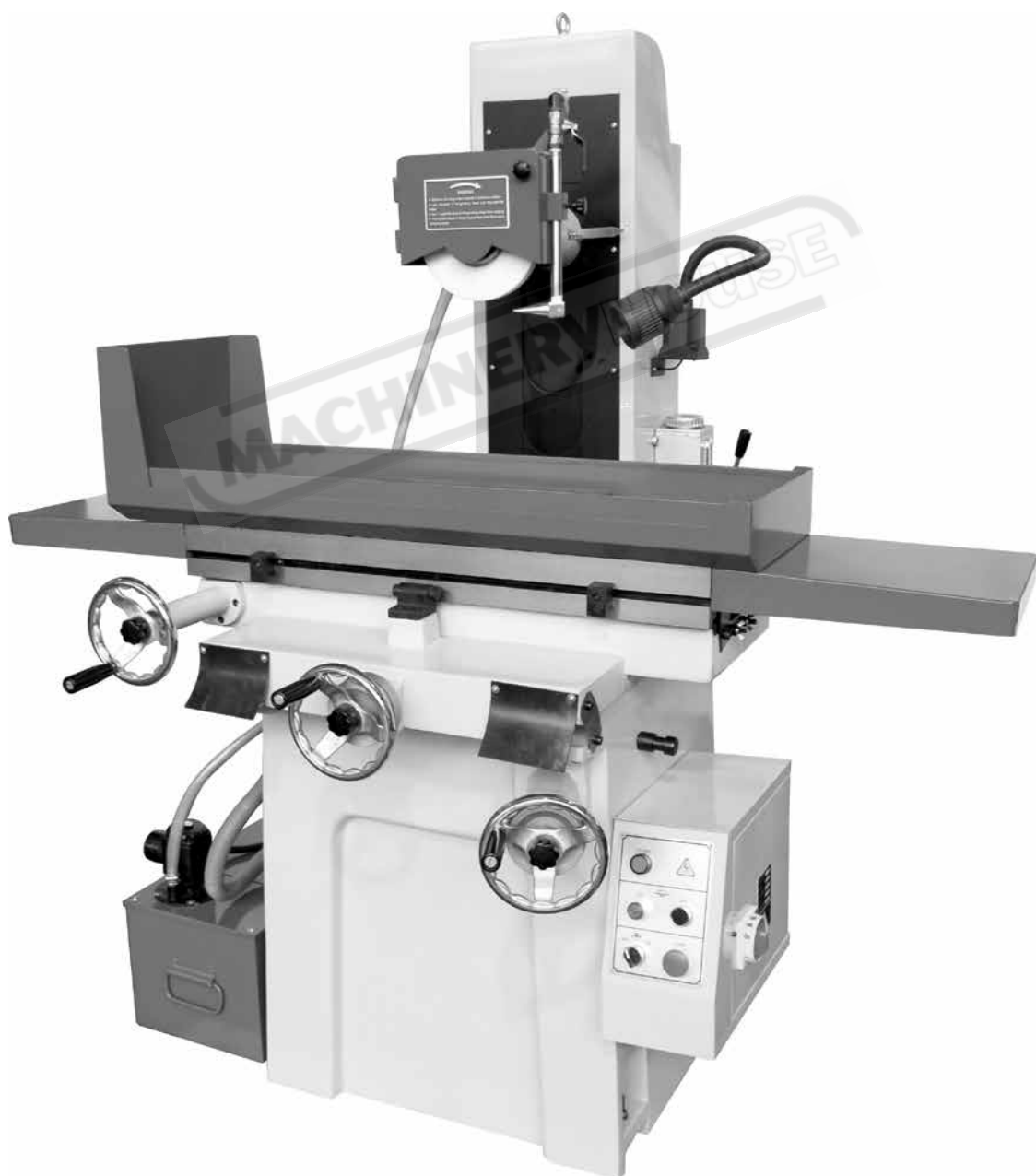


# INSTRUCTION MANUAL

## SG-820 Manual Surface Grinder (415V) 530 x 220mm Table Travel



G218

**G218 SG820**

**OPERATOR MANUAL  
FOR  
SURFACE GRINDER  
MODEL: SG-820**

**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

<b>Model</b>		<b>SG-820</b>
<b>Table size (mm)</b>		480x220
<b>Max. table travel (mm)</b>		530x220
<b>Max.grinding area (mm)</b>		520x220
<b>Max.distance from table to spindle center (mm)</b>		490
<b>Table slide-way</b>		V-type rail with steel-ball
<b>Feed of</b>	<b>Per revolution (mm)</b>	2.5
<b>Cross handwheel</b>	<b>Per graduation (mm)</b>	0.02
<b>Feed of</b>	<b>Per revolution (mm)</b>	1.25
<b>Vertical handwheel</b>	<b>Per graduation (mm)</b>	0.01
<b>Wheel speed (50HZ)</b>		2850
<b>Wheel size (WA46K5V) (in)</b>		8x(3/4)x(11/4)
<b>Power of spindle motor (W)</b>		1100
<b>Coolant pump (W)</b>		40
<b>Machine net weight (kg)</b>		700
<b>Packing gross weight (kg)</b>		800
<b>Machine size (M)</b>		1.68x1.14x1.76
<b>Packing size (M)</b>		1.14x1.25x1.94

