

OPERATOR MANUAL

FOR SURFACE GRINDER

**PLEASE READ THIS MANUAL CAREFULLY
BEFORE OPERATION**

It is essential to give the serial number of your machine in any order of repair parts to assure prompt and accurate service Order repair parts by part S/N, Part numbers, description and machine serial number

Specification and parameters of surface grinders

Model		M618A	M820	M1022	MY820	MY1022	MY1224	MY1230
Table size (mm)		460×180	480×200	540×250	480×200	540×250	600×300	750×300
Max. table travel (mm)		500*190	530×220	560×260	530×220	560×260	630×320	780×310
Max. distance from table to spindle center (mm)		335	440	420	450	450	520	520
Table slide-way		V-type rail with steel-ball			Double V-type rail			
Feed of Cross Handwheel	Per revolution(mm)	2. 5	2. 5	4. 0	2. 5	4. 0	4. 0	4. 0
	per graduation(mm)	0. 02	0. 02	0.02	0. 02	0. 02	0. 02	0. 02
Feed of Vertical handwheel	per revolution (mm)	1. 25	1. 25	1.25	1. 25	1. 25	2. 0	2. 0
	per graduation(mm)	0. 01	0. 01	0.01	0. 01	0. 01	0. 01	0. 01
Feed of Cross Handwheel	per graduation(in)	0. 1	0. 1	0. 1	0. 1	0. 1	0. 1	0. 1
	per graduation(in)	0. 0005	0. 0005	0. 0005	0. 0005	0. 0005	0. 0005	0. 0005
Feed of Vertical handwheel	per revolution(in)	0. 05	0. 05	0. 05	0. 05	0. 05	0. 08	0. 08
	per graduation(in)	0. 0002	0. 0002	0. 0002	0. 0002	0. 0002	0. 0004	0. 0004
Wheel speed (50HZ)		2850		2850	2850	2850	1450	
Wheel speed (60HZ)		3440		3360	3440	3360	1680	
Wheel size (WA46K5V)		180x31.75x13	200x31.75x20				300x76.2x30	
Power of Spindle motor(KW)		1. 1	1. 1	1. 1	1. 1	1. 5	2. 2	
Hydraulic station motor (KW)		/	/	/	1. 5	1. 5	2. 2	
Working Pressure (Mpa)		/	/	/	3	3	4	
Max. runoff (L/min)		/	/	/	18	18	20	
Fuel tank capacity (L)		/	/	/	80	80	100	
Coolant pump (W)		40	40	40	40	40	40	
Machine net weight (Kg)		650	750	850	850	950	1400	1450
Packing gross weight(Kg)		750	850	950	950	1050	1530	1550
Machine size (M)		1. 55x1. 15x1. 59	1. 68x1. 14x 1. 76	1. 68x1. 22x 1. 72	1. 68x1. 14x 1. 76	1. 68x1. 22x 1. 72	1. 96x1. 48x1. 85	
Packing size (M)		1. 0x1. 15x1. 76	1. 14x1. 25x 1. 94	1. 2x1. 4x 1. 94	1. 63x1. 17x 1. 94	1. 63x1. 29x 1. 94	2. 0x1. 64x2. 02	

INSTRUCTION MANUAL

INSTALLATION

1. Lifting

- 1.1 The machine should be lifted by using "fork lifter" 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 machines which may splash cutting chips.
- 2.1.3 To install at vibration-free place, away from compressors, presses, planers and other machines which generate vibration.
- 2.1.4 Concrete foundation is required when the place is not rigid or the vibrating sources are near.

