# AMCO

## Geared Head Drilling Machine

**Model No.: D150**
**Serial No.: B1306067**

*Operation Manual*

**WESTWAY Machinery Ltd.**
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Model Z5040 Vertical Drilling Machine

# Operation Manual

Max.Drilling Dia.40mm

Serial No.: B 1306067

# RELEASE NOTE

This Machine (serial N0. B1306067 ) should be connected with electric supply of 575 V 60 Hz .3-phasc, 4-core wires (L1,L2,L3,N).

Fuse current 15 A

# ⚠WARNING

## General Machinery Safety Instructions

You are required to read this entire Manual before using this machine.

1. **Read the entire Manual before starting machinery.** Machinery may cause serious injury if not correctly used.
2. **Always use correct hearing protection when operating machinery.** Machinery noise may cause permanent hearing damage.
3. **Machinery must never be used when tired, or under the influence of drugs or alcohol.** When running machinery you must be alert at all times.
4. **Wear correct Clothing.** At all times remove all loose clothing, necklaces, rings, jewelry, etc. Long hair must be contained in a hair net. Non-slip protective footwear must be worn.
5. **Always wear correct respirators around fumes or dust when operating machinery.** Machinery fumes & dust can cause serious respiratory illness. Dust extractors must be used where applicable.
6. **Always wear correct safety glasses.** When machining you must use the correct eye protection to prevent injuring your eyes.
7. **Keep work clean and make sure you have good lighting.** Cluttered and dark shadows may cause accidents.
8. **Personnel must be properly trained or well supervised when operating machinery.** Make sure you have clear and safe understanding of the machine you are operating.
9. **Keep children and visitors away.** Make sure children and visitors are at a safe distance for you work area.
10. **Keep your workshop childproof.** Use padlocks, Turn off master power switches and remove start switch keys.
11. **Never leave machine unattended.** Turn power off and wait till machine has come to a complete stop before leaving the machine unattended.
12. **Make a safe working environment.** Do not use machine in a damp, wet area, or where flammable or noxious fumes may exist.
13. **Disconnect main power before service machine.** Make sure power switch is in the off position before re-connecting.
14. **Use correct amperage extension cords.** Undersized extension cords overheat and lose power. Replace extension cords if they become damaged.
15. **Keep machine well maintained.** Keep blades sharp and clean for best and safest performance. Follow instructions when lubricating and changing accessories.
16. **Keep machine well guarded.** Make sure guards on machine are in place and are all working correctly.
17. **Do not overreach.** Keep proper footing and balance at all times.
18. **Secure workpiece.** Use clamps or a vice to hold the workpiece where practical. Keeping the workpiece secure will free up your hand to operate the machine and will protect hand from injury.
19. **Check machine over before operating.** Check machine for damaged parts, loose bolts, Keys and wrenches left on machine and any other conditions that may effect the machines operation. Repair and replace damaged parts.
20. **Use recommended accessories.** Refer to instruction manual or ask correct service officer when using accessories. The use of improper accessories may cause the risk of injury.
21. **Do not force machinery.** Work at the speed and capacity at which the machine or accessory was designed.
22. **Use correct lifting practice.** Always use the correct lifting methods when using machinery. Incorrect lifting methods can cause serious injury.
23. **Lock mobile bases.** Make sure any mobile bases are locked before using machine.
24. **Allergic reactions.** Certain metal shavings and cutting fluids may cause an ellergic reaction in people and animals, especially when cutting as the fumes can be inhaled. Make sure you know what type of metal and cutting fluid you will be exposed to and how to avoid contamination.
25. **Call for help.** If at any time you experience difficulties, stop the machine and call you nearest branch service department for help.

# ⚠WARNING

## Drilling Machine Safety Instructions

You are required to read this entire Manual before using this machine.

1. **Maintenance.** Make sure the Drill is turned off and disconnect from the main power supply and make sure all moving parts have come to a complete stop before any inspection, adjustment or maintenance is carried out.

2. **Drill Condition.** Drill must be maintained for a proper working condition. Never operate a Drill that has damaged or worn parts. Scheduled routine maintenance should performed on a scheduled basis.

3. **Leaving a Drill Unattended.** Always turn the Drill off and make sure all moving parts have come to a complete stop before leaving the Drill. Do not leave Drill running unattended for any reason.

4. **Avoiding Entanglement.** Remove loose clothing, belts, or jewelry items. Never wear gloves while machine is in operation. Tie up long hair and use the correct hair nets to avoid any entanglement with the Drill spindle or moving parts.

5. **Chuck key & wrench safety.** Always remove chuck keys, wrenches and any service tools immediately after use. Chuck keys left in the chuck can cause serious injury.

6. **Understand the machines controls.** Make sure you understand the use and operation of all controls.

7. **Drill bit selection.** Always use the correct Drill bit for the job you are Drilling. Make sure you use the correct shank drill bit for you drilling machine.

8. **Secure the Drill Bit.** Properly tighten and securely lock the drill bit in the chuck.

9. **Cutting Tool inspection.** Inspect Drill for sharpness, chips, or cracks before use. Replace any cutting tools immediately if dull, chipped or cracked. Handle new cutting tools with care. Cutting edges are very sharp and can cause lacerations.

10. **Reversing the spindle.** Make sure the spindle has come to a complete stop before changing the direction of the spindle.

11. **Stopping the spindle.** Do not slow or stop the spindle by using you hand.

12. **Speed selection.** Select the appropriate speed for the type of work, material, and tool bit. Allow the Drill to reach full speed before beginning a cut.

13. **Changing Belts for speed selection.** Always allow the machine to come to a complete stop and turn power off before changing belts. Not turning power off when changing belts can cause serious injury.

14. **Clearing chips.** Always use a brush to clear chips. Never clear chips when the drill is running.

15. **Power outage.** In the event of a power failure during use of the drill, turn off all switches to avoid possible sudden start up once power is restored.

16. **Clean work area.** Keep the area around the drill clean from oil, tools, chips.

17. **Surface/workpiece area.** Before turning the drill on, make sure the table is clear of any objects (tools, scraps, off-cuts etc.) Do not drill material that does not have a flat surface. unless a suitable support is used.

18. **Table Lock.** Make sure the table is tightened before starting the drill.

19. **Drilling Sheet metal.** All sheet metal should be clamped to the table before drilling.

20. **Mounting workpieces.** Use clamps or vices to secure workpiece before drilling. Position work so you avoid drilling into table.

21. **Guarding.** Do not operate the drill when chuck guard is removed.

22. **Eye and hand protection.** A face shield with safety glasses is recommended. Always keep hands and fingers away from the drill bit. Never hold a work[piece in your hand while drilling. Do not wear gloves while operating the drill.

23. **Drill operation.** Never start the drill with the drill bit pressed against the workpiece. Feed the drill evenly into the workpiece. Back the drill out of deep holes. Turn the machine off and clear chips and scrap pieces with a brush. Turn power off, remove drill bit, and clean the table before leaving the machine.

24. **Call for help.** If at any time you experience difficulties, stop the machine and call you nearest branch service department for help.

# PLANT SAFETY PROGRAM

## NEW MACHINERY HAZARD IDENTIFICATION, ASSESSMENT & CONTROL

## Drilling Machine

| Item No. | Hazard Identification | Hazard Assessment | Risk Control Strategies (Recommended for Purchase/Buyer/User) |
|---|---|---|---|
| A | ENTANGLEMENT | HIGH | Eliminate, avoid loose clothing / Long hair etc. |
| B | CRUSHING | LOW | Secure & support work material on drill table. |
| C | CUTTING, STABBING, PUNCTURING | MEDIUM | Isolate power to machine prior to any checks or maintenance being carried out.<br>Do not adjust or clean until the machine has fully stopped. |
| D | SHEARING | MEDIUM | Isolate power to machine when changing speeds or maintenance is being carried out.<br>Make sure all guards are secured shut when machine is on. |
| E | STRIKING | MEDIUM | Ensure workpieces are tightly secured on machine.<br>Wear safety glasses.<br>Ensure correct spindle direction when drilling.. |
| F | ELECTRICAL | MEDIUM | All electrical enclosures should only be opened with a tool that is not to be kept with the machine.<br>Never clean or dust machine when power is on.<br>Machine should be installed & checked by a Licensed Electrician. |
| G | HIGH TEMPERATURE | LOW | Wear appropriate protective clothing to prevent hot swarf. |
| H | OTHER HAZARDS, NOISE | LOW | Wear hearing protection as required. |
| Plant safety Program to be read in conjunction with manufactures instructions | | | |

Authorised and signed by:
Safety Officer: .....

Manager: .....