# 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.

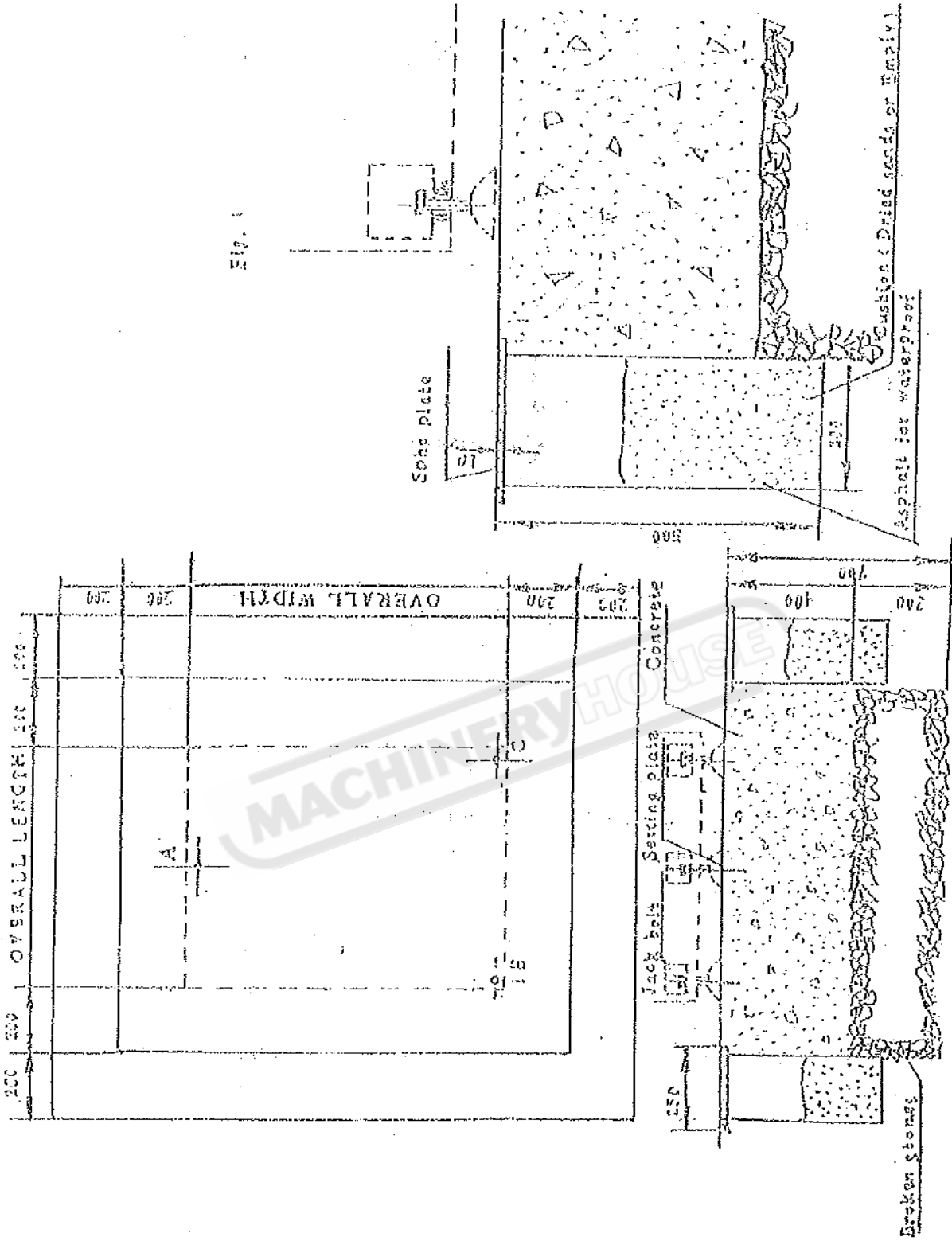
- 2.1.1 To install where the temperature varying is small.
- 2.1.2 To avoid the place near the machines which may splash cutting chips.
- 2.1.3 To install at vibration-free place, away from compressors, presses, planers and other machines which generate vibration.
- 2.1.4 Concrete foundation is required 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.