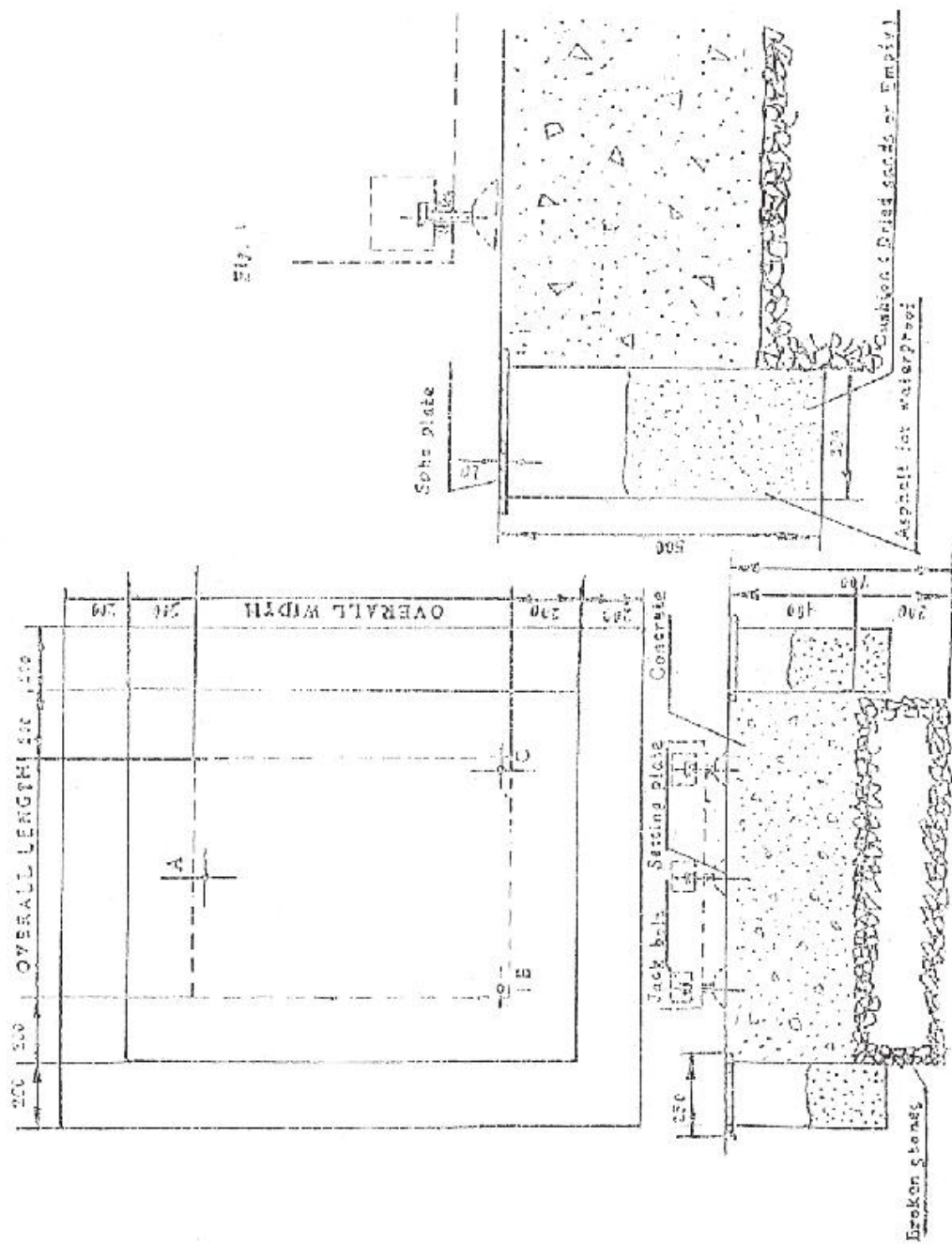
2.2 Foundation and Installation

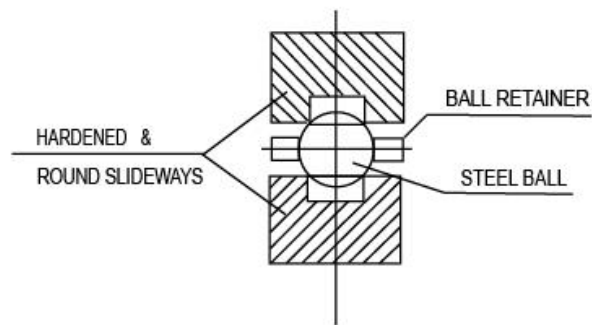
If the machine is badly installed, chatter marks and strips marks will be generated. Install the machine, therefore as follows: Such a foundation is desirable, please see Fig.1.

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

3. Mounting the table

- 3.1 This is just for the machine which provided with ball rolling slideways. (Fig. 2a)
- 3.2 For protecting the hardened and ground ball rolling slideways, the table is dismantled from steel balls when machine in transportation.
- 3.3 When the machine is placed in position, mounting the table as shown Fig. 2.
- 3.3.1 Wind the wire rope on the "Drum" 3 turns as shown 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 slideways will bump against the steel balls.
- 3.3.3 Fix the wire rope on the Fixed stand which 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" at the right hand of the table until it becomes tighten condition.





Fia. 2a

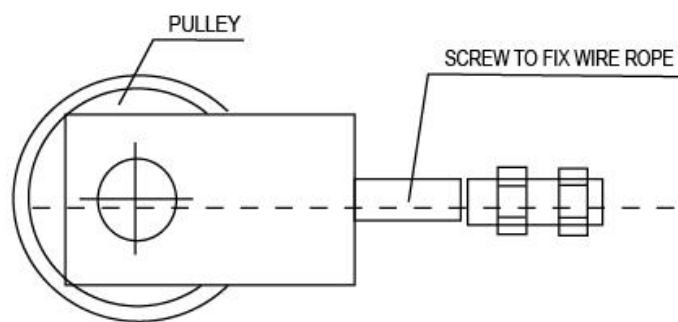


Fig. 2b

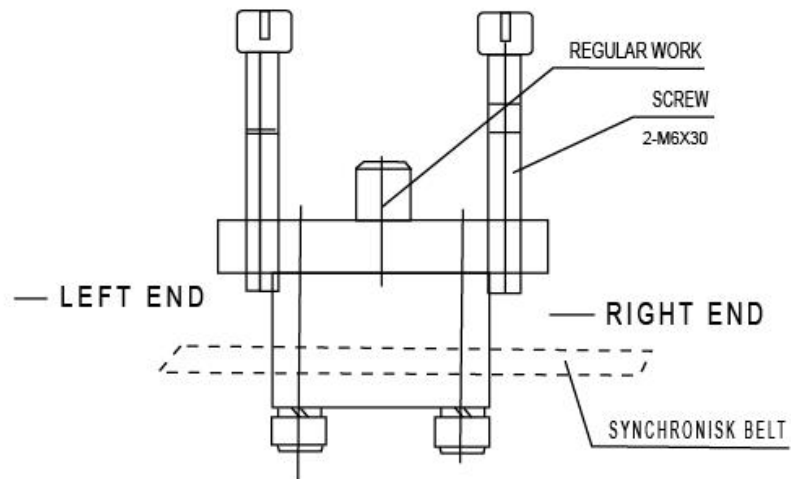


Fig. 2c

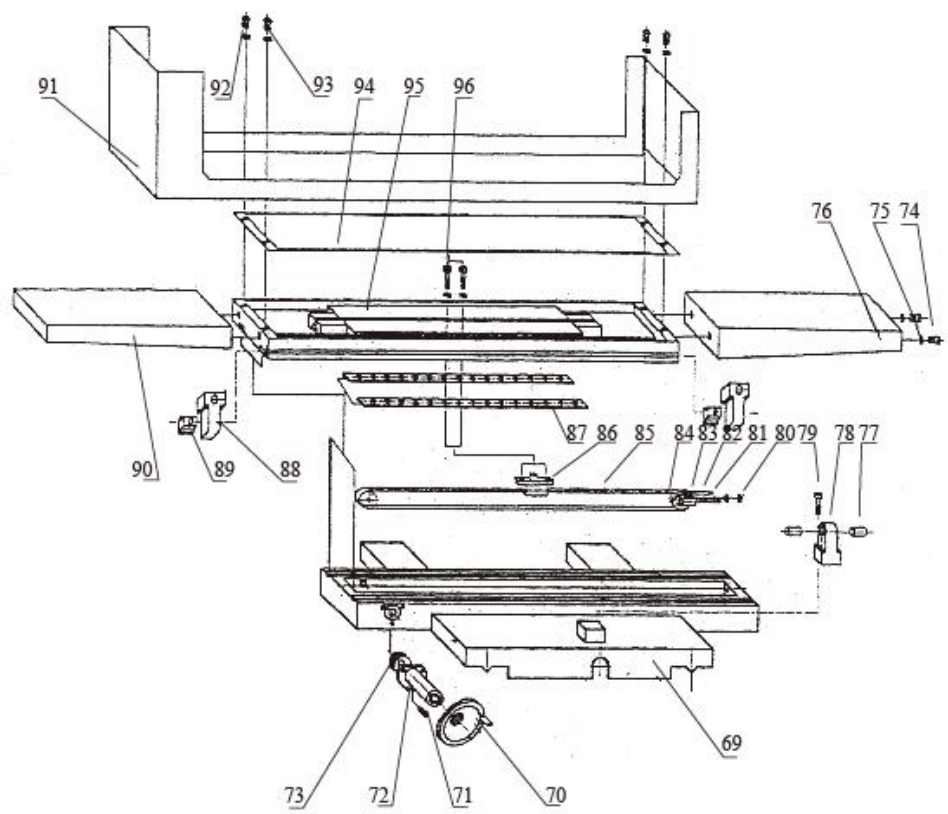
4. Levelling

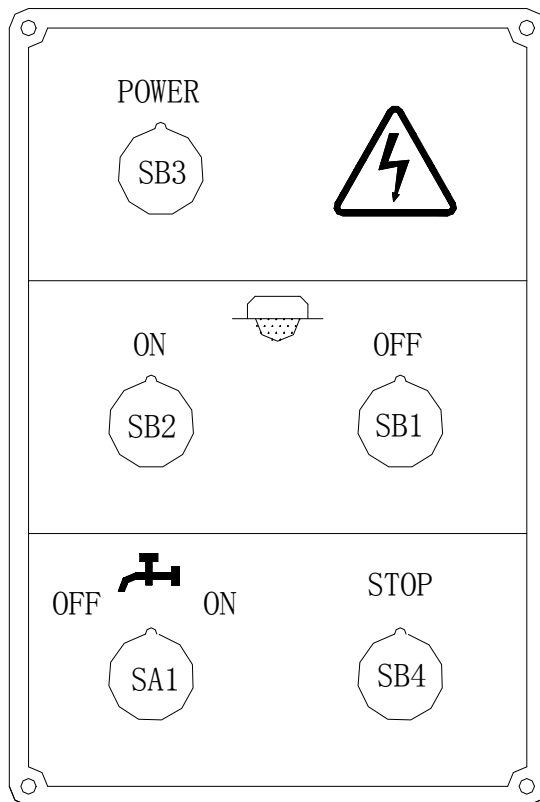
Machines should be carefully levelled, especially surface grinders, it must be levelled by a 0.02/m precision spirit level, and machine must be equally loaded on the jack bolt, the adjusting procedure as follows:

- 4.1 Set spirit level on the middle of the table (or chuck if any), both on longitudinal and transverse direction and adjust jack bolts until level accuracy shows within 0.02/m.
- 4.2 For getting good precision it is recommended to recheck level again:
 - 4.2.1 After 24 hours when machine installed on its final position for making the machine temperature same as those of the ambient circumstances.
 - 4.2.2 After levelling the machine, grinding the table (or chuck) surface, make it flat.
 - 4.2.3 When machine level is checked every time, table (or chuck) surface grinding is necessary.
 - 4.2.4 Usually the levelled machine will lose its level due to machine vibration, so that its level should be always checked.
 - 4.2.5 Levelling machine is troublesome but essential for getting good operation results, it is recommended to check level every month.

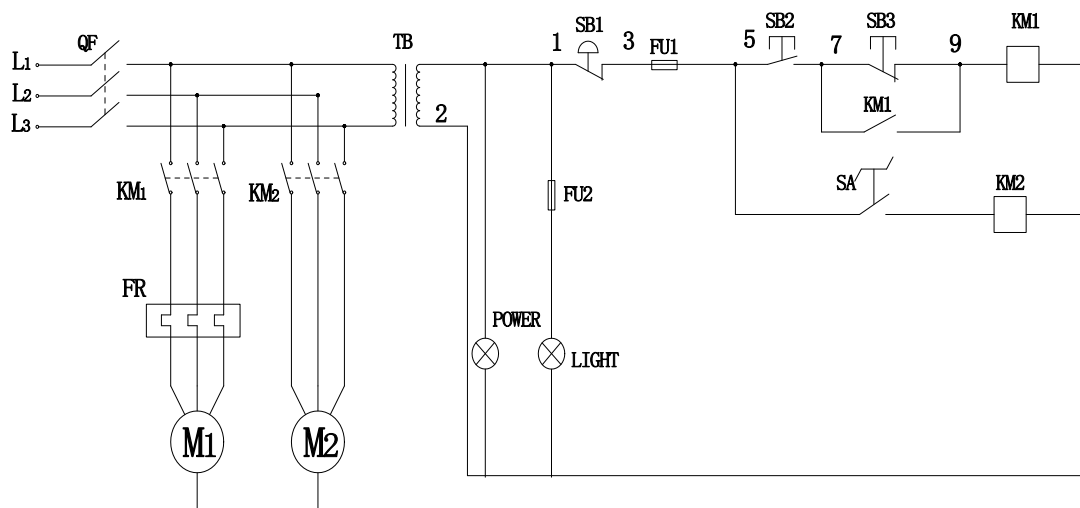
Lubrication Instruction Chart

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	Pull one shot lubrication pump 3 times	
MOBIL	Vacouline oil 1409			
SHELL	Tonna 33 or 27			
BP	BP Energol HP 20-C			





SB1: Wheel OFF
 SB2: Wheel ON
 SB3: Work indicating light
 SB4: Stop Button
 SA1: ON/OFF For Coolant System



WHEEL

1. Wheel Fitting

- 1.1 Check the wheel surface carefully and tap it with a woodhammer to ensure a clear sound. A crack inside of the wheel results 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 packings 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 damped, so it must retighten the fixing screws again diagonally.
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 sufficiency for this purpose. The grinding wheel together with the wheel flange must be fitted to balancing arbor and then place it on the wheel balancer, and balance the wheel as following method;