# Index

## 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 maintanence shops.

The worktable bracket can move up and down along the column at ±180° around the column, The work table can move with the bracket at ±180° , or±45° 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℃ to +40℃.
2.3.3 With a medium temperatures of 20±5℃, 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

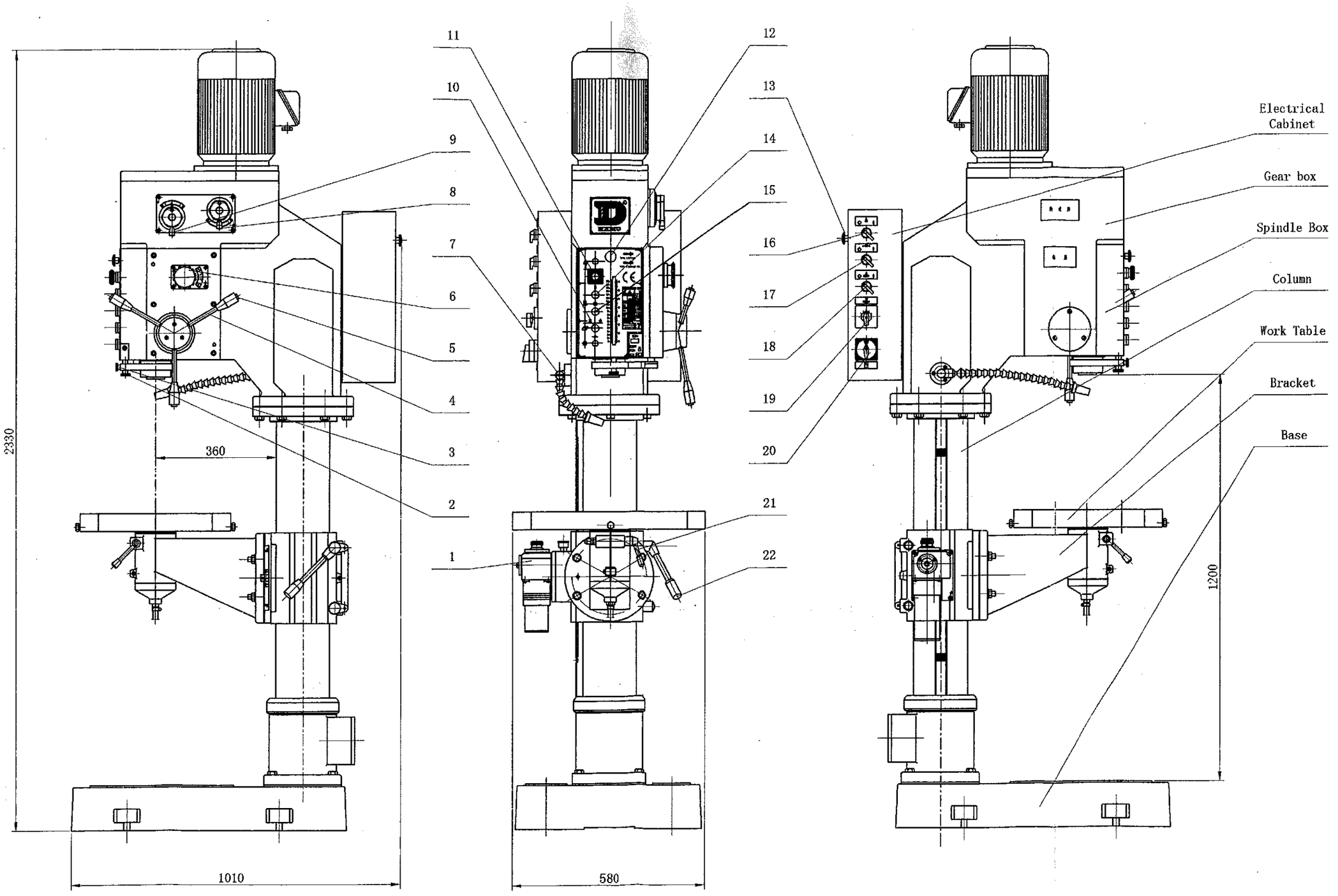



Fig. 1.

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 | ±45° | 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 | Φ160 | mm |
| 14 | Effective working area of table | 410x380 | mm |
| 15 | Effective working area of base | 450×440 | 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 | elecIromagnetic 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 patrs 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 surfacepreferably 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 fundation 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 acurate positionAfter solidification of the concrete, lay the machine on the foundation and fullytighten the foundation bolts and carefully leveled by spirit level in its longitudinaland transversal direction.

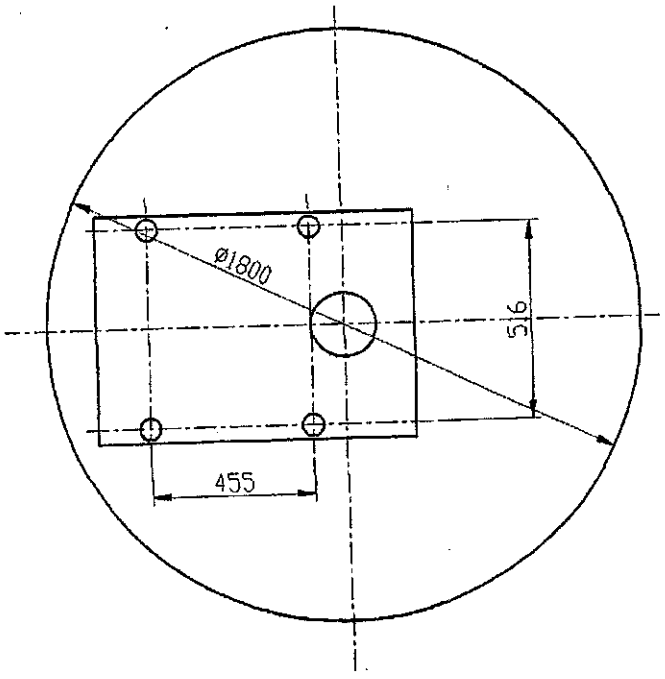



Fig. 2 Dimension of the foundation

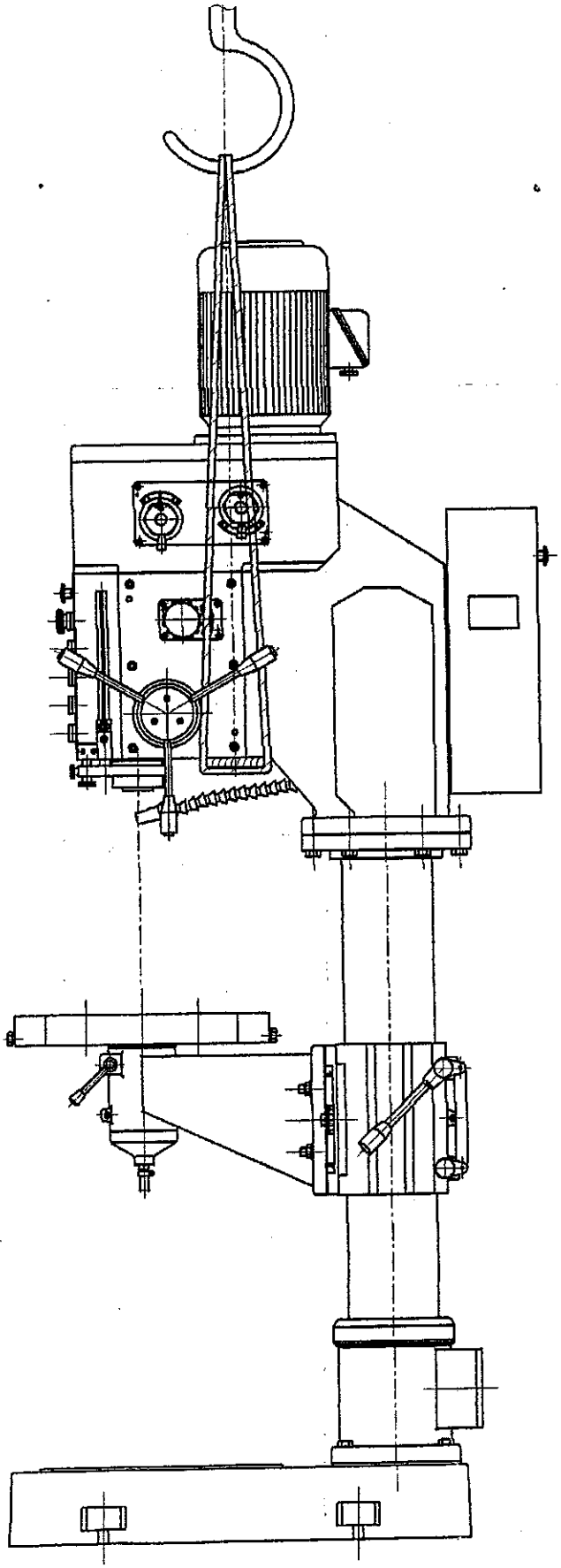
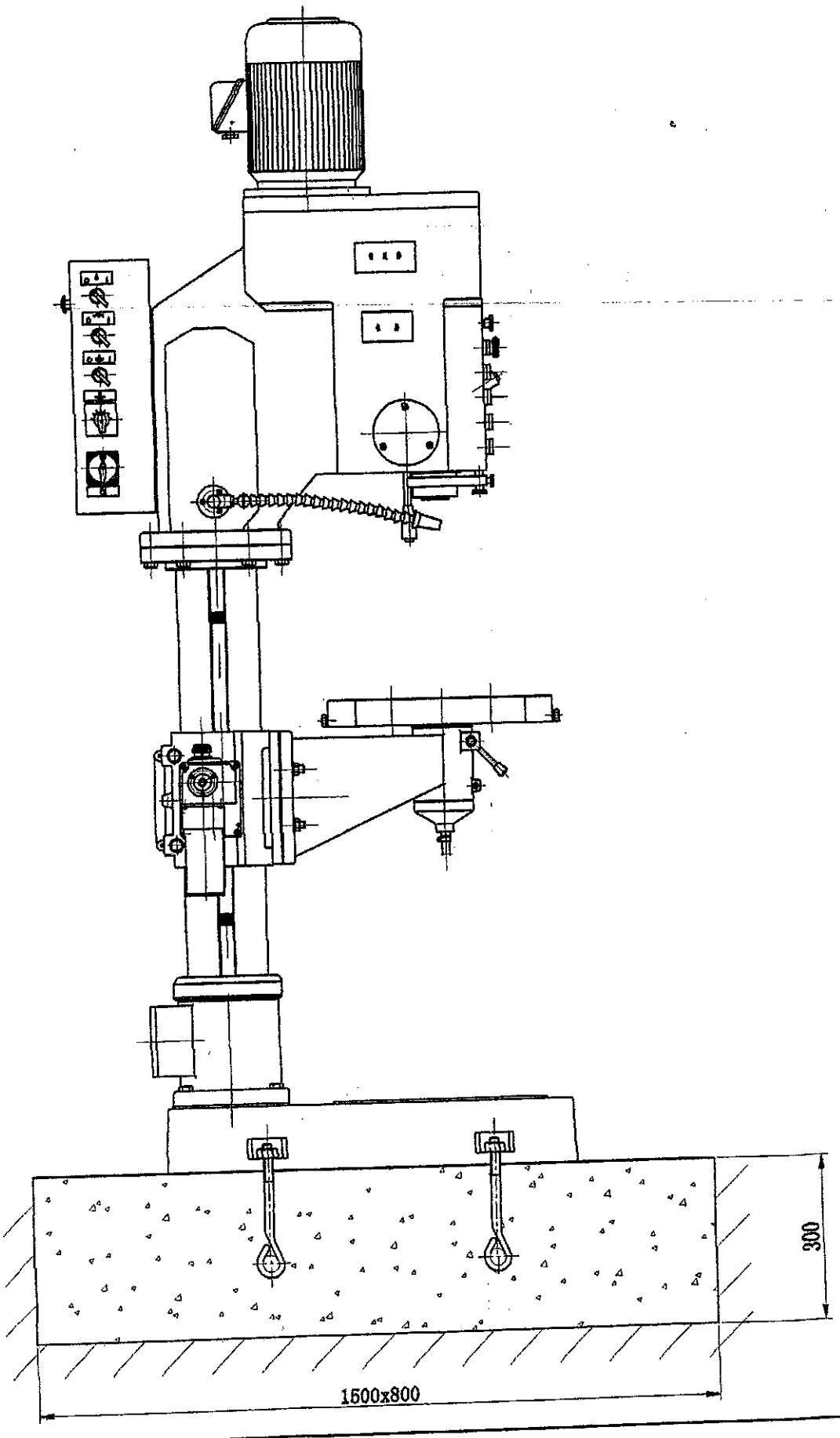


Fig. 3 Transport of the machine

Fig. 4 Foundation And Installation



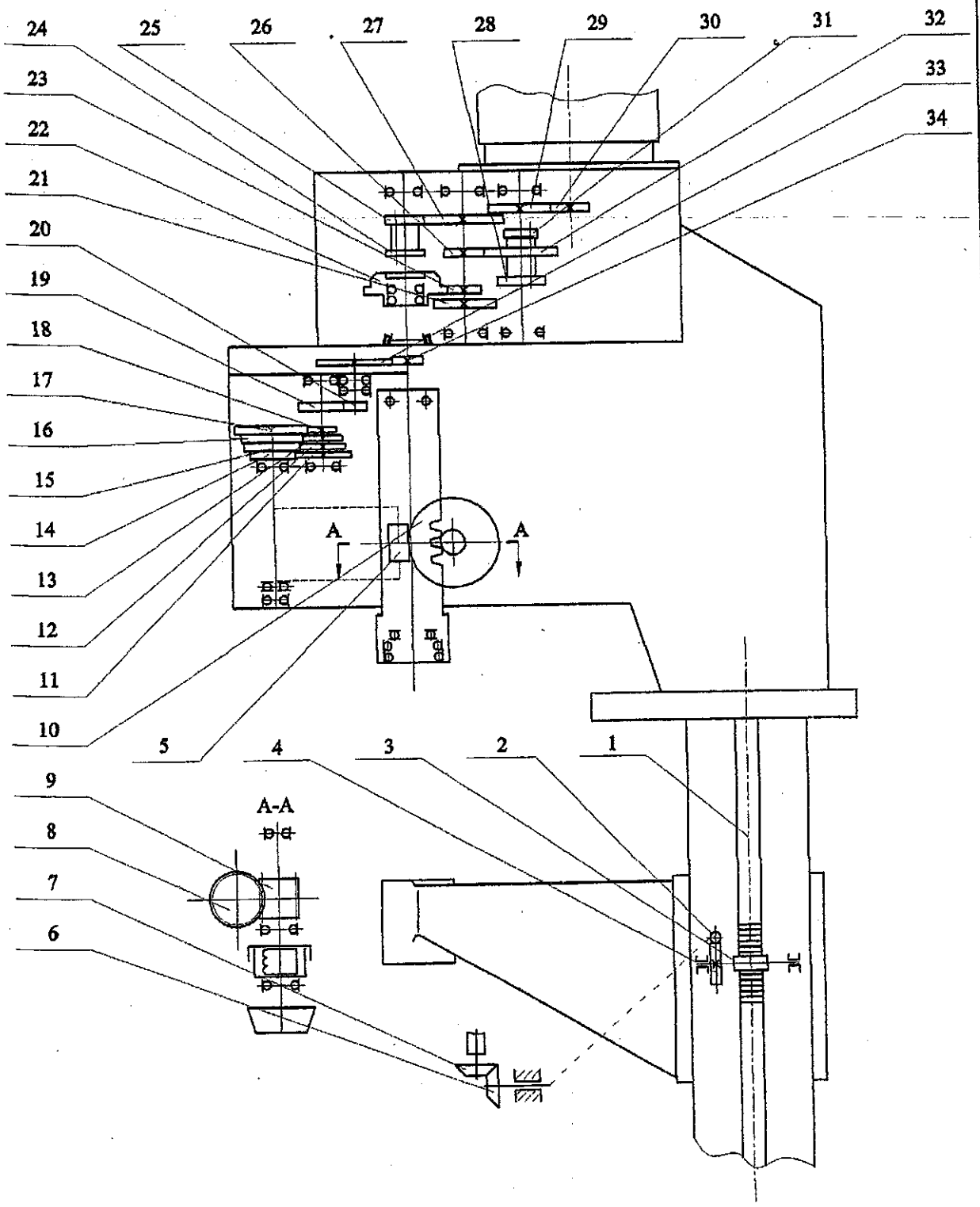



Fig. 5 Transmission System

**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 operater 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

6.22 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 seleeted. 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 inito 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 suppluy 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 $\pm 180°$ 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 $\pm 45°$ 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

a. Grease lubricating

b. 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.

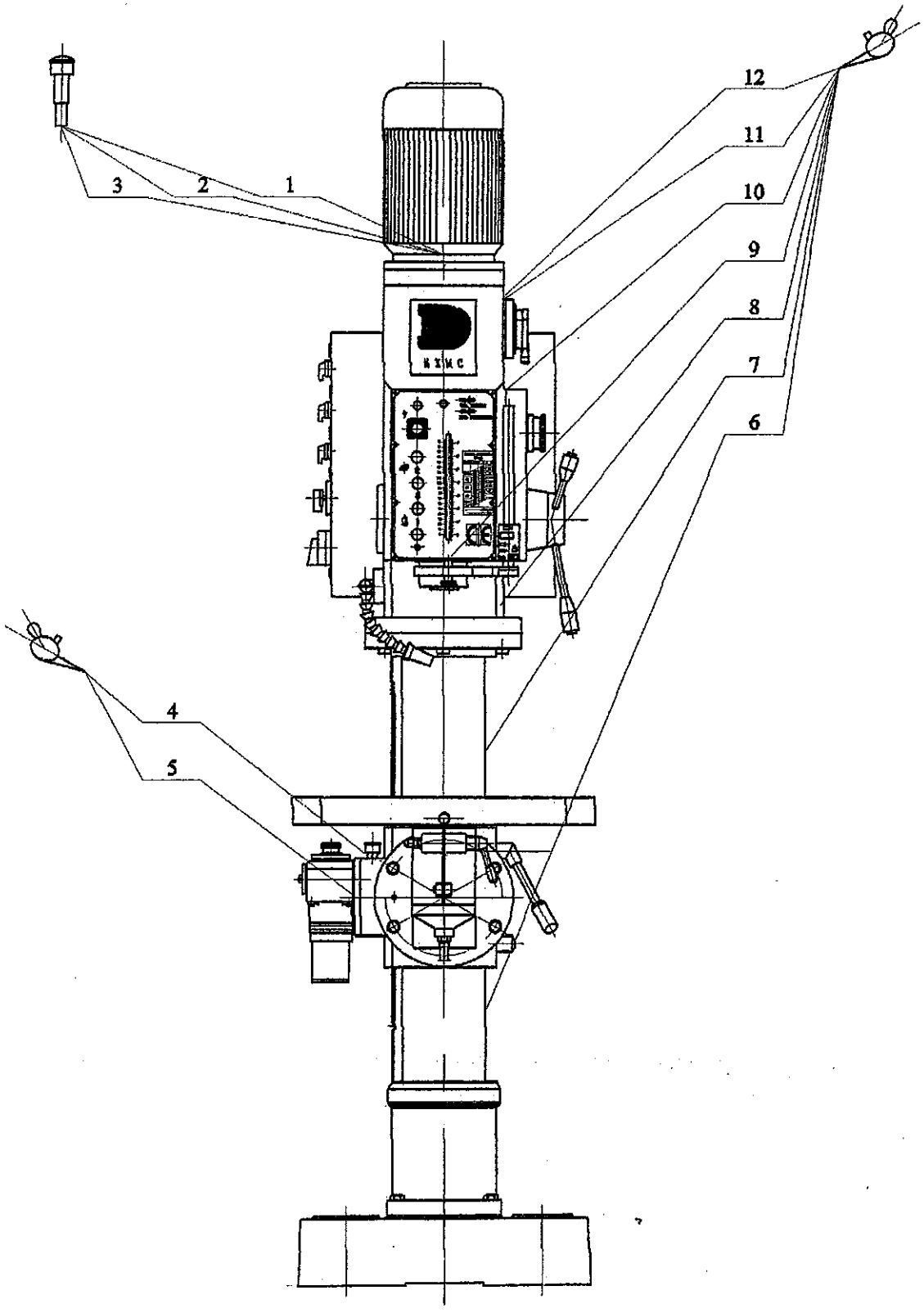
7.3 The machine needs hand lubrication.

