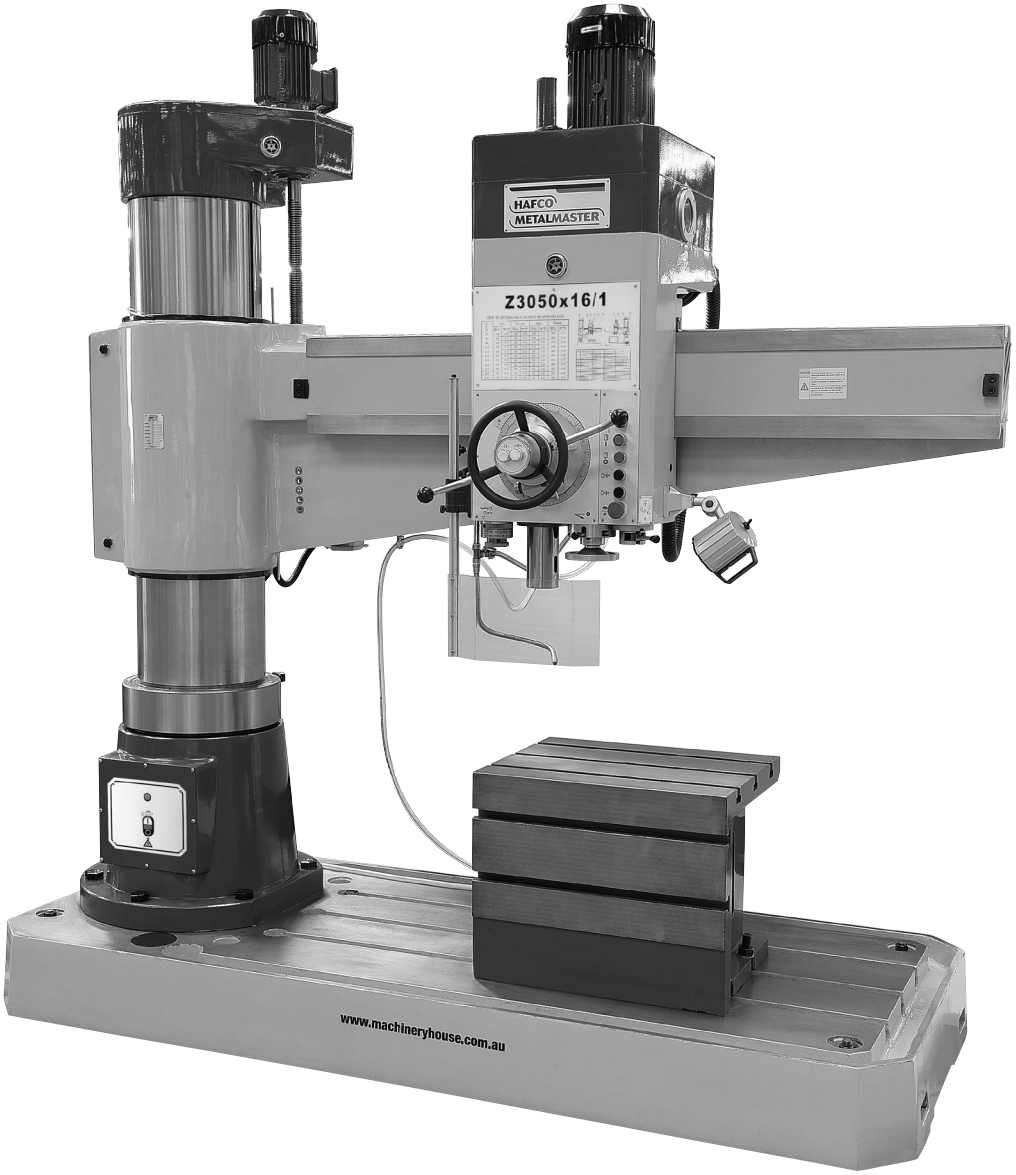
HAFCO METALMASTER



Edition : 2.0
Date: (02/25)

Instruction Manual

RADIAL ARM DRILL
Z3050x16

Order Code: (D166)

MACHINE DETAILS

MACHINE.	RADIAL ARM DRILL
MODEL NO.	Z3050x16
SERIAL NO.	
DATE OF MANF.	

Imported by

AUSTRALIA

HARE&FORBES MACHINERYHOUSE

www.machineryhouse.com.au

NEW ZEALAND

MACHINERYHOUSE

www.machineryhouse.co.nz

NOTE:
This manual is only for your reference. At the time of the compiling of this manual every effort to be exact with the instructions, specifications, drawings, and photographs of the machine was taken. Owing to the continuous improvement of the HAFCO METALMASTER machine, changes may be made at any time without obligation or notice. Please ensure the local voltage is the same as listed on the specification plate before operating any electric machine.

SAFETY SYMBOLS:
The purpose of safety symbols is to attract your attention to possible hazardous conditions.

⚠WARNING ***Indicates a potentially hazardous situation causing injury or death.***

⚠CAUTION ***Indicates an alert against unsafe practices.***

Note: Used to alert the user to useful information.

NOTE:
In order to see the type and model of the machine, please see the specification plate. Usually found on the back of the machine. See example (Fig.1)

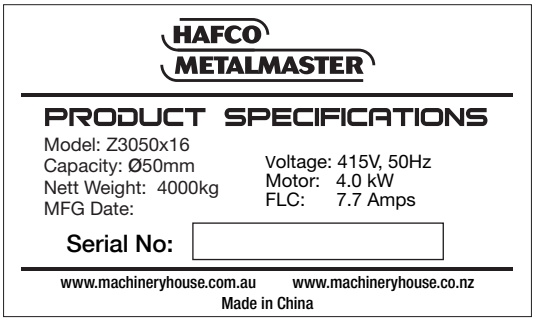


FIG.1

CONTENTS:

1.1 SPECIFICATIONS

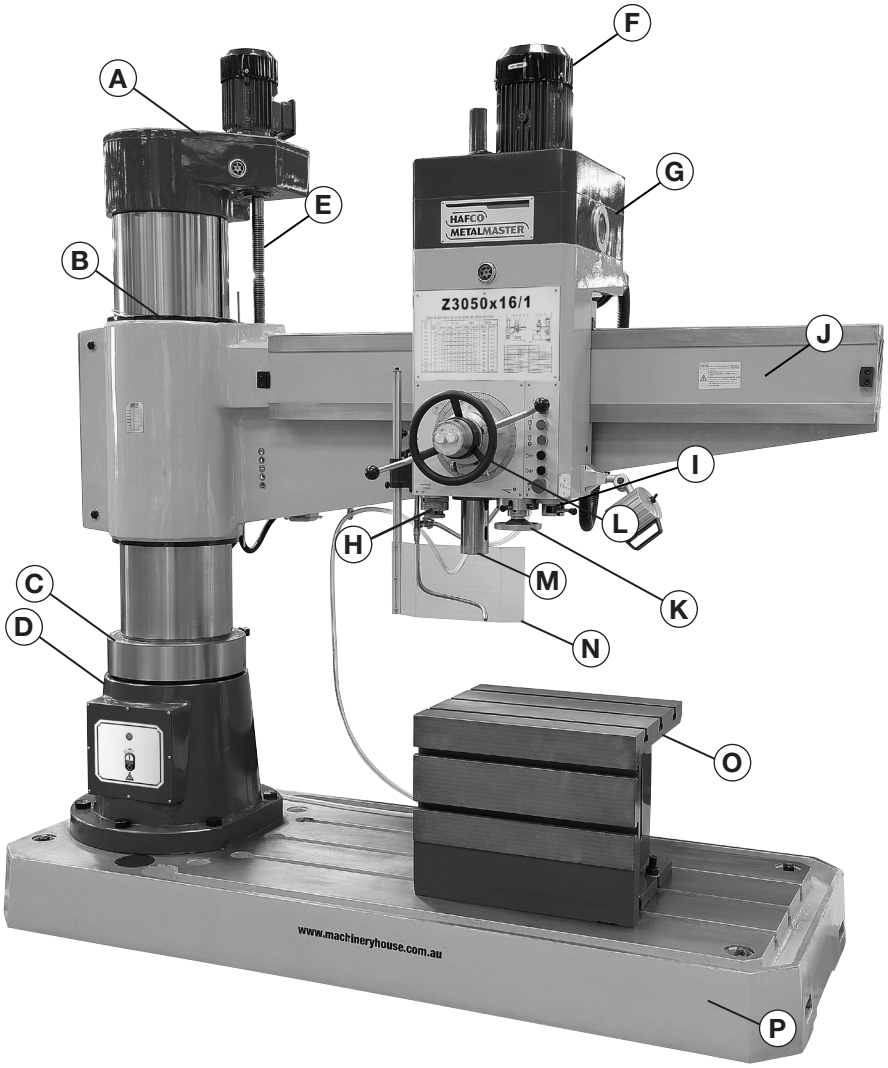
Order Code	D166
Model	**Z3050x16**
Drill Capacity (mm)	Ø50
Thread Tapping Capacity	M36
Quill Diameter (mm)	80
Spindle Taper (MT)	5
Spindle Travel (mm)	315
Spindle To Column (min-max) (mm)	350 - 1600
Spindle To Box Table (max) (mm)	750
Spindle To Base (max) (mm)	1250
Table Type	Square
Box Table Size (LxWxH) (mm)	620 x 500 x 500
T-Slot Size (mm)	20
Automatic Quill Feed (mm / rev)	16 (0.04 - 3.2)
Spindle Speed Steps (No.)	16
Spindle Speed Range (rpm)	25 - 2000
Motor Power (kW / hp)	4 / 5.3
Motor Voltage (V)	415
Nett Weight (kg)	4000

1.2 INCLUDED ACCESSORIES

- Box table
- Drill chuck & arbor
- 5-4, 4-3 & 3-2 morse taper sleeves
- Coolant pump
- Auto oil lubricator on column
- LED Work light
- Safety chuck guard
- Hex key and drill drifts

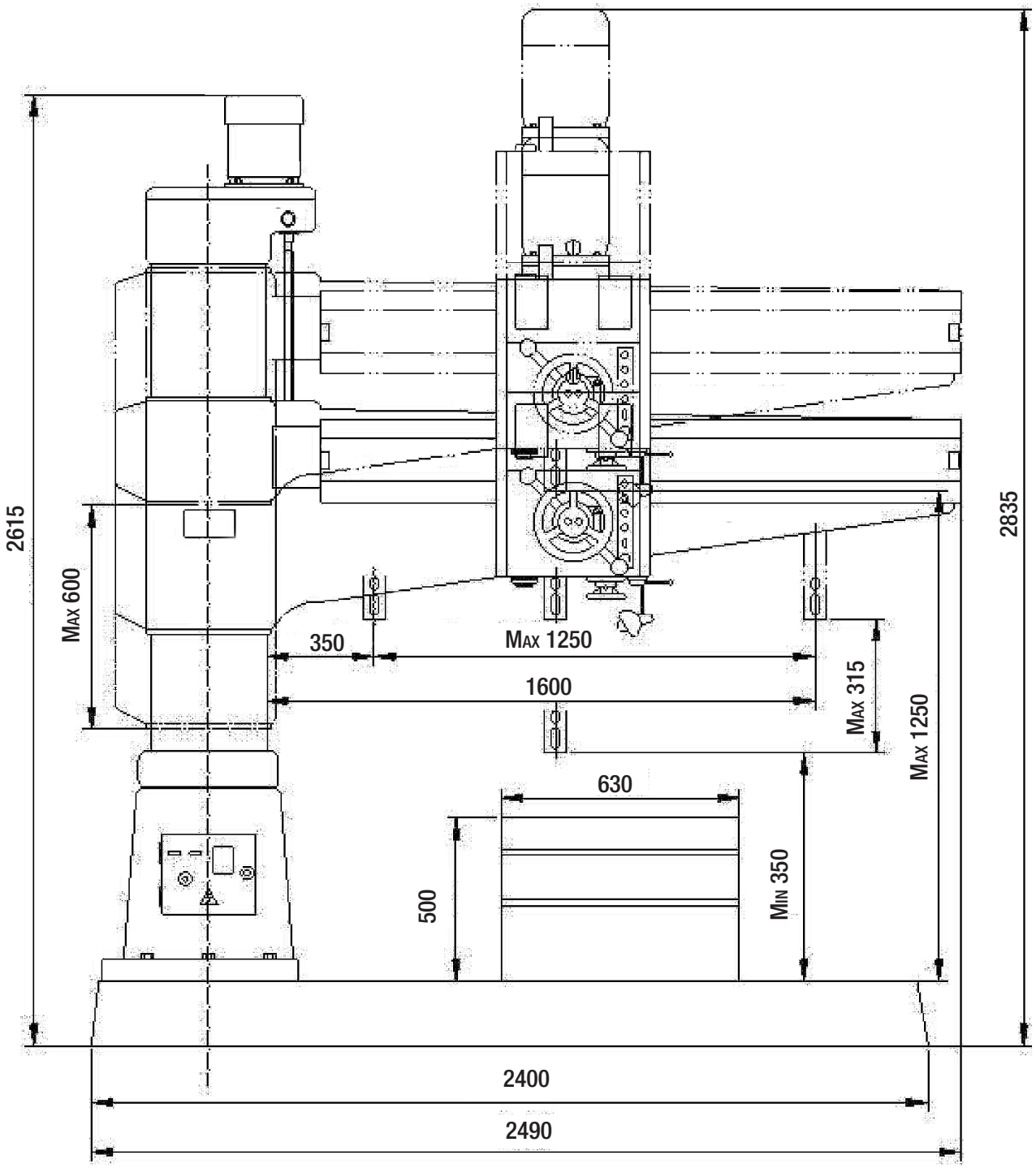
1.3 IDENTIFICATION

Become familiar with the names and locations of the controls and features shown below to better understand the instructions when mentioned later in this manual.



A	Elevating worm gearbox and motor	**I**	Speed speed change handles
B	Column sleeve	**J**	Radial arm
C	Column fixing ring	**K**	Manual feed hand-wheel
D	Column	**L**	Horizontal moving hand-wheel
E	Elevating screw	**M**	Spindle
F	Spindle motor	**N**	Spindle guard
G	Gear box	**O**	Table
H	Spindle Speed Preselection Switch	**P**	Base

1.4 DIMENSIONS



2. IMPORTANT INFORMATION

2.1 GENERAL METALWORKING MACHINE SAFETY

DO NOT use this machine unless you have read this manual or have been instructed in the use of this machine in its safe use and operation.

WARNING

This manual provides safety instructions on the proper setup, operation, maintenance, and service of this machine. Save this manual, refer to it often, and use it to instruct other operators.

Failure to read, understand and follow the instructions in this manual may result in fire or serious personal injury—including amputation, electrocution, or death.

The owner of this machine is solely responsible for its safe use. This responsibility includes, but is not limited to proper installation in a safe environment, personnel training and authorization to use, proper inspection and maintenance, manual availability and comprehension of the application of the safety devices, integrity, and the use of personal protective equipment.

The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

- ✓ Always wear safety glasses or goggles.
- ✓ Wear appropriate safety footwear.
- ✓ Wear respiratory protection where required.
- ✓ Gloves should never be worn while operating the machine, and only worn when handling the workpiece.
- ✓ Wear hearing protection in areas > 85 dBA. If you have trouble hearing someone speak from one metre (three feet) away, the noise level from the machine may be hazardous.
- ✓ DISCONNECT THE MACHINE FROM POWER when making adjustments or servicing.
- ✓ Check and adjust all safety devices before each job.
- ✓ Ensure that guards are in position and in good working condition before operating.
- ✓ Ensure that all stationary equipment is anchored securely to the floor.
- ✓ Ensure all machines have a start/stop button within easy reach of the operator.
- ✓ Each machine should have only one operator at a time. However, everyone should know how to stop the machine in an emergency.

2.1 GENERAL SAFETY REQUIREMENTS Cont.

- ✓ Ensure that keys and adjusting wrenches have been removed from the machine before turning on the power. Appropriate storage for tooling should be provided.
- ✓ Ensure that all cutting tools and blades are clean and sharp. They should be able to cut freely without being forced.
- ✓ Stop the machine before measuring, cleaning or making any adjustments.
- ✓ Wait until the machine has stopped running to clear cuttings with a vacuum, brush or rake.
- ✓ Keep hands away from the cutting head and all moving parts.
- ✓ Avoid awkward operations and hand positions. A sudden slip could cause the hand to move into the cutting tool or blade.
- ✓ Return all portable tooling to their proper storage place after use.
- ✓ Clean all tools after use.
- ✓ Keep work area clean. Floors should be level and have a non-slip surface.
- ✓ Use good lighting so that the work piece, cutting blades, and machine controls can be seen clearly. Position any shade lighting sources so that they do not cause any glare or reflections.
- ✓ Ensure there is enough room around the machine to do the job safely.
- ✓ Obtain first aid immediately for all injuries.
- ✓ Understand that the health and fire hazards can vary from material to material. Make sure all appropriate precautions are taken.
- ✓ Clean machines and the surrounding area when the operation is finished.
- ✓ Use proper lock out procedures when servicing or cleaning the machines or power tools.

DO NOT

- × Distract an operator. Horseplay can lead to injuries and should be strictly prohibited.
- × Wear loose clothing, gloves, neck-ties, rings, bracelets or other jewellery that can become entangled in moving parts. Confine long hair.
- × Handle cuttings by hand because they are very sharp. Do not free a stalled cutter without turning the power off first. Do not clean hands with cutting fluids.
- × Use rags or wear gloves near moving parts of machines.
- × Use compressed air to blow debris from machines or to clean dirt from clothes.
- × Force the machine. It will do the job safer and better at the rate for which it was designed.

WARNING.

Loose hair, clothing, or jewelery could get caught in machinery and cause serious injury or death. Keep these items away from moving parts at all times to reduce this risk.

2.1 GENERAL SAFETY REQUIREMENTS Cont.

HAZARDS ASSOCIATED WITH MACHINES include, but are not limited to:

- Being struck by ejected parts of the machinery.
- Being struck by material ejected from the machinery.
- Contact or entanglement with the machinery.
- Contact or entanglement with any material in motion.

Health Hazards (other than physical injury caused by moving parts)

- Chemicals hazards that can irritate, burn, or pass through the skin.
- Airborne items that can be inhaled, such as oil mist, metal fumes, solvents, and dust.
- Heat, noise, and vibration.
- Ionizing or non-ionizing radiation. (X-ray, lasers, etc.)
- Biological contamination and waste.
- Soft tissue injuries. (for example, to the hands, arms, shoulders, back, or neck) resulting from repetitive motion, awkward posture, extended lifting, and pressure grip.

Other Hazards

- Slips and falls from and around machinery during maintenance.
- Unstable equipment that is not secured against falling over.
- Safe access to/from machines. (access, egress)
- Fire or explosion.
- Pressure injection injuries from the release of fluids and gases under high pressure.
- Electrical Hazards, such as electrocution from faulty or ungrounded electrical components.
- Environment in which the machine is used (in a machine shop, or in a work site)

WARNING!

The machine is the sole responsibility of the owner for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training, proper inspection and maintenance, manual availability and comprehension. The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

WARNING!

Machines are safeguarded to protect the operator from injury or death with the placement of guards. Machines must not be operated with the guards removed or damaged.

2.2 SPECIFIC SAFETY FOR RADIAL DRILL

DO NOT use this machine unless you have been instructed in its safe use and operation and have read and understood this manual

Safety glasses must be worn at all times in work areas.

Long and loose hair must be contained.

Gloves must not be worn when using this machine.

Sturdy footwear must be worn at all times in work areas.

Close fitting/ protective clothing must be worn.

Rings and jewelery must not be worn.

PRE-OPERATIONAL SAFETY CHECKS

- ✓ Locate and ensure you are familiar with all machine operations and controls.
- ✓ Ensure all guards are fitted, secure and functional. Do not operate if guards are missing or faulty.
- ✓ Check workspaces and walkways to ensure no slip/trip hazards are present.
- ✓ Ensure the chuck key (if used) has been removed from the drill chuck.
- ✓ Follow correct clamping procedures to ensure work is secure.
- ✓ Erect a barricade if the job obstructs the walkway.
- ✓ Adjust the spindle speed to suit drill or cutter diameter.

OPERATIONAL SAFETY CHECKS

- ✓ Before making adjustments or before cleaning swarf accumulations, switch off and bring the machine to a stop.
- ✓ Feed downwards at a sufficient rate to keep the drill cutting.
- ✓ Feed with care as the drill breaks through the underside of the work.
- ✓ Use a safe working posture.

ENDING OPERATIONS AND CLEANING UP

- ✓ Switch off the machine when work completed.
- ✓ Leave the machine in a safe, clean and tidy state.

DON'T

- × Use faulty equipment. Immediately report suspect equipment.
- × Never leave the machine running unattended.
- × Hold the item being drilled with your hands. Use a clamp.

POTENTIAL HAZARDS AND INJURIES

- ❑ Hair/clothing getting caught in moving machine parts.
- ❑ Flying swarf and chips.
- ❑ Eye injuries.
- ❑ Sharp edges and burrs.

CAUTION!

It is impossible to cover all possible hazards Every workshop environment is different. These are designed as a guide to be used to compliment training and as a reminder to users prior to equipment use. Always consider safety first, as it applies to the individual working conditions.

3. POWER SUPPLY

3.1 ELECTRICAL REQUIREMENTS

Place the machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure there is access to a means of disconnecting the power source. The electrical circuit must meet the requirements for 415V. To minimize the risk of electrocution, fire, or equipment damage, these machines should be hard wired with installation work and electrical wiring done by a qualified electrician.

NOTE : The use of an extension cord is not recommended as it may decrease the life of electrical components on your machine.

ELECTRICAL REQUIREMENTS

Nominal Voltage..... 415V
Cycle..... 50 Hz
Phase.....Three Phase
Power Supply Circuit.....15 Amps
Full Load Current..... 7.7 Amps

(Full load current rating is also on the specification plate on the motor.)

3.2 FULL-LOAD CURRENT RATING

The full-load current rating is the amperage a machine draws when running at 100% of the output power. Where machines have more than one motor, the full load current is the amperage drawn by the largest motor or a total of all the motors and electrical devices that might operate at one time during normal operations.

Full-Load Current Rating for these machine can be found on the motor nameplate.
It should be noted that the full-load current is not the maximum amount of amps that the machine will draw. If the machine is overloaded, it will draw additional amps beyond the full-load rating and if the machine is overloaded for a long period of time, damage, overheating, or fire may be caused to the motor and circuitry.
This is especially true if connected to an undersized circuit or a long extension lead. To reduce the risk of these hazards, avoid overloading the machine during operation and make sure it is connected to a power supply circuit that meets the requirements.

4 SET-UP

4.1 UNPACKING

This machine was carefully packaged for safe transport. When unpacking, separate all enclosed items from packaging materials and inspect them for shipping damage. If items are damaged, please contact your distributor.

NOTE: Save all the packaging materials until you are completely satisfied with the machine and have resolved any issues with the distributor, or the shipping agent.

When unpacking, check the packing list to make sure that all parts shown are included. If any parts are missing or broken, please contact your distributor.

4.2 CLEAN - UP

The unpainted surfaces of the machine have been coated with a waxy oil to protect them from corrosion during shipment. Remove the protective coating with a solvent cleaner or a citrus based degreaser.

Optimum performance from your machine will be achieved when you clean all moving parts or sliding contact surfaces that are coated with rust preventive products.

It is advised to avoid chlorine based solvents, such as acetone or brake parts cleaner, as they will damage painted surfaces and strip metal should they come in contact. Always follow the manufacturer's instructions when using any type of cleaning product.

4.3 SITE PREPARATION

When selecting the site for the machine, consider the largest size of workpiece that will be processed through the machine and provide enough space around the machine for operating the machine safely. Consideration should be given to the installation of auxiliary equipment. Leave enough space around the machine to open or remove doors/covers as required for the maintenance and service as described in this manual.

It is recommended that the machine is anchored to the floor to prevent tipping or shifting. It also reduces vibration that may occur during operation.

4.4 LIFTING INSTRUCTIONS

On the day that the machine arrives, make sure that a crane or forklift with sufficient capacity is available to unload the machine from the vehicle. Ensure access to the chosen site is clear and that doors and ceilings are sufficiently high and wide enough to receive the machine.

To handle the machine, the slings should be positioned so the machine is level when lifted. When using slings please take note of the sling angle and the loads that apply

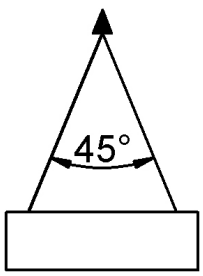


Fig 4.1.

When the slings are at a 45° angle then each sling is carrying the equivalent of 50% of load weight. (Fig.4.1).

When the slings are at a 90° angle then each sling will have a weight equal to 75% of the load on each sling.
(Fig 4.2)

NOTE: The manufacturer recommends that only an experienced rigger is used.

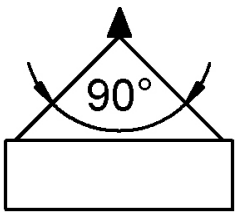
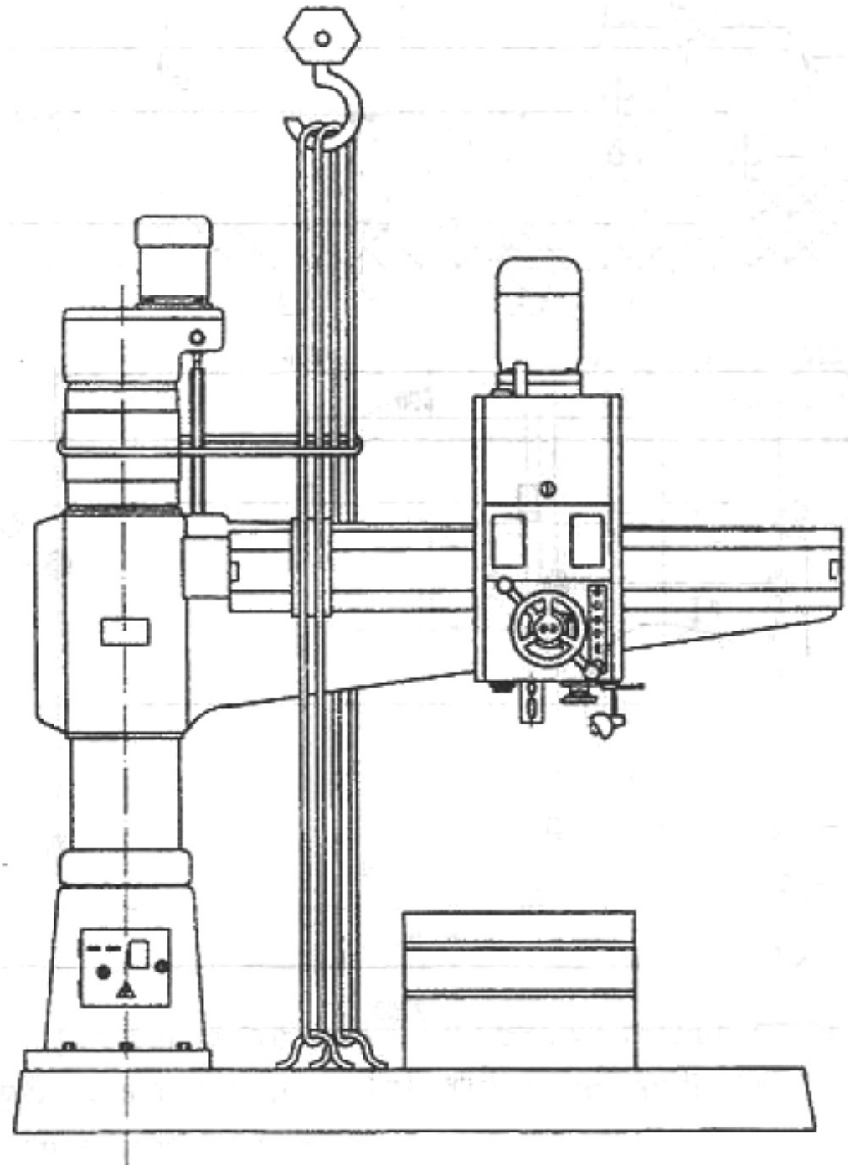


Fig 4.2

4.4 LIFTING INSTRUCTIONS Cont.

1. Prepare the soft materials (as cushion), hook and web slings.
2. Lifting equipment: Make sure the appropriate lifting crane device can handle the load of the machine. (more than 3 ton) The foundation floor must be flat and structurally sound.

- Sling the overall unit and put soft material in the place where the slings make contact with the surface of the machine to prevent damage to the surface.
- Lift the machine up and move it to the position of installation.



WARNING.

Make sure everyone is away from the load before hoisting. The load must be under control when lowering loads or when the load is suspended. Rigging and crane operation must be carried out by persons with approved qualifications.

4.5 ANCHORING TO THE FLOOR

The machine is best mounted on a concrete slab.

Masonry anchors with bolts are the best way to anchor machinery, because the anchors sit flush with the floor surface, making it easy to unbolt and move the machine later if needed. (Fig. 4.3)

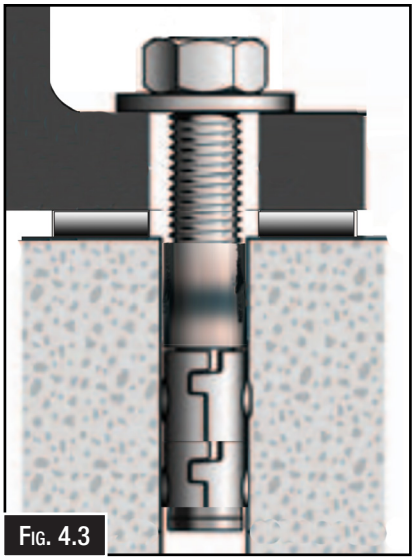


Fig. 4.3

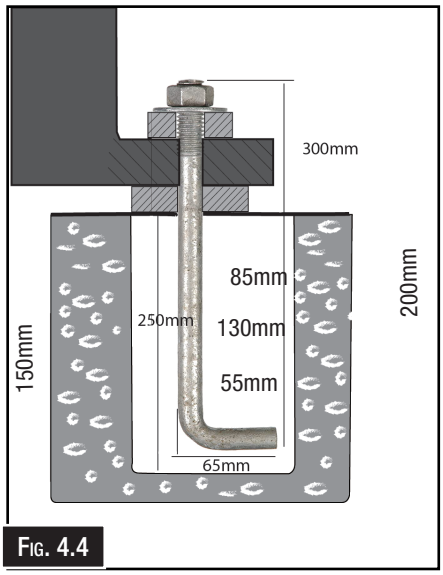
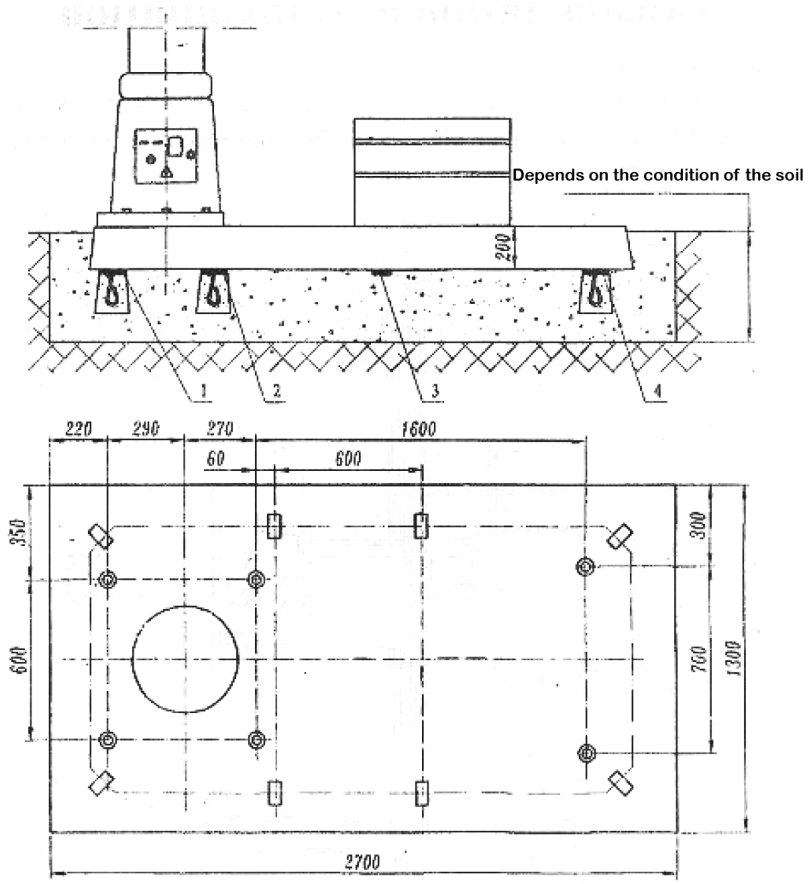


Fig. 4.4

In some cases a suitable foundation may not be available and a new one may need to be prepared.

The foundation should be concrete approximately 250mm thick with pockets left clear for the hold down bolts. The hold down bolts can be “L” shape as per the example in Fig. 4.4.

Screw the leveling screw into the holes in the machine base, then set the machine on the foundation, with the leveling pad under the each screw.



4.6 MACHINE LEVELLING

To set your machine up so that it operates to optimum performance, the machine should be level.

To level the machine follow the procedure below.

After your machine has been anchored to a concrete slab floor, then the leveling is performed by loosening the hold down bolts, and then adjust the leveling screws next to the hold down bolt until the machine is level and does not rock. (Fig. 4.5) Place a level on the surface of the working table to check if level. The longitudinal and cross levels should be within 0.04/1000. Once the machine is level, then tighten the hold down bolts.

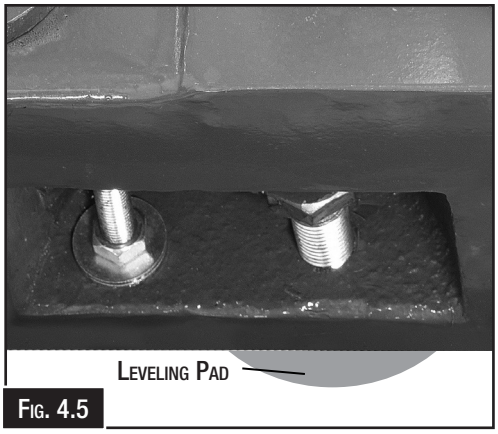


Fig. 4.5

CAUTION

The machine must not rest on supports other than those defined in Fig. 4.5

4.7 ASSEMBLY

The machine must be fully assembled before it can be operated. First clean any parts that are coated in rust preventative to ensure the assembly process can proceed smoothly.

After dismantling the wooden case, take out the manual, toolbox or other accessories shipped with the machine. After that, please loosen the fixing screws used to fix machine on the skid.

Remove the accessory box, and support brace used for shipping. After the machine is properly installed, the most important point is that the main power cable is properly connected.

Inspect oil leakage at all the oil pipe joints, oil window, oil leveler and associated parts of the machine tool, please disassemble and reassemble if necessary.

4.8 PREPARATION BEFORE FIRST RUNNING:

After the power is connected, release the clamps by pressing the release button on the headstock. (B in Fig. 5.2) then move and swing the column to make sure the clamps have been released.

Clean the rust preventing liquid with a clean cotton cloth. Once clean coat the sleeve surface with No.30 oil. Then lower the arm 50 mm, clean and lubricate the surface before raising the arm 100mm and again clean and lubricate. This procedure must be done,to ensure that the column sleeve is not scratched through dirt in the rust prevention liquid.

Check the lubricant levels and ensure they are are at the correct levels so the machine is ready for a test run.

4.9 TEST RUN

Once assembly is complete, test run the machine to ensure it is properly connected to the power and safety components are functioning correctly. Check that the direction of the motor is correct and make sure that the machine rotates in the correct direction.

If the direction is incorrect, isolate the machine and have the electrician make changes to the wiring.

If you find an unusual problem during the test run, immediately stop the machine, disconnect it from power, and fix the problem BEFORE operating the machine again. The Troubleshooting table in the Maintenance section of this manual may be able to help. If the problem persists the contact your dealers service technician.

To test run the machine:

1. Ensure the machine has been lubricated then, connect the machine to the power supply.
2. Make sure that the manual has been read and that the safety instructions at the beginning of the manual are understood. Make sure the machine has been setup correctly
3. Make sure all tools and objects used during set up have been cleared away from the machine.
4. Turn the machine ON. Make sure that the machine spindle and elevating screw is traveling in the correct direction.
5. Listen to and watch for abnormal noises or actions. The machine should run smoothly with little or no vibration or rubbing noises.
6. Any strange or unusual noises should be investigated and corrected before operating the machine again. Always disconnect the machine from power supply when investigating or correcting potential problems. The troubleshooting chart in the maintenance section may be helpful in rectifying a problem.
7. If all the components mentioned above are in the normal state, let the machine run for 10 mins.

Testing The Emergency Stop Button

Make sure that the emergency button is working correctly

1. Twist the top of the Emergency Stop button to ensure that it is in the raised position.
2. Start the machine and then press the emergency stop button. The machine should stop and the power should be cut off. If the machine cannot be started then the emergency stop is working correctly.
3. To reset the Emergency Stop twist the red top until it pops up. The machine should now work again.

5. OPERATION

This machine may perform many types of operations that are beyond the scope of this manual. Many of these operations may be dangerous or deadly if performed incorrectly.

The instructions in this section are written with the understanding that the operator has the necessary knowledge and skills to operate this machine. If at any time you are experiencing difficulties performing any operation, stop using the machine!

If you are an inexperienced operator, we strongly recommend that you read books, trade articles, or seek training from an experienced operator before performing any unfamiliar operations.

Above all, your safety should come first!

5.1 CONTROLS

The purpose of this control overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, and the machine controls and what they do. It also helps the operator to understand if they are discussed later in this manual.

NOTE: DO NOT start the machine until all of the setup instructions have been performed.

Operating a machine that is not setup may result in malfunction or unexpected results that can lead to serious injury, death or damage to the machine or property.

A **Main Isolating Switch:** Isolates the power from the machine. (Fig 5.1)

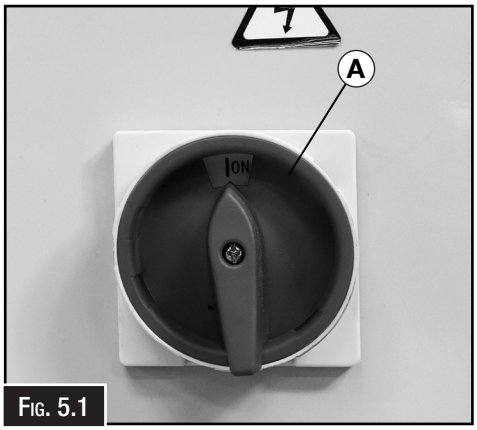


Fig. 5.1

⚠ WARNING	
SAFETY FIRST 	***Disconnect all power from the machine before servicing. There may be multiple power sources present. Remove the plug from the power point or remove the fuse if hardwired. Failure to do may cause death or injury.***

B. **Clamp Buttons:** Activates the clamps for both the swivel of the column and movement along the radial arm. (Fig 5.2).

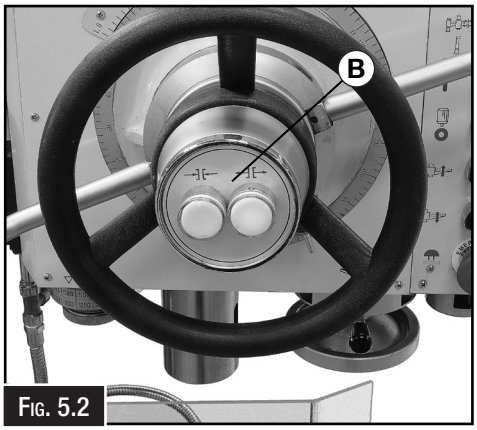


Fig. 5.2

5.1 CONTROLS Cont.

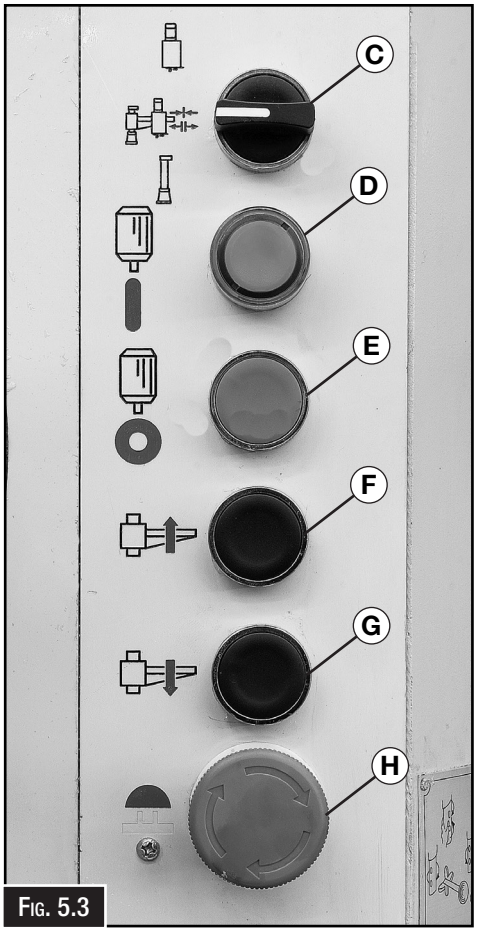


Fig. 5.3

C. **3 Way Select Switch:** Controls 3 operations

Top: Activates the power to the spindle

Middle : Activates the power to move the head stock along the radial arm.

Bottom: Activates the power to the column for raising or lowering the radial arm.

D. **ON Switch:** Switches on power to the spindle motor

E. **OFF Switch:** Switches off power to the spindle motor

F. **Column Up Button:** Moves the column up after the clamp button (B in Fig.5.3) is released.

G. **Column Down Button:** Moves the column down after the clamp button (B in Fig.5.3) is released.

Note: The clamp must be released before raising or lowering the radial arm.

H. **Emergency Stop Button:** When pressed cuts the power to the control panel and motors. The power stays disconnected until the button is reset. To reset the button must be twisted until it pops up.

The button D can now be pressed and the power is restored to the control panel.

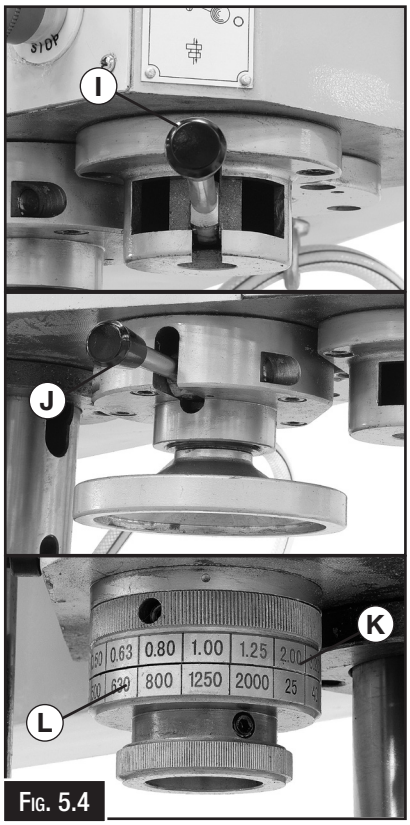


Fig. 5.4

I. **Spindle Operation Lever:** When moved forward or back, starts the spindle in forward or reverse. When pulled down activates the speed selected on the dial. (L)

J. **Feed Lever:** Engages the mechanical feed.

K. **Feed Dial:** Selects the feed amount.

L. **Speed Dial:** Selects the speed of the spindle

5.1 CONTROLS Cont.

L. **Motor Head Movement Handwheel:** Used to fine adjust the movement of the motor head along the radial arm.

Note: The Motor Head clamp must be released before it can be moved along the radial arm. (J in Fig: 5.3)

M. **Depth Stop Clamp:** Clamps the depth stop dial after it has been set. (Fig. 5.5)

The graduation collar is used to set the drilling depth, e.g. Lower the spindle until the drill is at the depth required.

To perform the 30mm drilling depth process, the graduation dial should be set to 30, then locked with the eccentric lever (M in Fig 5.5). It should be locked when the auto feed s activated.

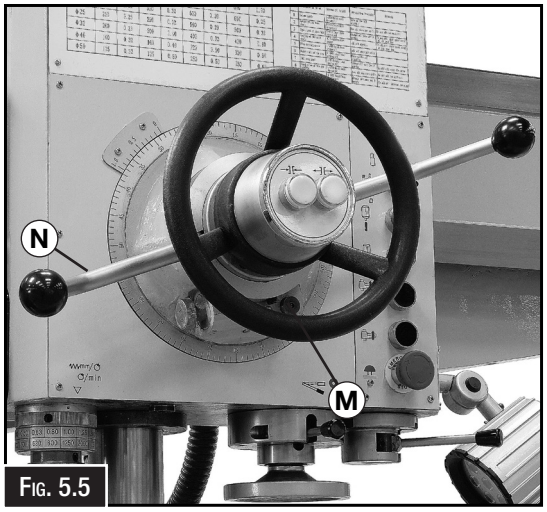


Fig. 5.5

N. **Spindle & Feed Handle:** Used to raise and lower the spindle. Also when pulled towards the operator, engages the auto feed to the spindle. (Fig. 5.4)

O. **Power Button:** When pushed, activates power to the control circuit.

P. **Coolant ON/OFF Switch:** Switches the coolant pump on and off.

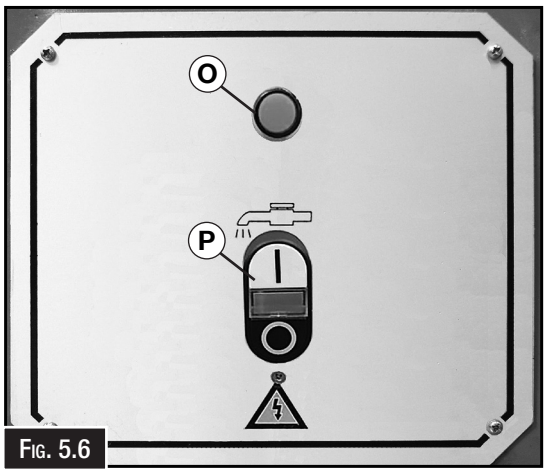


Fig. 5.6

5.2 CHANGING THE SPINDLE SPEED

The spindle speed for drilling and tapping operation is controlled by turning the dial displayed (L in Fig. 5.7) but, at this point the speed has only be pre-selected. For speeds available see Fig.5.9.

To change to the pre-selected speed.
The machine spindle must be rotating to change the speed. Once it is rotating then pull lever (A in Fig. 5.8) down.

NOTE: The spindle speed can be changed as many times as required while the spindle is running.

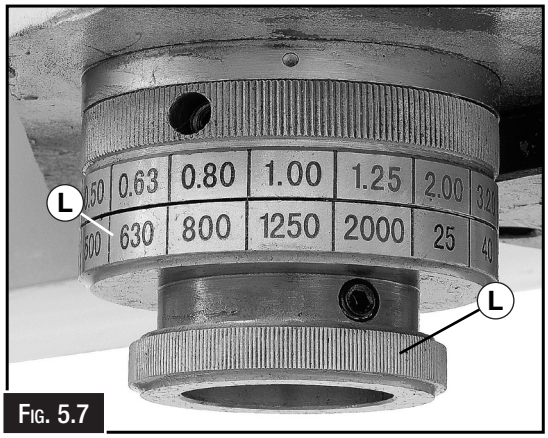


Fig. 5.7

5.2 CHANGING THE SPINDLE SPEED Cont.

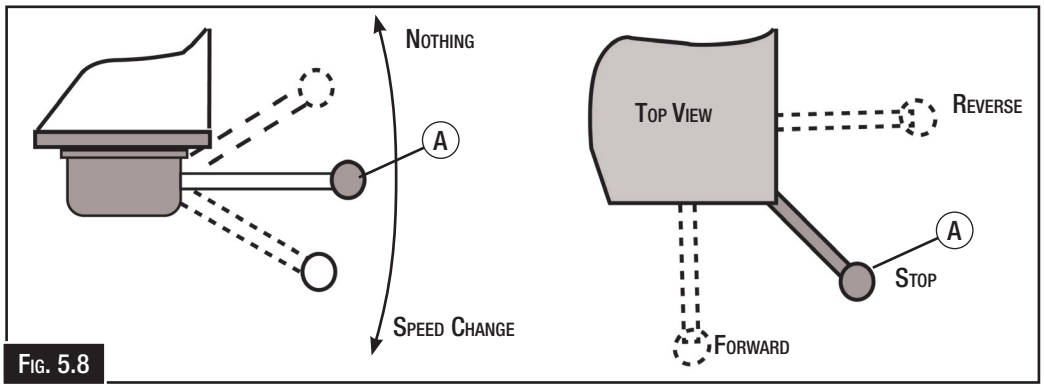


Fig. 5.8

Spindle Speed r.p.m.															
25	40	63	80	100	125	160	200	250	320	400	500	630	800	1250	2000

Fig. 5.9

5.3 SETTING THE SPINDLE FEED

The feed dial has fourteen positions. (Fig. 5.10)

The dial can be rotated by using the knurled ring “B” in Fig. 5 10. The range of feeds can be seen in Fig. 5.11.

NOTE: The spindle feed can be changed as required while the spindle is running.

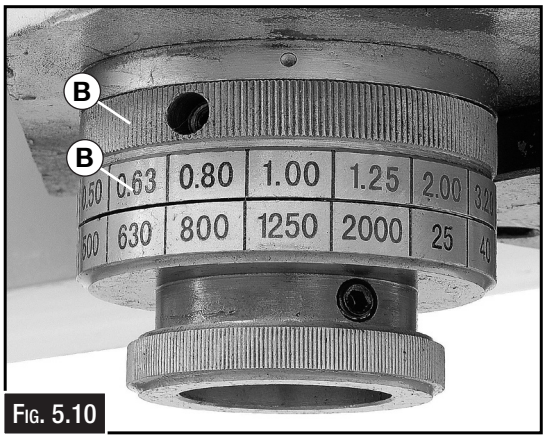


Fig. 5.10

Spindle Feeds mm / r															
0.04	0.06	0.10	0.13	0.16	0.20	0.25	0.32	0.40	0.50	0.63	0.80	1.00	1.25	2.00	3.20

Fig. 5.11

5.4 SETTING UP FOR TAPPING

It is very hard to accurately select the speed for tapping with a generic chart. The variables are too varied, such as number of threads, material, thickness of the material etc.
Below is a formula that can be the starting point for selecting the speed.

$$\text{Course Threads RPM} = \text{(Revolutions / Minute)} = \frac{\text{Cutting Speed (SFM) x 3.82}}{\text{Tap Diameter (mm)}}$$

$$\text{Fine Threads RPM} = \text{(Revolutions / Minute)} = \frac{\text{Cutting Speed (SFM) x 97.028}}{\text{Tap Diameter (mm)}}$$

Note: Hafco Metalmaster recommend that a tapping chuck be used to hold the taps.

5.6 SETTING THE DEPTH STOP

Pull out and turn the knob 8 to the position indicated in Fig.5.14, then rotate the depth scale plate to the position where the set depth value is in line approximately with the “0” line (Fig. 5.12) on the spindle box.

Turn the knob 8 to the position indicated in Fig.5.14, and micro adjust the scale, until the depth value on the scale and “0” in line. Return knob 8 as in Fig.5.13.

Push handle 7 in Fig.5.12 to clamp the scale and the auto-feed can be engaged. When the drill has reached “0” the handle will rise automatically.

The depth control cutting procedure is now over.

NOTE: It is prohibited to set a value beyond the stop limited value, otherwise the lever shaft will be damaged.

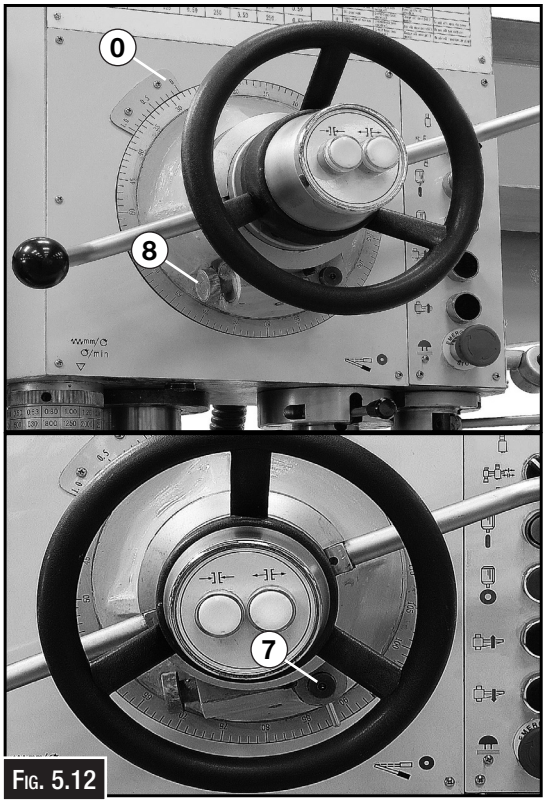


FIG. 5.12

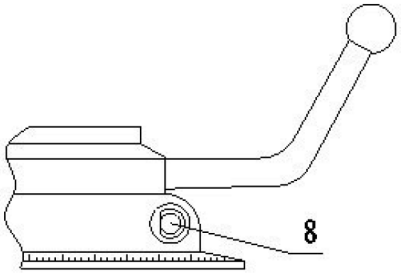


FIG. 5.13

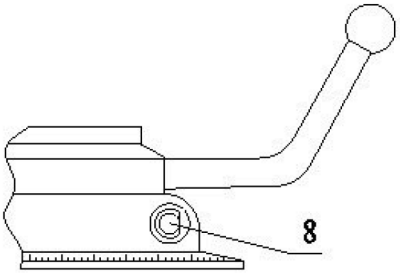


FIG. 5.14

WARNING

The machine is the sole responsibility of the owner for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training, proper inspection and maintenance, manual availability and comprehension. The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

CAUTION.

ROTATING CUTTER HAZARD Always keep hands clear of the cutter. Disconnect the power before installing or removing the cutter.

6. MAINTENANCE

It is very important that regular maintenance of the equipment is carried out. The operators need to follow the daily maintenance procedures. For optimum performance from this machine, the maintenance schedule listed below and in this section must be followed.

6.1 SCHEDULE

1-1 Inspection before operating:

a. That the machine is clean.

b. That the machine has been lubricated.

c. That the parts of each turning and movable part is adjusted correctly.

Methods of inspection and Treatment:

a. Ensure that any dust or iron residue has been removed from the sliding surfaces, and any tools have been removed from the machine. Wipe off the dust from the machined parts to prevent rust.

b. Check and adjust the oil levels daily.

c. Use both hands to push the radial arm's movements to check if it is too loose or tight, If necessary adjust.

1-2 Inspection before starting the motor

a. That the electricity has been switched ON.

b. That the machine control is operating correctly.

c. Check for excessive noise or vibration.

d. Cooling system

e. Lubricant path

Methods of inspection and Treatment:

a. Move the starting lever to the right side for the reverse rotation position. Check the rotation of the spindle. Check the workpiece is securely attached to the table. Forward and reverse and, start and stop lever is operating correctly.

b. Check that the noise and vibration do not exceed normal levels.

c. Start the coolant motor and check if there are any leaks.

d. With the machine running make sure the lubricating oil flows into the lubricant positions.

1-3 Check during operation.

a. Bearing temperature

b. Motor temperature

c. Noise and vibration

d. Quality of the product

e. Safety.

a. Touch the bearing to check its temperature.

b. Check the motor temperature when operating with high load cutting.

c. If finding excessive noise and vibration, stop operating and check the reason.

d. When the quality of the finish is found to be abnormal, check the reason before continuing.

e. Do not leave the machine running unattended.

6.1 SCHEDULE Cont.

1-4 Check after operation

a. The clutch device.
b. Cleaning tool
c. Return the part to the previous position
d. Cleaning machine

a. Return the clutch control lever to its idle position
b. Wipe and clean all the tools, then return them to their correct place.
c. Move the radial arm and headstock to the most suitable position and clamp.
d. Wipe and clean the oil stains and chips off the machine. Apply a thin layer of oil to the sliding surfaces.

Weekly Maintenance

The following items are carried out weekly.

I. Lubrication system
2. Cooling system
3. Transmission system
4. Safety installation

Maintenance and treatment methods:

1. Clean oil hole, oil tank, and replenishing oil tank.
2. Clean cooling oil tank and replenishing cooling oil.
3. Check every transmission device and adjust if necessary for looseness and tightness.
4. Check the limitation of lift and feed components.

Monthly Maintenance

The following items are carried out each month.

Maintenance items:

1. Cleaning machine
2. Electrical system

Maintenance and treatment methods:

1. Clean dust and iron residue from the narrow openings of the machines and parts.
2. Check whether the connection of the wires are firm and secure, whether the fixing crews are loose, and whether each switch joint is in good condition.

Annual Maintenance.

The following items are regularly implemented after a year:

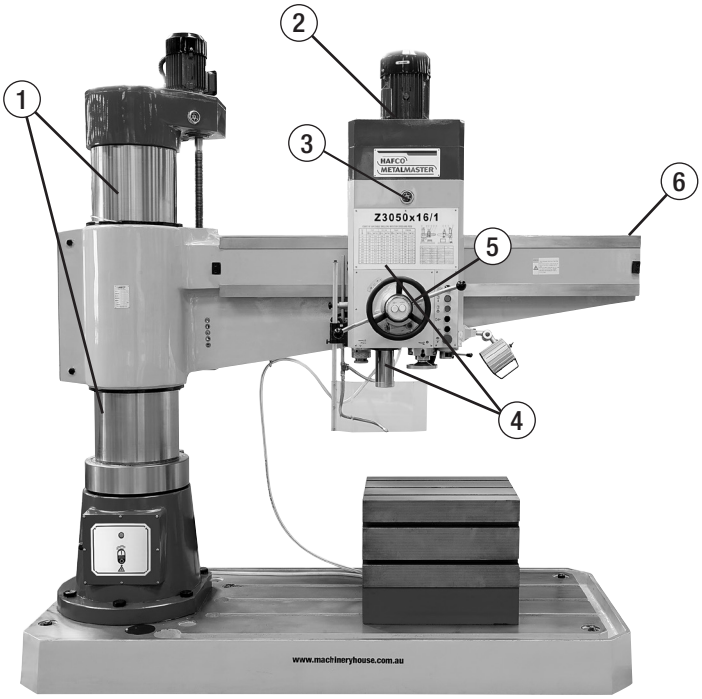
Maintenance items:

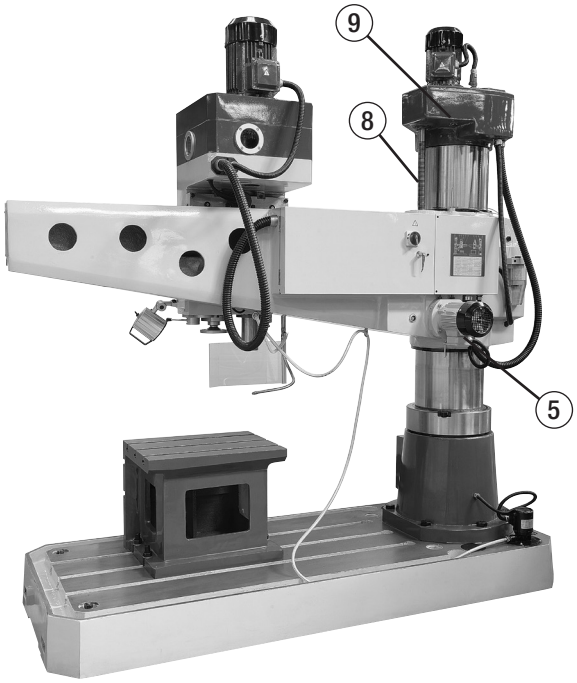
1. Change oil in gearbox.
2. Check wear and tear condition of gears and ball bearings.
3. Check each screw is tightened.

6.2 LUBRICATION

This machine has many moving parts that have metal on metal contact. These require regular and proper lubrication to ensure the efficient and long lasting operation of the machine. When a sight glass has the proper amount of oil it will be seen as halfway full. If oil level is not visible in the sight glass, then it needs to be filled until the halfway mark on the sight glass.

Lubrication points covered in this section, are listed below





No.	Lubrication Position	Lubricant	Lubricant Period	Remarks
1	Column Slide Way	No.40 Machine oil	Daily	
2	Spindle Spline	No.20 Machine oil	Daily	Fill Oil To Centre of Sight Glass
3	Upper Gearbox Reservoir	No.20 Machine oil	Every Three Months	Remove Top Cover When Filling
4	Upper & Lower Bearings	Calcium Base Grease N0. 2	Monthly	Remove Top Cover When Filling
5	Mini Adjusting Worm	No.30 Machine oil	Daily	
6	Arm Guides	No.40 Machine oil	Daily	
7	Pump Oil Reservoir	No.10 Machine oil	Every Three Months	Open Electrical Box to Fill Oil
8	Elevating Screw	No.40 Machine oil	Daily	Fill Oil To Centre of Sight Glass
9	Elevating Mechanism	No.20 Machine oil	Every Three Months	Unscrew cap to Fill Oil

6.3 TROUBLESHOOTING

Review the troubleshooting and procedures in this section if a problem develops with your machine. If you need replacement parts then follow the procedure in the beginning of the spare parts section or if additional help with a procedure is required, then contact your distributor.

Note: Make sure you have the model of the machine, serial number,and manufacture date before calling.

Symptom	Possible Cause	Possible Solution
Excessive Vibration	1. Motor out of balance 2. Faulty Motor 3. Loose machine clamps	1. Balance or replace motor 2. Replace faulty motor. 3. Tighten the machine clamps
Motor Stalls	1. Feed too great 2. Dull drill 3. Motor not building up to running speed 4. Faulty motor	1. Reduce feed rate 2. Sharpen the drill or replace' 3. Replace or repair motor. Check fuses on each leg of the power. 4. Replace Motor
Noisy Operation	1. Excessive vibration 2. Improper quill adjustment 3. Noisy spline 4. Noisy motor	1. Find vibration and correct condition 2. Adjust quill 3. Lubricate spline 4. Check motor bearings or loose fan
Drill or Tool heats up or burns work	1. Excessive speed 2. Chips not clearing the hole 3. Dull drill 4. Feed rate too slow 5. Rotation of drill incorrect 6. Lack of cutting oil or coolant	1. Reduce the spindle speed 2. Use pecking operation to clear chips 3. Sharpen tool or replace 4. Increase feed rate enough to clear chips. 5. Reverse spindle rotation 6. Use cutting oil or coolant (Steel)
Drill leads off	1. No spot drill 2. Cutting tips on the drill off centre 3. Quill loose in head 4. Bearing play	1. Centre punch or centre drill the workpiece 2. Regrid the drill. 3. Tighten the quill. 4. Adjust or replace spindle bearings
Excessive drill runout or wobble	1. failure to clamp the workpiece 2. Drill bent 3. Dirt in the spindle taper.	1. Clamp the workpiece to the table 2. Replace the drill 3. Eject drill and clean the spindle and drill taper
Workpiece comes loose or spins	1. Workpiece not clamped correctly. 2. Drill jamming	1. Securely clamp the workpiece to the table 2. Ensure the drill is sharpened and the hole is not running off centre
Motor will not start	1. Blown fuse 2. Micro switch failure 3. Faulty Motor	1. Check fuses and if faulty replace. 2. Check micro switches and replace if faulty. 3. Check and replace if faulty.

WARNING

Disconnect all power from the machine before servicing.
There may be multiple power sources present.
Remove the plug from the power point or remove the fuse if hardwired. Failure to do may cause death or injury.

6.4 MACHINE ADJUSTMENTS

The machine has been setup and adjusted in the factory, but over the life of the machine adjustments may need to be made to keep the machine in optimum performance.

Adjustments should only be done by an experienced maintenance fitter. If adjustment is needed, please perform according to the steps below.

1. Adjusting Column Clamp

If the column clamping pressure is not strong enough, un-lock the column, and remove the cover on the top of the column. Twist firmly the lock nut, then clamp the column again. Apply a pushing pressure load of 160 kg to the end of the radial arm. If there is no movement of the column, the adjustment has been successful.

If the lock nut has reached the limit of its position and the clamping pressure is still not enough to stop the column from moving, un-lock the column, release the inner hex head screw above the spring plate (12 in Fig. 6.2),and adjust again.

After adjustment of the clamping pressure, release the column, and apply a load of 160 kg to the end of the radial arm and the column should move.

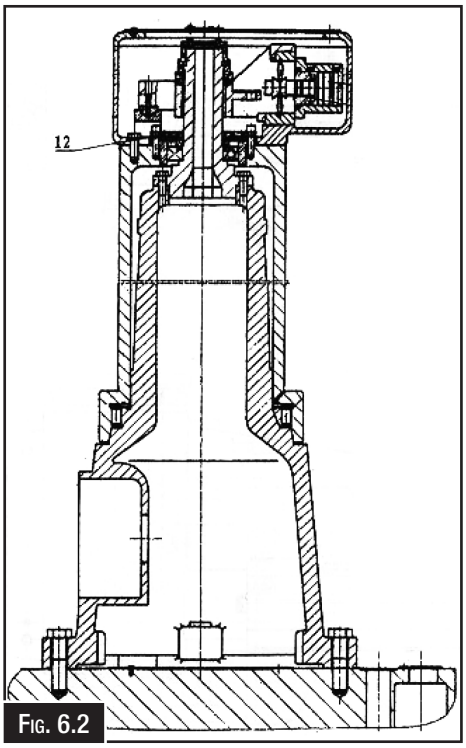


FIG. 6.2

⚠ WARNING	
SAFETY FIRST 	***Disconnect all power from the machine before servicing. There may be multiple power sources present. Remove the plug from the power point or remove the fuse if hardwired. Failure to do may cause death or injury.***

2. Adjusting the Spindle Head Clamping On the Arm.

When the clamping pressure of the spindle head is not strong enough, release the spindle box and the bolts (1 in Fig. 6.1) under clamping cylinder and move the bolt (E in Fig. 6.1) to the right along the slot. Then clamp the bolts and spindle head should be firm again. Try and rotate the hand wheel to move the head along the radial arm. If a pressure of 40KG doesn't move the head then the adjustment is correct.

After the adjustment of clamping pressure, release the clamp and rotate the hand wheel to move the headstock along the radial arm. If the adjustment is correct the spindle head should move with a force of less than 3-4 KG. With the spindle head clamped, insert a 0.04mm thickness gauge between the spindle head and the radial arm slide face. The front face depth should be not exceed 20mm.

SPINDLE HEAD CLAMP

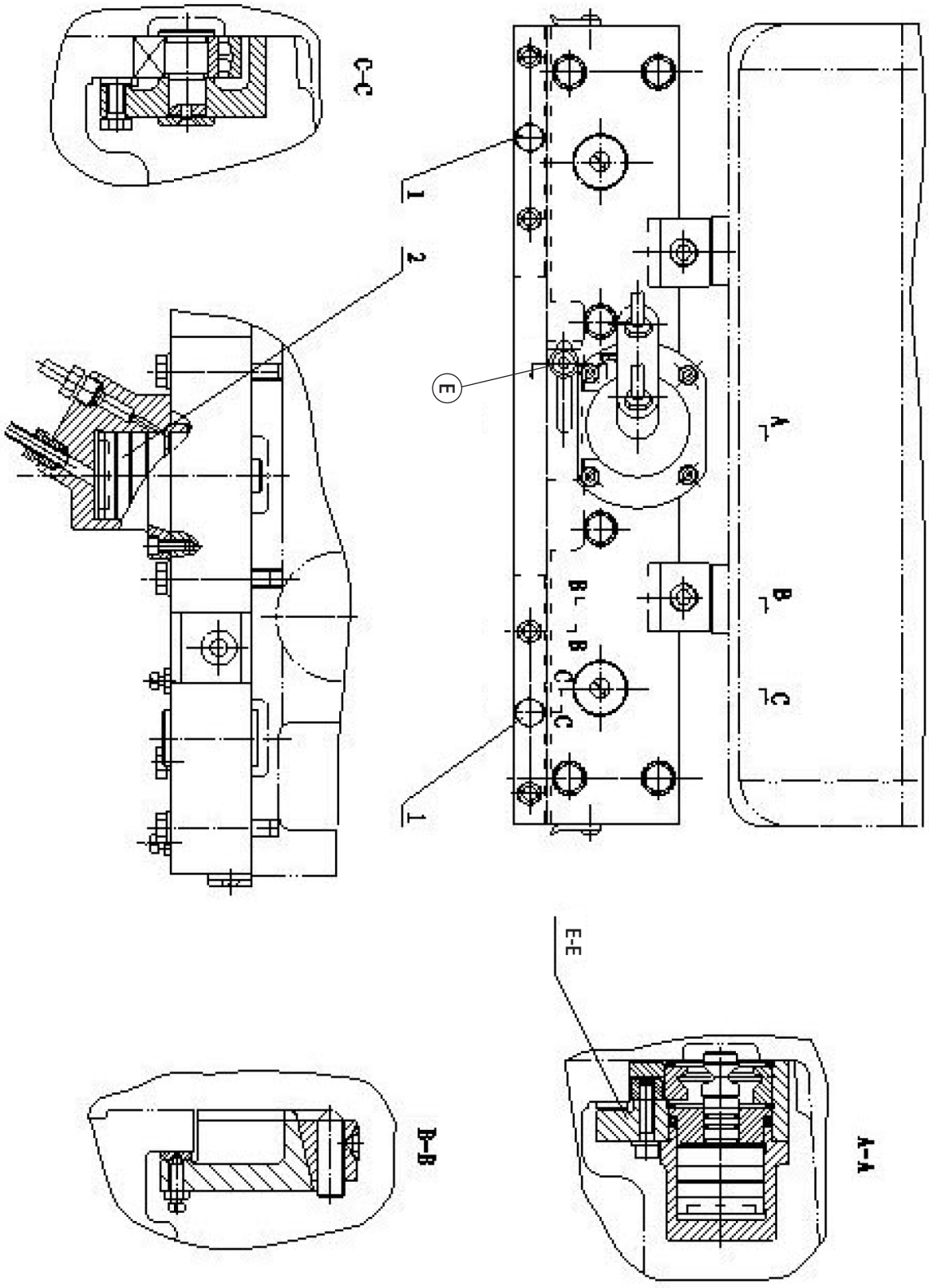


FIG. 6.3

6.4 MACHINE ADJUSTMENTS Cont.

3. Adjusting The Arm Clamp on the Column (Fig. 6.4)

If the clamping pressure of the radial arm on the column is not strong enough, release the clamp and check that the arm is elevating freely. Disconnect the power to the machine, then tighten the screw (6) clockwise.

Turn on the power and if a thickness 0.04mm feeler gauge can`t be inserted into the mounting place of the arm sleeve and outer sleeve.(It is better to fasten the screw until the rhombic stands up vertically.)

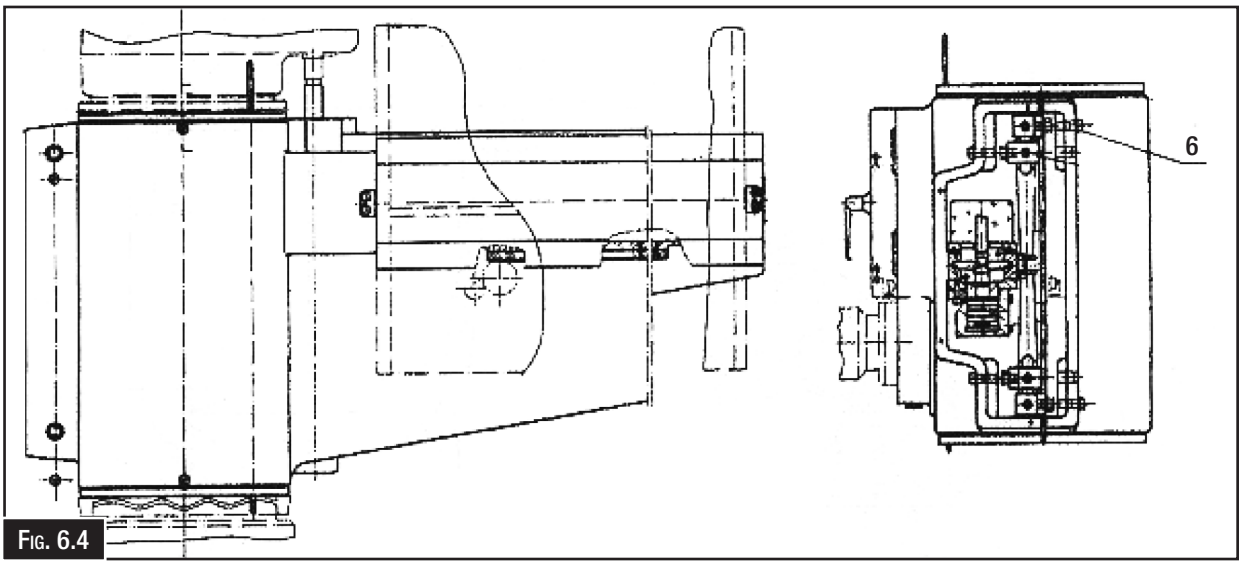


FIG. 6.4

6.5 ELECTRICAL OPERATION

Brief Overview

The machine use 3 phase AC power, 415V 50Hz, The controlling transformer supplies power to controlling circuit 110V, with lighting circuit 24V, signal lamps are 6.3V, as stipulated in the electronic elements item list

The machine is equipped with motors as below:

M1——Main Motor

M2——Elevating Motor

M3——Hydraulic Motor

M4——Coolant Pump

The coolant pump is connected to the bottom electrical box. All other electronic equipment are connected to the arm electrical box. Don't rotate the arm in the same circular direction around the column as the electrical wires will be twisted and could be broken.

The Electrical Circuit.

1. **Preparation for running:**
   In order to ensure the safety of the operator, the electrical door on the arm if opened, the power will be shut off. The door must be closed before running the machine. Turn on the switch QS1, and the signal lamp HL1 I will illuminate

6.5 ELECTRICAL OPERATION Cont.

2. Main motor rotation

Push the starting button SB2, AC contactor KM1 will connect and lock. Motor M1 will run. Signal light HL2 will illuminate. Push the stop button and the AC contactor KM1 is released.

Motor M1 will stop running and signal HL2 is extinguished. The thermal-relay will prevent the main motor running if it is under overloaded condition. The set value of the relay can be adjusted against the rating current of the main motor.

3. Arm elevation

When the up or down button SB3 or SB4 are pushed, time relay KT is corrected. At the same time it makes the magnet YA and contactor KM4 connect. The hydraulic motor M3 rotates to supply the clamp pressing oil to flow through the valve into arm clamp releasing cylinder, pushing the piston and rhombic block to release the arm at the same time.

The piston shaft press position switches SQ2 through the spring sheet. Contactor KM4 is released and KM1 or KM3 is connected. Motor M3 will stop running, and elevating motor M2 runs to raise or lower the arm.

If SQ2 is not released, KM2 or KM3 can't close its contactor points and the arm cannot be elevated.

When the arm moves to the target position, release button SB3 or SB4,K2,K3 and time relay KT is released. The elevating motor stops running and the arm stops elevation.

When the time relay KT is released,1-3 second later, contactor KM5 and magnet are connected and hydraulic motor M3 reverses to supply the clamp pressing oil flows through the valve into arm clamping cylinder, pushing the piston shaft and rhombic block along counter direction to clamp the arm and at the same time the piston shaft presses position switch SQ3 through the spring sheet. KM4 and YA are released and hydraulic motor M3 stops running.

The main function of the time relay is to control the controlling contactor contacting time. This allows the arm to be clamped after the elevating motor stops running. The delay time needed is 1-3 seconds.

This combined switch is for limiting the arm travel.

When the arm is raised to the limited position, SQ1 moves, and KM2 is released. The elevating motor stops running. When the arm is lowed to the limited position SQ1 moves, KM3 is released, and the elevating motor stops running.

Switch SQ3 is used to control the auto-clamping of the arm. The problems with the hydraulic clamping system such as auto-clamping not completing its cycle is caused by SQ3 incorrectly adjusted that leaves the SQ3 contacting point opened. This will make the hydraulic pump overloaded running overtime and could harm it. To prevent this problem a thermal relay in the circuit can have the value be adjusted according to the rated current of the motor.

4. The clamping and releasing of column and spindle head.

The clamping and releasing of column and spindle head are effected at the same time. When the release or lock button is pushed SB5 or SB6 are activated. Contactor KM4 is connected, the hydraulic motor M3 rotates to supply the pressure oil flowing through the valve into column clamping or releasing cylinder, pushing the piston and rhombic block to clamp or release the arm. Clamping or releasing signal lamp lights.

Inspection of the power phase sequence

After installing the machine, turn on the power and push the start button SB3. The main motor starts to run and the signal lamp is extinguished. Move the forward and reverse handle and the spindle will rotate in clockwise or counter clockwise direction. If the machine operates correctly then the correct phase sequence is set. If not, phase wires must change position.

RADIAL ARM DRILL
Z3050x16

Order Code: (D166)

Edition : 2.0
Date: (02/25)

The following section covers the spare parts diagrams and lists that were current at the time this manual was originally printed. Due to continuous improvements of the machine, changes may be made at anytime without notification.

HOW TO ORDER SPARE PARTS

1. Have your machines model number, serial number & date of manufacture on hand, these can be found on the specification plate mounted on the machine
2. A scanned copy of your parts list/diagram with required spare part/s identified.

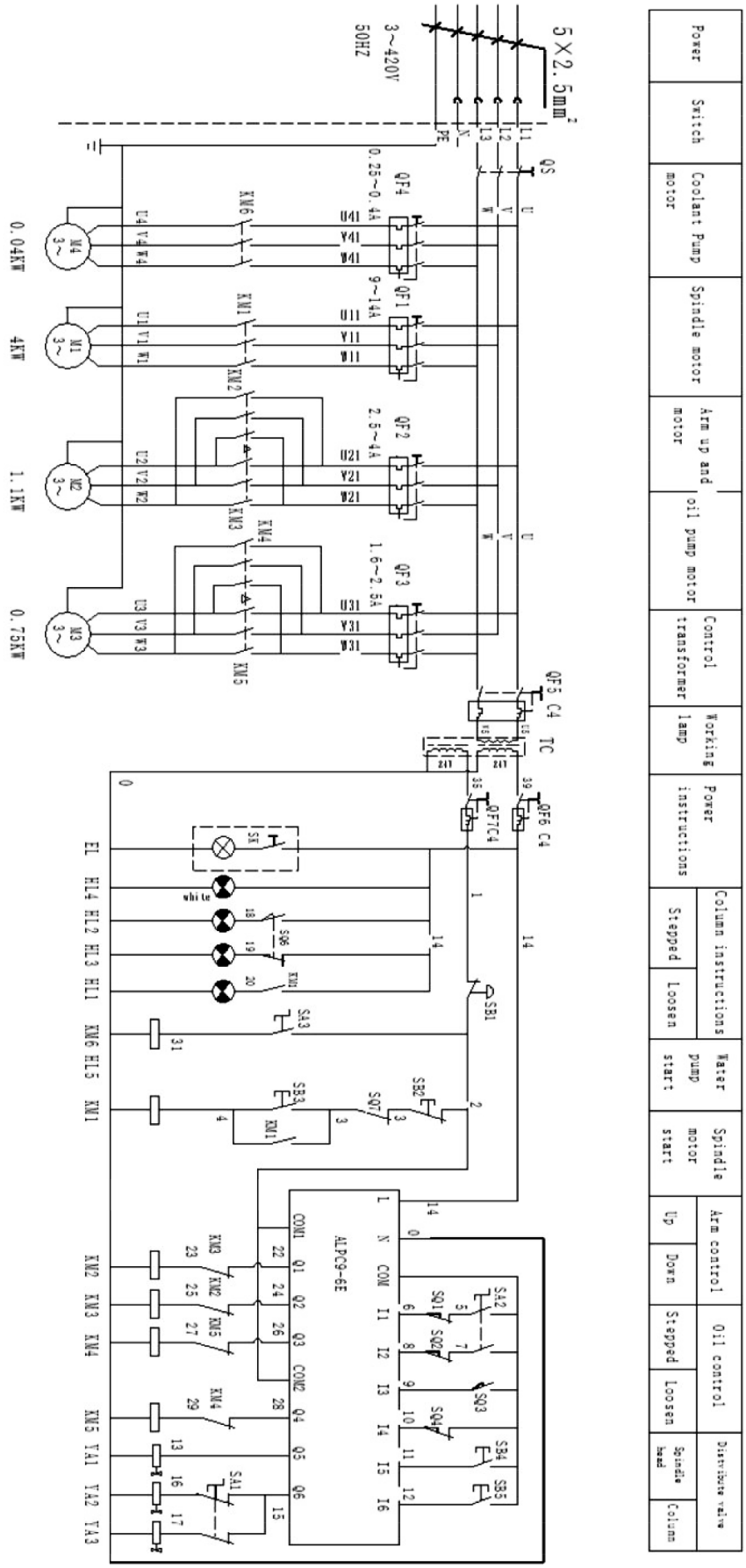
NOTE: SOME PARTS MAY ONLY BE AVAILABLE AS AN ASSEMBLY

3. Go to www.machineryhouse.com.au/contactus and fill out the inquiry form attaching a copy of scanned parts list.

WARNING!
Electricity is dangerous and could cause death.
All electrical work must be carried out by a qualified electrician.

CAUTION!
It is impossible to cover all possible hazards Every workshop environment is different. These are designed as a guide to be used to compliment training and as a reminder to users prior to equipment use. Always consider safety first, as it applies to the individual working conditions.

WIRING DIAGRAM

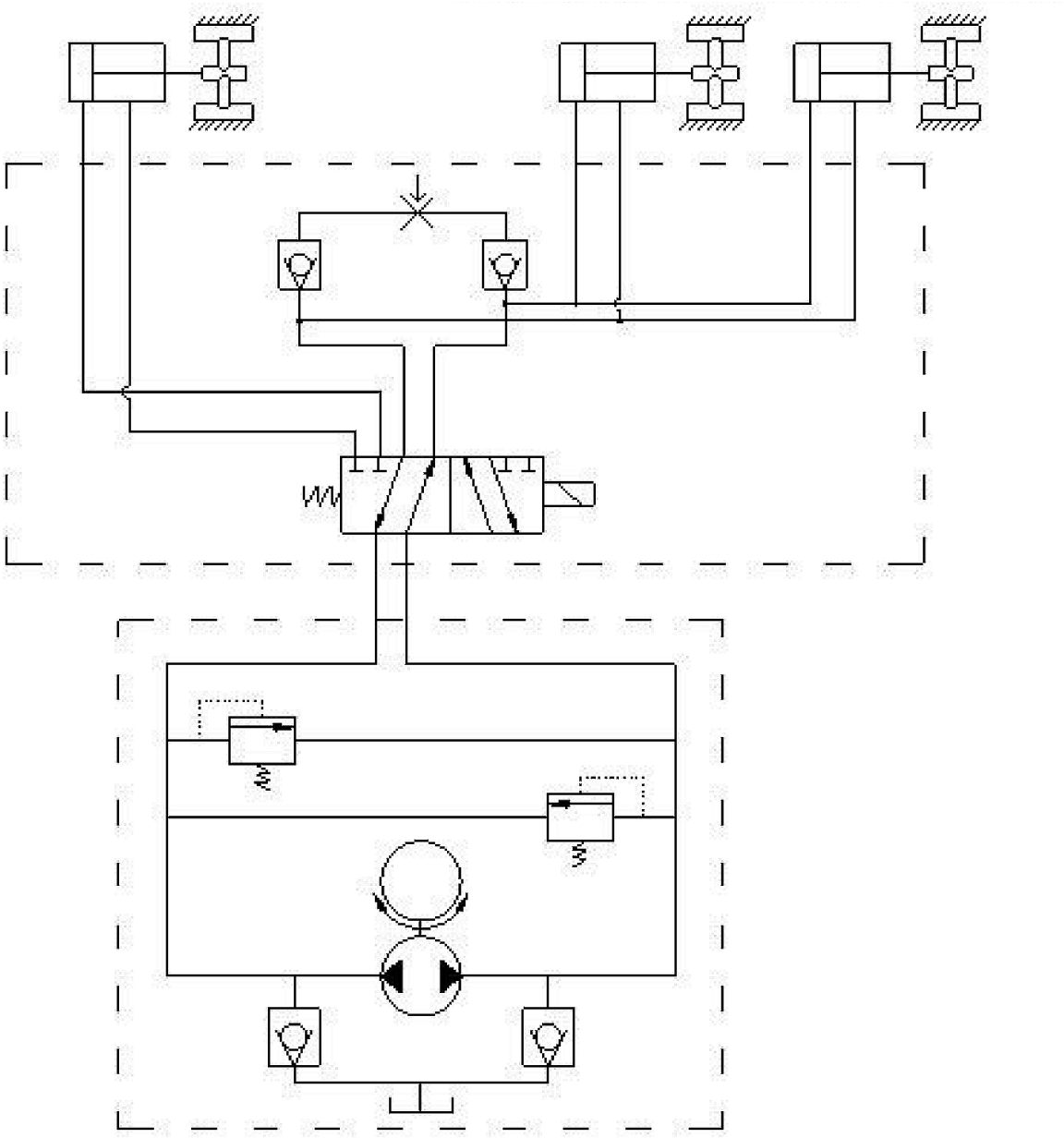


HYDRAULIC CIRCUIT DIAGRAM

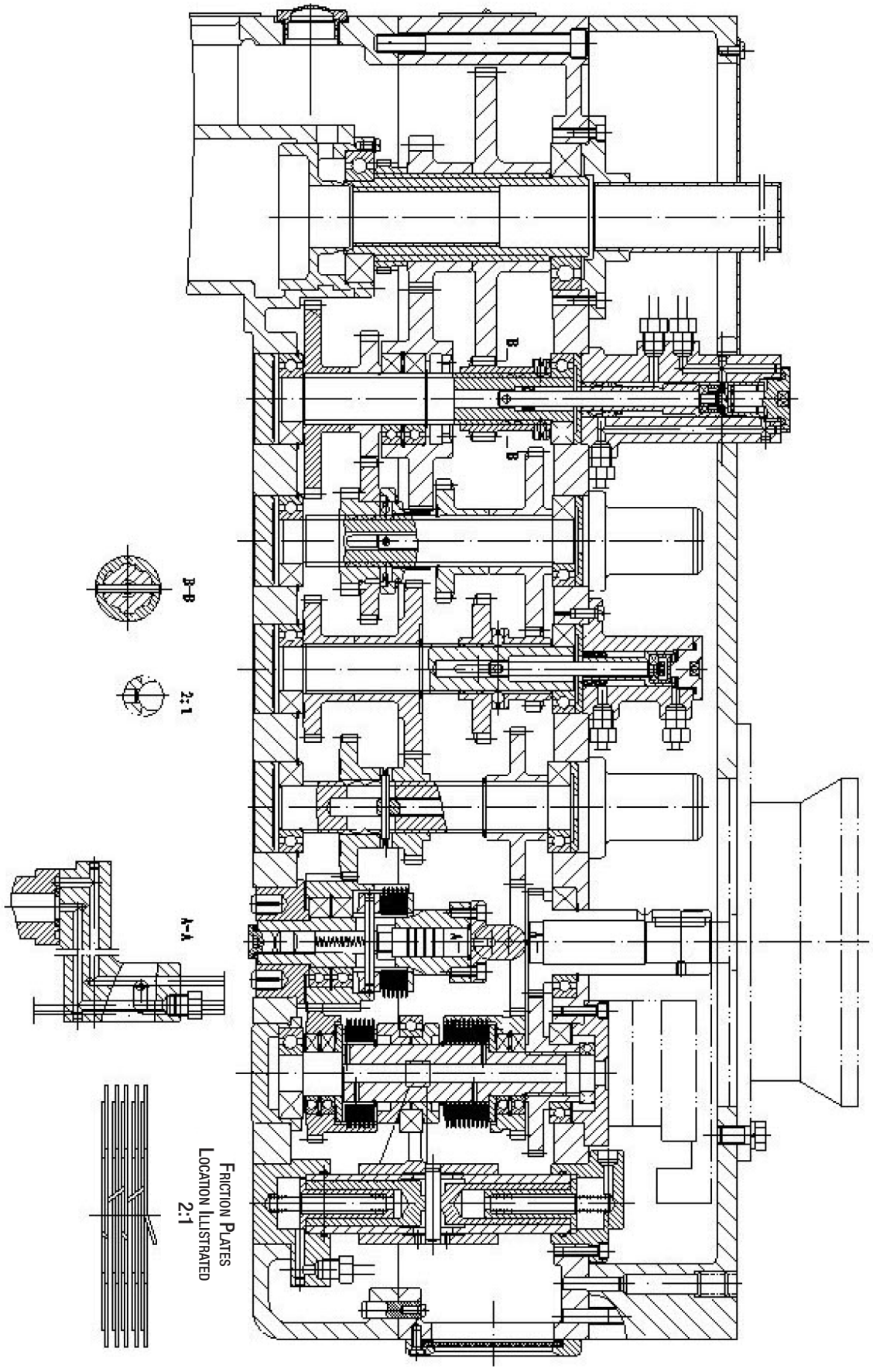
ARM
CLAMP MECHANISM

SPINDLE HEAD
CLAMP MECHANISM

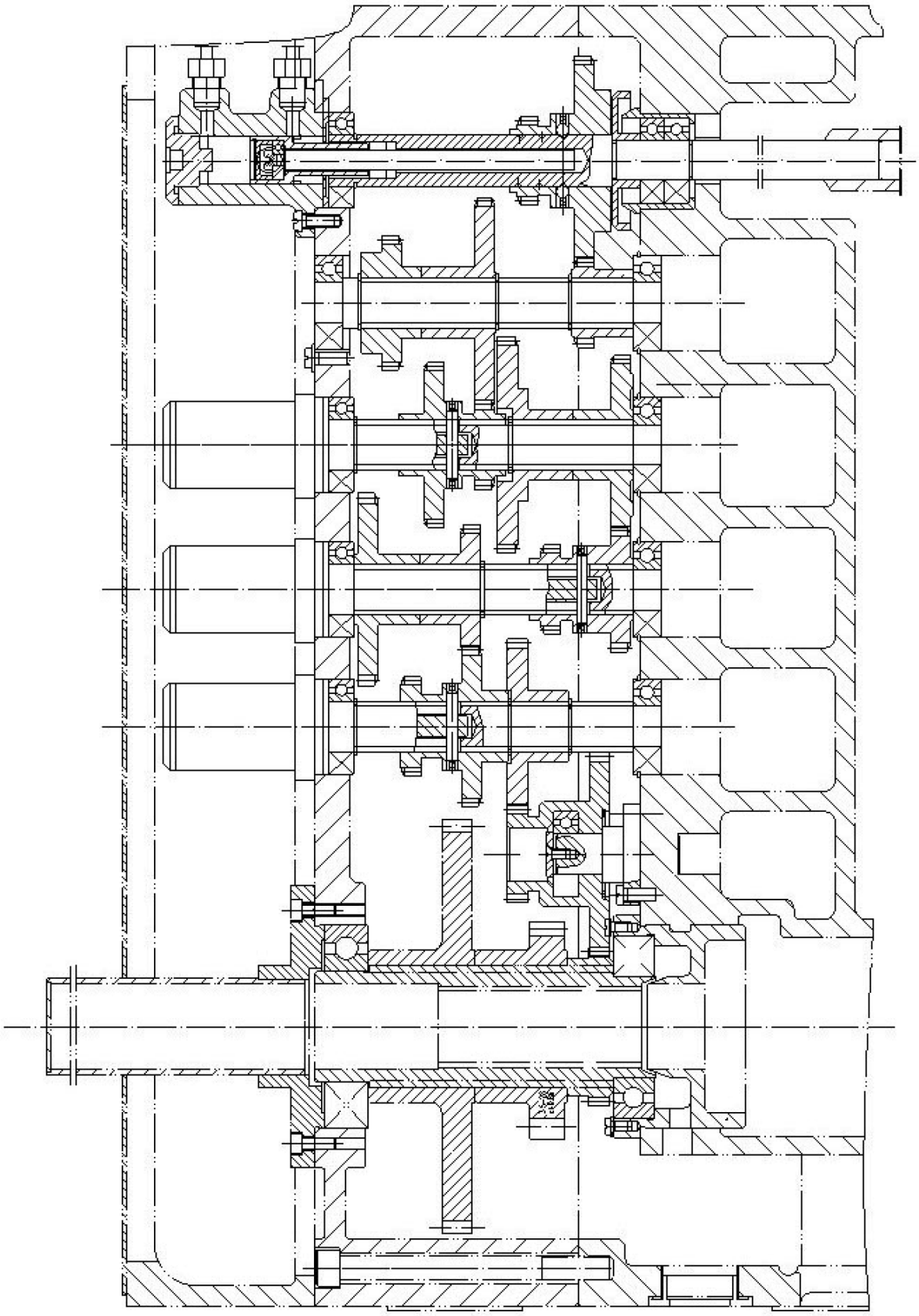
COLUMN
CLAMP MECHANISM



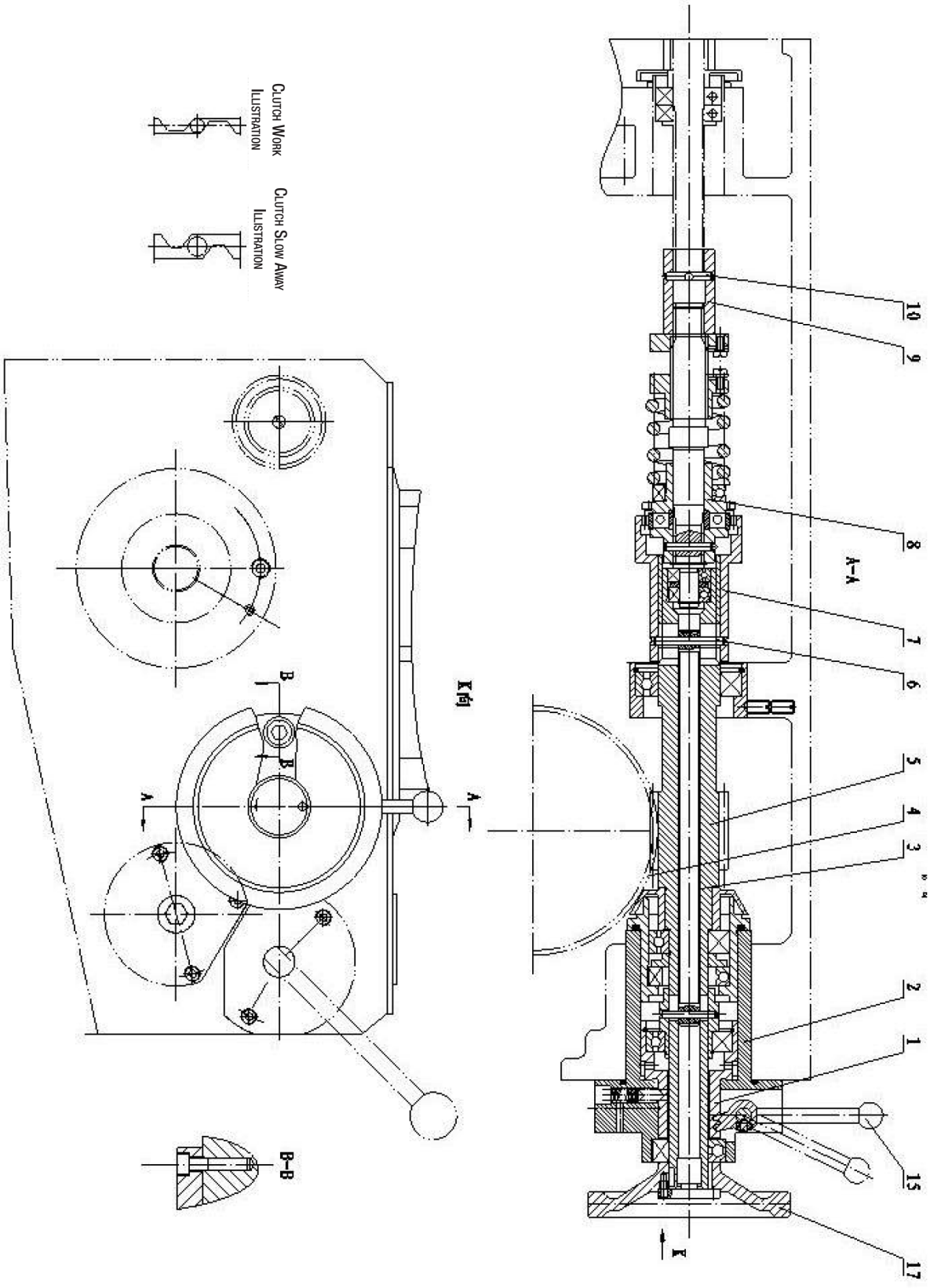
SPINDLE DRIVE & SPEED CHANGE Fig. 10.1



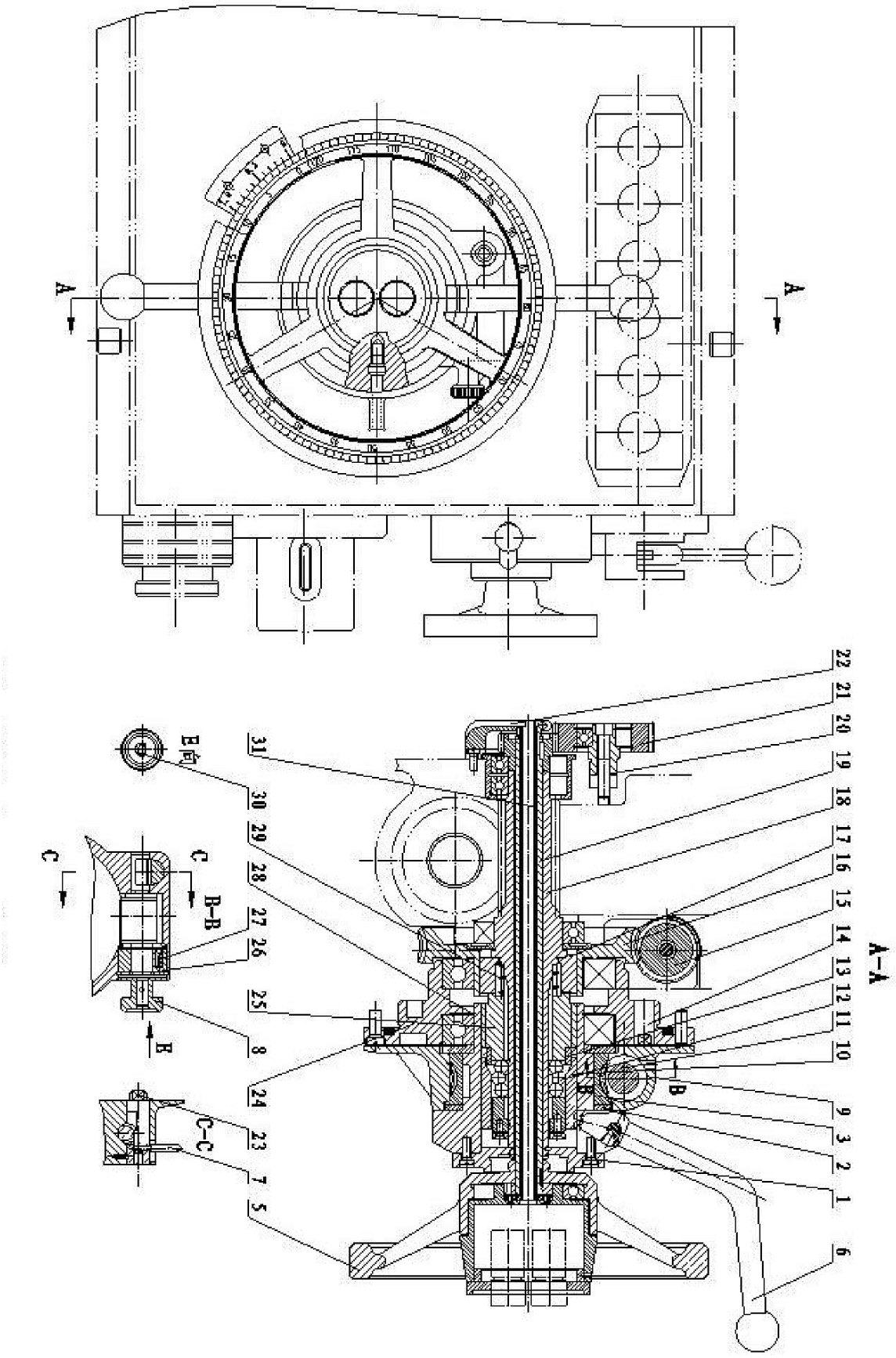
SPINDLE FEED SPEED MECHANISM Fig. 10.2



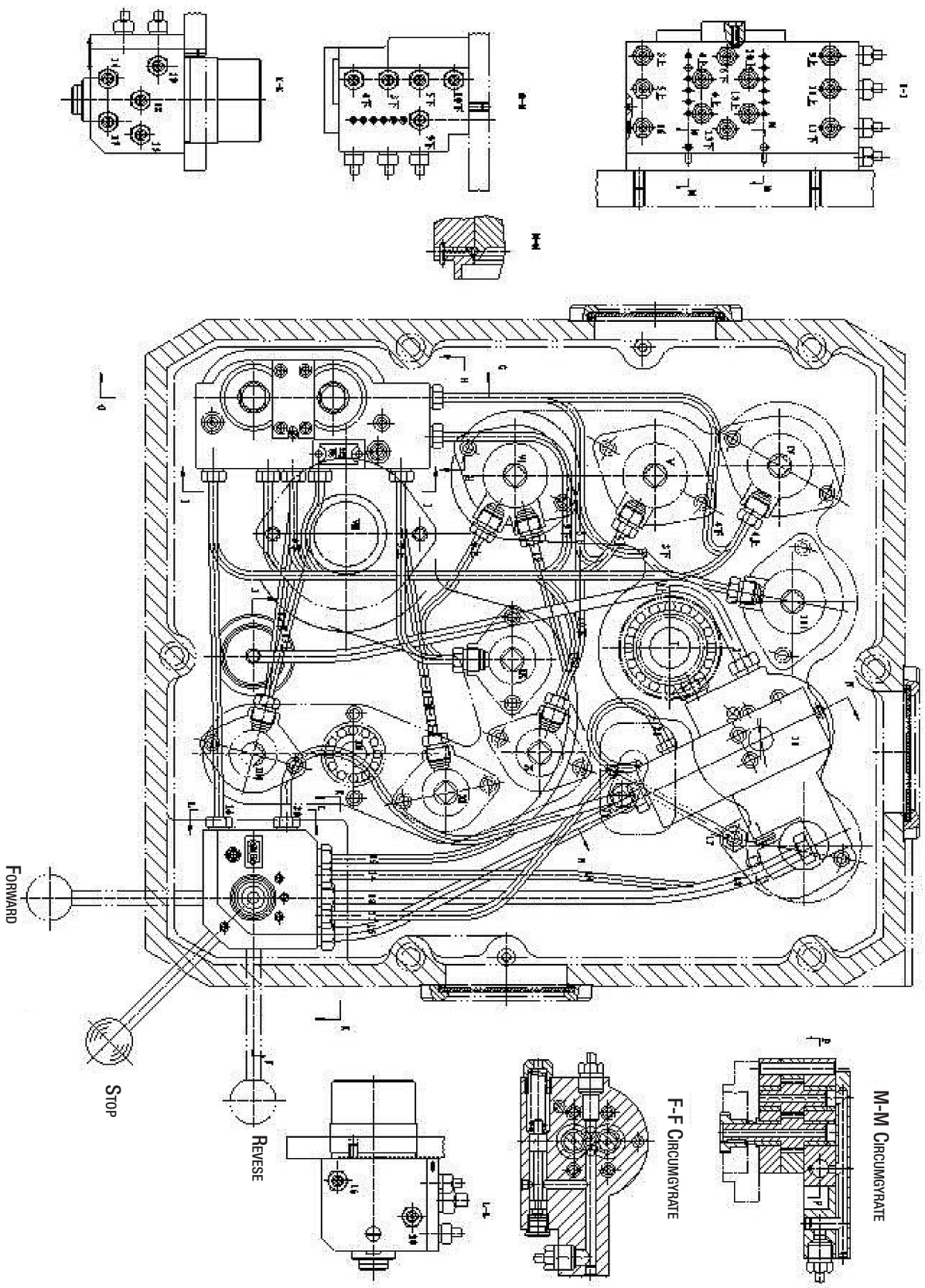
WORM Fig. 10.3


Clutch Work Illustration
Clutch Slow Away Illustration
A–A
B–B
K向
10
9
8
7
6
5
4
3
2
1
15
17

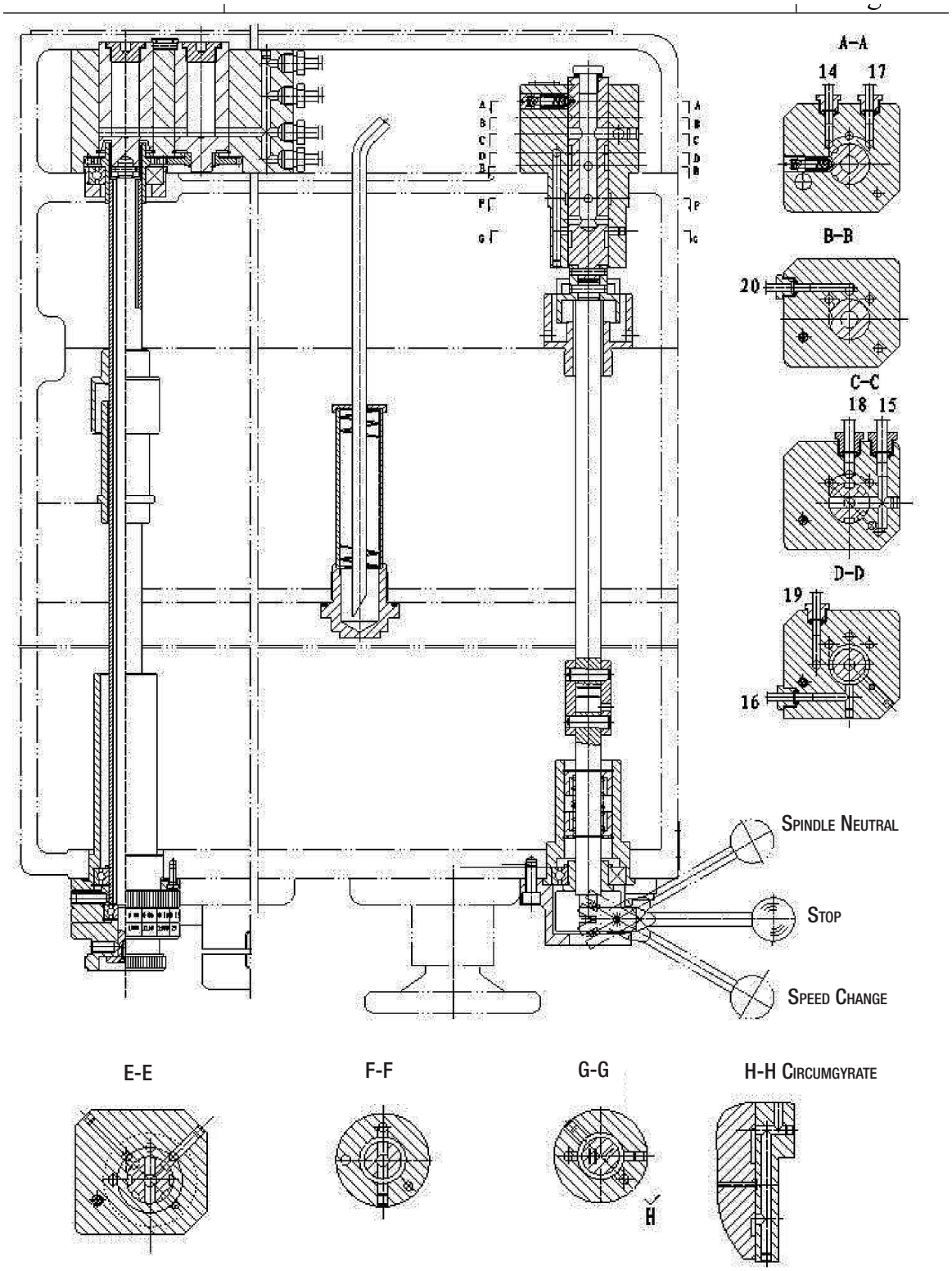
LEVER SHAFT DIAGRAM Fig. 10.4



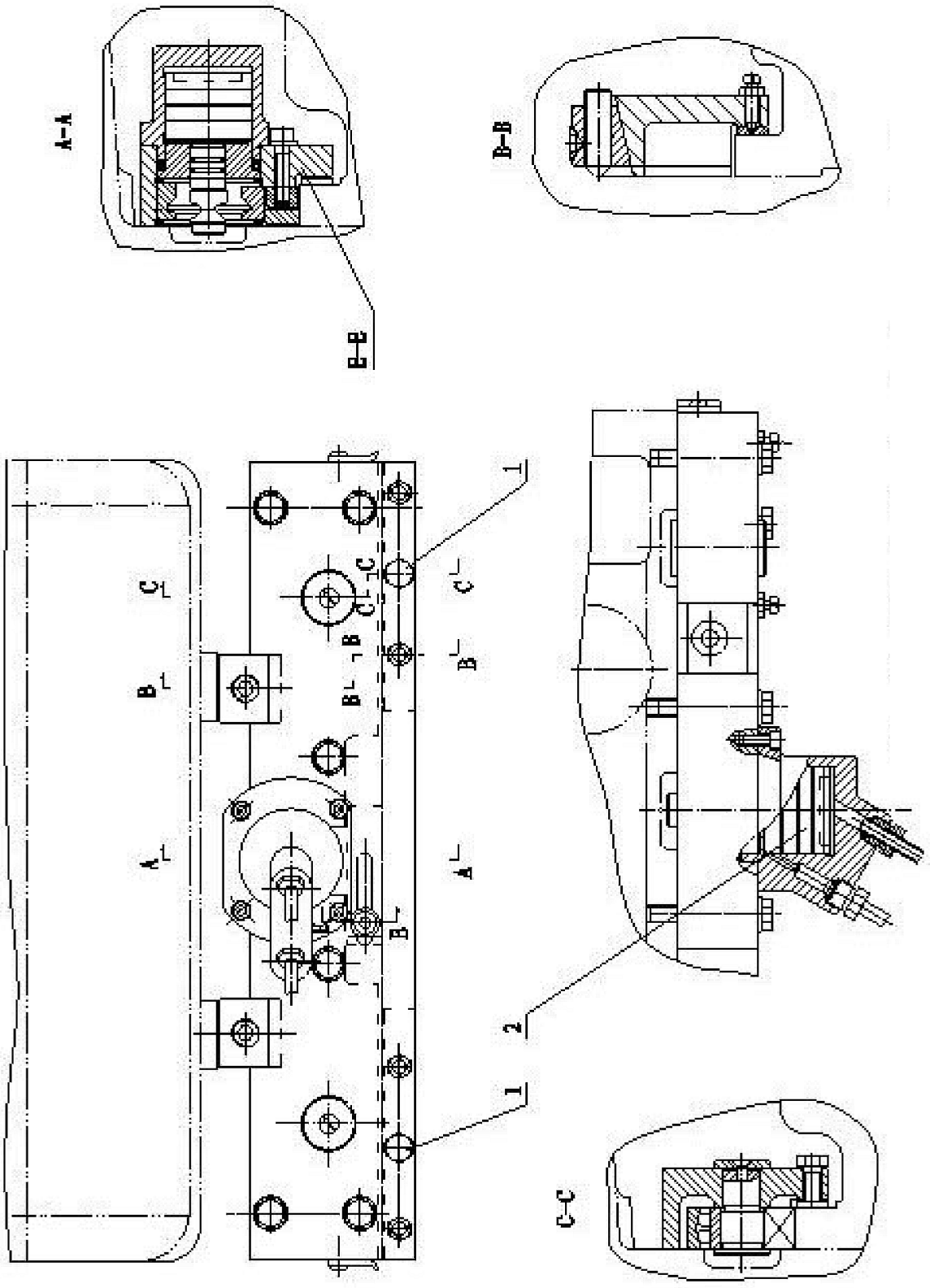
LUBRICATION DIAGRAM Fig.10.5



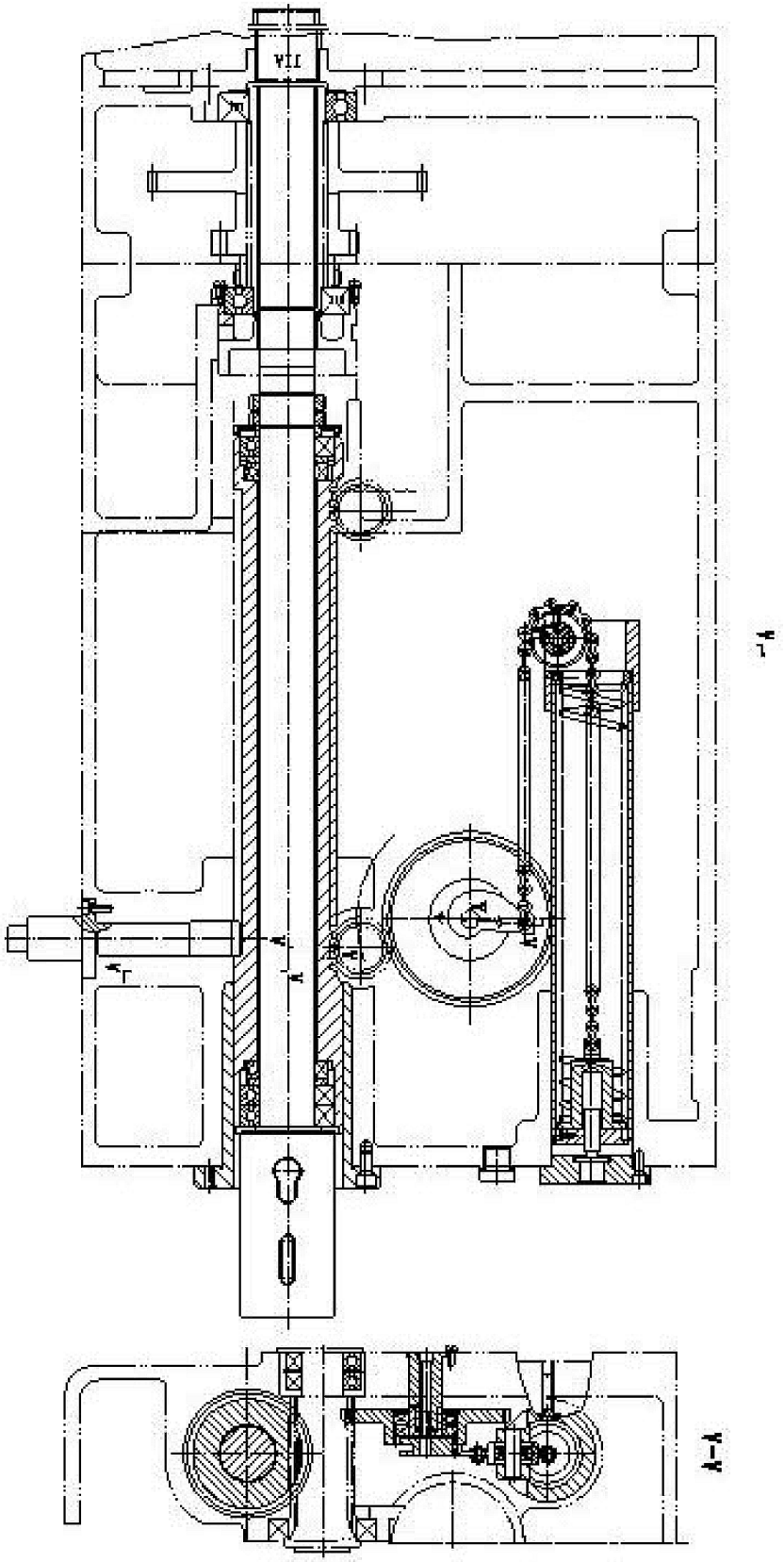
OPERATIONAL DIAGRAM Fig. 10.6



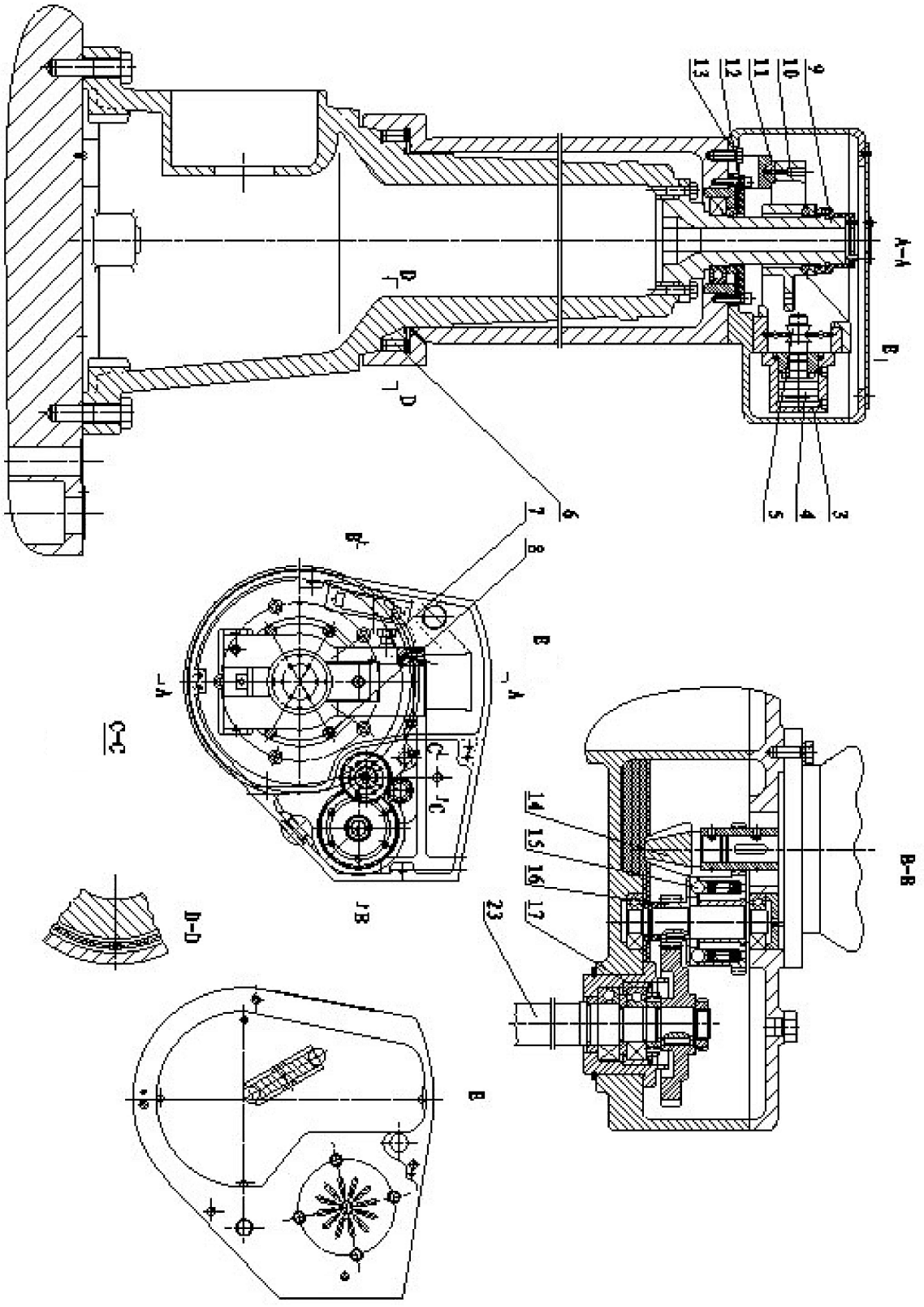
SPINDLE HEAD CLAMP MECHANISM Fig.10.7



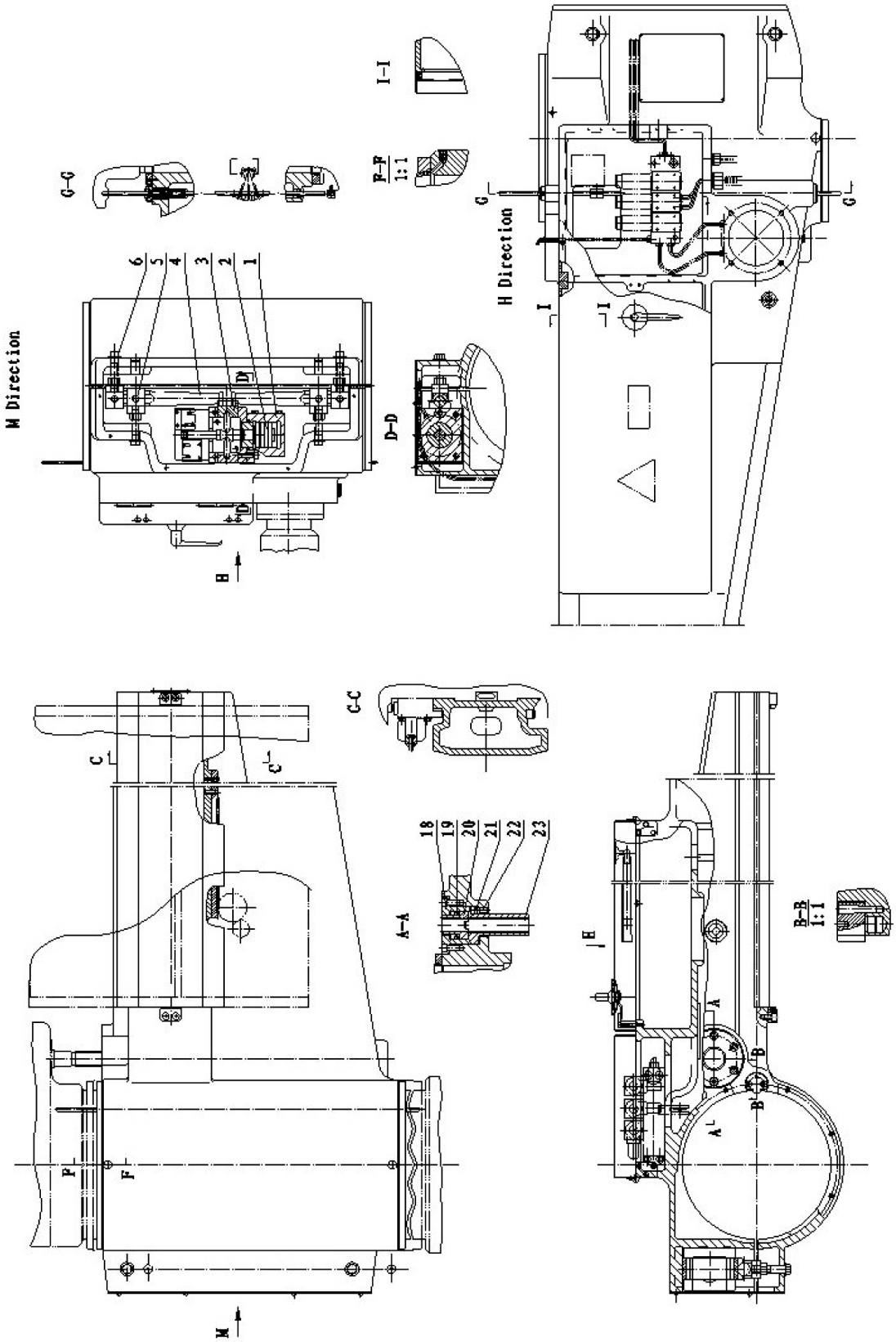
SPINDLE BALANCE MECHANISM Fig. 10.8



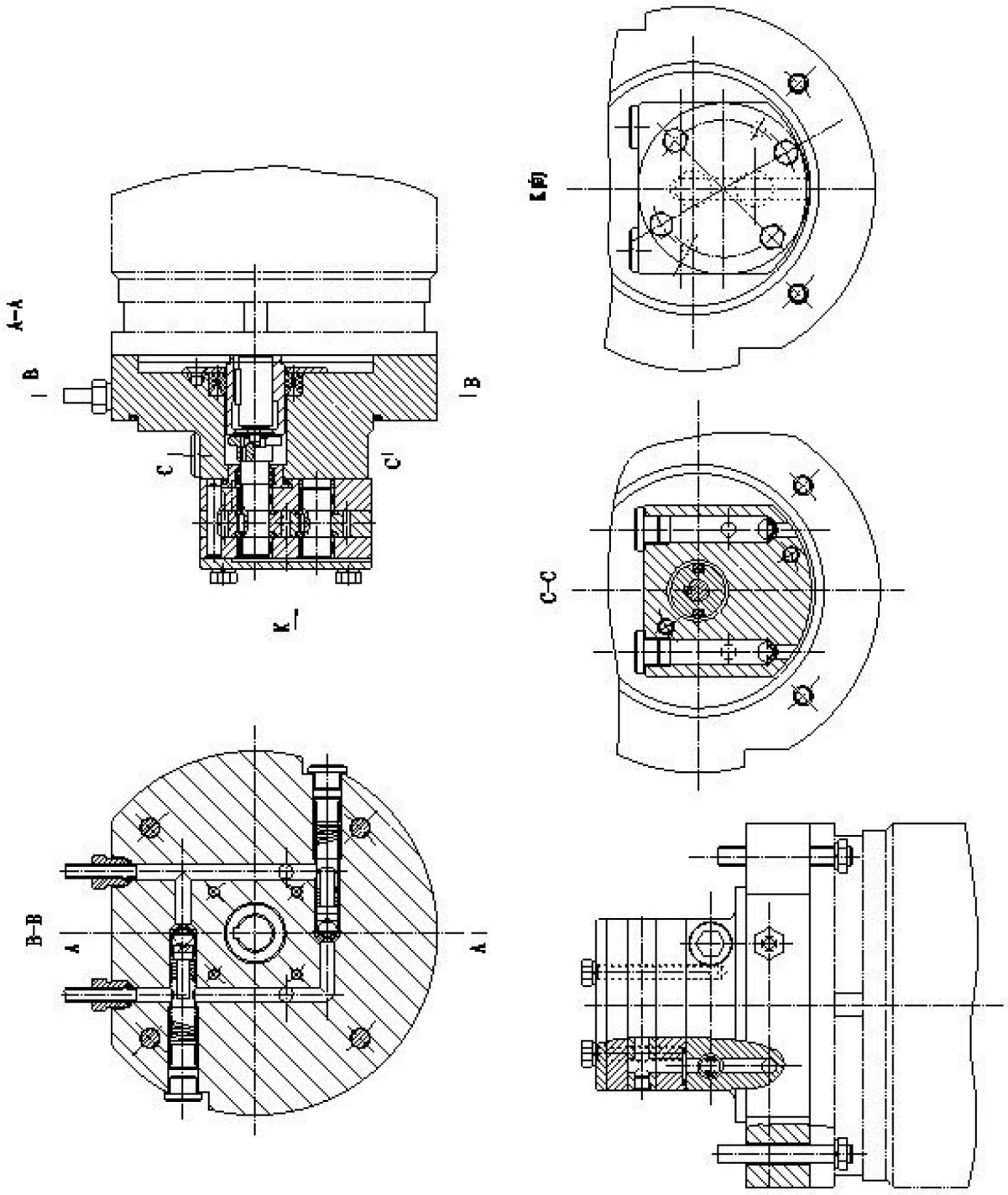
COLUMN CLAMP & ARM ELEVATION Fig. 10.9



ARM CLAMP MECHANISM Fig. 10.10



CLAMP PUMP DRAWING Fig. 10.11



ENVIRONMENT PROTECTION

Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycling centre and disposed of in a manner which is compatible with the environment. When the product becomes completely unserviceable and requires disposal, drain any fluids (if applicable) into approved containers and dispose of the product and fluids according to local regulations.

IMPORTED BY

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