlight high-temperature environment generated by the curing device will have a great negative impact on the process of cold foil of the printing substrate A and meanwhile the abnormal high temperature inside the machine will also affect the normal operation of the machine itself, in order to meet the requirements on temperature conditions in different cold foil environments for different printed matter, the cold foil machine of the embodiment further includes a cooling pipe assembly for supplying a cooling medium (such as cooling oil, cooling water, or cold air), the cooling pipe assembly comprises cooling pipes 25 distributed by passing through the rotating main cylinder 7, the pre-curing device e, the in-printing curing device n and the post-curing device k, and cooling supporting plates 26 disposed above or below the front-stage conveyor belt 5 and the post-stage conveyor belt 6; and the pre-curing device e and the post-curing device k are located within the contour coverage of the corresponding cooling supporting plates 26 respectively. In this way, the provided cooling pipe assembly can provide an auxiliary cooling function for an irradiation area of the curing device, avoiding excessive environmental temperature in the area; at the same time, performance improvement can be performed on each curing device, for example, a stepless dimming lamp is used as a core illumination element.

[0026] Based on the above structure, in order to more clearly describe the functional effects of the cold foil machine of the embodiment, the cold foil machine of the embodiment can adopt the following usage and control

principles, that is:

1. According to the process requirements, a stamping foil roll is mounted on the stamping foil mounting device f, and the stamping foil B guided to the stamping foil rewinding device h according to the conveying direction of the printing substrate A.
2. The front connecting conveyor belt 18 and the rear connecting conveyor belt 19 are unfolded by using the overturning cylinders respectively to be in butt joint with the front-end process processing device C and the post-stage process processing device D respectively, to form an assembly line.
3. Parameters of the machine are debugged and set through the electrical control assembly according to the actual demand, and energization, ventilation and cooling medium circulation are achieved; after the front-end process processing device C, the post-stage process processing device and the machine complete the preparation work, press "Start" on the operation panel 1, and then the machine can start waiting for the operation of a front-end device.
4. After the machine is started, the conveyor belt mechanism c, the vacuum suction mechanism m, the cooling pipe assembly, the fresh air port, the infrared preheater d, the curing devices, and the like start to run.
5. When the printing substrate A needing to be subjected to cold foil is sent by the front-end process processing device C, the stamping foil mounting device f and the stamping foil rewinding device h start to perform deviation rectification and tension regulation on the stamping foil B, the coining rubber roll automatically delays the time for descending to adhere to the rotating main cylinder 7, the printing substrate A is processed in the following order: heating and leveling by the infrared preheater d → semi-curing by the pre-curing device e → one-time press fit transfer of the stamping foil B and the printing substrate A by the front foil pressing roller 8 → curing in the cold foil process by the in-printing curing device n → second press fit of the stamping foil B and the printing substrate A by the rear foil pressing roller 9 → complete curing by the post-curing device k and automatic recycling of the waste film of the stamping foil B by the stamping foil rewinding device h → the conveyance into the post-stage process processing device D by the rear connecting conveyor belt 19, thereby completing the whole working process.

[0027] The above description is only a preferred embodiment of the utility model, and is not intended to limit the patent scope of the utility model. Any equivalent structure or equivalent process transformation performed using the specification and the accompanying drawings of the utility model may be directly or indirectly applied to other related technical fields and similarly falls within the patent protection scope of the utility model.

Claims

1. A cylinder type fully automatic cold foil machine, comprising:

a machine frame body, the machine frame body being provided with an electrical control assembly that functions as a core control;

a seal box, the seal box being mounted on the machine frame body, and the seal box is provided with a fresh air port and an air outlet;

a conveyor belt mechanism for conveying a printing substrate, wherein the conveyor belt mechanism being mounted on the machine frame body and distributed in a manner of passing through the seal box in the left-right direction;

an infrared preheater for preheating the printing substrate and leveling the glue on the printing substrate, the infrared preheater being mounted above the feeding end of the conveyor belt mechanism in the front-rear direction;

a pre-curing device for semi-curing the glue on the printing substrate, the pre-curing device being mounted above the conveyor belt mechanism in the front-rear direction and located on the discharging side of the infrared preheater;

a stamping foil mounting device for storing a plurality of stamping foil rolls and guiding and discharging stamping foil, the stamping foil mounting device being mounted above the conveyor belt mechanism in the front-rear direction and located on the discharging side of the pre-curing device;

a cold foil rubber roller mechanism for transferring to the printing substrate the stamping foil guided out by the stamping foil mounting device;

a stamping foil rewinding device for drawing the stamping foil outputted from the stamping foil mounting device and recycling a waste film of the stamping foil, the stamping foil rewinding device being mounted above the discharging end of the conveyor belt mechanism and located on the discharging end of the cold foil rubber roller mechanism;

a post-curing device for performing reinforced curing processing on glue between the stamping foil and the printing substrate, the post-curing device being mounted above the conveyor belt mechanism in the front-rear direction and located on the discharging side of the cold foil rubber roller mechanism;

and

a vacuum suction mechanism for adsorbing the printing substrate to the conveyor belt mechanism, the vacuum suction mechanism being disposed below the conveyor belt mechanism and connected with the conveyor belt mechanism; wherein

- the conveyor belt mechanism comprises a front-stage conveyor belt disposed under the infrared preheater, the pre-curing device and the stamping foil mounting device in the left-right direction and a post-stage conveyor belt disposed under the stamping foil rewinding device and the post-curing device in the left-right direction; relative to the horizontal plane, the installation position of the front-stage conveyor belt on the machine frame body is higher than that of the post-stage conveyor belt on the machine frame body; the cold foil rubber roller mechanism comprises a rotating main cylinder disposed between the front-stage conveyor belt and the post-stage conveyor belt and respectively connected with the front-stage conveyor belt and the post-stage conveyor belt through a synchronous belt set, a front foil pressing roller disposed above the discharging end of the front-stage conveyor belt and tangential to the rotating main cylinder, and a rear foil pressing roller disposed above the feeding end of the post-stage conveyor belt and tangential to the rotating main cylinder; the cylinder type fully automatic cold foil machine further comprises an in-printing curing device disposed on the machine frame body and located between the front foil pressing roller and the rear foil pressing roller to cure the printing substrate where the stamping foil is pressed; and the infrared preheater, the pre-curing device, the stamping foil mounting device, the front-stage conveyor belt, the cold foil rubber roller mechanism, the post-stage conveyor belt, the post-curing device and the stamping foil rewinder are located in the seal box.
2. The cylinder type fully automatic cold foil machine according to claim 1, wherein the stamping foil mounting device comprises at least one multi-stage roll set disposed above the front-stage conveyor belt in the front-rear direction, each of the multi-stage roll sets comprises a top slip-type air shaft for storing a stamping foil roll and a bottom slip-type air shaft, and the bottom slip-type air shaft is located under the top slip-type air shaft; the top slip-type air shaft and the bottom slip-type air shaft are each correspondingly provided with a tension guide roller for performing tension and guiding control on the stamping foil, and a discharging guide roller is disposed between the tension guide roller corresponding to the bottom slip-type air shaft and the front foil pressing roller; the stamping foil on the top slip-type air shaft is drawn to be between the rotating main cylinder and the front foil pressing roller through the tension guide roller corresponding to the top slip-type air shaft, the tension guide roller corresponding to the bottom slip-type air shaft and the discharging guide roller; and the stamping foil on the bottom slip-type air shaft is drawn to be between the rotating main cylinder and the front foil pressing roller through the tension guide roller corresponding to the bottom slip-type air shaft and the discharging guide roller.
 3. The cylinder type fully automatic cold foil machine according to claim 2, wherein the conveyor belt mechanism further comprises a single-stage roll matching one of the multi-stage roll sets for use; the single-stage roll comprises a single-stage slip-type air shaft parallel to the top slip-type air shaft in a left-right mode; the single-stage slip-type air shaft is correspondingly provided with at least one single-stage tension guide roller; and stamping foil on the single-stage slip-type air shaft is drawn to be between the rotating main cylinder and the front foil pressing roller through the single-stage tension guide roller, the tension guide roller corresponding to the bottom slip-type air shaft and the discharging guide roller.
 4. The cylinder type fully automatic cold foil machine according to claim 1, wherein the front foil pressing roller and the rear foil pressing roller each comprise a rubber roll lifting cylinder mounted in the machine frame body and located below the conveyor belt mechanism, a coining rubber roll placed above the conveyor belt mechanism and tangential to the rotating main cylinder, and a lifting swing arm that is connected to the machine frame body through a shaft, with the bottom end connected with the rubber roll lifting cylinder and the top end connected with the coining rubber roll.
 5. The cylinder type fully automatic cold foil machine according to claim 1, wherein the conveyor belt mechanism further comprises a front connecting conveyor belt that has the left end connected to the machine frame body through a shaft and is located on the feeding side of the front-stage conveyor belt and a rear connecting conveyor belt that has the right end connected to the machine frame body through a shaft and is located on the discharging side of the post-stage conveyor belt; the synchronous belt set comprises a first front-stage synchronous belt, a second front-stage synchronous belt, a first front-stage synchronous wheel, a second front-stage synchronous wheel, a front-stage tensioning wheel, a first post-stage synchronous belt, a second post-stage synchronous belt, a third post-stage synchronous belt, a first post-stage synchronous wheel, a second post-stage synchronous wheel, a third post-stage synchronous wheel, and a post-stage tensioning wheel; the front-stage tensioning wheel and the second front-stage synchronous wheel are sequentially distributed from top to bottom below the feeding end of the front-stage conveyor belt, the first front-stage

synchronous wheel is disposed below the front-stage conveyor belt, the first front-stage synchronous belt integrates the rotating main cylinder with the first front-stage synchronous wheel in a sleeved manner, and the left end of the second front-stage synchronous belt is wound around the first front-stage synchronous wheel; the right end of the second front-stage synchronous belt is simultaneously wound around the second front-stage synchronous wheel, a rotating shaft at the left end of the front connecting conveyor belt, and a rotating shaft at the right end of the front-stage conveyor belt, and the front-stage tensioning wheel is pressed on the second front-stage synchronous belt;

the post-stage tensioning wheel and the third post-stage synchronous wheel are sequentially distributed from top to bottom below the discharging end of the post-stage conveyor belt, the first post-stage synchronous wheel is disposed below the right end of the rotating main cylinder, the second post-stage synchronous wheel is disposed below the post-stage conveyor belt, the first post-stage synchronous belt integrates the rotating main cylinder with the first post-stage synchronous wheel in a sleeved mode, the second post-stage synchronous belt integrates the first post-stage synchronous wheel with the second post-stage synchronous wheel in a sleeved mode, and the right end of the third post-stage synchronous belt is wound around the second post-stage synchronous wheel; the left end of the third post-stage synchronous belt is simultaneously wound around the third post-stage synchronous wheel, a rotating shaft at the right end of the rear connecting conveyor belt, and a rotating shaft at the left end of the post-stage conveyor belt, and the post-stage tensioning wheel is pressed on the third post-stage synchronous belt.

6. The cylinder type fully automatic cold foil machine according to claim 5, wherein the machine frame body is internally provided with a front-stage overturning cylinder and a post-stage overturning cylinder, a power shaft of the front-stage overturning cylinder is connected to the bottom surface of the front connecting conveyor belt, and the front-stage overturning cylinder drives the front connecting conveyor belt to perform a 90-degree overturning movement relative to the front-stage conveyor belt; a power shaft of the post-stage overturning cylinder is connected to the bottom surface of the rear connecting conveyor belt, and the post-stage overturning cylinder drives the rear connecting conveyor belt to perform a 90-degree overturning movement relative to the post-stage conveyor belt.

7. The cylinder type fully automatic cold foil machine according to claim 5, wherein the vacuum suction mechanism comprises a vacuum pump, a vacuum

accumulator, and a plurality of air suction pipes; the vacuum pump and the vacuum accumulator are mounted in the machine frame body and located below the conveyor belt mechanism; the vacuum accumulator is connected with the vacuum pump, the tail end of each of the air suction pipes is connected with the vacuum pump, the head end of each of the air suction pipes is respectively correspondingly connected to the bottom surfaces of the front connecting conveyor belt, the front-stage conveyor belt, the post-stage conveyor belt, and the rear connecting conveyor belt.

8. The cylinder type fully automatic cold foil machine according to any one of claims 1 to 7, wherein the cylinder type fully automatic cold foil machine further comprises a cooling pipe assembly for supplying a cooling medium, the cooling pipe assembly comprises cooling pipes distributed by passing through the rotating main cylinder, the pre-curing device, the in-printing curing device and the post-curing device, and cooling supporting plates disposed above or below the front-stage conveyor belt and the post-stage conveyor belt; and the pre-curing device and the post-curing device are located within the contour coverage of the corresponding cooling supporting plates respectively.

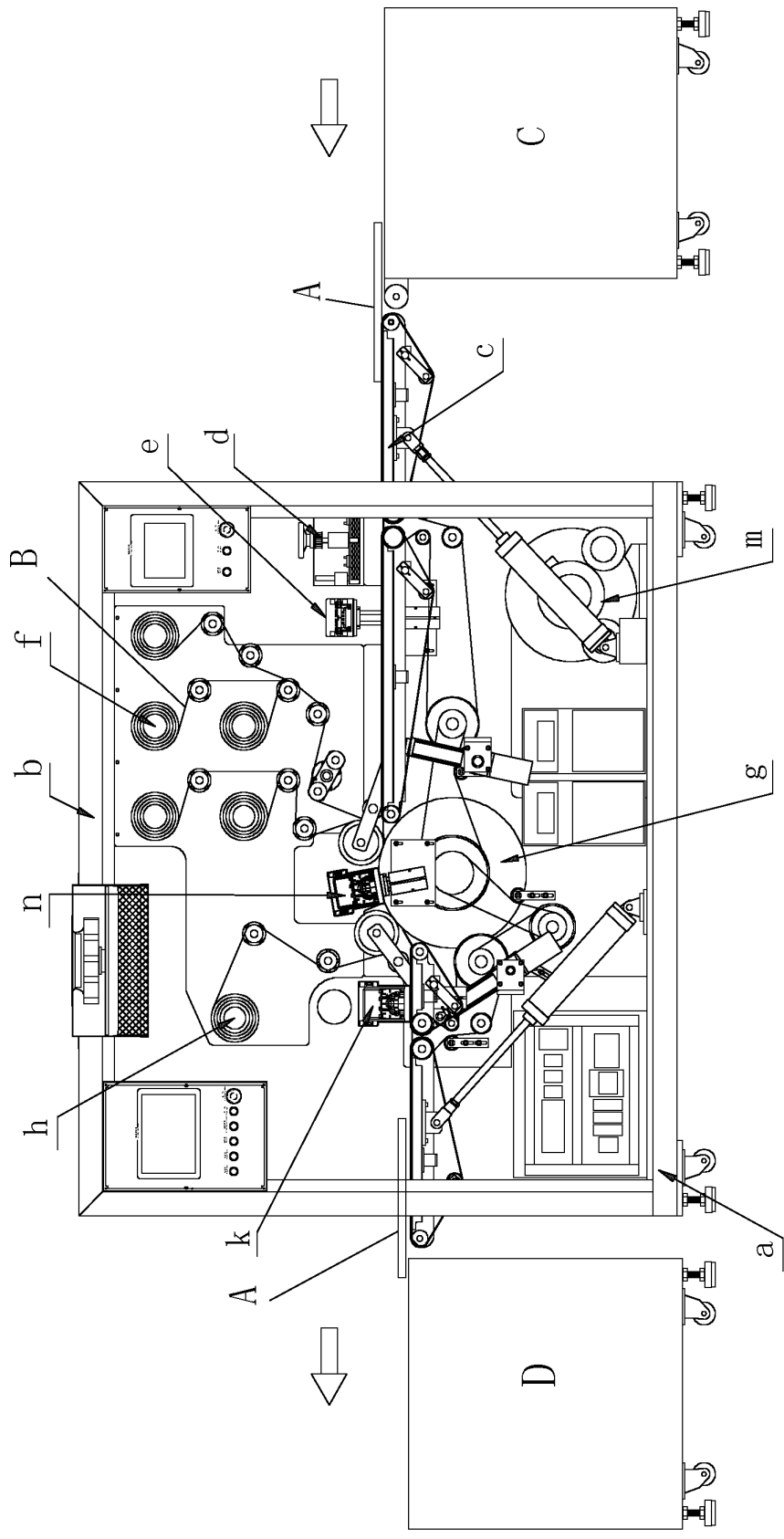


FIG. 1

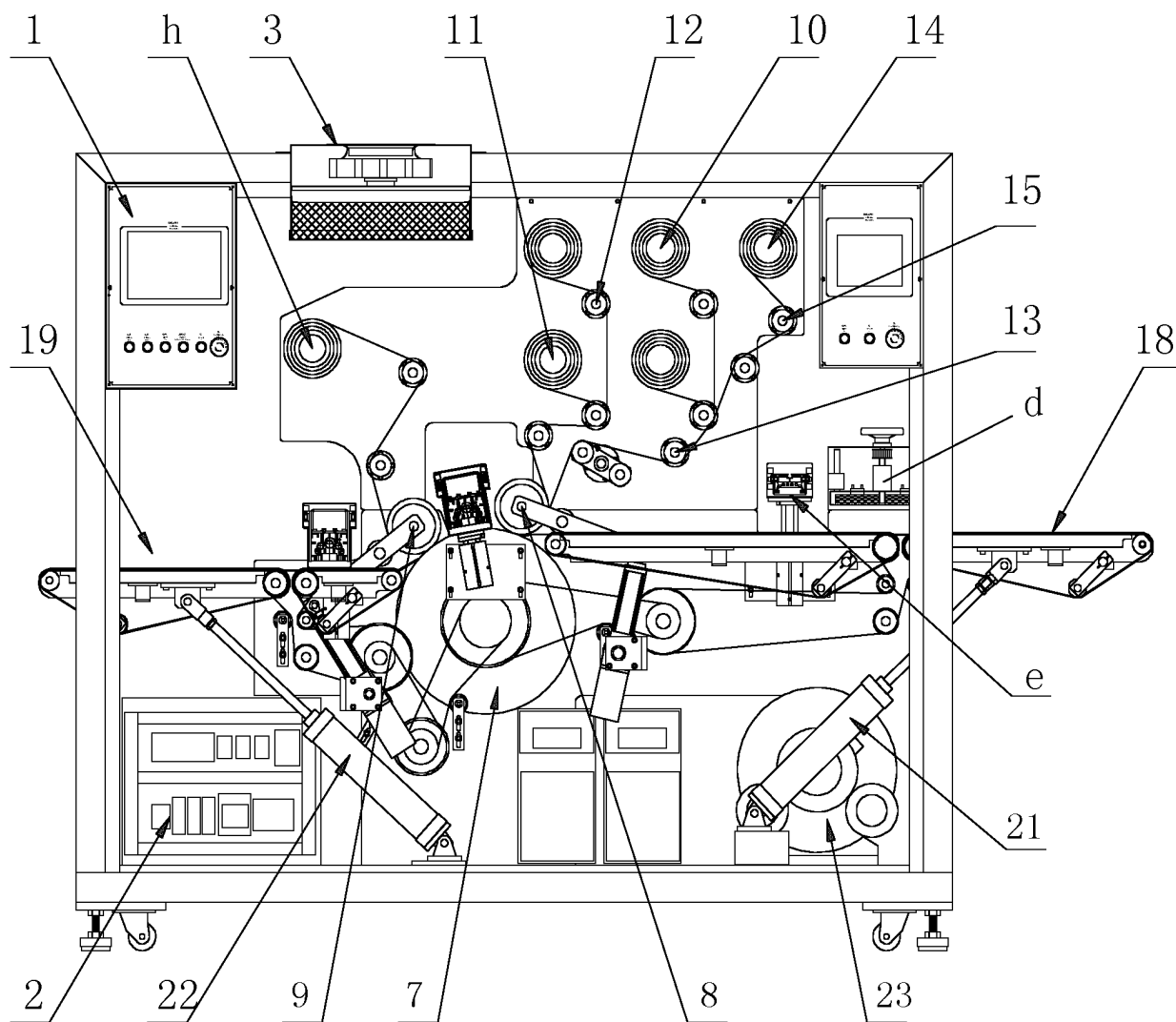


FIG. 2

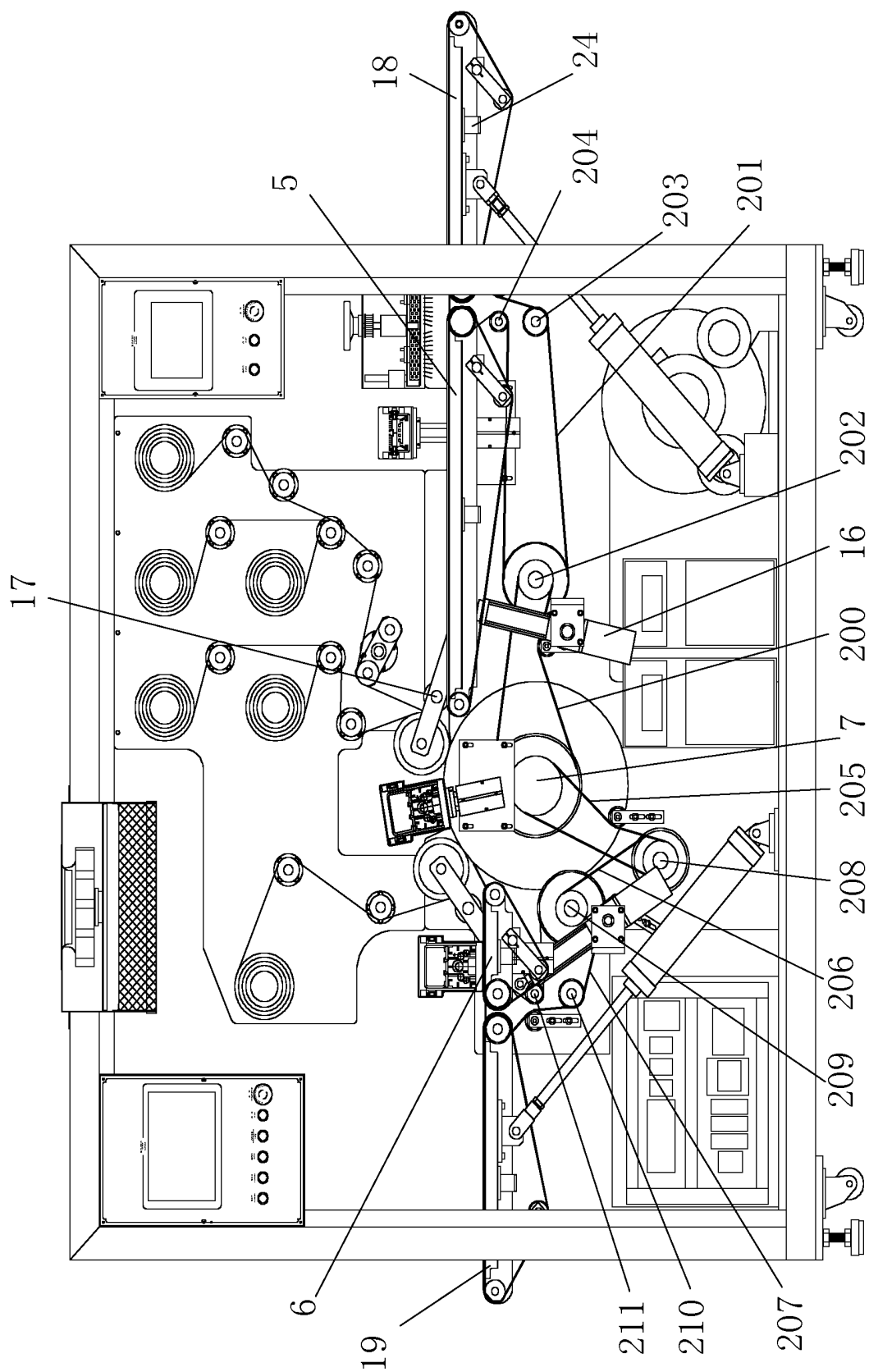


FIG. 3

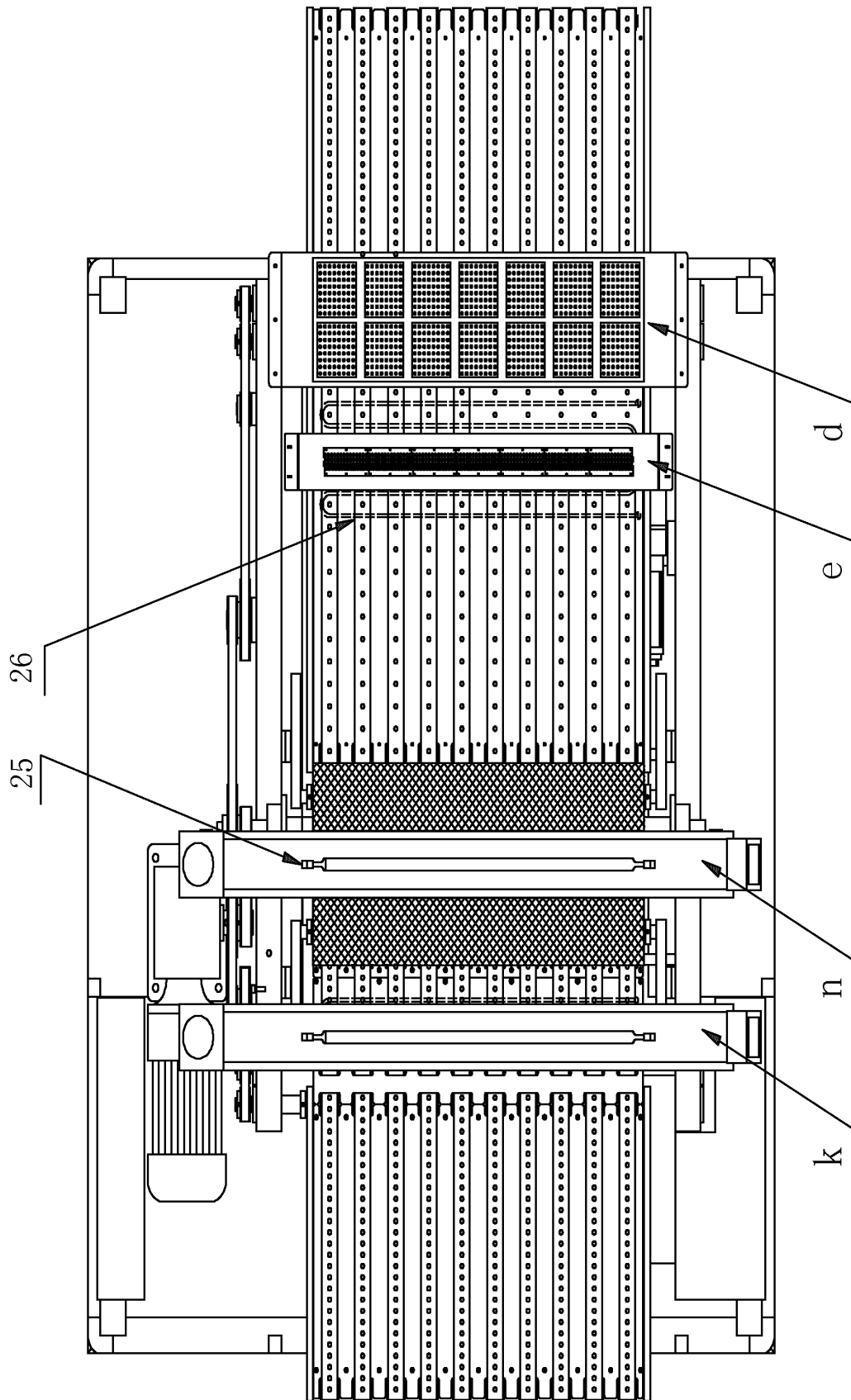


FIG. 4

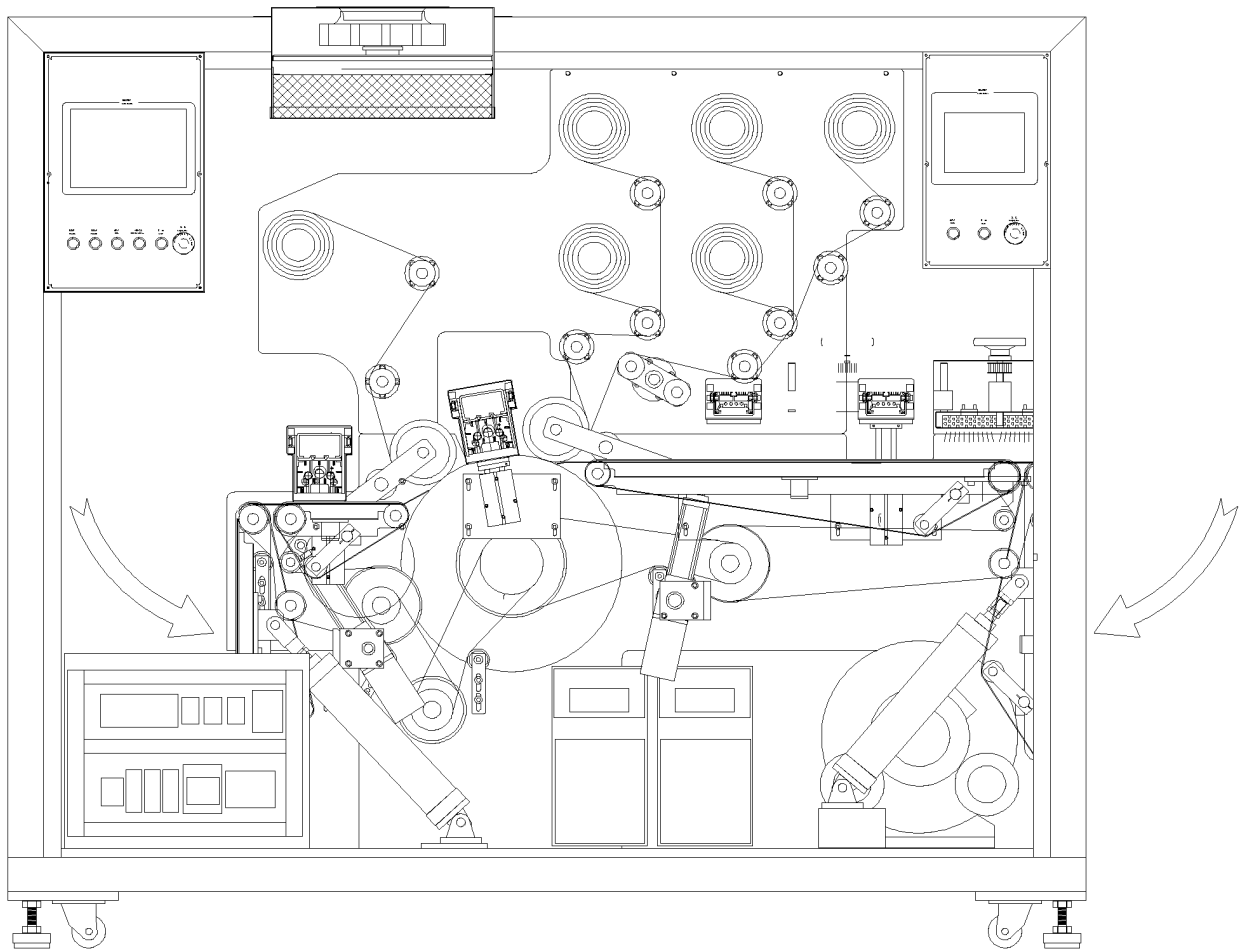


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/109061

A. CLASSIFICATION OF SUBJECT MATTER

B41F 16/00 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B41F 16/- B41F 13/- B41F 3/- B41F 5/- B41F 7/- B41F 9/- B41F 15/- B41F 25/- B32B 37/- B41M 7/- B41G 1/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, CNKI, CNPAT: 转轮, 滚筒, 辊筒, 胶辊, 冷烫, 转印, 贴合, 密封, 传动带, 传送带, 预热, 固化, 照射, 灯, 紫外线, 加热, 箔, 膜, 真空, 高度, cold, print+, transfer+, convey+, vacuum, transmission, belt, glue, roller, solidify+, dry+, lamp, light, ultraviolet, film, height

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	CN 106515208 A (WAN, Junxia) 22 March 2017 (22.03.2017), description, paragraphs [0050]-[0069], and figures 1-5	1-8
E	CN 206277787 U (WAN, Junxia) 27 June 2017 (27.06.2017), description, paragraphs [0050]-[0069], and figures 1-5	1-8
A	CN 105856819 A (WAN, Junxia) 17 August 2016 (17.08.2016), description, paragraphs [0042]-[0062], and figures 1-6	1-8
A	CN 101486270 A (LI, Zhongrong) 22 July 2009 (22.07.2009), entire document	1-8
A	CN 101092073 A (WU, Deming) 26 December 2007 (26.12.2007), entire document	1-8

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

10 August 2017

Date of mailing of the international search report

30 August 2017

Name and mailing address of the ISA
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Telephone No. (86-10) 61648143

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/109061

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	CN 204077059 U (WUXI LONGCHUANG PRINTING TECHNOLOGY CO., LTD.) 07 January 2015 (07.01.2015), entire document	1-8
A	CN 205736422 U (TANGSHAN WANJIE PRINTING MACHINERY CO., LTD.) 30 November 2016 (30.11.2016), entire document	1-8
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Form PCT/ISA /210 (continuation of second sheet) (July 2009)

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 Information on patent family members

 International application No.
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