a. Hand lubricating places (see Fig.6)

b. 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.40machine oil | Every shift |
| 5 | Bracket lift worm Bearing | Oil gun | No.40machine oil | Every shift |
| 6 | Column guideway Surface | Oil gun pouring | No.40machine oil | Every shift |
| 7 | Column guideway Surface | Oil gun pouring | No.40machine oil | Every shift |
| 8 | Feed Worm wheel | Oil gun | No.40machine oil | Every 6 months |
| 9 | Spindle sleeve surface | Oil gun pouring | No.40machine oil | Every shift |
| 10 | Feed system | Oil gun | No.40machine oil | Every shift |
| 11 | Speed declutch Shift shaft | Oil gun | No.40machine oil | 'Every shift |
| 12 | Speed declutch Shift shaft | Oil gun | No.40machine oil | Every shift |

Fig. 6 Lubrication



8. List and distribution of rolling bearings

8.1 Distribution of rolling Bearings

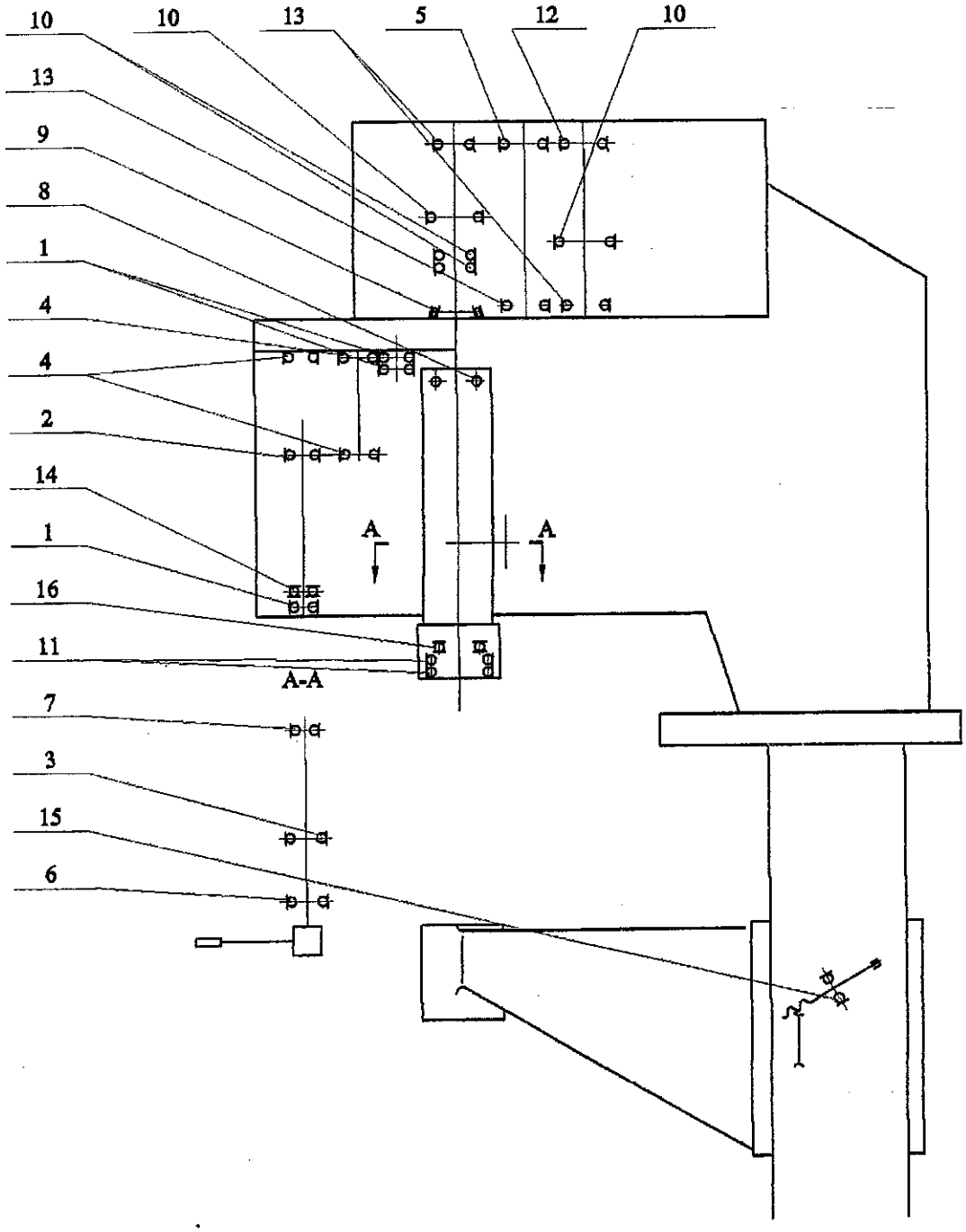



Fig. 7

## 8.2 List of Rolling Bearings

| No. | Model | Discription | Specification | Quan'ty | Acuracy |
|---|---|---|---|---|---|
| 1 | GB276;101 | Deep-groove bearing | 12x28x8 | 3 | |
| 2 | GB276;105 | Deep-groove bearing | 25x42x12 | 1 | |
| 3 | GB276;107 | Deep-groove bearing | 35x62x14 | 1 | |
| 4 | GB276;203 | Deep-groove bearing | 17x40x12 | 3 | |
| 5 | GB276;204 | Deep-groove bearing | 20x47x14 | 1 | |
| 6 | GB276;1000809 | Deep-groove bearing | 45x58x7 | 1 | |
| 7 | GB276;1000904 | Deep-groove bearing | 20x37x9 | 1 | |
| 8 | GB276;1000908 | Deep-groove bearing | 40x62x12 | 1 | P5 |
| 9 | GB297;2007106 | Tapered roller bearing | 30x55x17 | 1 | |
| 10 | GB276;7000107 | Deep-groove bearing | 35x62x9 | 4 | |
| 11 | GB276;7000109 | Deep-groove bearing | 45x75x10 | 2 | P5 |
| 12 | GB276;106 | Deep-groove bearing | 30x55x13 | 1 | |
| 13 | GB277;50204 | Thrust ball bearing with flat seat | 20x47x14 | 3 | |
| 14 | GB301;8102 | Thrust ball bearing with flat seat | 15x28x9 | 1 | |
| 15 | GB301;8104 | Thrust ball bearing with flat seat | 20x35x10 | 1 | |
| 16 | GB301;8108 | Thrust ball bearing with flat seat | 40x60x13 | 1 | |
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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.

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.

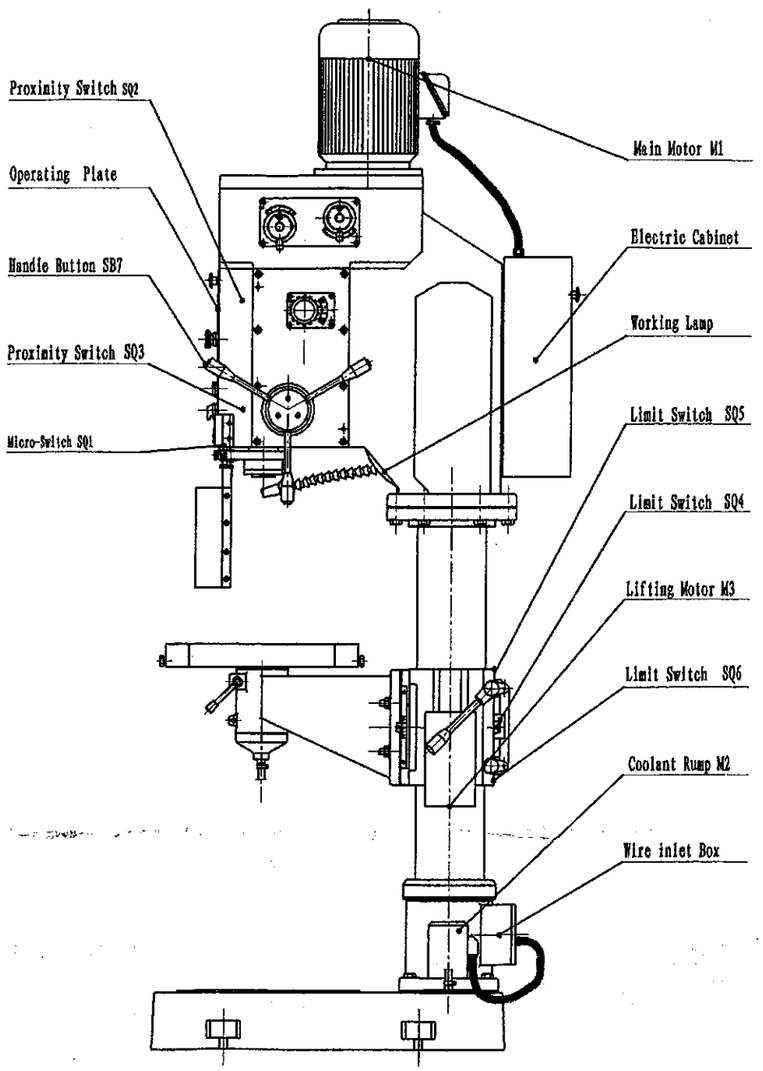
9.4 Maintainence of Electrical Device

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 ±10% of the rated voltage. To ensure the machine running normally, regular maintainence of the motor is a must.

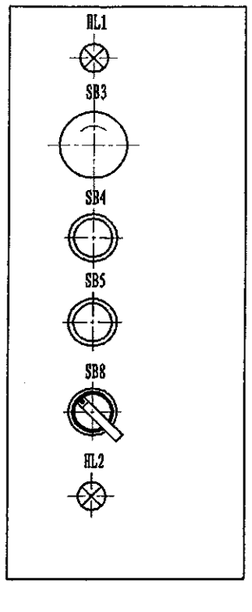
9.4 List of Electrical parts

Table 6

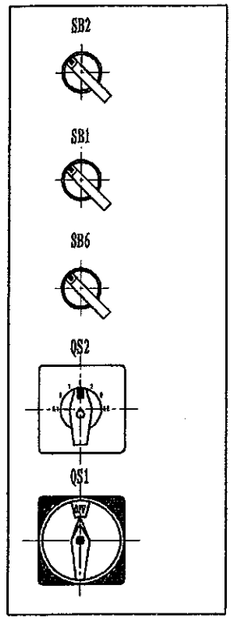
| Symbol | Item | Model & Specification | Qty | Remarks |
|---|---|---|---|---|
| QS1 | Main Switch | P1-25/EA/SVB | 1 | |
| QS2 | Conversion Switch | TO-6-67974GB/E | 1 | |
| QF1 | Circuit Breaker | MS116 4 ~ 6.3A | 1 | |
| QF2 | Circuit Breaker | MS116 0.16 ~ 0.25A | 1 | |
| SB1; SB2; SB6 | Select Switch | C2SS2-10B-10 | 3 | |
| SB3 | Emergency stop Button | | 1 | Red Mushroom Head |
| SB4 | Start Button | CP1-10G-10 | 1 | Green |
| SB5 | Stop Button | CP1-10R-01 | 1 | Red |
| SB7 | Handle Button | | 3 | Made by oursetf |
| SB8 | Select Button | C3SS2-10B-20 | 1 | Black |
| SQ1; SQ5; SQ6 | Micro-switch | SS-5GL-F | 3 | |
| SQ2; SQ3 | Proximity Switch | TL-Q5MC1 | 2 | |
| SQ4 | Travel Switch | LX19-001 | 1 | |
| KM1 ~ KM5 | Contactor | A12D-30-01 | 5 | |
| HL1; HL2 | Signal Lamp | CL502G | 2 | |
| EL1 | Working Lamp | 25W AC24V | 1 | Screw |
| T1 | Control Transfomer | JBK5TH-160VA 575/24; 27; 27; 9 | 1 | |
| U1 | Circuit Board | HXPCB5-C | 1 | |
| M1 | Two-speed Main Motor | YD112M-6/4 | 1 | |
| M2 | Coolant Pump | AYB-6B | 1 | |
| M3 | Lifting Motor | | 1 | Special Order |
| YC1 | Electromagnetic Clutch | DYLO-16S | 1 | |
| | Electrical Brush | M16X1 | 1 | Special Order |
| R1 | Resistor | 62Ω 2W | 1 | |
| D1 | Diode | 1N5404 | 1 | |
| FU1~FU3 | | 10A | 3 | |
| FU4 ~ FU6<br>FU10 ~ FU12 | | 3A | 6 | |
| FU8; FU9 | | 1A | 2 | |
| FU7 | | 5A | 1 | |
| | | 31110 | 4 | |
| | | 31112 | 1 | |
| | | 31113 | 2 | |



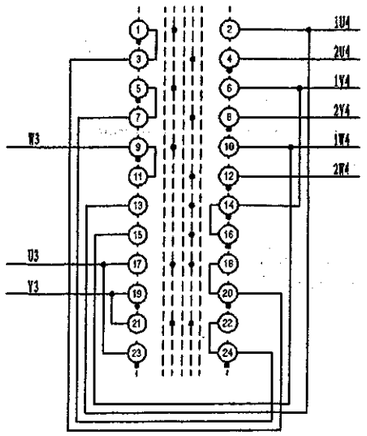

Front operating Plate




Side plate of electrical Cabinet




QS2




QS2 On/Off chart

TO-6-67974GBIB

| Contact Code \ Handle Position | R 135° | 0 90° | 1 45° | 0 0° | 2 45° | 0 90° | R 135° |
|---|---|---|---|---|---|---|---|
| 1-2 | × | | × | | | | |
| 3-4 | | | | | × | | × |
| 5-6 | × | | × | | | | |
| 7-8 | | | | | × | | × |
| 9-10 | × | | × | | | | |
| 11-12 | | | | | × | | × |
| 13-14 | | | | | × | | × |
| 15-16 | | | | | × | | × |
| 17-18 | | | × | | × | | |
| 19-20 | × | | | | | | × |
| 21-22 | | | × | | × | | |
| 23-24 | × | | | | | | × |

Fig. 8 Machine Electrical Diagram

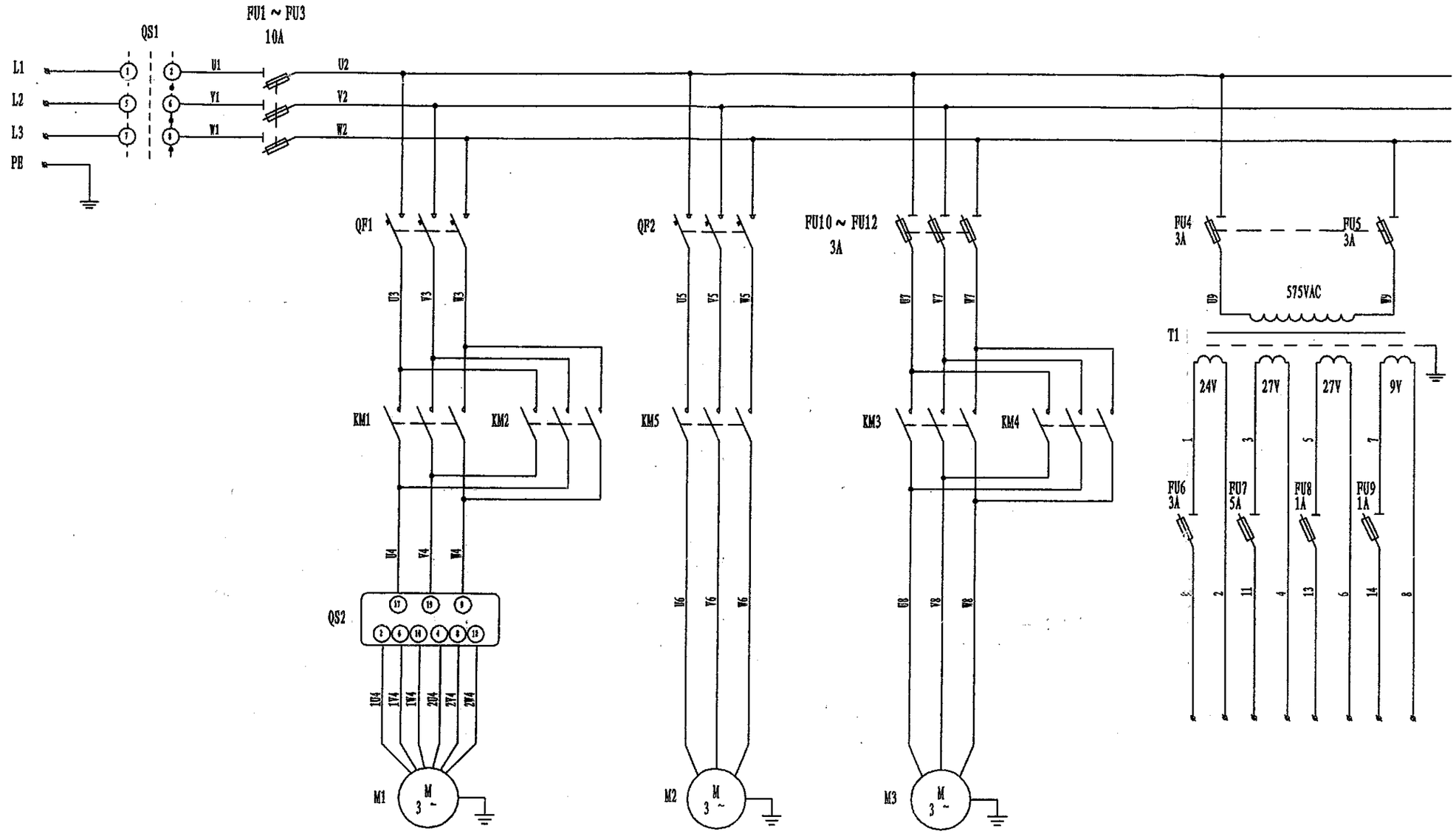



Fig. 9-1 Machine Electrical Diagram

## Electical Control Wiring

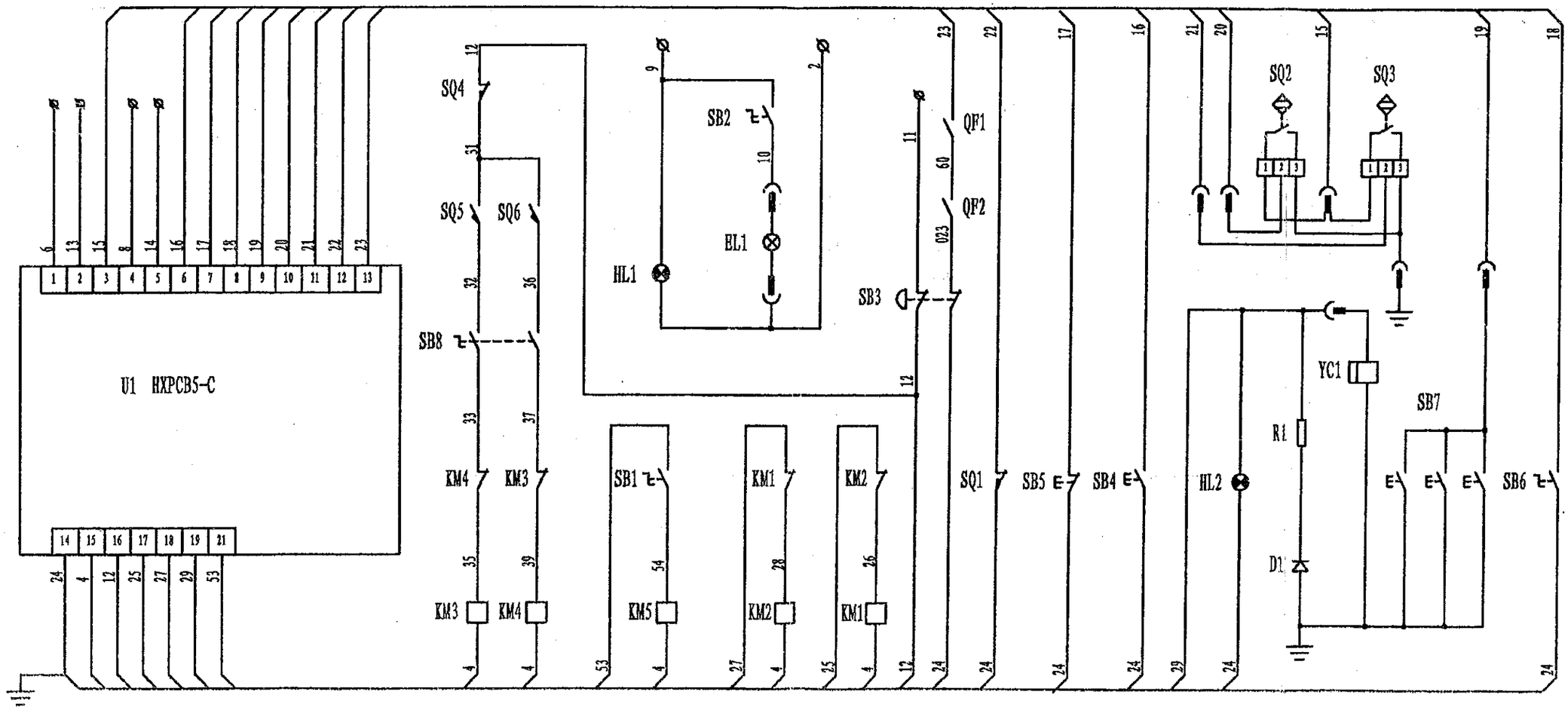



Fig. 9-2 Machine Electrical Diagram

## 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 |

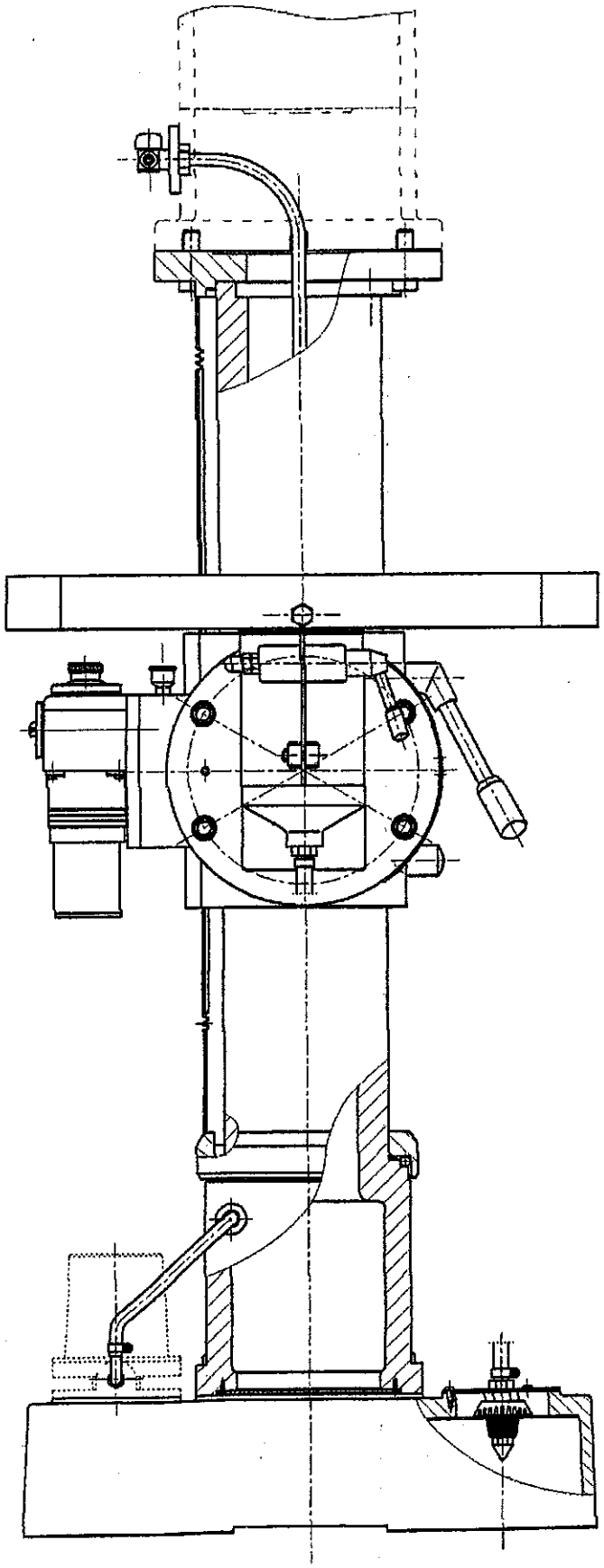
11. Structure of Main Components.

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



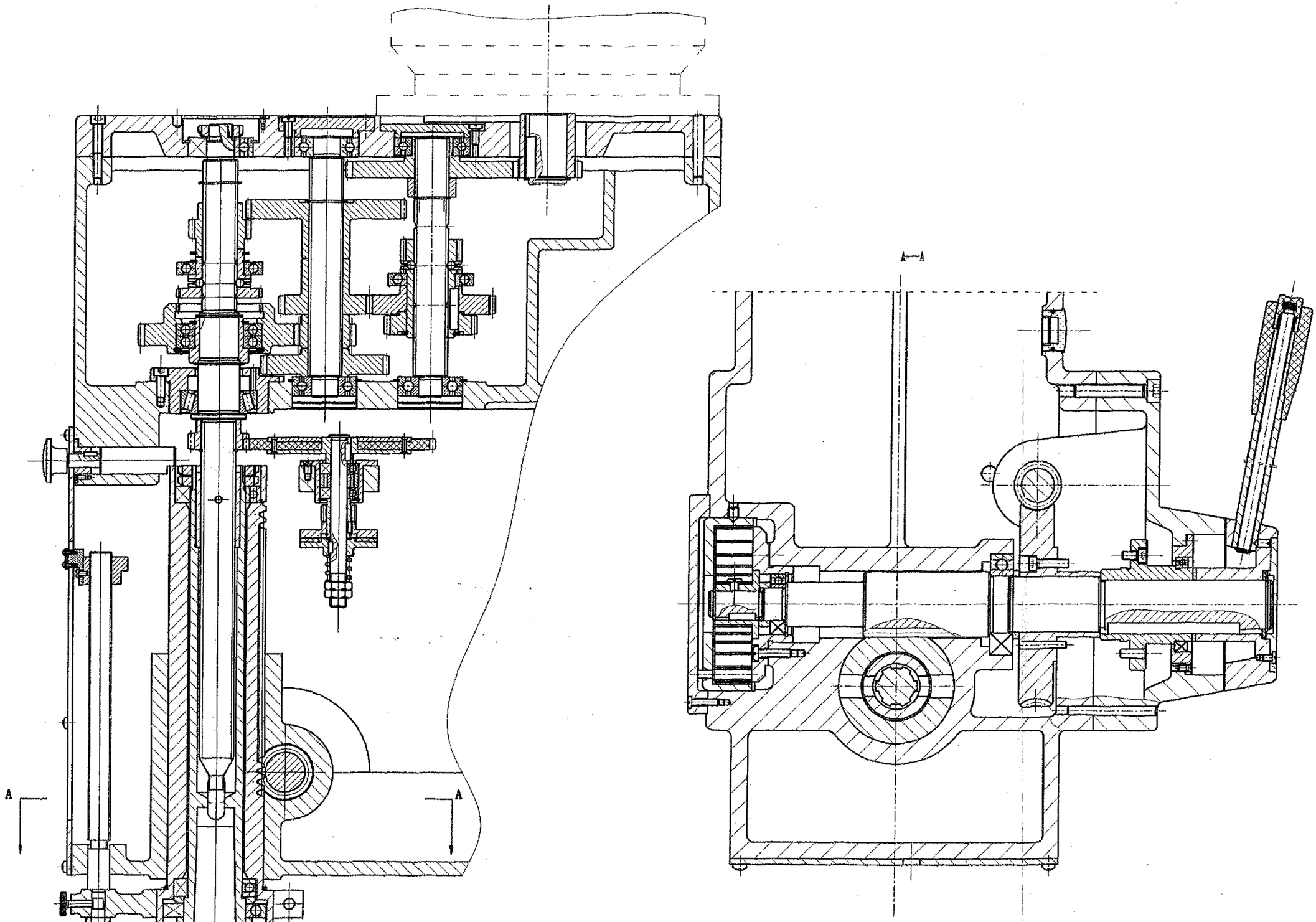



Fig. 11 Structure Of Spindle Box and Gear Box

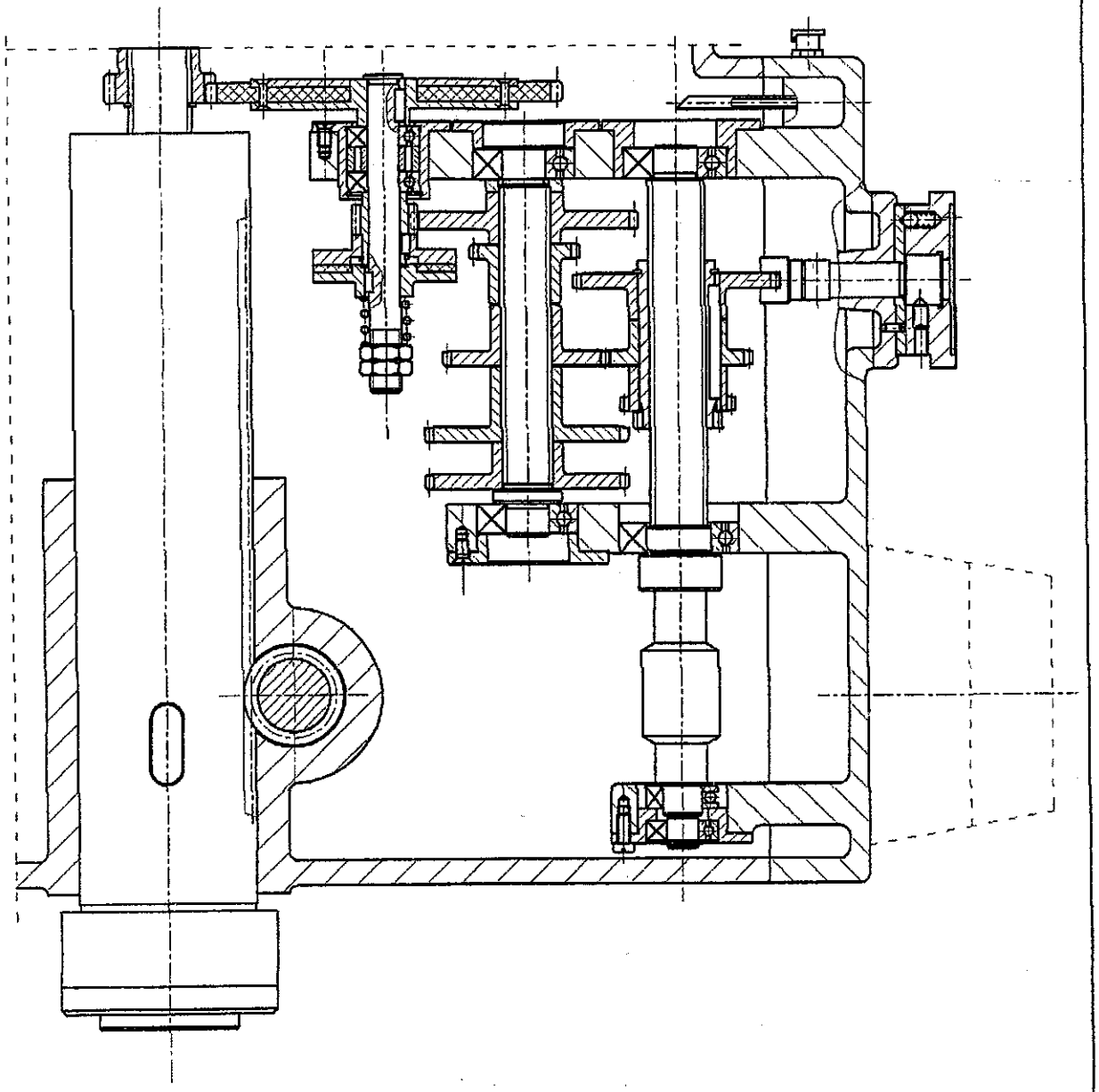


Fig. 12 Feed Gear Box

# Model Z5040 Vertical Drilling Machine.

## Certificate of Inspection

Max. Drilling Dia. 40mm

Serial No: B1306067

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

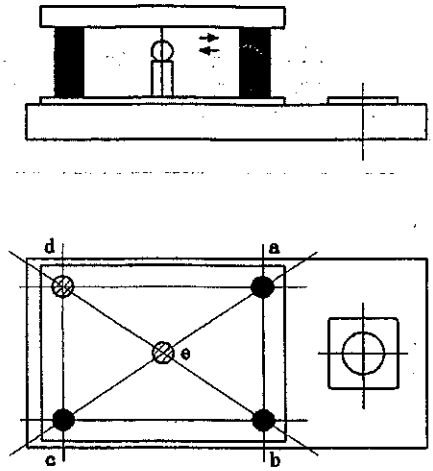
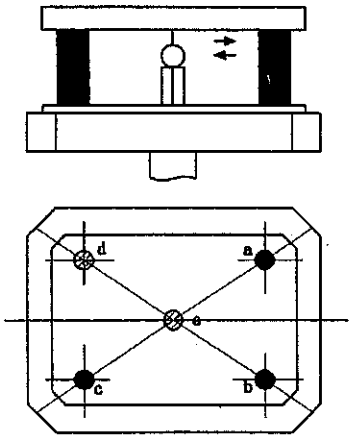
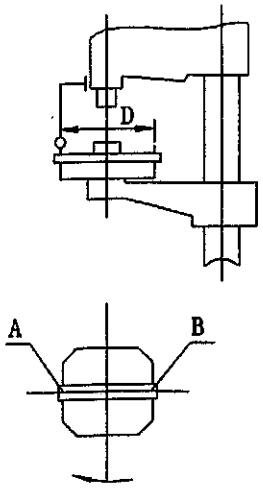
Factory Director: Zhangbin Date:

Inspection Director: Linzi gang Date:

| MODEL Z5040 | Certificate of Inspection | Total 3<br>Page 1 |
|---|---|---|

## Precision Inspection Record

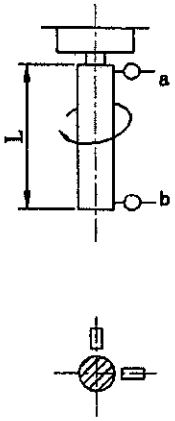
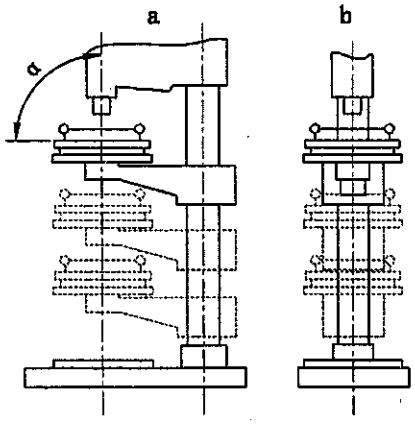
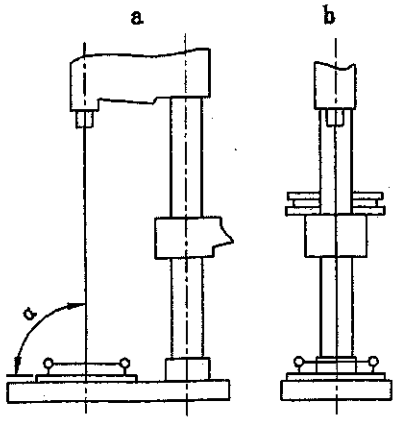
### Germetrical Precision Test:

| 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) | 0,04/300 (凹) |
| G2 | Parallelism of the work table surface |  | 0.04 at any tested Length of 300(flat or concave) | 0.03/300 (凹) |
| G3 | surface runout of worktable |  | D=300<br>0.04 | 0.03 |

| MODEL Z5040 | Certificate of Inspection | Total 3<br>Page 2 |
|---|---|---|

## Precision Inspection Record

### Germetrical Precision Test:

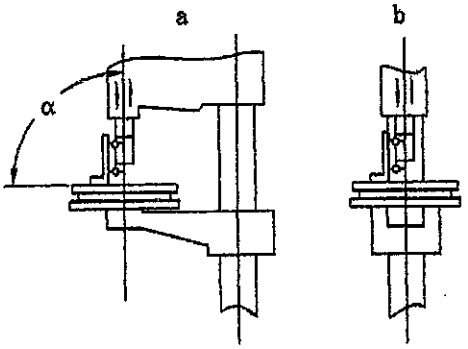
| No. | Item | Brief Drawing | Precision | |
|---|---|---|---|---|
| | | | Allowance (mm) | Actual Test |
| G4 | Spindle bore axis runout<br>a) Close to spindle surface<br>b) at a distance of L to spindle surface |  | L=200<br>a) 0.02<br>b) 0.035 | a) 0.01<br>b) 0.03 |
| G5 | Parpendicularity of the spindle axis to work table surface |  | a)<br>0.1/300*<br>(a≤90° )<br>b)<br>0.06/300* | a) 0.08/300<br>(α<90°)<br>b) 0.05/300 |
| G6 | Parpendicularity of the spindle axis to Base plate table surface |  | a) 0.10/300*<br>(a≤90° ) b)<br>0.10/300* | a) 0.07/300<br>(α≤90°)<br>b) 0.07/300 |

Distance between two contacts of indicator probe

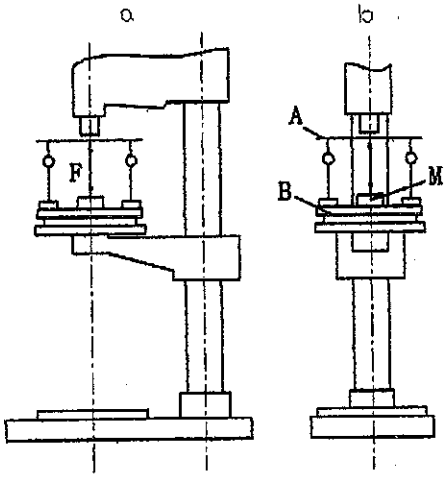
| MODEL Z5040 | Certificate of Inspection | Total 3<br>Page 3 |
|---|---|---|