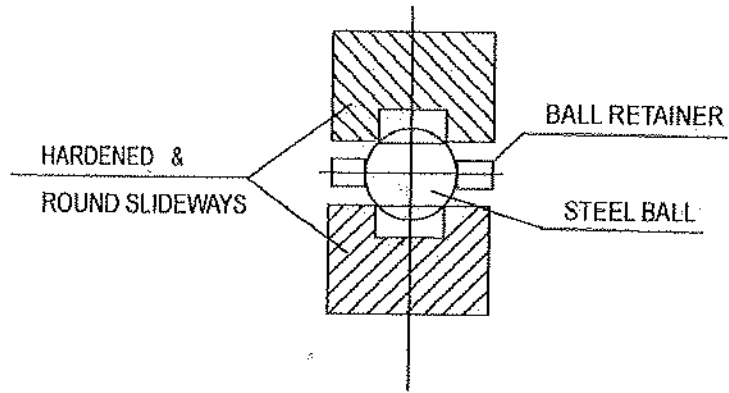


Fig. 2a

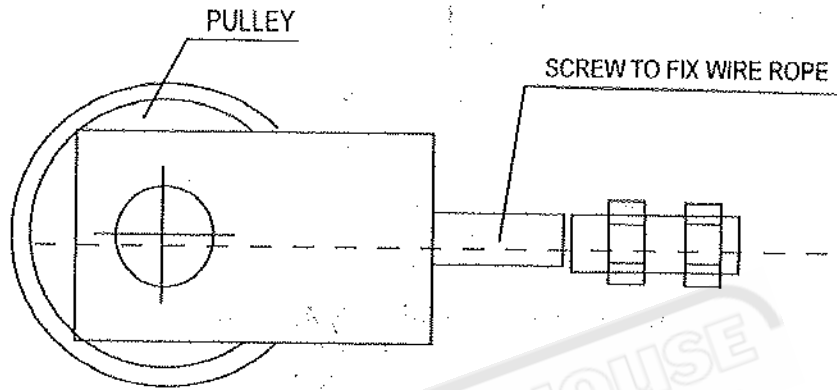


Fig. 2b

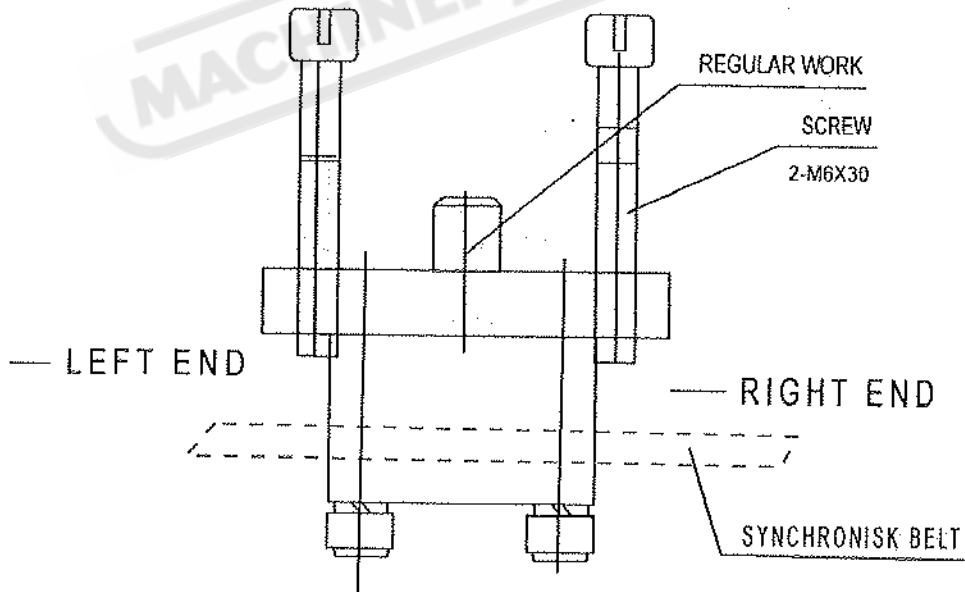


Fig. 2c

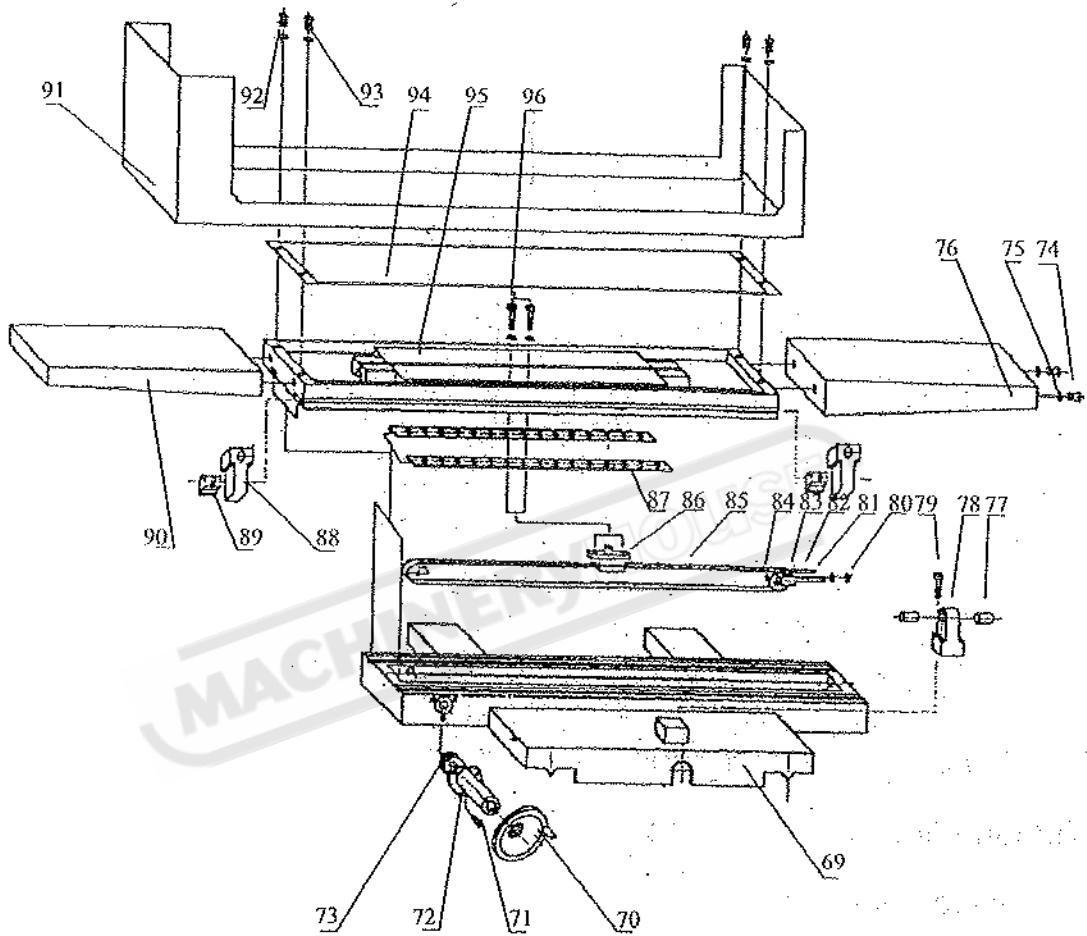
4. Levelling

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:

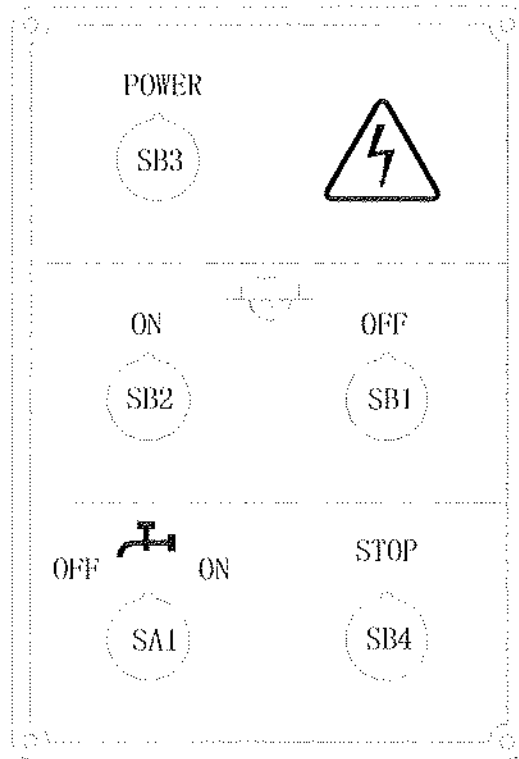
- 4.1 Set spirit level on the middle of the table (or chuck if any), both on longitudinal and transverse direction and adjust jack bolts until level accuracy shows within 0.02/m.
- 4.2 For getting good precision it is recommended to recheck level again:
  - 4.2.1 After 24 hours when machine installed 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 lost 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

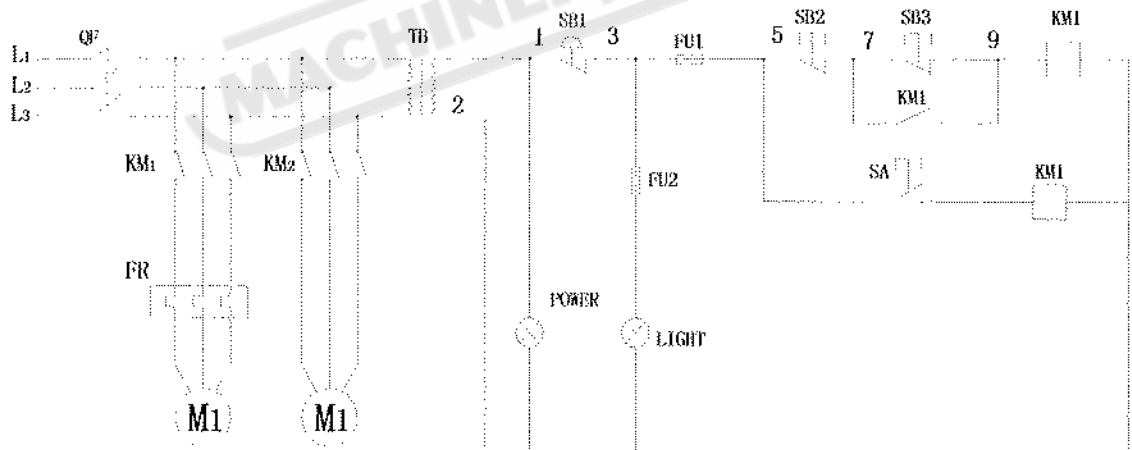
Lubrication points	Table guideways	Column guideways and Leadscrew	Saddle guideways and Leadscrew	
Interval	Autom atically	Twice daily	Twice daily	
Instruction		Pull one shot lubrication pump 5 times	Pull one shot lubrication pump 3 thimes	
MOBIL	Vacouliue oil 1409			
SHELL	Tonna 33 or 27			
BP	BP Energol 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 th 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 begin from the middle of the width, as shown on (Fig. 13e), due to two edges are usually worn out. If dressing begin 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 moves quickly over the wheel, this will makes 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 causes 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.

MACHINERYHOUSE

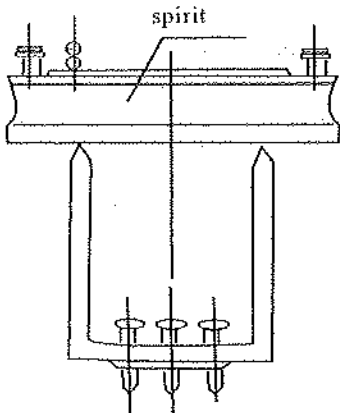


Fig. 4

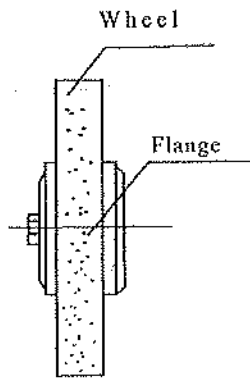


Fig. 5

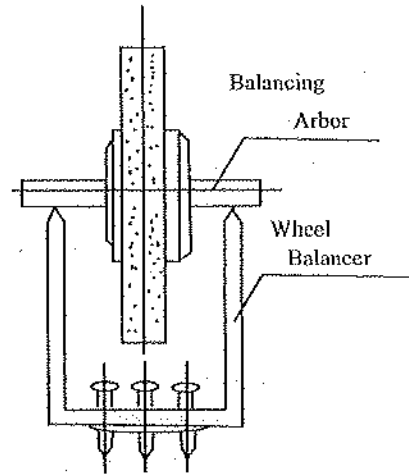
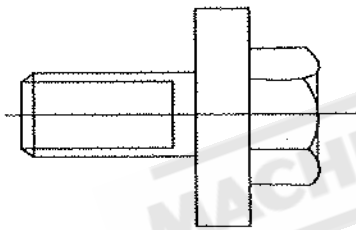
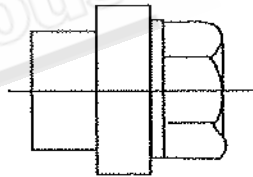


Fig. 6



Fixed Bolt

Fig. 7



Jacket Bolt

Fig. 8

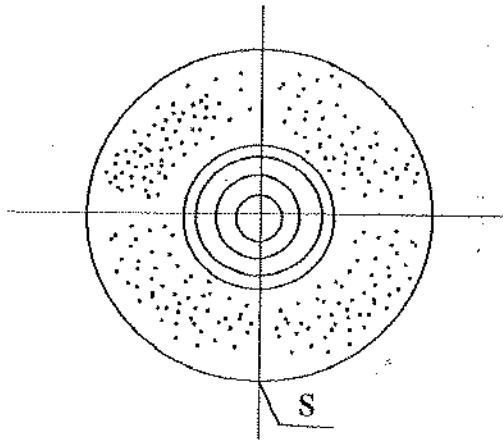


Fig. 8

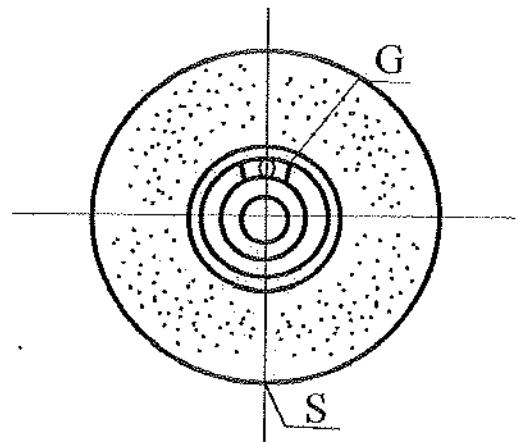


Fig. 10

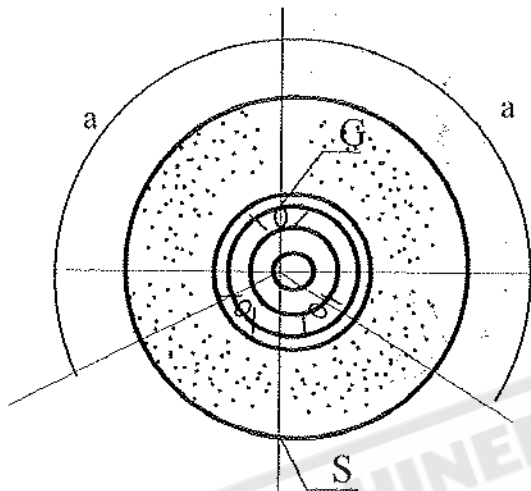


Fig. 11

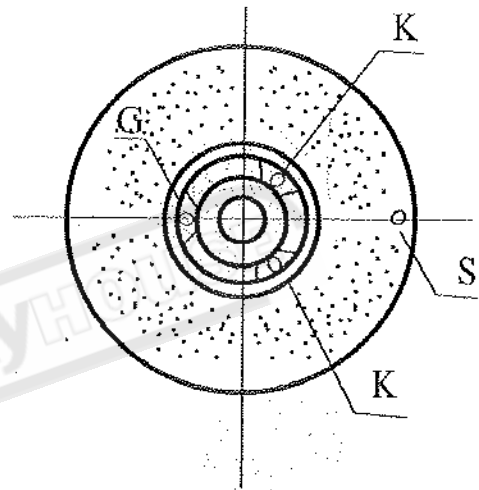


Fig. 12

## 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.

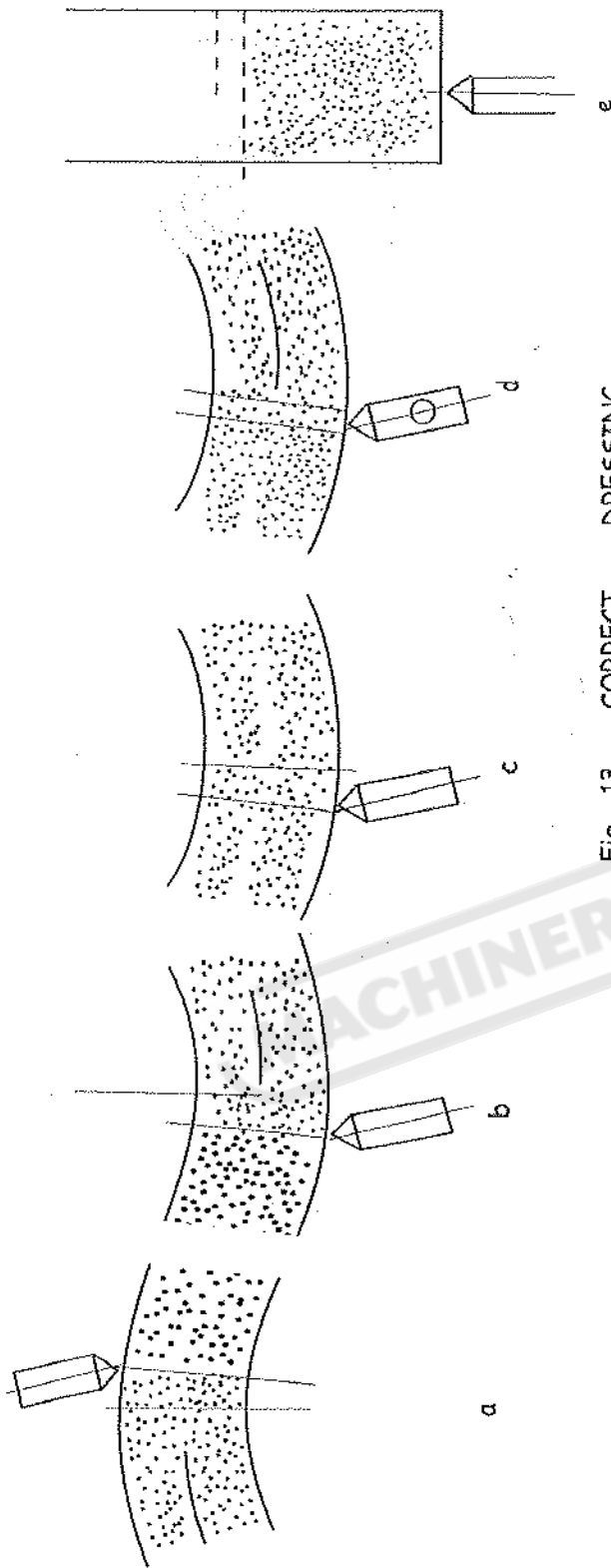
GC: For super-hard grinding such as tungsten carbide steel.

## 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



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-JI  
 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
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		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 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.

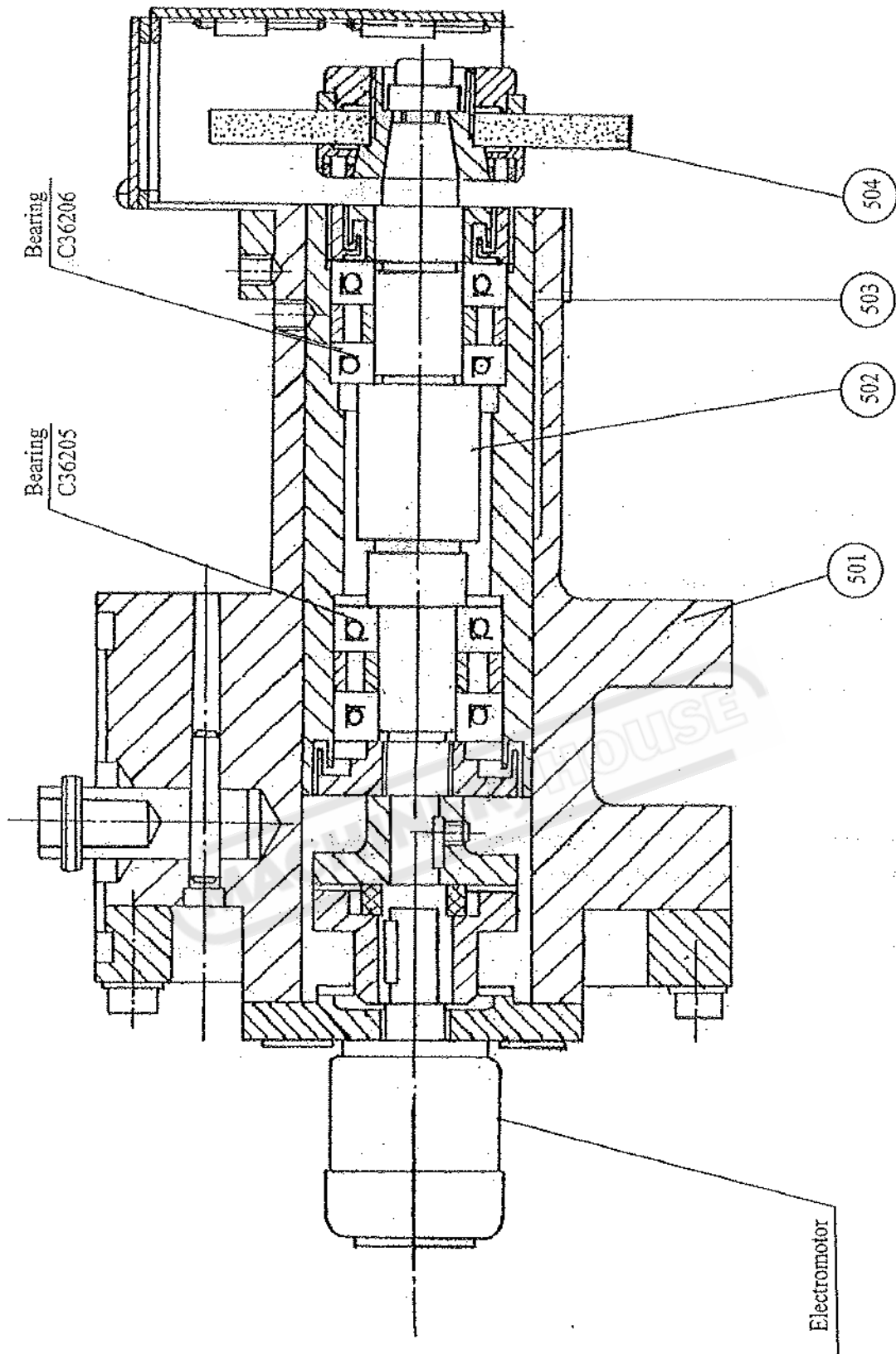
- 1.Reduce the possibility of distortion of the workpiece caused by heating.
- 2.Reduce the danger of burning.
- 3.Prevent wheel from clogging.

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 renew 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 prefer, the automatic paper strip filter is recommended to be used to instead of the simple coolant system.

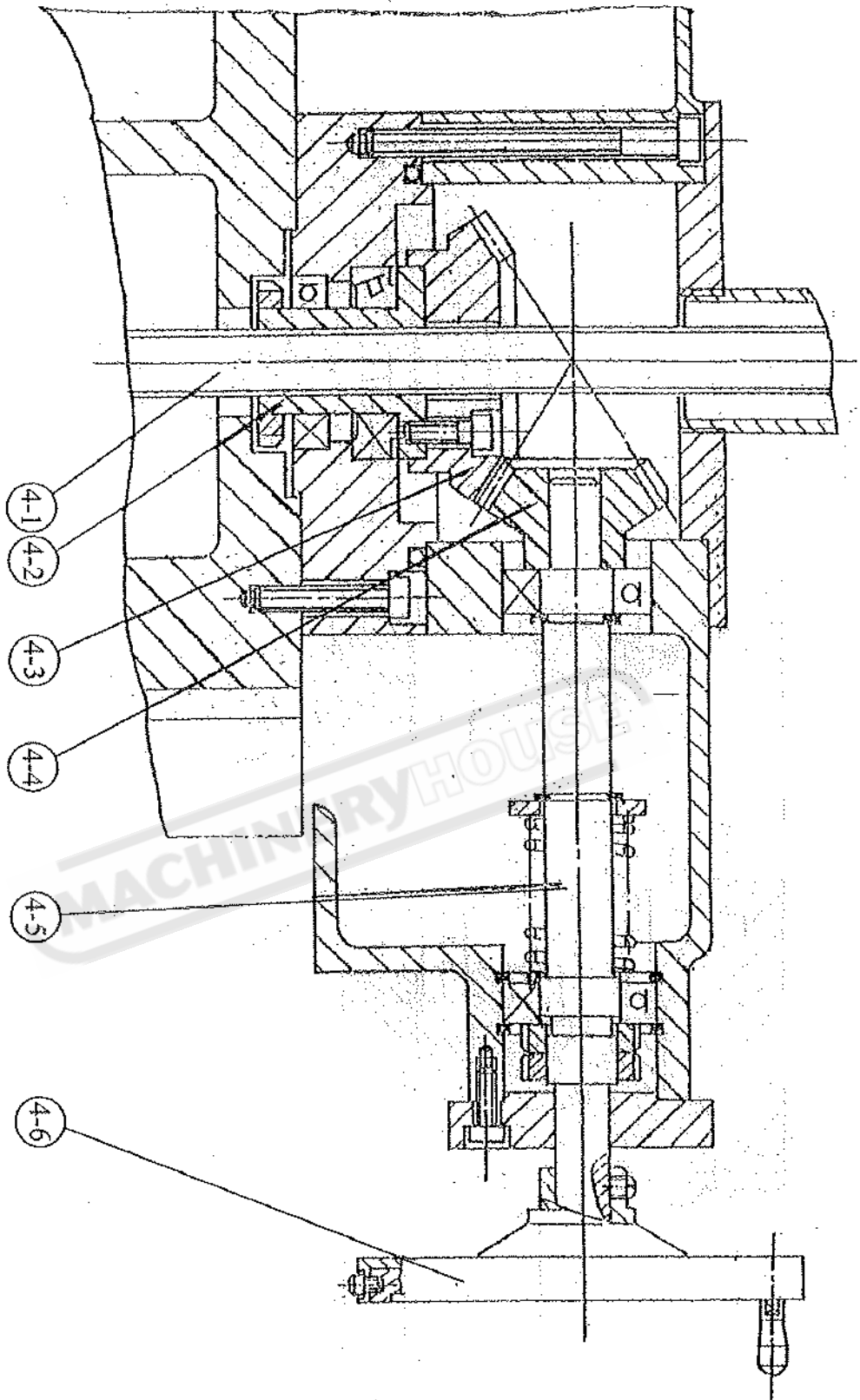
#### PERFECT SURFACE FINISH

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 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.



Column And Spindle Fig.15



Elevating Mechanism Fig. 16

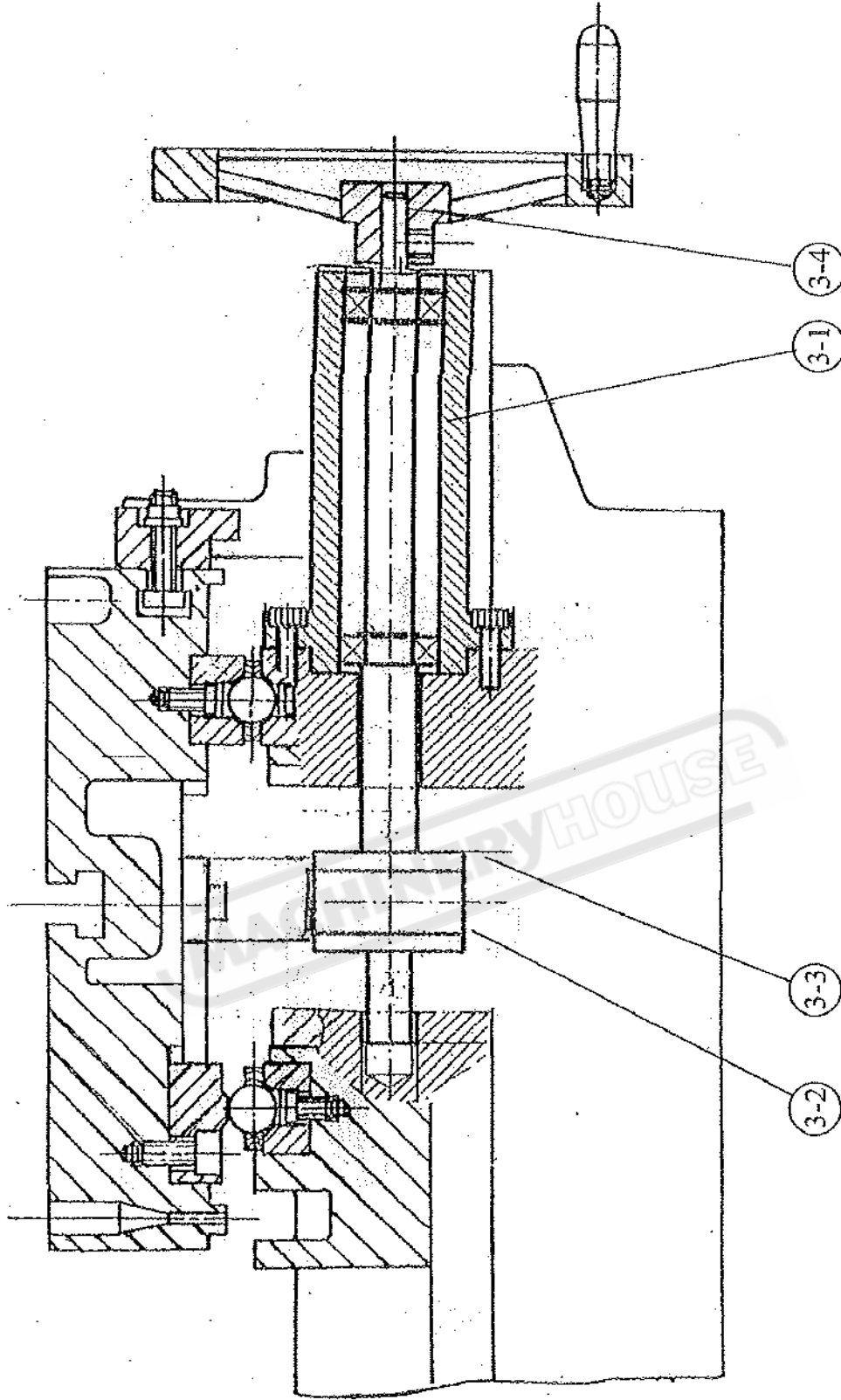
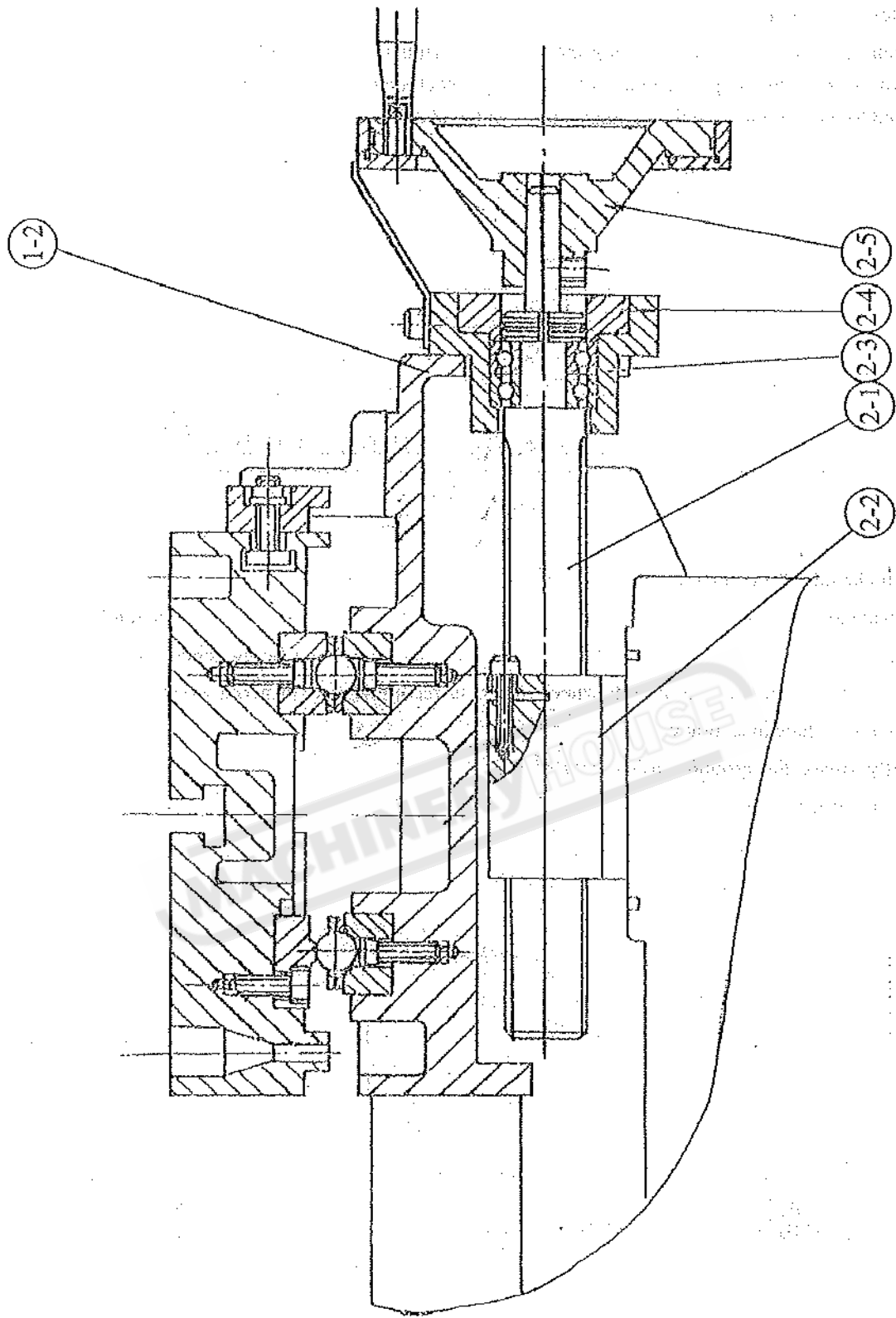


Table Traverse Mechanism sm

Fig.17



Cross feed mechanism Fig.18



## 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.

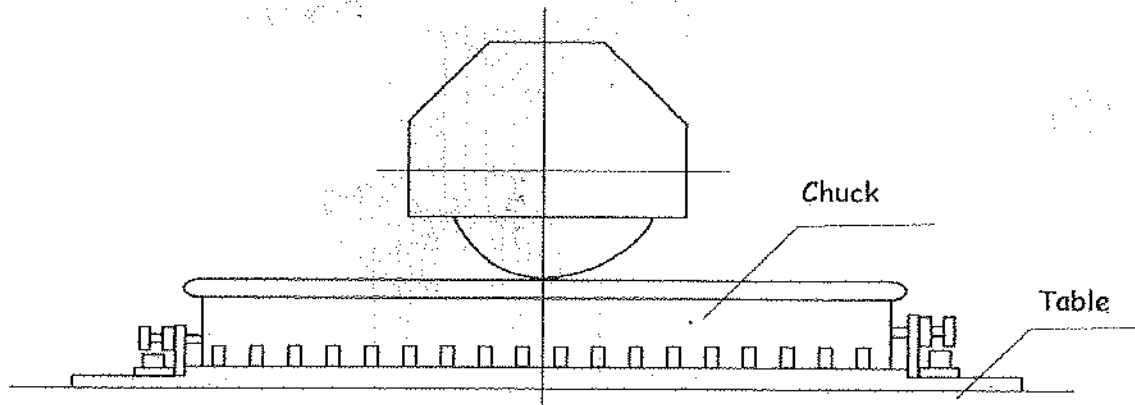


Fig. 19

1. The underside of the magnetic chuck must first be ground with great care to ensure this is flat. Chuck is laid upside down on the table, must not 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 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 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

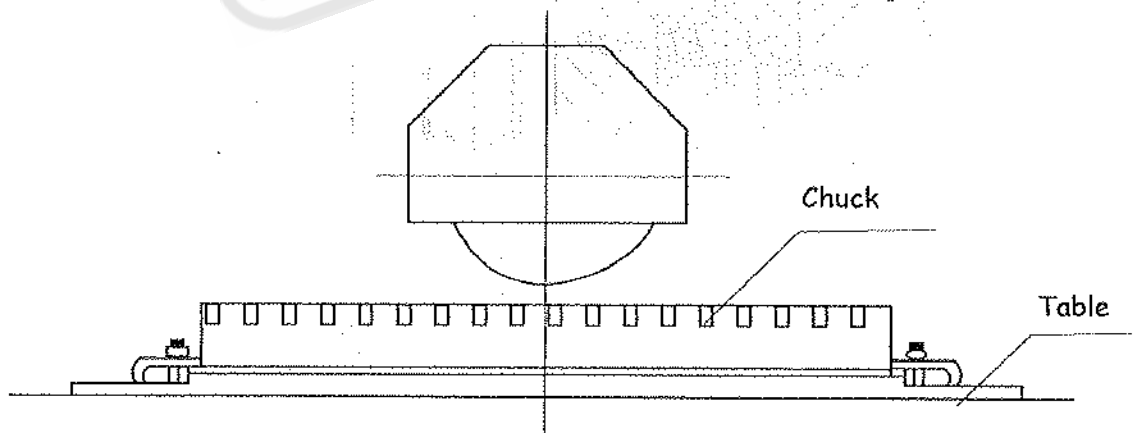


Fig. 20

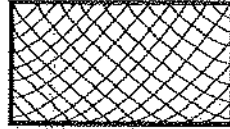
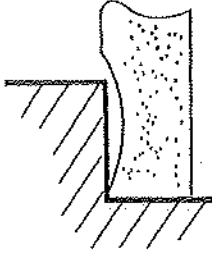
3.1 Rough grinding the chuck surface such as grinding the underside of the chuck.

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

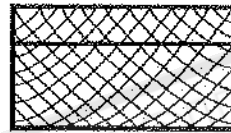
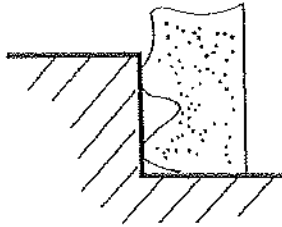
3.3 Spark out grinding the surface with no infeed, 2 to 3 times passes the wheel over the chuck surface.

#### COMMON CASES IN SIDE GRINDING

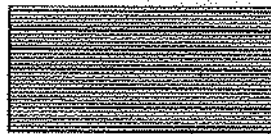
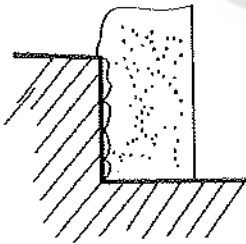
1. Wheel and the workpiece have a smaller contact surface, in which case the efficiency is higher, and the surface roughness is better.



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

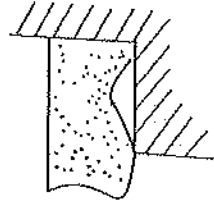
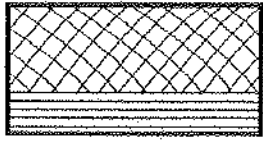


3. The wheel does not have the "Relief Angle", thus it contacts the whole face to the workpiece, causing the workpiece surface to be rough and rugged. Furthermore, it will cause workpiece burning and cracking.

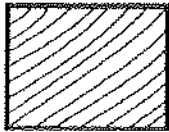


4. The "Relief Angle" of the wheel is lower than the surface of the workpiece, so that the

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.



MACHINERYHOUSE

TROUBLE SHOOTING

Grinding defects, Causes and Remedy			
NO.	Defects	Causes	Remedy
		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 balanced, replace 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 if 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 head guideways.	Clean and adjust the gibs

TROUBLE SHOOTING

Grinding defects, Causes and Remedy			
NO.	Defects	Causes	Remedy
1		Vibrations 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 position.
		Couplings of motor and spindle loosen or rubber broken.	Fix couplings well, or replace new ones.
		Unsteady running of grinding-wheel	3 phases voltage of power source are unbalance, please check and balance it or replace new spindle.
		Stock removal too great.	Reduce infeed
			Reduce cross feed
			Use softer or coarser wheel
		Grinding wheel too hard or dull and clogged	Increase table speed.
			Reduce infeed
			Roughen the wheel
			Check diamond of the dresser.

TRUBLE SHOOTING

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 defective.	See NO. 1 chatter marks.
		Too much play on wheelhead 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.

## TROUBLE SHOOTING

Grinding defects, Causes and Remedy			
NO.	Defects	Causes	Remedy
5	Burn marks and grinding 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 clogged.	Dress the wheel make it roughen and bit better.
			Reduce infeed.
Stock removal too great.	Reduce cross feed.		
Inefficient cooling	It can not be "spark out".	Table speed too low.	Increase table speed.
			Increase coolant
			Use stronger mixture coolant (fill up with fresh oil)
6	Grinding spark abnormally		Re-align the machine by adjusting the jack 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 17 × 19 22 × 24	1	Flange wrench	1
	1	Setting plate	3
	1	Anchor bolt(with nut)	3
Inner hexagon spanner 3 4 5 6 8 10 12	1	Wheel dresser	1
	1		
	1		
	1		
	1		
	1		
	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: