VACUUM TYPE

BANKNOTE COUNTING MACHINE

MÜHLEN FALCON F24

TECHNICAL MANUAL

FALCON F24

CONTENTS

1. Introduction

This manual contains specifications, operating procedures, diagnosis and trouble-shooting, etc. for a good service. It is strongly recommended to read through this manual before operating the counter.

All information contained herein is based on the latest specifications at the time of publication. However, there may exist some minor discrepancies between the actual machine and the text including illustrations due to HARBIN`s constant striving for the products improvement.

We hope that this technical manual will be very helpful and that the users will not feel any difficulties in using our counters. We will do our best to make our products better.

2. Specifications

Classification / Specification		CQ600	CQ700
Counting Mechanism		Vacuum Operated	
Countable Note Size and Thickness		Size : 50 X 100 ~ 100 X 200 mm Thickness : 0.06 ~ 0.12 mm	
Capacity of Feed Hopper		Max. 200 notes	
Counting Speed (Actual Speed)		100 notes / about 4 seconds	
Counting Speed (Feeding and releasing time included)		100 notes / about 4.5 seconds	
Dimensions (W X D X H)		350 X 310 X 855 mm	350 X 450 X 340 mm
Weight	Net	42 Kg	29 kg
	Gross	47 Kg	32 kg
Power required		AC 220V ± 10%. 50 / 60 Hz	
Max. Power Consumption		Approx. 300W	
Option		1. STAMP ASEEMBLY. 2. EXTERNAL DISPLAY.	

3. General Description

3-1. Nomenclature and Functions of Major Components / Parts

A	**Feed Plate**	Rubber pad that clamps notes at the initial position to start counting
B	**Start Sensor**	Note detection sensor to start counting
C	**Set Lever**	Note holding rod to prevent notes from being clamped excessively
D	**Stop Lever**	Note stopping device in the Batch mode
E	**Spindle Assembly**	Counting device by sucking notes one by one with the help of rotating Spindles
F	**Blowing Pipe**	Note separating device by blowing air to count notes accurately and easily
G	**Power Switch**	Switch for the Power ON/OFF
H	**Vacuum Pump**	Air sucking and blowing system
I	**Spindle Motor**	Motor for rotating the Spindle
J	**Clamp Motor**	Motor for operating the Feed Plate
L	**Separator Spring**	Plate spring for separating each note to feed notes one by one during counting

Figure 3.1-1

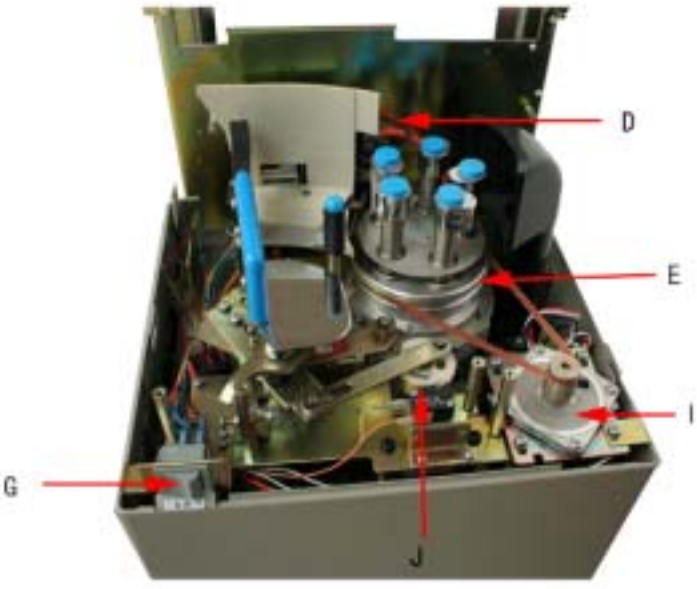


Figure 3.1-2

3. General Description

3-2. Operating Panel (Main Panel)

Free counting	: Clamp will be restoration when banknote finished counting at any quantity.
Memory function	: Used to check the banknote quantity of free counting.
Re-count:	: Used to check the banknote quantity is 100 sheets, the machine will alarm if the quantity is not 100 sheets and clamp won`t open.
Batch function	: Counting by each batch, the clamp won`t open until count to destine quantity.
Batch Accumulation	: Record the amount of every same destine quantity automatically.
Re-count Accumulation	: Record the amount of every 100 sheets automatically.
Free Accumulation	: Record the amount of every counting quantity automatically.
Dust defend & Noise reduce	: The auto-shutter will close accompany with counting action, which can defend the dust and reduce the noise effectively.
Reset function	: The reset key is at the left of upper cover. Please press when machine stop at counting action, then the system will restore to present state.

LCD display of Model CQ600 Serial:

LCD selection is lattice number 192×64,

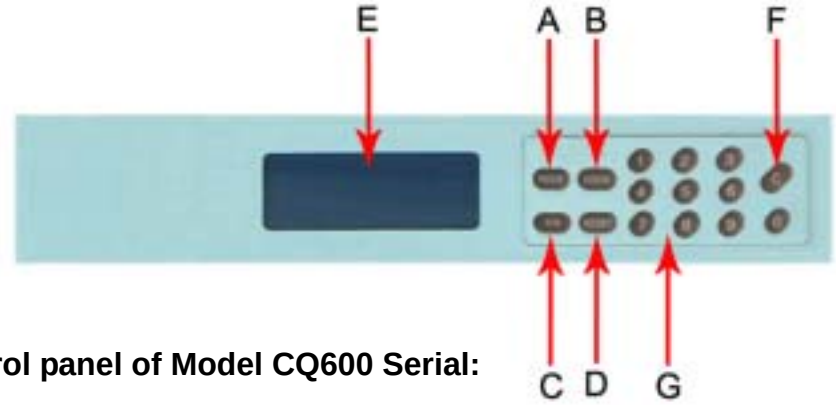
(1) Normal Display

On the left of LCD is the cursor, use mode key to move the cursor to process choosing. When the cursor is on some item, this item is reverse video. You can only choose only between amount checking and batch checking. When the cursor is on fake checking, you can use number key from 1-8 to choose fake checking sensitivity, in total 8 levels. On the right upper of LCD is 32×32 lattice four digits big number display, it is used to display the note counting number for every time, when

another counting is processed, the number reset from 0. On the right down of LCD is 16×16 lattice four digits small number display, it is used to display the total amount after accumulation.

(2) Malfunction Display

When there is fault during counting, the display screen will show the phenomena and description of fault directly. The user and repairer will find the fault easily and expediently.



Control panel of Model CQ600 Serial:

Description of Function Key on Control Panel:

A. Mode key

Press this key, the cursor guide finger choose dust proof, amount checking, batch, accumulation, stamp, fake checking and other items from the top down.

B. Door key

When press this key, the dust proof will be closed, press this key again, it will be opened. In any options, no matter if the dust proof is chosen, the door can be opened and closed freely when press this key.

C. Y/N key

When the cursor guide figure appoint on some item, press this key to confirm, when this item is converse video, it means this item is chosen. When the fake checking sensitivity is chosen, the showing number is “5”, the default fake checking sensitivity is Level 5. The fake checking sensitivity is displayed by number 1-8, in total 8 levels. You can choose either of amounting checking or batch. If you choose amount checking, you can’t choose batch checking, also if you choose batch checking, you can’t choose amount checking. Stamp only can be chosen only in the

amount checking state, not batch checking. In the reverse video state, press the reset key, then it will come back to the normal state, achieving switch on. You can adjust the number value only when the cursor in on this item and this item is chosen.

D. Reset key.

In any state, press this key, it can back to the original counting state.

E. LCD Display Screen

F. Clear key

Press this key in batch state, the display number will be zero. Press this key on counting state, the display number will be counting resetting value 100. It is useless in other state.

G. 0-9 number key

When the mode key is on counting or batch, use the number key to set three digits significant figure. When the cursor is on fake checking, use the number key to choose fake checking sensitivity, one digit significant figure.

4. How to operate the machine

4.1 Origin state (Default counting state)

When the machine power switch is on, the machine is on initial state, that is the cursor on the dust proof position, and this item shows reverse video. When other functions have not been chosen, it will display normally. At that time, the four small digits shows”000”, and four big digits shows:100”. Move the cursor to counting item, you can set the counting number freely within the capacity range by number key. Then put 100 pieces notes which are in batches in the machine, press the starting switch, the note clip moves to clip the note, and the auto door begins to close, the number recording head rolls back 0.2 seconds, then begin to count the notes. Then the big number begins to accumulate, when the number reaches the setting number or the default number 100, the note will return to its original position, and one time counting is finished. If the counting result is not the setting number or 100, the note clip will not move, and the alarm will make long alarm to tell you the counting result is not the setting one or 100, you can press the reset key on the machine cover, then it will alarm and the note clip opens.

4.2 Free counting state

In the original state(default counting state), press the manner key, move the cursor to the counting position, and the counting show is reverse video, then press enter key, counting shows normally, so the counting is not chosen, it is in the free counting state. Put the notes in, when touch the start key, it will begin to count until it is finished. The big number will shows the last counting accumulating number, then the note clip opens, and the counting result doesn’t relate to 100.

4.3 Memory state

When finish once counting, press key C, the nether small digitals will record them result of this counting. Then each counting result will be record and compare with memory, clamp will open if they are same, speaker will alarm if they are different. Press key C again, memory has been clear, and nether small digital return “000”

4.4 Free accumulating state

In the free accumulating state, press the manner key, the cursor will move to the accumulation state then press enter key, this item will shows reverse video. Then begin to count the note, the upper big number changes gradually and shows the counting number at last, and the down small number will show last counting finishing number in one time. When the note counting is finished, the note clip will go back to original position. When another counting is processed, and the upper

number resets, the upper number will record the new counting result from zero, but the down number will accumulate two counting results together and shows.

4.5 Re-count accumulation state

When use the manner key to choose counting and accumulation and begin to count the note, the upper big number will changes base on it gradually, and the last counting result shows 100. And the down small number will change only one time and shows 100. When counting another time, the upper big number will set from zero and changes gradually and shows the counting result in 100, but the down small number will change only one time to be 200. If counting in 10 times, the upper big number will changes 10times, and show the same number 100, and the down small number will change 10 time, and shows orderly 100, 200, 300…… and the show the last result 1000, the biggest showing number is 9900.

4.6 Batch state

When choose batch, if set the batch to 50 by the number key, start the machine to count the note, then the down small number will shows from 0 to 50, and the machine stops, but the upper big number will show 50 by changing one time, and the machine stops, the batch electromagnet action will be separated, and the note clip keeps stable, when press the reset key, the note clip will go back to its original position. When counting the notes in another time, the down small number will go back to zero and changes gradually to 50 and machine stops, at that time, the upper big number will still show 50, press the reset key, the note clip will go back to its original position. The biggest setting number for batch is 150. When in the batch state, if not set the batch number, that is the small number is 0, when put the notes in, it will count.

4.7 Batch accumulation state

a. batch accumulation

When use the manner key to choose batch and accumulation state synchronously, and begin to count, the down small number will show as the batch state, and changes gradually, and the upper big number will shows the last result in one time, accumulating the total number of every counting result. For example, if the batch setting number is 50, and counting note in five times, the upper big number will show 50, 100, 150, 200 and 250 when every counting is finished.

4. How to operate the machine

b. Several number recording to batch numbers

When the counting number is less than the batch number, when the counting is finished, the note clip will open automatically and alarm . You can put the notes in again, and go on counting, the big number will accumulate to the last displayed number. For example, when the batch setting number is 150, for the first time, put 50 pieces notes in, start the machine, and record the counting result as 50, press the reset key, the note clip opens, remove these notes, then put 50 pieces for the second time, then it will accumulate to 100, and the machine stops, then repeat it for the third time, at last it will show 150 and machine stops.

4.8 Fake checking state

When fake checking is chosen, the displayed number will be 5, you can choose number key1-8 to choose the fake checking sensitivity.

During the counting state, when fake note is checked out, the machine will stop, and the batch electromagnet will act, and transfer to fault menu to show fake note and tell the fake note position, for example, if the fifteenth piece is fake one, when counting to the fifteenth piece, it will recognize the fake one and machine stops, the LCD will shows fake note. See Figure5.

Figure 5: LCD display when fake note is checked out

4.9 Stamp state

When this function is chosen, it will shows reverse video. When the counting result reaches the setting number or 100, the machine stops, and the note clip doesn’t open, the stamp electromagnet will act, after printing is finished, the stamp electromagnet will release, and note clip will open.

5. Fault Finding and Troubleshooting

1) The machine do not work while turn on the power.

☞ Check the Check that the AC power cord is plugged correctly.

☞ Check the fuse which is mounted on the rear part of the machine.

(Refer to "8 - 10. How to replace the CPU (89C52)")

☞ Check each harness within the machine

3) When the power is turned on, abnormal noisy sounds are generated.

☞ Check the noisy part(s) within the machine.

☞ Check that any harness or alien substance has penetrated the fan.

☞ If the noise is generated at the friction making part of the clamp assembly, some grease must be applied over the friction making part.

3) Metallic sounds are generated during counting.

☞ Check that any alien substance has penetrated the machine.

☞ Check that the separation spring has some burrs on its edge.

4) Though the feed plate comes into contact with the spindle assembly, the spindle assembly rotates idly for a while without sucking any note and then the feed plate returns to the initial position.

☞ Check the setting of the separation spring.

(Refer to "8 - 5 How to adjust the separator spring.")

☞ Check the vacuum pump in the TEST mode. **(Refer to "7. Self - diagnosis.")**

☞ Check each harness within the machine.

☞ Check the setting of the vacuum sensor. Readjust the vacuum sensor if necessary.

5) The machine vibrates excessively during counting.

☞ Adjust the tension of the tension spring at the middle of the clamp assembly.

(Refer to "8 - 4 How to eliminate excessive vibration during counting.")

☞ Check the distance between the feed plate and the spindle assembly when the feed plate is closed.

(Refer to "8 - 3 How to assembly the rubber assembly.")

5. Fault Finding and Troubleshooting

6) During counting, the feed plate returns to the initial position without completing counting.

- ☞ Check the setting of the plate spring.
- ☞ Check that notes are well aligned.
- ☞ Readjust the vacuum sensor.
- ☞ Check the distance between the feed plate and the spindle assembly when the feed plate is closed.
- ☞ Check the setting of the gap adjustment bolt.

(Refer to “8 - 4 How to eliminate excessive vibration during counting.”)

7) The spindle does not stop rotating after counting.

- ☞ Readjust the vacuum sensor. **(Refer to “8 - 1 Setting of the vacuum sensor”)**

8) The machine over counts or undercounts.

- ☞ Check the alignment and the state of the notes.
  (Refer to “8 - 6 How to insert the notes”)
- ☞ Check that the notes are inserted properly.
- ☞ Readjust the vacuum sensor.
- ☞ Check the setting of the plate spring.
- ☞ Check the setting of the spindle assembly.
  (Refer to “ 8 - 2 Setting of the suction position”)
- ☞ Make sure that there is no dust around the count sensor which is located at the lower right side of the spindle assembly.

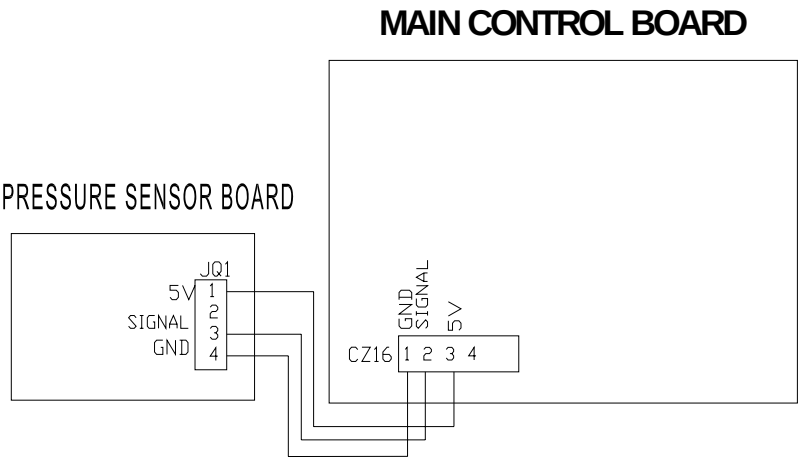
9) After the power is turned on, the vacuum pump does not operate at all even though notes are inserted.

- ☞ Check each harness within the machine.
- ☞ Check the SSR.

5. Fault Finding and Troubleshooting

10) After the power is turned on, the counted number is not displayed even though notes are inserted, or the spindle stops after rotating for a short while if the start sensor is operated.

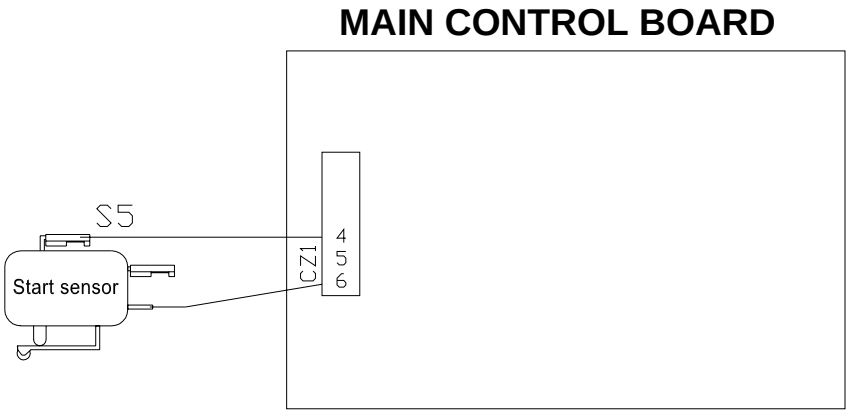
☞ Check that the connection between JQ1 of the vacuum sensor board and CZ16 of the motor drive board is correct as shown below.



11) After the power is turned on, the spindle assembly continues to rotate with the feed plate closed.

☞ Check the start sensor and the encoder sensor in the TEST mode.
(Refer to "7. Self - diagnosis.")

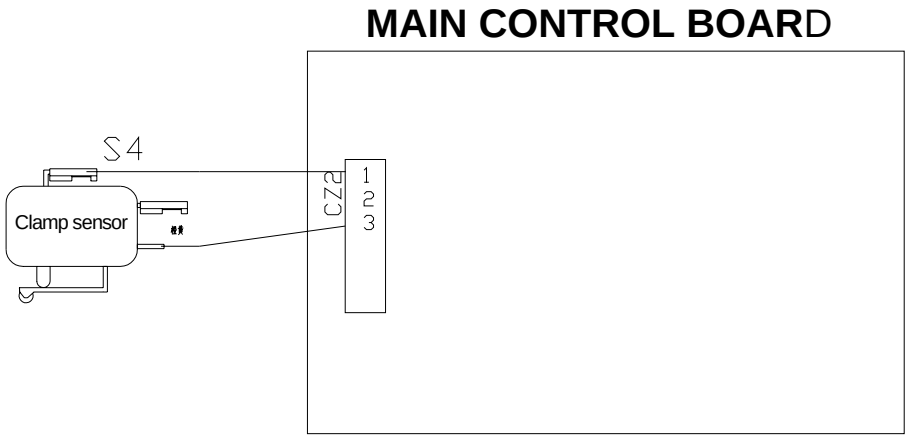
☞ Check that the connection CZ1 of the start sensor board and main control board is correct as shown below



5. Fault Finding and Troubleshooting

12) After the power is turned on, the clamp assembly operates and the feed plate repeats closing and opening.

☞ Check that the connection between CZ2 of the clamp sensor board and main control board is correct as shown below.



13) After the power is turned on, the spindle assembly does not operate at all even though notes are inserted.

☞ Check the urethane belt around the spindle assembly and the spindle motor.

☞ After turning on the power, try to rotate the spindle assembly with your hand. If the spindle assembly does not rotate, the cause of the problem may be one or some combination of the following possibilities:

① Alien substance may have penetrated the spindle assembly.

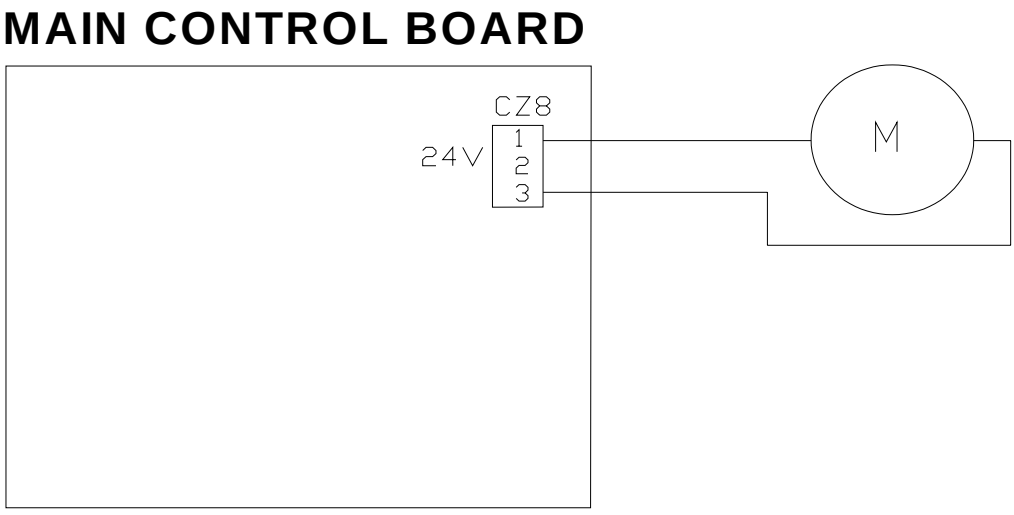
② The pinion gear and the internal gear may have been worn away, which enable each spindle head to rotate.

③ The fixing bolt of the internal gear may have been fastened excessively.

5. Fault Finding and Troubleshooting

In such cases, it is necessary to clean the interior of the spindle assembly or to replace the spindle assembly by a new one. (Since it may result in serious problems to disassemble and assemble the spindle assembly without the setting jig, anyone other than an expert must not try to do it.)

☞ Check that the connection between CZ8 of the motor drive board and the main control board is correction as shown below.



6. Cautions

Most of the faults reported in the field are due to careless handling or not keeping the safety rules. Therefore almost all faults may be prevented in advance and the machine hence can be utilized to its full performance if the user gets used to operating the machine.

1) Incorrect maintenance or inappropriate measures are dangerous enough to give damage to the machine or to hurt the user himself or other people.
2) Never clean or repair the machine while the machine is powered up.
3) Take care that tools, fingers, hair or the loose clothing may never come into contact with the moving part of the machine.
4) Remove damaged notes and alien substance in advance and insert notes pushing them soft and smoothly to the end of the upper cover.
5) Turn off the power and unplug the power cord before starting cleaning.
6) Using a small brush or something like that is recommended to clean the parts which are not handy.
7) Use wet soft cloth and soft soap to clean the external cover.
8) Never use strong chemicals such as alcohol, acetone, etc. to clean the external cover.
9) Never spray liquid into the machine when cleaning.

7. Fault Processing Method

When machine has fault, display screen will show fault menu as follows. Please check as fault reason displayed.

（1）fake note display

When machine checks fake note, it will stop and alarm, LCD display as Fig.5, display digit is the place where fake note is.

（2）shutter fault

When dusting shutter can not reach left and right place, i.e. can not check photoelectricity signal from left and right, there are faults as follows: please check as fault reason displayed:

Shutter can not reach the place
1. check mechanical drive part.
2. check photoelectricity switch.
3. check motor’s plug, wiring, work voltage.

（3）note clamp motor

When note clamp motor does not reach the correct place, there are faults as follows: please check as fault reason displayed.

Clamp can not reach the place
1. check mechanical drive part.
2. check start switch.
3. check motor’s plug, wiring, work voltage.

（4）no counting

When no counting, machine shows fault as follows: please check as fault reason displayed.

No counting
1、check pump head of air pump motor.
2、check counting motor, air pressure switch.
3、check channel for air.

8. Setting Method for each Part

8-1 Setting of the suction position

A brand new machine delivered from the factory need not be adjusted. However, when it is needed to adjust the machine during using, the machine must be adjusted as follows:

1) Separate the front cover and back cover from the machine.

2) Loosen a little the 3 fixing bolts of the internal gear of the spindle assembly which is a big white gear located at the lower end of the spindle assembly.

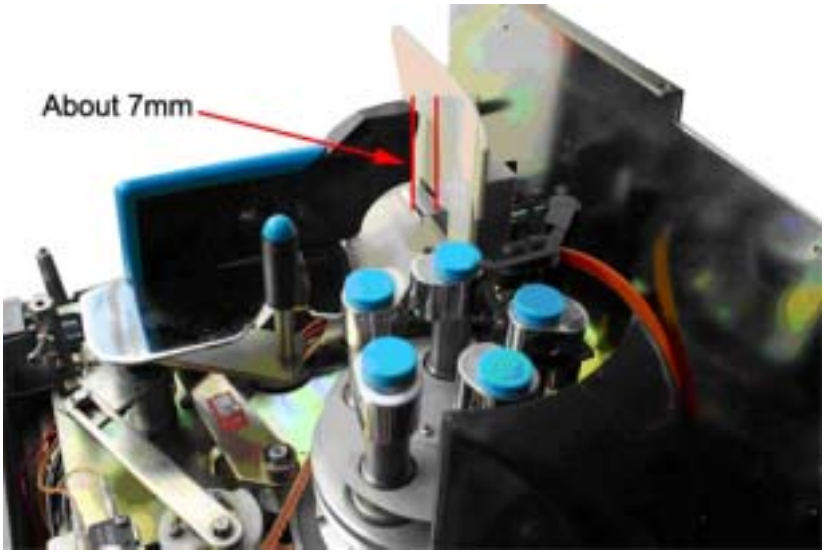
3) Insert the setting panel with an inscription of 7 mm or a note sized paper sheet pushing it to the end of the upper cover. (The start sensor must be operated by the setting panel or the paper.)

4) Adjust the suction position turning the internal gear. If the internal gear is turned clockwise (CW), the suction position becomes shorter and vice versa. Normally about 6-7 mm are adequate for satisfactory counting of both the new and the old notes. (The suction position is adjusted to be about 6-7 mm for brand new machines delivered from the factory.)

8. Setting Method for each Part

8-1 Setting of the suction position

4) Adjust the suction position turning the internal gear. If the internal gear is turned clockwise (CW), the suction position becomes shorter and vice versa. Normally about 6-7 mm are adequate for satisfactory counting of both the new and the old notes. (The suction position is adjusted to be about 6-7 mm for brand new machines delivered from the factory.)



5) The machine must be fully tested to ensure exact counting when the suction position was readjusted.

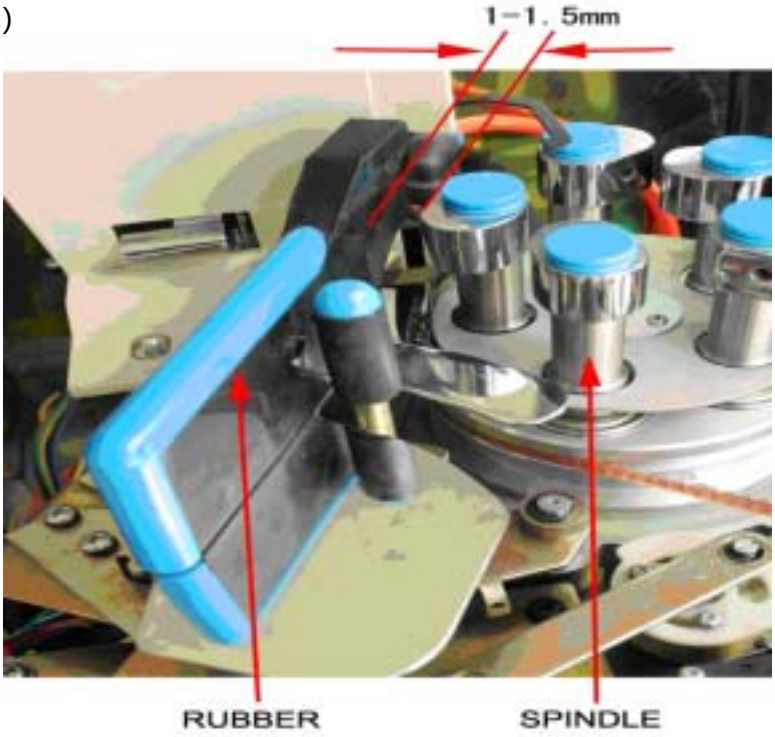
6) Take care lest an excessive force should be applied when the fixing bolts of the internal gear are assembled after the suction position adjustment was finished. If the bolts are fastened with an excessive force, the spindle may not operate smoothly.

