

INSTRUCTION MANUAL

INSTALLATION

1. Lifting

- 1.1 The machine should be lifted by using a “fork lift” or “hoist”.
- 1.2 There are transit clamps at the saddle/base guide and table/base guide.
These clamps must not be removed until the machine is completely installed.

2. Installation

2.1 Place

It is very important to install the grinding machine, in good condition, to obtain high accuracy. Installation should be accomplished considering the following notices;

- 2.1.1 To install where the temperature varying is small.
- 2.1.2 To avoid the place near the machine this may splash cutting chips.
- 2.1.3 To install, at vibration-free place, away from compressors, presses, planners and other machine which generate vibrations.
- 2.1.4 Concrete foundation is required when the place is not rigid or the vibration sources are near.

2.2 Foundation and Installation

If the machine is badly installed, chatter marks and strips marks will be generated. Install the machine, therefore as

Follows: Such a foundation is desirable, Please see Fig.1.

Move the machine to the place, and then install it by using jack bolts.

3. Mounting the table

- 3.1 This is just for the machine which provided with ball rolling sideways (Fig.2a).
- 3.2 For protecting the hardened and ground ball rolling sideways, the table is dismantled from steel balls when the machine is in transportation.
- 3.3 When the machine is placed in position, mount the table, as show Fig2.
 - 3.3.1 Wind the wire rope on the “Drum” 3 turns as show Fig.2b. Tightening

and fix it temporarily.

3.3.2 Lift the table with men and put it on the steel balls very, very carefully. Do not use hoist instead, otherwise the sideways will bump against the steel balls.

3.3.3 Fix the wire rope on the fixed stand, which is located under the table (Fig.2c)

3.3.4 The wire rope will loosen after long use, and will slip on the: "DRUM", so that the table can't move smoothly. In this case, adjust the "Adjust Bolt" on the right hand side of the table until it becomes tightened.

4. Leveling

Machines should be carefully leveled, especially surface grinders. The machine must be leveled by a 0.02 mm/m precision spirit level, and machine must be equally loaded on the jack bolt. The adjusting procedure is as follows:

4.1 Set the spirit level on the middle of the table accurately, but the longitudinal and transverse directions, and adjust the jack bolts until level accuracy shows within 0.02 mm/m.

4.2 For getting good precision it is recommended to recheck level again:

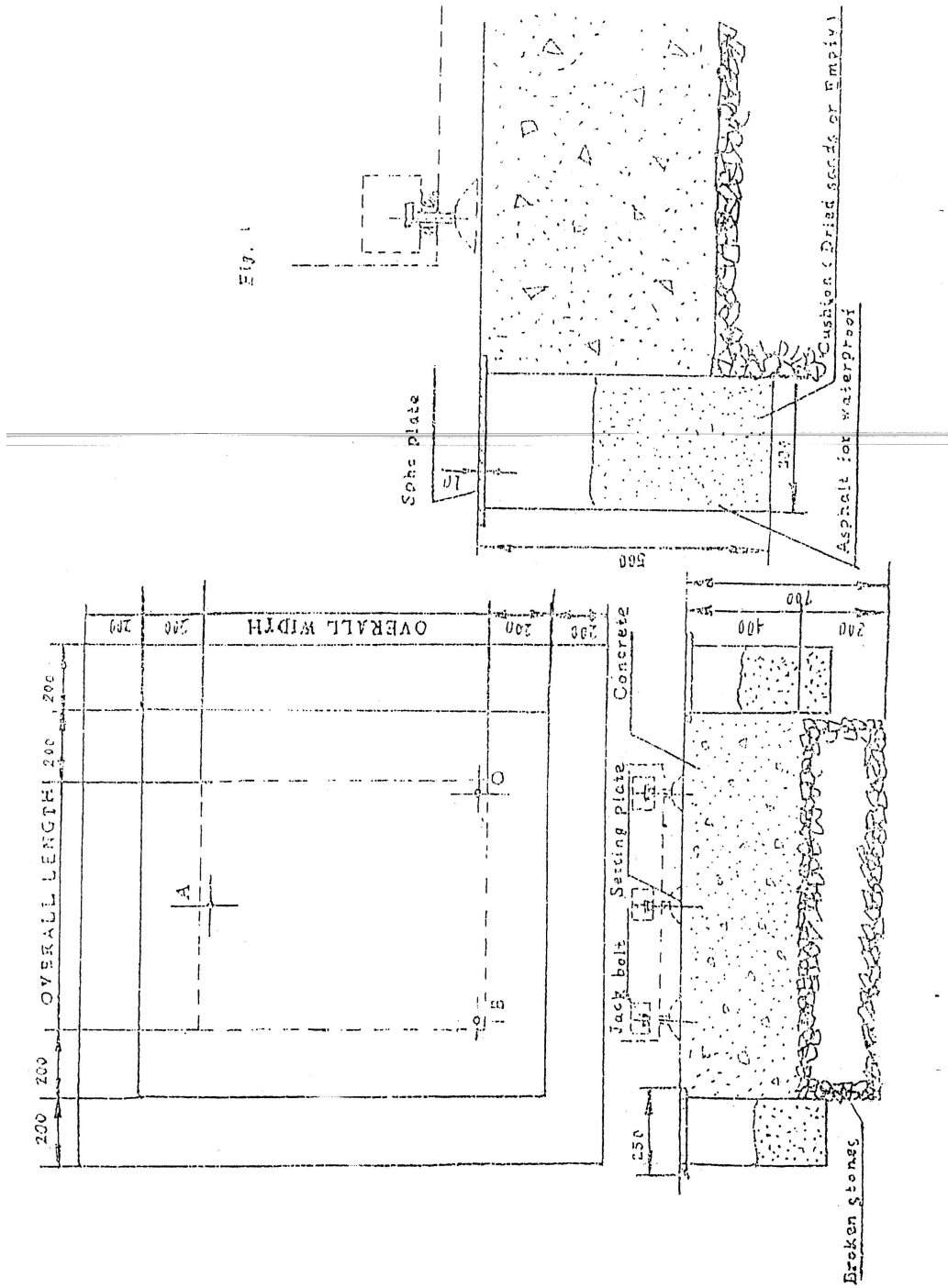
4.2.1 After 24 hours when the machine is installed in its final position make the machine's temperature the same as the surrounding room.

4.2.2 After leveling the machine, grind the table surface and make it flat.

4.2.3 When machine level is checked every time, a little surface grinding might be necessary.

4.2.4 Usually the leveled machine will lose its level (due to machine vibration), so check the level every time it is used.

4.2.5 The leveling machine is troublesome but essential for the best operation you need to check the level of the machine every month.



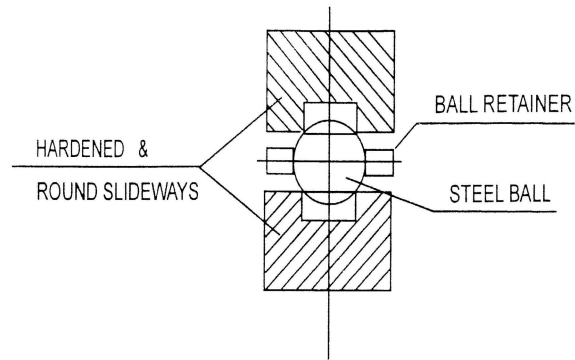


Fig. 2a

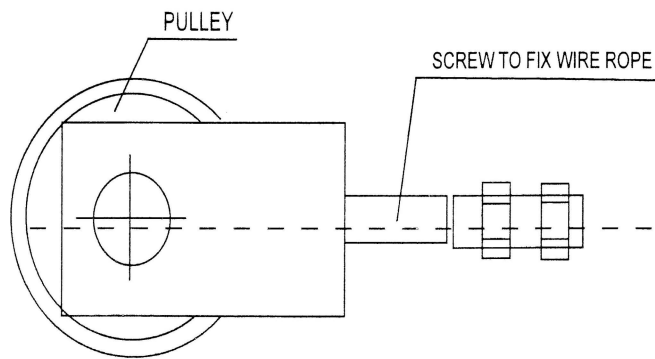


Fig. 2b

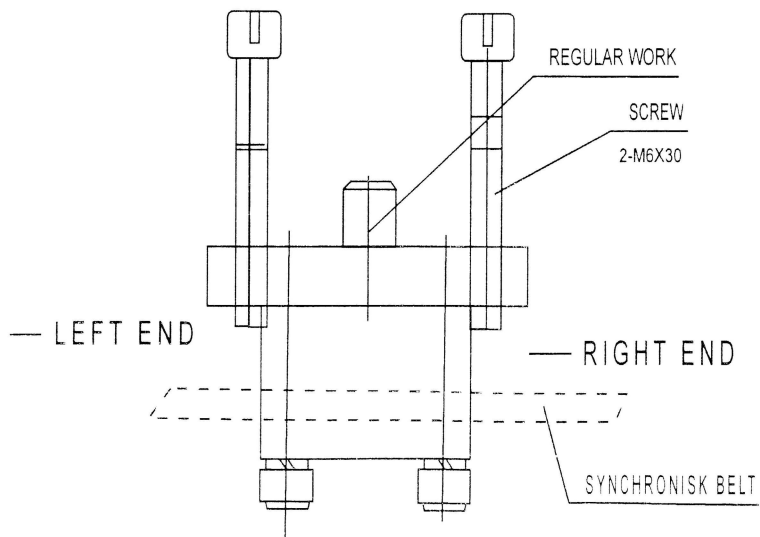
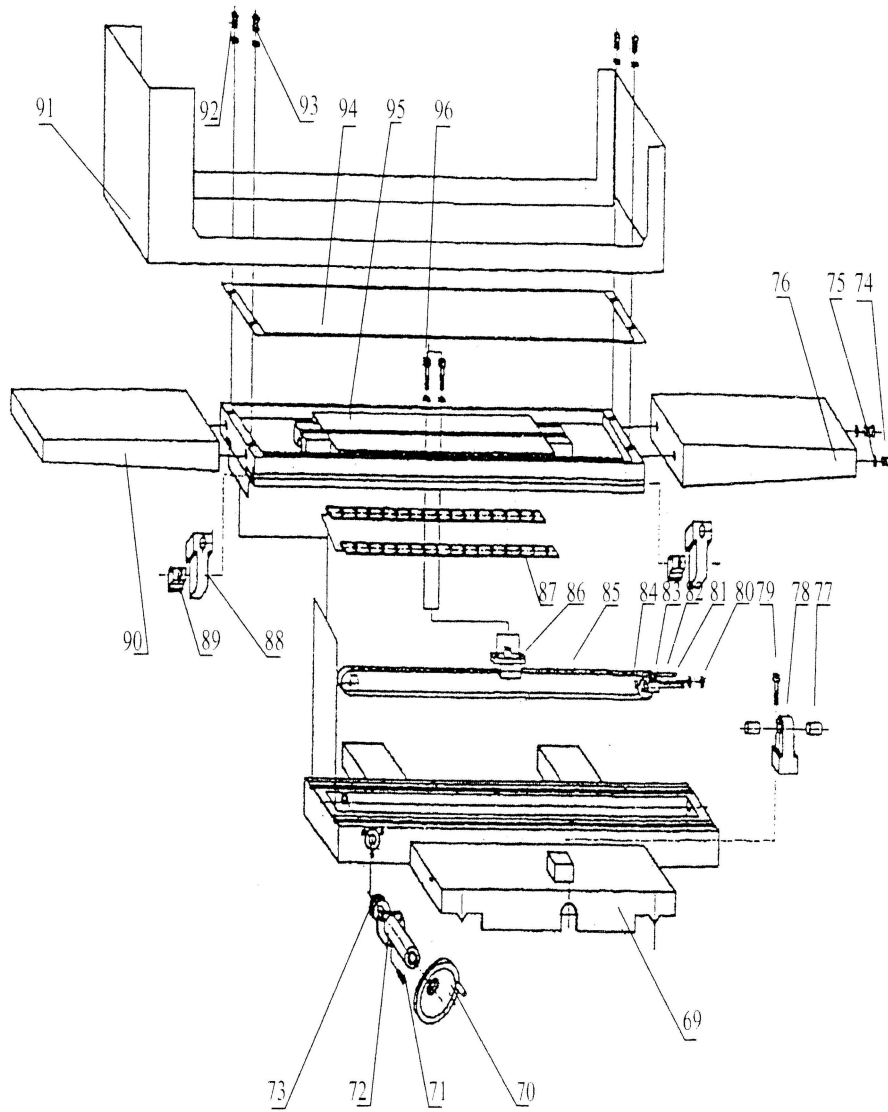
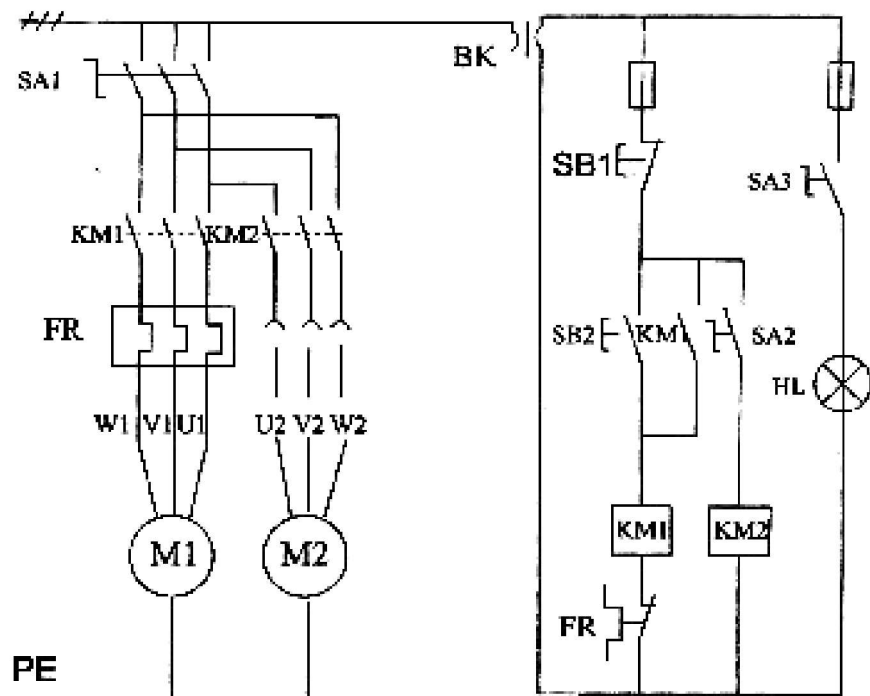


Fig. 2c





SB1: Power source "STOP" button

SB2: Grinding wheel "ON" switch

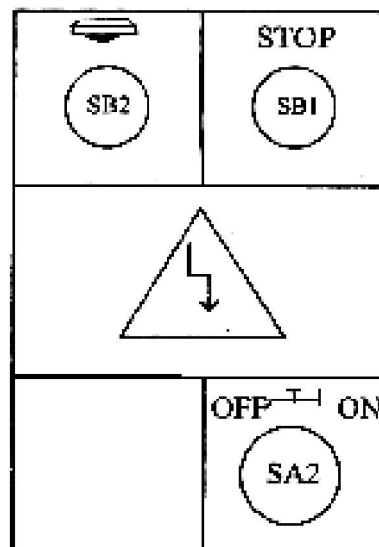
SA1: Power switch

SA2: Switch of coolant system

SA3: Working light

M1: Spindle 1.1KW

M2: Coolant motor 40W



Lubrication Instruction Chart

Lubrication points	Table guideways	Column guideways and Leadscrew	Saddle guideways and Leadscrew	
Interval	Automatically	Twice daily	Twice daily	
Instruction		Pull one shot Lubrication pump 5 times	Twice daily	
MOBIL	Vacouliue oil 1409			
SHELL	Tonna 33 or 27			
BP	BP Energol HP 20-c			

WHEEL

1. Wheel Fitting

1.1 Check the wheel surface carefully and tap it with a wood hammer, to ensure a clear sound. A crack inside of the wheel results in a sonant sound. Be sure to check for cracks carefully.

1.2 There are two pieces of paper washers on both sides of wheel and serve as elastic packing between wheel and flange. The packing washers must not be removed.

1.3 The flange fixing screws should be tightened gradually and diagonally. The wrench should be applied at least 4 to 6 times to each screw in turn.

1.4 When the wheel runs under coolant for some time the paper packing washers will be damp, so you must retighten the fixing screws again diagonally.

The wrench should be applied at least 4 to 6 times to each screw in turn.

2. Wheel Complete

Check the following points before grinding:

2.1 Wheel guard is in its right position.

2.2 Turn the wheel without loading for a few minutes.

3. Wheel Balancing

3.1 How to balance the wheel:

Efficient balancing is essential to eliminate unnecessary and additional stress in the wheel. It is also unavoidable to obtain high quality results. Grinding accuracy and surface finish as well as life of grinding wheel, wheel spindle and bearings depend on some considerable extent on careful balancing. Static balancing will frequently for this purpose. The grinding wheel, together with the wheel. Flange, must be fitted to balance the arbor. Then place it on the wheel balancer, and balance the wheel, in the following way;

3.1.1 The wheel balancer must be leveled (Fig.4), check it by spirit.

3.1.2 Let the wheel oscillate, and find the center of gravity. Then mark with chalk. (Fig.9)

3.1.3 Fix the first balance weight "G" opposite to point "S" and set it. (Fig.10)

3.1.4 Place two correction weight "K" anywhere round the periphery, but at equal distance "a" from weight "G". (Fig.11)

3.1.5 Turn the wheel through 90 degree and see if it is in balance, if not, the correction weight "K" must be changed a place until the wheel is in balance, and no oscillation occur in every position. (Fig.12)

3.1.6 After balancing, the wheel, give a running test for at least five minutes, at full working speed.

3.2 Fitting the wheel flange:

Prior to placing the flange-mounted grinding wheel to the grinding wheel to the grinding spindle, flange cone bore and spindle taper must be absolutely clean, and the wheel is pushed by hand onto the spindle taper. Subsequently, tighten wheel flange securely with fixed bolt (Fig.7) release wheel flange from spindle taper with jacket bolt (Fig.8).

3.3 How to check the wheel vibration:

3.3.1 If no vibration occurs it means the wheel balance is no good. Please rebalance it.

- 3.3.2 If the spindle still vibrates please, take down motor and spindle and check the rubber and coupling, if rubber is broken, change new one. If the couplings loosen, set them well.
- 3.3.3 The spindle can be used more than 10 years under normal operation. Please don't disassemble it without our advise.
- 3.3.4 Because of the spindle running at a very high speed the wheel must be balanced. Otherwise it will cause spindle vibration, owing to its wear. It is advisable to rebalance the wheels occasionally. Grinding wheel absorb humidity and coolant, therefore it is advisable not to start coolant supply when the wheel is nit running, otherwise the wheel will absorb liquid on bottom side only and make it out of balance. If the wheel is allowed to stand for any length of time, coolant will collect at the lowest point, unbalance will also be generated if the wheel is not allowed to idle after completing the grinding operation. So that idle running is essential to throw off coolant by centrifugal force.
- 3.4.1 The wheel can be dressed either by the diamond dresser on the chuck (Fig.13b) or on the parallel dressing attachment (Fig.13a), which is mounted beside the spindle carrier. The diamond tool is arranged at an angle to the center line of the wheel as shown on (Fig.13a, 13b) so that when the diamond loses its keenness, as (Fig.13c) it can be turned on an angle, and another sharp edge is obtained as in (Fig.13d). When dressing the wheel, it begins from the middle of the width, as shown on (Fig.13e), due to two edges being worn out. If the dressing begins at the edges, there is danger of high pressure in the middle, than over stressing the diamond and shattering it. Light dressing, with more times, is better for the life of the grinding wheel and diamond, than a heavy dressing. Various degrees of roughness can be produced in the ground workpiece by varying the feed and speed of the diamond. If there is 0.0079 inch (0.2 mm) or 0.0118 inch (0.3 mm) stock removal it is advisable to roughen the wheel. This is done by feeding the diamond in about 0.00118 inch (0.03mm) and let the diamond move quickly over the wheel. This will make the wheel bite well and the stock removal is good. If the workpiece is to be "finish-ground" to size, with the same wheel. The wheel must be dressed again. This time slowly, in two or

three passes, with the diamond feed only about 0.000393 inch (0.01mm). Experience has shown that, with highly accurate grinding, or better surface finish dressing with the diamond dresser which mounted on the magnetic chuck is better than that which is on the spindle housing (the former is more stable than later). The latter condition will cause light undulation in the surface of the wheel.

3.4.2 Sufficient coolant to contact point of wheel and the diamond is necessary.

3.4.3 Wheel speed, to pass through diamond, is between 9-27/32 inch/min to 39-3/8 inch/min (250mm/min to 1000mm/min). For rough grinding, high speed is better.

GRINDING OPERATION

1. The grinding results obtained depend to very great degree on the choice of the correct grinding wheel and suitable operation:

1.1 Stock removal efficiency:

For intensive stock removal a coarse grain (about 30-36) should be used. The wheel is dressed by passing the diamond over it quickly, so that the surface of the wheel is rough and bites well.

1.2 Surface finish required:

If a fine finish is to be produced, a finer grain is required (40-80). The diamond in this case is passed slowly over the wheel, so as to break up the grain.

1.3 Distortion of the workpiece: If the workpiece show too much distortion, when being ground, this means that the stock removal was too great and the longitudinal and cross movements of table too slow. Or the grinding wheel is blunt or "clogged".

1.4 If undesirable burns and grinding cracks appear, this means that the wheel is too hard, or wheel blunt or "clogged".

2. Selection of suitable grinding wheels.

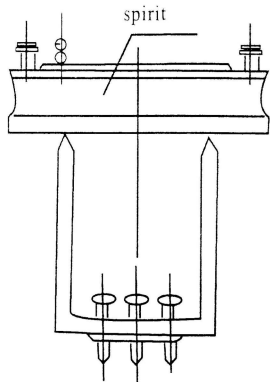


Fig. 4

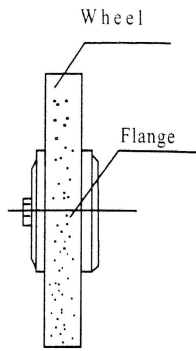


Fig. 5

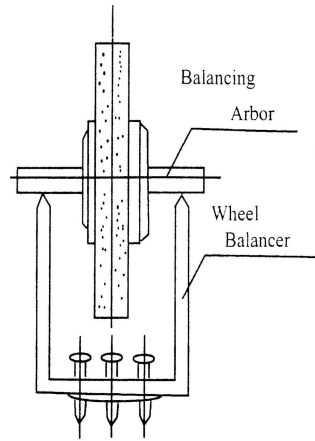
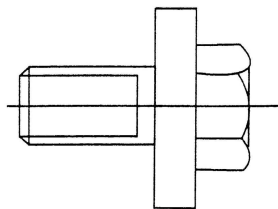
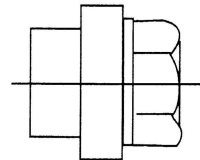


Fig. 6



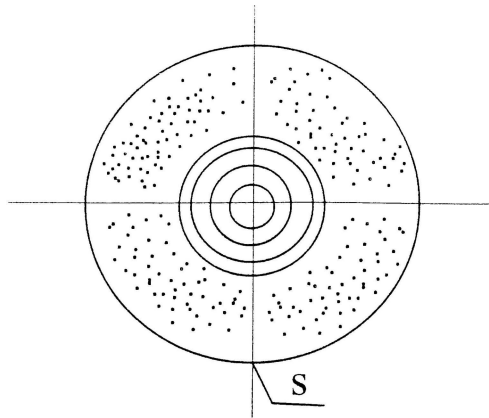
Fixed Bolt

Fig. 7

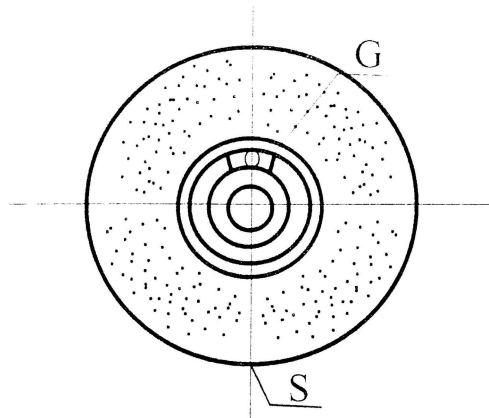


Jacket Bolt

Fig. 8



Fig, 8



Fig, 10

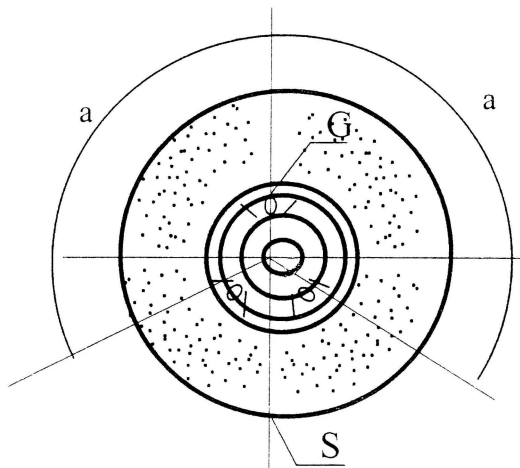


Fig. 11

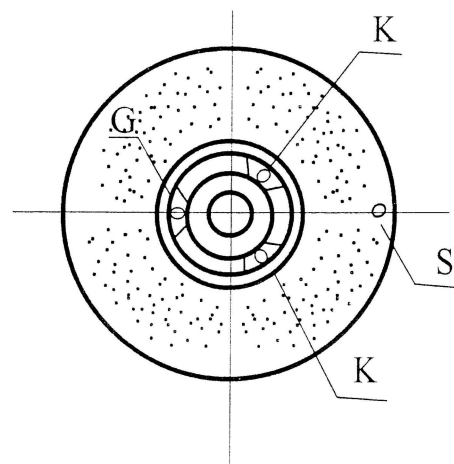


Fig.12

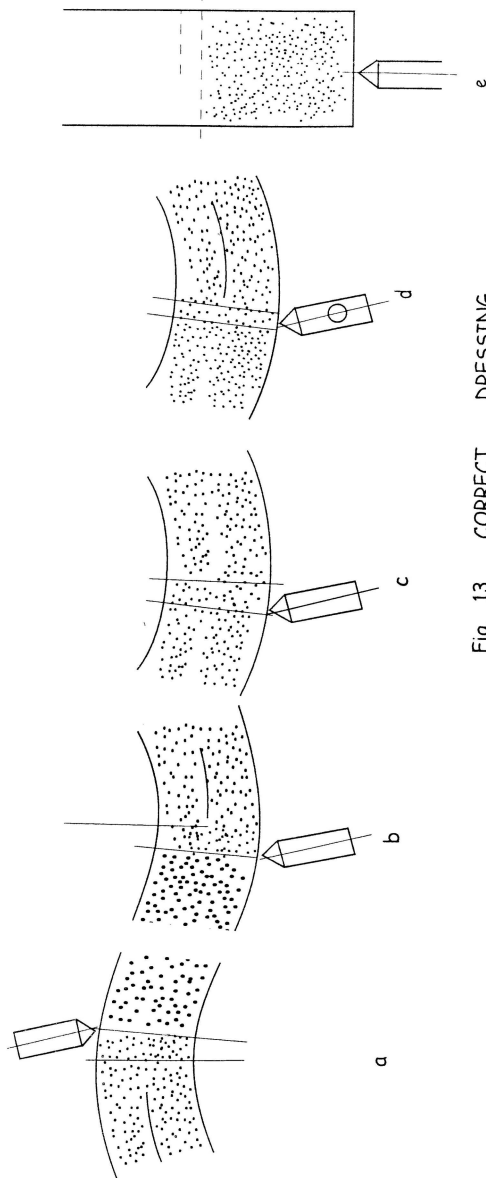


Fig. 13 CORRECT DRESSING

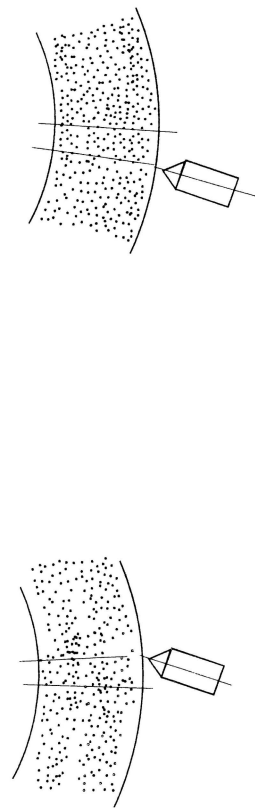


Fig. 14 INCORRECT DRESSING

2.1 Kinds of abrasive:

- A: For common steel grinding
- WA: For higher hardness materials grinding, such as heat-treated carbon steel, alloy steel etc.
- H: Suitable for higher hardness material particularly high-speed steel.
- C: For cast iron and non-ferrous grinding.
- GC: For super-hard grinding, such as tungsten carbide steel.

2.2 Grain size:

Coarse: 10, 12, 14, 16, 20, 24

Medium: 30, 36, 46, 54, 60

Fine: 70, 80, 100, 120, 150, 180

Grinding condition \ Grain Size	Coarse	Fine
Stock removal	much	Little
Surface roughness	coarse	Sine
Workpiece hardness	soft	Hard
Surface contacted	wide	Narrow
Diameter of the wheel	big	small

2.3 Grade: It indicates the strength of the bond which hold abrasive.

Soft: A-I

Medium: I-P

Hard: Q-Z

Grinding condition \ Grain	Soft	Hard
Workpiece hardness	hard	Soft
Surface contacted	wide	narrow
Movement of workpiece	slow	quick
Wheel speed	quick	slow

2.4 Structure: The structure number of a wheel refers to the relative spacing of the grains of abrasive. The larger the number, the wider the grain spacing.

Close: 0, 1, 2, 3, 4, 5

Medium: 6, 7, 8, 9

Wide: 10, 11, 12

Grinding Condition	Structure	Wide	Close
	Surface roughness	coarse	Fine
	Surface contacted	wide	Narrow
	Workpiece hardness	soft	hard

3. Wheel be recommended

Wheel Diameter		Under (8-5/64 inch 205 mm)	
		Material be ground	
Carbon Steel	Under HRC 25	WA 46K or A 46K	
	Above HRC 25	WA 46J	
Alloy Steel	Under HRC 55	WA 46J	
	Above HRC 55	WA 46I	
Tool Steel	Under HRC 60	WA 46I	
	Above HRC 60	WA 46H	
Stainless Steel		WA 46J	
Cast Iron		C 46J	
Brass		C 30J	
Aluminum Alloy		C 30J	
Tungsten Carbide		GC 60-100H,I	
Glass		C 60K	
Marble		C 36M or GC 36M	

4. Choice of the Grinding Condition

4.1 Down feed of grinding wheel

Down Feed	Great	Small
Grinding resistance	great	small
Heat produced	much	less
Surface finish	rough	Fine
Wheel worn-out	much	little

4.2 Cross Feed

Cross Feed	Great	Small
Grinding resistance	great	small
Heat produced	less	much
Surface finish	rough	fine
Wheel worn-out	much	little

Rough grinding: 3-15/16~19-11/16 inch/min. or under 1/2 of the wheel width. Fine grinding: under 1-31/32 inch/min. or under 1/4 of the wheel width.

4.3 Table Longitudinal traverse:

Table Traverse	Quick	Slow
Grinding resistance	Quick	small
Heat produced	Less	much
Surface finish	rough	fine
Wheel worn-out	much	little

Suitable speeds of the table traverse: m/min

Workpiece Material	Soft steel	Heat-treated Steel	Tool steel	Cast Iron
Speed	6-15	30-50	6-30	16-20

4.4 Suitable peripheral speeds of wheel: 20-30w/sec.

Condition \ Wheel	Quick	Slow
Grinding resistance	small	Great
Heat produced	much	Less
Surface finish	fine	Rough
Wheel worn-out	small	Great
Safety	bad	better

Material	Peripheral Speed
Steel	20-30m/sec
Cast Iron	20-18m/sec
Tungsten Carbide	8-18m/sec

Zinc alloy & Light Metal	25-30m/sec
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The symbol of bonda listed below:

V: Vitrified

S: Silicate

B: Resinoid

R: Rubber

E: Shellac

COOLING THE WORKPIECE DURING GRINDING

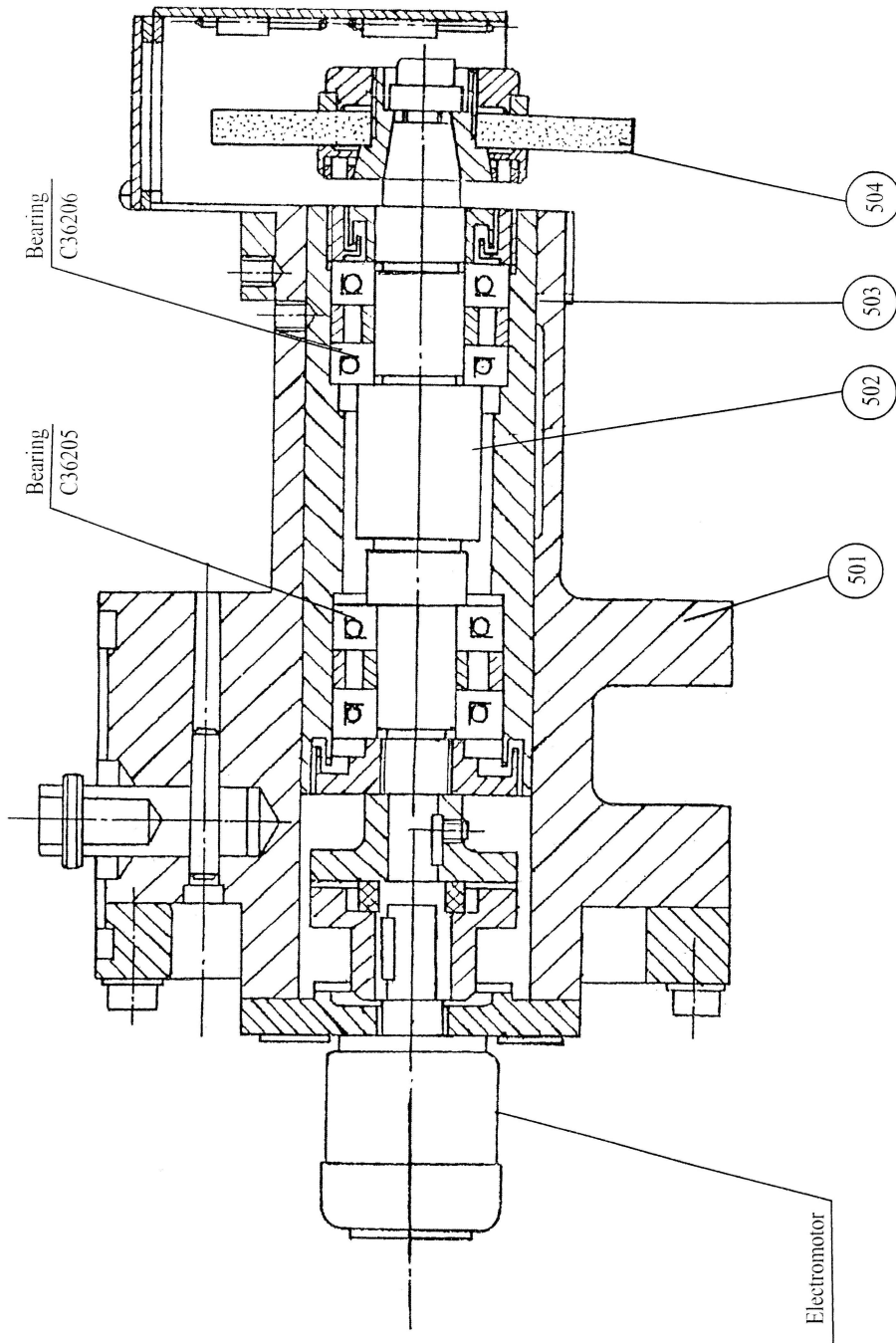
Advantages of wet grinding, for most of the workpiece.

1. Reduce the possibility of distortion of the workpiece caused by heating.
2. Reduce the danger of burning.
3. Prevent wheel from clogging.
4. Shorter grinding times.
5. Longer the wheel life.
6. Protect the operator, machine and circumstances from grinding dust.
7. Clear transparent coolant is recommended to replace a milky one, because:
 - 7.1 The workpiece surface can easily be watched when it is begin ground.
 - 7.2 The grinding wheel can keep more of a bite and sharper, than the milky one.
8. The coolant should have an oil base. The mixing ratio should preferably be about oil: water=1:60-80. If less than 1:50 the excessive heat will make the workpiece distorted.
9. The coolant will gradually loose its effectiveness. Some will be lost as spray, some evaporates during grinding, and become thin. If it must be renewed or correct the mixing ratio by adding new oil.
10. The coolant delivered by a water pump to the wheel through a nozzle, is to prevent the wheel from clogging.
11. If beautiful surface finish is prefer, the automatic paper strip filter is recommended to be used to instead of the simple coolant system.

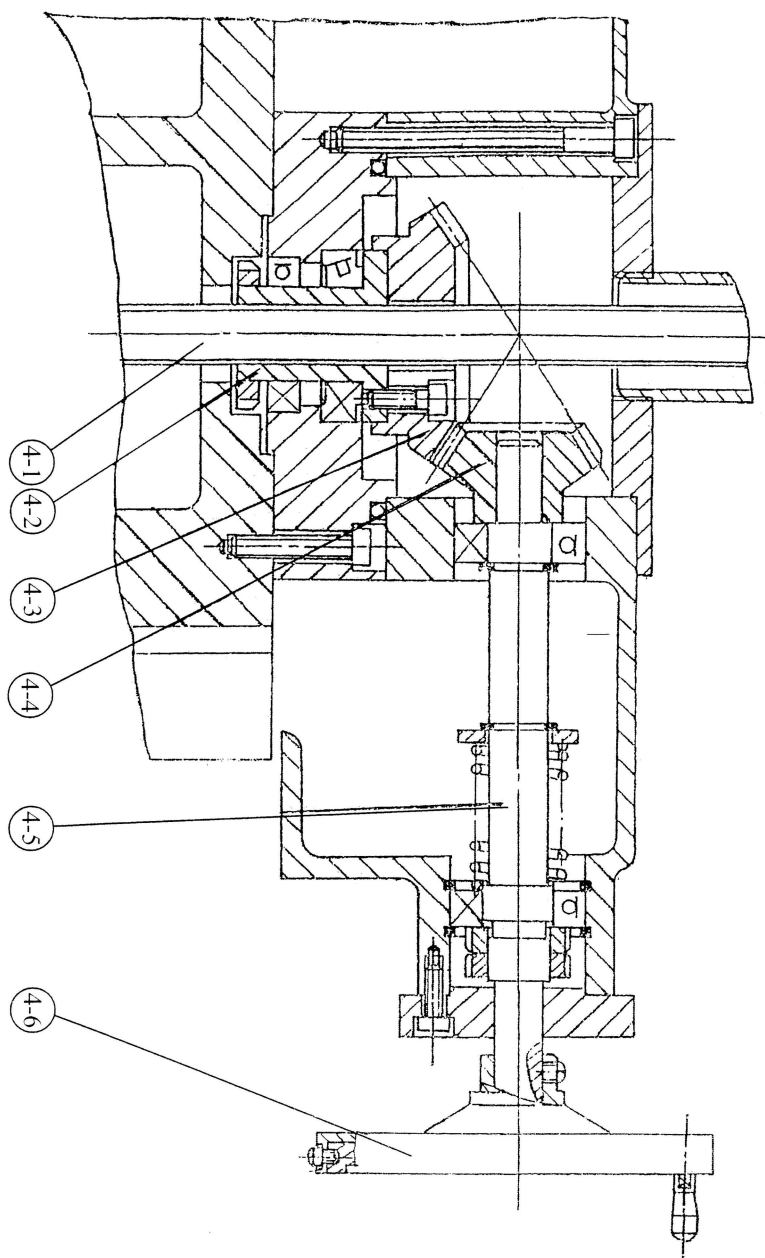
PERFECT SURFACE FINISH

If there exist any one of the following items, the perfect surface finish can not be obtained.

1. Wheel is too hard, or wheel is not correctly chosen.
2. Workpiece is not fixed well.
3. If it is dirty between the spindle taper and flange(adaptor) bore, it makes the wheel vibrate.
4. If you use an unqualified flange, such as poor concentricity and poor squareness.
5. Wheel and flange are not fixed well and slip, somewhat.
6. Use unbalanced wheel or the wheel is not balanced well.
7. Wheel be not well dressed.
8. The coupling between motor and spindle become loosen broken.
9. There is defective bearing in the spindle to motor.
10. Coolant mixing is improper, with too much oil. The correct ratio of oil: water=1:60-80.
11. The coolant is dirty. For getting a good surface finish the automatic paper strip filter attachment is recommended.



Col Umn And Spindle Fig.1.5



Elevating Mechanism Fig.16

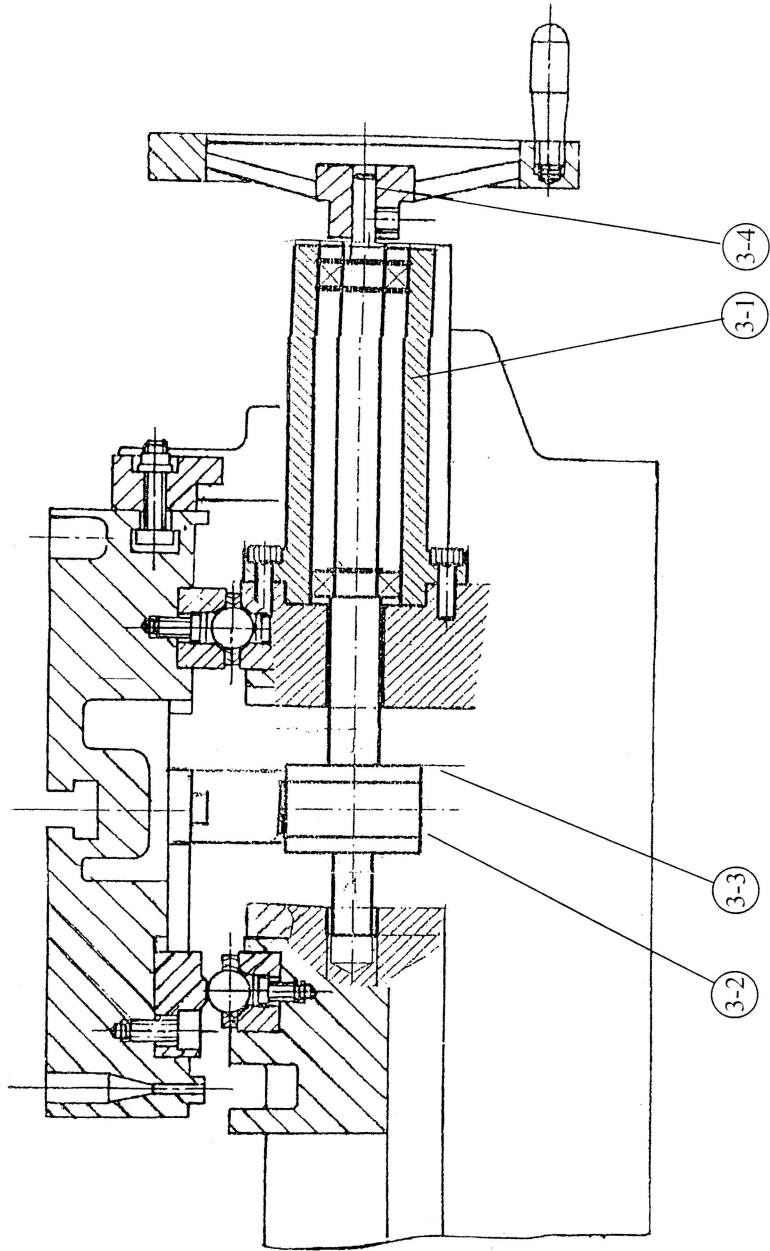


Table Traverse Mechanism sm

Fig.17

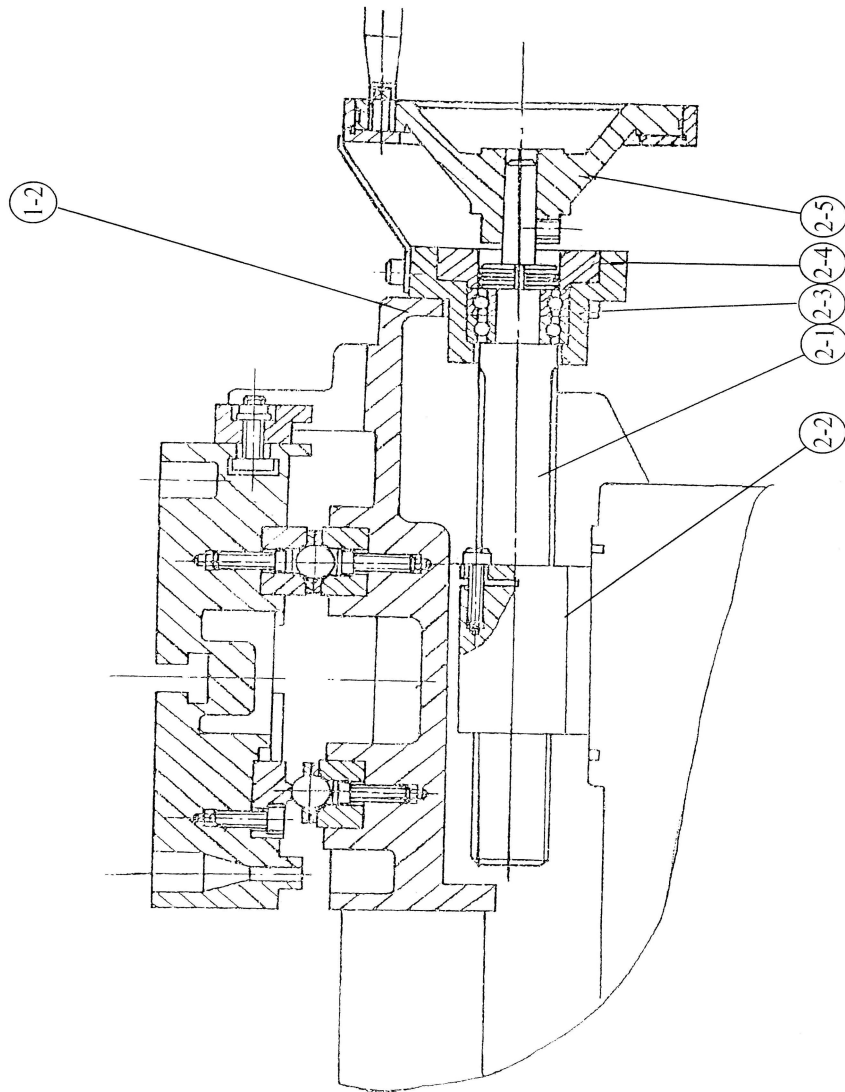


Fig.18

Cross feed mechanism

MAGNETIC CHUCK

To ensure maximum precision, when grinding with a magnetic chuck, the following process must be taken. Take care of grinding the magnetic chuck, otherwise the machine table will be distorted. This will happen if the magnetic chuck, clamped to the table, does not have a flat contact surface.

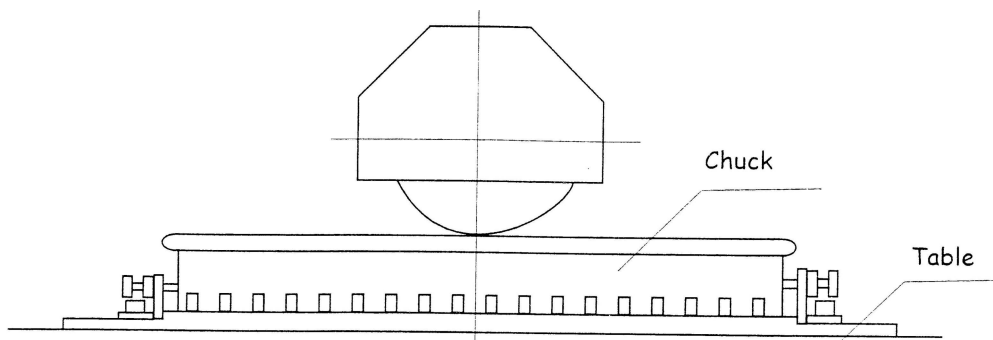


Fig. 19

1. The underside of the magnetic chuck must first be ground with great care to ensure this is flat sides, they are used to prevent chuck from moving only, in this way, chuck must not be switched on, wet grinding with max. Coolant volume and minimum wheel in feed is recommended to avoid excessive heating and the consequent surface inaccuracy.
2. Lightly grease the ground surface area of the machine table, and underside of the magnetic chuck, to for keeping it accurate.
3. Clamp the magnetic chuck on the machine table.

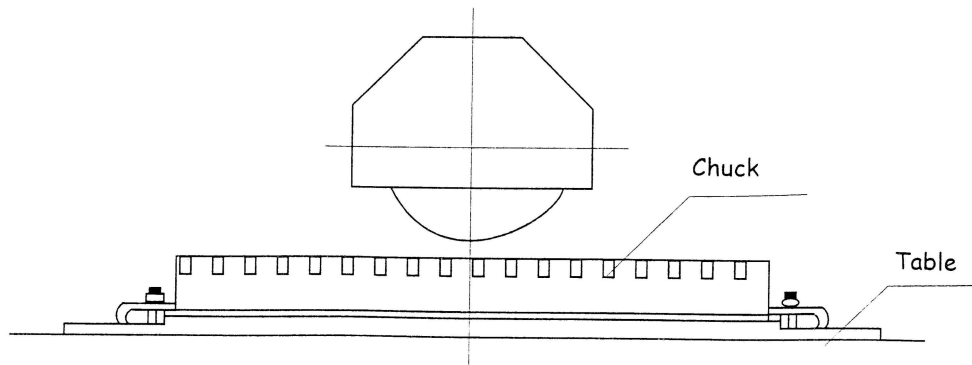
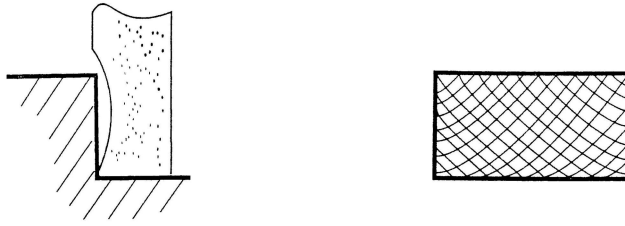


Fig. 20

- 3.1 Rough grinding the chuck surface such grinding the underside of the chuck.
- 3.2 Switch on the magnetic chuck and fine grind the surface with 0.0005 inch wheel infeed.
- 3.3 Spark out grinding the surface with no infeed, 2 to 3 times passes the wheel over the chuck surface.

COMMON CASES IN SIDE GRINDING

1. Wheel and the workpiece have a smaller contact surface, in which case the efficiency is higher, and the surface roughness is better.



2. The wheel and the workpiece have two contact sections, and the surface of grinding is bad.



3. The wheel do not have the "Relief Angle", thus it contacts the whole face to the workpiece, cause the workpiece surface rough and rugged. Furthermore, it will cause workpiece burned and cracked.



4. The "Relief Angle" of the wheel is lower than the surface of the workpiece, so that the workpiece face becomes two sections, the upper part like those in (3) and the lower in (1).



5. If the spindle does not right angle with the work able, the side faces will be as shown on bellow.