## Precision Inspection Record

### Germetrical Precision Test:

| No. | Item | Brief Drawing | Precision | |
|---|---|---|---|---|
| | | | Allowance (mm) | Actual Test |
| G7 | Parpendicularity of the vertical movement of spindle sleeve to work table surface |  | a. 0. 1/300 (a≤90° )<br>b. 0. 1/300 | a) 0.08/300 (α<90°)<br>b) 0.08/300 |

### Work Acuracy:

| | | | | |
|---|---|---|---|---|
| P1 | The change of Parpendicularity of spindle axis to work table surface under the axial force. |  | F=9000N<br>2/1000 | 1.8/1000 |
| | | | | |

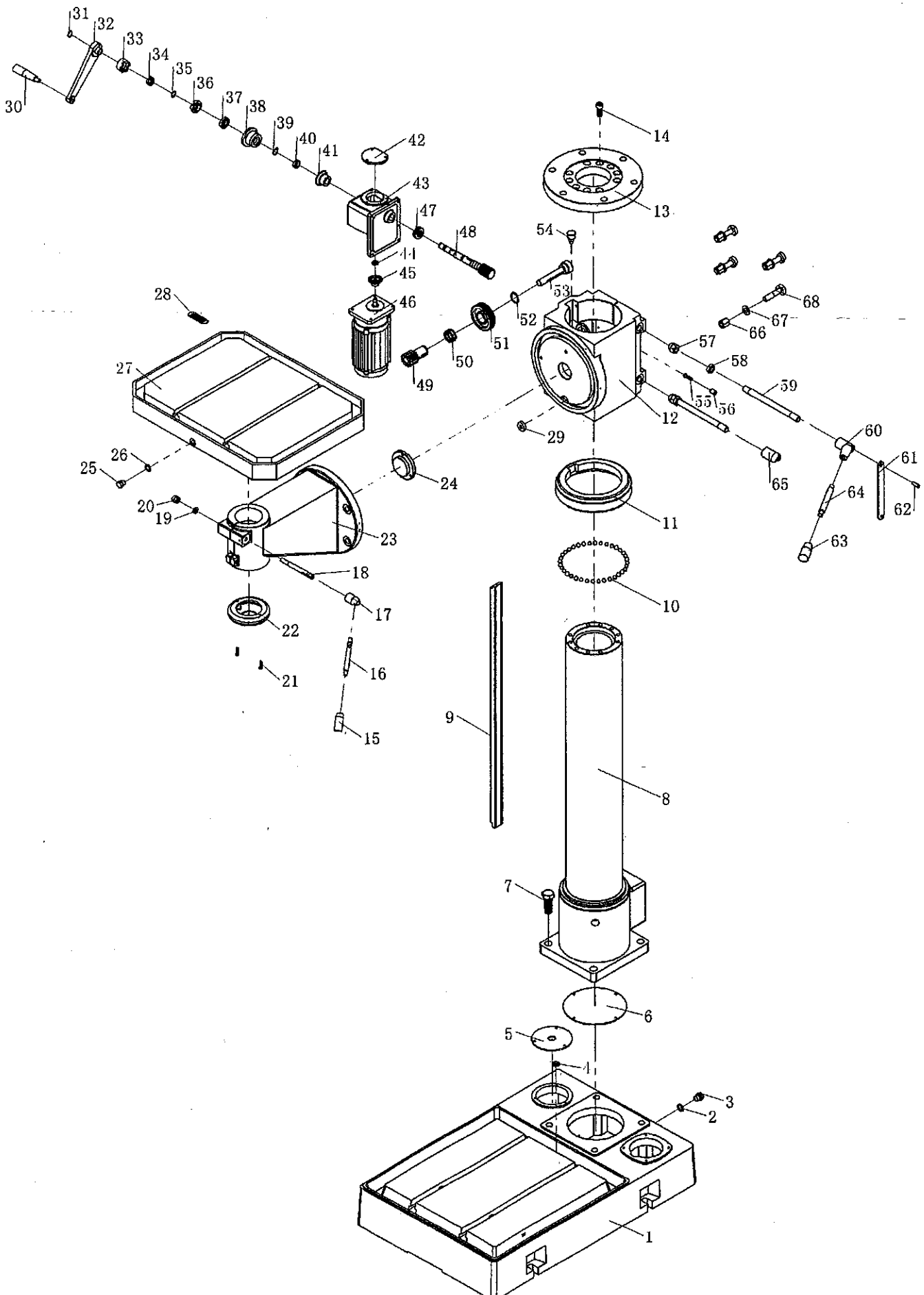



Fig1. Three-view drawing of work table and bracket parts

# Model Z5040 Vertical Drilling Machine

## Packing List

Max. Drilling Dia. 40mm

Serial No: B1306067

| MODEL Z5040 | PACKING LIST | PAGE 1 OF 1 |
|---|---|---|

Case No. 1/1
Dimension: (L×W×H)
110CM×67CM×215CM
Gross weight: 750kg
Net weight: 690kg

| No. | Item | Spec. & Marks | Q'ty | Remarks |
|---|---|---|---|---|
| 1 | Main Machine | | 1set | |
| 2 | Main Motor | LYD112M-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 | Φ5x20;3A | 2pcs | |
| 16 | Fuse | Φ5x20;5A | 2pcs | |
| 17 | Operation manual | | 1 copy | |
| | Certificate of Inspection | | 1 copy | |
| | Packing List | | 1 copy | |

Packing Inspector: Lizigang
Date:

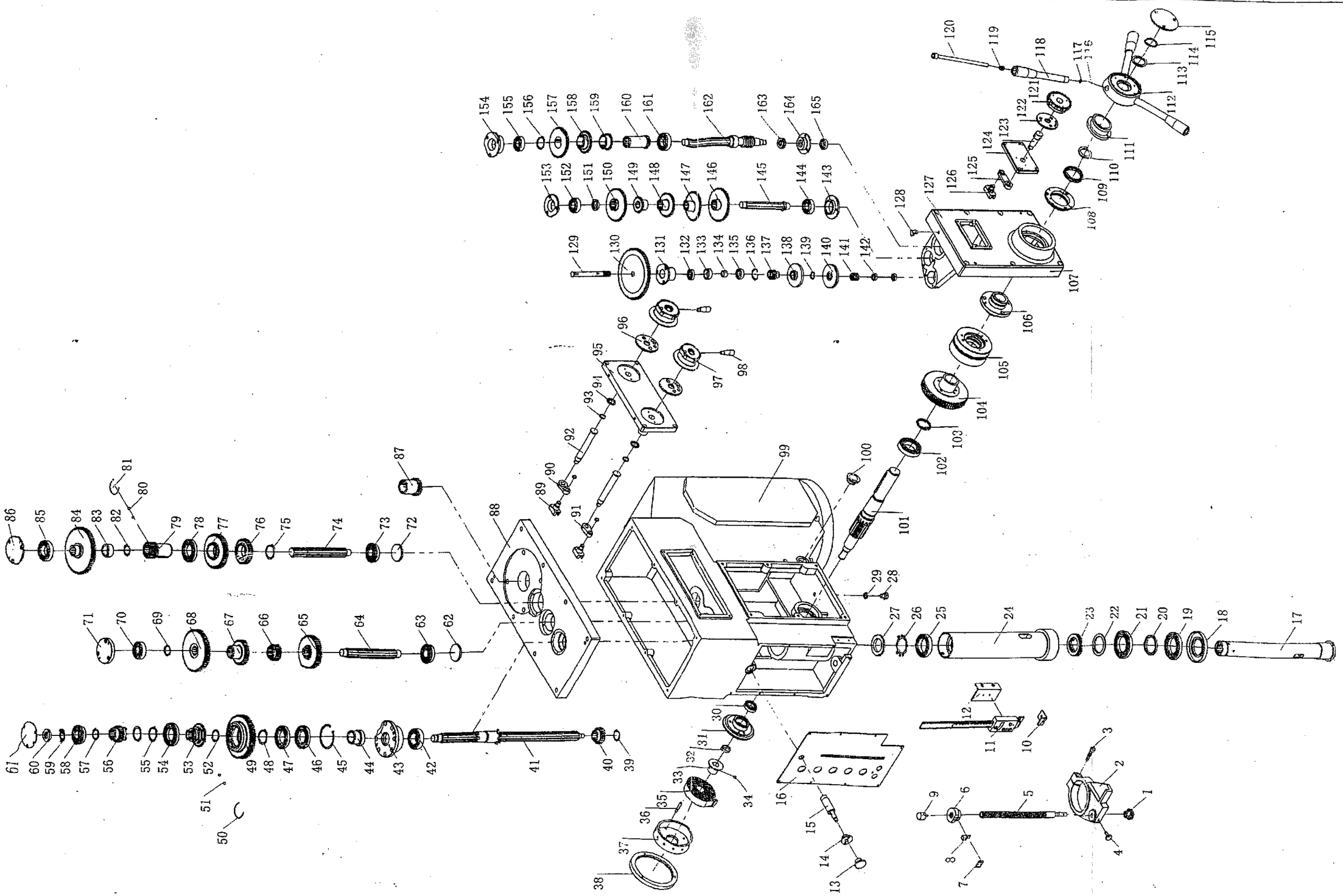


Fig2. Three-view drawing of spindle box and geared system