8. Setting Method for each Part

8-2 How to assembly the rubber assembly

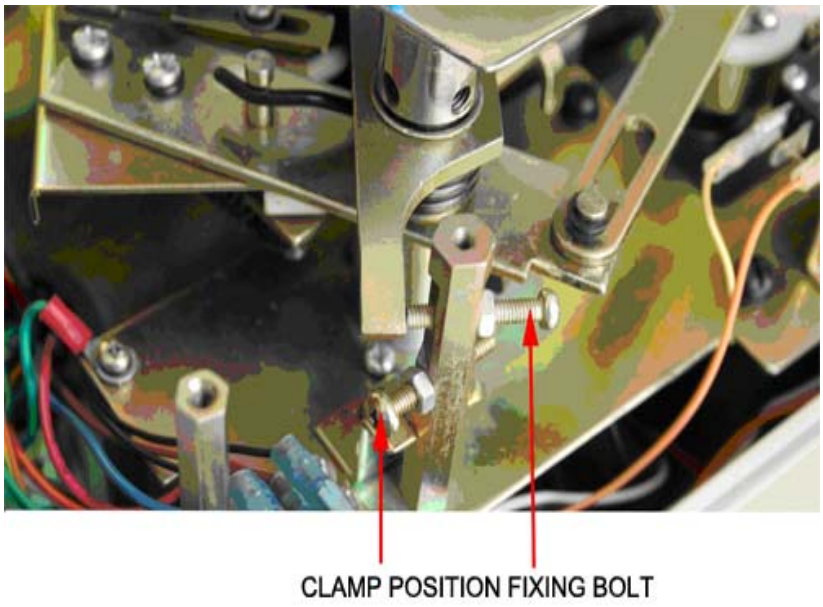
When the rubber assembly is to be reassembled after it was disassembled to inspect the machine, follow the following directions:

1) Turn on the power of the machine.
2) Assemble the rubber assembly that the long holed part of the rubber bracket may be positioned at the center of the end of the note supporter. (Take care lest the note supporter should come into contact with the long holed part of the rubber bracket when assembling.)
4) Adjust the position of the spindle head, rotating the spindle axis with your hand, that one of the spindle heads may be positioned at the position at which the flat part of the spindle head can come into contact with the rubber assembly.
5) If the start sensor is operated, the rubber assembly stops at the position where the rubber assembly looks the spindle head face to face.
6) Adjust the position of the rubber assembly, turning the rubber position setting bolt with a + driver and a spanner, that the distance between the rubber assembly and the flat surface of the spindle head might become 1-1.5 mm. Then, adjust the position of the note supporter, turning the note supporter setting bolt with a + driver and a spanner, that the note supporter might come into contact with the rubber. And then fix the rubber assembly tight by fastening the two fixing bolts. (Take care lest the bolt and the nut should be damaged when turning the setting bolt.)



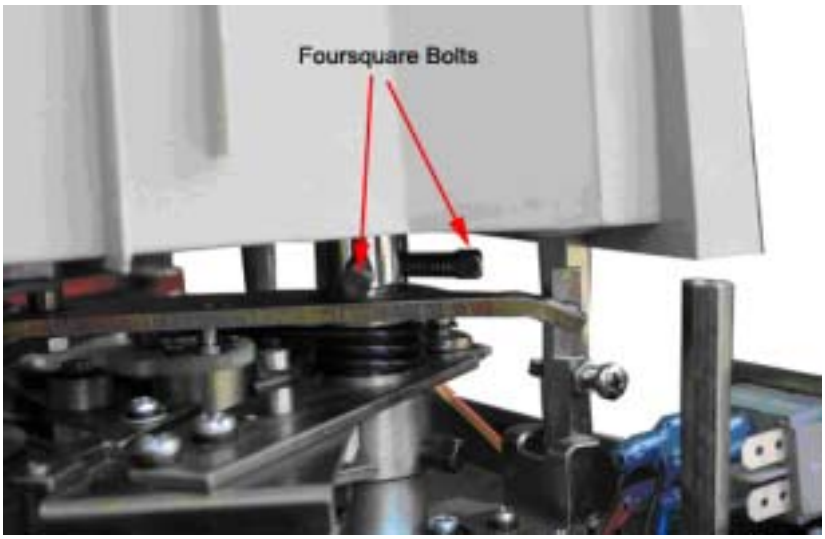
8. Setting Method for each Part

8-3 How to assembly the clamp assembly



1) Make the rubber assembly return to its initial position by pressing the RESET key of the display panel.

2) Check that the note supporter is in contact with the long holed part of the bracket which is located at the bottom surface of the rubber assembly.



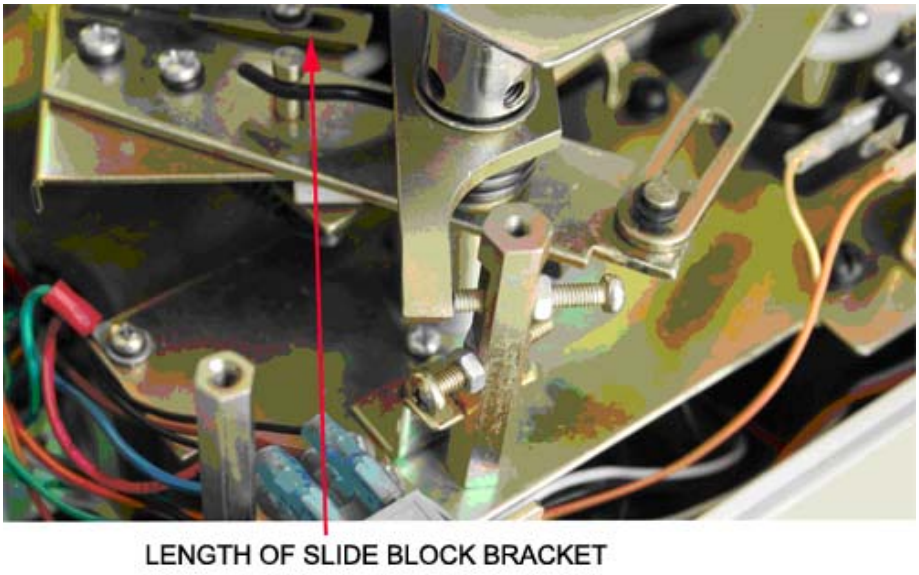
8. Setting Method for each Part

8-4 How to eliminate excessive vibration during counting

If an excessive vibration occurs during counting, follow the following directions:

1) Turn off the power of the machine.
2) Separate the front cover and back cover from the machine. (Take care lest the fan attached on the rear part of the machine should be separated.)
3) Separate the rubber bracket and the upper cover from the machine.

4) Adjust the length of slide block bracket.



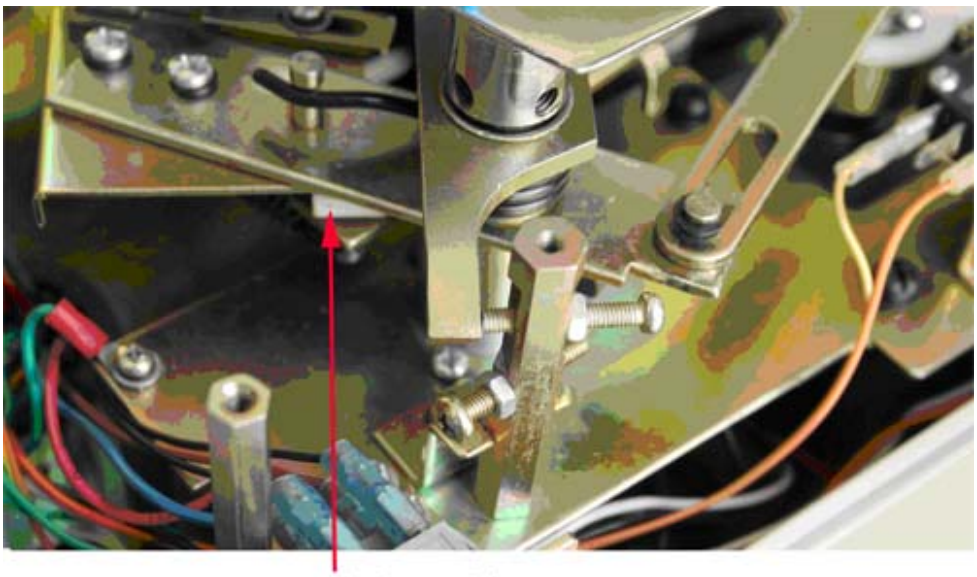
8. Setting Method for each Part

8-4 How to eliminate excessive vibration during counting

5) The length is set to be middle when the machine is delivered from the factory. If there is an excessive vibration during counting, the length must be set to reduce the pull. But do not reduce so much, which will affect the veracity. The adjustment is done as follows:

a. Loosen the nut a little turning it CCW with a spanner.

b. Adjust the position of bracket to change the resistance, turn left for increase, turn right for reduce.



6) If the setting is finished, assemble the upper cover and the rubber bracket. And then perform the counting test. During the counting test, check that the rubber assembly moves smoothly and that there is no abnormal behavior while counting both the new notes and the old ones.

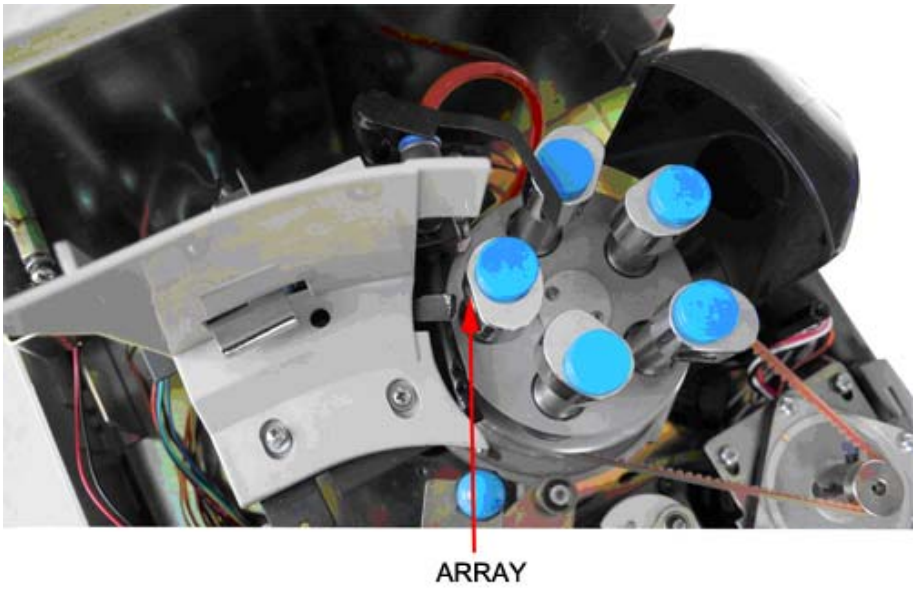
7) After the counting test is finished, apply some bolt bond around each fastening bolt of the upper cover.

8. Setting Method for each Part

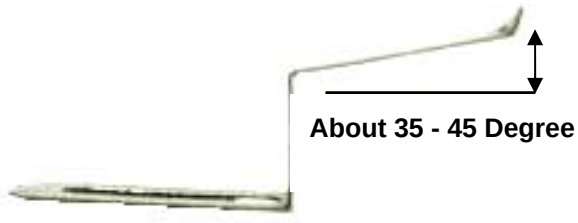
8-5 How to adjust the separator spring

It is necessary to check the separator spring if counting error continues to occur even after the vacuum sensor was readjusted. The separator spring separates each note during counting, and it must be adjusted as follows:

1) Check that the bended end of the separator spring is in line, viewed from above, with the flat surface of the spindle.



2) Check that the bended angle of the separator spring is about 35 – 45 degrees. (If the bended end is set too high, the note sometimes cannot pass over the spring end, and if the bended end is set too low, the notes are not separated.)



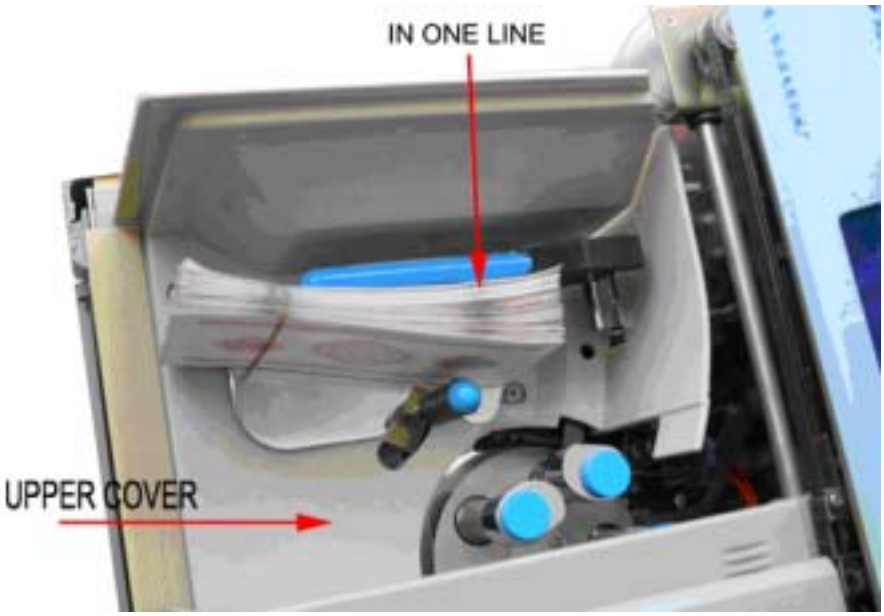
3) Make sure that there is no burr at each corner of the separator spring.

8. Setting Method for each Part

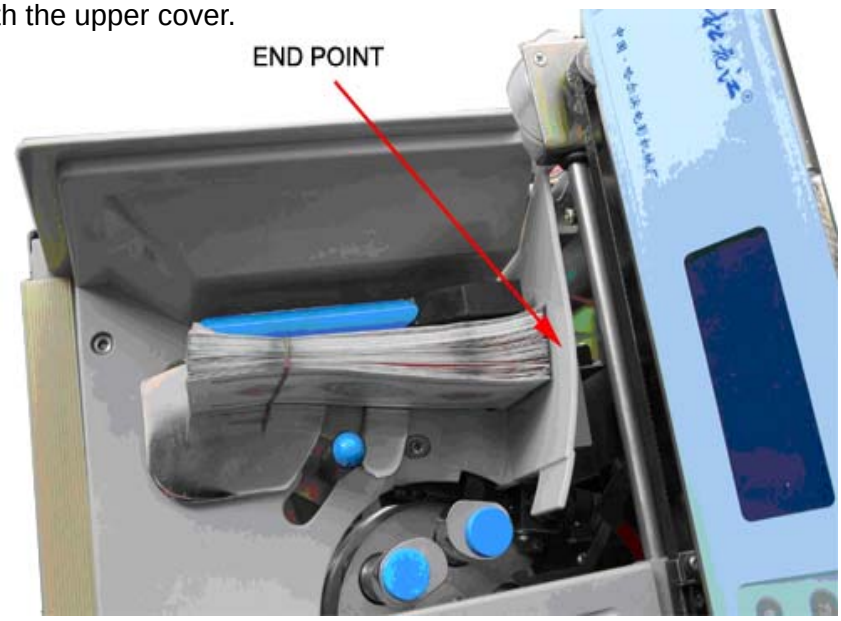
8-6 How to insert the notes

Since counting error may occur during counting if the notes are not inserted properly, the notes must be inserted as follows:

1) Make sure that the notes are properly aligned before they are inserted.



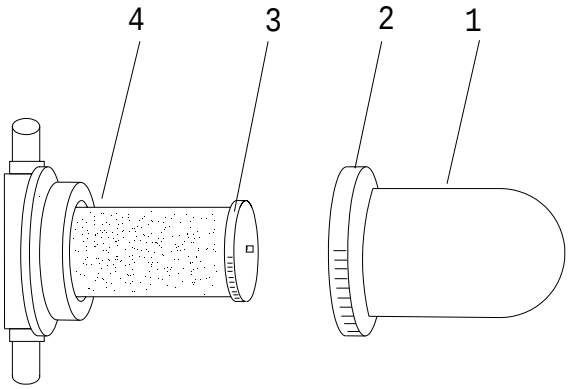
2) Insert the notes by pushing them softly until the fore end of the note bundle comes in contact with the upper cover.



8. Setting Method for each Part

8-7 How to assemble the air filters

There are two filters in cabinet to prevent dust into vacuum pump and keep air pressure ‘s stability and reduce noise. To ensure vacuum tube smooth, it need to be cleared every half month, or observe filter cartridge 4, if there are a lot of dust on it, please clear immediately. Disassembly order is following:



Open back door and revolve diaphaneity cap 2 at anticlockwise, then take off diaphaneity cover 1, clear it with brush. When refixing it, please pay attention to fix seal ring well, and then revolve the cap tightly.

8. Setting Method for each Part

8-8 How to assemble the filtering net

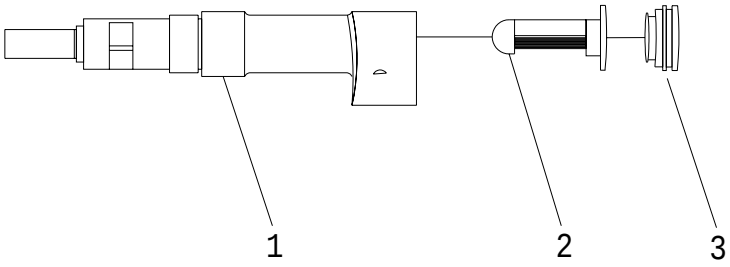
Filtering net is put in five note suck heads to filter dust from note, the order to clear dust is following:

① open top cover of every note suck head with special cap opener in order.

② take off filter net with hook；

③ clear filter net with brush；

④ fix every spare parts in proper order to ensure seal of cap of note suck head.



8. Setting Method for each Part

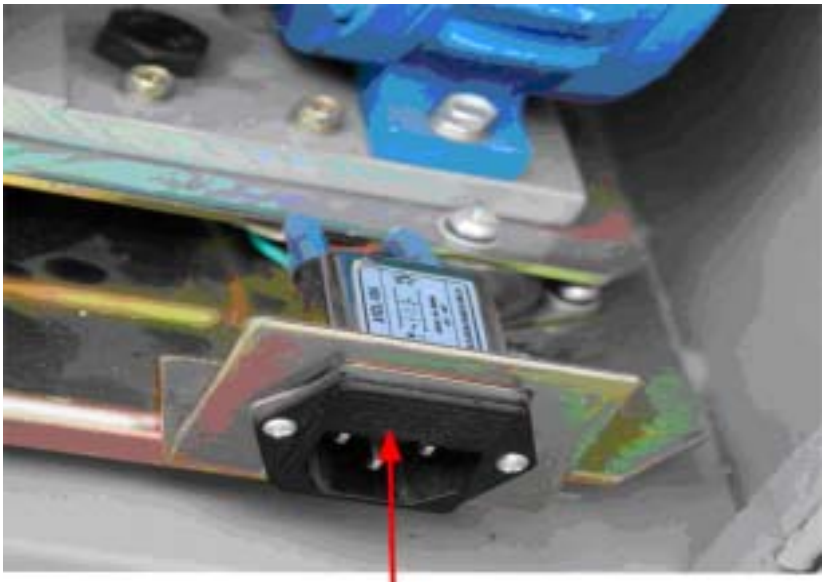
8-9 How to check and replace the fuse

The fuse which is mounted on the rear side of the machine and each harness within the machine must be checked if the machine does not operate even though the power of the machine is turned on. The fuse must be checked as follows:

1) Turn off the power of the machine.

2) Separate the power receptacle. (Attention: there is a FUSE inside receptacle)

3) Press, with a - screw driver, the hole located at the upper end of the fuse holder.

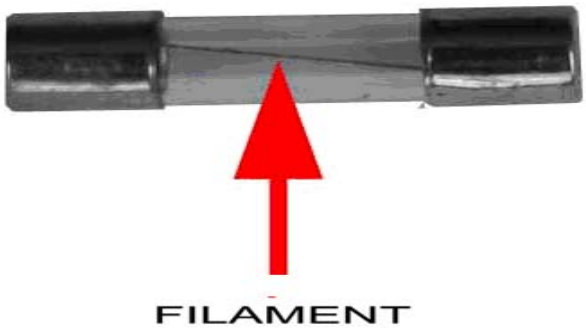


8. Setting Method for each Part

8-9 How to check and replace the fuse

4) Pull out the fuse from the power receptacle after separating the power receptacle from the machine.

5) Check the filament of the fuse, and replace the fuse by a new one if the filament is broken.
(The specifications of the fuse : 250V, 10A)

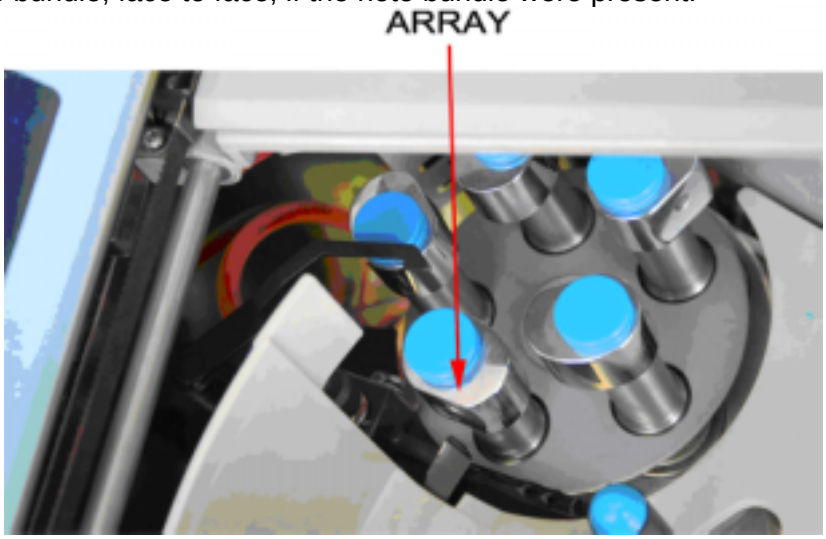


8. Setting Method for each Part

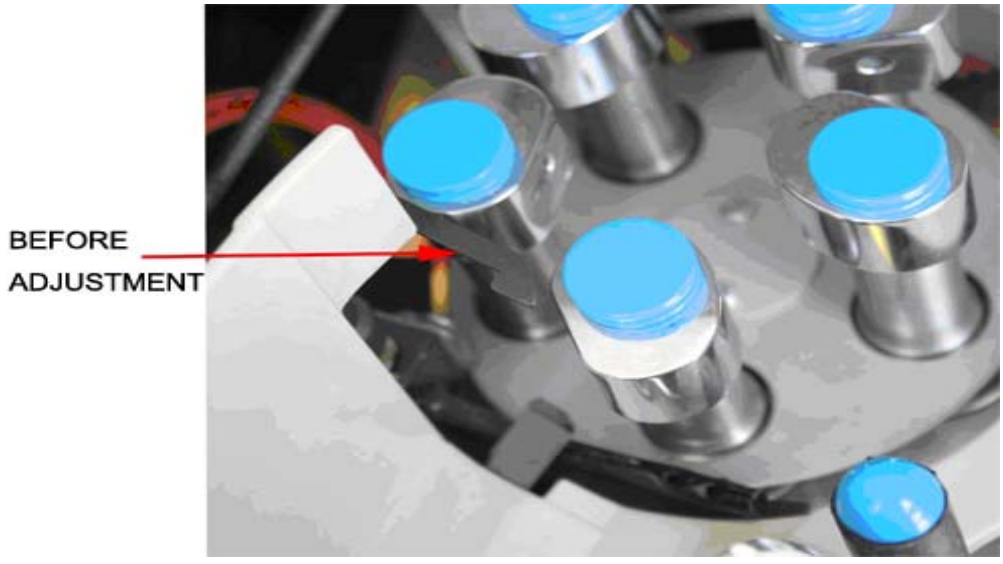
8-10 How to adjust the stopper assembly

If the number of the batch-counted notes does not coincide with the preset number in the batch mode, the setting of the stopper assembly must be checked. Note that used notes, improperly aligned notes or mutilated notes may result in errors in the batch mode. The stopper assembly must be adjusted as follows:

1) Turn off the power of the machine.
2) Separate the front cover and back cover from the machine.
3) Adjust the orientation of the spindle head such that the spindle head might come into contact with the note bundle, face to face, if the note bundle were present.



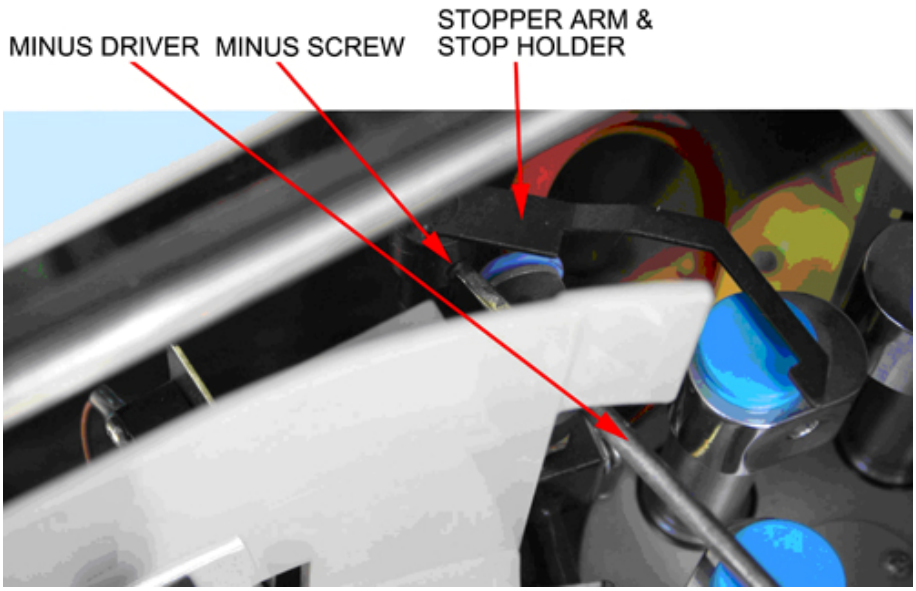
4) Check that the end of the stopper arm is in line with the flat surface of the spindle head when the stopper arm is pushed fully toward the feed plate.

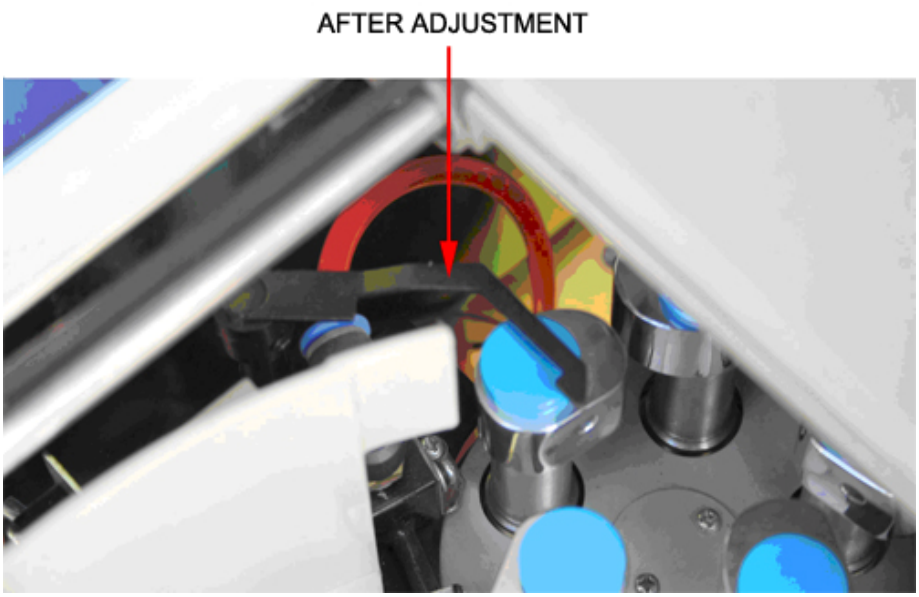


8. Setting Method for each Part

8-10 How to adjust the stopper assembly

5) If the end of the stopper arm is not in line with the flat surface of the spindle head, adjust the orientation of the stopper arm & stop holder after loosening the hexagon insert bolt slightly.





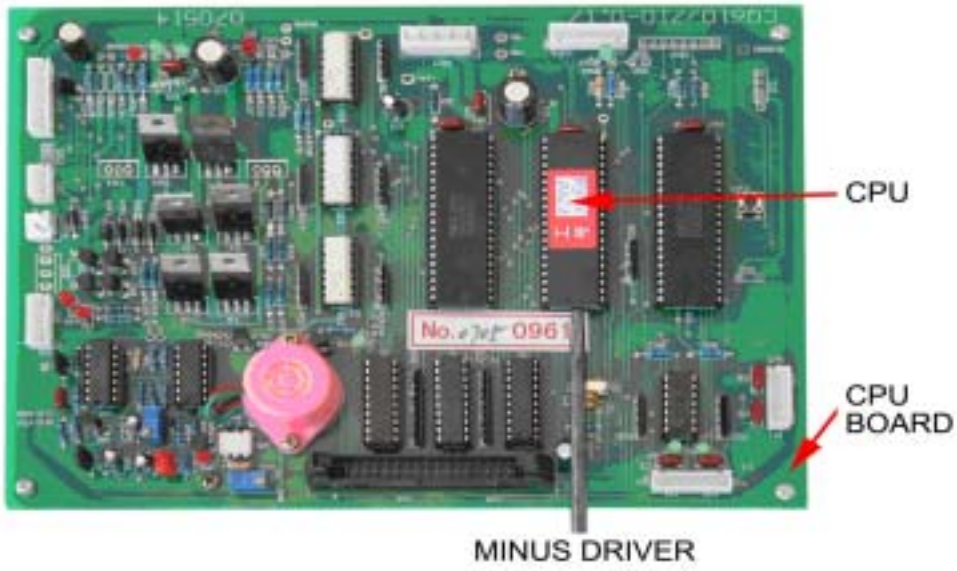
6) If the end of the stopper arm & stop holder comes in line with the flat surface of the spindle head, fasten the hexagon insert bolt tightly. And then, apply some bolt bond around the bolt.

8. Setting Method for each Part

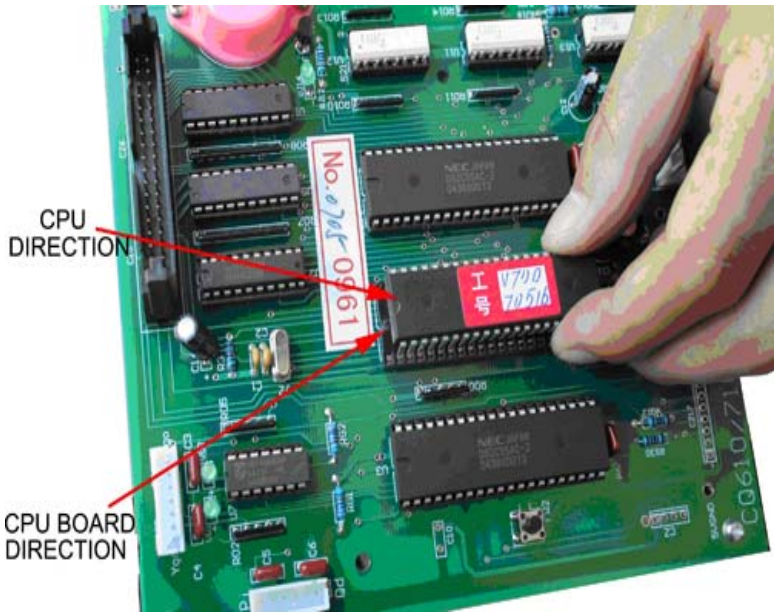
8-10 How to replace the CPU (89C52)

It is necessary to pull out the CPU from its socket when the software is to be updated. The CPU can be separated from its socket as follows:

1) Turn off the power of the machine.
2) Remove the harness connecting the main board and the machine.
3) Push up the CPU slightly after inserting the - screw driver between the CPU and its socket.

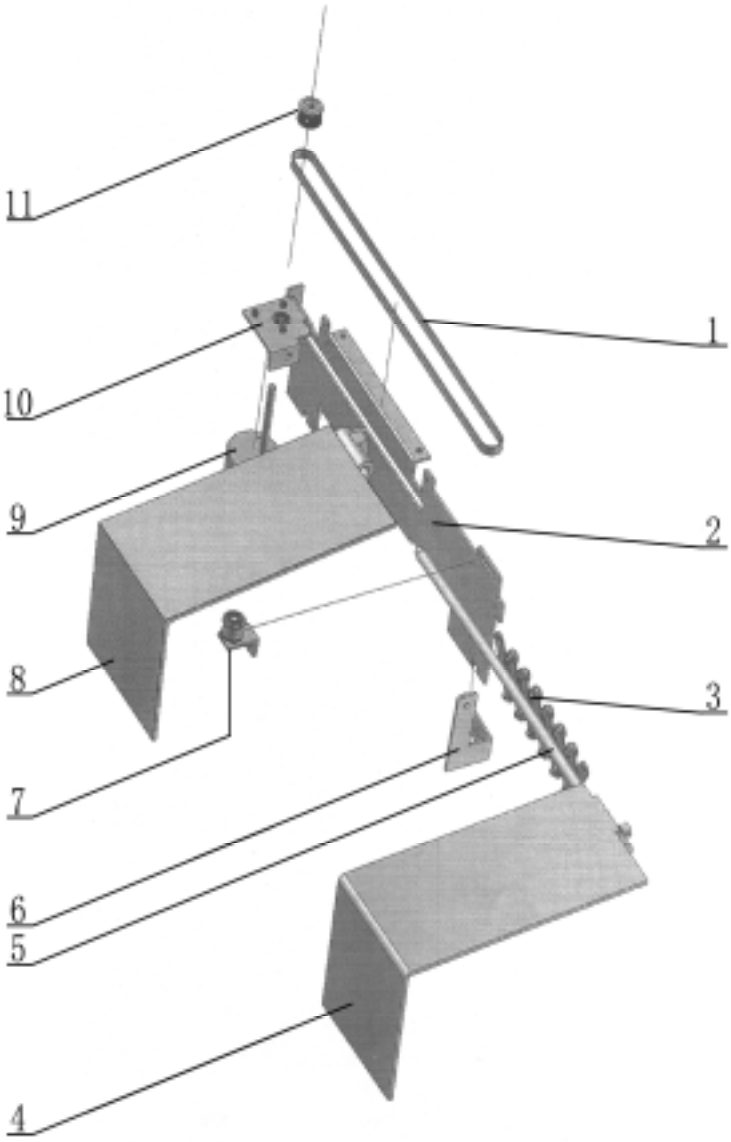


4) If the CPU is to be reassembled after the software update, insert the CPU into the socket keeping the orientation of the CPU as shown below. Take care lest the orientation should be mixed up. Note that the dotted/notched side of the CPU must be inserted into the notched side of the socket.

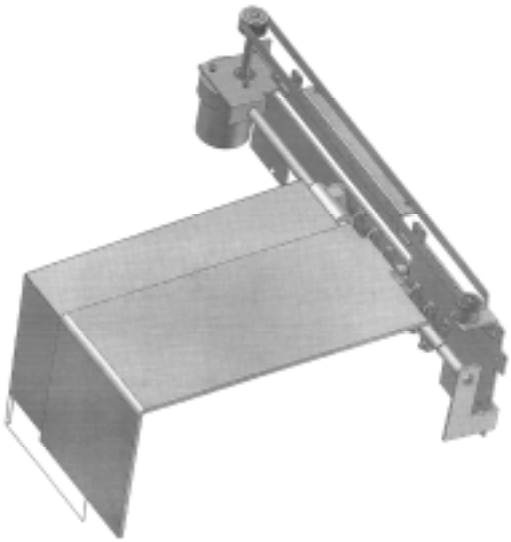


9. Assembly of each Part

Ⅰ. Auto shutter Assembly



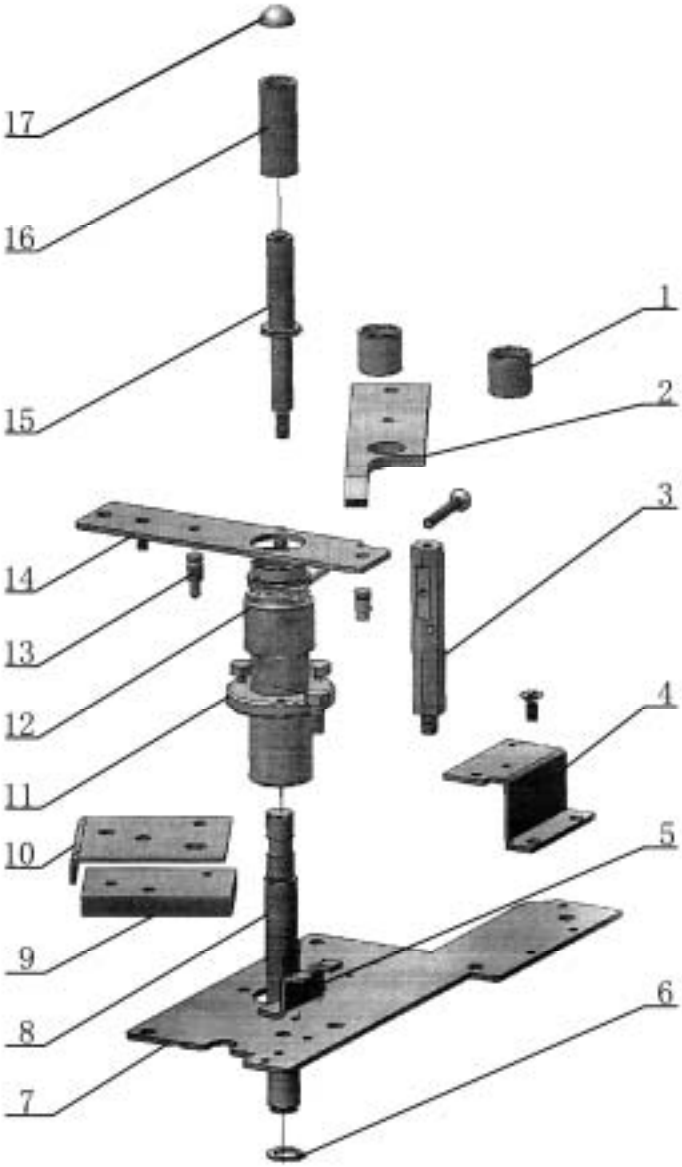
1. Synchro belt
2. Assembly plate
3. Rhombic framework
4. Door No.2
5. Shaft
6. Bracket
7. Under prop
8. Door No.1
9. Motor
10. Bracket
11. Belt wheel

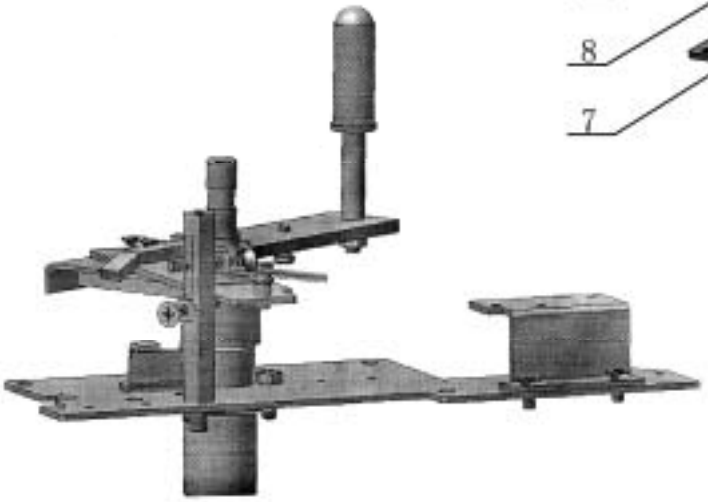


9. Assembly of each Part

Ⅱ. Clamp Assembly

1. Sheath
2.
3. Block column
4. Switch board of cam
5. Anchor bracket
6. Block spring
7. Base plate
8. Clamp shaft
9. Slide plate
10. Dust defend cover
11. Shaft base
12. Shaft sheath
13. Column of block spring
14.
15. Hold pole
16. Rubber cover
17. Shaft nut

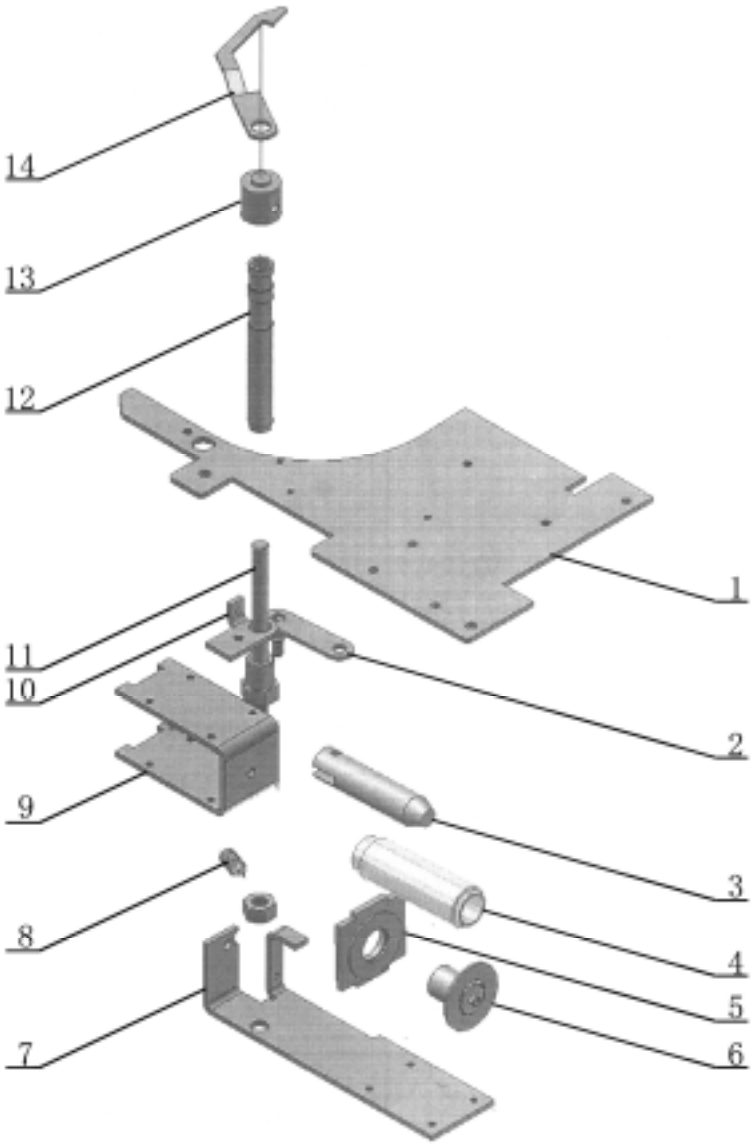


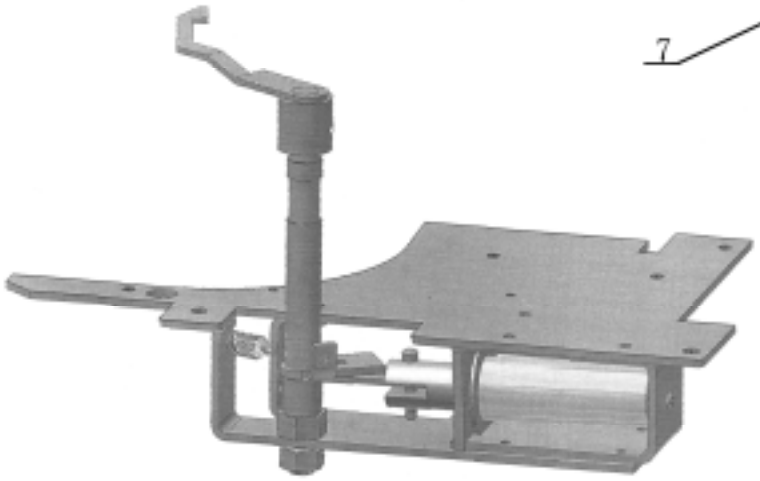


9. Assembly of each Part

Ⅲ. Stopper Assembly

1. Upper plate
2. Connect pole
3. Shaft
4. Sleeve
5. Bottom nut
6. ..
7. Stopper fasten plate
8. Spring
9. Outside frame
10. Base plate
11. Stopper shaft
12. Cannula
13. Stopper base
14. Stopper

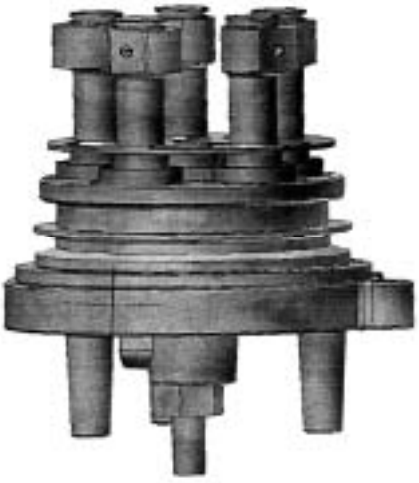


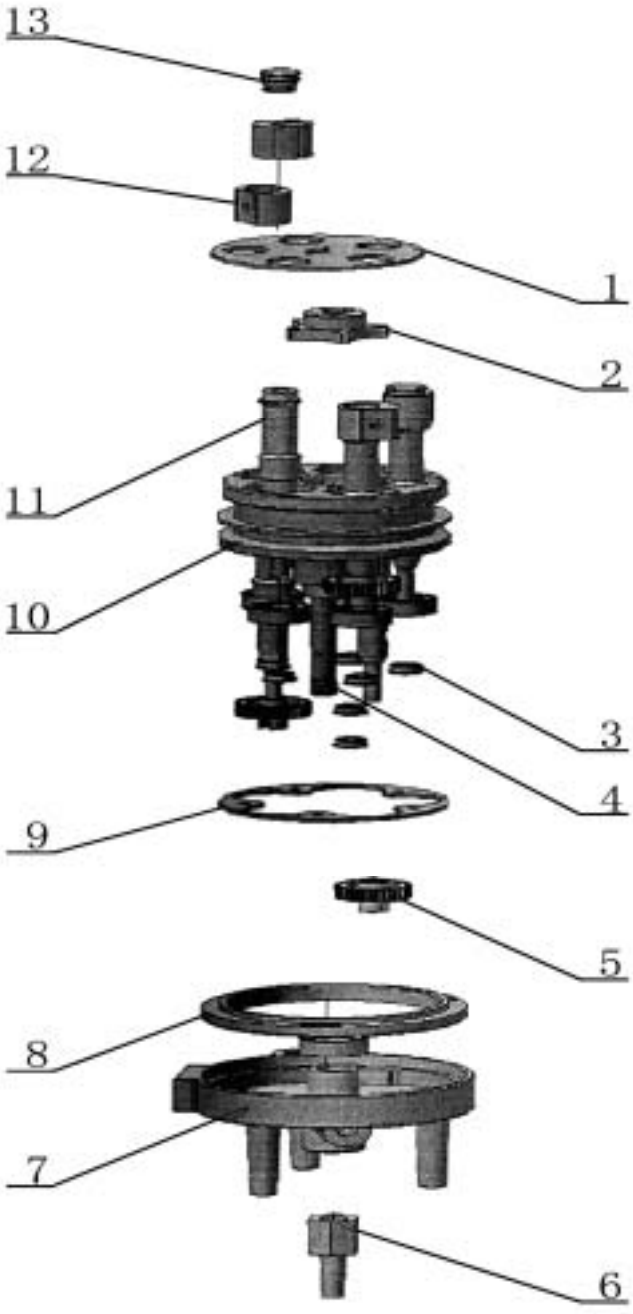


9. Assembly of each Part

Ⅳ. Spindle Assembly

1. Dust defend cover
2. Main shaft sheath
3. Bearing
4. Main shaft
5. Gear
6. Connection
7. Gear base
8. Gear circle
9. Lower dust cover
10. Gyroidal system
11. Sucking pole
12. Sucking head
13. Nut of ucking pole





9. Assembly of each Part

Ⅴ. Vacuum Pump Assembly

1. Bolt
2. Bearing press cover
3. Bottom cover
4. Body
5. Bearing
6. Upper cover
7. Shaft
8. Carbon slice
9. Rotor