MODEL JBB-50C PERFECT BINDING MACHINE

OPERATION INSTRUCTION

THE PEOPLE'S REPUBLIC OF CHINA

WENZHOU QUNLONG PRINTING MACHINERY CO., LTD.

Contents

I. Summary

This machine is applied to perfect binding for various medium- or small sized printing factories or printing factories of higher education institutions, followed by below binding technology: book core feeding by hand; back milling; gluing, cover feeding by hand and covering, etc. This machine is applicable for short typography in large-scale printing factories for case of operation and facility in exchange of different specifications. Furthermore, it is featured with such advantages as simple adjustment, convenient maintenance and compact size, and it is also applicable to the paperbound binding machine without back milling.

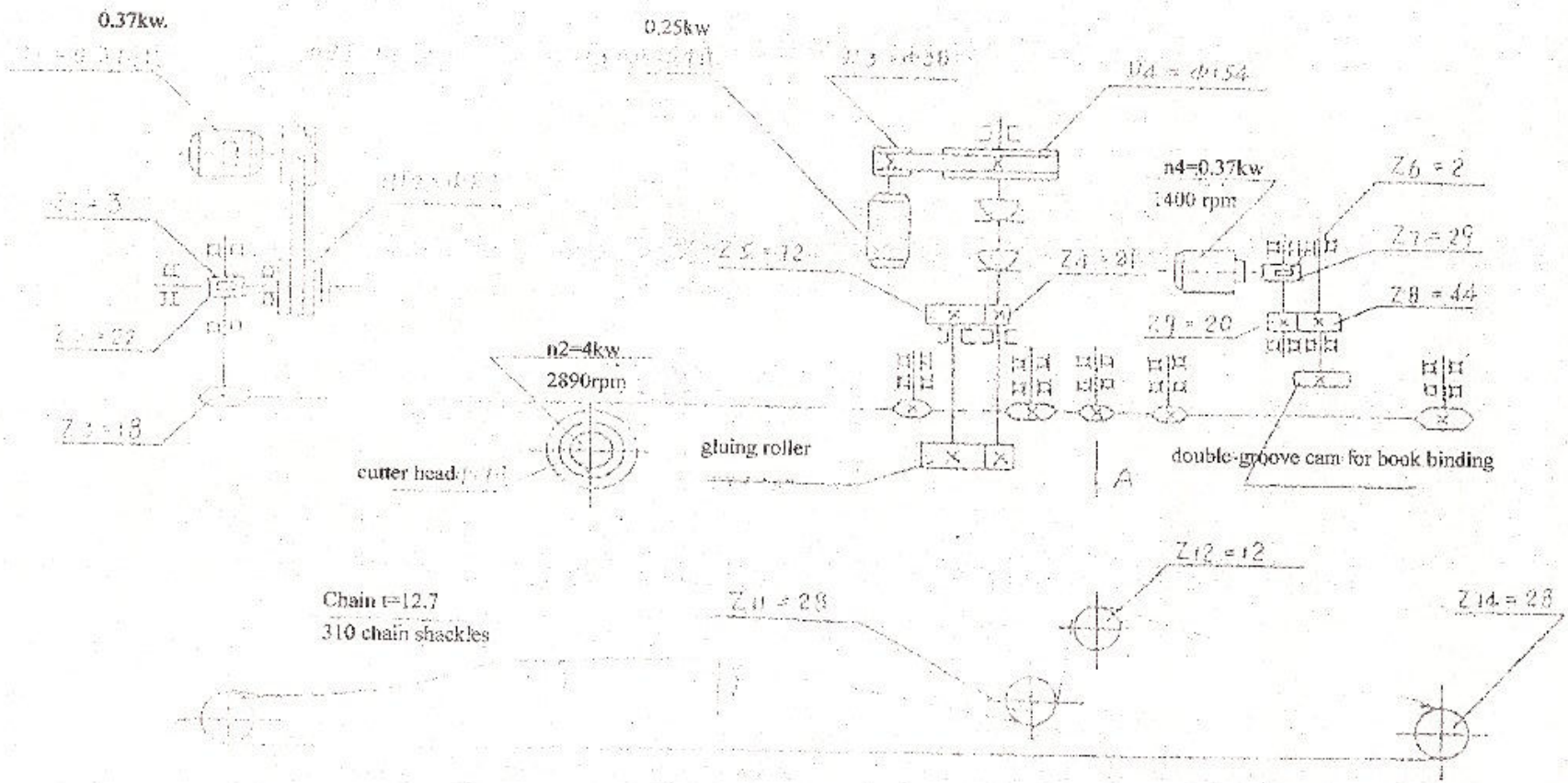
II. Main Technical Parameters

1. Binding speed Max. 600 books per hour
2. Binding thickness (mm) 3--50
3. Binding amplitude (mm)
   Max. 420×160 (or 32-folio double joint-book)
   370×300 (or 8-folio single book)
   Min. 150×130
4. Power of whole machine (KW) total 8.5

Main drive motor	0.37	AO_2-7124
Back milling motor	4	Y112M-V_3
Glue box motor	0.25	JW6324
Covering motor	0.18	YW6314
Electric heater of base glue box	2.5	
Electric heater of side glue box	1.0	

5. Weight of whole machine (Kg) 780
6. Dimensions (length ×width ×height) (mm)
   2600×720×1400

III. Transmission Diagram (Fig. 1 attached)


0.37kw.
0.25kw
n4=0.37kw
1400 rpm
Z6 = 2
Z7 = 29
Z8 = 44
Z9 = 20
n2=4kw
2890rpm
gluing roller
cutter head
double-groove cam for book binding
A
Chain t=12.7
310 chain shackles
Z12 = 12
Z14 = 28

1. Mechanical speed of binding

$$n\ \text{Max.} = \frac{n_1 \times \frac{D_1}{D_2} \times \frac{Z_1}{Z_2} Z_3 \times \text{factor}}{\text{sprocket wheel pitch number}}$$

$$= \frac{1400 \times \frac{88}{82} \times \frac{3}{22} \times 18 \times 0.98}{364}$$

$$= 10 \text{ rpm}$$

$$n\ \text{Min.} = \frac{n_1 \times \frac{D'}{D} \times \frac{1}{2} \times \frac{Z_1}{Z_2} \times Z_3 \times \text{factor}}{\text{sprocket wheel pitch number}}$$

$$= \frac{1400 \times \frac{70}{82} \times \frac{3}{22} \times 18 \times 0.98}{364}$$

$$= 7.9 \text{ rpm}$$

2. Linear velocity of binding chain

$$V\ \text{linear Max.} = \frac{n_1 \times \frac{D_1}{D_2} \times \frac{Z_1}{Z_2} \times Z_3 \times t}{1000}$$

$$= \frac{1400 \times \frac{88}{82} \times \frac{3}{22} \times 18 \times 12.7}{1000}$$

$$= 46.8 \text{ meters per minute}$$

$$V\ \text{linear min.} = \frac{n_1 \times \frac{D_1}{D_2} \times \frac{Z_1}{Z_2} \times Z_3 \times t}{1000}$$

$$= \frac{1400 \times \frac{70}{62} \times \frac{3}{22} \times 18 \times 12.7}{1000}$$

$$= 37.2 \text{ meters per minute}$$

3. : Peripheral linear velocity of milling-back knife

$$\text{Knife linear V} = \frac{n_2 \times \pi \times \text{Ø D}}{1000}$$

$$= \frac{2819 \times 3.14 \times 178}{1000}$$

$$= 1615.2 \text{ meters per minute}$$

4. Linear velocity of glue roller in glue box

$$\text{Glue roller linear V Max.} = \frac{N_3 \times \frac{D_3}{D_4} \times \frac{Z_4}{Z_5} \times \pi D}{1000}$$

$$= \frac{1400 \times \frac{38}{154} \times \frac{24}{72} \times 3.14 \times 144}{1000}$$

$$= 52 \text{ meters per minute}$$

5. Time for cover binding

$$t = \frac{60}{n_4 \times \frac{Z_6}{Z_7} \times \frac{Z_8}{Z_9}}$$

$$t = \frac{60}{1400 \times \frac{2}{29} \times \frac{20}{44}}$$

$$= 1.37 \text{ seconds}$$

IV. Operating principle

1. Technique flowcharts
   Feed book (mount book core by hand) → back milling, trim and cut groove →brush base glue (thermal sol) → brush side glue → bind (mount the cover by hand) - →impress→ deliver book

2. Operating principle

(1) Feed book: when the machine is running, first place the prepared book core into the book clamper by hand with the spine facing downward. The book clamper is used to convey the book core, and it can fasten and release the book core in reciprocation movement. The open degree of holding press can be adjusted according to the thickness of book core. The clamping force at both ends of exterior and interior splints is generally 35kg and adjustable. There are some screw holes dispersed in different distance on the interior splint and when the size of format varies, adjust chord axis of book core according to format and specifications. The machine can be added an exterior splint to facilitate the mounting of book core of small format.

(2) Back milling: The book core enters into the back-milling mechanism. The back-milling blade edge is made of hard alloy. There are 4 groove cutters mounted in the cutter head. Balance test of whole set of turning gear ensures that the vibration and noise of iron chopping are minimized and optimal milling and chopping result obtained and meanwhile the service life of back-milling blade prolonged. To minimize the deformation of book core while back milling and trimming, pressing equipment is furnished in this process. Book core is smoothly scraped a certain amount by both exterior and interior splints pressing the lower part of boor core. In order to avoid the remained paper scraps left on the spine or flying into glue pot and has a severe impact on glue brushing and cause quality accident, a brush is added before entering the glue pan to remove the paper scrap on the book core and ensure the evenness of spine after binding.

(3) Brush glue: After back milling, the book clamper clamps the book core into the glue pot, in which, both counter rotating glue rollers are mounted. The book core goes through the upper part of upper glue roller and the glue roller will apply the glue on the spine and then the other spreading roller spreads the glue evenly so as to ensure the quality of book spine. In the glue pot, two spreading control mechanisms are attached to control the applying-glue layer of two big and small rollers. Meanwhile a heating box is set under the lower part of glue pot and directly heat by using heater tube.

(4) Book binding The process of binding a book consists of descending and ascending a book and then clamping it. When a book is to be bound, the platen on the binding machine descends to the lowest position and the book clamper stops moving after it successively carries the book to the position above the platen. And then the platen ascends to the highest point with the well-positioned cover binding to the glued spine on both sides of which there are interior and exterior supporting boards relatively moving to ensure firmly binding. An additional expansive platen is available for the book of big format.

(5) Transmission: the power developed by the motor is transmitted to the book clamper through the rotation of belt driven wheel that changes its speed steplessly. The rotation speed reduced by the worm and wormwheel is transmitted to the chain gear on which there is a special dowel to drive the book clamper to shuttle. In order to reduce noise, there are a muffler and a chain strainer available and adjustable at any time to ensure normal work.

The binding machine is equipped with protection mechanism against overload. When it is overloaded in motion, the belt driven wheel slips due to overcoming spring pressure, thus protecting mechanical parts and components from being damaged. In addition, a brake is equipped to lessen the slip of transmission devices and ensure normal work.

V. Adjustment

1. Adjusting the opening, thickness and various specifications and format of book
   (1) When moving forward to both sides of guide wheel, the book clamper tilts at a certain angle as conveniently as for books in and out. To adjust book clamper's opening, loosen both left and right fastening screws on the supporting board on which there is a long slot to adjust the opening by moving in and out. Screw the bolts down after it is appropriately adjusted. It is unnecessary for customers to readjust it as it has basically been adjusted in the factory.
   (2) When the book clamper is closed, it is appropriate for its opening to be 1-2mm less than books in thickness. Washers with different thickness may be used to make adjustment of its opening.

eg. If a book core is 10mm thick, both left and right washers① should be 8-9mm(let's take 8mm). First of all, move the book clamper to the left end and unscrew both left and right star nuts when the clamper is open. Take out the washer ② and left and right washers ① on the front clamping plate ④. Select washers with same thickness (8mm) among ① and ② washers, and put them on the position of ① with the total thickness of 8mm. And then place the front clamping plate ④, adjust both left and right washers ②(plus prior washers ①) in the same thickness and finally screw down star nuts ③.

(3) When books with various specifications and formats are to be bound, they should be placed in the middle position between the interior and exterior clamping plates for even clamp force. According to different books, screw holes vary in the distance on the interior clamping plate. When books vary in format, remove fixed axes and screw them into other holes accordingly, making sure that books is placed in the middle of the book clamper (Figure 2).

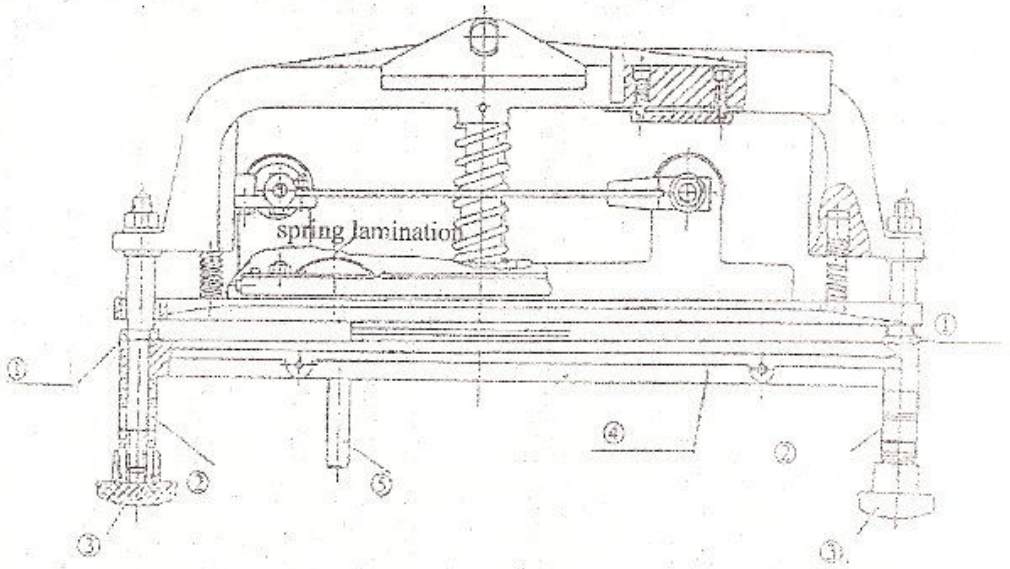


Figure 2

①washer ②washer ③star nut ④front clamping plate ⑤fixed axis for fastening books

4. the front cover plate on the back-milling chamber

In order to prevent books from distortion when being milled and slot-cut, the front cover plate should be adjusted in accordance with different books, usually 0.5mm thicker than the book. As a result, the bottom of a book is pressed tightly but it is still easy for the book to pass through. It is better to have a bit bigger exit. If necessary for adjustment, unscrew the two star knobs on the front cover plate, push the plate forward or backward and lock the knobs after it is appropriate.

5. adjusting the position of bracket

The bracket is the benchmark for binding a book. It controls clamping height and parallelism of the book clamper and is closely connected with the position where the book is clamped and back-milled. Meanwhile it places a direct impact on the quality of book binding. When making adjustment, unscrew left and right nuts, calibrate the bracket horizontally, turn adjusting bolts with a special wrench to make the bracket move and thus the whole mechanism move up and down, and at last screw bolts tight when it meets the requirements of height. It is the best to limit the bracket and the bottom of book clamper within 9-10mm in height. Otherwise it will have a bad effect on the quality of book binding.(Figure 5).

6. adjusting the position of gluing mechanism

After being back milled, books, clamped by the book clamper, moved into the glue pot that is adjustable eccentrically. The glue roller and spreading wheel also can be adjusted slightly by adjusting screws. The appropriate distance between the glue roller and the back of milled book should be 1.5-2mm, with spreading wheel 0.5mm higher than glue roller. The glue on the surface of spreading wheel should be spread evenly; otherwise it will affect the quality of book binding. The spreading plate can adjust the thickness of glue on the glue roller.(Figure 6)

7. adjusting the temperature of glue pot

There is a heater below the glue container, directly heated by electric heating tubes. The pot is also equipped with temperature presetting equipment and an automatic controller. Operators should determine the optimum gluing temperature according to the property of glue and their own operation experience. The glue is usually used at the temperature of 130 to 180 degrees Celsius. At a higher temperature, the glue tends to age and at lower, tends to flow fault (Figure 6).

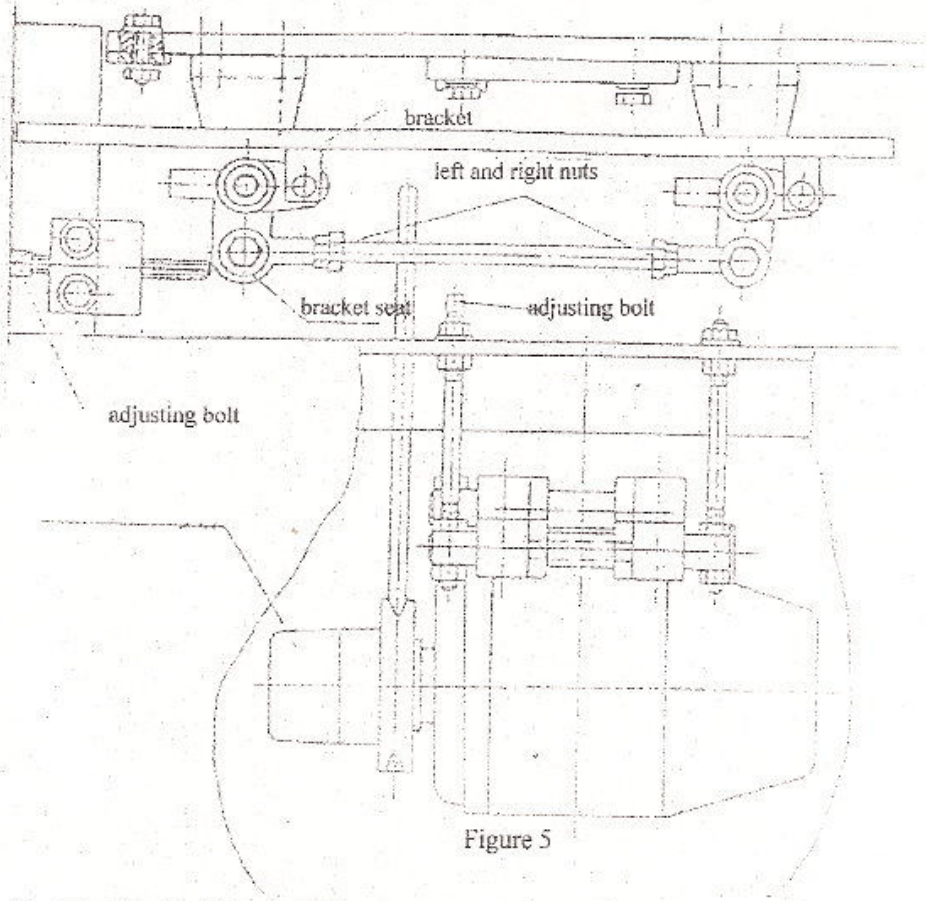


Figure 5

8. adjusting binding mechanism

With the adjustment and change being made on the position of back milling, slot cutting and gluing, it is necessary to adjust the binding mechanism. The book clamper stops moving after it successively carries the book to the position above the platen on which well-positioned covers stay. The platen ascends to the highest point and keeps on the same plane with the book back that has been milled. On both sides of book there are front and back supporting boards to squeeze the spine, with their positions adjustable. Make sure that the covers on both sides of binding edge are firmly bound.

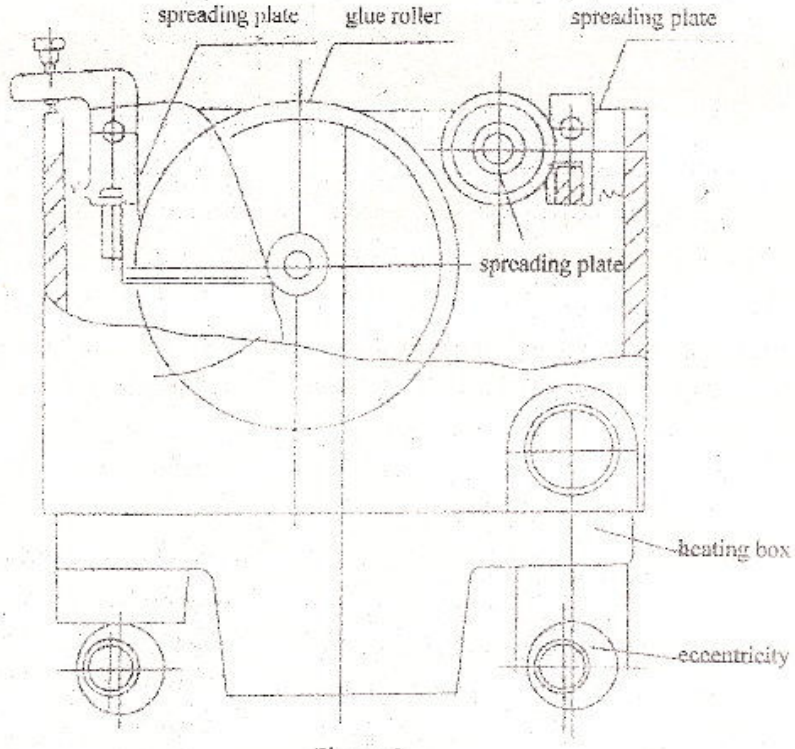


Figure 6

As for books with different thickness, it is necessary to adjust the front supporting board, not the back board. The back board should be consistently kept on the same plane with the back clamping board. However, it is better to be 0.1-0.2mm higher (Figure 8). Book thickness may be changed by the front supporting board before adjustment. While adjusting, turn the screw with a wrench and move the front supporting board forward or backward, increasing or decreasing the distance between the front and back boards which is usually the same with thickness of the book having been clamped tightly(Figure 7).

9. adjustment of the precision of binding mechanism

Binding mechanism can get the two actions of elevating and clamping through double-groove cam, when the book clamper is in the middle position of binding machine, the pin in the book clamper relieves and stops moving, that is to say that the book clamper has been positioned accurately, and at this time double-groove cam begins the actions of elevating and clamping. If the adjustment of binding mechanism is precise, the appearance of book binding will be fine, if not, books will either have no edges or crease on the backs. So the adjustment of the precision of binding mechanism directly does matter with the quality of book-binding (figure 7).

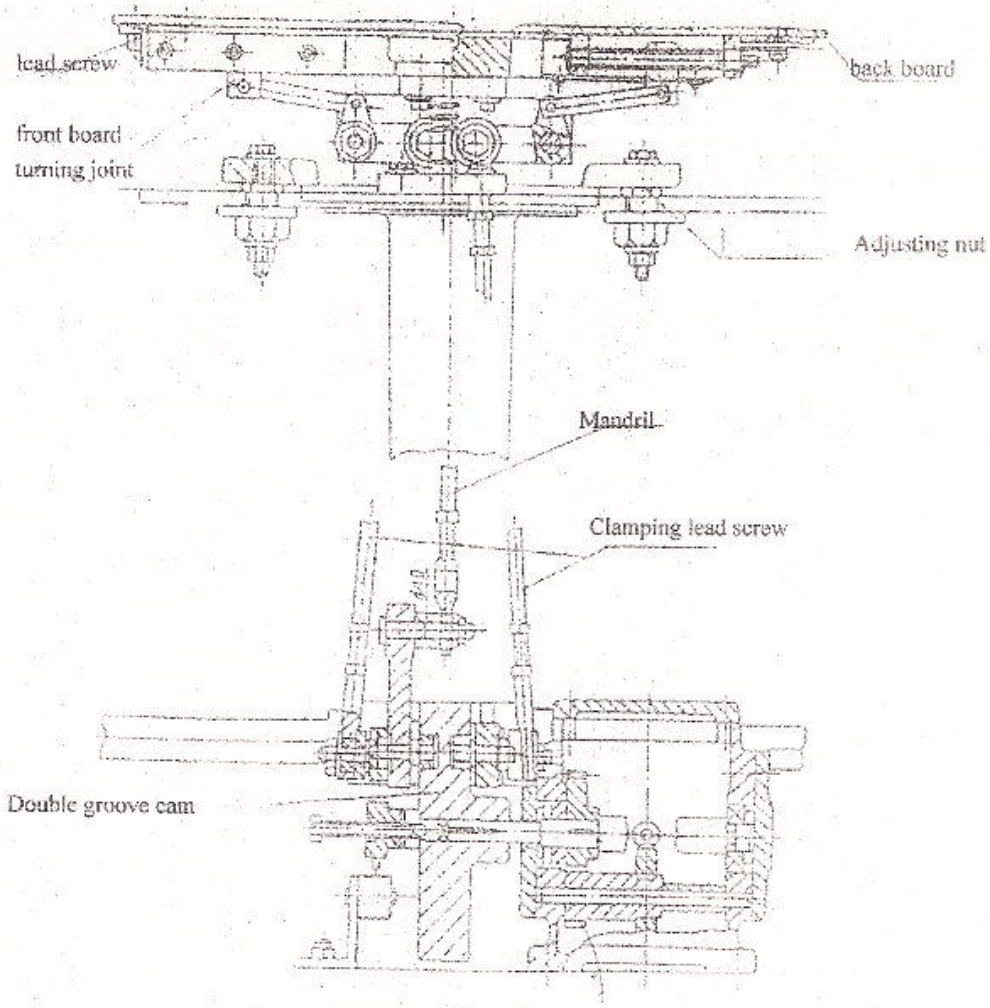


Figure 7

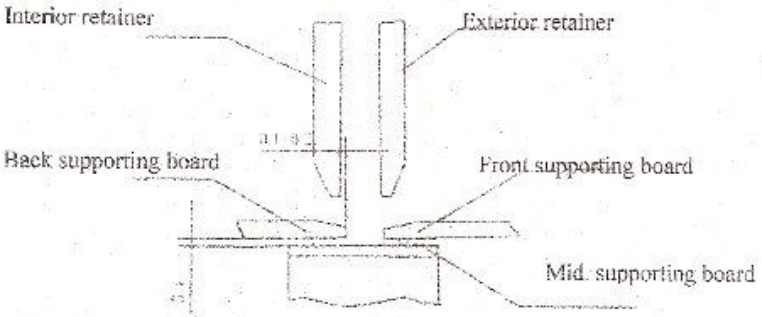


Figure 8

(1) The middle book board (steel board) shall be horizontal, or the backs of book-binding won't be accordant. When adjusting, release nuts first and then turn nuts with a spanner, after adjustment, tighten the nuts.

(2) The working tangent plane of back board must be parallel to the plane of book clamper, depth of parallelism should be less than 0.10 mm, it will be better that the working tangent plane is 0.1 or 0.2 mm higher than the plane of book clamper.

(3) The working tangent plane of front board must be parallel to the working tangent plane of back board, depth of parallelism should be not more than 0.2 mm, or after book-binding, the thickness of the two sides of book will not be accordant.

(4) The clearance between the bottom of front/back boards and middle board should be less than 0.2mm, or thread cast-off occurs in book-binding.

10. Adjustment of the tension of driving chain

Chains will loosen during the process of long time using due to abrasion, which will influence the driving and make noise, so it is necessary to tension the chains. While adjusting, release the fastening bolt first and adjust the bolt to make the chain wheel move out, tighten the chain and then the fastening bolt when the tension is appropriate (figure 9).

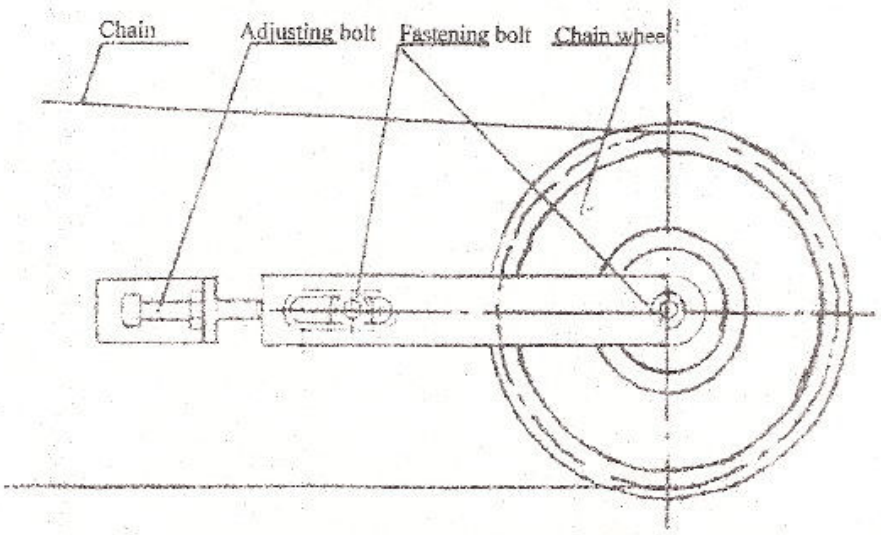


Figure 9

13. Adjustment of braking force of book clamper

When the book clamper moves to the position of binding mechanism, in order to prevent the book clamper from moving forward caused by inertia, brake assembly is set up and installed on the back of control panel. Brake spring leaf always withstands the book clamper to fasten it. Adjustment can be made in the event the tension is not enough. When adjusting, release the screw cap with a spanner first and turn the stretching screw 8 to make the spring leaf move downwards and withstand the book clamper (notice: the braking force should not be over-adjusted.) no oiling during braking.

VI. Notice in Operation

1. Just adjust the opening of book clamper, the position of the front cover plate in back-milling box, the thickness of glue solution on gluing roller and the position of the front board of binding mechanism according to the format and thickness in operation, and rest parts have been adjusted to the proper positions in the factory during the trial run.
2. If it is necessary to open the front cover plate in back-milling box for adjustment or repair, the power must be shut down. In order to avoid accidents work should not begin until the milling cutter stops.
3. If it is not necessary to mill the back of book core, adjust the back milling box to the lowest position and raise the board.
4. Book core having been brushed with glue should not be milled by collar plate milling cutter, or it will make the blade coagulated with glue and become blunt.

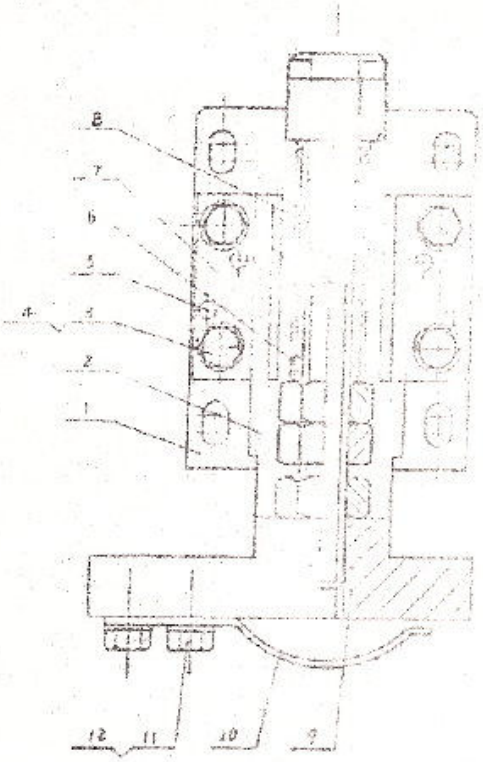


Figure 12

5. When the thermosol in gluepot decrease gradually, it should be added momentarily so that the temperature of thermosol will not decrease so much as to influence the quality of book-binding.

VII. Information about Electric Control System

1. Electrical source and power

Power supply voltage required for complete machine: triphase four-wire AC 380V 50Hz. Triphase wires L1, L2, L3 and neutral wire N are connected to the power connecting terminals in electric control box; leg of circuit of electrical source is made of 0.5 sq.mm copper wire, neutral wire is made of copper wire with cross section not less than 1 sq. mm. The machine body must be reliably grounded while using.

Main motor $M_1$370W 4-pole; back-milling motor M24KW 2-pole; glue box motor M3250W 4-pole; covering motor M4180W 4-pole; heater motor RW3.7KW, the total installed power of complete machine is about 80KW.

The electrical source of machine control and heater is AC220V and is supplied by electrical source phase voltage.

2. Operating principle of electric control system

(1) Main motor control

Main motor has three operation modes of continuous, single and inching, which can be chosen by the operation mode selection switch KW. When in continuous mode, after pressing the activate button IQA, main motor will bring book clamper to move back and forth on the guide strip. When in inching mode, while pressing and holding inching button 2QA, main motor runs, and it will stop if releasing the button. Inching mode is usually used in adjustment or repair of machine. When in single mode, book clamper moves to the book core position of machine, contactor 1C coil loses power due to the cut-off of n-c contact of inching switch 1XX, the main motor 1M will shut down due to the loss of power. This moment, after pressing single button 3QA, the main motor will restart, and the book clamper will move back and forth once again; single running can also be realized by photoelectric control, while using in such way, the selection switch of photoelectric switch amplifier F installed in the upper left corner of electric control box should be turned to the twinkling position, then adjust the sensitivity potentiometer so that the micro- photoelectric transducer can actuate the amplifier F due to the infrared light reflected by book core after the book core was put in the book clamper, and with the action of the output contact, photoelectric control can make the main motor restart and the book clamper move back and forth once again. The machine usually runs in the single mode controlled by photoelectric switch (photoelectric switch is optional and its installation subjects to customer's requirement).

(2) Back milling motor control

Milling motor M2 operation is directly controlled by the switch 1K, and M2 has the protection function against over current and overload through automatic switch 3HK.

(3) Interlock control of glue box motor and heater

After power on, the heater RW heats up the glue in glue box, the temperature of glue is controlled in the constant temperature by the electronic temperature control device composed by electronic adjuster T and platinum thermal resistance R, to make sure the temperature of glue in the glue box is maintained in the preselected temperature.

The glue box motor M3 will drive the glue wheel to rotate while it is running. Therefore M3 is not allowed to run until the glue in the box is in the melting state lest the glue wheel mechanism or the motor might be damaged. In the control system, glue box motor and heater are interlock controlled. When Power On, only after closing the heater switch 2K and glue box motor switch K3, and the temperature of glue in glue box rises to the preselected temperature (between about 130 and 180 degrees Celsius), the contact T will be released, the contactor 4C coil lose power, at the same time that heater RW stop heating up glue box after Power Off, 4C n-c contact will be close after release, then contactor 3C coil is power on and self-locked by 3C contact, glue box motor M3 will start running. M3 has protection function against over current and overload protection through automatic switch 3HK.

(4) Covering motor control

When in using the covering switch 4K should be closed, when book clamper moves to the position of covering, make the inching switch 2XK on-off for a time by mechanism, cause 3XK is closed when covering mechanism is on the lowest position, 2J and 5C coils are Power On, covering motor M4 will start running to actuate covering action, after that, 3XK is cut off, 2J and 5C if Power Off, M4 will lose power, but due to the function of inertia, when M4 stops, 3XK is in the status of close again to prepare for another covering action. Emergency stop button 2TA is setup in the covering control, when the cover is found wrongly placed or the book core is oblique, covering action can be stopped emergently to reduce the loss of covers.

Covering motor M4 has protection function against over current and overload through automatic switch 5HK.

VIII. Installation

Upon receipt of the machine, the user shall check weather the package is in conformity with the packing list and potential damages occur in transit. First place the machine firmly, and then turn on power supply and movement buttons and observe the motor if it runs in right rotating direction. The back milling cutter shall run clockwise observing it from top to bottom.

The glue roller shall run clockwise observing from the operation side of machine. The binding cam shall run anticlockwise observing from the same side. Check whether the photoelectric control is sensitive. It can not be put into formal use until all the parts function normally.

IX. Lubrication

In order to make the machine function normally, decrease wear, and prolong the operation life, all transmission parts shall be lubricated before starting the machine. Make sure not to omit or block up them. The oil in the gearbox shall be replaced every three months. The engagement place between chain and chain gear shall be lubricated regularly. The sliding surface of guide track, the oil dynamic bearing of glue roller rubber wheel, function surface of cam shall be regularly lubricated.

During lubrication, keep the contact place of book core and cover clean.

X. Repair and maintenance

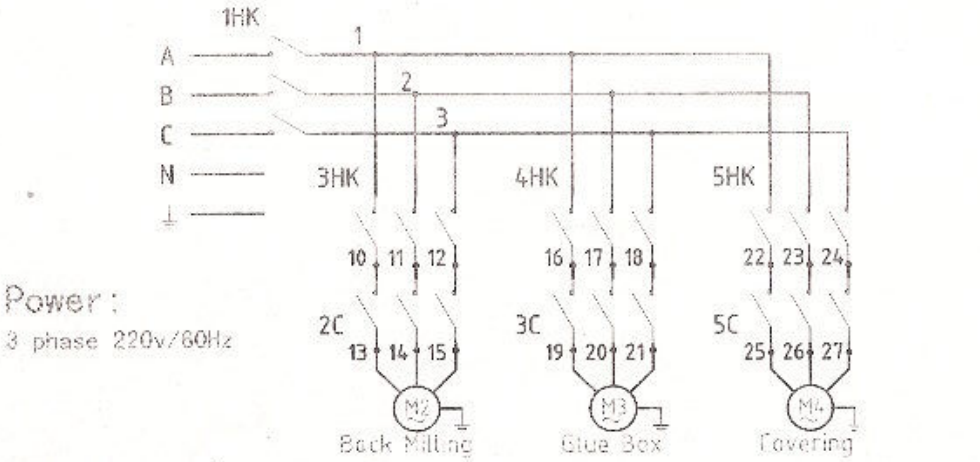
i) Check carefully the correctness and firmness of main components or parts. Make sure all the active parts have been lubricated and blocks of transmission parts been removed. Don't start the machine until they are checked in order.

ii) While starting the machine, no abnormal sound is allowed. Upon any defect is detected, the machine shall stop immediately for maintenance.

iii) Check the parts regularly, such as quick-wear part, transmission belt, tension of chain, and lubricating condition. Solve in time if any abnormal is found.

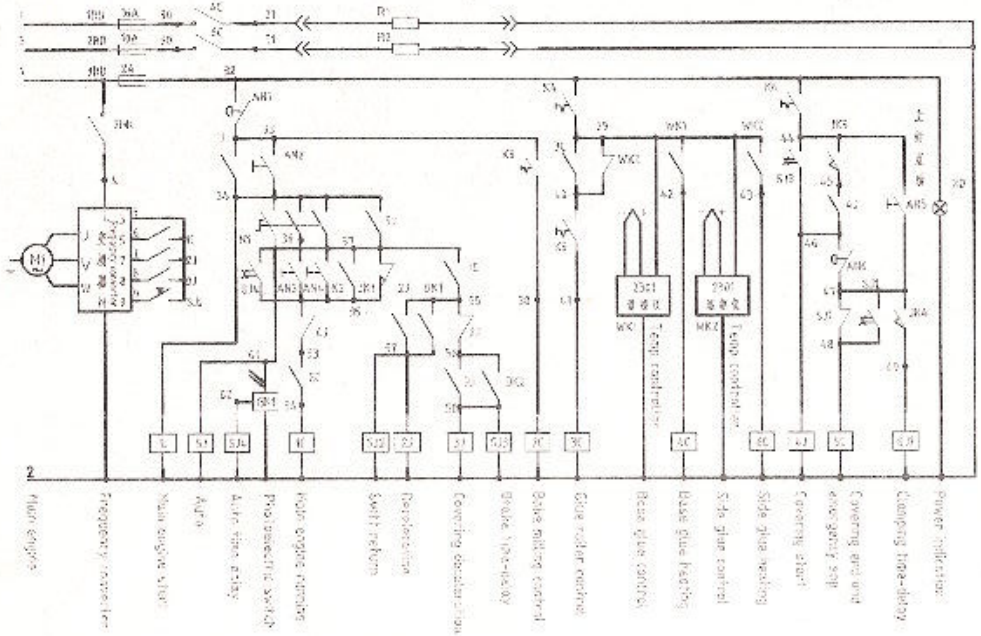
iv) Always keep the inside of machine clean. No scraps of paper or lime sand, etc. are allowed in the machine especially on the guide track surface. Rubber waste shall be cleaned all the time to keep the chip removal pipe unblocked.

JBB500 Electric Schematic Diagram



Power :

3 phase 220v/60Hz



Order No.	Code	Description	Model& Specification	Qty
30	6HK	Automatic switch	DZ47-60/1A	1
29	GK1,GK2	Photoelectric switch	BL50-S3AW1	2
28	VFD	Frequency converter	BFV000720	1
27	R2	Platen heater	1000W	1
26	R1	Platen heater	2500W	1
25	SJ1-SJ4	Time relay	AH3-3 0-3S	4
24	WK1,WK2	Temperature controller	XMT-230	2
23	DK2	Proximity switch	K-18Y5D	1
22	DK1	Proximity switch	K-18Y5D	1
21	JK1-JK3	Inching switch	TM703	3
20	3RD	Fuse	2A	1
19	2RD	Fuse	10A	1
18	1RD	Fuse	16A	1
17	K3-K6	Toggle switch	KN3-2315	4
16	K2	Foot switch	FS-1	1
15	K1	Changeover switch	LS48-S342-S002	1
14	AN2-AN5	Button	XB2-BD21C	4
13	AN1,AN6	Emergency stop button	XB2-BS542	2
12	XD	Signal light	XB2-EVM43	1
11	1J--5J	Relay	MY2J AC220V	5
10	2C--6C	Contactor	LC1-D0610 M5X	5
9	1C	Relay	MY2J AC220V	1
8	M6	Triphase asynchronous motor	YW6316 180W	1
7	M5	Triphase asynchronous motor	AC27124 0.37KW	1
6	M2	Triphase asynchronous motor	Y112M-2V3 4KW&2A 2890R/A	1
5	M1	Triphase asynchronous motor	AC27124 0.37KW	1
4	4HK,5HK	Automatic switch	DZ47-60/1A2-Ⅲ	2
3	3HK	Automatic switch	DZ47-60/15A3-Ⅲ	1
2	2HK	Automatic switch	DZ47-60/5A3-Ⅲ	1
1	1HK	Automatic switch	DZ47-60/25A3-Ⅲ	1

Packing List

Description	Qty	Remarks
JBB50C Perfect Binding Machine	1	
Operation Instruction	1	
Chain Chain roller	5	
Chain Interior chain flake	4	
Chain Exterior chain flake	1	
Chain Circlip	2	
55×7, 8×10, 14×17, 17×19	One for each	
22×24, 27×30 double end solid wrench	One for each	
3, 4, 5, 6 Allen keys	One for each	
12" Adjustable spanner	One for each	
Screwdriver (+)	1	
Screwdriver (-)	1	
HH52P relay	2	
1703 inching switch	1	
Reinforcing steel bracket	1	
Adjustable sleeve	1	

Packer: _____

Date of production: _____

WENZHOU QUNLONG PRINTING MACHINERY CO.,LTD.
Add: 38-1 North Niushan Road
Tel: 0577-88628688 88627818
Fax: 0577-88628688
Mobile Phone: 13705771238 13906658612
Post Code: 325027
Opening Bank: Agricultural Bank of China, Wenzhou Sub-branch Business Department
A/C No. 319-299901040000928
Contact Person: Mr. Zhou Mr. Li