

D137 GHD-45 A

Model Z5040
VERTICAL DRILLING MACHINE

OPERATION MANUAL

Max. Drilling Dia. 40mm

Serial No.:

RELEASE NOTE

This Machine (serial N0.)
should be connected with electric
supply of 420 V 50 Hz .3-phasc,
4-core wires (L1,L2,L3,N).

Fuse current 18 A

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1. Attention

1.1 Inspection And Acceptance

1.2 Safety

Please read the operation manual carefully before the installation and adjustment of the machine. When finish the installation, check all the details and trial run the machine idlly before put it into operation. Should any quality problems arise, contact the dealer.

1.3 Caution

Keep in mind the safety measures for elecfrical and operating protection

2. Machine Appearance, application and working Environment

2.1 Machine Appearance

The machines application, refer to fig.1. The machine is constructed with Gear Box, spindle box, Column, work table, bracket, base and electrical cabinet. The Gear Box is atop the spindle box, The spindle Box is set up on the upper end of the Column. The work table is supported by the bracket which is assembled in the middle of the column. The Column sits on the base. The contour design of the machine is composed of straight lines and squares, gives a feeling of light, artistic and flexible.

2.2 Application

The machine is designed with multi-function of drilling, broaching, reaming, tapping and conterboring etc, With a strengthened capacity of drilling it allows the workpieces to be drilled with larger range of size. It is suitable for using in both production and maintenance shops.

The worktable bracket can move up and down along the column at $\pm 180^\circ$ around the column, The work table can move with the bracket at $\pm 180^\circ$, or $\pm 45^\circ$ parallel to the bracket. It is more flexible and easy to operate.

2.3 Working Environment

2.3.1 The elevation height of the workshop has to be 2000m or less.

2.3.2 The environmental temperature should be -20°C to $+40^\circ\text{C}$.

2.3.3 With a medium temperatures of $20 \pm 5^\circ\text{C}$, the relative humidity should not exceed 85%.

2.3.4 No conductive dust allowed.

2.3.5 No explosive factor allowed.

2.3.6 No corrosive metal and gas or stream, which may corrode metal or damage the insulation.

2.3.7 No impact and vibration near the machine.

Fig. 1 Outside Drawing

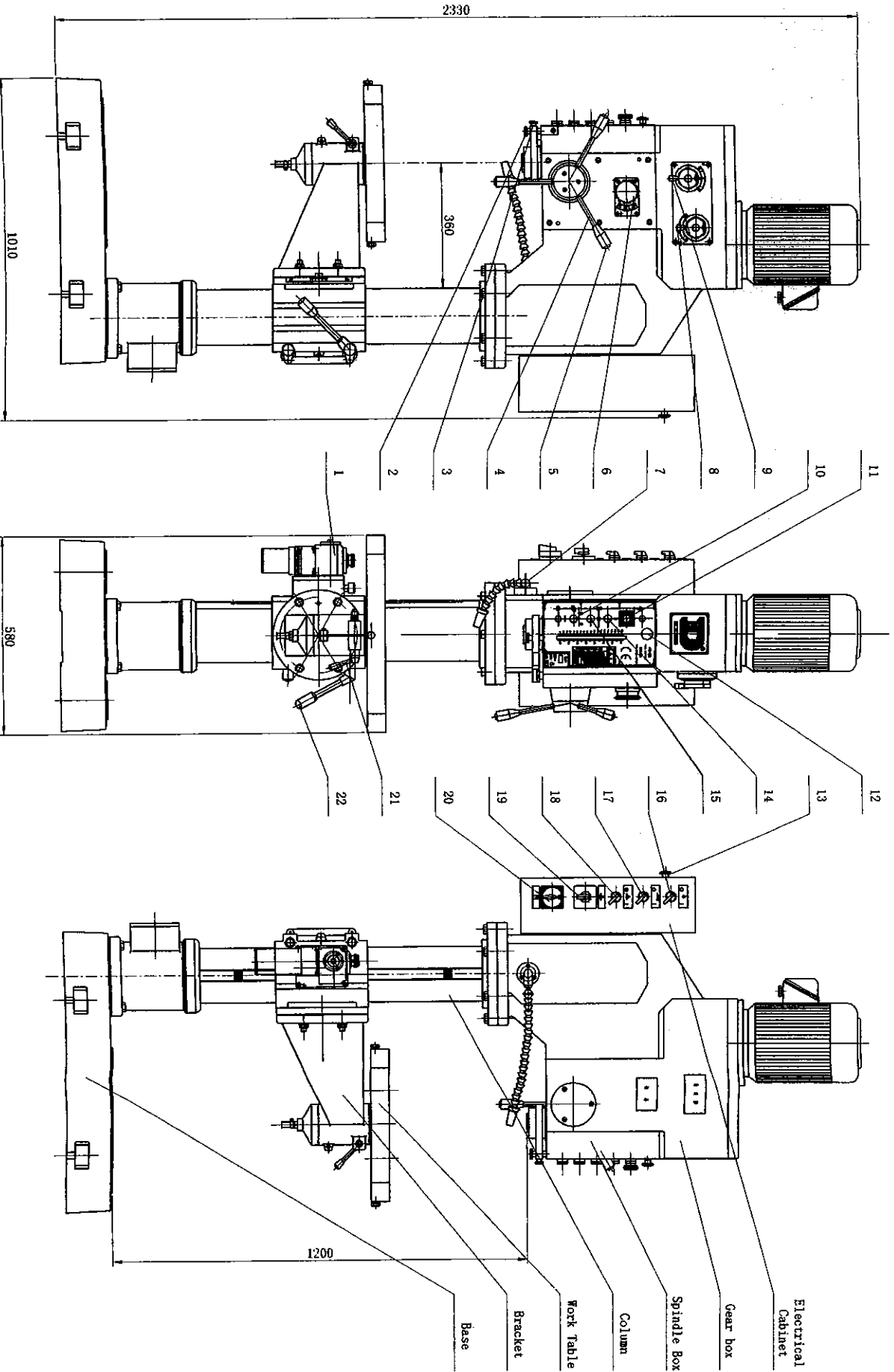


Fig. 1.

MODEL Z5040		OPERATION MANUAL		PAGE 4
3.Main Specification			Table(1)	
No.	Discription	Specification	Unit	
1	Max.Dia.of drilling	40	mm	
2	Distance between axis of spindle and generating line of column	360	mm	
3	Max.Distance between spindle nose and surface of worktable(automaticly)	600(560)	mm	
4	Max.distance between spindle nose and base surface	1200	mm	
5	Max.travel of spindle	180	mm	
6	Max travel of work table and bracket (automaticly)	500(420)	mm	
7	Horizontal swing degree of work table and bracket	$\pm 45^{\circ}$	degree	
8	Taper of spindle bore	4	Morse	
9	Number of spindle speeds	12	steps	
10	Range of spindle speeds	42、62、85、125、170、250	r/min	
		340、510、690、1035、1365、2050		
11	Spindle feed steps	4	steps	
12	Spindle feed range	0.07、0.15、0.36、0.40	mm/r	
13	Dia.of column	$\Phi 160$	mm	
14	Effective working area of table	410x380	mm	
15	Effective working area of base	450x440	mm	
16	work table and base T-slot	2--14,2--18	mm	
17	3-phase 2-speed AC Motor LYD112M—6/4A	Power	2.2/2.8	kw
		Voltage	380(220,400,420)	v
		Speed	960/1440	r/min
18	3-phase electrical pump AYB-6B	Power	0.085	kw
		Voltage	380(220,400,420)	v
		Flow rate	6	L/min
19	electromagnetic clutch DLYO-16S	Power	0.024	kw
		Voltage	24	v
20	Machine dimension(L×W×H)	1010x580x2330	mm	
21	Machine Weight (Gross/net)	820/760	kg	

4. Transportation and Installation
- 4.1 Transport of the machine
- 4.1.1 Handle with care when transporting the machine. Pay close attention to the shipping marks. Don't lay down the machine on the wrong side. Avoid impact.
- 4.1.2 The machine is fully assembled and packed before shipping to the customer. Please check carefully when open the package and make sure no parts are missing
- 4.1.3 When lifting the machine by crane, the center-of-gravity should be close watched. For the correct way, see Fig. 3. To avoid damaging the machine surface preferably put soft materials between the rope and machine surface.
- 4.2 Foundation and Installation
- 4.2.1 Take the work table as Radius, go 360° around the column would be the max. area of the foundation. The diameter of the foundation is 1800mm. See Fig. 2. Customers can decide the Foundation area according to their own needs.
- 4.2.2 The depth of the foundation is selected so that it rests on a dense soil. The depth provided in Fig. 4 is for reference.
- 4.2.3 Bury the foundation bolts in the concrete mortar at the accurate position. After solidification of the concrete, lay the machine on the foundation and fully tighten the foundation bolts and carefully leveled by spirit level in its longitudinal and transversal direction.

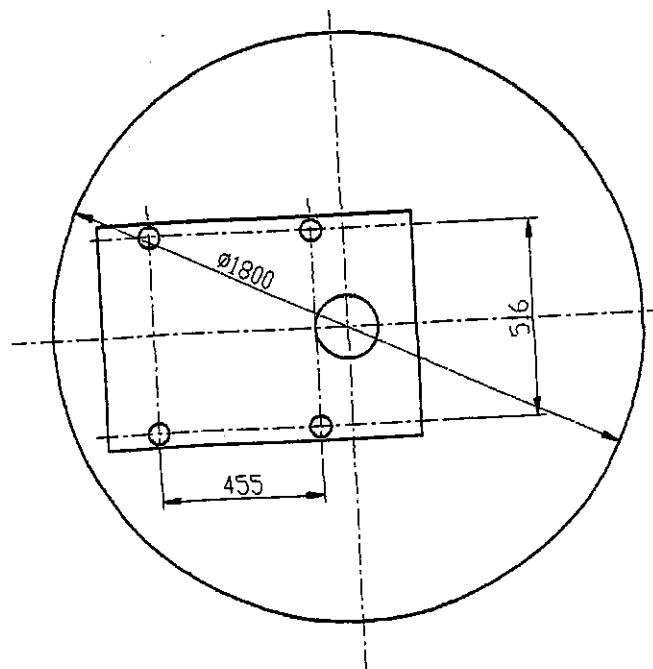


Fig. 2 Dimension of the foundation

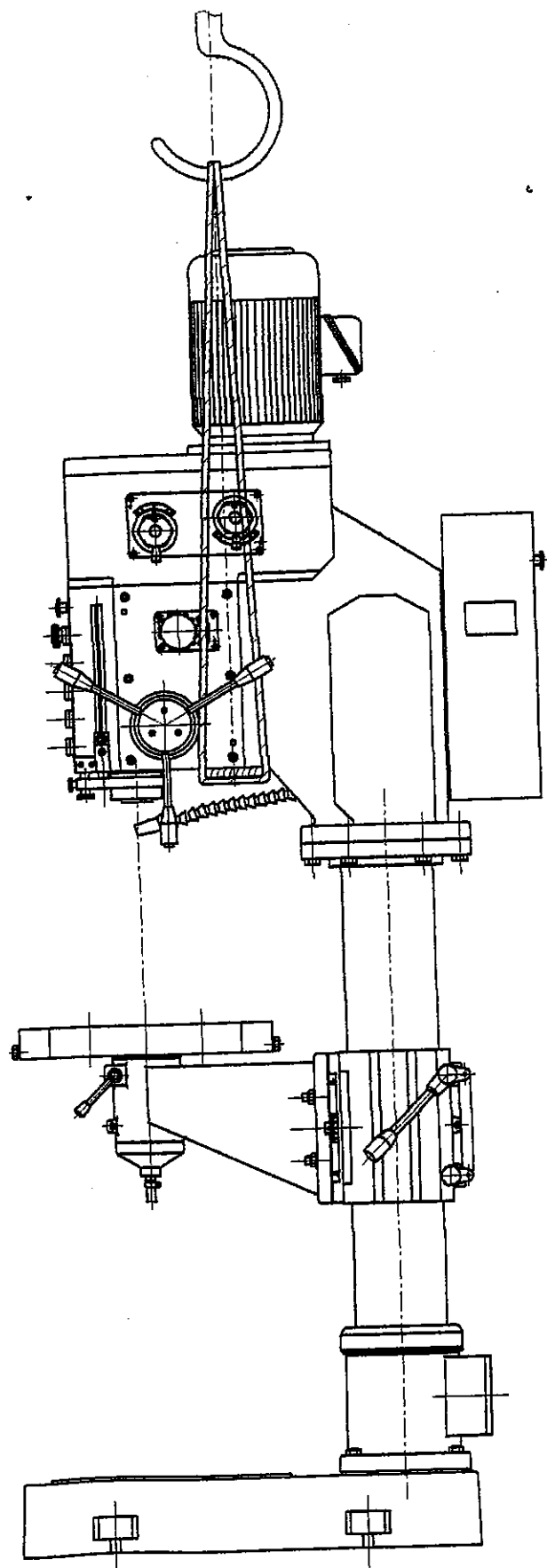
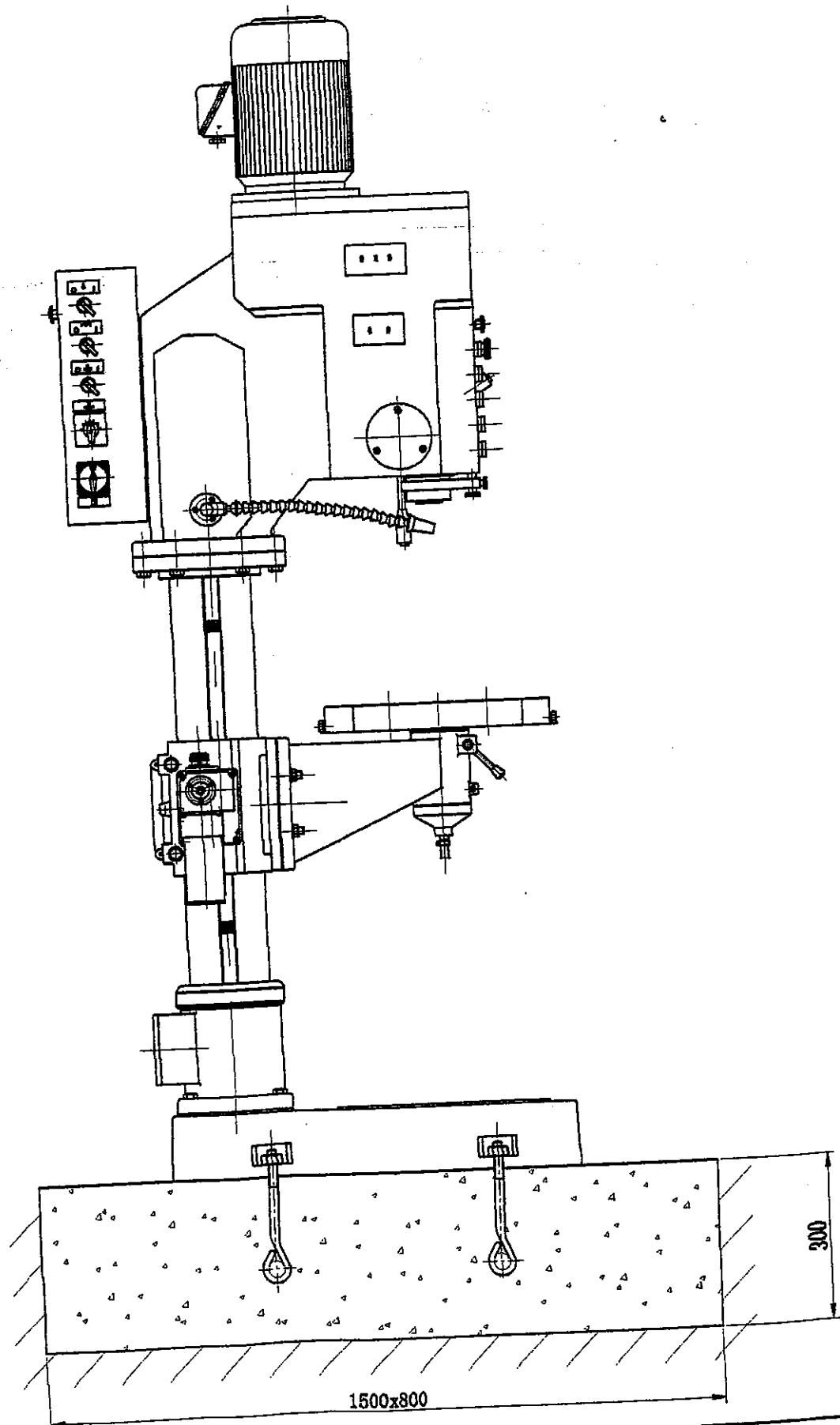


Fig.3 Transport of the machine

Fig.4 Foundation And Installation



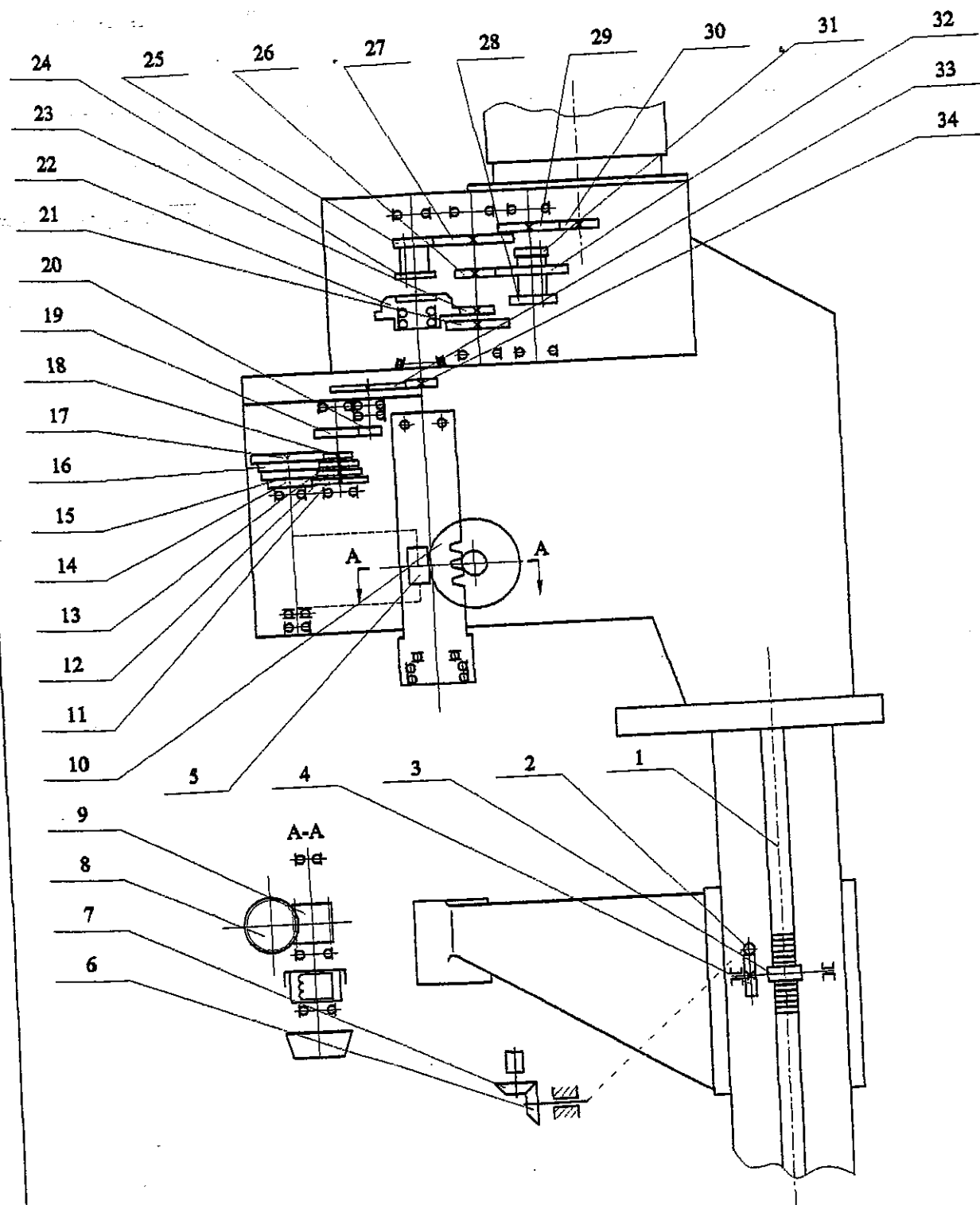


Fig. 5 Transmission System

6. Operation Instruction

6.1 Starting the Machine

6.1.1 Before starting the machine, read carefully the operation manual and be fully acquainted with all the details.

6.1.2 The operator should be familiar with all the rules and points of attention of running and maintaining the machine.

6.1.3 Strickly follow the instruction of lubrication. To fill the oiling places with lubricant at regular intervals.

6.1.4 When push in the tool unloading spacing shaft, there should be a clearance between the end of the tapershank of the Twist drill and the ram of the tool unloading device. Unqualitied Taper shank and sleeve adapter can not be used.

6.1.5 Remove all the anti-rust coating or grease from the machine. Fill the machine with lubricant. Run the machine from low to high speed and check if it is normal.

6.2 Description of control parts. See Fig.1

6.2.2 Code of the control patrs. See Table 3

Table(3)

1	Bracket table lift handle	13	Electrical cabinet handle
2	Feed depth adjusting handle	14	Main Motor start button
3	Feed depth leadscrew lock handle	15	Main motor stop button
4	Hand feed handle	16	Lamp button
5	Connect or shut off button for feed electro-magnetic clutch	17	Coolant pump button
6	Feed regulating lever	18	Tapping select button
7	Water supply switch	19	Speed motor switch
8	Spindle speed change handle A	20	Power supply switch
9	Spindle speed change Handle B	21	Table clamp/loose lever
10	Brackot table lifeing button.	22	Bracket clamp/loose lever
11	Emergency stop button		
12	Tool unload handle		

6.3 Spindle speed change control

The 12 steps of spindle speed are accomplished by Gear driving system and 2-speed motor .See Fig.5

To change speed, first stop the motor. Turn the speed change handles(8)and(9)to the desired position. Then turn the switch (20) to Position (1) or(2). The speed of forward is selected. Turn the switch to position "R", the same speed of Reverse running is selected.

6.4 Spindle feed operation(Fig.1)

6.4.1 Automatic feed

First, stop the motor. Turn the feed change lever (6) to the desired feed rate on the Feed chart. Push down the button (5) on the end of hand feed lever (4) to engage the electromagnetic clutch. The auto feed of the selected amount is realized. If need to stop in the process, push button (5) on the panel to disengage the electromagnetic clutch

6.4.2 Hand Feed

Turn the handle (4) counter-clockwise, the hand feed of spindle drilling can be realized.

6.4.3 Tapping

The auto feed button should not be pushed down when tapping, because the spindle feeds according to the pitch. For safety, please turn the tapping select button (19) to the tapping position and keep it interlocked with auto feed.

6.5 Spindle Reset

The balance and reset of the spindle are accomplished by the coil spring. The force of spindle balance can be adjusted by loosening the screw and turn the angle of spring box.

6.6 Tool loading and unloading (See Fig.1)

6.6.1 Tool Loading

Push in the tool loading lever (12) toward the spindle box, The limit shaft blocks the spindle sleeve from rising to its limit height. Push the tool taper shank into spindle bore and fit it tightly.

6.6.2 Tool Unloading

Pull the Tool unloading lever out. Grasp the tool with one hand, turn hand feed lever (4) with another hand. The spindle arises rapidly. The tool shank knocks into the ram on the end of the spline shaft. The tool is pushed out .

6.6.3 Points need attention

- a. Never pull out the tool unloading lever (12) while the machine is running. It is dangrous because when the spindle arise and the ram on the end of spline shaft knock into the tool taper shaft, the tool will drop.
- b. In case. the tool taper shank fits in the spindle bore too tightly, turn the hand feed lever (4) quickly and make the tool taper shank knock into the ram three fime. If it still can not come out ,extend the spindle sleeve and use a tool unloading wedge to knock down the tool.

6.7 Control of the feed depth

The cutting depth is realized by moving the scale nut on the scale rod. In batch production,the cutting depth is controled by loosening screw 3 and turn hand wheel (2) and moving the scale nut to the desired depth.

6.8 Coolant System

Coolant system: Turn coolant pump button (18) to "on"position, then turn the water supply switch (7),the coolant supply is controled.

6.9 Work table Bracket

By loosening lever (23) and turning lift handle (1), the work table bracket can be elevated to its desired height. It also can swing around the column at certain angle.

By loosening lever (21),the worktable can swing around the center at $\pm 180^\circ$ and clamp the levers (22)(23) tightly.

By loosening the 4 nuts of M14 on the bracket and taking out of the roller pin, the worktable can swing at $\pm 45^\circ$ horizontally. To reset the bracket, readjust the acuracy according to G5 and push the roller pin back in.

7 Lubrication System

7.1 The machine adopts two ways of lubrication

- Grease lubricating
- Hand oiling

7.2 The gears in the gear box are lubricated by No.3 lithium grease. For new machines, after 6 months of running, the lubricant shall be cleaned and changed. Then change lubricating grease once per year. The gears in the driving system are lubricated by No.3 lithium grease, the worm is lubricated in oil tank.

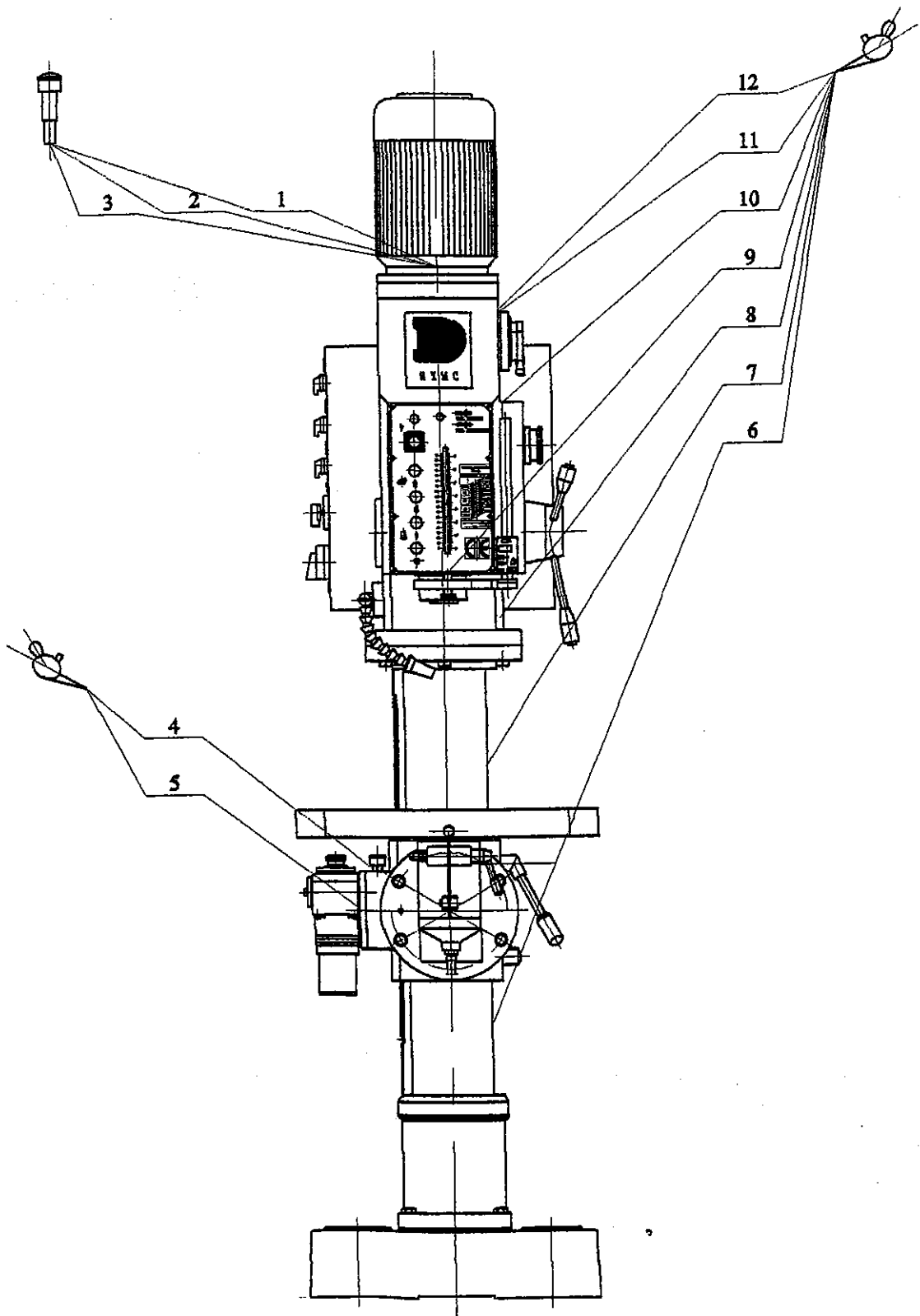
The lubricant in the oil tank is machine oil. The oil should be changed every 6 months. On the right side of the machine, there are a filling hole and an oil gauge. The oil outlet at the bottom of the oil tank. The level of the oil is indicated by the oil gauge.

7.3 The machine needs hand lubrication.

- Hand lubricating places (see Fig.6)
- Method of hand lubricating(see Table 4)

NO. Of Place Need lubrication	Name of the Place	Method	Name of Lubricant	Cycle
1	Main Driving Shaft I Bearing	Oil gun	No. 3 Lithium grease	Every 3 months
2	Main Driving Shaft II Bearing	Oil gun	No. 3 Lithium grease	Every 3 months
3	Main Driving Shaft III Bearing	Oil gun	No.3 lithium grease	Every 3 months
4	Bracket lift system	Oil gun	No.40machin e oil	Every shift
5	Bracket lift worm Bearing	Oil gun	No.40machin e oil	Every shift
6	Column guideway Surface	Oil gun pouring	No.40machin e oil	Every shift
7	Column guideway Surface	Oil gun pouring	No.40machin e oil	Every shift
8	Feed Worm wheel	Oil gun	No.40machin e oil	Every 6 months
9	Spindle sleeve surface	Oil gun pouring	No.40machin e oil	Every shift
10	Feed system	Oil gun	No.40machin e oil	Every shift
11	Speed declutch Shift shaft	Oil gun	No.40machin e oil	Every shift
12	Speed declutch Shift shaft	Oil gun	No.40machin e oil	Every shift

Fig. 6 Lubrication



8. List and distribution of rolling bearings

8.1 Distribution of rolling Bearings

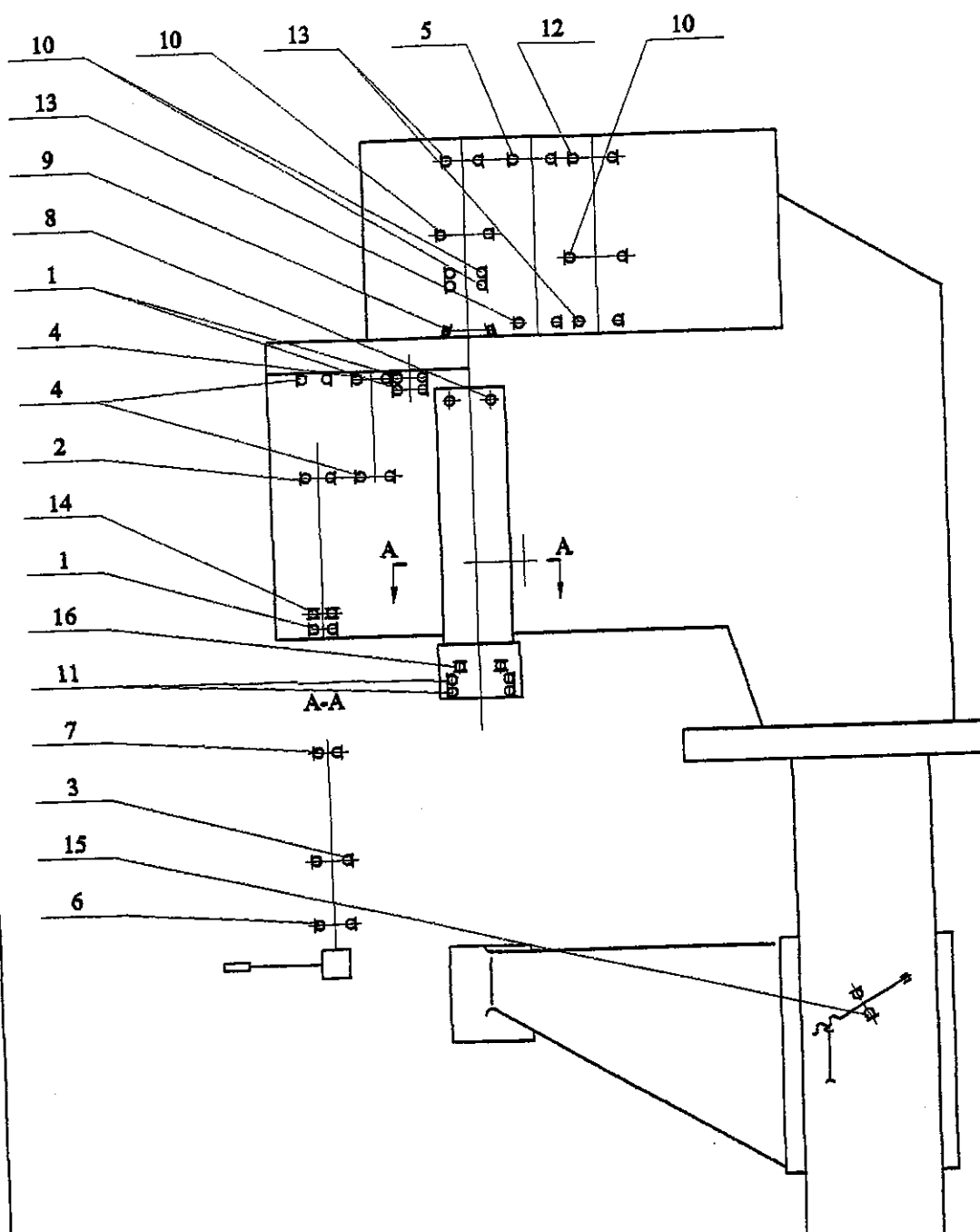


Fig. 7

8.2 List of Rolling Bearings

[illegible]

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9 Electrical System

9.1 General

The power supply of the machine is of 380V/50HZ. 3-phase, 60HZ and other voltages are possible. Power supply for control circuit and lighting system is of 24V, which is provided by control transformer. On the control circuit, there are fuses for short circuit protection and an emergency stop button for emergency stop. The transmission is driven by a 2-speed, 3-phase AC asynchronous motor, its speed change is realized by turning the switch.

The electrical cabinet is amounted on the back of the spindle box. The emergency stop button and other switches are on the front left site of the spindle box. (see fig.1)

To ensure the safety of the operator, the electrical system has a safe ground connection.

9.2 Electrical Circuit

9.2.1 Main Power Switch(QSI)

The main Power Switch(QSI) is for the control of the power supply. It has a lock for protection.

9.2.2 protection of main motor

The main motor is protected by 3VU1340 auto switch (QFI), which can protect the motor from overload.

9.2.3 protection of Coolant pump

Protection of the coolant pump is provided by 3VE automatic Switch(QF2).

9.2.4 Tapping Operation

Tapping operation is controlled by contactors KM1, KM2, and select button SB6. The travel limit of tapping is control by SQ2, SQ3.

When tapping, turn the select button SB6 on Position "1", ("0" for driving), turn the LW6B combination switch to "1", start the spindle forward (KM1 suction engaged). Operate spindle by hand downward until touch the work piece to be tapped. When the tapping depth is reached, limit switch SQ3 is on, spindle rotates reversely (KM2 suction engaged), tap withdraws from the work piece.

When the spindle return to the highest point, limit switch SQ2 is on. Then Spindle turn forward and one cycle of the operation is finished.

For next tapping operation, repeat the steps above. For drilling, turn the button SB6 on the position "0".

Warning! The motor turns forward and reverse frequently during tapping, so each operation should not exceed 8 times per minute. Please stop the motor and cool it down when it is hot, otherwise the motor could be burnt down.

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9.2.5 Power feeding operating Spindle is moved down over 5--6mm and push the any one button of the three operating levers, the electromagnetic clutch is engaged and power feed is starting and the indicate lamp HL2 is lighted. The process is stopped by limit switch when the desired depth is arrived. If need to stop the power feed, push the button (5) again to disengage the electromagnetic clutch. 9.2.6 Emergency stop During the process of machining, the emergency stop button SB3 can be pushed down for emergency stop. When SB3 is pushed down, contactor KM1 lost power, the machine stops. To restart the machine, relieve the mechanical lock of the button. 9.2.7 Zero voltage Protection Zero Voltage Protection is provided by Contactor KM1. When the power is re-connected, push the button SB4 to suction engage the contactor KM1, the machine is restarted. 9.2.8 Raising and lowering of the work table and it's bracket when the bracket is clamped, the electric lifting mechanism of worktable can not be started. 9.2.9 The function of protecting screen The machine can not be started, when the protecting screen is not in the correct working position. 9.3 Installation of Main Motor 9.3.1 Engage the gears of the main motor with those of the gear box, tighten the 4-M14×35 hex bolts. 9.3.2 Connect the main power supply line and ground wire as shown on the electrical diagram 8. 9.4 Maintainence of Electrical Device Disconnect the main power supply before checking the electrical device. Keep the device clean by removing dust, dirt and grease regularly. Korosine or gasoline are prohibited using as cleaner. The working voltage of the motor can not exceed $\pm 10\%$ of the rated voltage. To ensure the machine running normally, regular maintainence of the motor is a must.		

9.4 List of Electrical parts

Table 6

[illegible]

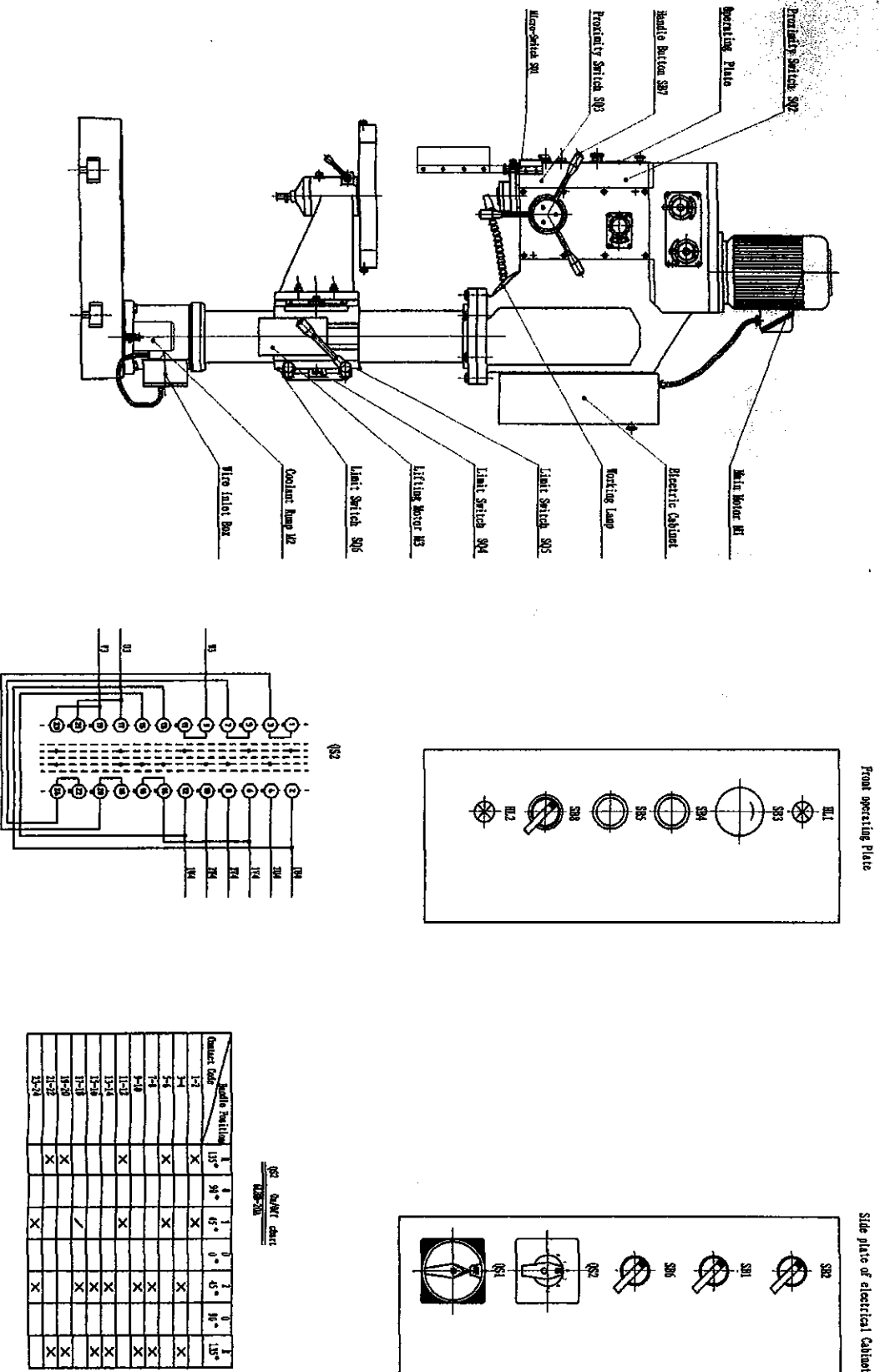


Fig. 8 Machine Electrical Diagram

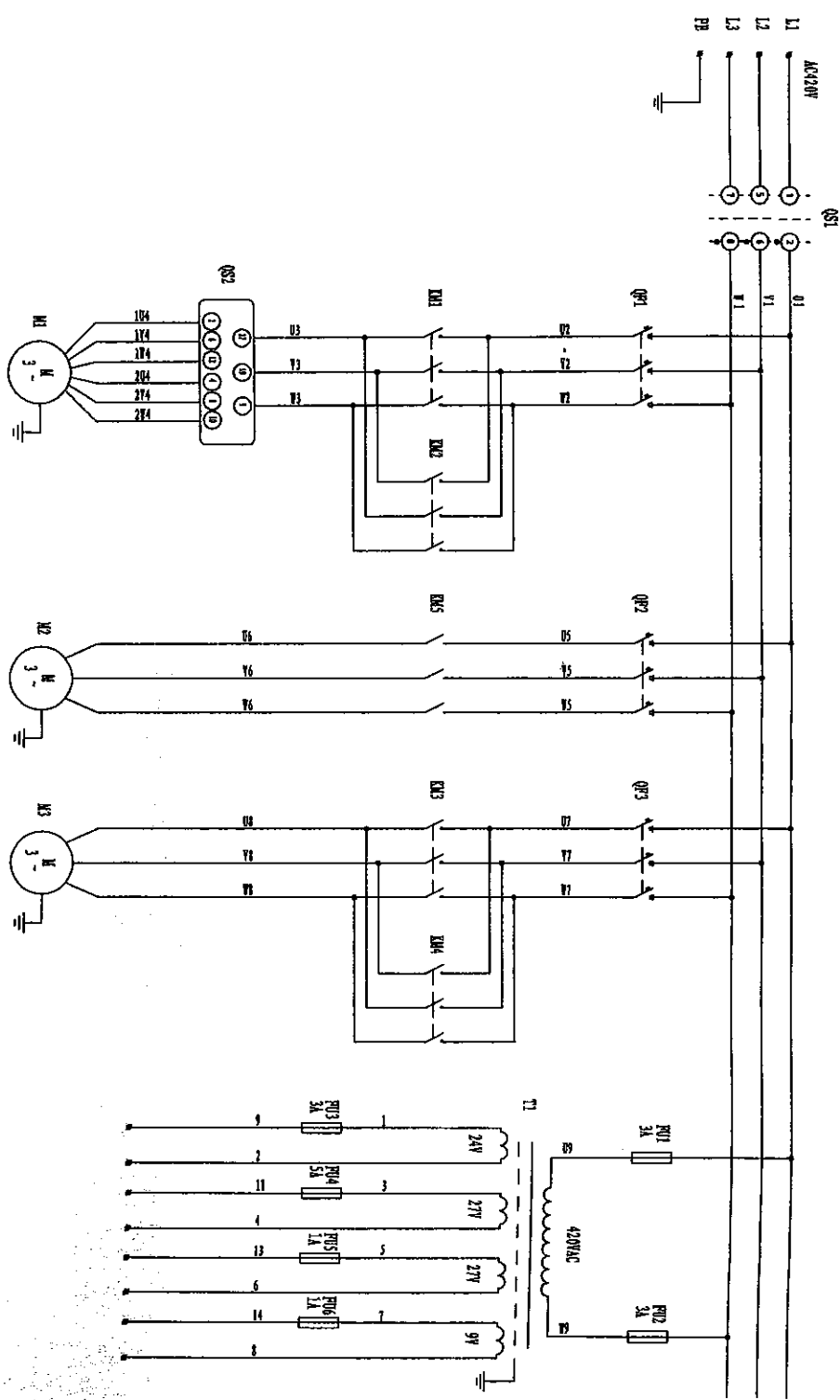


Fig. 9-1 Machine Electrical Diagram

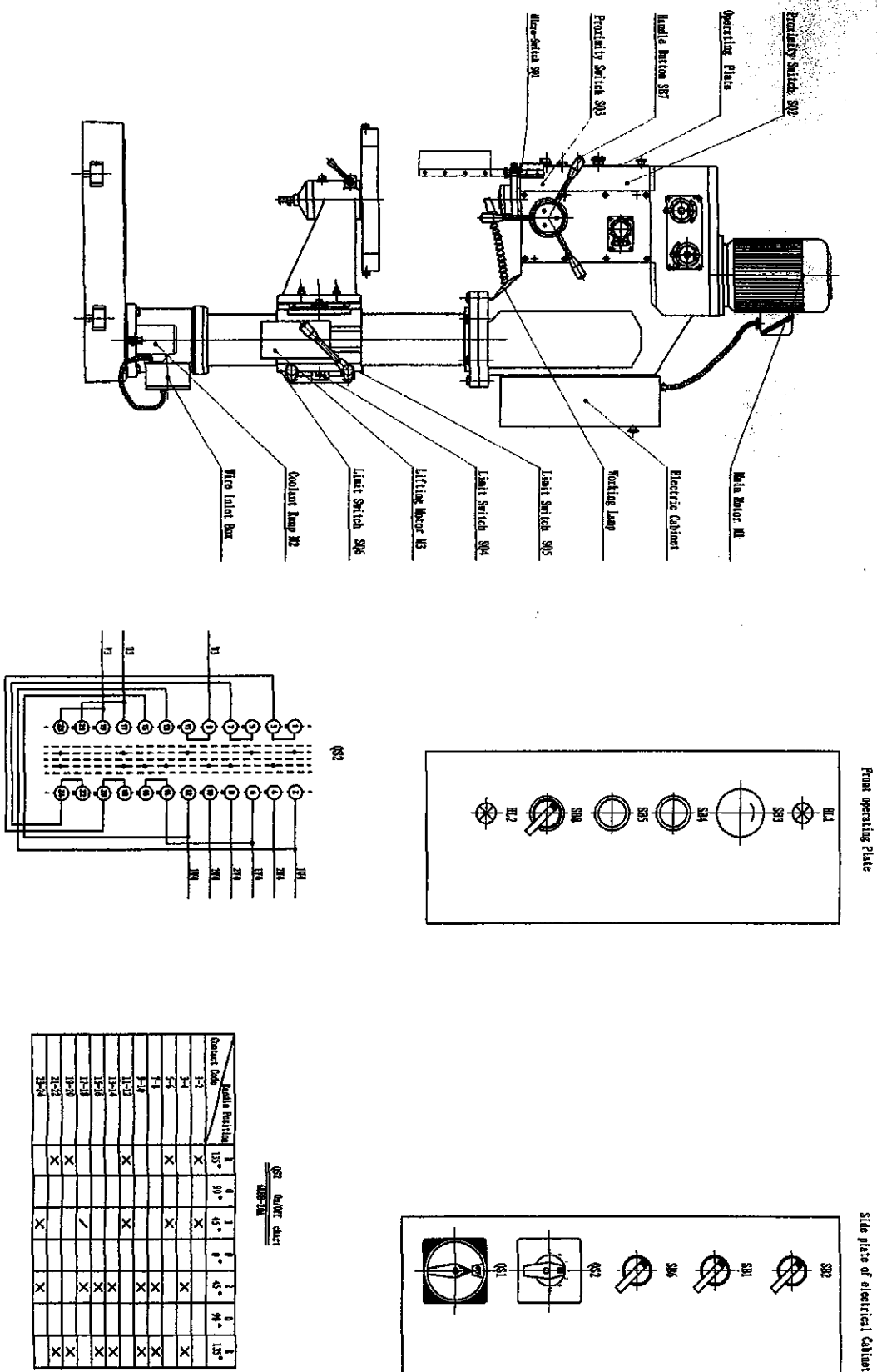


Fig. 8 Machine Electrical Diagram

Model Z5040	Operation Manual			Page 20
Power inlet	Main Power Switch	Two speed Main Motor	Coolant Pump	Lifting Motor for portable
				Transformer

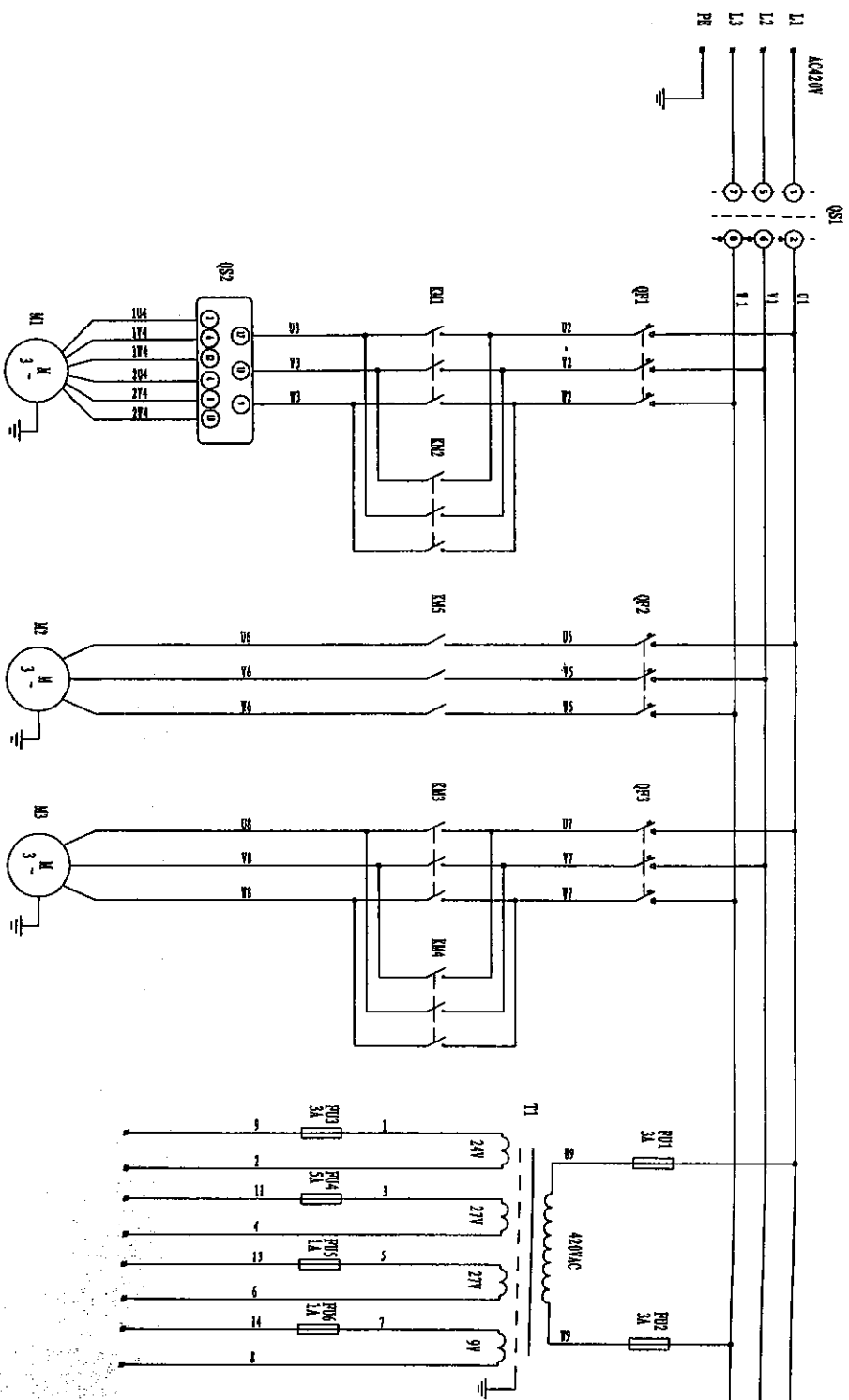


Fig. 9-1 Machine Electrical Diagram

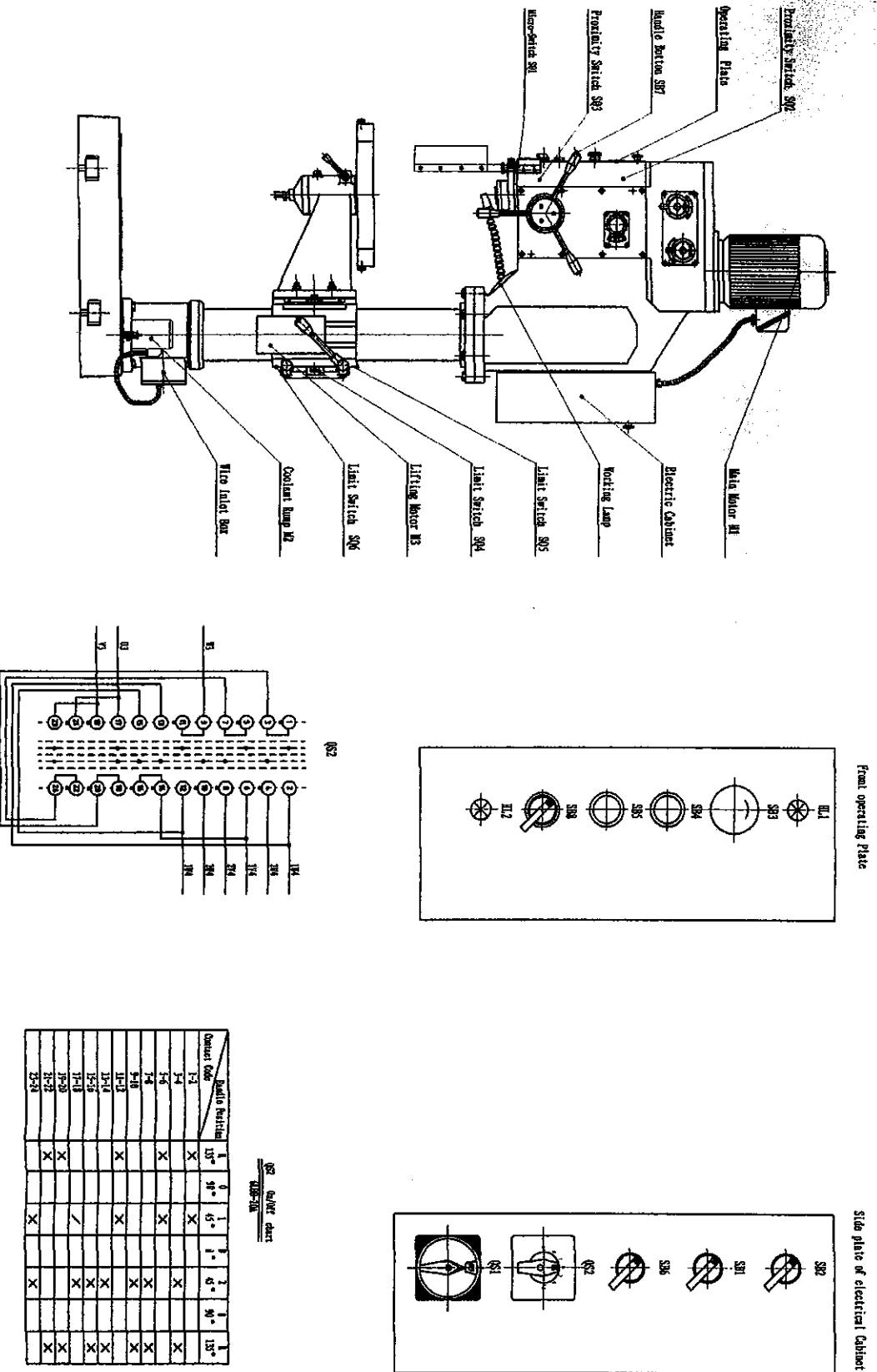


Fig. 8 Machine Electrical Diagram

Electrical Control Wiring

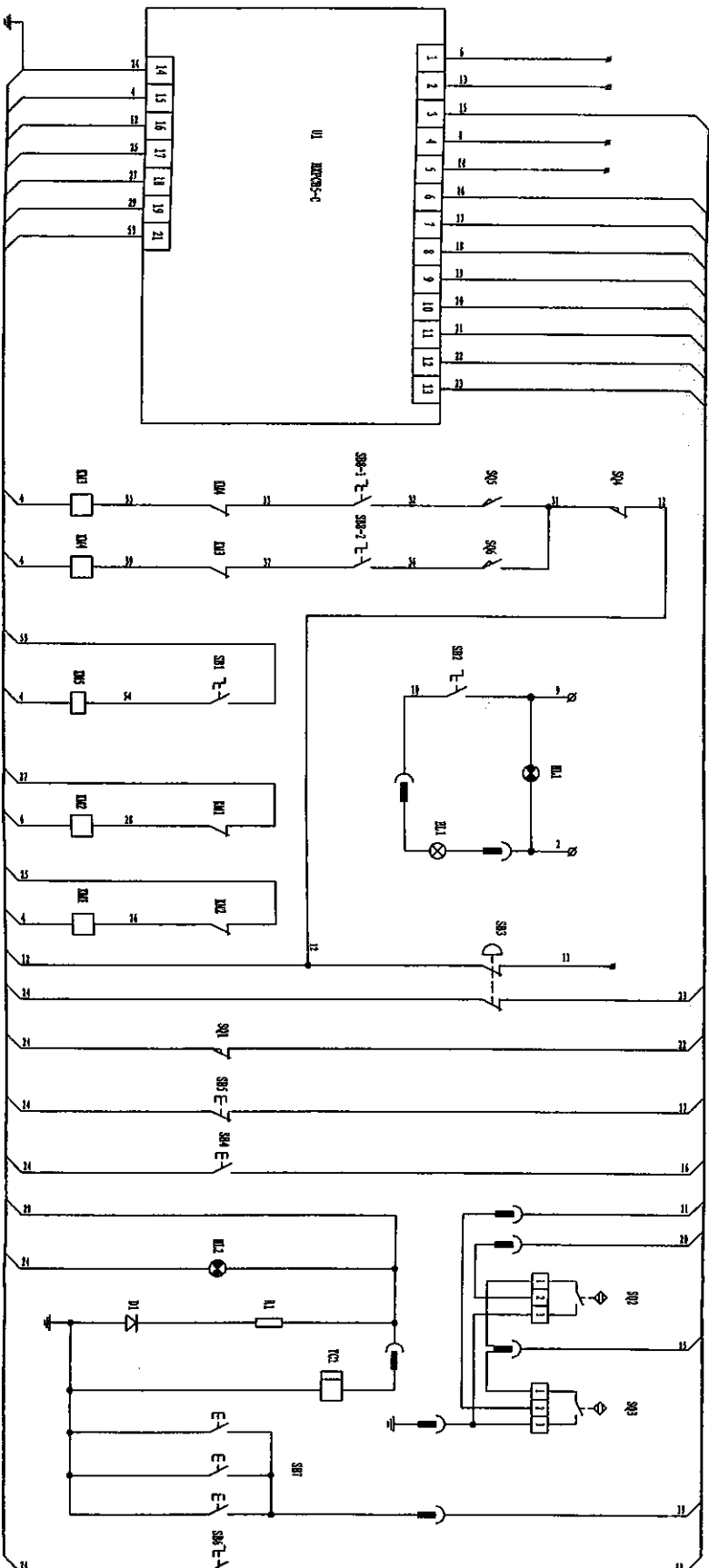
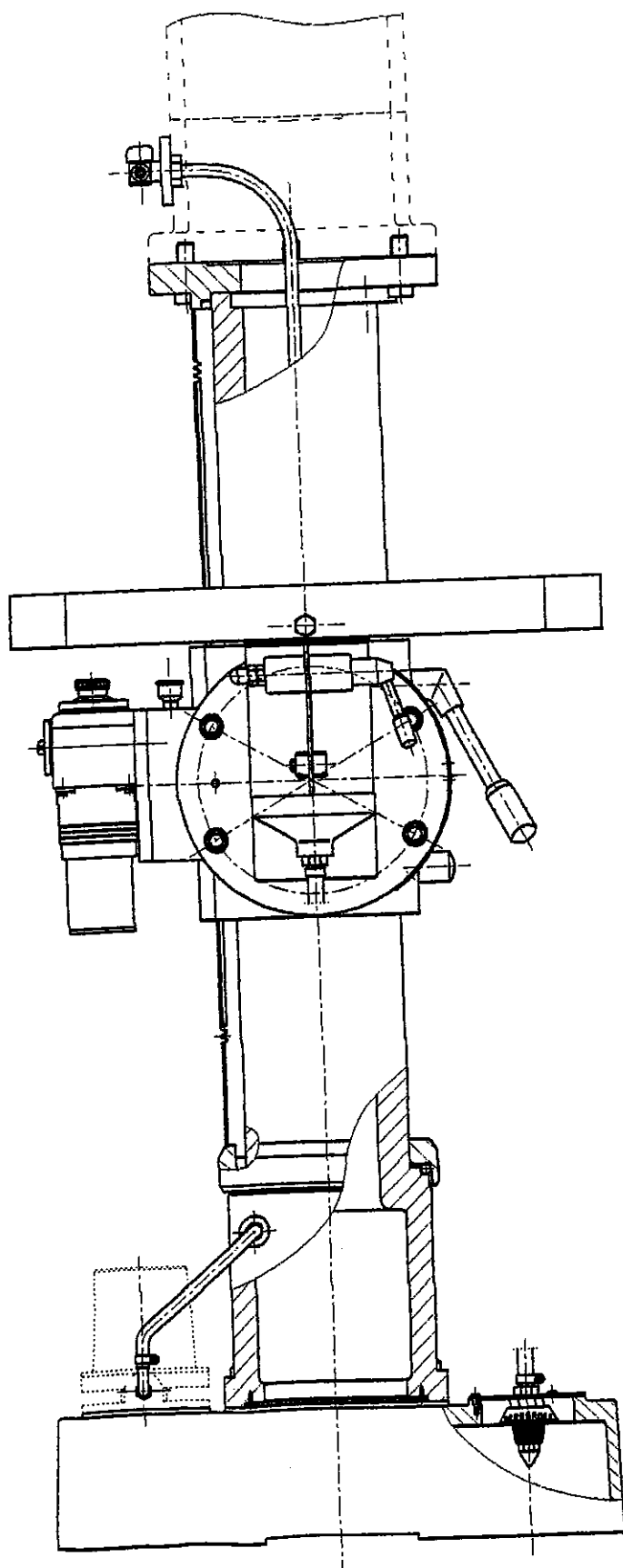


Fig. 9-2 Machine Electrical Diagram

MODEL Z5040		OPERATION MANUAL		Page 22
10.List of Accessories				
No.	Description	Part No. or Draw. No.	specification	Q'ty
1	Spanner drill chuck	GB6087	1—13	1 Pce.
2	Connecting bar of drill chuck	Z5032-50-207		1 Pce.
3	Short sleeve for taper shank tool	JB3477	4—3	1 Pce.
	Short sleeve for taper shank tool	JB3477	4—2	1 Pce.
	Short sleeve for taper shank tool	JB3477	3—1	1 Pce.
4	Wedge for taper shank tool	JB3482	Wedge 1	1 Pce.
	Wedge for taper shank tool	JB3482	Wedge 3	1 Pce.
5	Hex nut	GB6170	M16	4 Pcs
6	Foundation bolt	GB799	M16×300	4 Pcs
7	Washer	GB97.2	16	4 Pcs
8	Double head wrench	GB4388	22×24	4 Pcs
9	Hex bolt	GB5728	M14×35	4 Pcs
10	Washer	GB97.2	14	4 pcs
11	Spring washer	GB93	14	4 pcs
12	Brush			1.set
13	Battery		SR44	1 pce
14	Fuse		φ 5x20;3A	2 pcs
15	Fuse		φ 5x20;5A	2 pcs
11. Structure of Main Components.				
11.1 Structure of Column and Bracket work table (Fig.10)				
11.2 Structure of Spindle box and Gear Box (Fig.11)				
11.3 Expand View of Feed Gear Box (Fig.12)				

Fig.10 Strure of Column and Bracket table



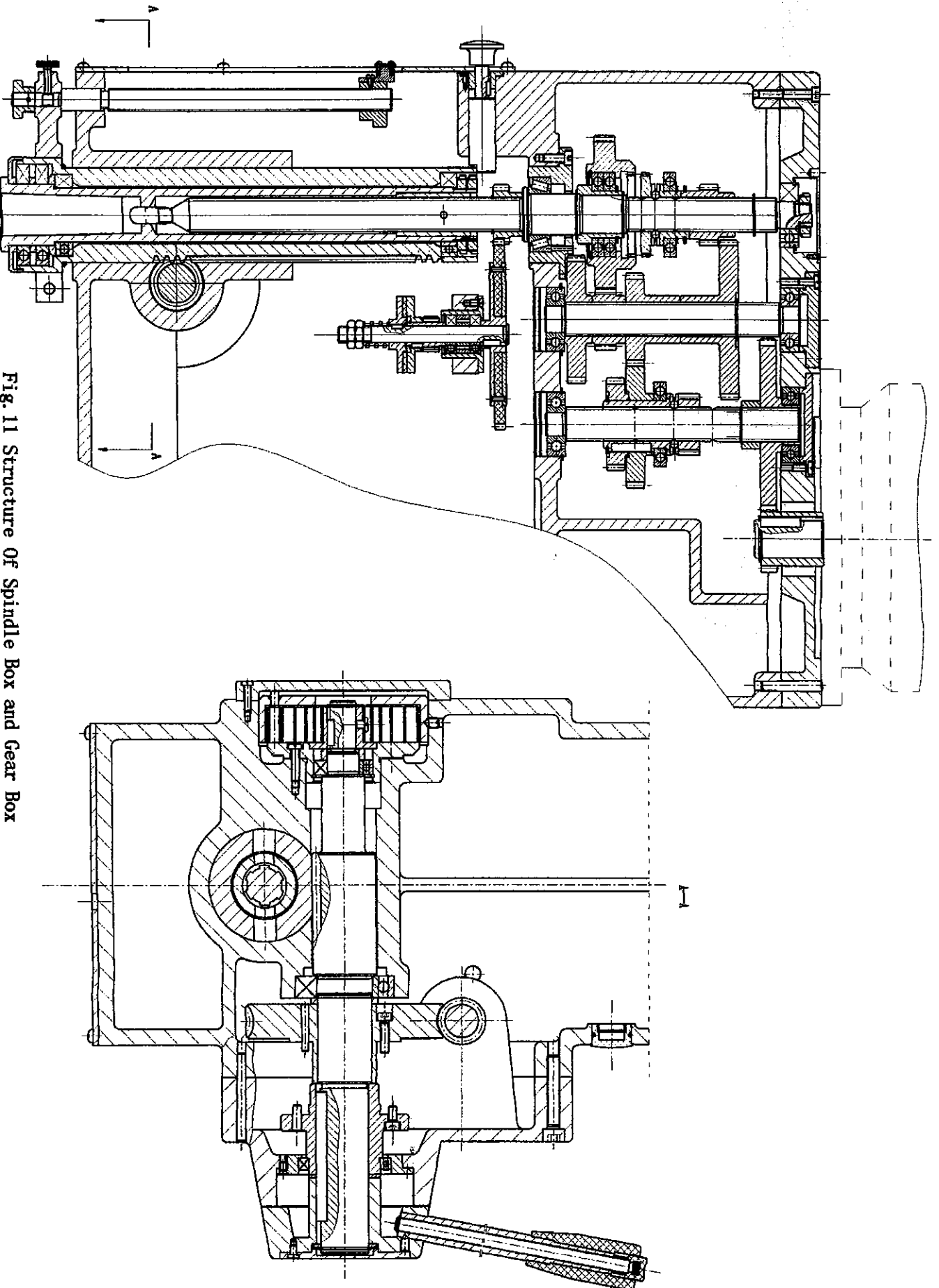


Fig. 11 Structure Of Spindle Box and Gear Box

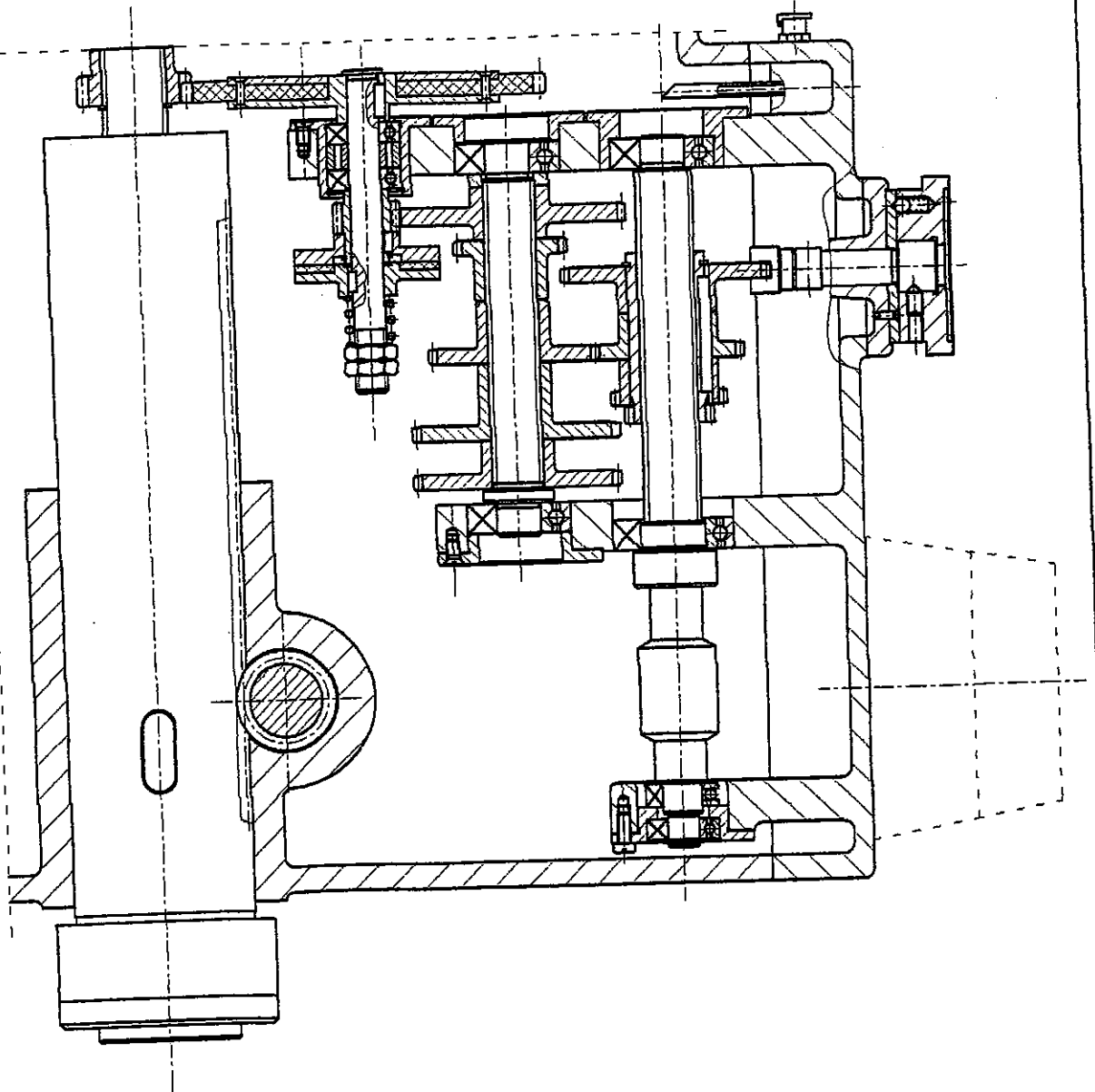


Fig. 12 Feed Gear Box

Model Z5040 Vertical Drilling Machine.

Certificate of Inspection

Max. Drilling Dia. 40mm

Serial No:

Inspection confirmed That the quality of the machine is up to Standard Q/SMOS1—2000.It is permitted to deliver.

Factory Director:

Date:

Inspection Director:

Date:

MODEL Z5040

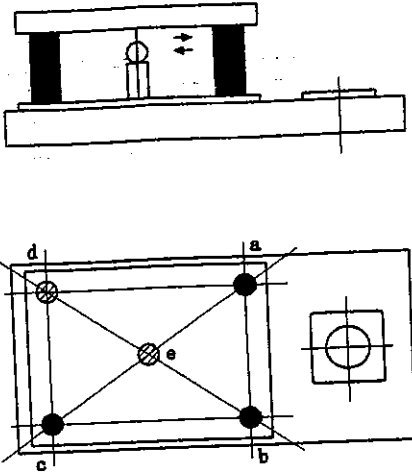
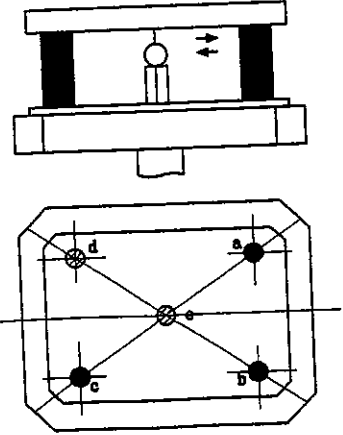
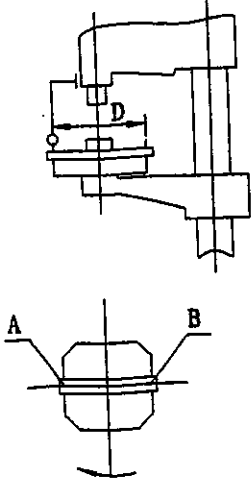
Certificate of Inspection

Total 3

Page 1

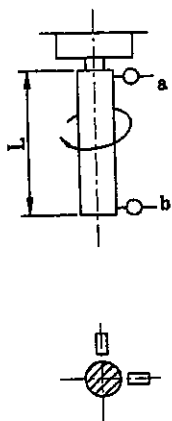
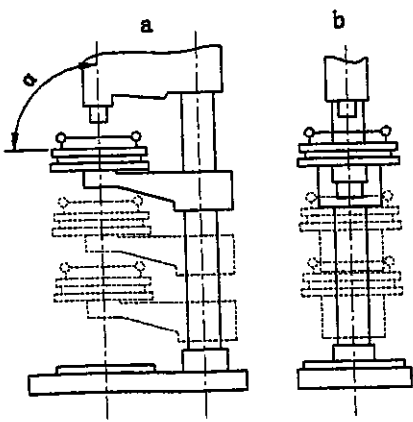
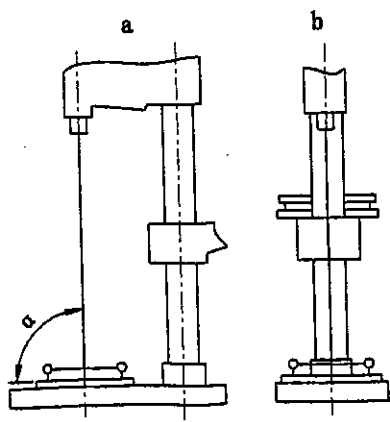
Precision Inspection Record

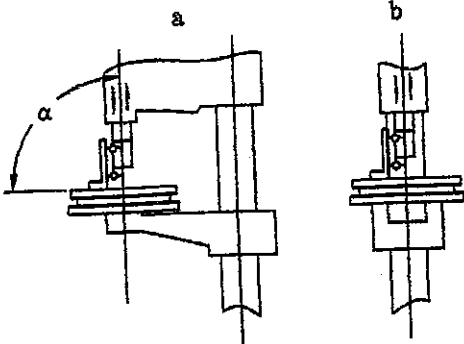
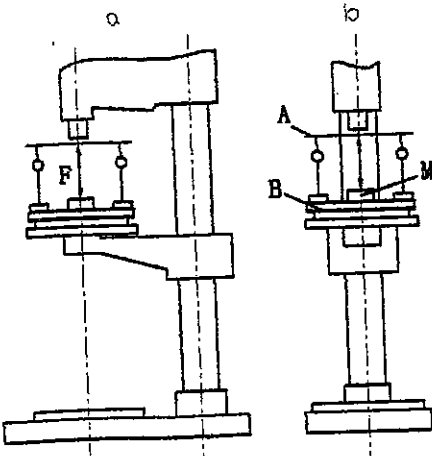
Germetrical Precision Test:

No.	Item	Brief Drawing	Precision	
			Allowance (mm)	Actual Test
G1	Parallelism of the base surface		0.06 at any tested Length of 300 (flat or concave)	0.040 (127)
G2	Parallelism of the work table surface		0.04 at any tested Length of 300 (flat or concave)	0.035 (127)
G3	surface runout of worktable		D=300 0.04	0.02/300

Precision Inspection Record

Germetrical Precision Test:

No.	Item	Brief Drawing	Precision	
			Allowance (mm)	Actual Test
G4	Spindle bore axis runout a) Close to spindle surface b) at a distance of L to spindle surface		L=200 a) 0.02 b) 0.035	0.01 0.020
G5	Parpendicularity of the spindle axis to work table surface		a) 0.1/300* ($\alpha \leq 90^\circ$) b) 0.06/300*	0.04/300 $\alpha < 90^\circ$ 0.04/300
G6	Parpendicularity of the spindle axis to Base plate table surface		a) 0.10/300* ($\alpha \leq 90^\circ$) b) 0.10/300*	0.06/300 $\alpha < 90^\circ$ 0.04/300
Distance between two contacts of indicator probe				

MODEL Z5040		Certificate of Inspection		Total 3	
				Page 3	
Precision Inspection Record					
Germetrical Precision Test:					
No.	Item	Brief Drawing	Precision		Actual Test
			Allowance (mm)		
G7	Parpendicularity of the vertical movement of spindle sleeve to work table surface		a. 0.1/300 (a ≤ 90°) b. 0.1/300		0.09/300 0.08/300
Work Acuracy:					
P1	The change of Parpendicularity of spindle axis to work table surface under the axial force.		F=9000N 2/1000		1.70/1000

Model Z5040 Vertical Drilling Machine

Packing List

Max. Drilling Dia. 40mm

Serial No:

MODEL Z5040		PACKING LIST		PAGE 1 OF 1	
Case No. 1/1 Dimension: (L×W×H) 110CM×65CM×210CM Gross weight: Net weight:					
No.	Item	Spec. & Marks	Q'ty	Remarks	
1	Main Machine		1set		
2	Main Motor	LYD100M-6/4A	1set		
3	Spanner Drill Chuck	1~13;GB6087	1pce.		
4	Connecting bar of Drill Chuck	Z5035-50-206	1pce.		
5	Short sleeve for taper Shank Tool	4—3; JB3477	1pce.		
		4—2; JB3477	1pce.		
		3—1; JB3477	1pce.		
6	Wedge for taper shank tool	Wedge 1; JB333482	1pce.		
		Wedge 3; JB333482	1pce.		
7	Hex Nut	M16; GB6170	4pcs.		
8	Foundation Nut	M16x300; GB799	4pcs.		
9	Washer	16;GB97.2	4pcs.		
10	Double head wrench	22×24;GB4388	1pce.	In the machine	
11	Washer	14;GB97.2	4pcs	In the machine	
12	Spring washer	14;GB93	4pcs	In the machine	
13	Hex bolt	M14×35;GB5782	4pcs.		
14	Batters	SR44	1pce		
15	Fuse	φ 5x20;3A	2pcs		
16	Fuse	φ 5x20;5A	2pcs		
17	Operation manual		1 copy		
	Certificate of Inspection		1 copy		
	Packing List		1 copy		
Packing Inspector: 07 Date:					