- 3.1.1 The wheel balancer must be levelled (Fig.4), check it by spirit.
- 3.1.2 Let the wheel to oscillate, and find the center of gravity then marked 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, no oscillation occur in every position. (Fig.12)
- 3.1.6 After balancing, the wheel must be given a test running of at least five minutes at full working speed before being used.
- 3.2 Fitting the wheel flange:
prior to placing the flange-mounted 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:

If the spindle vibrates please take off the wheel then switch on the spindle and check the following items:

- 3.3.1 If no vibration occur it means the wheel balance is no good. please rebalance it.
- 3.3.2 If the spindle still vibrate please take down motor and spindle and check the rubber and coupling, if rubber broken, change new one. if couplings loosen, set it 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 very high speed the wheel must be balanced well otherwise it will cause spindle vibration and can't get good surface finish. Since the balanced wheel will lose its balance during grinding operation owing to its wear, it is advisable to rebalance wheels occasionally. Grinding wheel absorb humidity and coolant, it is therefore advisable not to start coolant supply when the wheel is not 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 diamond dresser on the chuck (Fig. 13b) or on the parallel dressing attachment (Fig. 13a) which mounted beside 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 an angle, and another sharp edge is obtained as (Fig. 13d). When dressing the wheel, it begins from the middle of the width, as shown on (Fig. 13e), due to two edges are usually worn out. If dressing begins at the edges, there is danger of the higher pressure in the middle, then 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 feeds and speed of the diamond. If there is 0.2mm or 0.3mm stock removal, it is advisable to roughen the wheel, this is done by feeding the diamond in about 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 0.01mm. 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 which on the spindle housing (the former is more stable than latter) as the latter condition will cause light undulation in the surface of the wheel.

- 3.4.2 sufficient coolant to contact point of wheel and diamond is necessary.
- 3.4.3 Wheel speed to pass through diamond is between 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 roughened and bites well.
 - 1.2 Surface finish required
If 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 shows too much distortion when being ground, this means that the stock removal was too great and the longitudinal and cross movements of the table too slow, or the grinding wheel is blunt or "clogged".
 - 1.4 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.

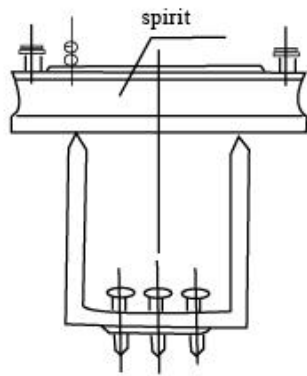


Fig. 4

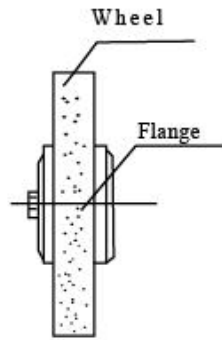


Fig. 5

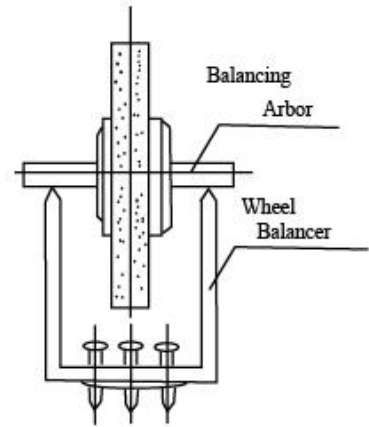
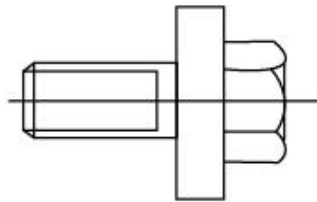
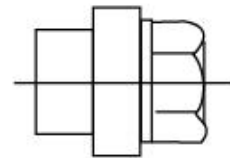


Fig. 6



Fixed Bolt

Fig. 7



Jacket Bolt

Fig. 8

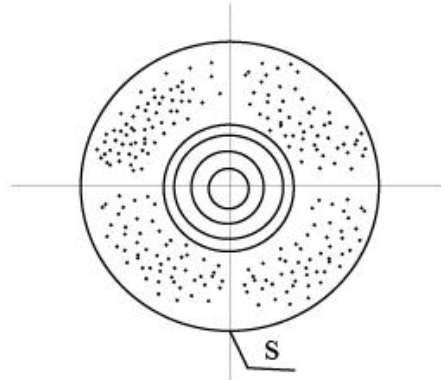


Fig. 8

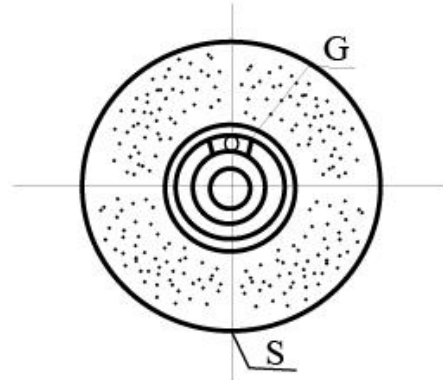


Fig. 10

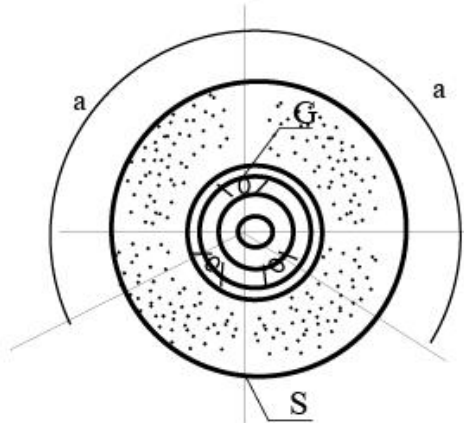


Fig. 11

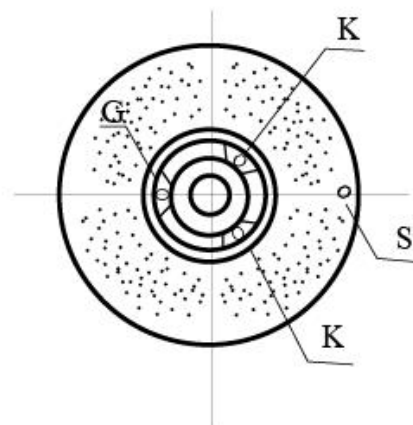


Fig. 12

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, 90, 100, 120, 150, 180

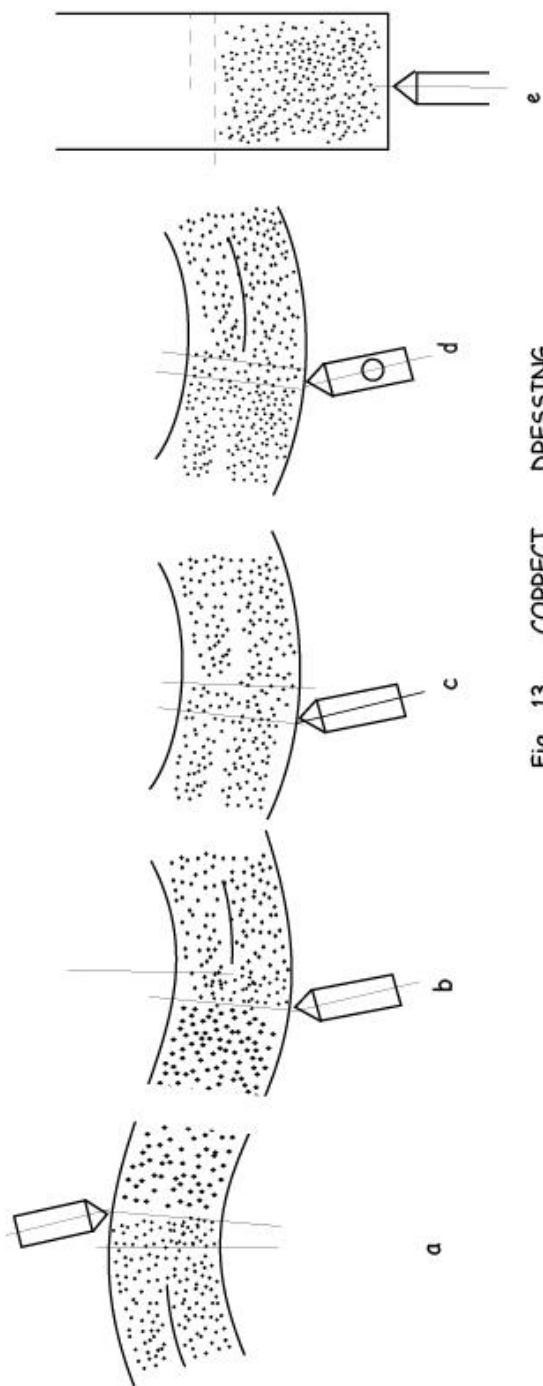


Fig. 13 CORRECT DRESSING



Fig. 14 INCORRECT DRESSING

Grinding condition	Grain Size	Coarse	Fine
Stock removal		much	little
Surface roughness		coarse	fine
Workpiece hardness		soft	hard
Surface contacted		wide	narrow
Dia of the wheel		big	small

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

Soft: A-II

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 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

Material be ground \ Wheel Diameter		Under 205 mm	
Carbon Steel	Under HRC 25 Above HRC 25	WA 46K or A 46K WA 46J	
Alloy Steel	Under HRC 55 Above HRC 55	WA 46J WA 46I	
Tool Steel	Under HRC 60 Above HRC 60	WA 46I 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 Conditions

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:100-500mm/min.or under 1/2 of the wheel width
Fine grinding:under 50mm/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

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.

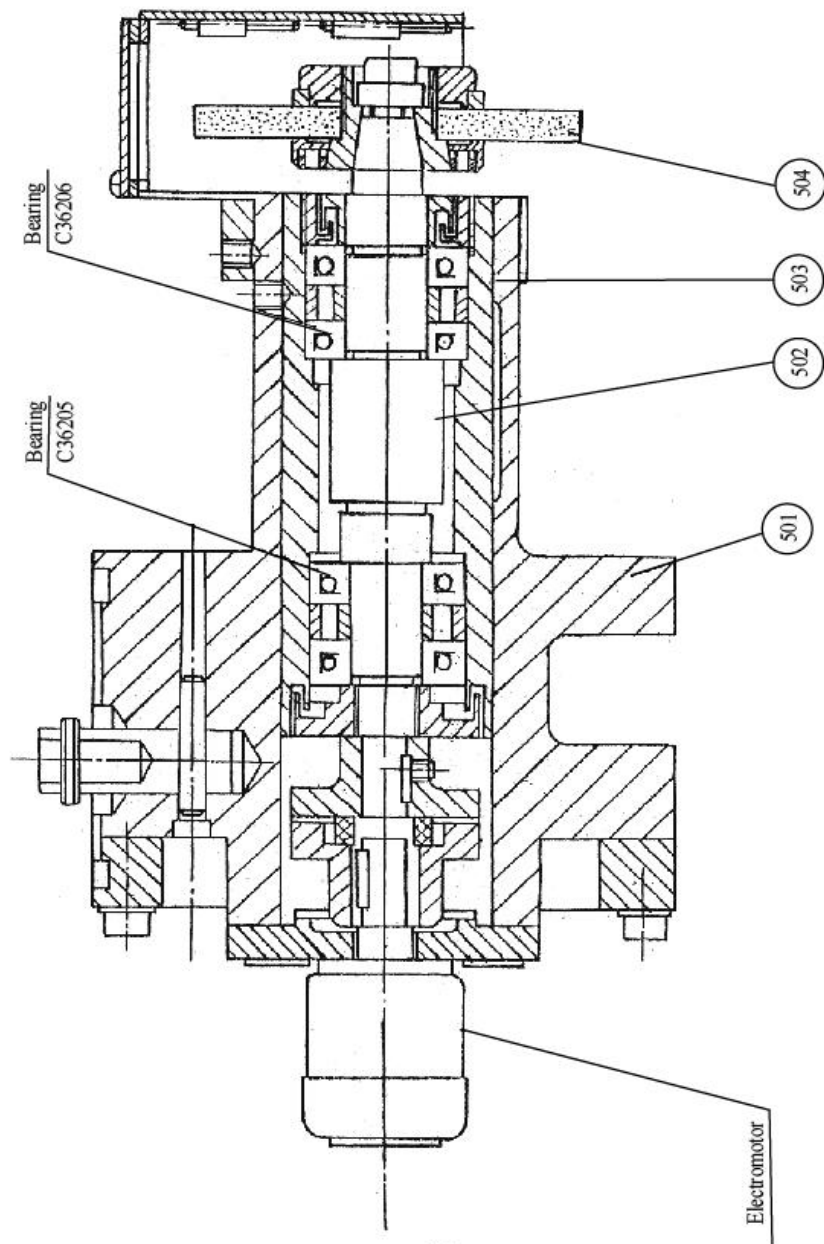
- 1.Reduce the possibility of distortion of the workpiece caused by heating.
- 2.Reduce the danger of burning.
- 3.Prevent wheel from clogging.

4. Shorter grinding times.
5. Longer the wheel life.
6. Protect operator, machine and circumstances from grinding dust.
7. Clear transparent coolant is recommended to replace milky one, because:
 - 7.1 The workpiece surface can easily be watched during it is being ground.
 - 7.2 The grinding wheel can keep more bite and sharp than the milky one.
8. The coolant should have an oil base, the mixing ratio preferably be about oil:water=1:60-80 if less than 1:50 the excessive heat will make workpiece distorted.
9. The coolant will gradually loses its effectiveness, some lost as spray, some evaporates during grinding, and become thin, so that 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, to prevent the wheel from clogging.
11. If beautiful surface finish is preferred, the automatic paper strip filter is recommended to be used instead of the simple coolant system.

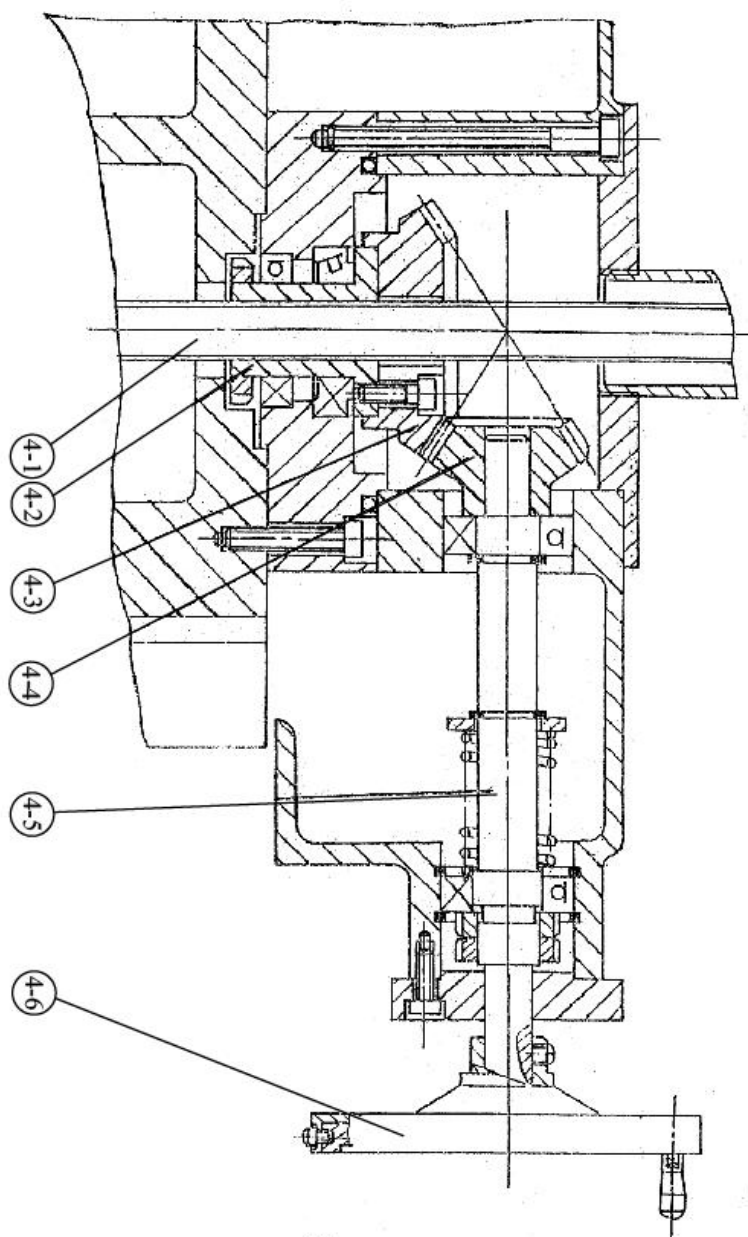
PERFECT SURFACE FINISH

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 choiced,
2. Workpiece is not fixed well.
3. There is dirty between spindle taper and flange(adaptor)bore, and make the wheel vibrate.
4. Use unqualified flange, such as poor concentricity and poor squareness.
5. Wheel and flange not fixed well and have somewhat slip.
6. Use unbalanced wheel or wheel not be balance well.
7. Wheel not be well dressed.
8. The coupling between motor and spindle become loosen or broken.
9. There is defect bearing in spindle or motor.
10. Coolant mixing is improper, the oil too much. The correct ratio is oil:water=1:60-80.
11. The coolant is dirty. For getting good surface finish the automatic paper strip filter attachment is recommended.



Col Umn And Spindle Fig.15



Elevating Mechanism Fig.16

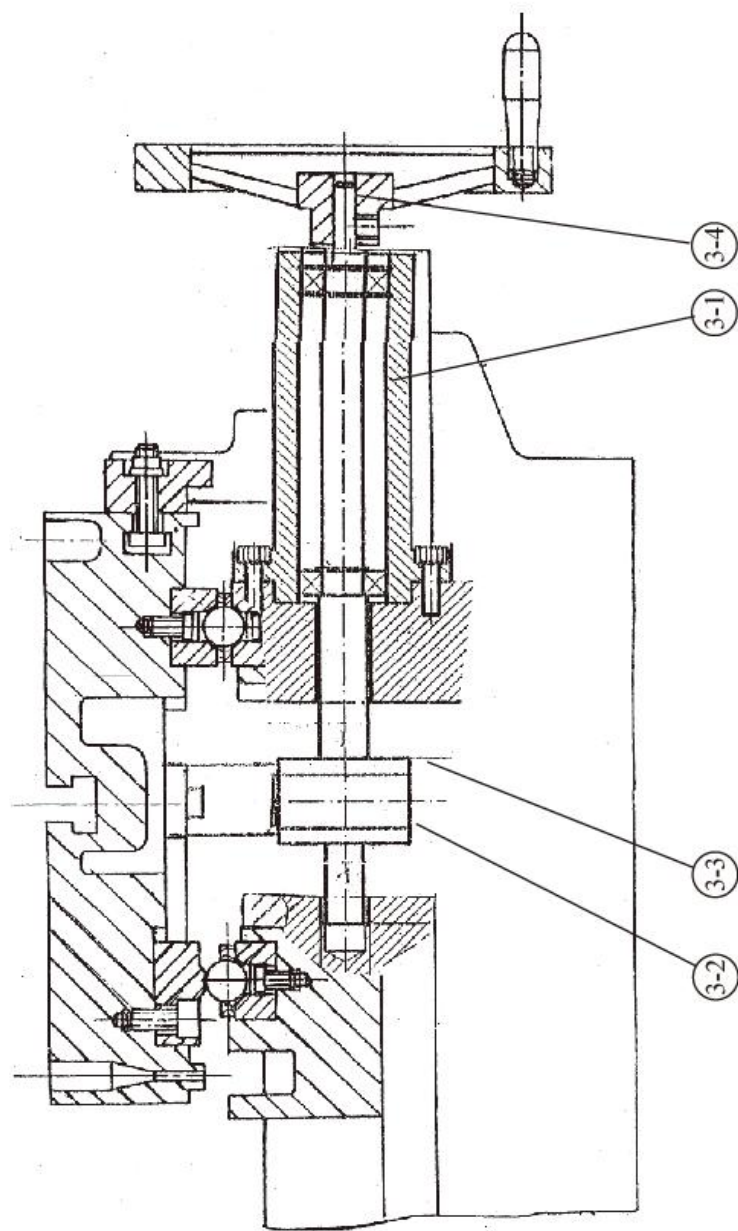


Table Traverse Mechanism
Fig.17

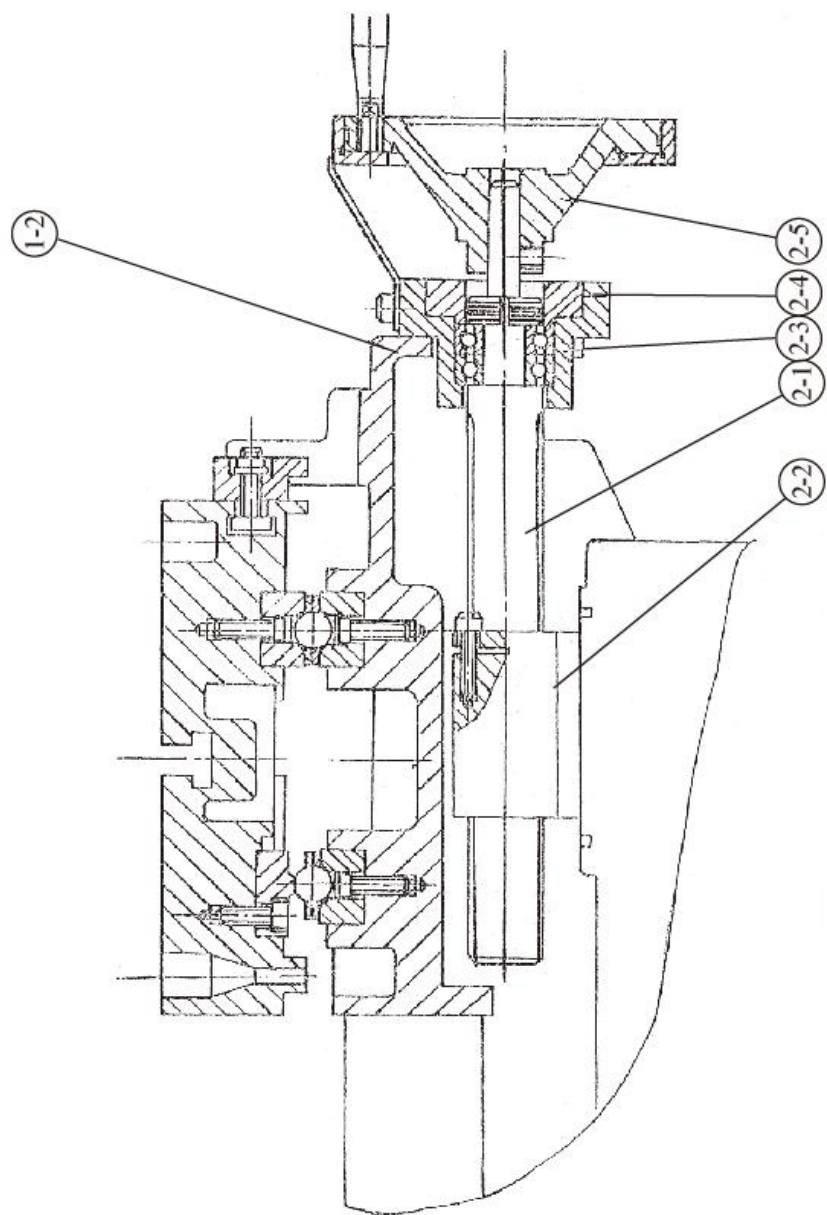


Fig.18

Cross feed mechanism

MAGNETIC CHUCK

To ensure maximum precision when grinding with a magnetic chuck, the following process must be taken care for grinding the magnetic chuck, otherwise the machine table will be distorted if the magnetic chuck clamped to the table in case the contact surface of the chuck is not flat.

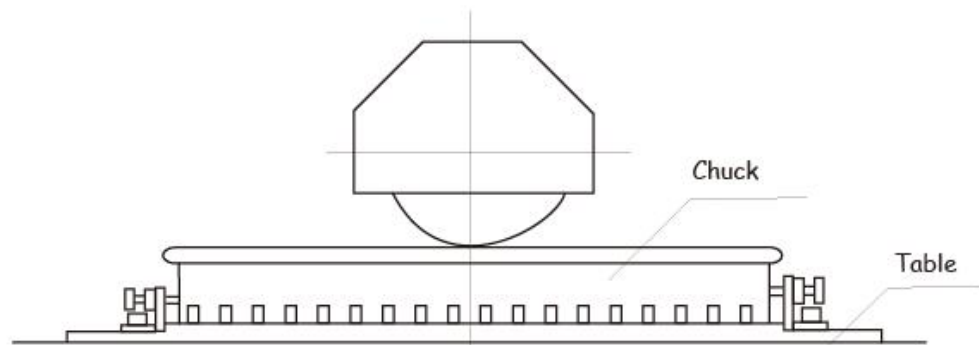


Fig. 19

1. The underside of the magnetic chuck must first be ground with great care to ensure this is flat. Chuck is laid upsidedown on the table, must not to be clamped, stoppers are used at both right and left 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 infeed 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 prevent them from getting dust after the latter clamped to the former. The grease coating must be very thin for keeping the accuracy.
3. Clamp the magnetic chuck on the machine table

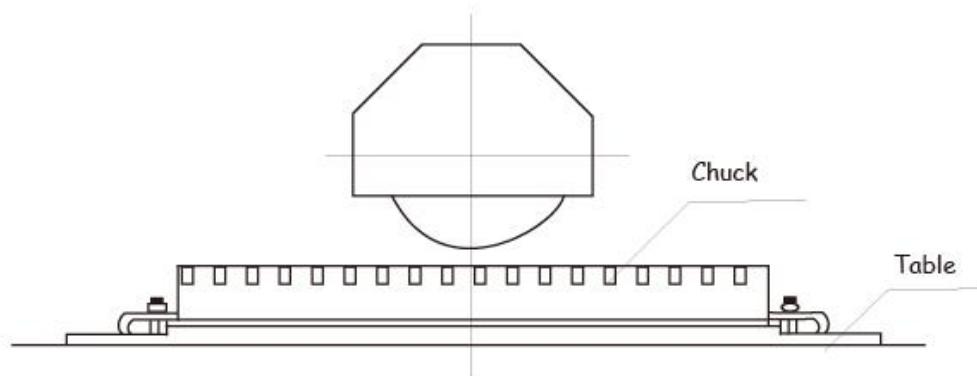


Fig. 20

3.1 Rough grinding the chuck surface such as grinding the underside of the chuck.

3.2 Switch on the magnetic chuck and fine grinding the surface with 0.005mm 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.

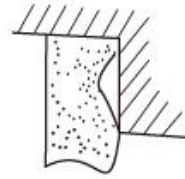
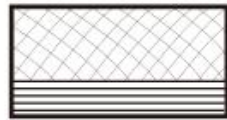


3. The wheel does not have the "Relief Angle", thus it contacts the whole face to the workpiece, causing the workpiece surface rough and rugged. Furthermore, it will cause workpiece burned and cracked.



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 table, the side faces will be as shown on bellow.



TROUBLE SHOOTING

Grinding defects,Causes and Remedy			
NO.	Defects	Causes	Remedy
1		Wheel is unhomogeneous	If wheel and flange can not be well balance,dress wheel on periphery and both sides and rebalance again,if can't make it balance a new wheel
		Use unproper wheel	Select the proper one to suit the workpiece material
		Wheel is not dressed correctly	The dressing diamond must be turned an angle or replace new one ir it is not contacted wheel with an edge
			Diamond tool not firmly fixed
		Too much play on the grinding spindle	Re-adjust the spindle play by qualified technician
		Too much play on wheel hddad guideways	Clean and adjust the gibs
		Vibranons transferred to machine from outside,such as rough-running machines,travelling cranes of the building and street vehicles.	Improve the foundation,make it vibration free,place machine to another vibration free pseition
		Couplings of motor and spindle loosen or rubber broken	Fix couplings well,or replace new noes
		Unsteady running of grinding wheel	3phases voltage of power source are unbalance,please check and balance it or replace new spindle
		Stock removal too great	Reduce infeed
			Reduce cross feed
		Grinding wheel too hard or dull and clogged	Use softer or coarser wheel
			Increase table speed
			Reduce infeed
			Roughen the wheel
			Check diamond of the dresser

Grinding defects,Causes and Remedy			
NO.	Defects	Causes	Remedy
2	Flutter marks Appear in the form of small flat surface distributed over the surface of the workpiece unevenly	Travelling cranes or hoist of the building	Improve the foundation
		Travelling vehicles in the building or street	Change the position
			Use anti-vibration plates
3	Ray pattern parallel lines , hardly perceptible to the naked eye.	Grinding spindle bearings detective	See No.1 chatter marks
		Too much play on wheel head guideways	
		Wheel badly dressed	
4	Commas It appear the form of comma-shaped lines when grinding to get a high finish	Coolant too dirty	Clean coolant,,or use automatic paper strip filter
		Grinding wheel chips off	Clean inside of the wheel cover
			Choose proper wheel
5	Burn marks and grmgding cracks, caused by intense local heating of the workpiece	Grinding wheel too hard or too fine	Use softer or coarser wheel
			Increase table speed
			Reduce peripheral speed of wheel
		Grinding wheel dull or cligged	Dress the wheel make it roughen and bit better
		Stock removal too great	Reduce infeed
			Reduce cross feed
		Table speed too low	Increase table speed
		Inefficient cooling	Increase coolant
			Use stronger mixture coolant(fill up with fresh oil)
6	Grinding spark abnormally	It can not be "spark out"	Re-align the machine by adjusting the jace bolt and checked it with spirit level

PACKING LIST

Customer:

No:

Date:

Name	Qt	Name	Qt
Horizontal grinder With rectangular table	1	Puller for adaptor	1
		Flange	1
Tool box	1	Wheel	1
Screw-driver 100 × 6	1	Pipe dram	1
Cross screw-drive 100 × 6	1	Wash pipe	1
Open-end wrench 12 × 14	1	Flange wrench	1
17 × 19	1	Setting plate	3
22 × 24	1	Anchor bolt(with nut)	3
Inner hexagon spanner 3	1	Wheel dresser	1
4	1		
5	1		
6	1		
8	1		
10	1		
12	1		
Sheath for inner hexagon spanner	1		
Balancing stand	1		
Adjusting screw for balancing stand	1		
Balancing shaft	3		
Customer's check		Packer	

Person in charge:

Check: