Kent Industrial USA Inc

Technical Documentation
Operating Manual

M-40 Universal Tool Grinder

Machine S/N：_____

Version：2013/09/18

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Technical Documentation
Operating Manual

Installation and Commissioning

M-40 Universal Tool Grinder

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1. Installation and Commissioning

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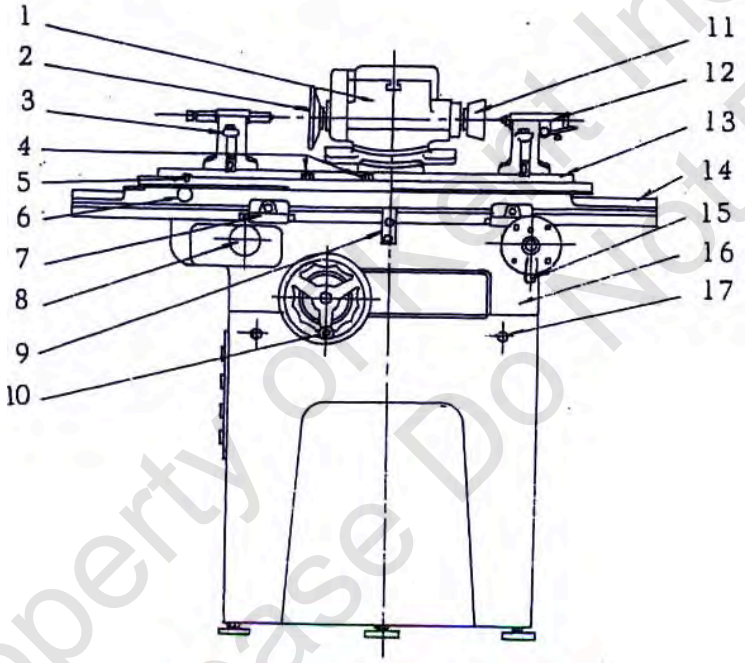
1. Installation and Commissioning

1.1 Lifting the Machine

When lifting up the machine transported into the factory by train or truck, fix the table at the middle of the bed (fasten (30) in Fig. 1.2) and set the dogs (7) at right and left show in Fig. 1.1, on stoppers (9) as illustrated in Fig. 1.3, and then move the wheel head to the table as closely as possible. The wire ropes to be used for this work should be strong enough to withstand a weight of 2000 kg. (4400 lbs.). The portions where the wire ropes may touch should be protected form any crush, which may cause some inaccurate movements later on.



(1) Grinding wheel head
(2) Grinding wheel (Standard equipment)
(3) Left tailstock (Standard equipment)
(4) Hexagonal nut for fixing turning table
(5) Eccentric pin
(6) Taper adjusting screw
(7) Dog
(8) Knob for table travel
(9) Stopper
(10) Hand-wheel for grinding head cross movement
(11) Grinding wheel (Standard equipment)
(12) Right tailstock (Standard equipment)
(13) Turning table
(14) Sliding table
(15) Crank handle for table fine feed
(16) Bridge
(17) Bolt for lifting machine

Fig.1.1 Names of parts (A)

1.2 Inspection and Cleaning of Machine

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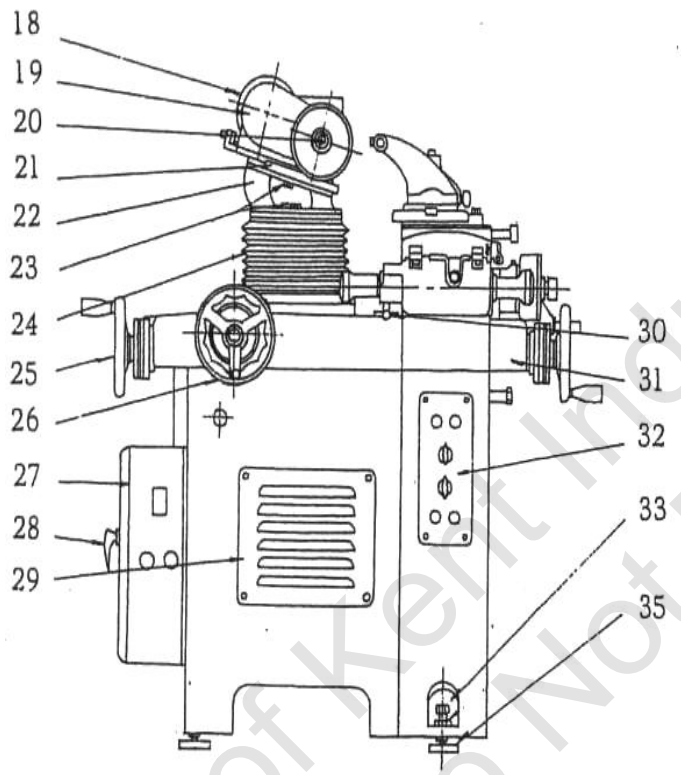
An inspection to find some damaged portion which might have been caused by shock during the transportation, as well as to find if there are some parts, the standard equipment missing, should be made after the arrival of the machine in your works.

The dirty spots possible made during the packing of the machine should be cleaned, and the antirust liquid should be thoroughly washed out by a proper oil.



(18)Motor
(19)Belt cover
(20)Grinding spindle
(21)Swivel base
(22)Angle base
(23)Hexagonal nut for fixing base
(24)Dust guard bellows
(25)Hand wheel for grinding head cross movement
(26)Hand wheel for grinding head vertical movement
(27)Electromagnetic control box
(28)Electromagnetic control box opening handle
(29)Bed cover
(30)Table fixing screw
(31)Saddle
(32)Electric operation panel
(33)Leveling bolt
(35)Nut

Fig.1.2 Names of parts (B)

1.3 Foundation and Installation

The machining accuracy obtained owes very much to the foundation and installation of the machine. For this reason, a perfect foundation with proper thickness and pressure-enduring space must be provided according to the ground nature, as specified in chapter 2.4 , "floor plan".(In general case , a thickness of 300 mm (12") is considered to be enough.) If the concrete floor of your words is originally provided with an enough strength, there is no need to make up a special foundation. When the machine is now placed on the installing place, fix it with the fixing device at three portions, each consisting of leveling bolt (33), nut and leveling pad (35), (see Fig. 1.2, and by which level up the machine in either longitudinal or cross direction using a leveling device for precision measurement.

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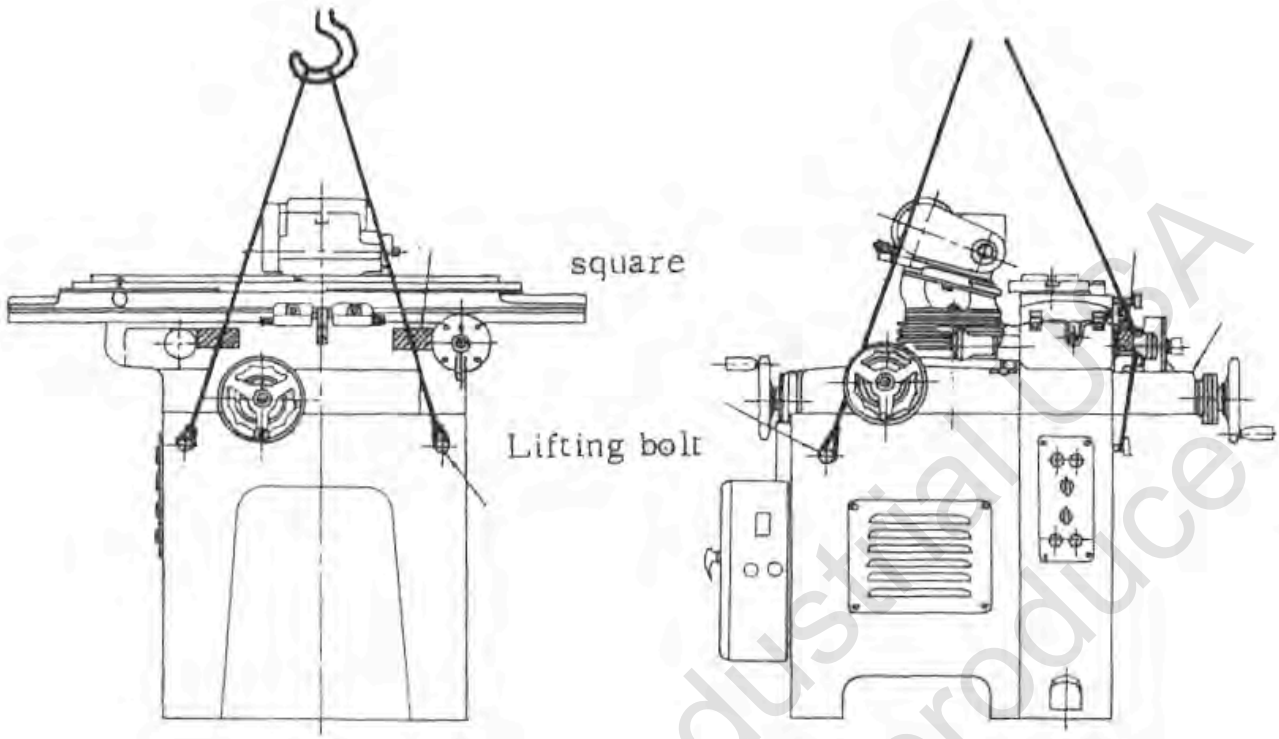

Fig.1.3 The method of hoisting

1.4 Power of Connection

After installing the machine, connect the wires of the power source to the terminals (R,S,T), (1), for 3-phase supply, which you see among the terminals equipped in the elector- magnetic control box, when you open the cover by the provided handle. Confirm that the power source plug for grinding spindle motor is inserted in the socket illustrated in the Fig. 1.6, as 1.

Now the power source indication lamp [(2) in Fig. 1.4] will be lighted when you set the main switch [(1) in Fig. 1.4] "ON". Then turn the selection switch for grinding spindle to the right. The grinding wheel spindle will then rotation in counter-clock-wise direction, viewed form the opposite side of belt- cover [(19) in Fig. 1.2], the spindle is running in the specific direction. However, should you find it running in clock-wise direction, it is reversed rotation.

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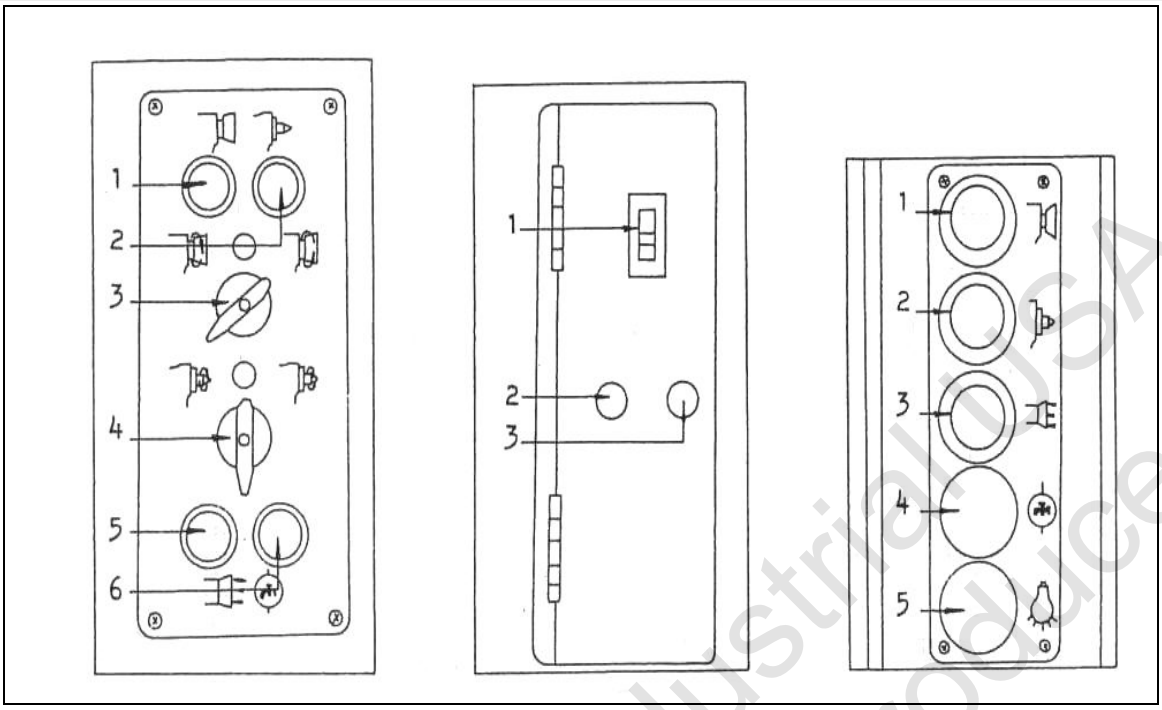
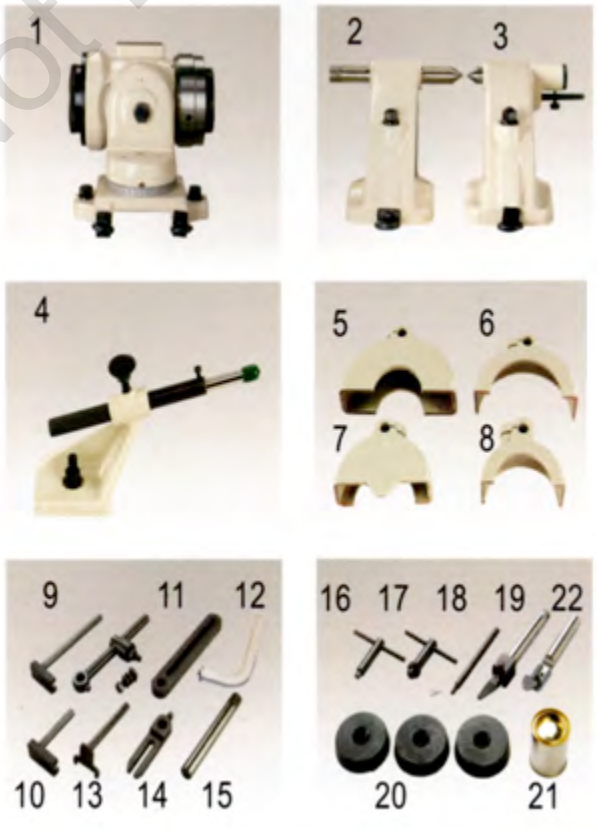


Fig. 1.4 Fig. 1.5 Fig.1.6

1.5 Standard Accessories

Tab.1.1 Standard Accessories

1.	Working head
2.	Left-hand tailstock
3.	Right-hand tailstock
4.	Diamond dresser holder
5.	Wheel guard
6.	Wheel guard
7.	Wheel guard
8.	Wheel guard
9.	Wheel guard holder(long)
10.	Wheel guard holder(short)
11.	Universal tooth rest plate and blade holder extension
12.	Center gauge
13.	Collet wrench
14.	Plain tooth rest holder (with offset blade)
15.	Ejector rod
16.	T-wrench for grinding wheel sleeve
17.	Sleeve extracting bar
18.	Pin wrench
19.	Micrometer adjustable toothrest



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	(with round top blade)
20.	Leveling pads (3pcs)
21.	Touch-up paint
22.	Plain tooth rest holder (with offset blade)
23.	Reducing collet B&S No.12 × No.10 (or MT No.5 × No.4)
24.	Reducing collet B&S No.12 × No.9 (or MT No.5 × No.3)
25.	Reducing collet B&S No.12 × No.7 or MT No.5 × No.2)
26.	Grinding wheel sleeves (5sets)
27.	Grinding wheel (6"×3/4"×1 1/4")
28.	Grinding wheel (6"×1/2"× 1 1/4")
29.	Grinding wheel (6"×1/2"×1 1/4")
30.	Grinding wheel (3"×1/2" 1 1/2"×1 1/4")
31.	Grinding wheel (4"×1/16"×1/4")
32.	Grinding wheel (5"×1 1/2"×11/4")
33.	Grinding wheel (3"×1/2"×1/2")
34.	Double end wrench
35.	Nut wrench
36.	Driver
37.	Nut wrench
38.	Allen type wrench
39.	Washer for 1/8" dia. Grinding wheel
40.	Center for workhead spindle B&S No.7 (or MT No.2)
41.	4" spindle extension
42.	4" extension wheel sleeve and collar
43.	Belt for spindle drive (Poly-flex belt)
44.	Draw-in bolt for workhead and washer
45.	Tool cabinet
46.	Extension and washers of slit-saw and side-mill cutters

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2. Product Description

2.1 Feature

Fig.2.1 Feature

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2.2 Machine Specifications

Tab. 2.1 Capacity

Swing over table	250 mm(10")
Distance between centers	700 mm(27")
Distance between tailstock and work-head	580 mm(22")
Taper hole of work-head spindle	One end MT # 5 other end ASA # 50

Tab. 2.2 Table

Wide bed	135 mm(5 $^{5"}/_{16}$)
Bed length	940 mm(37 $^{1"}/_{2}$)
Longitudinal movement	400 mm(16")
Table graduation on end, for taper of	±10°
Graduation for table swivel movement	±60°
Cross movement of wheel head	250 mm(10")
Vertical movement of wheel head	250 mm(10")
Wheel head swivels	360°
Wheel head tilts	30(±15) ° /180(±90) °
Distance between spindle center and table surface	50 mm(2")(min.)
Distance between spindle center and table surface	300 mm(12")(max.)
Grinding wheel spindle speed	2600,3700,6200 rpm
Grinding wheel spindle drive motor	0.7kw(1HP),2-poles
Required floor space	1550 mm × 1735 mm (61" × 68 $^{1}/_{2"}$)
Net weight	1160 kgs (2560 lbs)
Packing size	1460 mm×1460 mm×1510 mm

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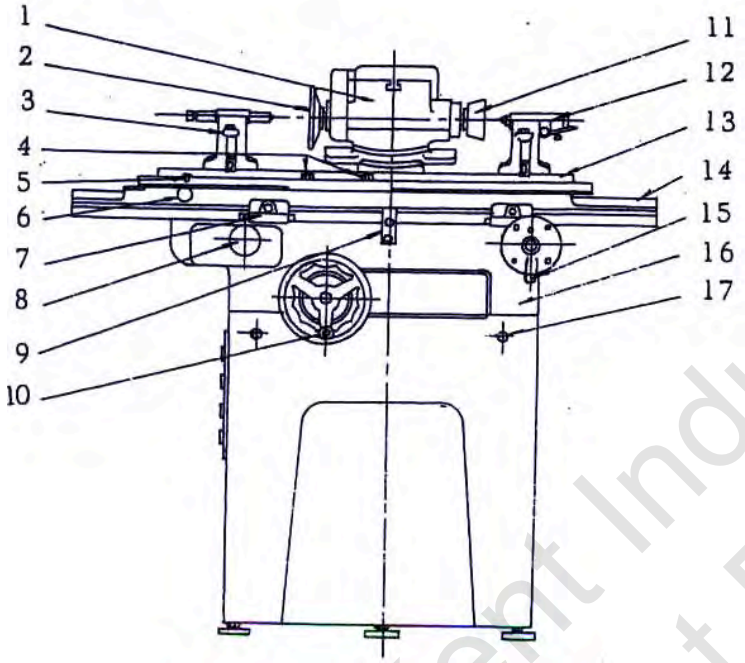
2.3 Names of Operation Parts and Others



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(17) Bolt for lifting machine

Fig.2.2

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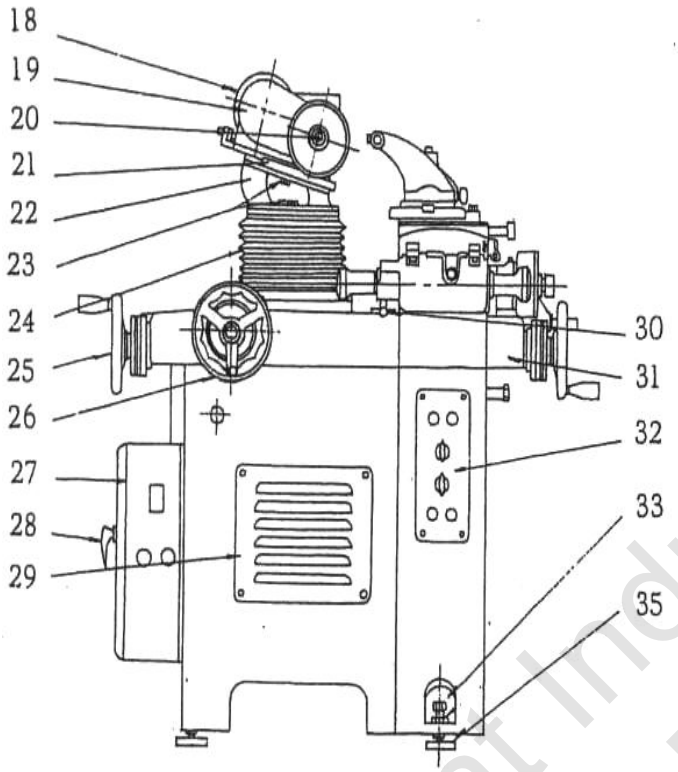

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(31)Saddle
(32)Electric operation panel
(33)Leveling bolt
(35)Mounting pad

Fig.2.3

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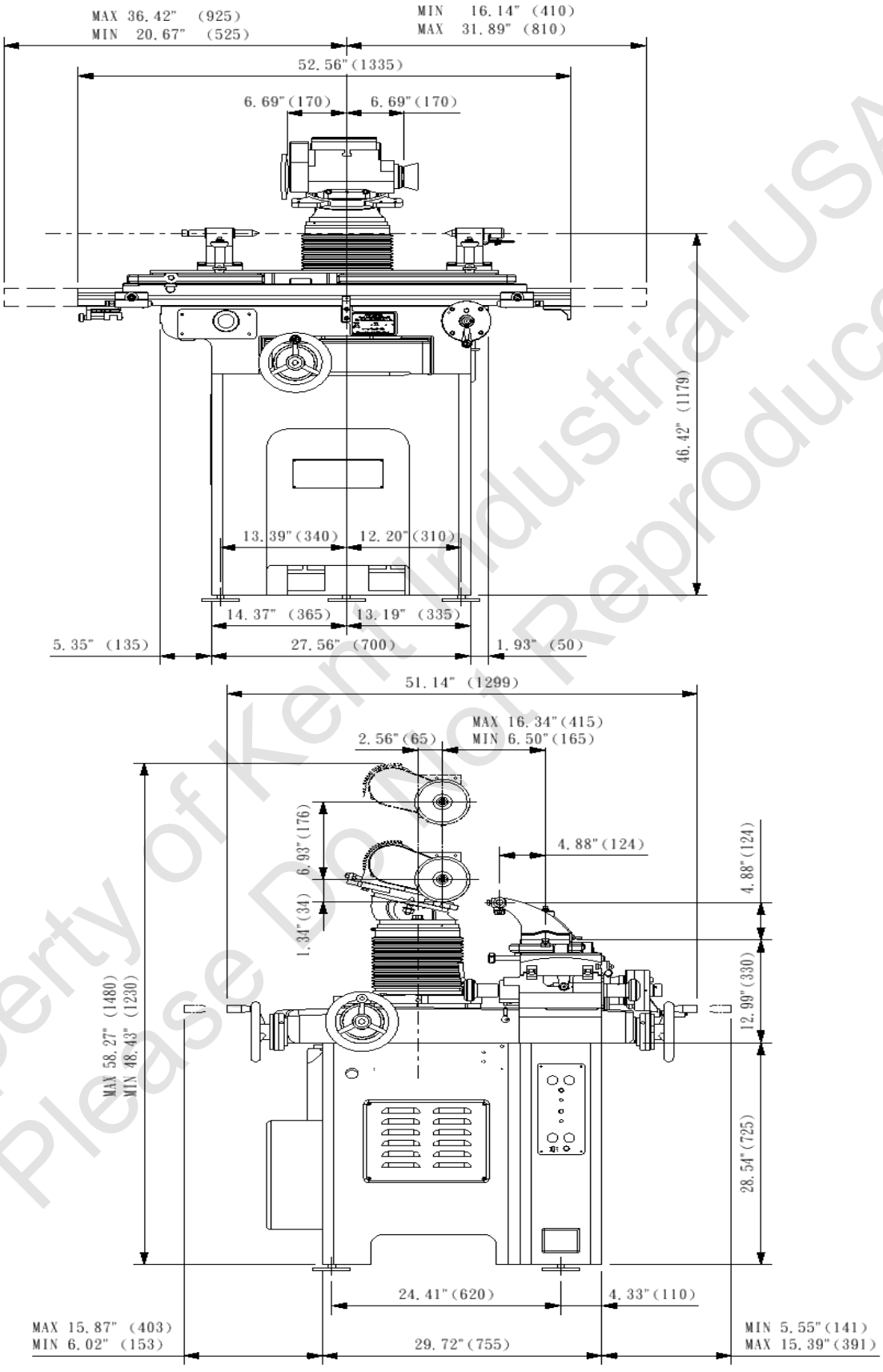
2.4 Main Size of Each Part and Foundation



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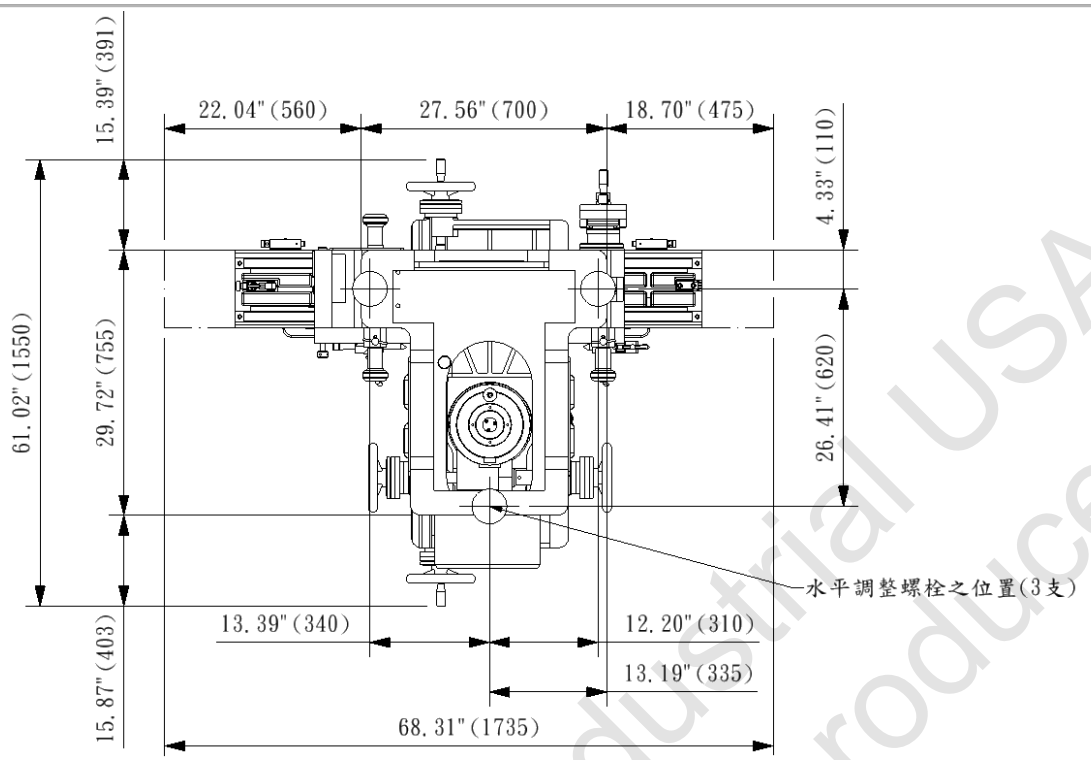

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3. General Safety Notes

3.1 General Safety Precautions

1. Before starting machine, a user must first read this manual and follow the instructions Attorney machines. Accordance with the instructions to operate the machine if equipped, resulting in damage to the danger, users need to be responsible.
2. Well-trained professional operator action or maintenance, non-professional personnel are strictly prohibited to touch any of the machine's device or button.
3. Users should familiarize themselves with the location of the emergency stop switch, in response to a variety of hazards that may occur. When any accident occurs, immediately press the emergency stop switch.
4. Users should note that the machine's safety and warning signs. Safety and warning signs are strictly prohibited tear.
5. Accumulation of persons with long hair should wear a hat or hair covered properly, before approaching the machine; if not, then this machine is strictly prohibited proximity of one meter range.
6. Prohibited wearing robes, ties, scarves, necklaces, or any long hanging items close to the machine.
7. Wearing a long-sleeved shirt buttoned sleeves should first before approaching the machine.
8. Machine and its surroundings should be kept clean, can not place objects on the machine table, to prevent accidents.
9. The machine is equipped with the sharp knives; replacing or moving the tool, you should first put on gloves to avoid cuts.
10. Hand stretched near the machine before, turn the power off.
11. Before starting machine, should make sure there are no other people around the machine (Especially children)。
12. Before starting machine, should make sure all of the safety cover on the machine has been turned off properly.
13. Before starting machine, should make sure to secure the proper axis.
14. Before starting machine, should be at low speed until the machine stable condition without problems, before beginning to accelerate.
15. Loading or unloading, you should make sure the machine is completely still, and turn off the machine power.
16. Maintenance inside the machine, they should carry a flashlight.
17. Without our permission is strictly prohibited to change the machinery of any devices or structures. Found inside the machine there is any danger that might occur, immediately stop operating the machine, and contact us.

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4. Exploded Diagram and Parts List

4.1 Parts List

4.1.1 Bed and Saddle

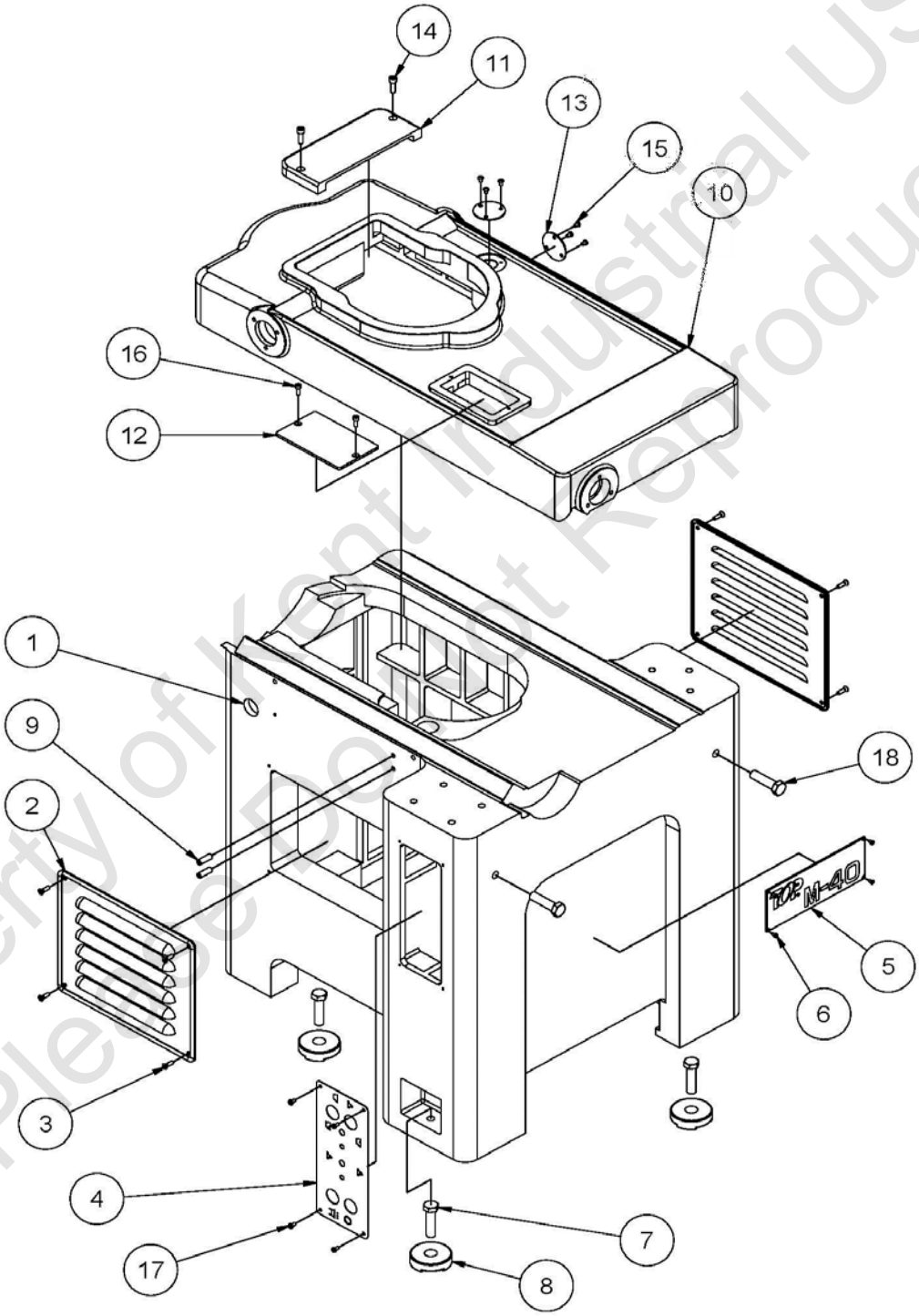

Fig.4.1
Tab.4.1

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Project	Product No.	Name	Specification	Quantity
1	M410010**	Base		1
2	M410030**	Bed cover		2
3	GF015963	Oval countersunk head screw	M6*20	8
4	M410080**	Operation nameplate		1
5	M410071**	Indication plate		1
6	GF010544	Drive screw rivet	M4*8	4
7	GF017192	Leveling bolt	M16*60(Whole tooth)	3
8	M460350**	Base plate		3
9	GF012692	Straight pin	M10*30	2
10	M410020**	Saddle		1
11	M410050**	Saddle upper cover		1
12	M410040**	Circular lid		1
13	M410061**	Circular lid		2
14	GF013983	Socket head cap-screw	M8*25	2
15	GF010560	Pan head screw	M5*8	6
16	GF012016	Pan head screw		2
17	GF017202	Pan head screw	M5*10	4
18	GF014232	Lifting bolt	M16*60	2

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4.1.2 Saddle Feed

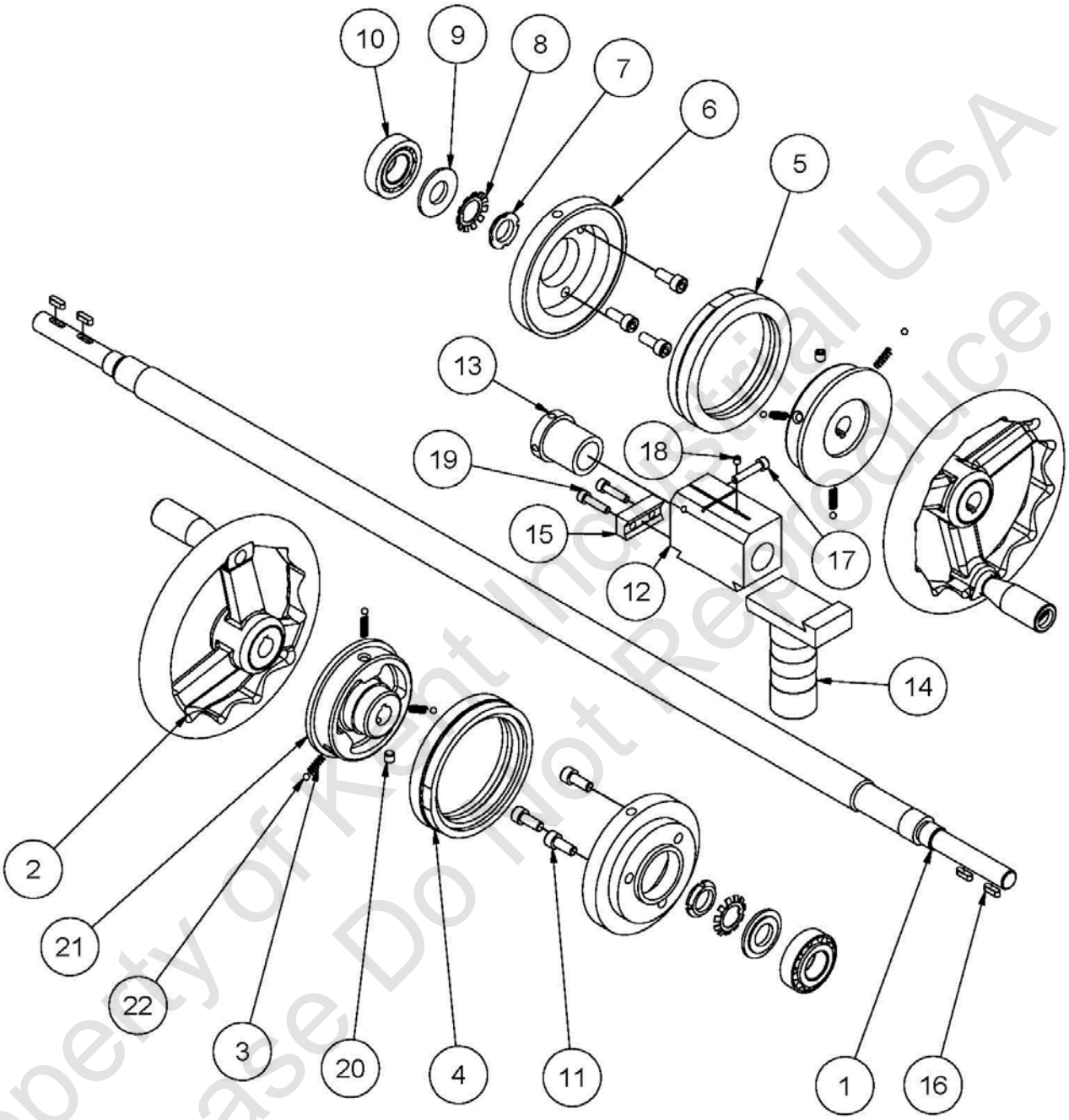

Fig.4.2

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Tab.4.2

Number	Part No.	Part Name	Specification	Quantity
1	M430058**	Saddle feed screw		1
2	GD020389	Handwheel	KPS 200 + FG 90/M10	2
3	M430100**	Spring		6
4	M430111**	Graduated collar		1
5	M430112**	Graduated collar		1
6	M430080**	Indication collar		2
7	M430070**	Crown nut		2
8	GE010269	Rose washer	20	2
9	M430060**	Washer		2
10	GB020017	Tapered roller bearing	30205	2
11	GF014575	Socket head cap-screw	M8*20	6
12	M430028**	Saddle feed nut		1
13	M430038**	Telescope		1
14	M430010**	Saddle feed nut		1
15	M430040**	Spacer		1
16	GC010188	Woodruff key	5*5*16	4
17	GF011398	Pan head screw	M6*30	1
18	GF010780	Spring	M5*6	1
19	GF011987	Pan head screw	M6*25	2
20	GF012595	Woodruff key	M8*8	2
21	M430090**	Collar		2
22	GB050092	Steel ball	Φ5.0	6

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4.1.3 Vertical Feed Shaft for Grinding Wheel Head

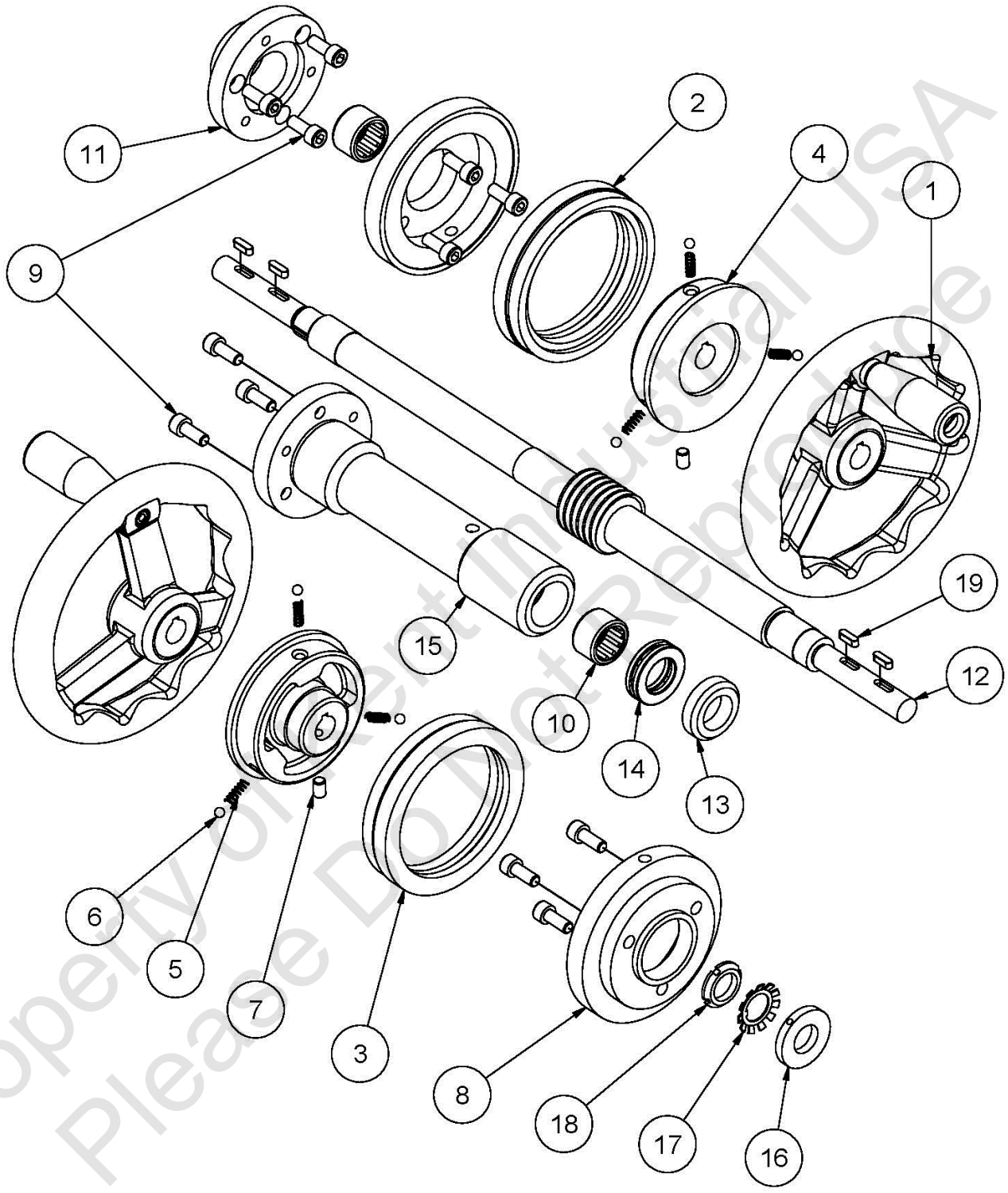

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Fig.4.3

Tab.4.3

Number	Part No.	Part Name	Specification	Quantity
1	GD020389	Handwheel (Left side of saddle)	KPS 200 + FG 90/M10	2
2	M430112**	Graduated collar		1
3	M430111**	Graduated collar		1
4	M430090**	Collar		2
5	M430100**	Spring		6
6	GB050063	Steel ball	Φ1/4”	6
7	GF012618	Woodruff key	M8*12	2
8	M430080**	Indication collar		2
9	GF014575	Socket head cap-screw	M8*20	12
10	GB020431	Needle bearing	HK2520	3
11	M431050**	Sleeve		1
12	M431038**	Vertical feed shaft		1
13	M431040**	Bearing collar	Φ25*Φ42*11L	1
14	GB030124	Thrust ball bearing	51105	1
15	M431020**	Sleeve		1
16	M431010**	Washer	Φ20.5*Φ42*6L	1
17	GE010269	Rose washer	20	1
18	M430070**	Crown nut		1
19	GC010188	Woodruff key	5*5*16	4

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4.1.4 Elevating Column

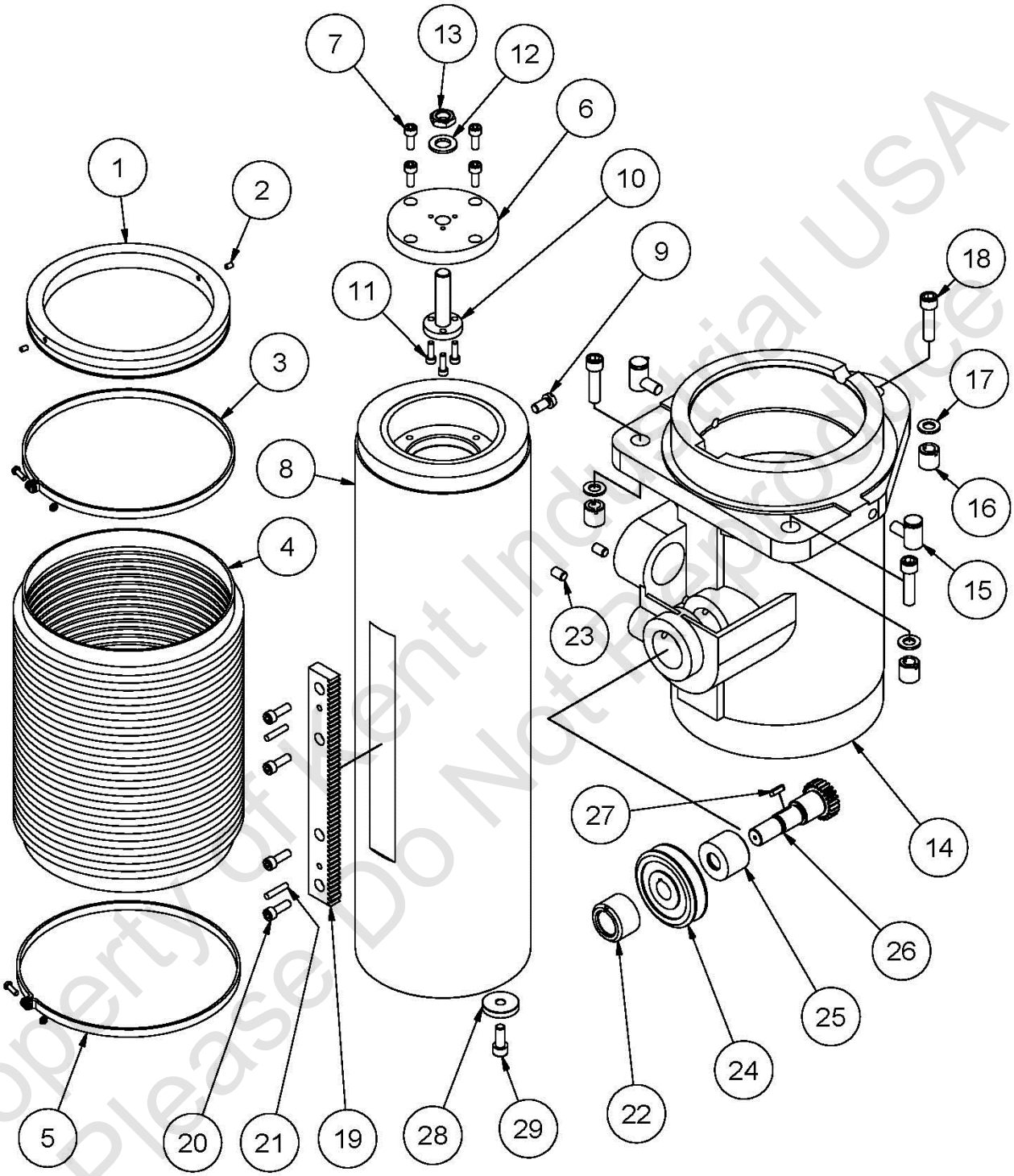

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Fig.4.4

Tab.4.4

Number	Part No.	Part Name	Specification	Quantity
1	M432140**	Graduated ring		1
2	GF015057	Set screw ,cone point	M5*8	2
3	GM071112	Dust guard(A)	9.5”	1
4	GA010078	Dust guard bellows		1
5	GM071109	Dust guard(A)	9”	1
6	M432080**	Circular lid		1
7	GF014575	Socket head cap-screw	M8*20	4
8	M432020**	Elevating column		1
9		Screw		1
10	M432090**	Flanged pin		1
11	GF012003	Socket head cap-screw	M6*20	3
12	GE011738	Washer	16	1
13	GF030810	Hexagonal nut	16	1
14	M432010**	Elevating column base		1
15		Oil cup		2
16	M432150**	Adjusting screw		3
17	GE011644	Washer	12	3
18	GF014069	Hexagonal bolt	M12*45	3
19	M432030**	Grinding wheel head elevating rack		1
20	GF013983	Socket head cap-screw	M8*25	4
21		Taper pin		2
22	M432070**	Pinion bushing(b)		1
23	GF012676	Taper pin	M10*16	2
24	M432068**	Worm wheel		1
25	M432040**	Pinion bushing (a)		1
26	M432050**	Pinion		1
27	GC010450	Woodruff key	5*5*20	1
28	M432100**	Stopper	Φ10*Φ40*7.5L	1
29	GF014944	Socket head cap-screw	M10*25	1

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4.1.5 Wheel Head

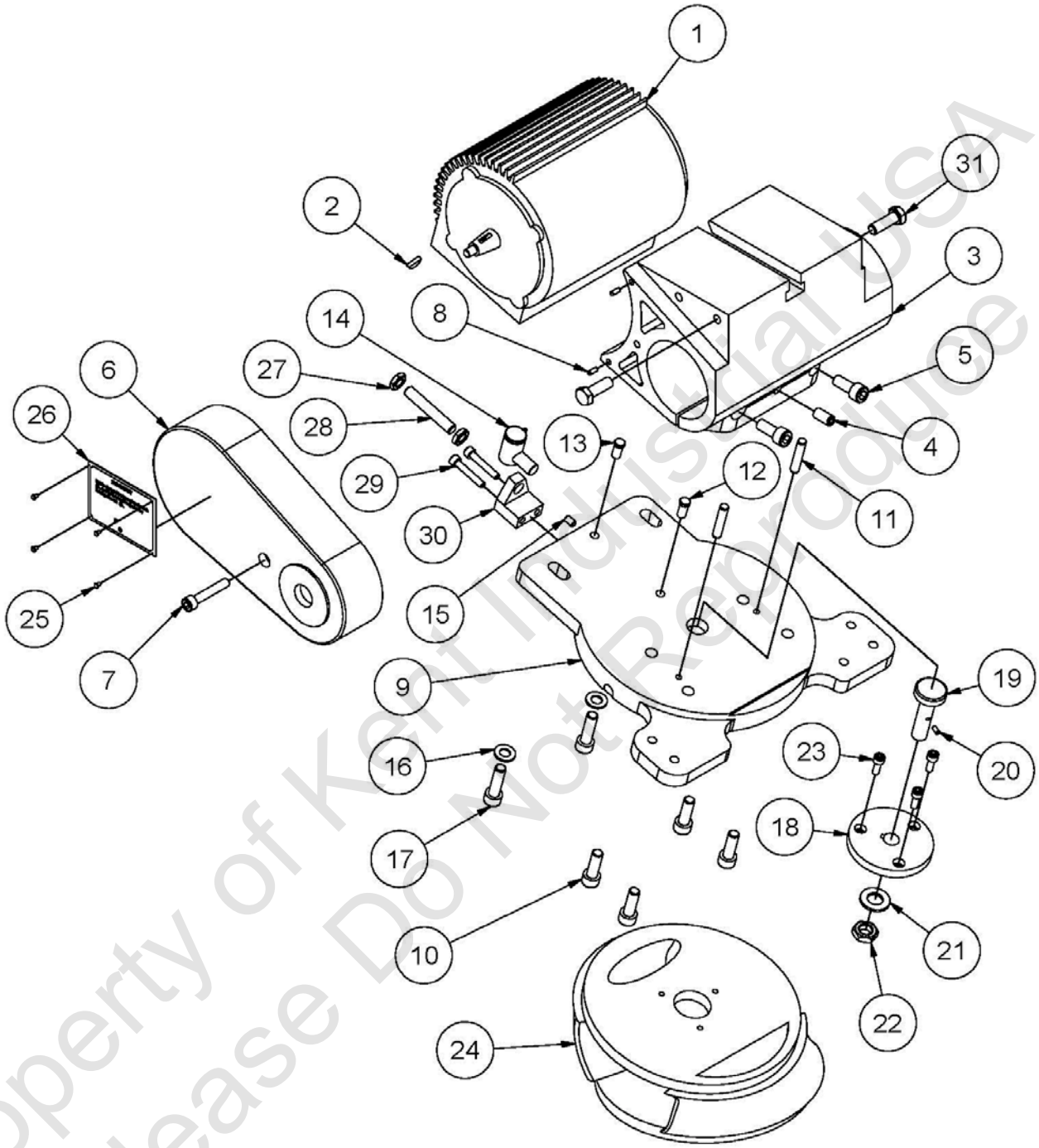

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Fig.4.5

Tab.4.5

Number	Part No.	Part Name	Specification	Quantity
1	GG010052	Electric motor	220V/380V/3PH/50/ 60HZ/1.5HP/IP22/2P	1
2		Woodruff key		1
3	M440080**	Block wheel support, Grinding ,proper wheelhead Set screw , flat point		1
4	GF012689	Socket head cap-screw	M10*20	1
5	GF014944	Socket head cap-screw	M10*25	2
6	M440130**	Belt cover		1
7	GF011482	Socket head cap-screw	M8*45	1
8		Taper pin	Ø 4*10	2
9	M440050**	Swivel base		1
10	GF011631	Socket head cap-screw	M10 x 30	4
11		Taper pin	Ø 8*40	2
12	M440090**	Pin		1
13	M440091**	Eccentric pin		1
14		Oil cup	W5/16	1
15	GF015219	Set screw , flat point	M6*10	1
16	GE011055	Washer	10	2
17	GF014601	Socket head cap-screw	M10*35	2
18	M440040**	Pivot		1
19	M440060**	Round head bolt	(Left-hand thread)	1
20	GC030852	Straight pin	4*8	1
21	GE011631	Washer	14	1
22		Nut(left hand screw)	M14(Left-hand thread)	1
23	GF012016	Socket head cap-screw	M6*16	3
24	M440010**	Angle base		1
25		Rivet	Ø 3*5	4
26	M440150**	Indication plate		1
27	GF030357	Hexagonal lock nut	M10	2
28	M440120**	Screw rod		1
29	GF014698	Socket head cap-screw	M6*35	2
30	M440110**	Bracelet		1
31	GF016759	Hexagonal bolt	M10*30	2

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4.1.7 Workbench and Bridge Seat

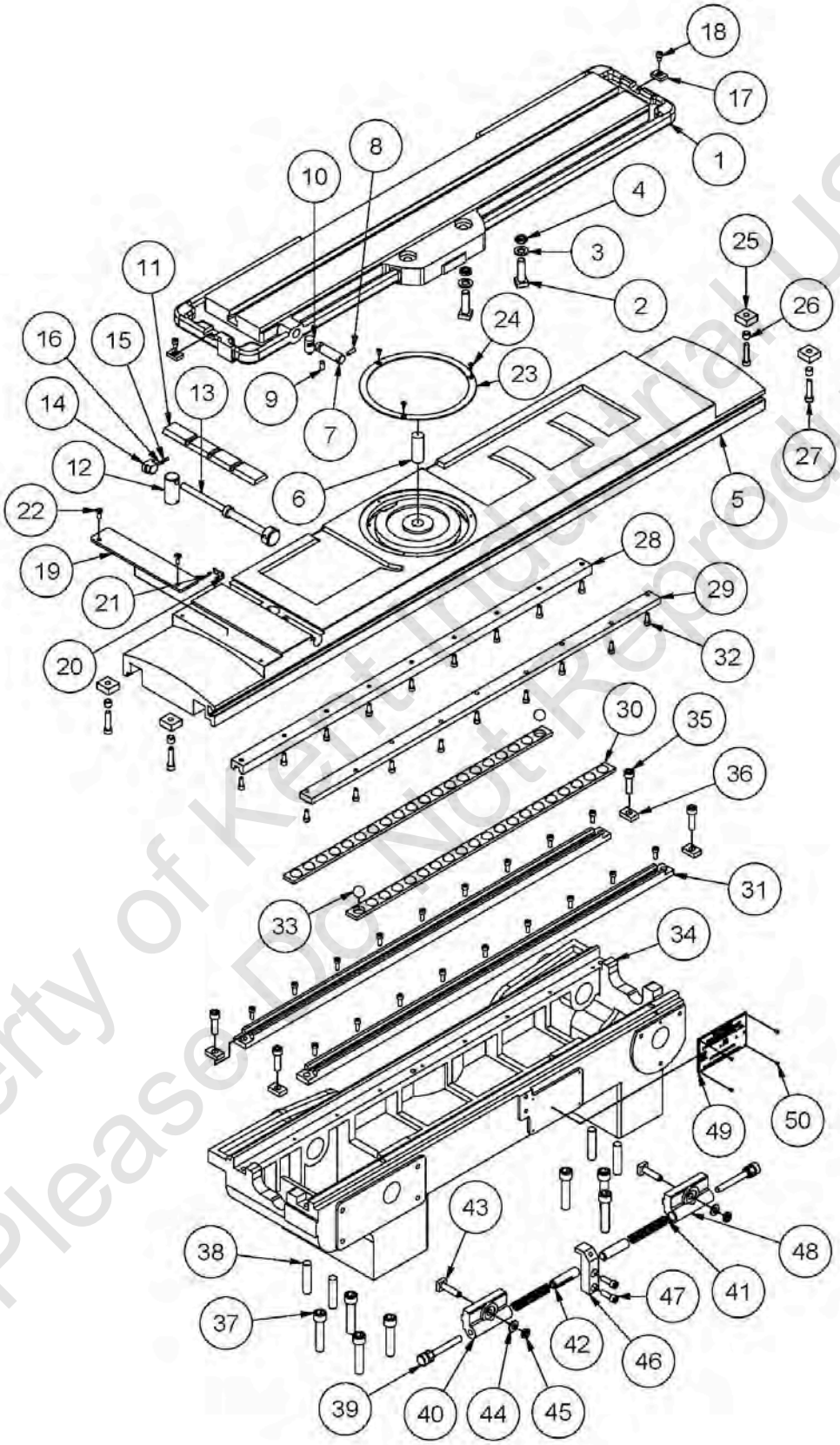

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Fig.4.7
Tab.4.7

Number	Part No.	Part Name	Specification	Quantity
1	M420290**	Swivel table		1
2	M420310**	T-bolt		2
3	GE011644	Washer	12	2
4	GF030360	Hexagonal lock nut	M12	2
5	M420130**	Sliding table		1
6	M420200**	Pin		1
7	M420270**	Eccentric pin		1
8		Taper pin	Ø 5*18	1
9		Set screw，dog point	M8*16	1
10	M420260**	Taper adjusting pin		1
11	M420250**	Taper adjusting plate		1
12	M420240**	Taper adjusting nut		1
13	M420230**	Taper adjusting screw		1
14	M420280**	Plug		1
15		Spring		1
16		Steel ball	3/16"	2
17	M420300**	Filler metal		2
18	GF011343	Flat fillister head screw	M6*10	2
19	M4202608	Angle graduated plate (1)		1
20		Indicator		1
21		0000000000	Ø 3*5	2
22		Pan head screw	M6*16	2
23	M420180**	Angle graduated plate(11)		1
24		Flush head screw	M4*8	3
25	M420170**	Stopper fixing block		4
26	M420160**	Dog		4
27	GF011518	Socket head cap-screw	M8*35	4
28	M420140**	Ball race(Upper)		1
29	M420150**	Ball race(Upper)		1
30	M420030**	Ball retainer		2
31	M420020*	Ball race (Lower)		2
32	GF012016	Socket head cap-screw	M6*16	36
33		Steel ball	3/4"	40
34	M420010**	Bridge		1
35	GF011644	Socket head cap-screw	M10*35	4
36	M420040**	Square washer		4
37		Socket head cap-screw	M14*65	7
38	GC030108	Taper Pin	8#*90(M10*P1.5)	4
39	M420110**	Dog screw		2
40	M420080**	Dog (Left)		1
41	M420090**	Dog spring		2

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42	M420100**	Dog holder		2
43	M420120**	T-bolt		2
44		Washer	M10	2
45	GF030357	Hexagonal nut	M10	2
46	M420050**	Stop base		1
47	GF013983	Socket head cap-screw	M8*25	2
48	M420070**	Dog (Right)		1
49	M410130**	Drive screw rivet		1
50		Indication plate	M3*6	4

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4.1.8 Workbench Supply

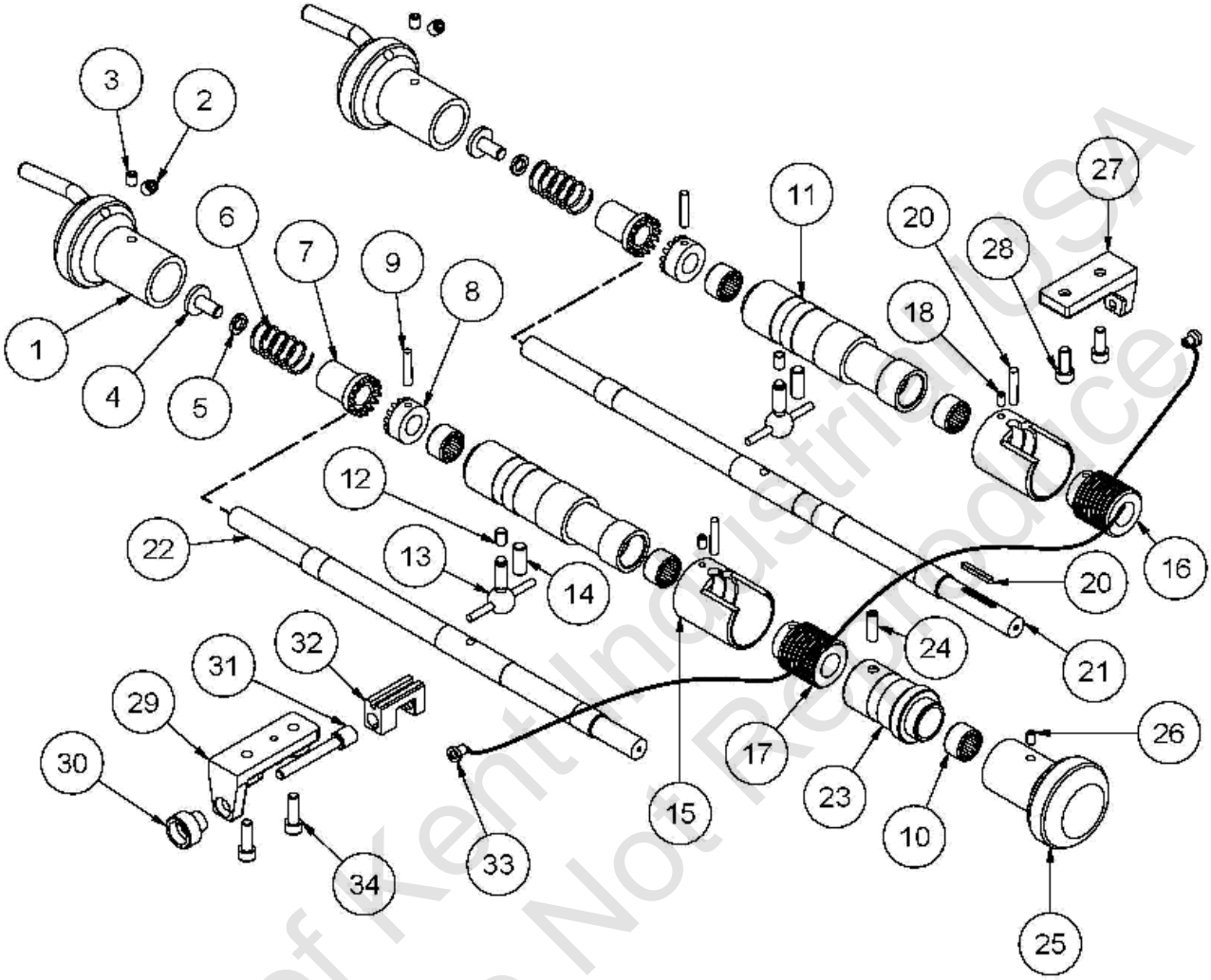

Fig.4.8

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Tab.4.8

Number	Part No.	Part Name	Specification	Quantity
1	M421110**	Feed shaft handle with handle		2
2	GF012663	Allen fix screws	M10*10	2
3	GF010845	Allen fix screws	M8*10	2
4	M421140**	Spring adjustment screws		2
5	GE010036	Spring washer	10	2
6	M421130**	Spring		2
7	M421100**	Clutch (Ago)		2
8	M421070**	Clutch (After)		2
9		Slope pin	Ø 6*32	2
10	GB010453	Needle Bearings	TLA2016	5
11	M421010**	Feed shaft sleeve		2
12	M421020**	Thin rod		2
13	M421030**	Feed shaft locking bolt		2
14	GF014960	Allen fix screws	M10*25	2
15	M421040**	Steel wire wheel sleeve		2
16	M421090**	Reels (right)		1
17	M421080**	Adjust wire reel table (left)		1
18	GF015219	Allen fix screws	M6*10	2
19		Slope pin	Ø 6*32	2
20		Flat key	4*4*32	1
21	M421050**	Table feed axis (right)		1
22	M421060**	Table feed axis (left)		1
23	M421150**	Table feed axis cover		1
24	GF015484	Allen fix screws	M8*25	1
25	M421160**	Handle feed axis		1
26	GF015219	Allen fix screws	M6*10	1
27	M420220**	Adjust seat (right)		1
28	GF014575	Hexagon socket head screws Order	M8*20	2
29	M420210**	Steel wire adjustment seat(left)		1
30	M421210**	Steel wire adjustment round		1
31	M421200**	Steel wire adjustment screws		1
32	M421190**	Steel wire adjustment tension blocks		1
33	M421180**	Steel wire chock		2
34	GF013983	Hexagon socket head screws Order	M8*25	2

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4.1.9 Trimming Supply Handle

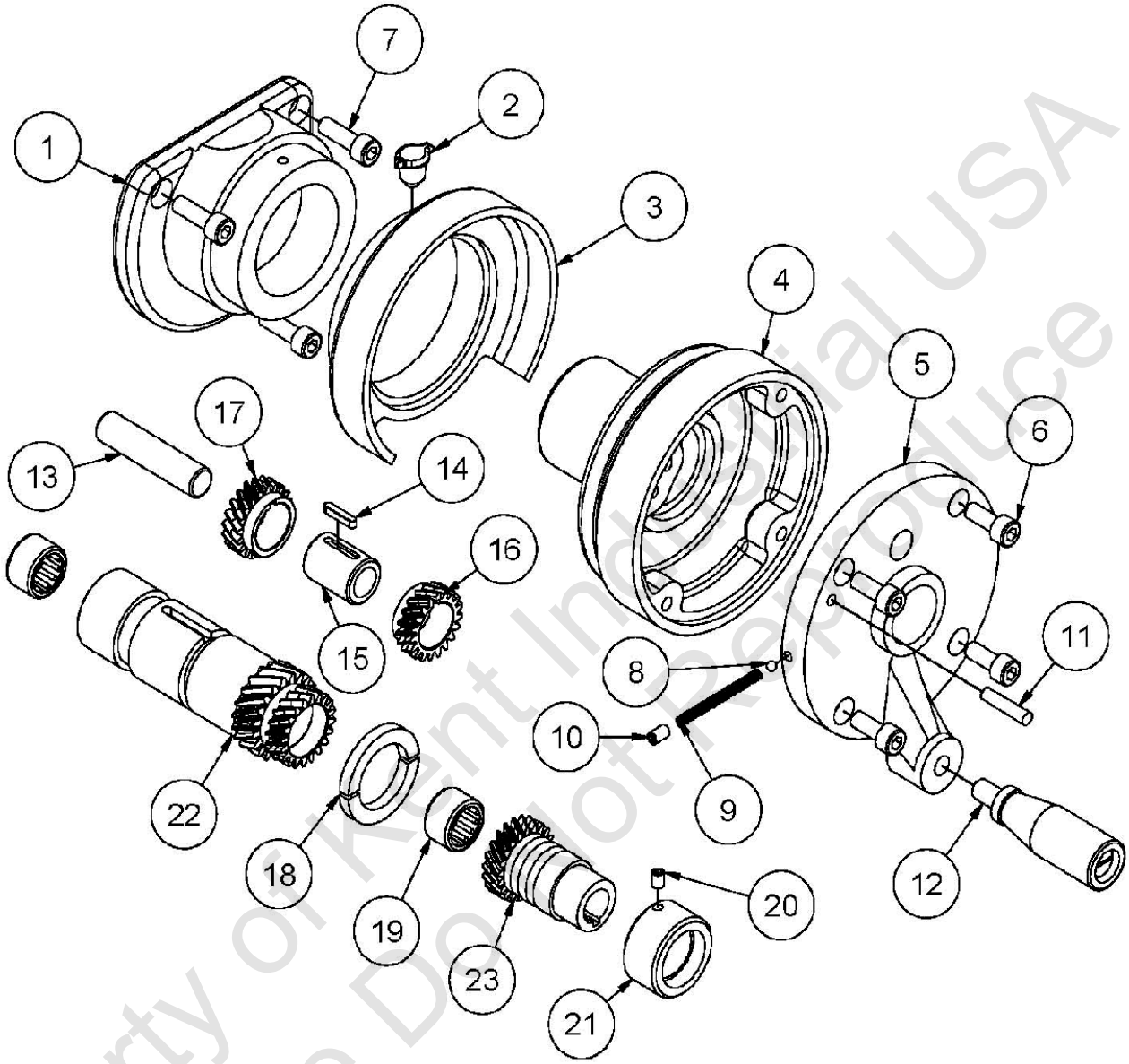

Fig.4.9

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Tab.4.9

Number	Part No.	Part Name	Specification	Quantity
1	M422010**	Feed tuning bracket		1
2		Oil cup		1
3	M422030**	Feed adjustment base		1
4	M422020**	Seat trim Feed		1
5	M422120**	Fine feed cover		1
6	GF014575	Hexagon socket head screws Order	M8*20	4
7	GF013983	Hexagon socket head screws Order	M8*25	3
8		Ball	3/16"	1
9	M422180**	Spring		1
10	GF015219	Allen fix screws	M6*10	1
11		Slope pin	Ø 6*30	1
12	GD020554	Rotation of the handle 1011-23-M8		1
13	M422060**	Tuning gear spindle		1
14		Flat key	4*4*20	1
15	M422080**	Bush		1
16	M422090**	Feed tuning helical gear		1
17	M422070**	Feed tuning helical gear		1
18	M422050**	Move trim ring gear		1
19	GB010453	Pin type Bearings	TLA2016	2
20	GF012579	Allen fix screws	M6*8	1
21	M422130**	Trim ring gear		1
22	M422040**	Helical gear shaft sleeve		1
23	M422100**	Fine helical gear		1

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4.1.10 Pumps and Piping

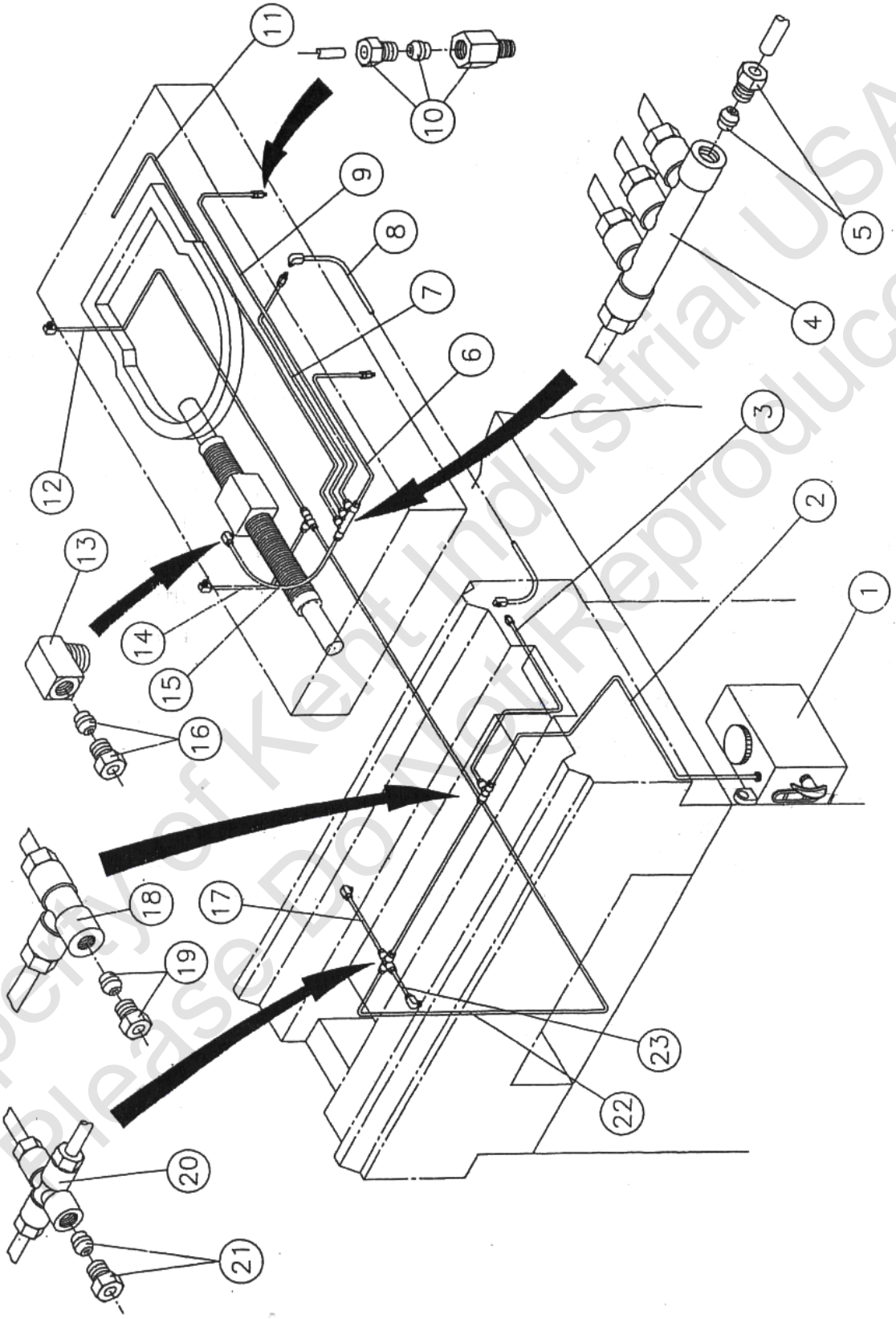

Fig.4.10

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Tab.4.10

Number	Part No.	Part Name	Specification	Quantity
1		NRK oiler	62*78m/m	1
2		Aluminum oil tubing	4φ	1
3		Aluminum oil tubing	4φ	1
4		Six common denominator oil cooler		1
5		Casing and casing cap	4m/m	1
6		Aluminum oil tubing	4φ	1
7		Aluminum oil tubing	4φ	1
8		Aluminum oil tubing	4φ	1
9		Aluminum oil tubing	4φ	1
10		Casing and casing cap	4m/m	1
11		Aluminum oil tubing	4φ	1
12		Aluminum oil tubing	4φ	1
13		ELBOW	1/8PT*4	71
14		Aluminum oil tubing	4φ	1
15		Aluminum oil tubing	4φ	1
16		Casing and casing cap	4m/m	1
17		Aluminum oil tubing	4φ	1
18		Three oil separator		2
19		Casing and casing cap	4m/m	1
20		Stone oil separator		1
21		Casing and casing cap	4m/m	1
22		Aluminum oil tubing	4φ	1
23		Aluminum oil tubing	4φ	1

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4.1.11 Working Head Standard Accessories

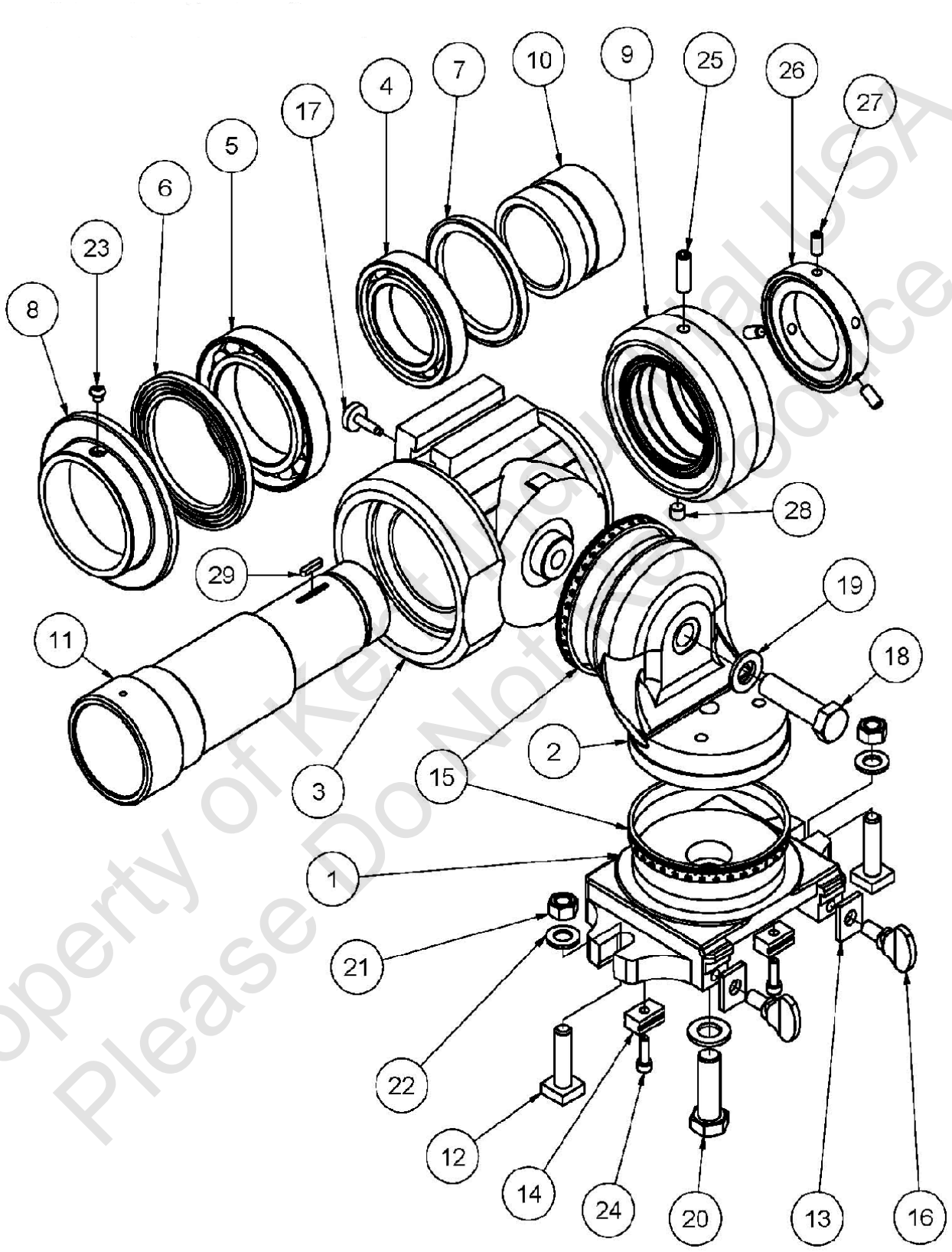

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Fig.4.11
Tab.4.11

Number	Part No.	Part Name	Specification	Quantity
1	M450010**	Work spindle base		1
2	M450050**	Working head swivel base		1
3	M450090**	Work spindle seat		1
4	GB010829	Angular contact ball bearings	7012A	1
5	GB010845	Angular contact ball bearings	7015A	1
6	M450150**	Front inner dust ring		1
7	M450120**	After the inner dust ring		1
8	M450160**	Front inner dust cover		1
9	M450130**	The outer dust cover		1
10	M450110**	Within the spacer ring		1
11	M450101**	Work spindle		1
12	M450080**	T-bolt		2
13	M450060**	Clamping block		2
14	M450030**	Key		2
15	M450020**	Rotating seat scale ring		2
16	M450070**	Butterfly-shaped bolt		2
17	M450170**	Fixing screws the spindle		1
18	GF014232	Hexagon head screw	M16*60	1
19	GE011738	Flat washer	16	2
20	GF016092	Hexagon head screw	M16*50	1
21	GF030360	Hex nut	M12	2
22	GE011644	Flat washer	12	2
23	GF010696	Hexagon socket button head screws	M6*6	1
24	GF012003	Hexagon socket head screws Order	M6*20	2
25	GF012692	Allen fix screws	M10*30	1
26	GF031004	Locknut	AA-SB058AER-B017	1
27	GF012621	Allen fix screws	M8*16	3
28	GM011178	Plug	1/8	1
29	GC010162	Double round key	4*4*20	1

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4.1.12 Standard Accessories

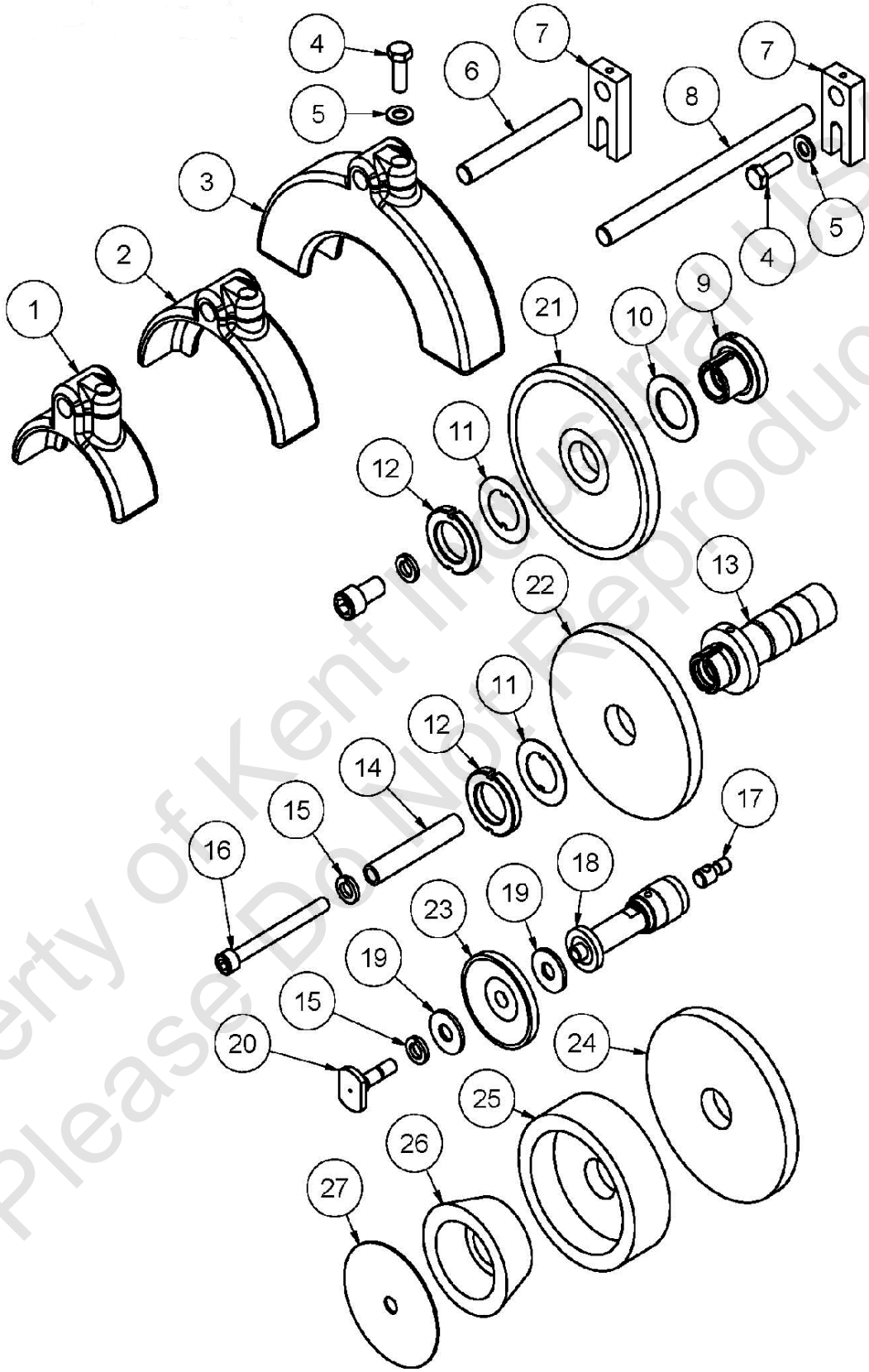

Fig.4.12
Tab.4.12

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Number	Part No.	Part Name	Specification	Quantity
1	M460080**	Grinding wheel protective cover		1
2	M460060**	Grinding wheel protective cover		1
3	M460050**	Grinding wheel protective cover		1
4	GF016759	Hexagon head screw	M10*30	5
5	GE011055	Flat washer	10	5
6	M460110**	Guard support rod		1
7	M460100**	Guard support rod fixing plate		2
8	M460090**	Guard support rod		1
9	M46041A**	Grinding wheel flange		1
10	M460510**	Gasket		1
11	M460520**	Gasket		2
12	M460420**	Grinding wheel flange nut		2
13	M460551**	4 "Grinding wheel extension rod		1
14		4 "Grinding wheel extension pole sleeve		1
15		Spring washer		3
16		Hexagon socket head screws Order		1
17	M460590**	Screw		1
18	M460581**	4 "Spindle extension rod		1
19	M460600**	Washer		2
20		4 "extension rod screw spindle		1
21		Dish-shaped grinding wheel	150*19*31.75	1
22		Straight grinding wheel	150*13*31.75	1
23		Dish-shaped grinding wheel	75*13*12.7	1
24		Straight grinding wheel	150*13*31.75	1
25		Bowl-shaped grinding wheel	125*38*31.75	1
26		Oblique bowl-shaped grinding wheel	90*38*31.75	1
27		Straight Grinding wheel	100*1.5*12.7	1

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4.1.13 Tailstock Standard Accessories

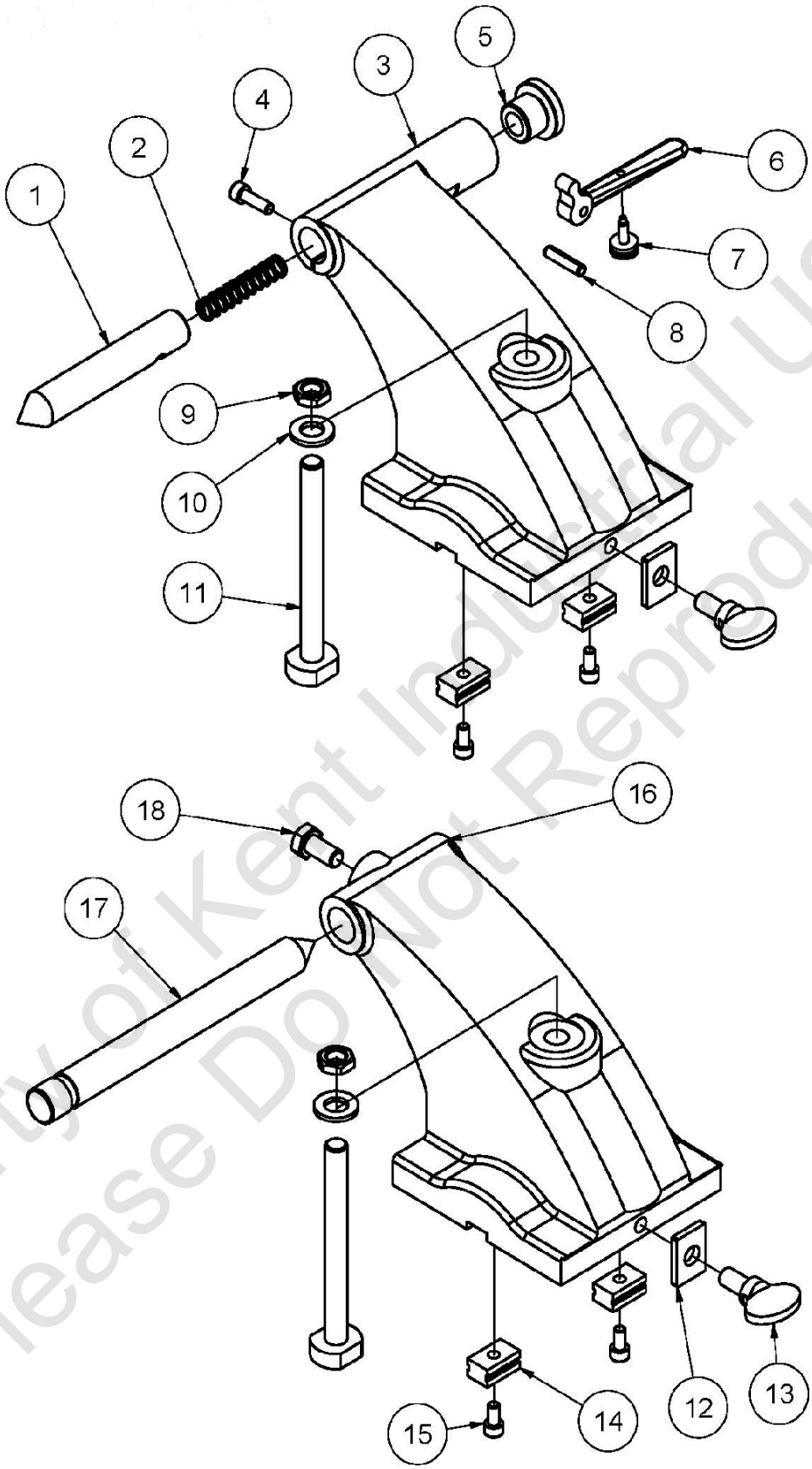

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Fig.4.13

Tab.4.13

Number	Part No.	Part Name	Specification	Quantity
1	M451020**	Right Tailstock Quill		1
2	M451040**	Spring		1

3	M451010**	Right tailstock		1
4	GF012003	Hexagon socket head screws Order	M6*20	1
5	M451050**	Right tailstock nut		1
6	M451030**	Right hand lever tailstock		1
7	M451060**	Hand lever mounting screws		1
8		Spring Pin	6*26	1
9	GF030360	Hex nut	M12	2
10	GE011644	Flat washer	12	2
11	M451070**	T-bolt		2
12	M450060**	Clamping block		2
13	M450070**	Butterfly-shaped bolt		2
14	M450030**	Key		4
15	GF011990	Hexagon socket head screws order	M6*12	4
16	M451100**	Left tailstock		1
17	M451110**	Left tailstock quill		1
18	GF015824	Hexagon head screw	M10*20	1

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4.1.14 Standard Accessories

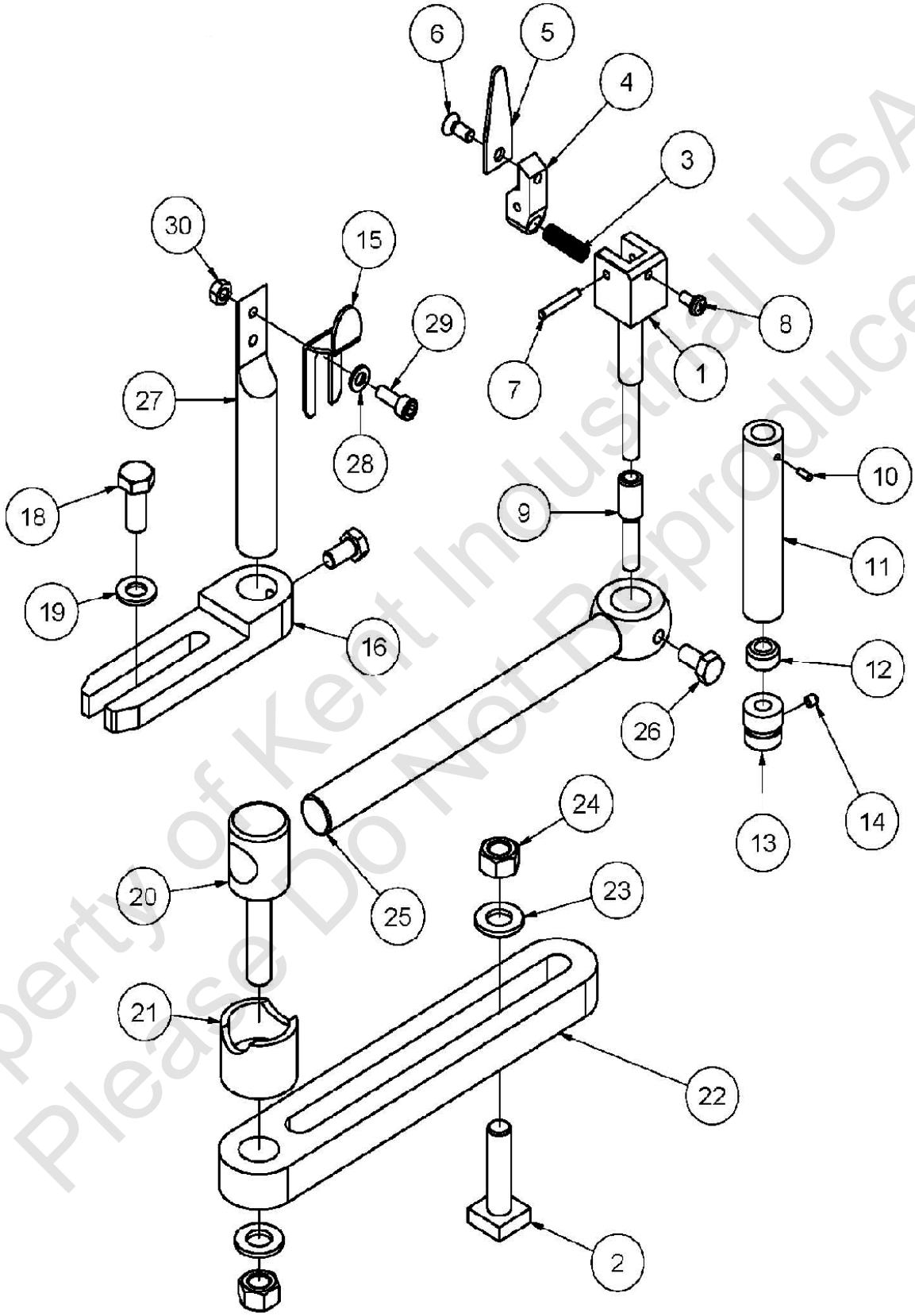

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Fig.4.14
Tab.4.14

Number	Part No.	Part Name	Specification	Quantity
1	M460270**	Tool support for fine-tuning lever shaft		1
2	M450080**	T-bolt		1
3	M460310**	Spring		1
4	M460320**	Trimming cutter knife support bar		1
5	M460330**	Tool support pole piece		1
6		Phillips head screws	M6*14	1
7		Falt pin	Ø 4*26	1
8	GF017202	Phillips head screws	M5*10	1
9	M460280**	Tool support rod inner mandrel		1
10		Falt pin	Ø 3*8	1
11	M460260**	Weitiao tool support Taotong		1
12	M460290**	Tool Support Rod tooth ring		1
13	M460300**	Tool support rod scale ring		1
14	GF010777	Allen fix screws	M5*5	1
15	M460370**	Guide		1
16	M460210**	Opening guide seat		1
17		Hexagon head screw	M8*16	1
18	GF016050	Hexagon head screw	M10*25	1
19	GE011055	Flat washer	M10	1
20	M460130**	Universal tool support rod bolts		1
21	M460150**	Universal tool support rod cover		1
22	M460120**	Universal tool support rod base		1
23	GE011644	Flat washer	12	2
24	GF030360	Hex nut	M12	2
25	M460140**	Universal tool support bar		1
26		Hexagon head screw	M8*16	1
27	M460360**	Fixed guide rods		1
28	GE011068	Flat washer	6	1
29	GF012016	Hexagon socket head screws Order	M6*16	1
30	GF030535	Hex nut	M6	1

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4.1.15 Standard Accessories

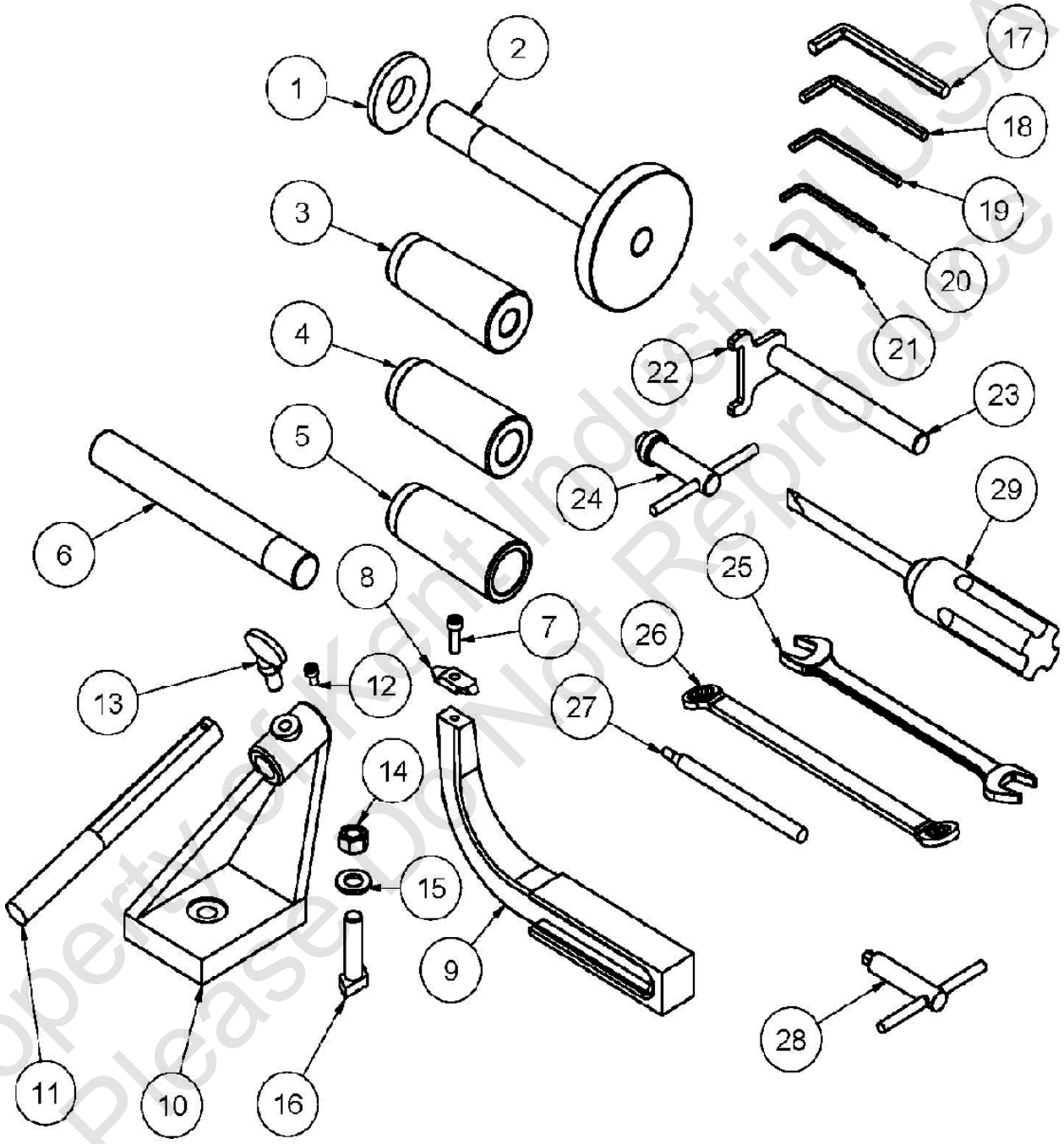

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Fig.4.15

Tab.4.15

Number	Part No.	Part Name	Specification	Quantity
1	M460640**	Tensioning screw gasket		1
2	M460620**	Tighten the screw		1
3	M460381**	MT5#x2# Bush		1
4	M460391**	MT5#x3# Bush		1
5	M460401**	MT5#x4# Bush		1
6	M460220**	1 "diameter shank		1
7	GF012003	Hexagon socket head screws Order	M6*20	1
8	M460180**	Quill gauge indicates the block		1
9	M460170**	Quill Regulation		1
10	M460010**	Dresser Support Block		1
11	M460020**	Rod Dresser		1
12	GF011301	Hexagon socket head screws Order	M5*10	1
13	M450070**	Butterfly-shaped bolt		1
14	GF030360	Hex nut	M12	1
15	GE011644	Flat washer	M12	1
16	M460040**	Skew T-bolt		1
17		Hexagon wrench hole	8MM	1
18		Hexagon wrench hole	6MM	1
19		Hexagon wrench hole	5MM	1
20		Hexagon wrench hole	4MM	1
21		Hexagon wrench hole	3MM	1
22	M460190**	Grinding wheel socket wrench fixed		1
23	M460200**	Grinding wheel fixing plate handle sleeve		1
24	M460240**	Grinding wheel wrench sets out		1
25		Double open end wrench		1
26		Ring spanner		1
27	M460250**	Wrench		1
28	M460230**	T plate hand		1
29		Screw driver		1

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5. Maintenance and Error Messages

5.1 General Maintenance

The rule of general maintenance, the operator needs to record the maintenance schedule precisely. The machine maintenance comes prior than production schedule. The maintenance can extend lifespan of machine and controller.

The maintenance schedule focuses on maintained machine's status such as function and accuracy. For lifespan of machine, please follow the maintenance step as below.

5.1.1 Daily Maintenance

1. Clean dusts from working table and machines surface. Keep the control system and surrounding area of the machine clean.
2. Apply anti-rusting oil thinly over metal surface of machine.
3. Keep control panel, monitor, keyboard, and mouse environment clean.
4. Clean water tank filter and check water capacity. (With water system)
5. Must use air-laid paper to clean spindle taper. (Do not use air-pressure to clean it).
6. Check the capacity of lubricant. (With lubricant system)
7. Check status of limited switch. (If the limited switch is broken, please contact with TOPWORK service)

5.1.2 Weekly Maintenance

1. Check items on daily maintenance.
2. Clean electrical box filter.
3. Clean inside of electrical box.
4. Clean and unload oil for lubricant tank. (Depends on status of lubricant system)

5.1.3 Monthly Maintenance

1. Check item of weekly maintenance.
2. Check and clean proximity sensor.
3. Check directives and warning nameplate clearly.

5.1.4 Seasonal Maintenance

1. Check items on weekly maintenance.
2. Check all of proximity sensor.
3. Check all nameplates and follow the directives of nameplate maintenance.
4. Check connector of wire status.
5. Clean water tank. (Depends on status)

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6. Check the belts and chains.

5.1.5 Six Months Maintenance

1. Check items on weekly maintenance.
2. Adjust leveling of machine and recheck precision of machine.

5.1.6 Annual Maintenance

1. Check items on weekly and monthly maintenance.

5.2 General Lubrication Maintenance Instruction (with Lubricant System)

Keep machine at good lubricant status may extend the lifespan and precision of machine. Maintain machine at good status, operator has to check capacity of oil and quality of oil every day. Clean up spindle, wheel cover, indication ruler and indicator before start machine.
Note: To avoid damaging the machine, please do maintenance work thoroughly.

5.2.1 Lubrication of Machine

1. If machine rest working for long time, please grease anti-rusting oil on metal surface.
2. The machine should grease lubricant every parts of machine and components.
3. The lubricant must use lubricant specification, do not change lubricant that affects the proper function of the machine.

5.2.2 Lubrication

Special care on lubrication should be taken to maintain the service life and performance of the machine for a long period. For this reason, specified oil given in the Tab.5.1, or oil of equal or better quality, must be used for the respective party in Fig. 1.. The built- in lubrication pump (1) is capable of containing 1 litter (61 Cubic inch) oil.

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Tab.5.1

Frequency	Oil Station No	Parts lubricated	Port	Oil supplying instruction	Oils used

Once a day	(1)	Slide-ways of V-groove and plain slide-way of bed and saddle Saddle cross feed screw and backlash eliminator Bearings for handle shaft for grinding wheel head vertical movement Table slide ways of no abrasion type	Oil supply pump	Set the red marks as depicted in Fig. 4 Oil is automatically supplied by means of a spring action When you Pull out and detach (1) Oil quantity per one time is 6.5 cc.	MOBIL VACTRA OIL NO. 2 (66.9 to 73.4. 37.8˚C)
	(2)	Elevating column	Motor cap		
	(3)	Tilting portions of swivel base and angle base	Tails cap	Pour oil with a proper oiler. Take out the screw when Oiling (6)	
	(4)	Gear-box for table fine feed			
	(5)	Right-hand tailstock			
	(6)	Wheel spindle collar	Ball cap		
	(7)	Wheel spindle			
Unnecessary (grease lubrication)	(8)				MOBIL GREASE BRB LIFE TIME (Viscosity 270 to 310 25˚C)
Supply when necessary	(9)	Oil port for (1)		Pour oil in by taking off the threaded cap	(refer to (1))
Unnecessary (Grease lubrication)		Left hand bearings of handle shaft for grinding Wheel head Vertical movement, bearings of handle for grinding head cross Movement and bearings for table feed			

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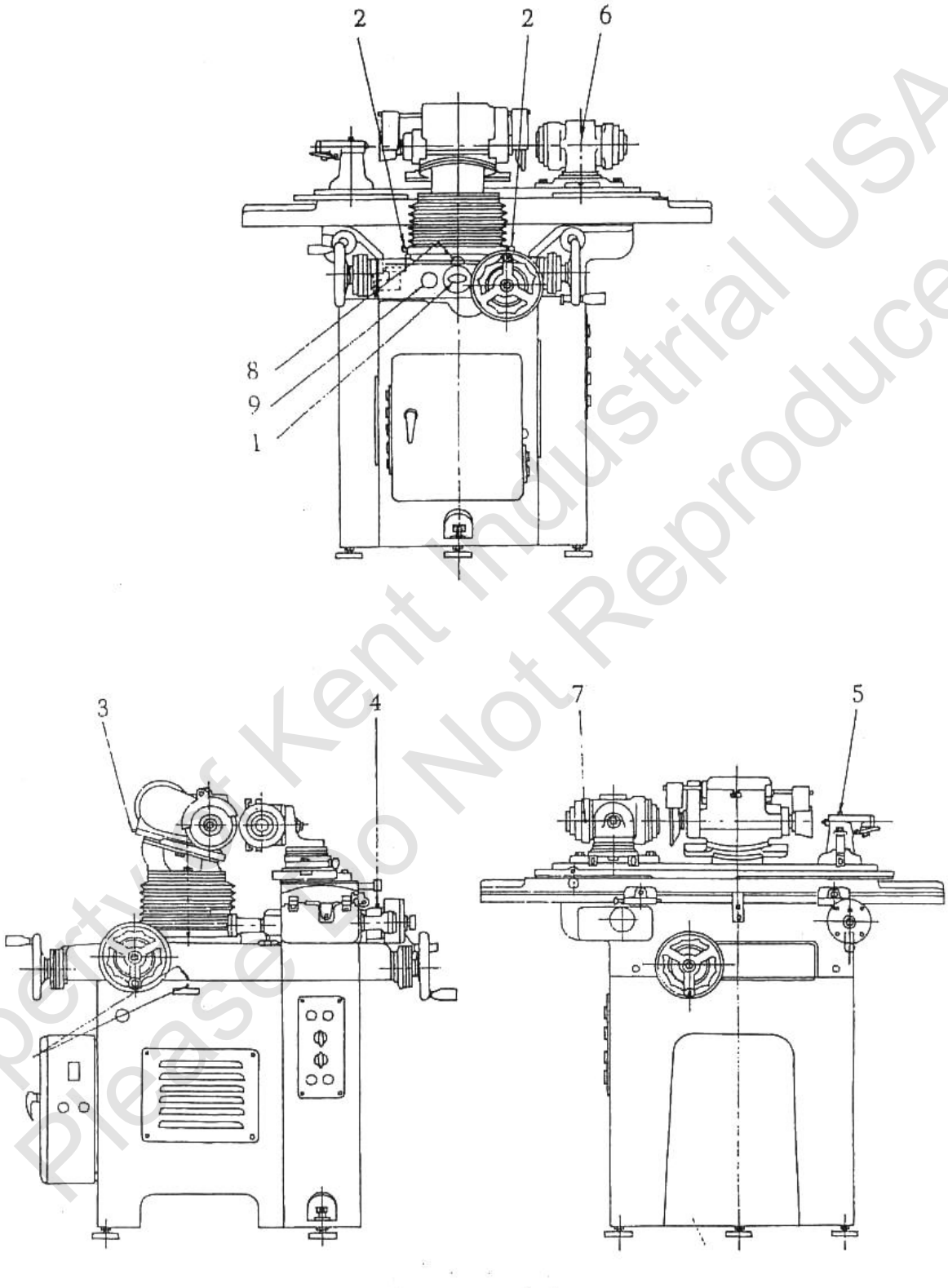

Fig.5.1

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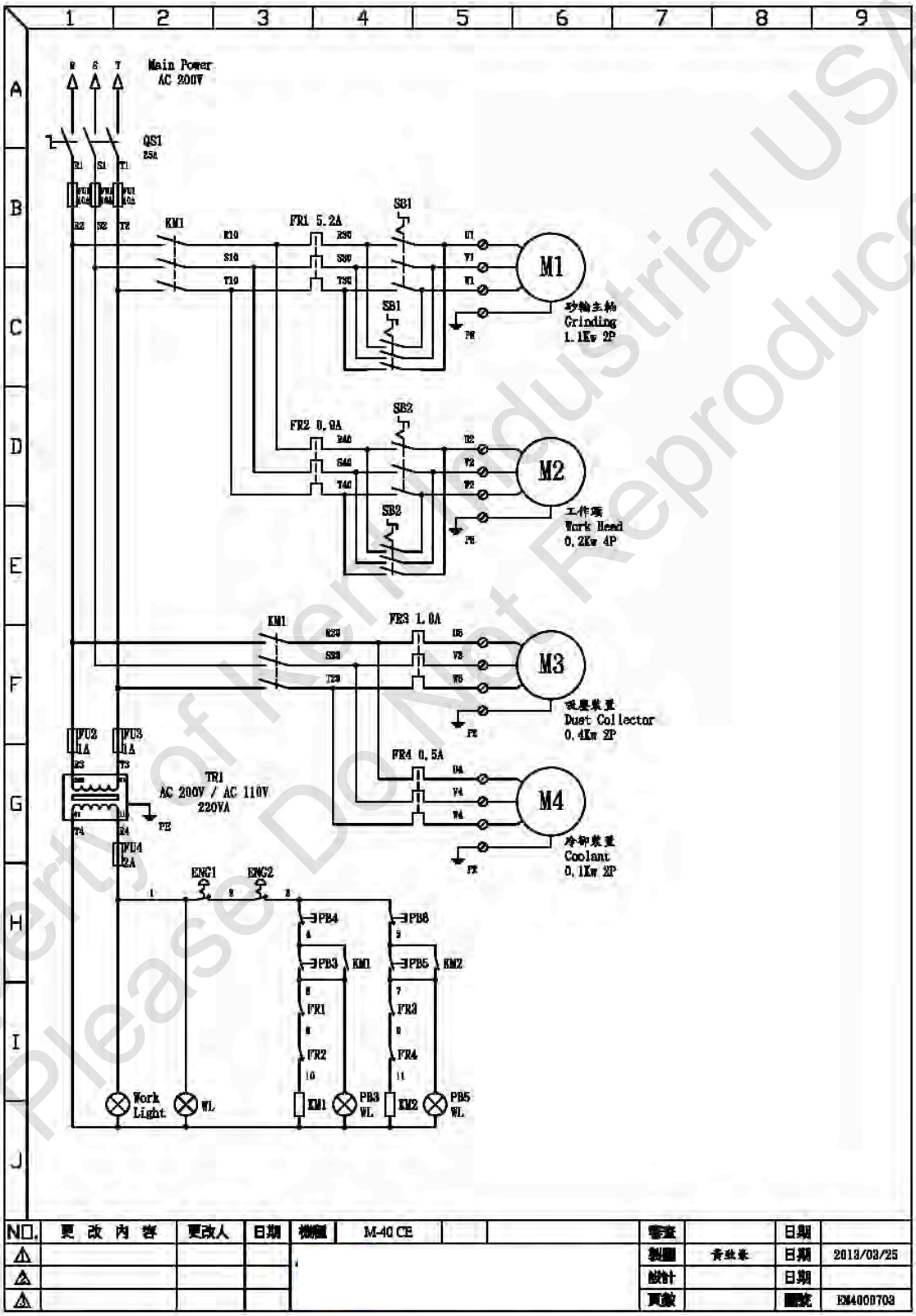
6. Circuit

6.1 M-40 CE AC200



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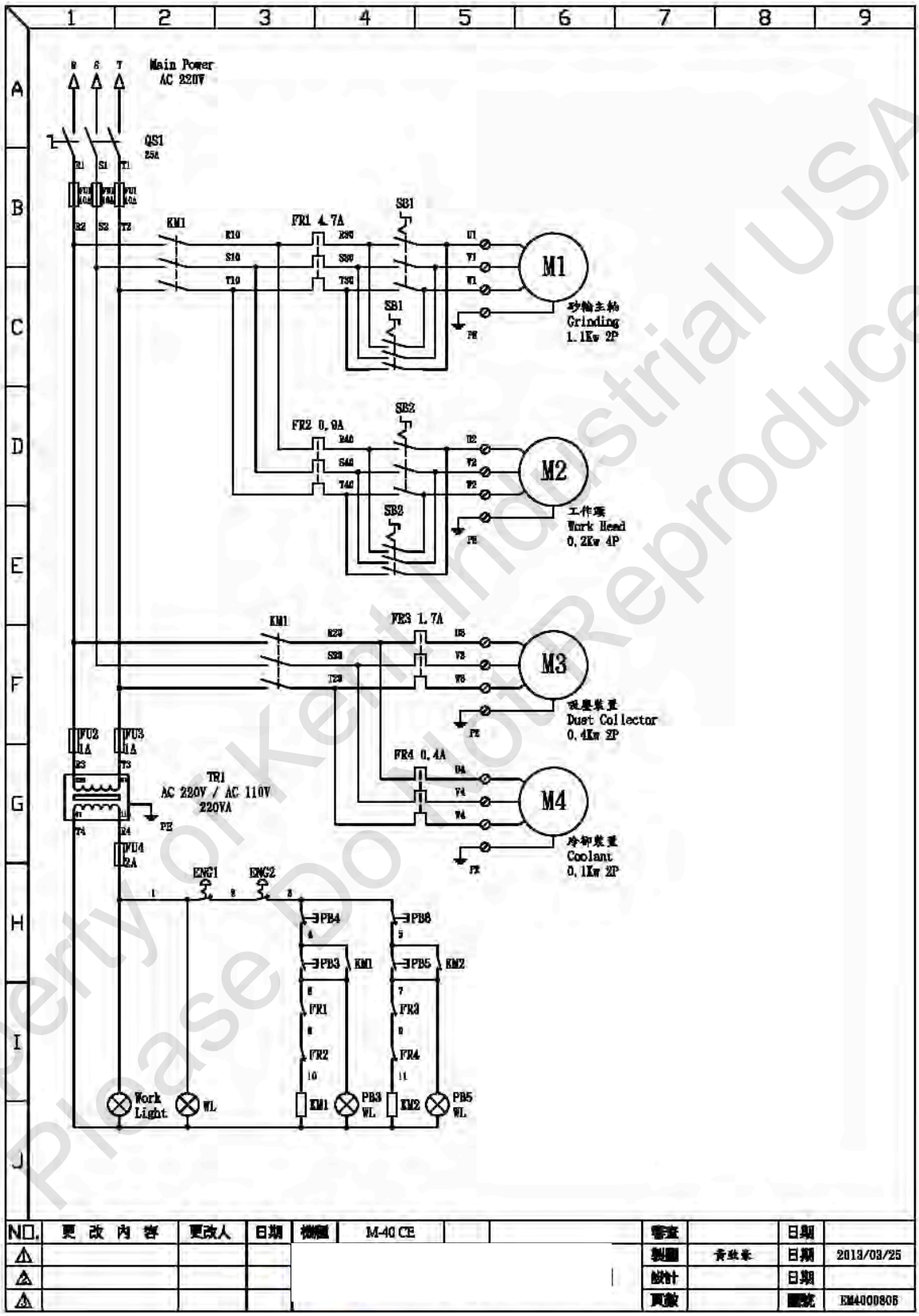
6.2 M-40 CE AC220



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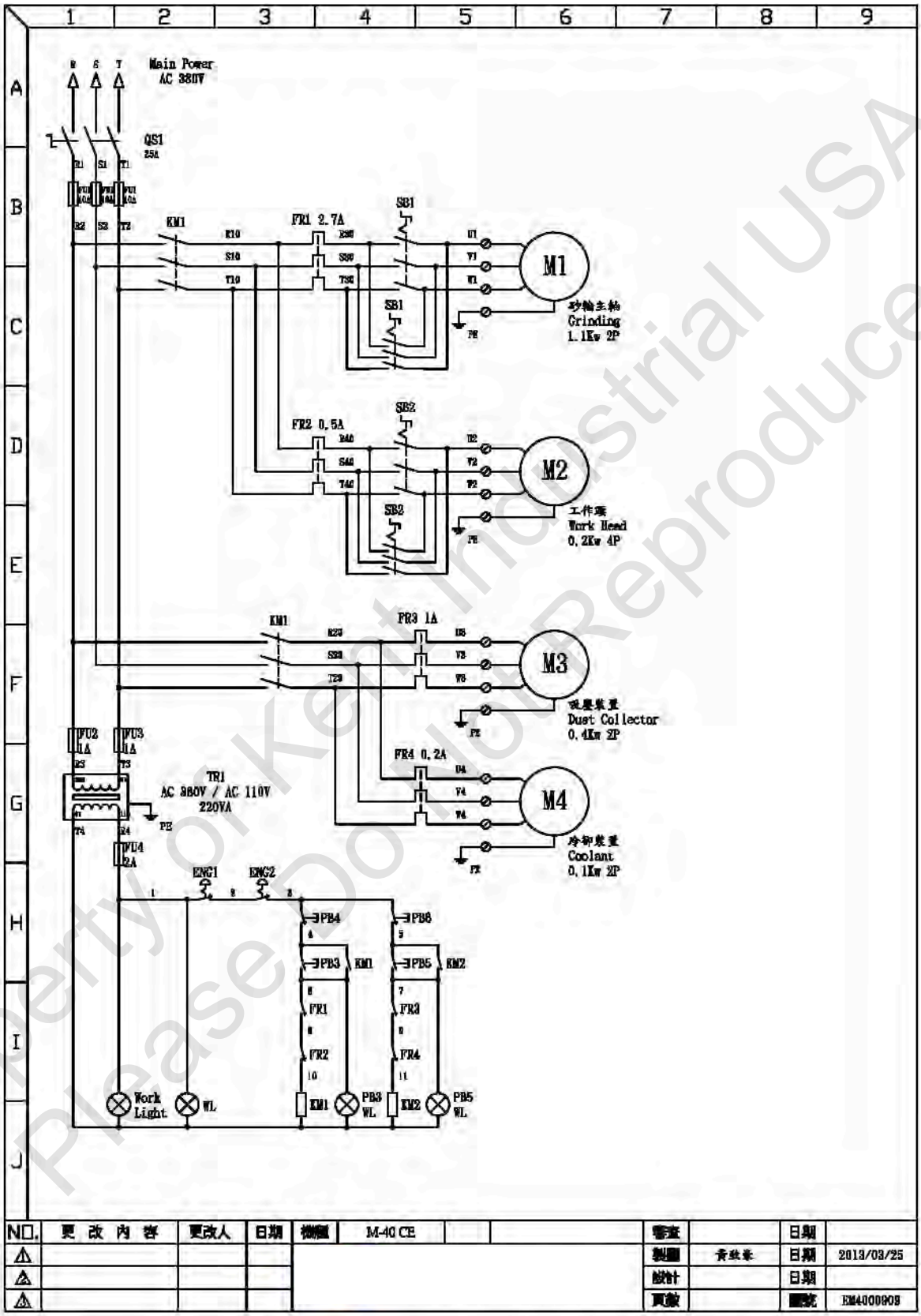
6.3 M-40 CE AC380



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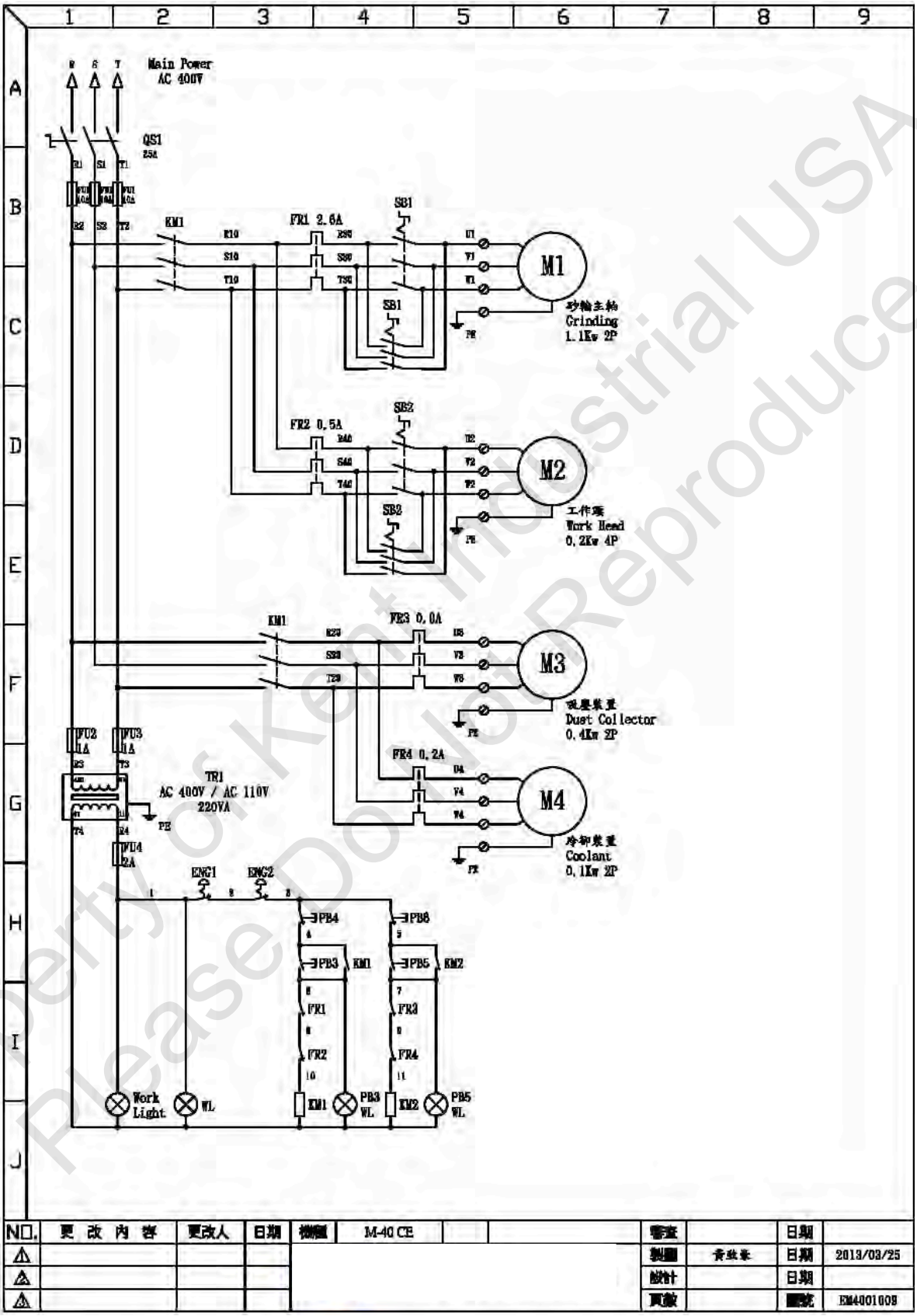
6.4 M-40 CE AC400



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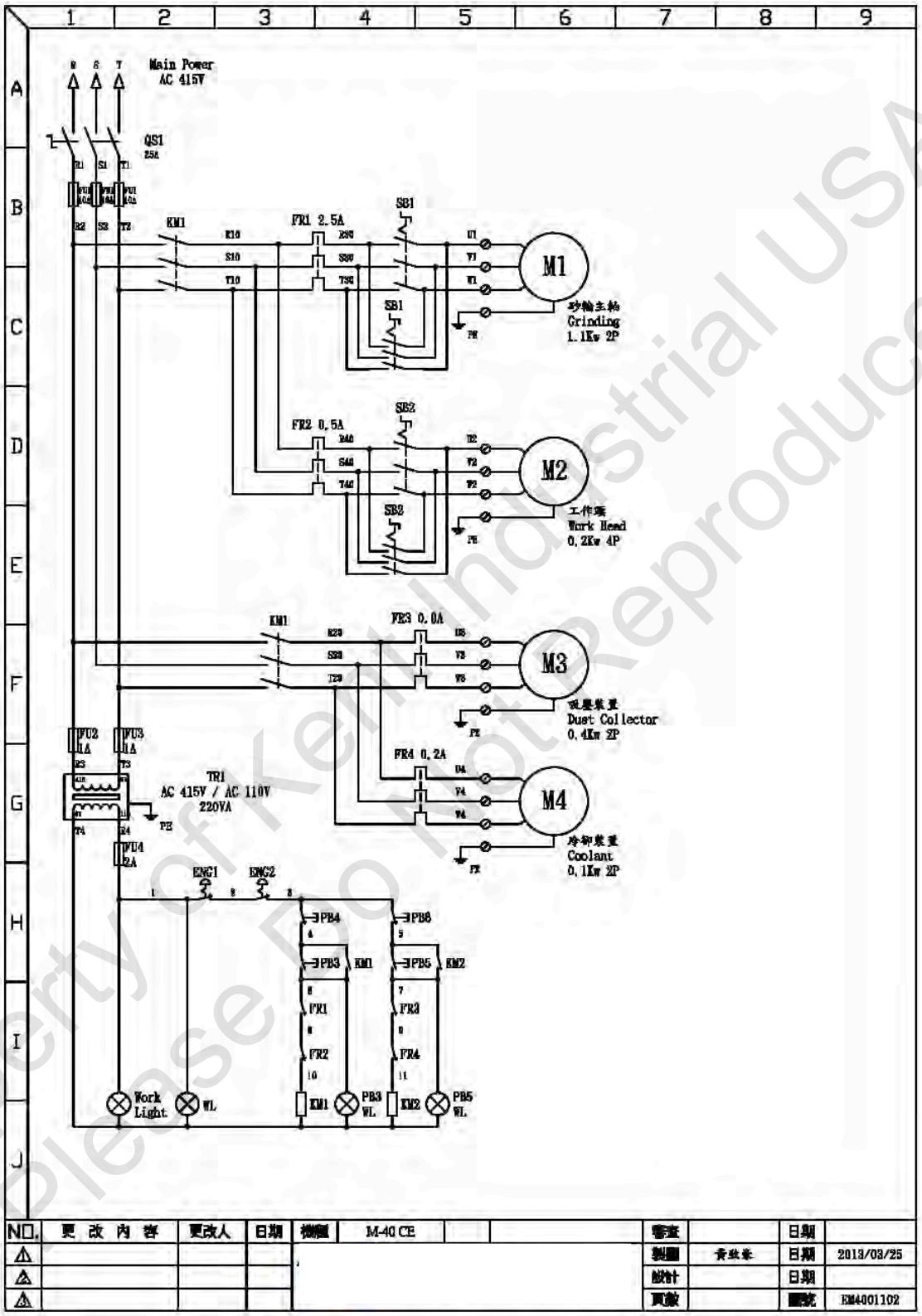
6.5 M-40 CE AC415



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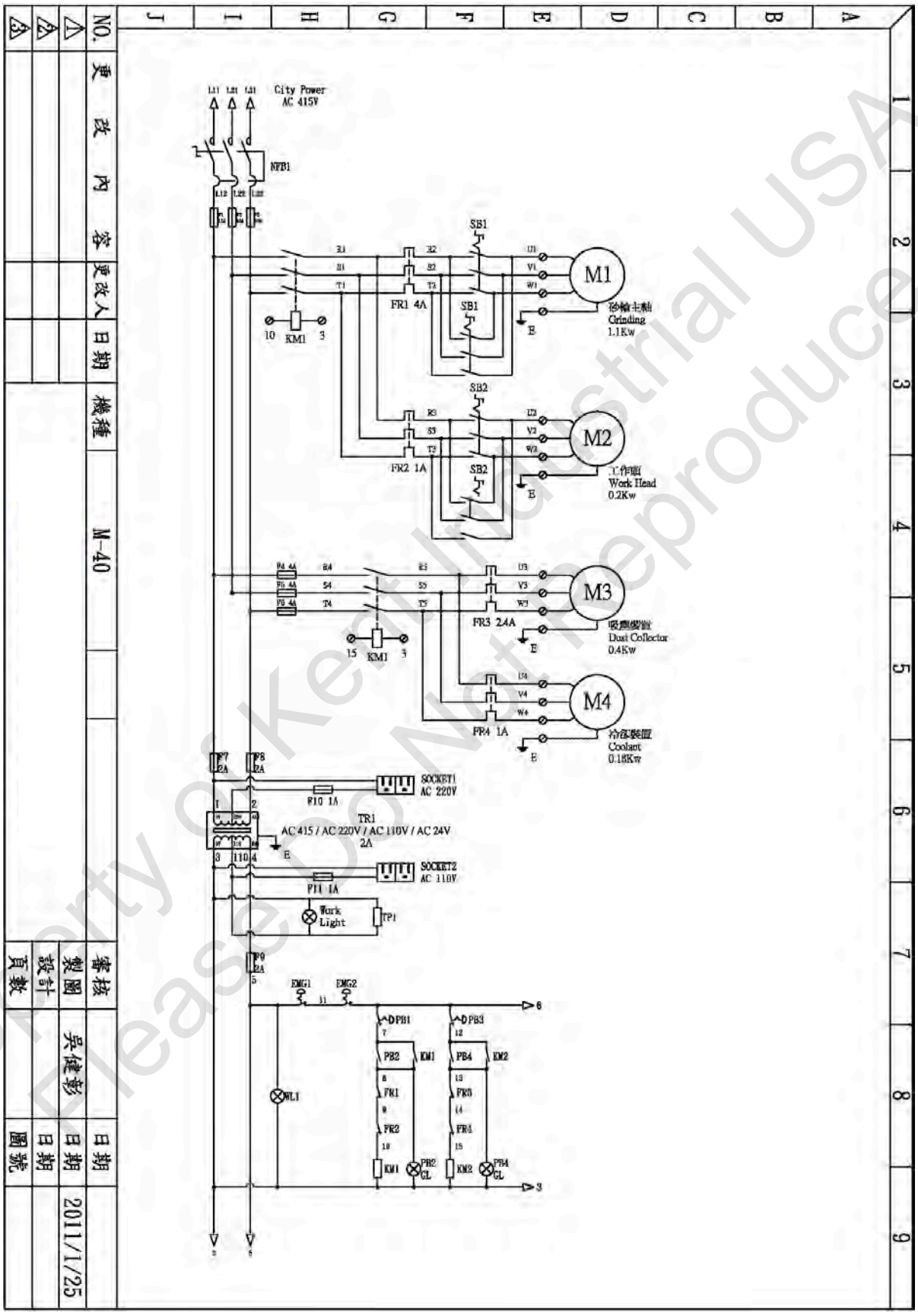
6.6 M-40 CE AC415（Honda）



6.7 M-40 CE AC415（Honda）

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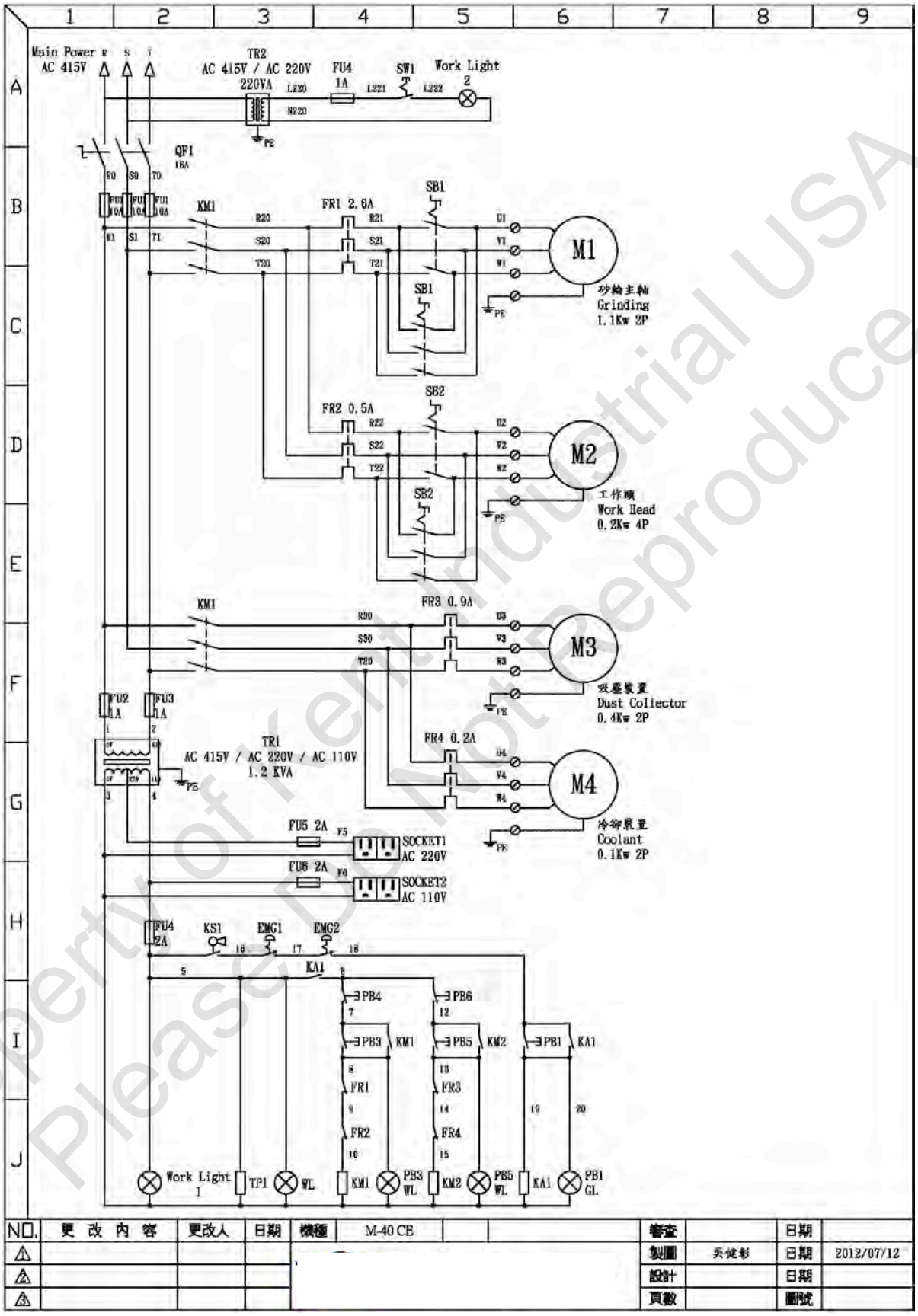

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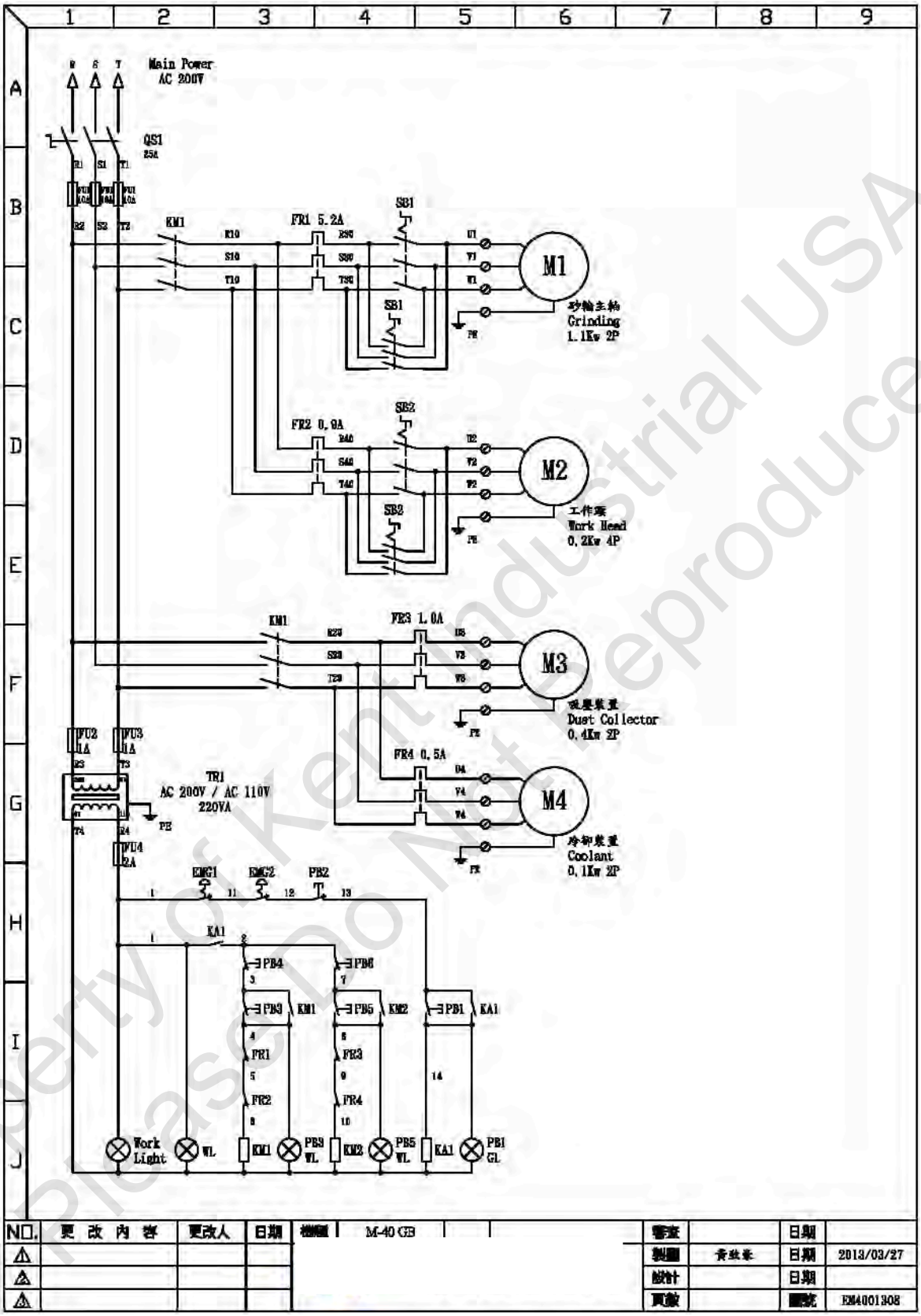
6.8 M-40 GB AC200



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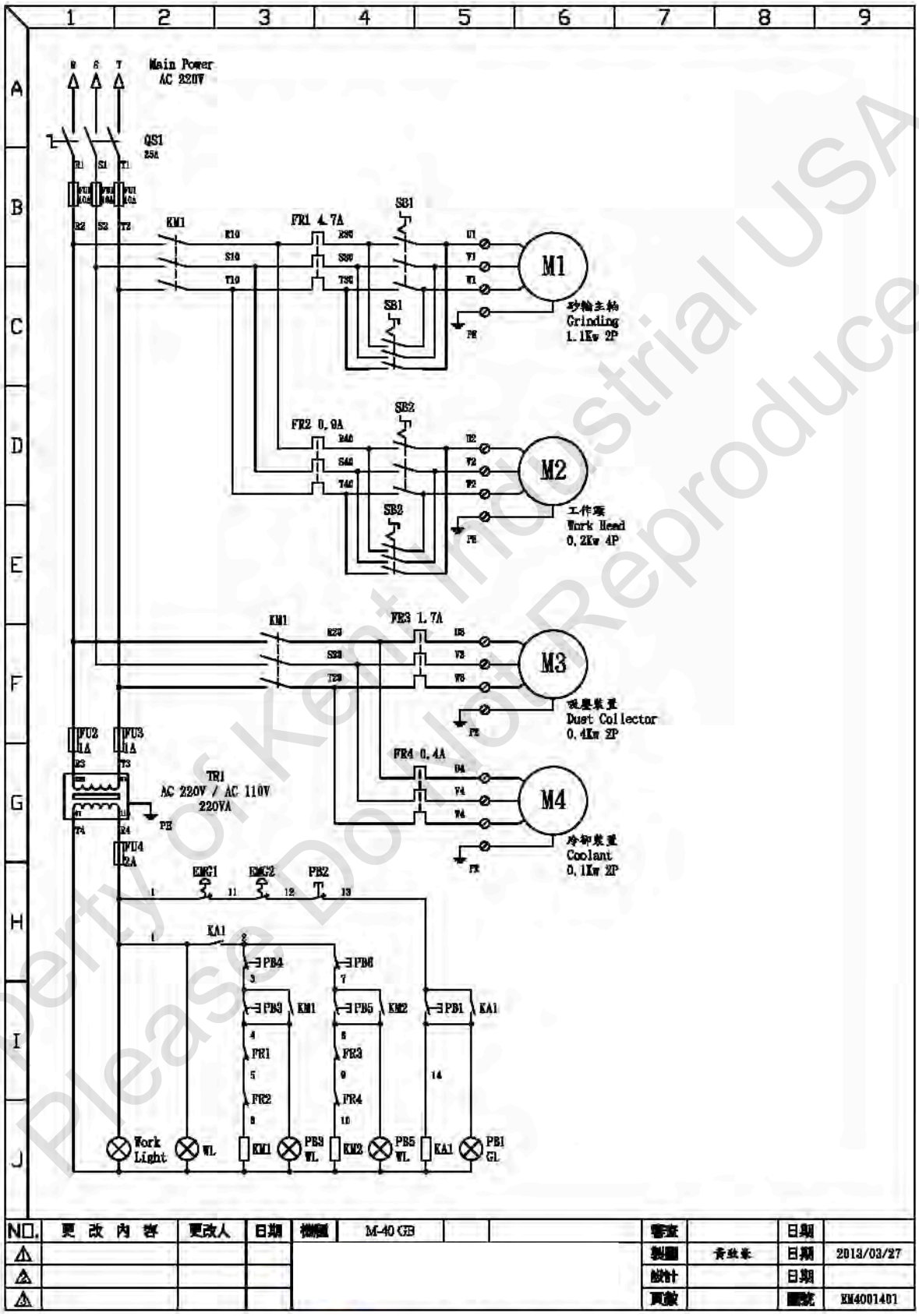
6.9 M-40 GB AC220



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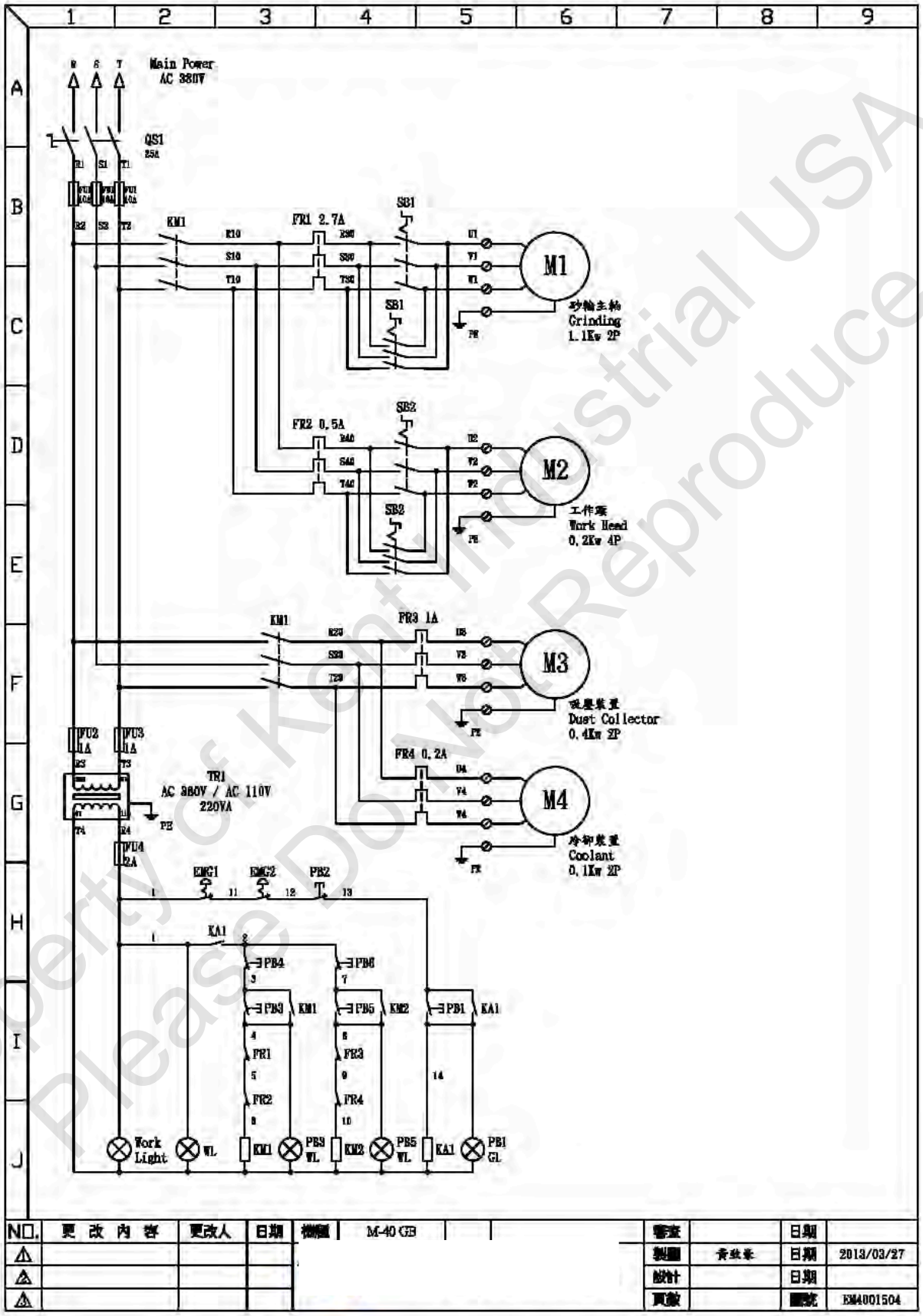
6.10 M-40 GB AC380



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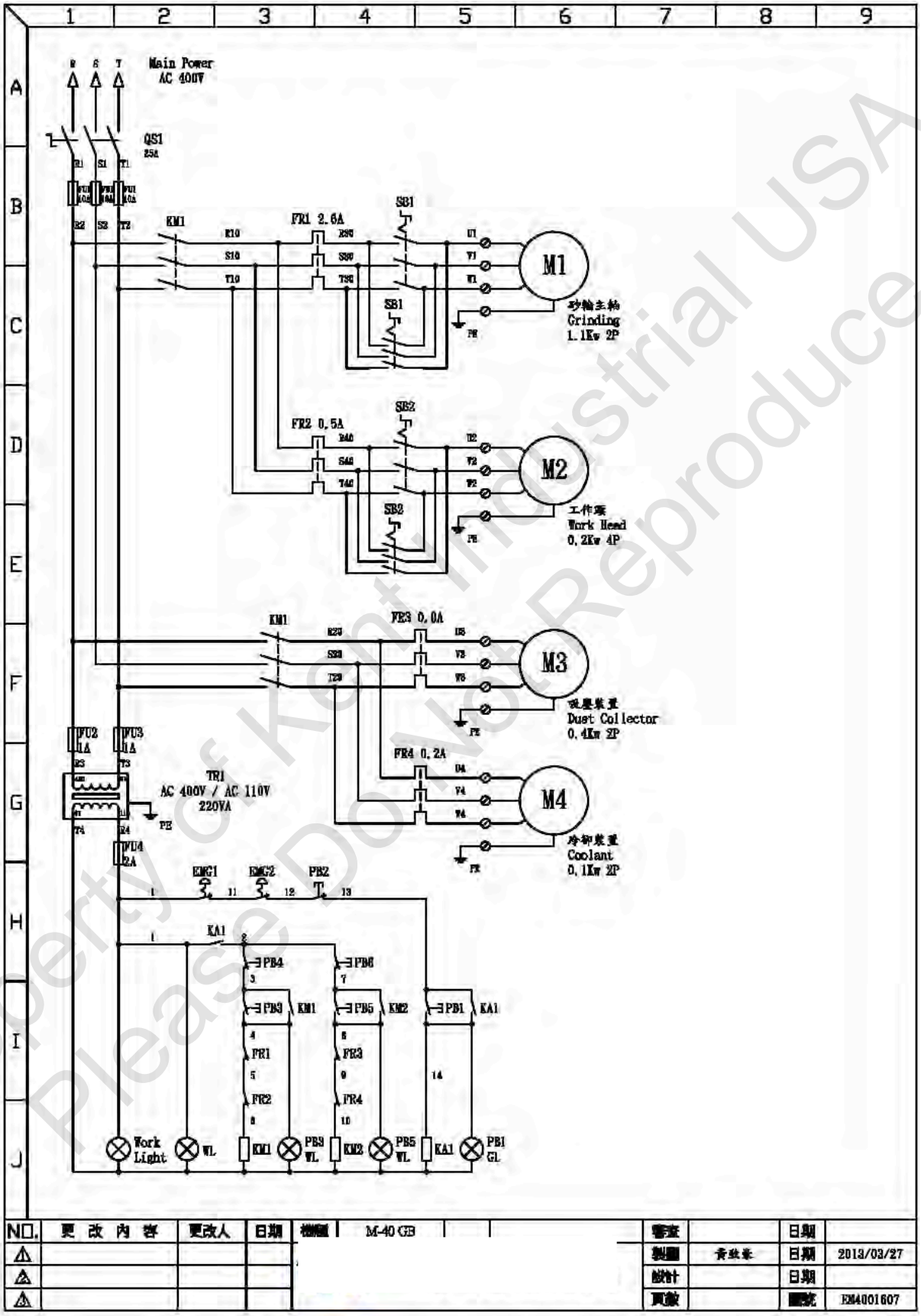
6.11 M-40 GB AC400



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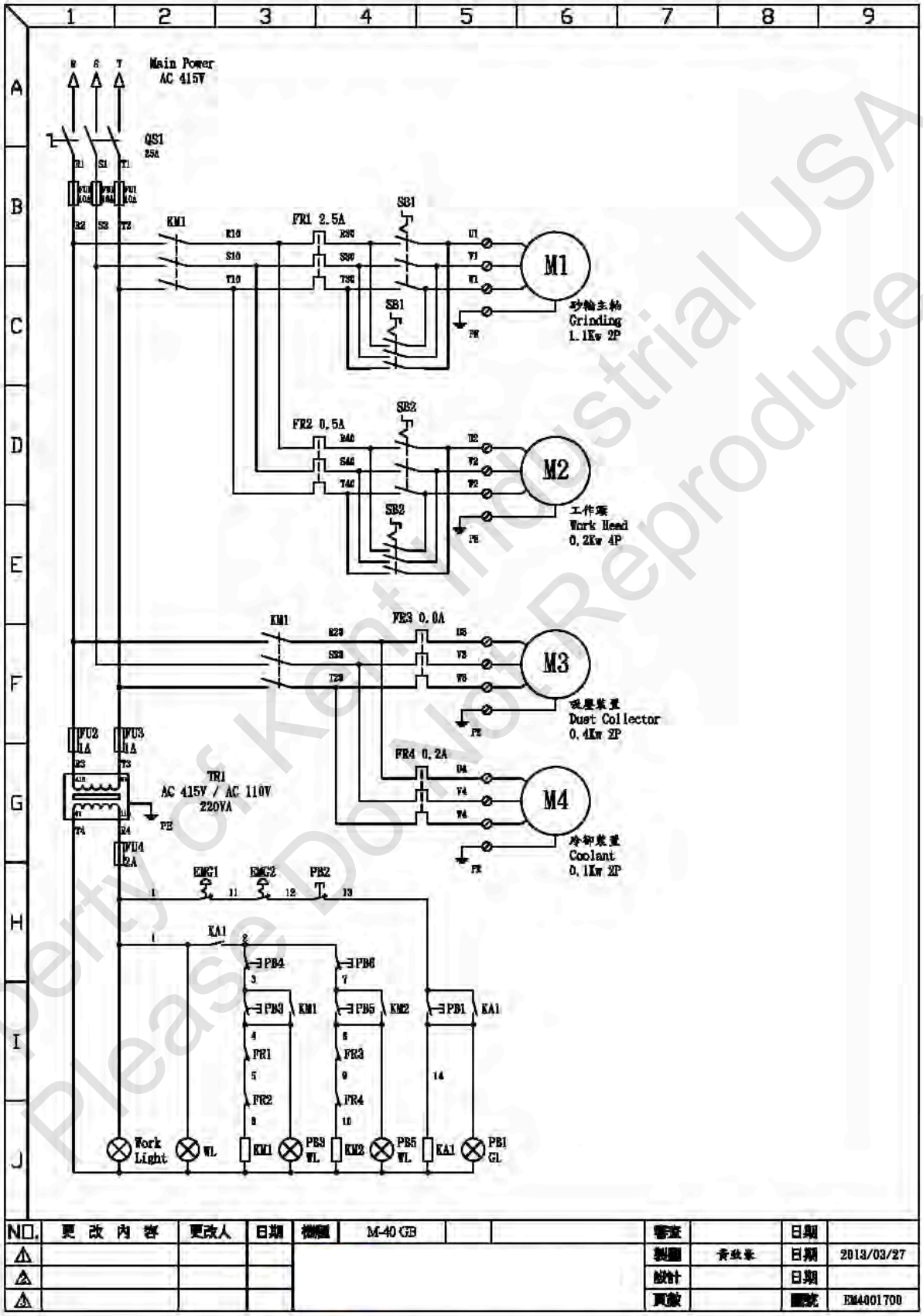
6.12 M-40 GB AC415



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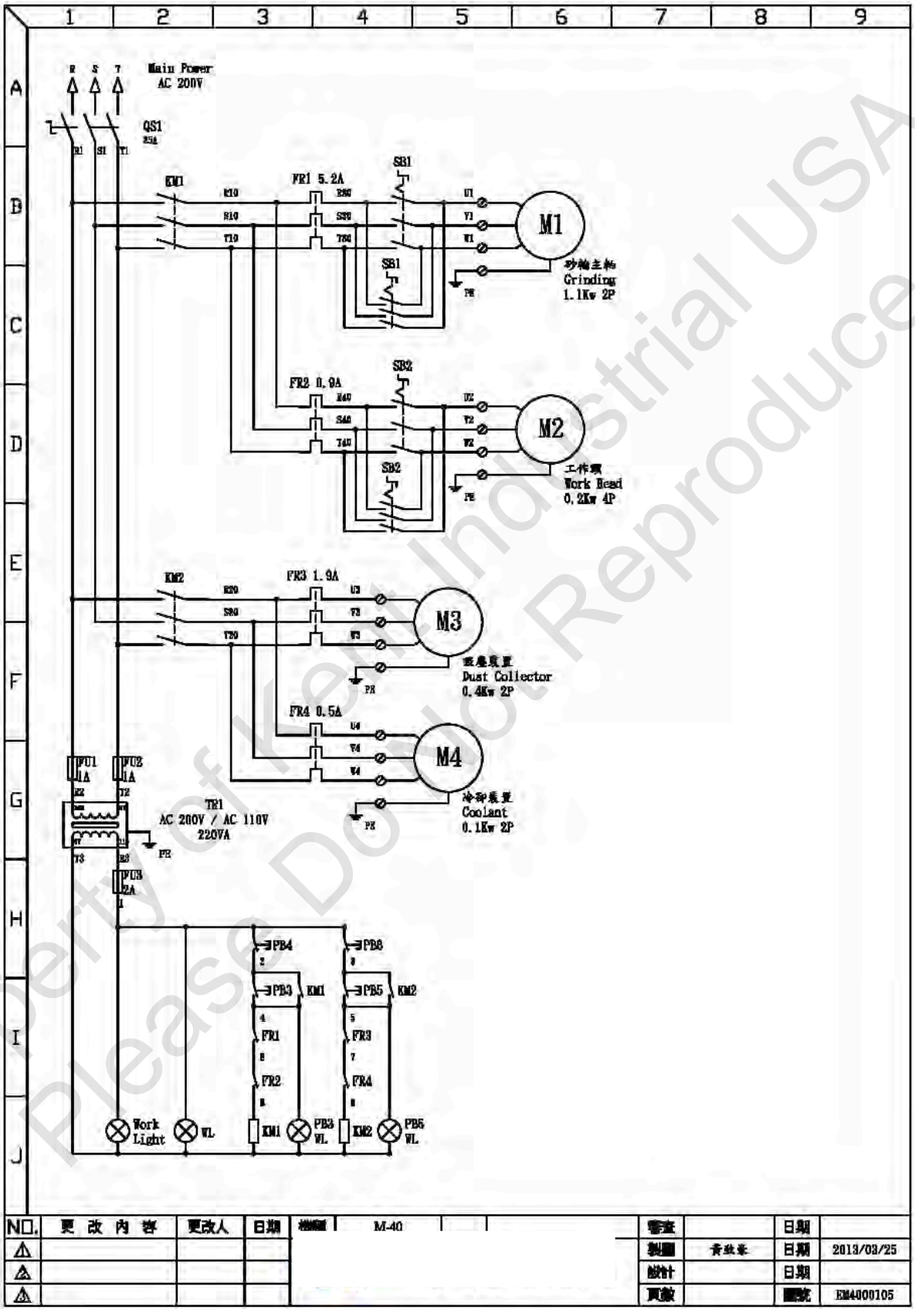
6.13 M-40 Standard AC200



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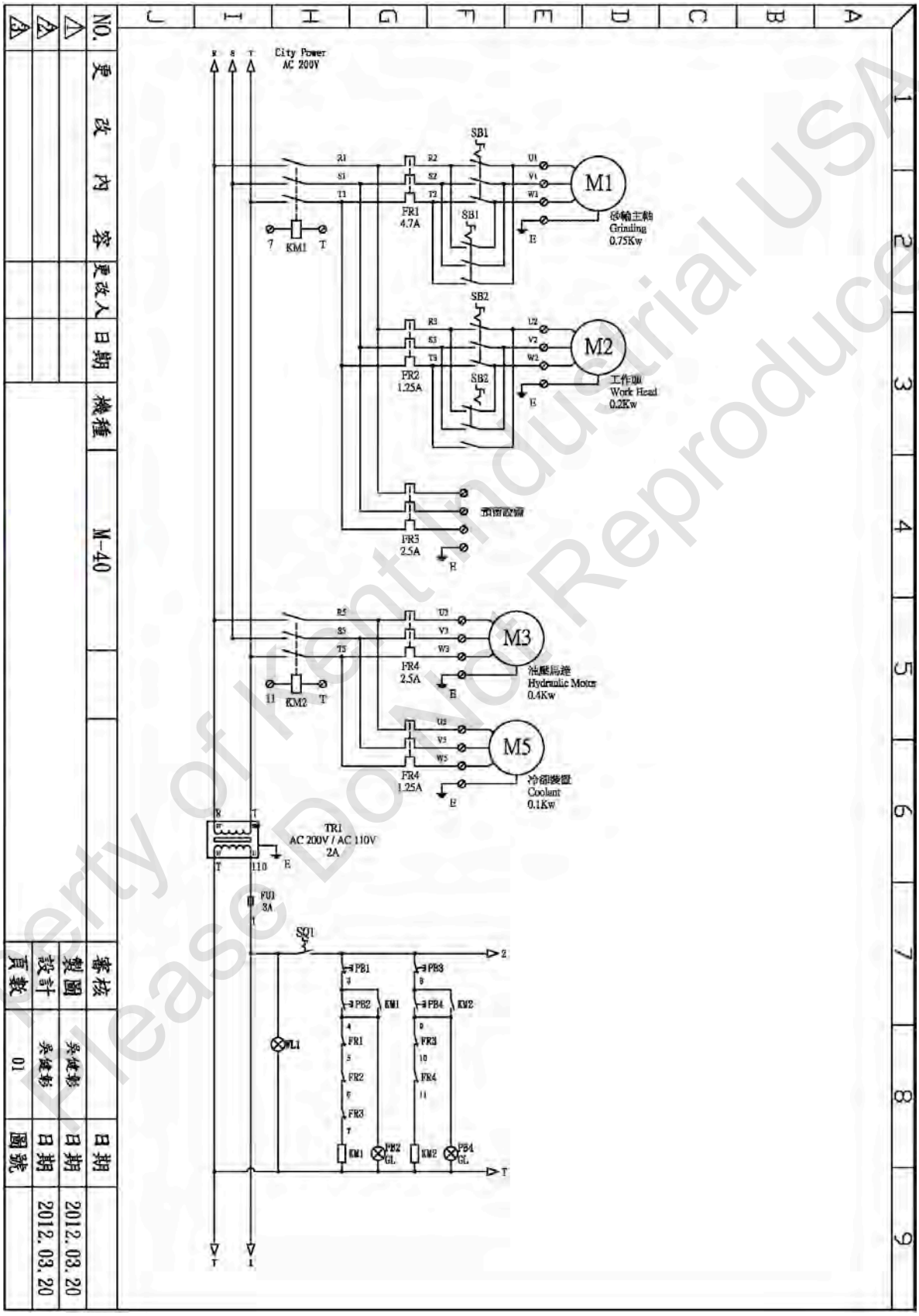
6.14 M-40 Standard AC200 Hydraulic cylinder three speed back and forth



6.15 M-40 Standard AC220

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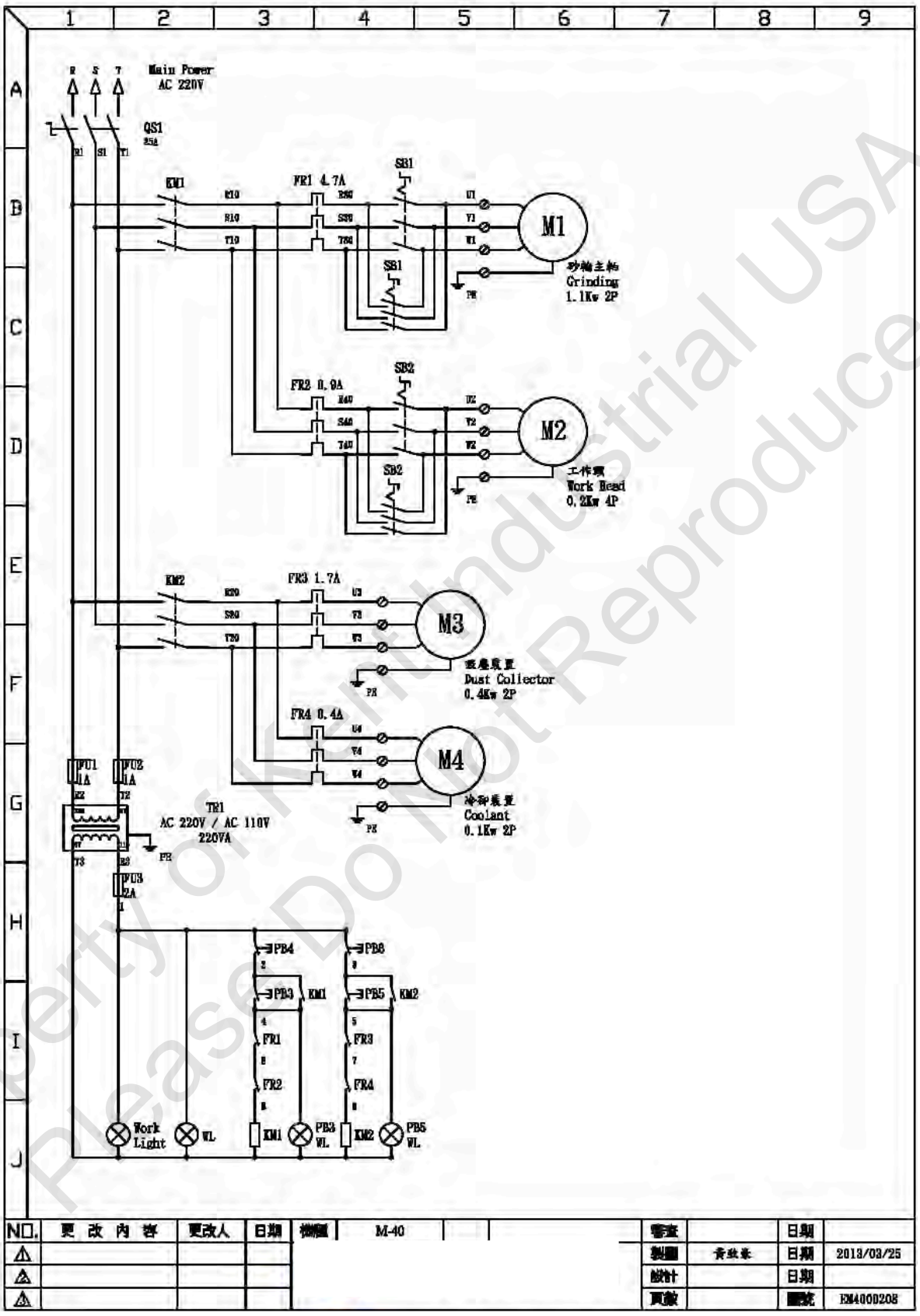

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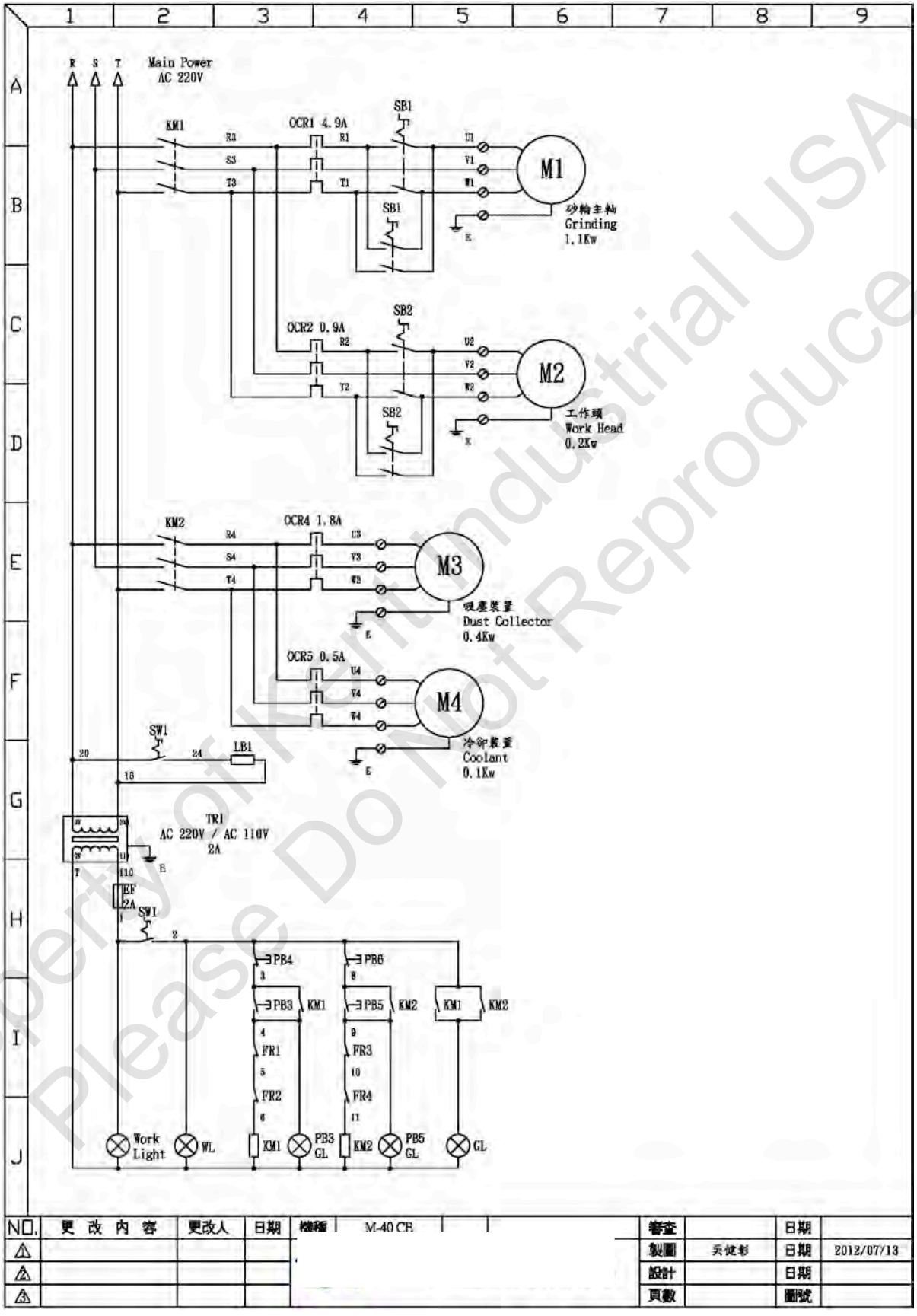
6.16 M-40 Standard AC220 Automatic oil



6.17 M-40 Standard AC380

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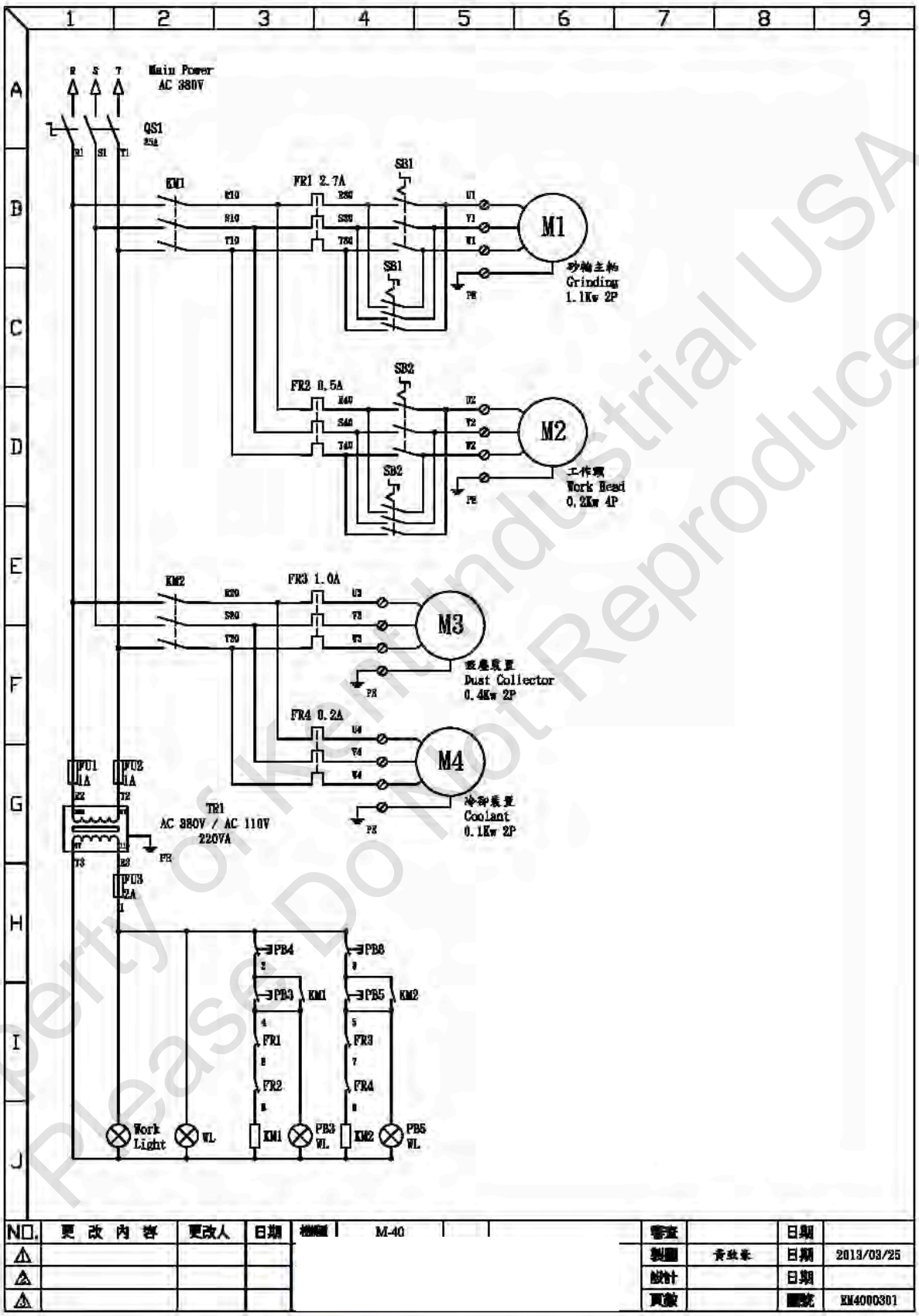

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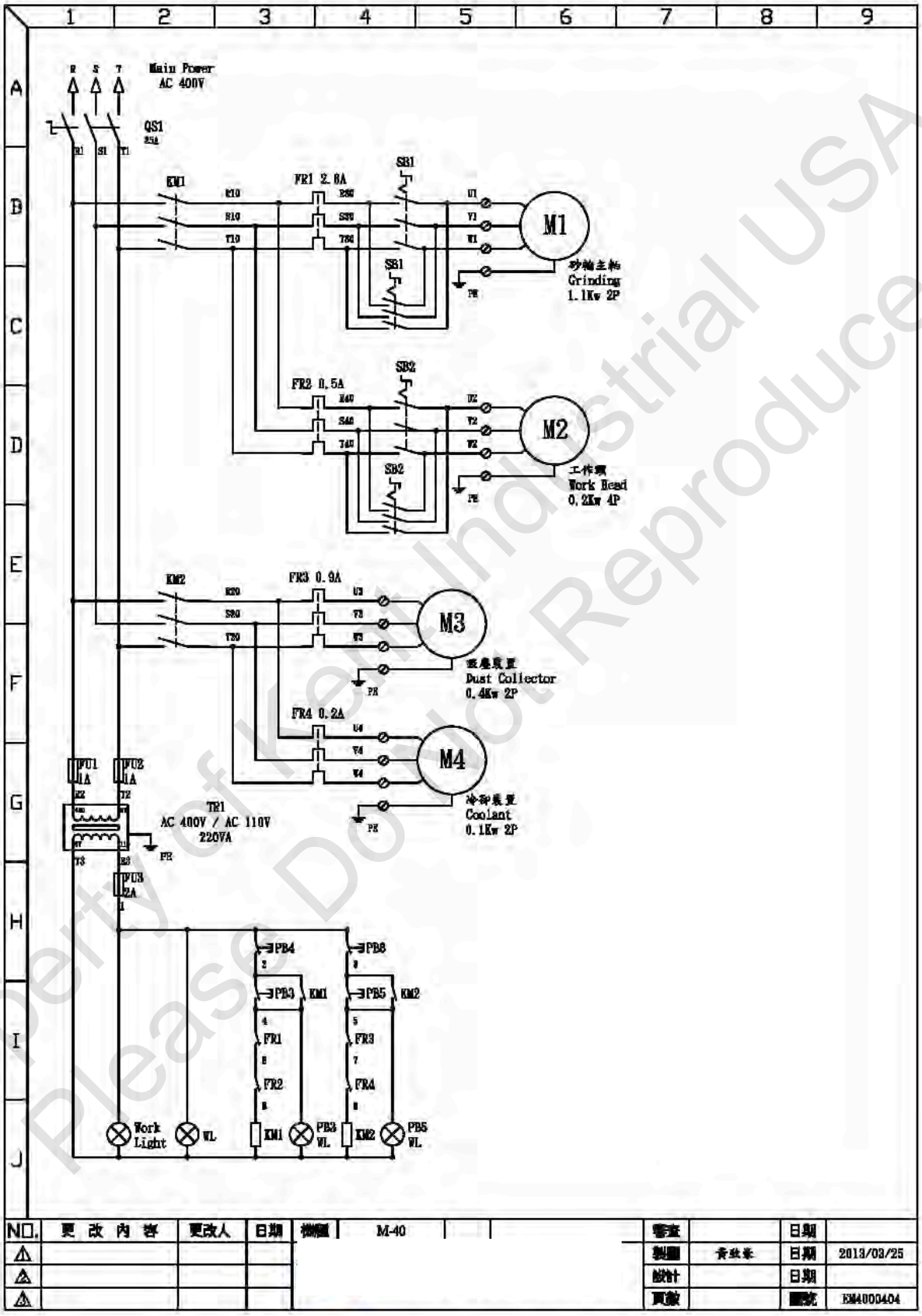
6.18 M-40 Standard AC400



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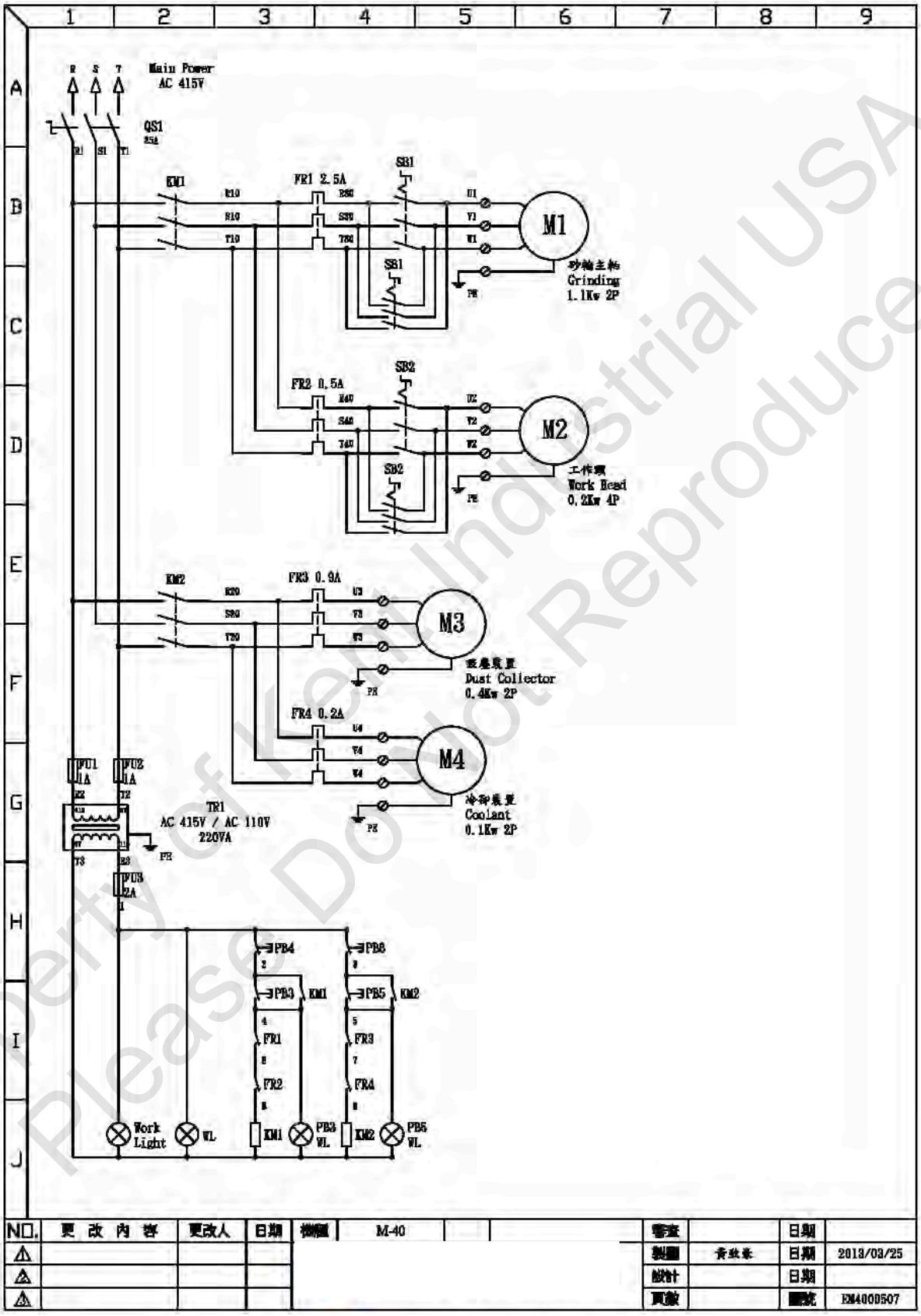
6.19 M-40 Standard AC415



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7. Operation of the Machine

7.1 Operating Instructions

Tab.7.1 Symbols used in wiring diagram for electro-magnetic circuit and explanation of them

SYMBOL	EXPLANATION	SYMBOL	EXPLANATION
MC1	MAIN SPINDLE MOTOR, GRINDING WHEEL SPINDLE MOTOR ELECTRO MAGNETISM SWITCH	EF	TUBULAR FUSE 3A
MC2	COOLANT PUMP, DUST COLLECTOR SWITCH	E1-M5	MOTOR
OCR1	OVER LOAD RELAY FOR MAIN MOTOR	43M	CHANGE-OVER SWITCH FOR MAIN SPINDLE REVOLUPION
OCR2	OVER LOAD RELAY FOR GRINDING WHEEL	43W	CHANGE-OVER SWITCH FOR GRINDING WHEEL
OCR3	OVER LOAD RELAY FOR HYDRAULIC TABLE FEED	43N	HYDRAULIC TAVLE FEED SWITCH(ON-OFF SWITCH)
OCR4	OVER LOAD RELAY FOR DUST COLLECTOR	PB1	PUSH-BUTTON FOR GRINDING WHEEL SPINDLE,MAIN SPINDLE, HYDRAULIC TABLE FEED STOP.
OCR5	OVER LOAD RELAY FOR WET GRINDING ATTACHMENT	PB2	PUSH-BUTTON FOR GRINDING WHEEL SPINDLE,MAIN SPINDLE, HYDRAULIC TABLE FEED START
RL	POWER SOURCE INDICATION LAMP	PB3	PUSH-BUTTON FOR DUST COLLECTOR AND COOLANT SYSTEM STOP.
GL	OPERATION INDICATION LAMP	PB4	PUSH-BUTTON FOR DUST COLLECTOR AND COOLANT SYSTEM START.

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7.1.1 Electrical Equipment

The electrical equipment consists of electro-magnetic control box (27) in Fig. 2.3, and electrical control panel (32) in Fig. 2.3, on the basis of the wiring diagram given in Fig. 7.1.

Fig.7.3 illustrates the side-view of the electro-magnetic control box; (1) is the power source switch and (2) is an white power source indication lamp (lighted when the main switch is set "ON"); (3) is operation signal lamp (green) (lighted when the motor in Fig. 7.3 starts). The electric control panel is situated at the left side of the machine. Figure 9 illus-trates the side-view of the electromagnetic control box, and shows (1):grinding wheel spindle motor, (2): socket for main spindle motor , (3):socket for dust collector motor, (4): socket for wet grinding attachment or mist type coolant system and (5): socket for machine illumination. When starting the grinding wheel spindle, please follow the order given in the item D ("Handling of machine "as well as 2), "Wiring".

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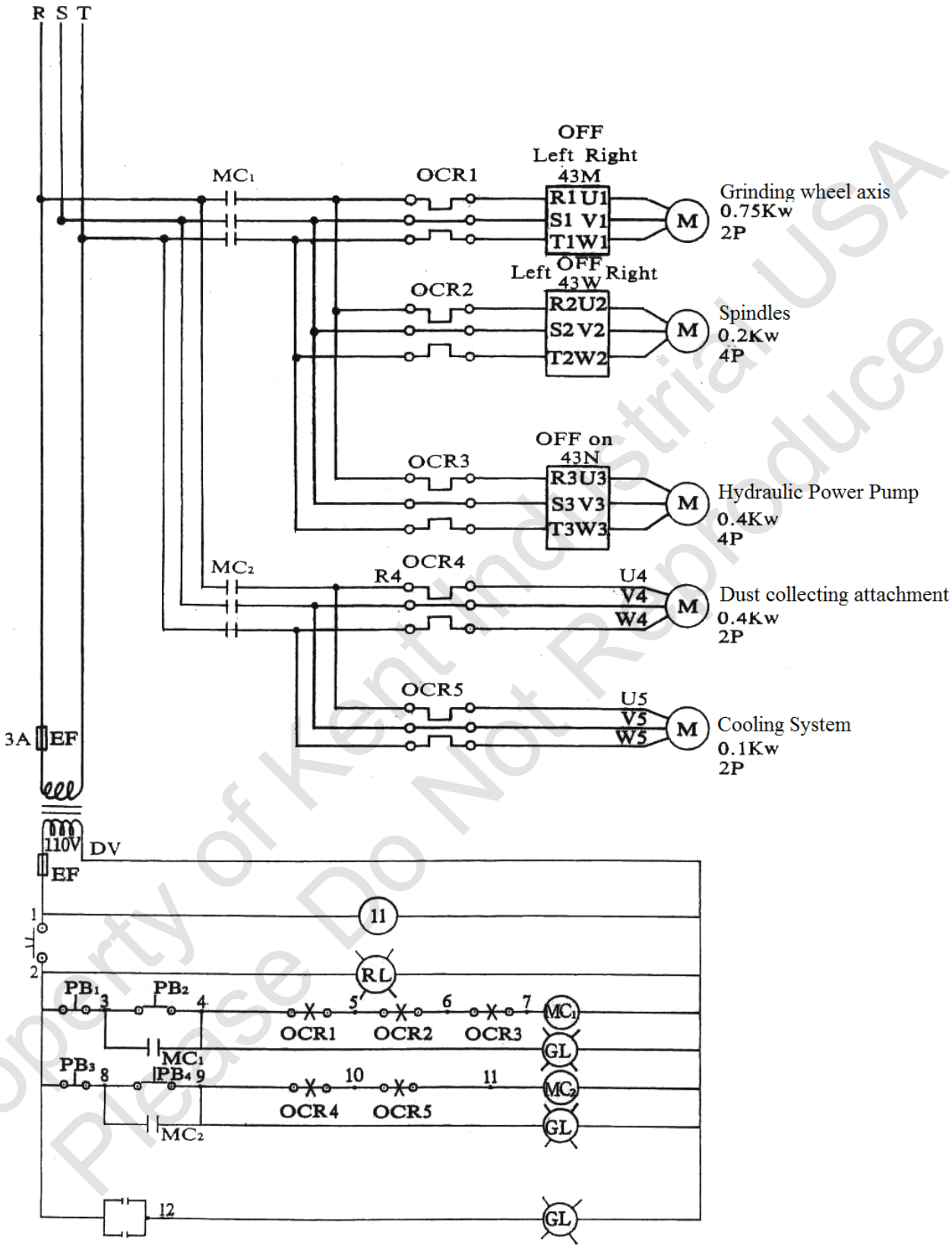

Fig.7.1 Figure M-40 electrical equipment

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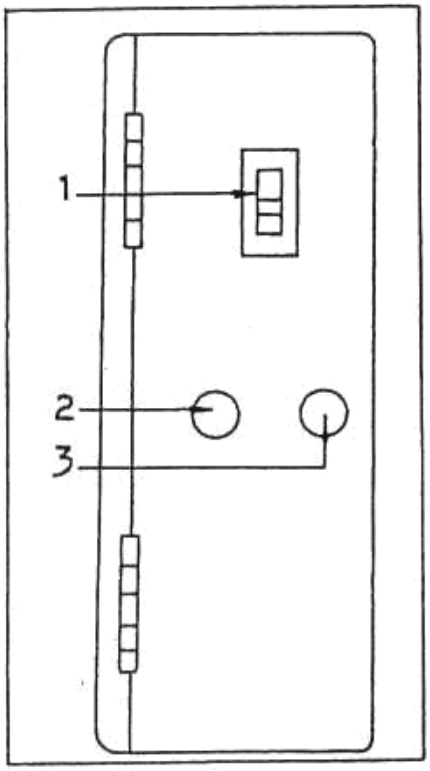

Fig.7.2

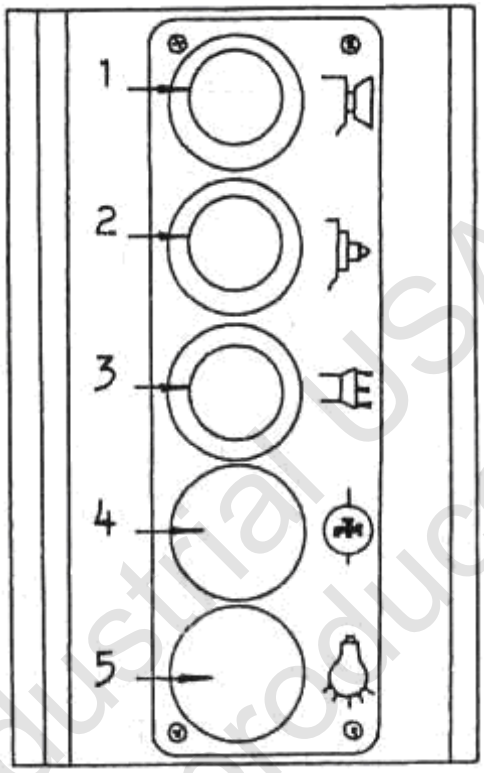

Fig.7.3

7.1.2 Workbench Longitudinal Movement Agency

Figure 7.4 illustrates the structure of longitudinal movement of table, table and straddle between the use of mobile as a ball, ball and ball seat rails are not worn design, handle and move around when the table or bench tangent to move around , longitudinal feed shaft drive, and secured to the table and around the cable at both ends of the cable wheel is fixed in the longitudinal axis of the cable feed wheel drive leaving the workbench starts moving around smoothly and there is no gap, (stroke 400m / m) (16 "), the cable tension adjustment knob tightness available (Figure 7.4 in the (2)) adjustment of the tension of the cable must be adjusted to the right, are too loose or too tight will produce workbench the movement is not smooth uneven, table tangent to (Figure 2.2 in (8) of 126m / m (5 ") decreased to (12m / m (1/2")) move left and right hand when using the former must To figure 7.5 in the (2) pressed into the differential gear separated before.

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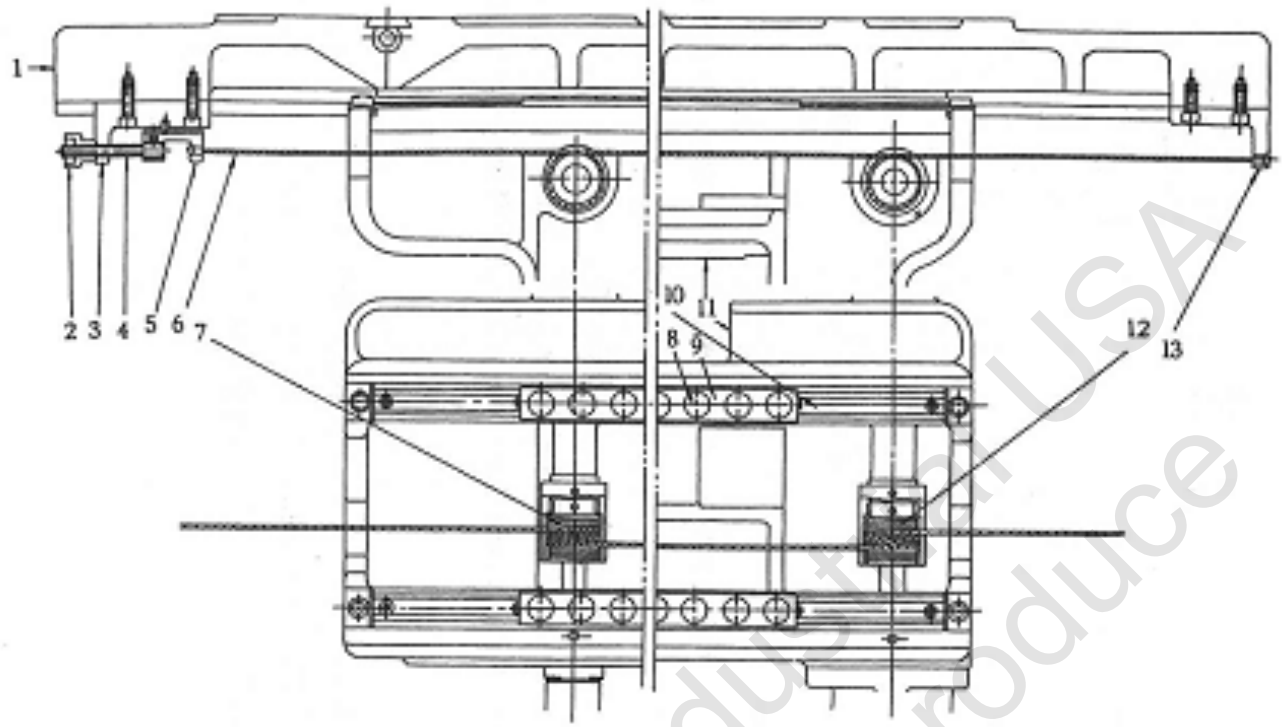

Fig.7.4

(1) Sliding table
(2) Knob
(3) Wire bracket
(4) Adjusting screw
(5) Tension dog
(6) Wire rope
(7) Wheel with left hand threads
(8) Steel ball
(9) Ball retainer
(10) Ball race
(11) Bridge
(12) Wheel with right hand threads
(13) Wire bracket

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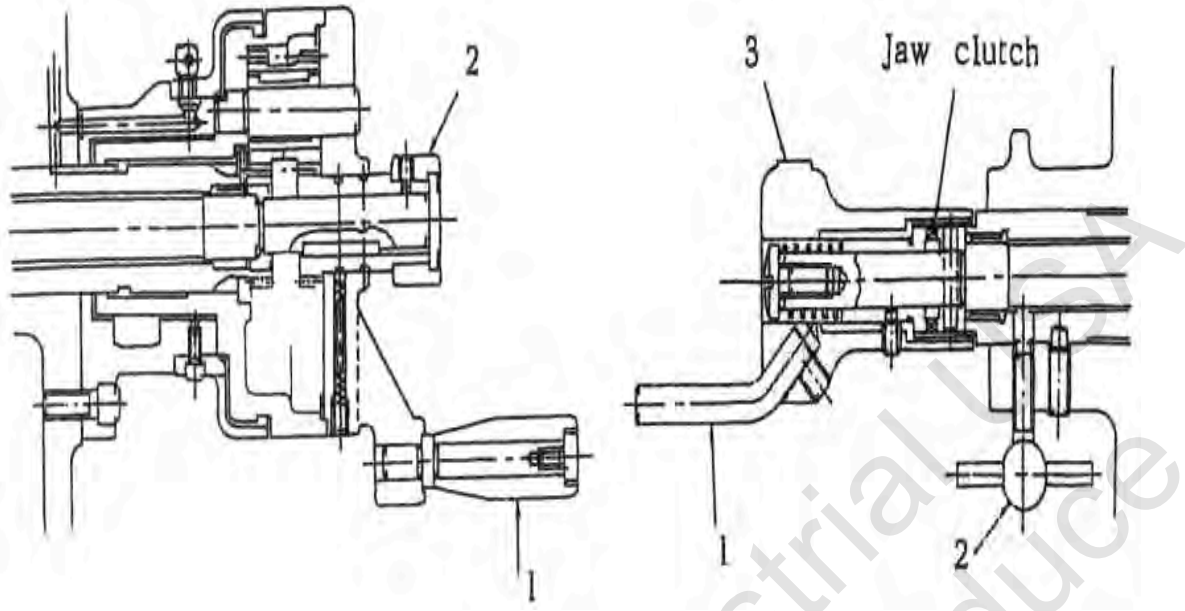

Fig.7.5

7.1.3 Wheel Head Horizontal Moving Mechanism

This machine's saddle (Figure 2.2 (31)) and the wheel head lifting columns linked together, when the saddle horizontal transfer handwheel [Figure 2.2 of (10) and (25)] is rotated and driven mobile saddle grinding head, grinding head maximum distance of lateral movement 250m / m (10 "), shown in Figure 7.6, lateral movement of the hand wheel when the rotation around the transverse movement being moved around the hand wheel saddle 3m / m (0 ~ 1 ").

Shown in Figure 7.7 on the scale ring before and after moving into 300 (100) aliquots, each aliquot 0.01m / m (0.0005 "), when wishing wheel head parked at any one location and scale ring zeroed simply hand wheel (1) and turn the dial ring grip to zero at the can, when turning the handwheel, scale ring will rotate together.

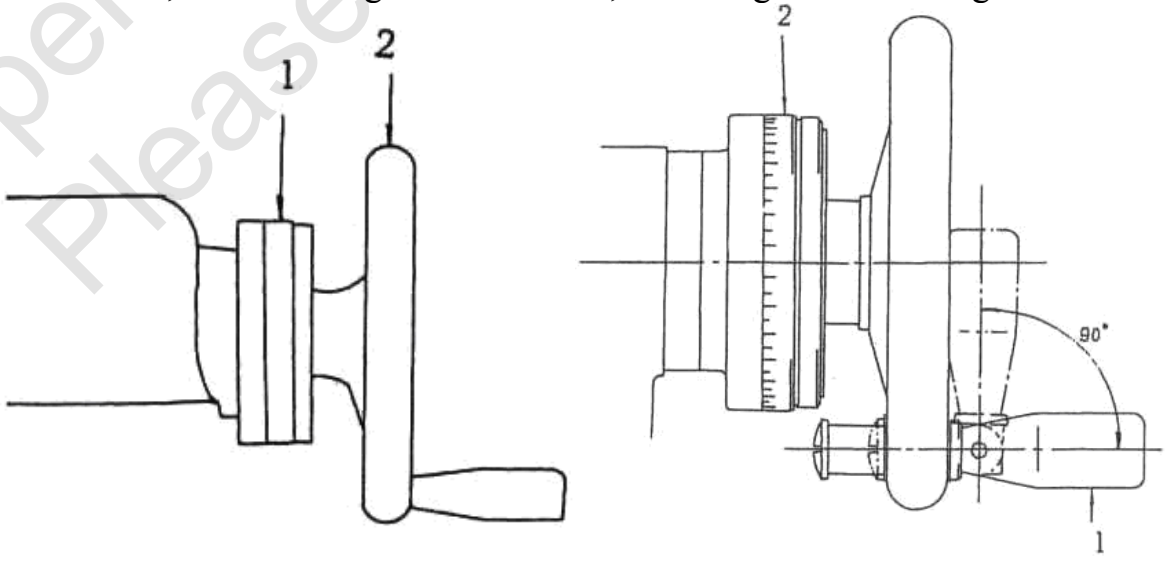

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Fig.7.6 Fig.7.7

7.1.4 Grinding Head Up and Down Movement Mechanism

When you turn the elevating handwheel [Figure 2.2 (26)], the hand wheel direct drive connection thereon worm, and then through the worm gear, rack and spur wheel lifting column and the head moves up and down the line whenever a handwheel even if the wheel head coil generates 3mm (0.1") of the mobile, dial ring is divided into 300 (200) points scored each scored for 0.1mm (0.0005"), wheel head can be in any position sometimes the scale ring zero, methods and the same wheel head horizontal moving mechanism.

7.1.5 Operation of Wheel Head

1. structure:

Wheel head assembly includes a body, wheel spindle, motor and angle seat ... and so on. (See Figure 7.8)

2. wheel spindle:

Wheel spindle is inclined angular contact ball bearings in the two support surfaces, bearing the preload is achieved by a lock nut and butter as a lubricant, designed to prevent interference of the thermal expansion of the spindle. Spindle assembly is factory fitted with a temperature controlled chamber carefully assembled, but because of different climatic conditions around, if customers use anomalies are found, please contact the factory or dealer promptly, when as soon as possible adjustment of repair.

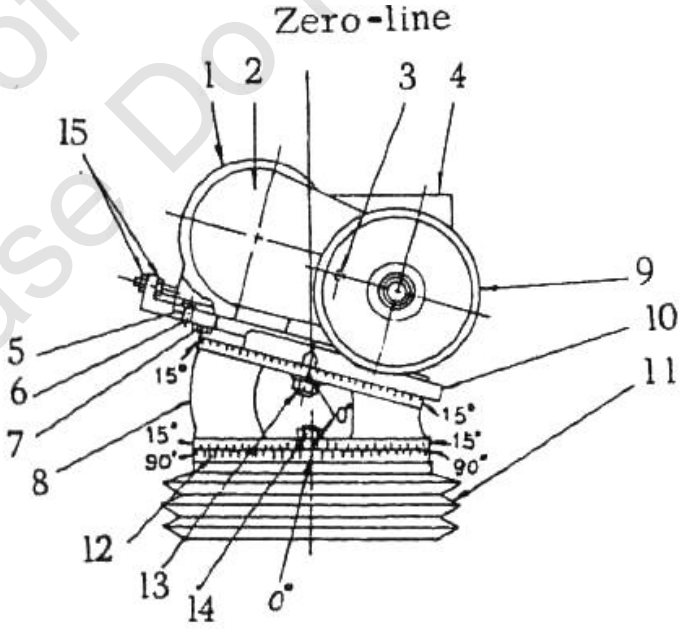

Fig.7.8

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Tab.7.2

1. Motor	10. Swivel seat
2. Belt cover	11. Dust cover
3. Belt cover fix screws	12. Dust cover above the calibration
4. Grinding wheel ontology	13. Hex nut (left)
5. Fix screws	14. Hex nut (right)
6. Eccentric tip	15.Adjust belt
7. Hex Bolts (Fix motor)	
8. Angle seat	
9. Grinding wheel	

3. Grinding wheel spindle speed of change:

As shown in Table 7.3, the speed of the wheel spindle is divided into low, medium and high speed. When you need to transform the spindle speed, the reference to Figure 7.9, the first (4) Remove the bolt can be (2) Pulley cover win, then you can see (3) motor pulley and (4) the spindle pulley on each of third-order outermost bands of the lowest speed, medium speed and followed inward maximum speed, both for the V-groove, when adjusting the belt tension, referring to Figure 7.8, the two (7) motor fixing bolts loose, then adjust (15) nut, when adjusted to the proper belt tension, do not forget then (7) bolts tight, if the belt wheel to become the situation by unilateral shall first (7) bolt relax, adjust (6) setscrew and eccentric pin (see Figure 7.8) parallel to the pulley and the belt is fitted so far.

Tab.7.3

Low speed	2600RPM
Medium speed	3700RPM
High speed	6200RPM

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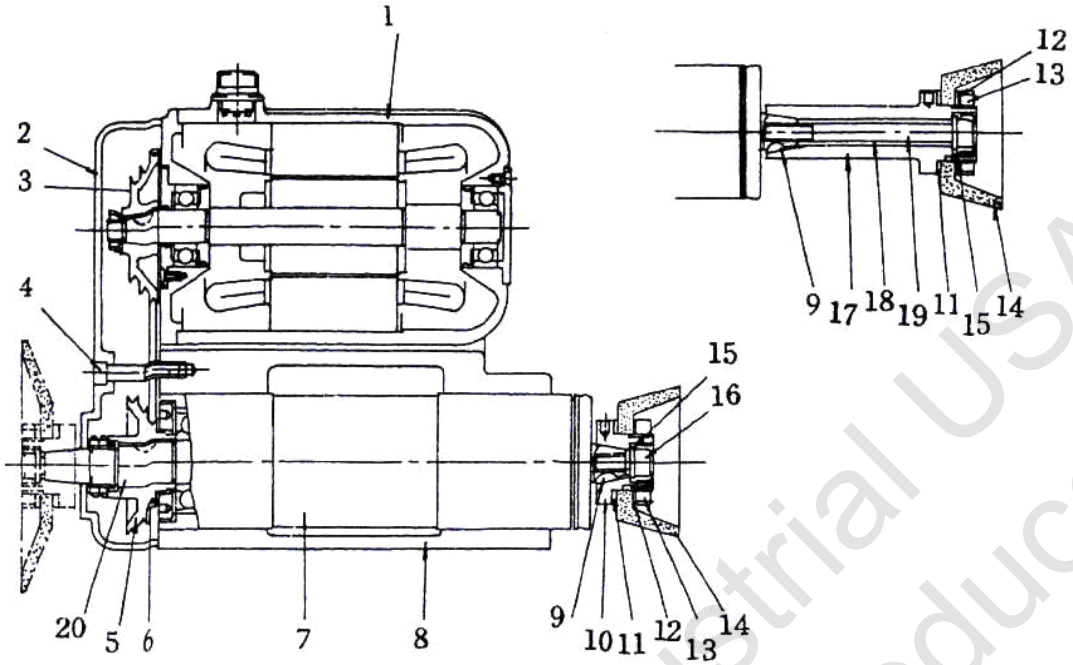

Fig.7.9

Tab.7.4

(1) Motor	(8) Grinding wheel head ontology	(15)Washer
(2) Belt pulley cover	(9) Woodruff key	(16)Countersunk head screws
(3) Motor Belt pulley cover	(10Grinding wheel sleeve	(17)Extended grinding wheel flange
(4) Countersunk head screws	(11)Washer	(18)Extension rod
(5) Grinding wheel spindle Belt pulley	(12)Rubber gasket	(19)Countersunk head screws
(6) Drive belt	(13)Nut	(20)Grinding wheel spindle
(7) Grinding wheel spindle outer sleeve	(14)Grinding wheel	

4. wheel head's rotation and angle settings (see Figure 7.8):

Grinding wheel head can be 360 ° in the plane of rotation, and in the vertical plane for 30 ° (15 °) of the up and down tilt.

a. horizontal rotation of the wheel head (seat angle of rotation):

Figure 7.8 shows the swivel in the 360 ° angle of rotation. And (4) Grinding wheel head body with (a) the motor is locked in (10) rotating seat, the (13) Nuts (left teeth) relaxation can be transferred back to the desired angle and fixed. Angle seat at the top and bottom have the same scale, to once as a grid. Extends to the left and right 15 °, but each cell lengths, angles above the horizontal seat of 15 ° tilt.

b. swivel of Rotation:

Figure 7.8 shows the swivel in the 360 ° angle of rotation. And (4) Grinding wheel head body with (a) the motor is locked in (10) rotating seat, the (13)

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Nuts (left teeth) relaxation can be transferred back to the desired angle and fixed. Angle seat at the top and bottom have the same scale, to once as a grid. Extends to the left and right 15 °, but each cell lengths, angles above the horizontal seat of 15 ° tilt.

c. Grinding wheel spindle tilt:

Taking these procedures a and b, while rotating swivel and angle of the seat, you can achieve the purpose of tilting spindle, the next is a practical example that demonstrates how the spindle inclination (see Figure 7.10) when wishing spindle inclination angle α, according to the program first seat rotation angle to the length of Grinding wheel spindle axis is perpendicular to the long axis of the table (ie, the angle of the seat bottom reticle alignment mark on the dust cover on the ring of 90 °), and then swivel seat angle turn in the α to the desired angle (15 ° or less), the angle of the seat angle set to swivel the top of the scale that is based on the bottom line of the mark, locked to the bottom of the seat angle dust the top of the scale and the scale of the ring 0 ° marking based on the angle of rotation of the rotating seat to just the opposite direction of the direction of rotation α angle, spindle lock and tilt to the desired angle of α.

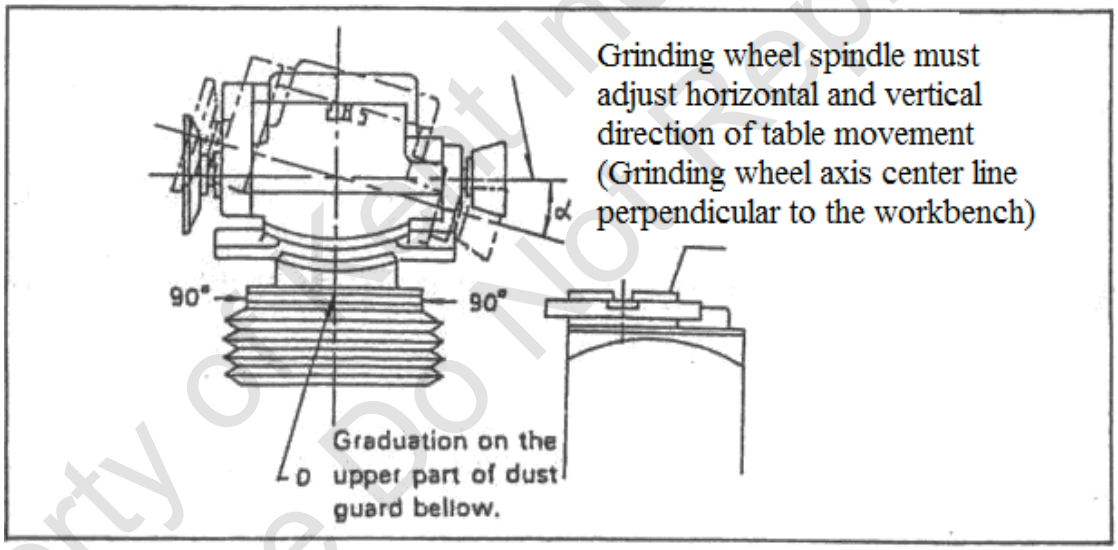

Fig.7.10

This may be done by the following steps to accomplish the lower angle loose nut (Figure 7.8 of 14) and then the angle of the direction of rotation seat at an angle, while the angle of the direction of rotation seat at an angle to the reference rotation, rubber dust cover under the seat angle is on the ring of the zero-scale prevail.

7.1.6 Tailstock and Working Head

When fitted to the left and right tailstock and working head, (see Figure 1.5) should follow the steps below, (see Figure 7.11 and 7.12) in this case take the right tailstock and working head, the left and right tailstock installation method tailstock same), will (1) screw to relax, then head placed on a rotating tailstock or work bench and bottom card system aligned with T-slot, then (1) and tighten the screws, locking

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(2) the bolt can be fixed. Figure 7.11 The center-right tailstock (7) or by the (3) handle and (4) adjustment screw to adjust. Figure 7.12 in the ontology of the working head can be rotated 360 °, its relaxation and fixed. The rotation angle of the settings, you can refer to (3) on the base (horizontal rotation) and (4) rotating seat (vertical rotation) on the scale. The work spindle (9) by (10) locking screws. Figure 7.12 in (11) 15 ° on the collar of the scale, which is known as clearance angle adjustment.

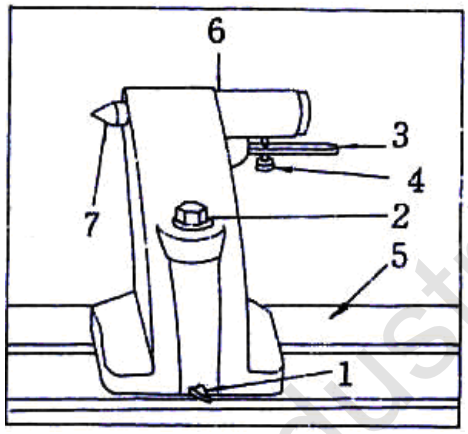

Fig7.11

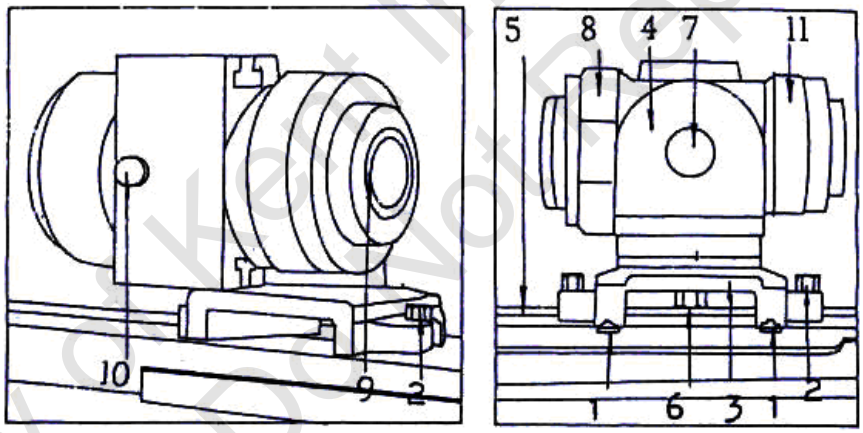

Fig.7.12

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7.1.7 Rotary Workbench Adjusting and Rotation Angle Setting

Rotary table on the sliding board though only do 60 ° fixed-angle rotation, but in fact the maximum can be rotated up to 180 ° as much. When I want to rotate the rotary table when the figure 7.13 (3) nut loose and then (5) eccentric pin to rotate clockwise 90 °, to the figure of 7.14 (6) slope upward adjustment pin lift. At this time on a skateboard according to the angle of sliding scale for large angle adjustment setting. If you wish to make a large angle after trimming or move to fine-tune the position is shown in Fig.7.14, when the inclination adjustment pin in the A slot, turn (4) 7 ° tilt adjustment screws to do the fine-tuning, if I want to move forward to do more than this limit can be used when the adjustment (5) of the rotation of the eccentric pin (6) adjustment Pins prolapse A trough, hand to promote the rotary table, and then (6) adjustment pin into slot B, you can be longer be 7 ° of adjustment range, if done in the opposite direction than the 7 ° A slot position adjustment required (3) stopper win, but will (4) As Figure 7.11 pitch adjustment screws in the broken line position, in accordance with the the above method, (6) can be inserted into the C slot, the slope angle adjustment setting is completed, the two required in Figure 7.13 (3) and tighten the nut can work.

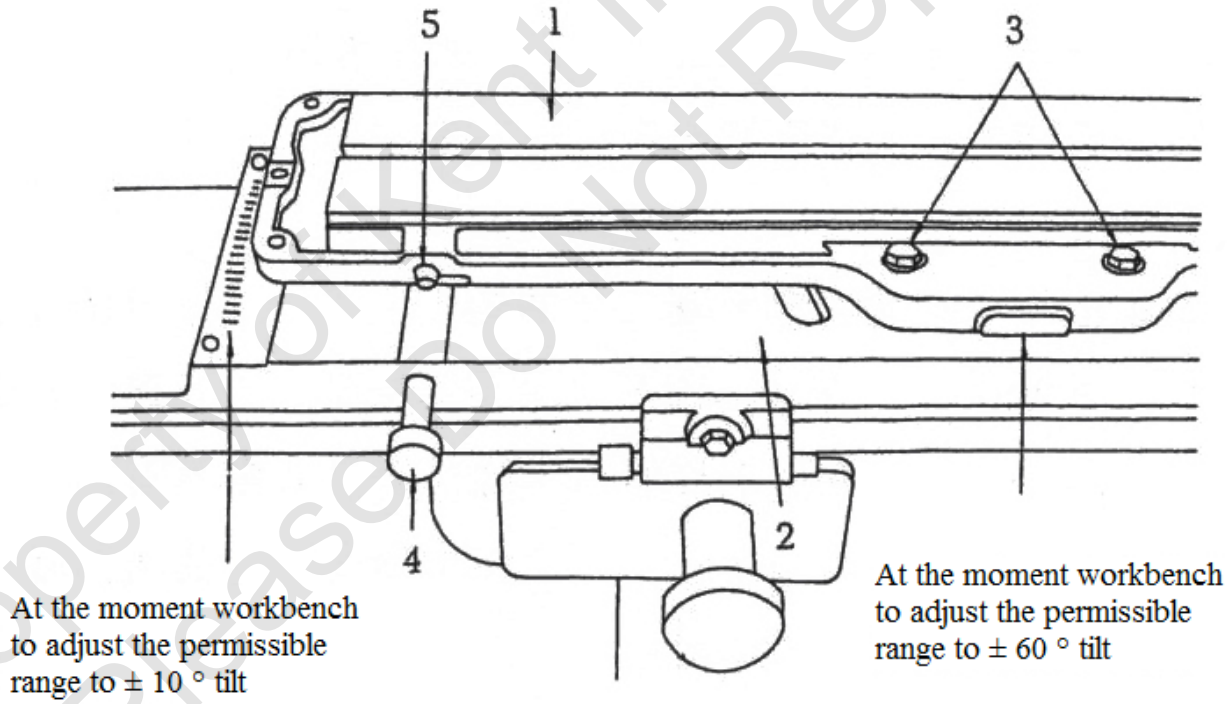

Fig.7.13

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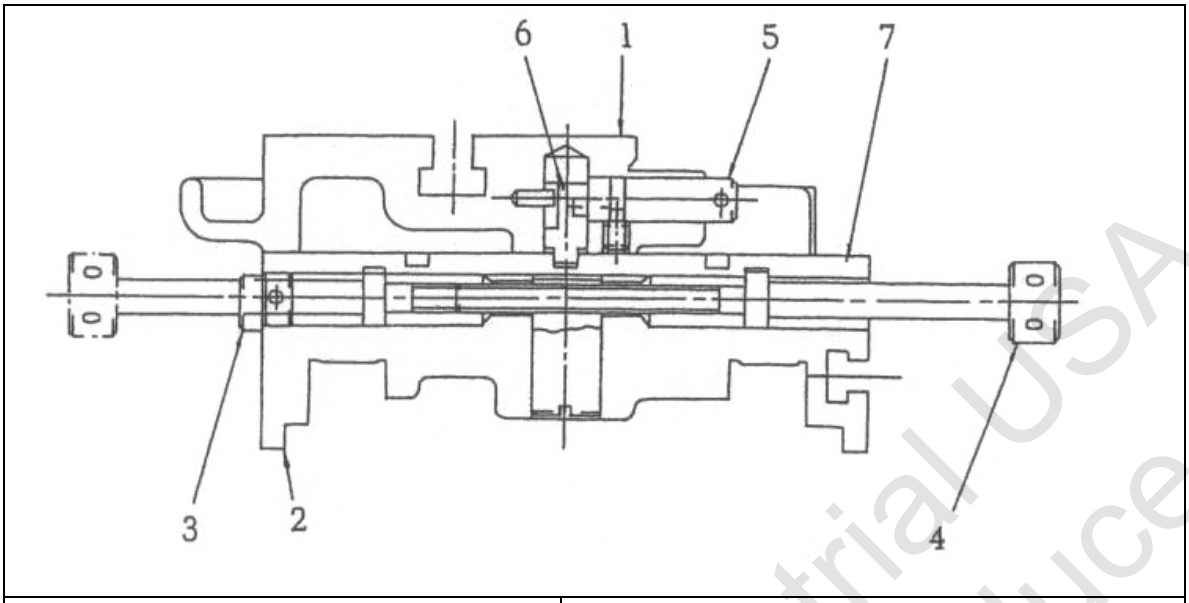

(1) Swivel table	(5) Eccentric pin
(2) Sliding table	(6) Taper adjusting pin
(3) Plug	(7) Taper adjusting plate
(4) Taper adjusting screw	

Fig.7.14 Inclination adjustment mechanism

7.2 The Preparatory Work Before Grinding Tool

7.2.1 Select the Direction of Rotation of the Grinding Wheel

The direction of rotation of the Grinding wheel blade of the tool, there are two relative motion **a.** close to **b.** away. The following figure shows **a.** close to the situation, usually **a.** the kind of abrasive grinding obtain better precision, and can avoid the drawbacks of the blade from the feather. Intervals should be used except in special cases **a.** by way of grinding close.

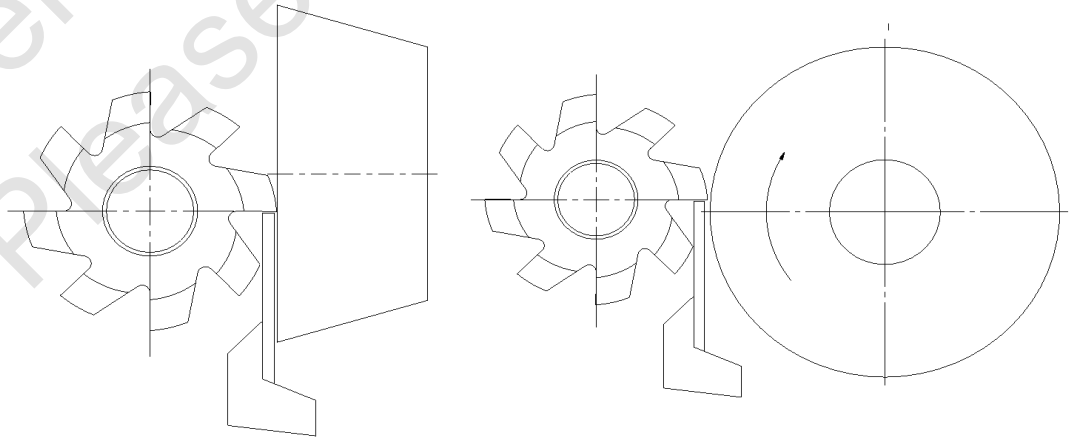

Fig.7.15

7.2.2 The Grinding Wheel Dressing

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To make the blade sharpened razor knives and fine, the Grinding wheel should always be trimmed. General summary of the dressing, it took the diamond knife leveling, formal dressing Larry Diamond wheel frame of use, as shown in Figure 7.16 (Note that the direction of Grinding wheel rotation, and check whether the diamond blade fixed tight).

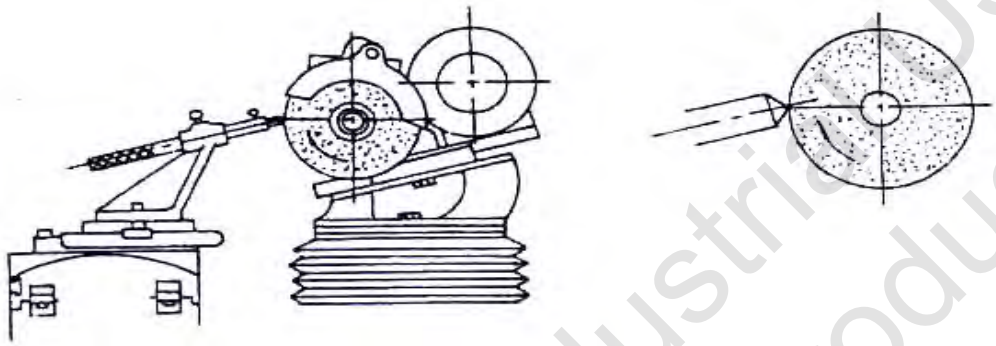


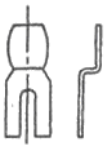
Fig.7.16

Note：Full circle and diamond knife inserted leveling seat of aperture 10.8 mm.

7.2.3 Tool Support Bar and Blade

Tab.7.5 in the support bar of the cutting edge of the tool shape and purpose.

Tab.7.5

Shapes	Name and usage	Shapes	Name and usage
	straight multiply rack piece: for straight ditch reamer, side cutter, milling cutter, keyway milling cutter purposes		Deviation shaped racks tablets: large diameter spiral groove milling cutter and insert knife,shaped milling cutter purposes Omo
	Curved racks tablets: Shell end mill		L-shaped rack piece: SAW BLADE milling cutter and multi-blade flat cutter

Depending on the work piece different blade should be fixed in the fine-tuning tool support rods or rod fixed tool support, and the blade support rod fixed in the universal tool, while the blade fixed in the universal tool support rod base plate, which can be placed in the work stage, the working head or grinding wheel head. If the grinding mill or other similar tool flat surface, the tool supports the blade must be supported in the blade tip, the blade should be very stable fixed objects from the work

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at the appropriate distance and not floating edge of the wheel and the tool support farther nearly as possible, the general condition of 5mm is the most appropriate.

7.2.4 Grinding Wheel

The machine is configured with several Grinding wheel as a standard accessory, its shape and dimensions as shown in Fig.7.16 and Tab.7.6.

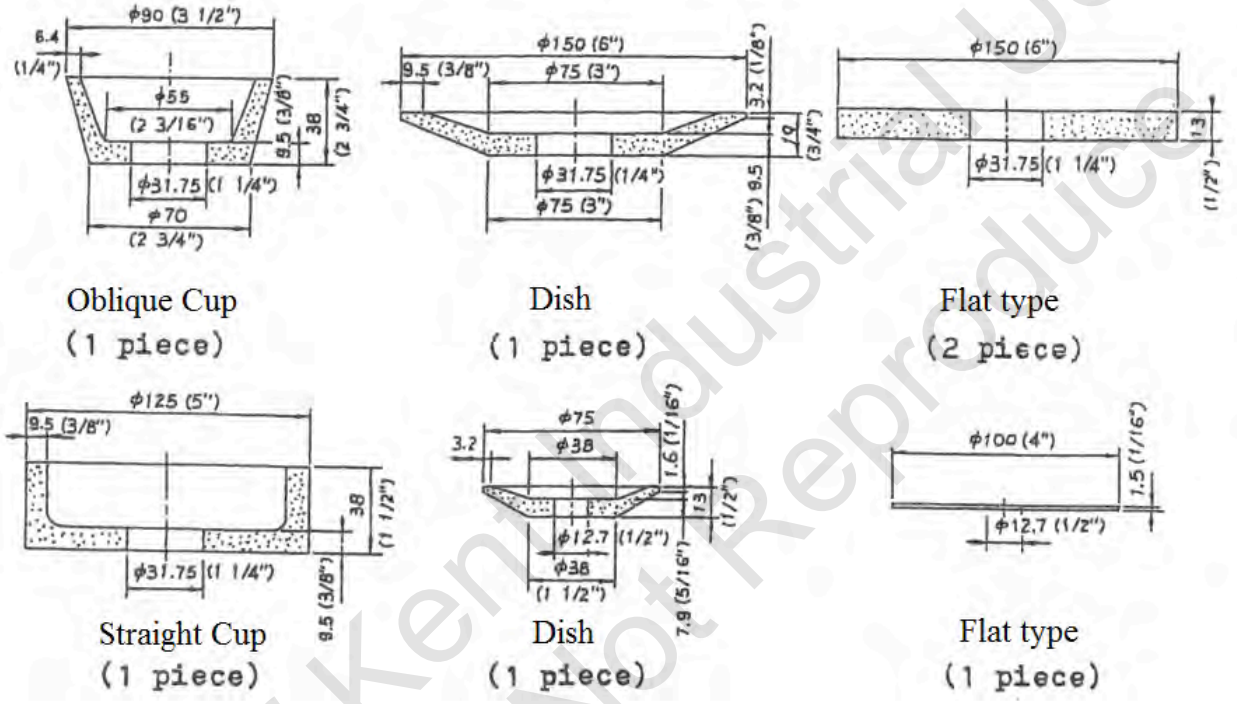

Fig.7.16

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Tab.7.6

Grinding wheel(Standard equipments)		Usage
Grain grade shape thickness bonds structure and bonding material	Size Outside Diameter x thickness x hole diameter	
PA 60 J	90 x 38 x 31.75 mm (3.54 x 1.40 x 1.25”) (Flaring cup)	For High-steel Cutters O.D. of face blades on plain mills, angular cutter face mill, side mill, key seating mill, end mill, metal saw, and those of others.
GC 100J	125 x 38 x 31.75 mm (4.92 x 1.49 x 1.25”) (Straight cup)	For Carbide Tipped Cutters Face mill, mill with inserted end mill, and metal saw.
WA 60K	150 x 13 x 31.15 mm (5.09 x 1.18 x 0.86”) (Flat Shaped)	For Steel (Cylindrical grinding surface grinding.)
GC100J	150 x 13 x 31.75 mm (5.09 x 0.51 x 1.25”) (Flat Shaped)	For Carbide metal (Cylindrical and surface grinding.)
A60 N.B	100 x 1.5 x 12.7 mm (5.90 x 0.75 x 1.25”) (Straight)	For High Speed Steel Slitting.
WA 60 IJ	150 x 19 x 31.75 mm (5.90 x 0.75 x 1.25”) (Dished)	For High Speed Steel The peripheral teeth of plain mill, face mill, side mill and various cutters.
WA 60 J	75 x 13 x 12.7 mm (2.95 x 0.51 x 0.50”) (Dished)	Peripheral teeth of reamer, tap. And small dia. End mill.

7.2.5 Safety Precautions

When the relief grinding, grinding tools must first be required to grind the teeth of the tool plane and the centerline set at the same level. At this point the top-center and center height indicator gauge the height of the plane fixed by the tailstock center grinding tools as high as it will not only be used to adjust the tool to be prepared abrasive polishing tooth height, can be used to prosecutors and tailstock working head of the center line (so that the center line of the wheel head down and working head tailstock on a plane).

When placed on top of the heart Grinding wheel gauge head (Figure 7.18), the center height of the grinding wheel axis indicator is a horizontal centerline plane, as shown in Figure 7.20 of the various uses of the top center Regulation, A and B in FIG top center Regulation is placed on the table, while C and D are placed in the Grinding wheel head.

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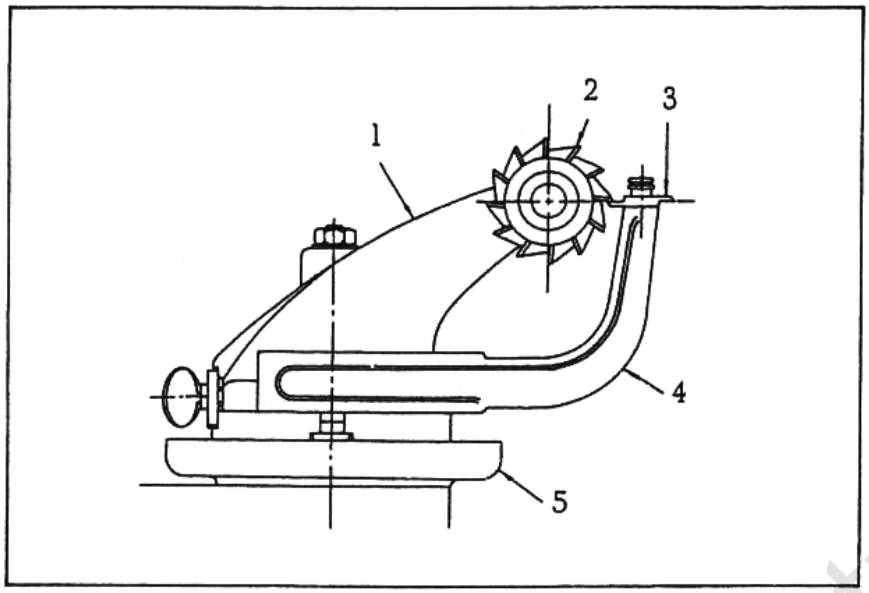

(1) Tailstock
(2) Milling cutter
(3) Center height indicator
(4) Centres Regulation
(5) The rotary table

Fig.7.17

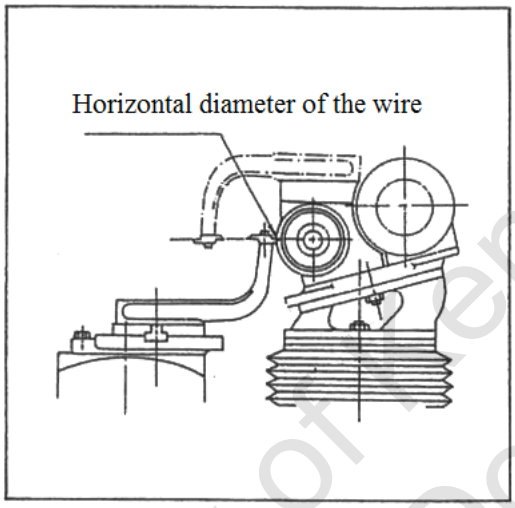

Fig.7.18

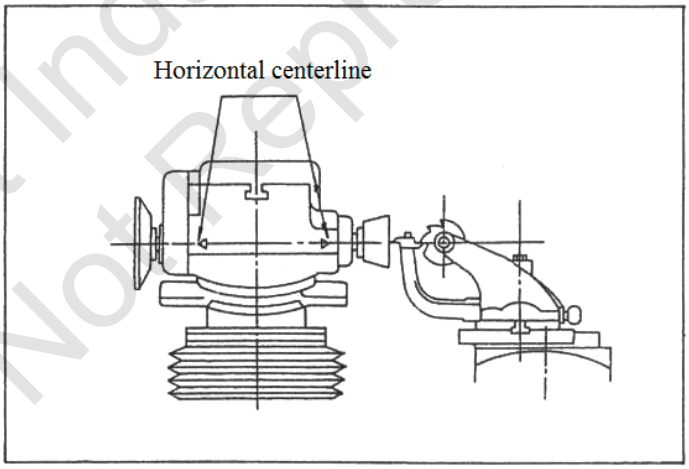

Fig.7.19

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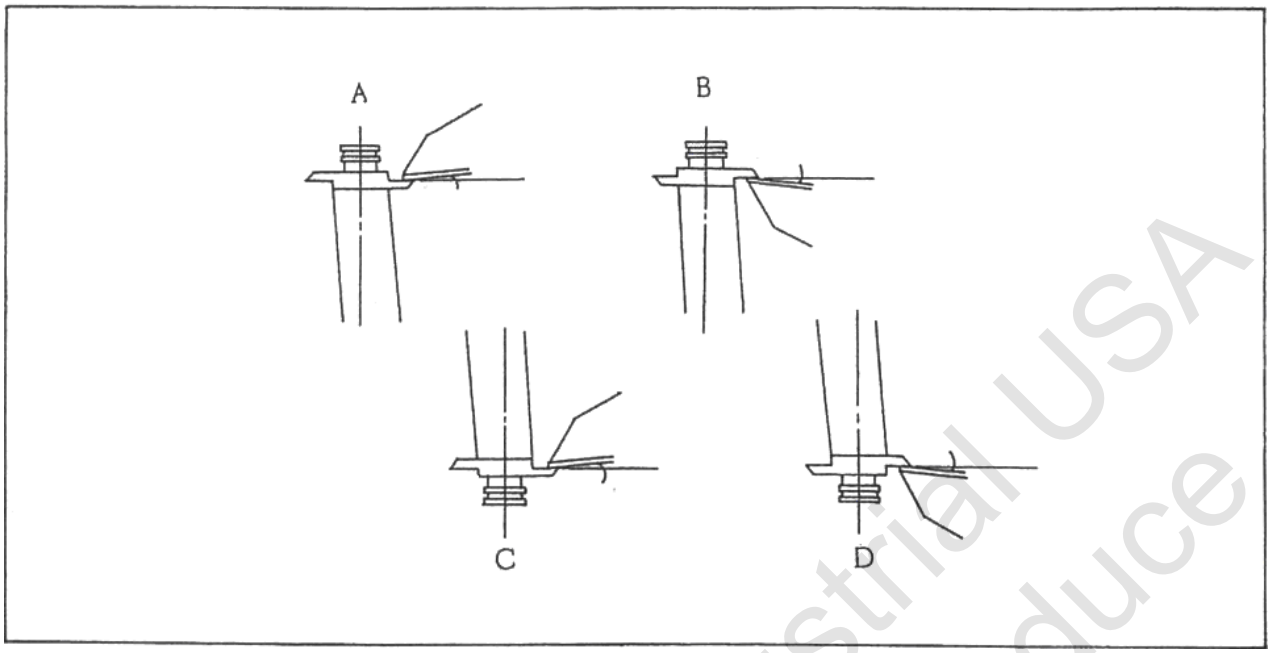

Fig.7.20

7.2.6 Safety Precautions

1. Please bring safety glasses
2. Please solid Grinding wheel lock to ensure safety passport
3. Grinding wheel of installation:

The standard Grinding wheel installation shown in Figure 7.21 and Figure 7.22, the order of each one. Grinding wheel sleeve 2. Washer 3. Rubber gasket 4 Grinding wheel sleeve nut 5. Grinding wheel long sleeve 6 cylinder sleeve 7. Spring Washers 8 sets of head cap screw 9. Grinding wheel 10. keys. Grinding wheel fitted with his kind that they can not properly use the washer and rubber washer, use a blotter and soft leather pad thick, but its thickness does not exceed the former each 0.6mm (0.025 "), the latter (skin) each not more than 3mm (0.1 ").

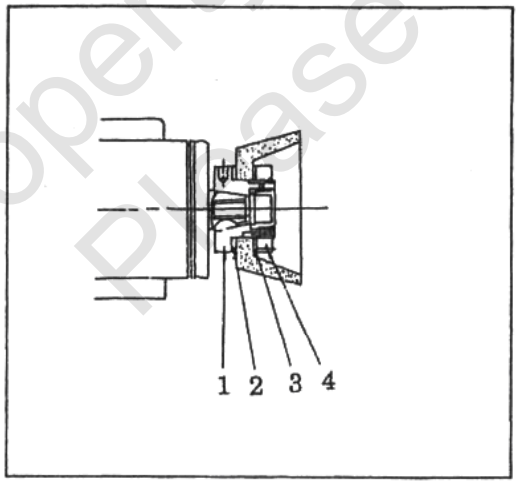

Fig.7.21

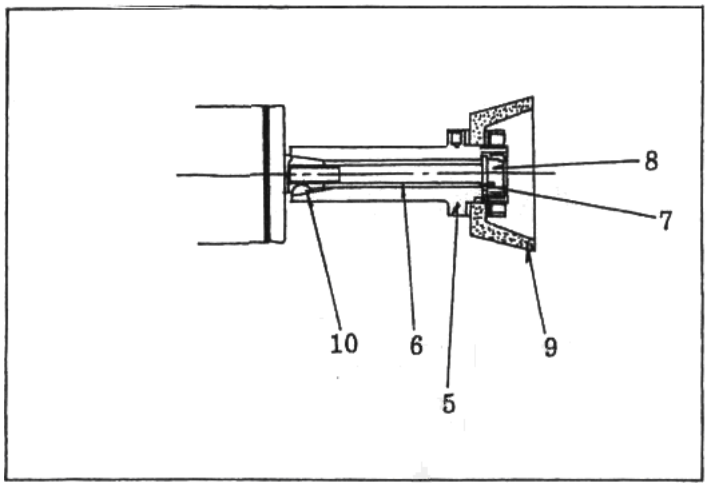

Fig.7.22

Special use of the washer which should be equal to or slightly larger than the

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outer diameter Grinding wheel sleeve. In installed by foreign inclusions should be taken to avoid the meantime, especially the pull Grinding wheel cone sleeve should pay more attention.

4. Grinding wheel of checks and balances:

A good deal Grinding wheel operator for installation, and maintenance and inspection of the overall work. Receipt should immediately check whether the damaged Grinding wheel. And make appropriate judgments, the grinding wheel wear from the inside hole with a screwdriver and gently tap the hang up and send the sound quality, you can determine whether there is rupture is suspected.

The percussion doing the above, you should first clear the Grinding wheel on each side of the dirt and debris powder, and note whether the Grinding wheel is not dry tide. Listen carefully to the sound of its tapping out, different binders to produce a variety of different audio with clear, there is chaos, the other, those who have special distinct cracking sound, you should be careful to distinguish it.

Ideal storage method should be placed in a dry, out of direct sunlight place, each with a large nail to the Grinding wheel suspension.

5. Operating rules and work things should be noted that the Department:

Grinding wheel starts working again with the new material, you should let the Grinding wheel at full speed, turned one minute, at the moment the operator should stand on the side of the direction of the Grinding wheel carefully observe its operation, to ensure safety. Grinding wheel should gradually by slowly working on things, so that the Grinding wheel at room temperature, stability slowly back to temperature, so avoid excessive eating knife, a sudden rise in temperature caused by the rupture Grinding wheel. These matters, in the morning or in cold air from the warehouse when drawn particular attention. Generally, when working with a grinding Grinding wheel side, there are latent danger of broken Grinding wheel. So unless Grinding wheel side to reach normal temperature, otherwise do not grind the side of the work, but not too hard to work material into the Grinding wheel, causing great stress. Nor excessive locking flange screws, as this may cause the deformation of the Grinding wheel so that the screws may break. Ding-dimensional M-40 universal tool grinder, which is equipped with a wet Dust collecting attachment, to the operator's health, should be adopted.

7.3 Grinding Tools

7.3.1 Description of Grinding Tools

The application of the grinding machine tool, its work can be divided into the following two parts, each part has its special polishing method.

1. of surrounding teeth grinding:

Figure 7.23 represents the surrounding tooth milling cutter is usually (flat cutter that fall into this category) part of the M-40 machine polishing tool that belongs to this type. This tool can be repeated grinding and milling repair intermittent use, it has

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the original times and the second individual clearance angle. Often leads to incorrect grinding work piece machined surface jump knife marks, many say it is due to incorrect clearance angle caused. So the size of the clearance angle selection, tool grinding division should be added attention. Generally speaking, the smaller the clearance angle, the conductivity to dissipate heat more easily, and the strength of the blade is also possible. Anti-clearance angle is too large, the blade's strength greatly reduced, but can not withstand the pressure to eat Avenue. However, if the clearance angle is too small, will make the blade root easily and work materials after grinding touch, also caused adverse effects. Secondary clearance angle established aims to clear former times maintain clearance angle greater width of the back of the blade root and the resulting work Grist Mill after the touch of adverse consequences. The following table lists the various clearance angle selection, should be properly selected.

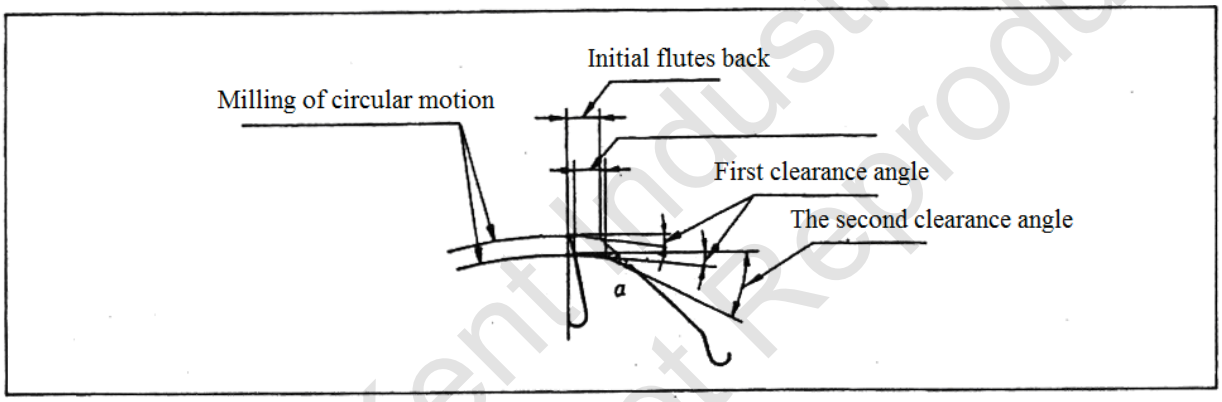

Fig.7.23

Tab.7.7

Work piece material	First clearance angle	The difference between first clearance angle and second clearance angle
Low-carbon steel	3~5°	3~5°
High-carbon steel	3~5°	3~5°
Cast iron	4~5°	3~5°
Bronze (hard)	4~7°	3~5°
Brass and bronze (soft)	10~12°	3~5°
Aluminum and plastic	10~12°	3~5°

Figure 7.24 indicates inlay tungsten steel blade edge face milling blade and teeth of a variety of angles, grinding cutter sharpening Also note that the kind of reference. When the clearance angle grinding is completed, the next and the verification of their point of view is correct, the testing method, see Figure 34 and the application form. And the relationship between identity tanα = h / L.

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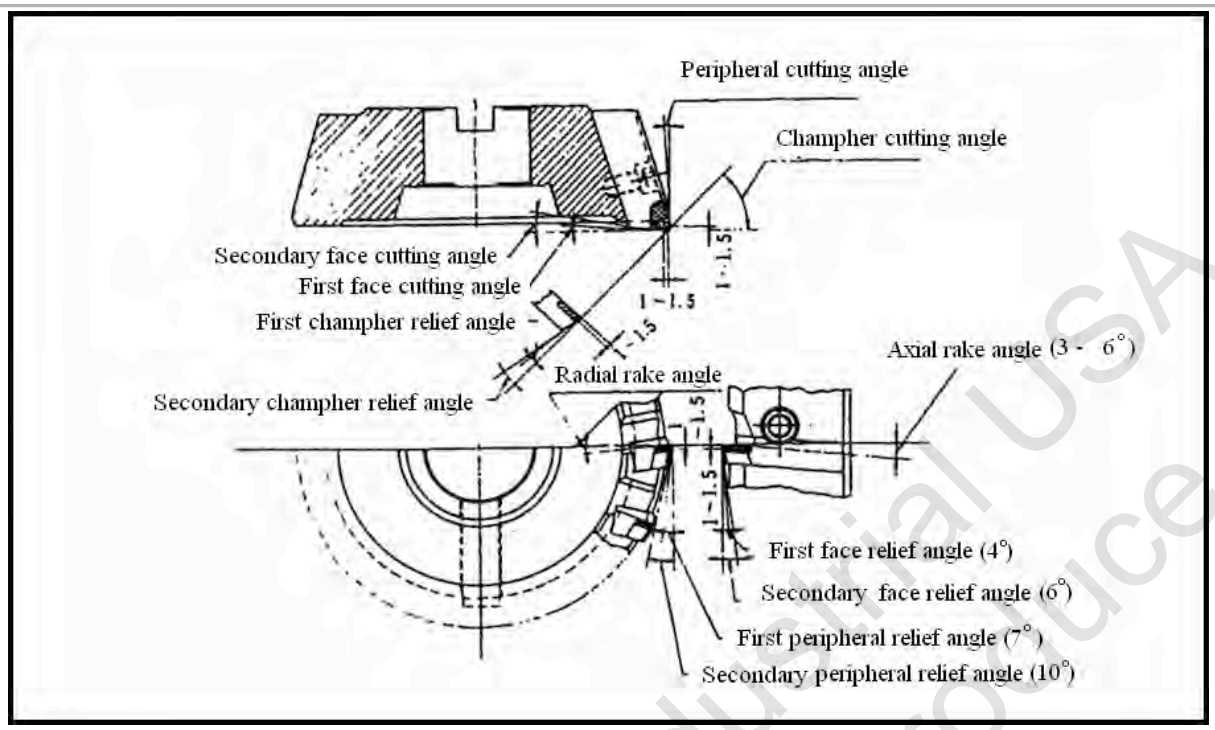

Fig.7.24

Tab.7.8 RELATION BETWEEN RELIEF ANGLE-LAND DIAL GAUGE INDICATING LENGTH-h

Unit: mm

a / L	h										
	30	1°	2°	2°	4°	5°	6°	7°	8°	9°	10°
1	0.009	0.017	0.035	0.052	0.070	0.087	0.105	0.123	0.141	0.158	0.176
(0.04)	0.00036	0.00068	0.00140	0.00208	0.00280	0.00348	0.00420	0.00490	0.00564	0.00632	0.00704
2	0.017	0.035	0.070	0.105	0.140	0.175	0.210	0.246	0.281	0.317	0.353
(0.08)	0.00068	0.00140	0.00280	0.00420	0.00560	0.00700	0.00840	0.00984	0.01124	0.01268	0.01412
3	0.026	0.052	0.105	0.157	0.210	0.262	0.315	0.368	0.422	0.475	0.529
(0.12)	0.00104	0.00208	0.00420	0.00628	0.00840	0.01048	0.01260	0.01472	0.01688	0.01900	0.02116
4	0.035	0.070	0.140	0.210	0.280	0.350	0.420	0.491	0.562	0.634	0.705
(0.16)	0.00140	0.00280	0.00560	0.00840	0.01120	0.01400	0.01680	0.01964	0.02248	0.02536	0.02820
5	0.044	0.087	0.175	0.262	0.350	0.437	0.526	0.614	0.703	0.792	0.882
(0.20)	0.00176	0.00348	0.00700	0.01048	0.01400	0.01748	0.02104	0.02456	0.02812	0.03168	0.03528
6	0.052	0.105	0.210	0.314	0.420	0.525	0.631	0.737	0.843	0.950	1.508
(0.24)	0.00208	0.00420	0.00840	0.01256	0.01680	0.02100	0.02524	0.02948	0.03372	0.03800	0.04232
7	0.061	0.122	0.244	0.367	0.490	0.612	0.736	0.860	0.984	1.109	1.234
(0.28)	0.00244	0.00488	0.00876	0.01468	0.01960	0.01448	0.02944	0.03440	0.03936	0.04436	0.04936
8	0.070	0.140	0.279	0.420	0.560	0.700	0.841	0.982	1.124	1.267	1.411
(0.32)	0.00280	0.00560	0.01116	0.01680	0.02240	0.02800	0.03364	0.03928	0.04496	0.05068	0.05644
9	0.089	0.157	0.314	0.472	0.630	0.787	0.946	1.105	1.265	1.425	1.587
(0.36)	0.00356	0.00628	0.01256	0.01888	0.02520	0.03148	0.03784	0.04420	0.05060	0.05700	0.06348
10	0.087	0.175	0.349	0.524	0.690	0.875	1.051	1.228	1.405	1.584	1.863
(0.40)	0.00348	0.00700	0.01396	0.02096	0.02768	0.03500	0.04204	0.04912	0.05620	0.06336	0.07452

Inch measure should follow the formula tan a=h/L

2. surface grinding teeth:

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Molding cutter, such as gear cutter, hob and so it must be in the clearance angle and shape, are made in the tool specialized manufacturing plants. Tool Grinder can only be done in front of his dressing blade of the work, and did not change in its appearance. Refer to Figure 7.25 build, as noted before sharpening the blade, its polished surface and tool Grinding wheel center line of solid agreement. When grinding sharpening plane displacement "A" dimension, as shown in Figure 7.26.

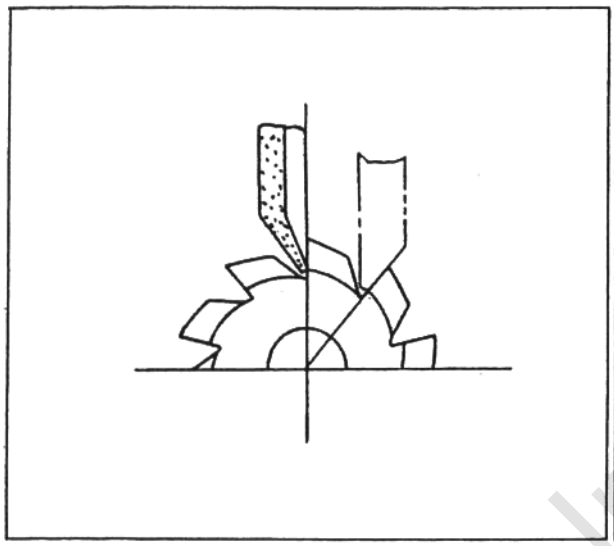

Fig.7.25

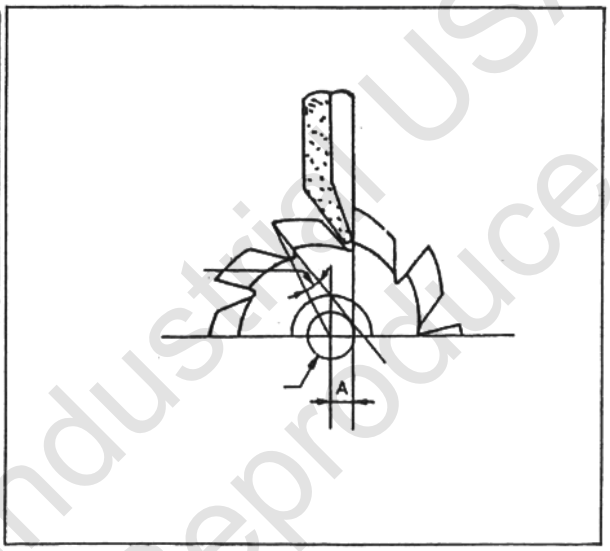

Fig.7.26

The full application of the grinding method also M-40 tilt wheel spindle can be simplified to the special features, which can not be above a Inclination angle of rotation of the tool with Grinding wheel axis tilt angle instead. When forming helical teeth grinding sharpening the knife blade in front, use a dish-shaped grinding wheel to the back, as shown in Section 7.27 dotted line. The same method can also tilt Grinding wheel axis, use the back of the dish-shaped grinding wheel to the front of the training Inclination angle (RAKE) for the polished surface of the grinding wheel and the tool centerline coincide consistent work should be a special measuring method according to Figure 7.27 be corrected. The forming tool sharpening grinding work, you need to correct, otherwise its special sand outline becomes lost, whether right after grinding, according Figure 7.28 Inspection. (This method applies only to non-Inclination angle of the tool RAKE)

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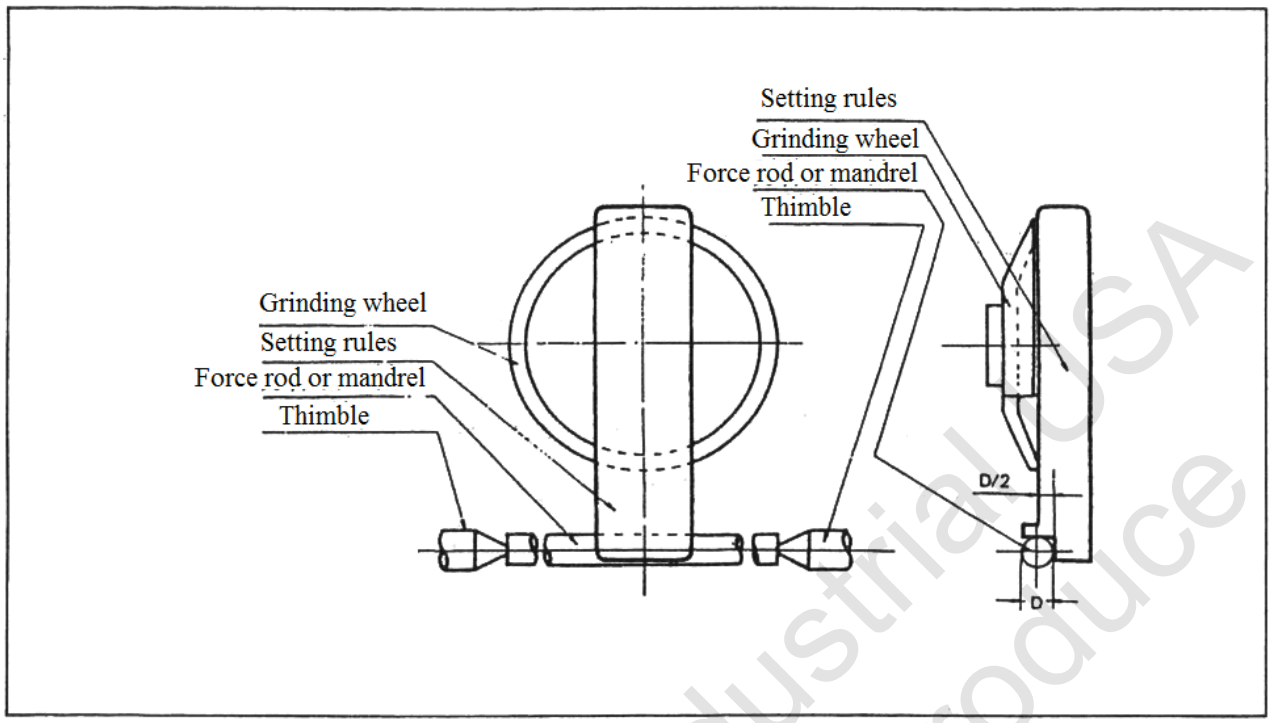

Fig.7.27

With a gauge block stack to 124.00mm high (or center-regulatory alternative) school table to "0" and then move the tool tip touches the blade calibration is also "0" position, then push inside calibration, testing whether the nuclear front edge is also "0" reading, so was the correct grinding, grinding teeth are forming cutter knife grinding can be applied when forming a special position, grinding helical shaped cutting tools (such as hobs), can be applied to the special position of the spiral grinding.

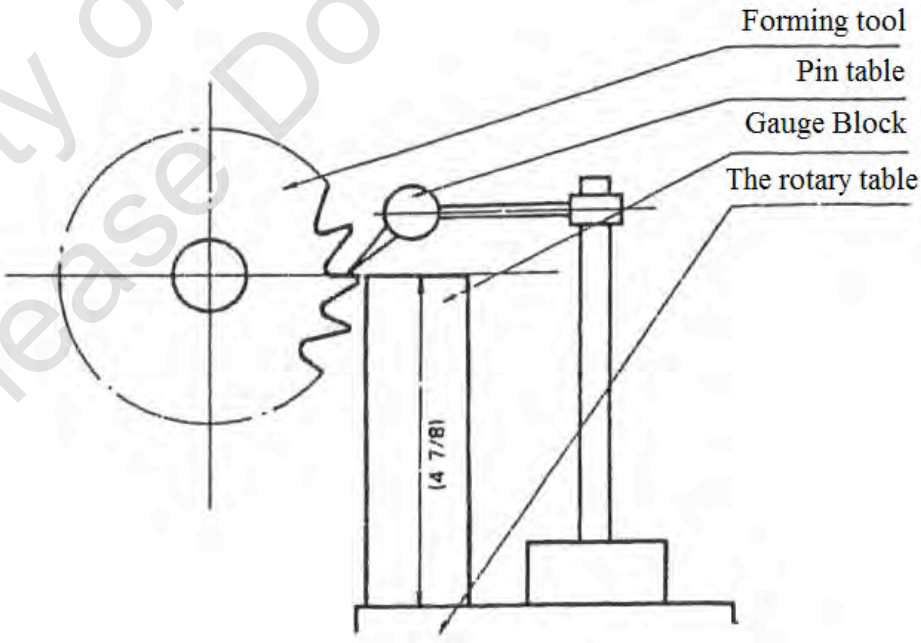

Fig.7.28

7.3.2 Flat Cutters of Grind

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1. With a flat milling cutter grinding:

Application of Flat grinding wheel peripheral milling cutter cutter flat when adjusting the blade as 7.17 princes of circumstances, straight trench flat cutter grinding, its blade into the rack should be placed on bed sets (with the same tool movement) . If the spiral groove, then the edge rack should be placed on stage Grinding wheel. Figure 7.29, the use of adjustable blade rack, tool support for the use, and can be corrected with a center height gauge, wheel axle center and tool center with high.

Clearance angle up and down by the Grinding wheel center displacement "A" distance depending on the size, move up Inclination angle when upright, down Inclination angle is negative. Figure 7.29, α is the relief angle, D is the wheel diameter, A is the vertical displacement of the center Grinding wheel, the geometric relationship between identity of A = (D / 2) Sinα. For the removal of the troublesome calculation, special list as shown in Table 9 can be easily obtained by the displacement of A, when using a disc wheel, D is the outer diameter of the tool changes.

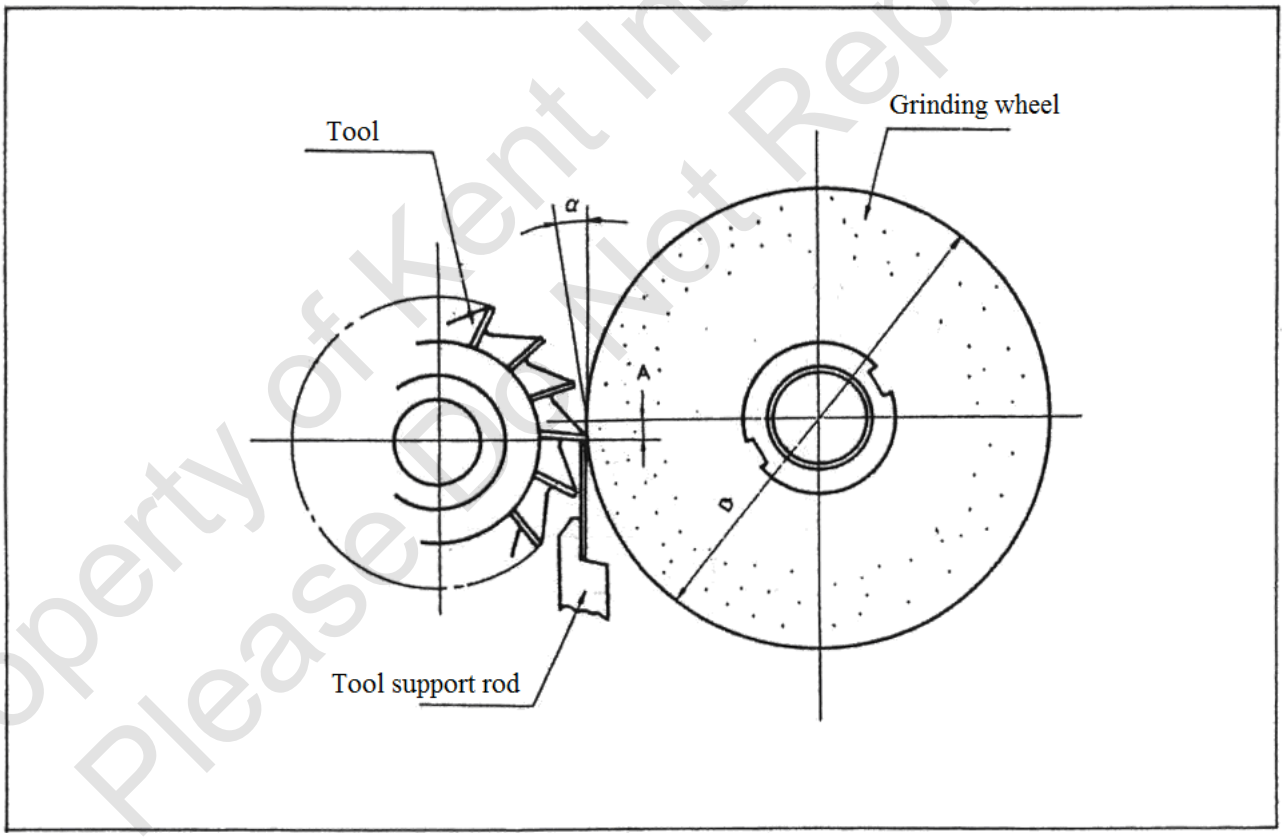

Fig.7.29

Tab.7.9 Clearance angle be set value of the spiral cutter grinding wheel

Unit：mm

α	A	α	A

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D	3°	4°	5°	6°	7°	D	3°	4°	5°	6°	7°
6	0.16	0.21	0.26	0.31	0.37	95	2.49	3.31	4.14	4.97	5.79
8	0.21	0.28	0.35	0.42	0.49	100	2.62	3.40	4.36	5.23	6.09
10	0.26	0.35	0.44	0.52	0.61	110	2.83	3.84	4.77	5.75	6.70
12	0.31	0.42	0.52	0.63	0.73	120	3.14	4.19	5.23	6.27	7.31
14	0.37	0.49	0.61	0.73	0.85	130	3.40	4.53	5.67	6.79	7.92
16	0.42	0.56	0.70	0.84	0.97	140	3.66	4.88	6.10	7.32	8.53
18	0.47	0.63	0.78	0.94	1.10	150	3.93	5.23	6.54	7.84	9.14
20	0.52	0.70	0.87	1.05	1.22	160	4.19	5.58	6.97	8.36	9.75
23	0.60	0.80	1.00	1.20	1.40	170	4.45	5.93	7.41	8.89	10.36
26	0.68	0.91	1.13	1.36	1.58	180	4.71	6.28	7.84	9.41	10.97
30	0.79	1.05	1.31	1.57	1.83	190	4.97	6.63	8.28	9.93	11.58
35	0.92	1.22	1.53	1.83	2.13	200	5.23	6.98	8.72	10.45	12.19
40	1.05	1.40	0.74	2.09	2.44	210	5.50	7.32	9.15	10.98	12.80
45	1.18	1.57	1.96	2.35	2.74	220	5.76	7.67	9.59	11.50	13.41
50	1.31	1.74	2.18	2.62	3.05	230	6.02	8.02	10.02	12.02	14.02
55	1.44	1.92	2.40	2.87	3.35	240	6.28	8.37	10.46	12.53	14.62
60	1.57	2.09	2.61	3.14	3.66	250	6.54	8.72	10.95	13.07	15.23
65	1.70	2.27	2.83	3.40	3.96	260	6.80	9.07	11.33	13.59	15.84
70	1.83	2.44	3.05	3.66	4.27	270	7.07	9.42	11.77	14.11	16.45
75	1.96	2.62	3.27	3.92	4.57	280	7.33	9.77	12.20	14.63	17.06
80	2.09	2.79	3.49	4.18	4.87	290	7.59	10.12	12.64	15.16	17.67
85	2.22	2.97	3.70	4.44	5.18	300	7.85	10.46	13.07	15.68	18.28
90	2.36	3.13	3.92	4.70	5.48						

In measure should follow the formula A = D/2 sin α .

2. With plagioclase cup wheels or flat grinding cup wheels:

Figure 7.30 illustrate this grinding method, the clearance angle α according to the method described in the previous section, the demand that A = (D / 2) Sinα. Figure 7.31 illustrate the application M-40 Grinding wheel axis tilt can be converted to the special properties of this type of tool grinding the clearance angle. Grinding straight teeth, its blade rack placed in bed according helical teeth grinding edge of the stage, its blade rack according placed side wheel head.

Application of the two grinding clearance angle of approach, its procedure for the first Setting with a central regulation of the height of the blade rack, blade height and tool center height to make it consistent, then raise or lower the Grinding wheel axis, or rotating Grinding wheel axis tilt device . This blade rack grinding wheel surface and the top surface of the blade touch point, thimble and the central regulation should be the same height, when grinding helical teeth, the top surface of the blade should be tilted rack, which are consistent with the tool Inclination. Refer to Figure 7.32 above.

Figure 7.31 represents the helix angle of the cutter tooth grinding conditions grinding finish a tooth, will turn 180 ° milling cutter opposite the cutter, the amount of its straight instantly degree, if found not run until about rotating table perfect date, so be reground other cutter. (Figure 7.13).

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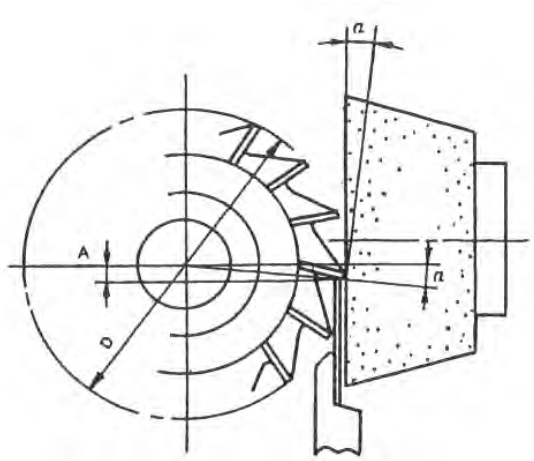

Fig.7.30

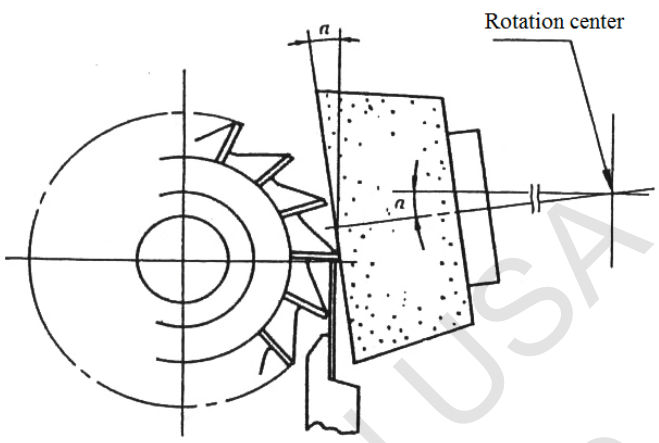

Fig.7.31

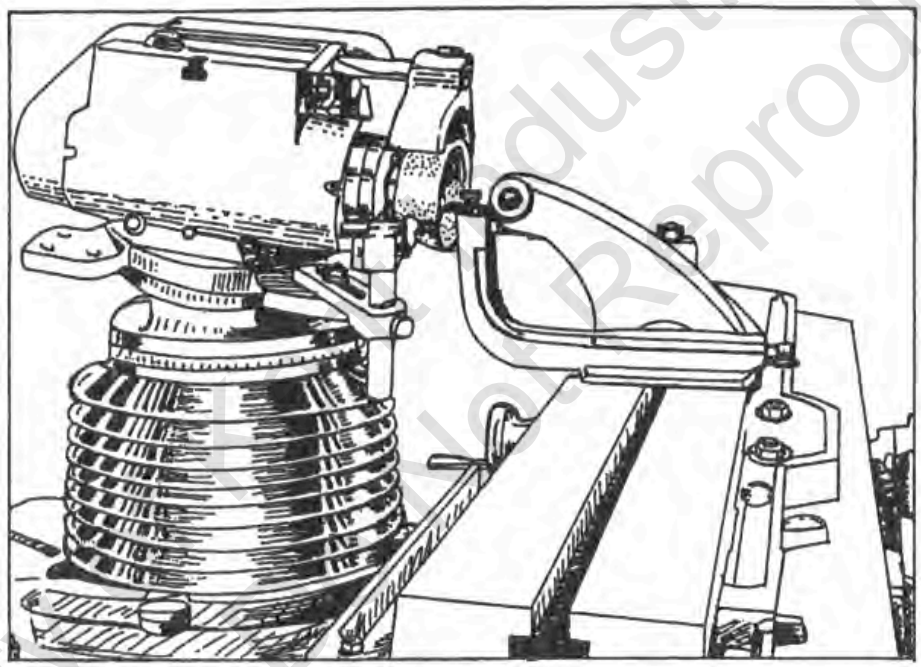

Fig.7.32

7.3.3 End Mill and Shell-Type Knife of Grind

The grinding mill grinding flat cutter basically the same. Dissimilarity only more teeth at one end and ends at the edge surface of the grinding corner only. This two blade usually do in the surrounding edge after grinding, while the peripheral edge milling cutter grinding method and the same level. End and corner cutting edge applications plagioclase cup wheel is more convenient. Figure 7.33 and 7.34 indicate mills and shell mills.

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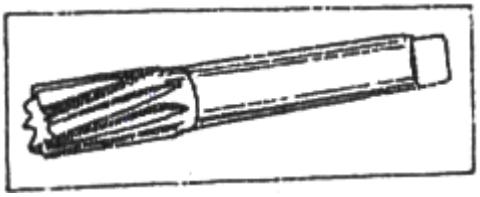

Fig.7.33

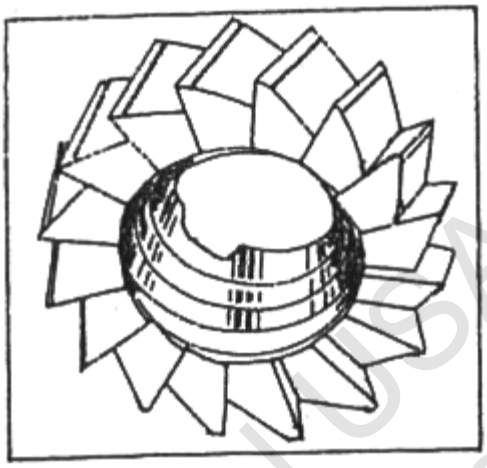

Fig.7.34

1. At the end of the edge surface of teeth grinding:

   The surface of the clearance angle can be applied to the work of the horizontal and vertical sides head angle adjustment to be fulfilled. Or by the Grinding wheel axis tilt device works in conjunction with the first horizontal rotation angle and ground.

2. Corner edge of grinding:

   Usually it is 45 ° chamfer corner, in the horizontal plane rotary head or grinding wheel shaft to the required angle of the tool mounted on the arbor press, push pull plug holes arranged. Compliance with the center blade to adjust its height and tool center with a high, while adjusting the blade rack to support the tool, then tighten the fixed working head, the spindle can not rotate, and then tilt Grinding wheel shaft to the required clearance angle. Figure 7.35 represents Shell Corner grinding mill.

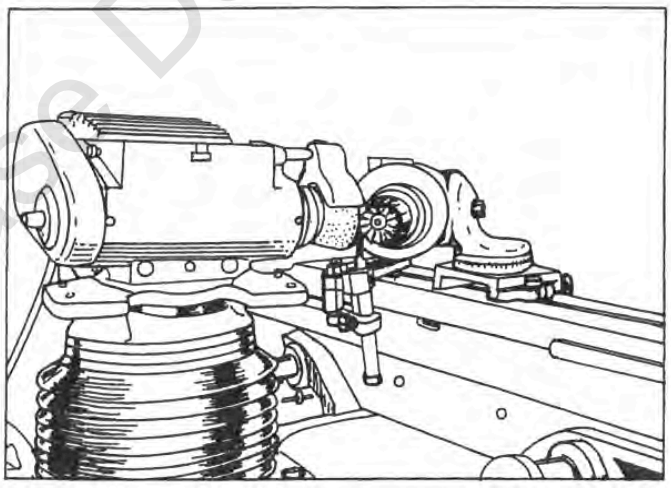

Fig.7.35

7.3.4 Face Milling Cutter of Grind

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Face milling cutter diameter is less than 8 "by its grinding mill shell case with exactly the same, plagioclase cup wheels are more practical, face milling spindle can be special ordered in Figure 7.36 illustrate the situation abrasive peripheral edge Figure 7.37 says abrasive blade end edge surface of the case. Figure 7.38 indicates corner grinding.

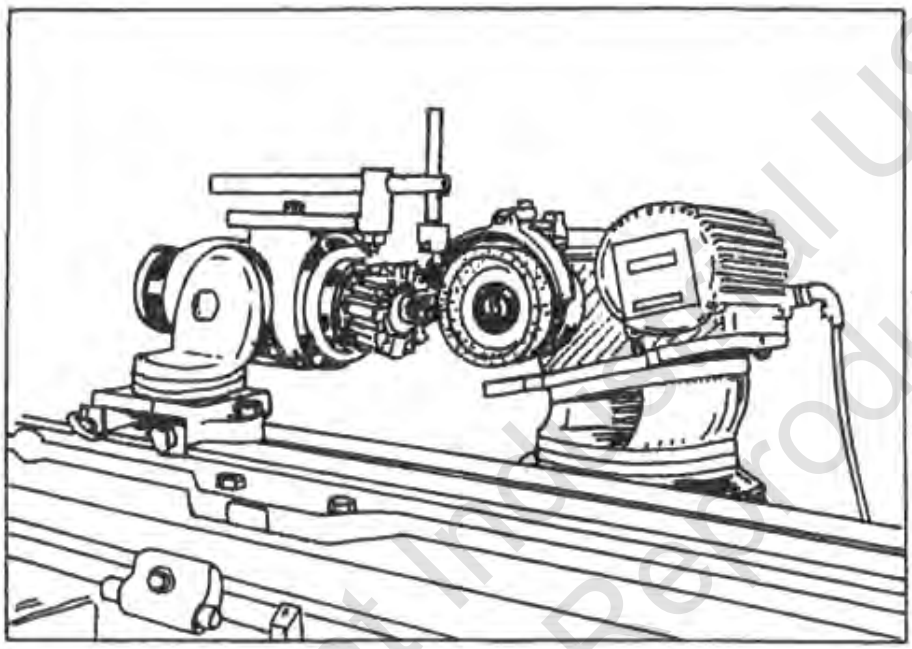

Fig.7.36

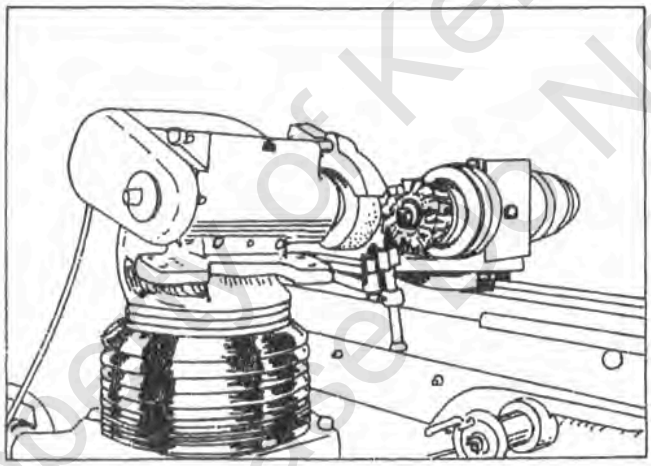

Fig.7.37

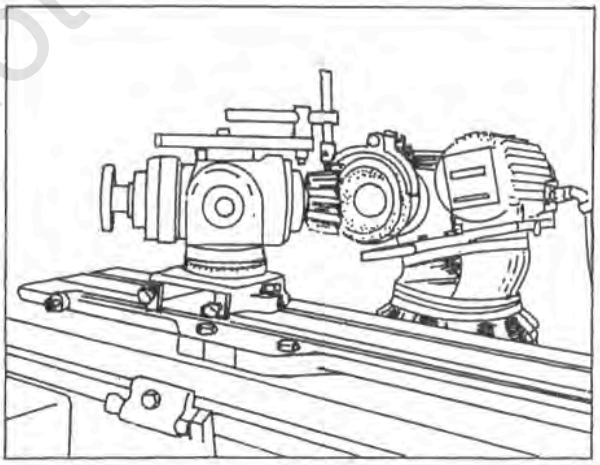

Fig.7.38

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7.3.5 Keyway Milling Cutter of Grind

The type of tool grinding and flat cutter were similar. Straight teeth grinding, the blade rack should be installed bed edge of the stage, helical teeth, then head of the wheel rim.

7.3.6 Side Cutter of Grind

The abrasive blade around the same as those with flat cutter, side cutter blade of the same type of research. Light Duty its clearance angle B is about 1 °, Figure 7.39 This eliminates machining jump knife trembled at risk. This defect could be met by establishing clearance angle A be eliminated.

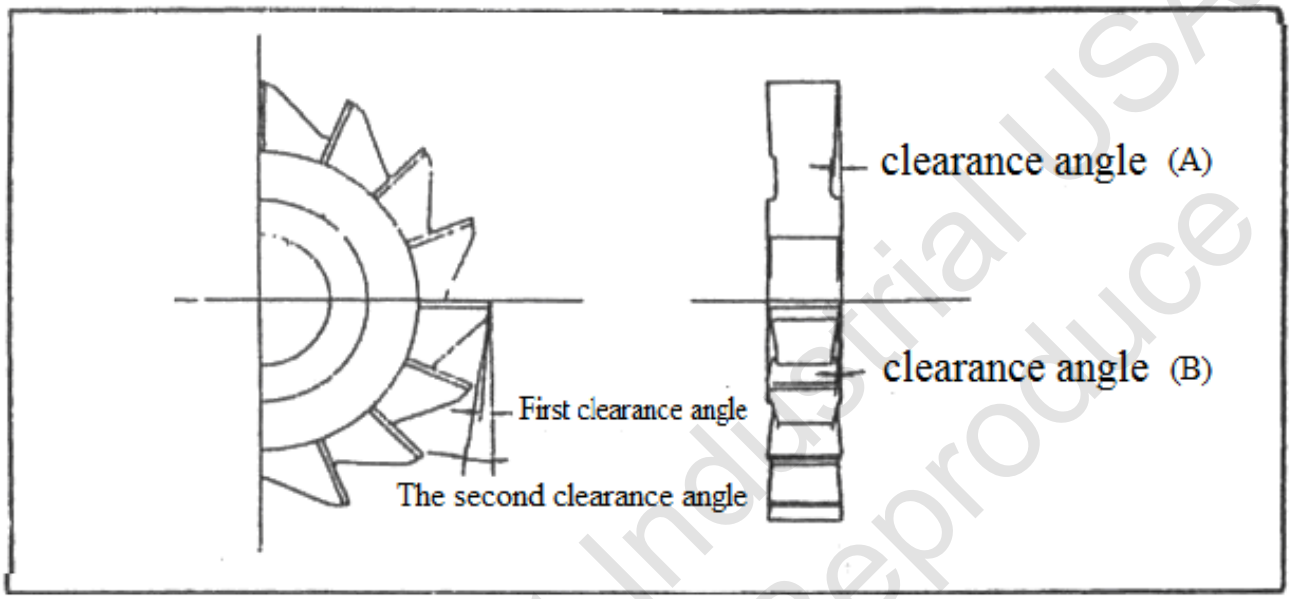

Fig.7.39

7.3.7 Wrong Cutter of Grind

This is a special type of side milling cutter. The flat spiral milling cutter cutter type its spiral into a single direction and such was staggered orientation. The class of the peripheral edge of the milling cutter and flat cutter of the same type spiral cutter, milling cutter whose blade rack such tablets should be used as shown in Figure 7.40.

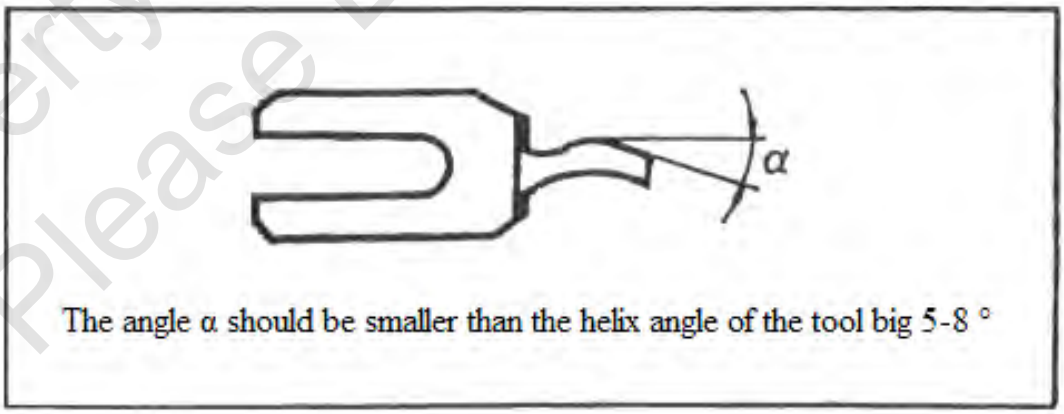

Fig.7.40

Its clearance angle of the setting, refer to Figure 7.29 and Table 7.9 displacement method. A direction oblique teeth grinding properly after all, only the direction of the transform tool, and back to the other direction of helical gear. Two directions of the blade shall verify with the school table aliquots uniform grinding, it shall be reground.

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Figure 56 shows that the grinding tool case. The milling cutter blade is usually of which neither side surfaces polished to change its processing unless width. Primary clearance angle of the line is also the same way.

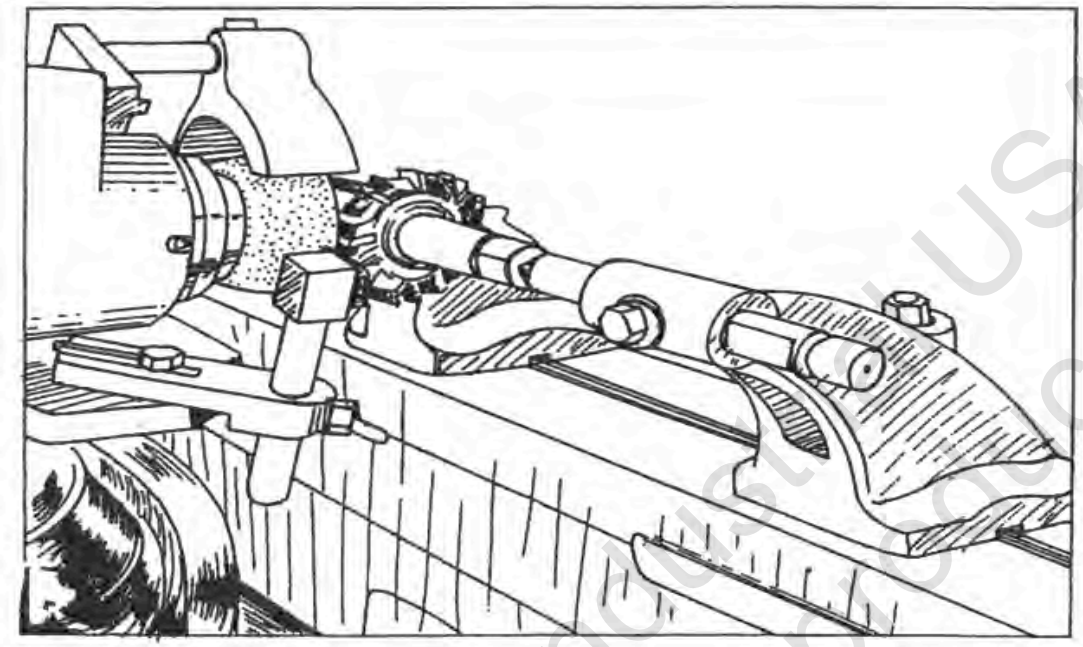

Fig.7.41

7.3.8 Angle Cutters of Grind

The type of milling cutter grinding and sharpening work and similar shell end mills, the basic angle can be adjusted in the horizontal plane workbench or Grinding wheel sets to be fit, the clearance angle can be adjusted in the vertical plane angle or workbench application Grinding wheel axis tilt device be required. Blade rack should be placed in the grinding Grinding wheel cephalic helical teeth, straight teeth for grinding, the bed can be placed on desk side or the Grinding wheel cephalic. Figure 7.42 represents the situation when grinding corner.

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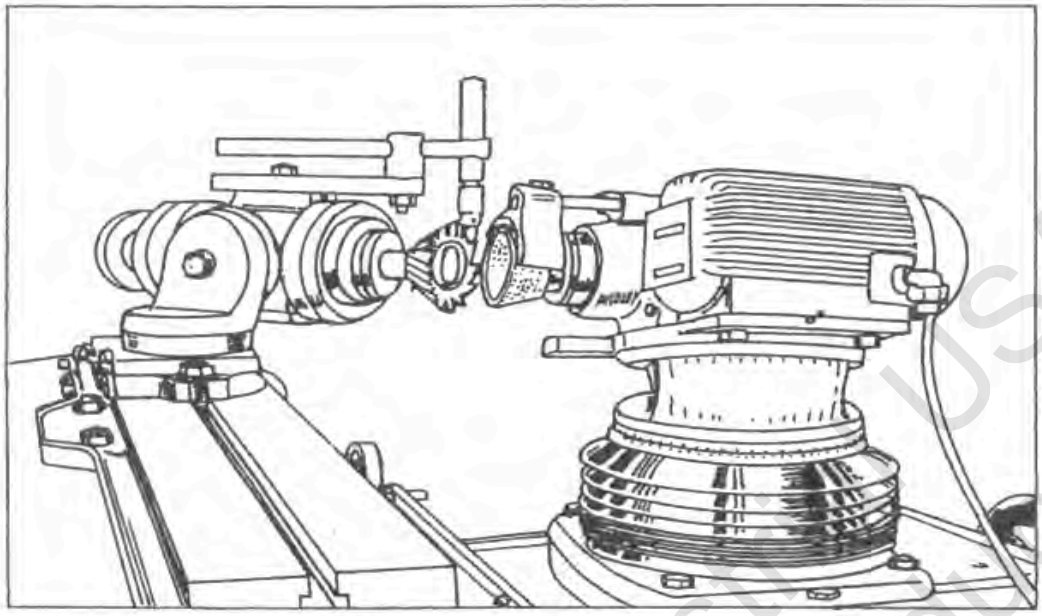

Fig.7.42

7.3.9 Long End Mill of Grind

When plagioclase long grinding cup wheel cutter blade end edge surface, its length should not exceed 235mm. As shown in Figure 7.43, this value is the longest mills limit, then the bed platform rotates 60 °, when the machine is placed in the normal position, the maximum height of only 142mm. If the bed platform rotated by 180 °, its value was 225mm.

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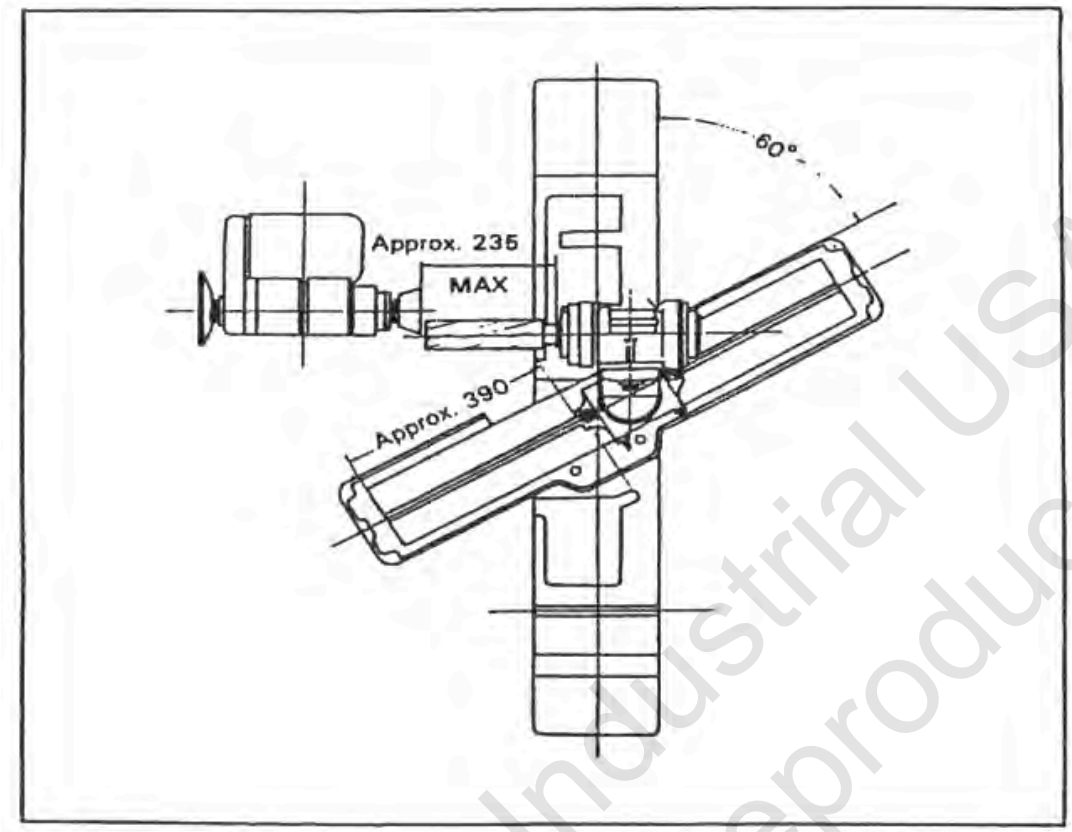

Fig.7.43

7.3.10 Large Diameter of Blockbuster Cutter of Grind

Diameter to 48 "could grind on this machine, tool grinding division to prepare a special knife rack that bolts to the bolt axis milling cutter blockbuster, a rotating grinding teeth a tooth sequentially. Grinding procedure as described below :

a. press plagioclase cup wheels mounted on Grinding wheel shaft center line painted on the blade milling cutter knife on the bolt lock, and its elastic can rotate the blade by hand for the degree of re-adjustment Grinding wheel shaft to the correct height when the machine is again positive, normal position, grinding milling cutter is too large, can be rotated to a right angle bed table, and then the bed TFN lock it. Then its clearance angle of the grinding.
b. first take a corner Gage, the angle is set to 90 ° ten clearance angle according to previously drawn to the side of the center line thereon stand.
c. cutter blade rack with the hold of the rack position located on the rotary table, and then the Grinding wheel axis horizontal rotation, the plane parallel to the grinding wheel angle gauge the other side. So then grinding the teeth. finish, you can relax after the pressure plate bolts once the other teeth grinding.

Figure 7.44 represents the situation grinding. Large SAW BLADE milling cutter usually have to be done every corner teeth grinding work, as shown in Figure 7.45. Then use the level Grinding wheel or disc-shaped grinding wheel. To enhance its height axle research to achieve the required number of corner angles and wrong tooth

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grinding, opposite versa, but also shifted the front teeth.

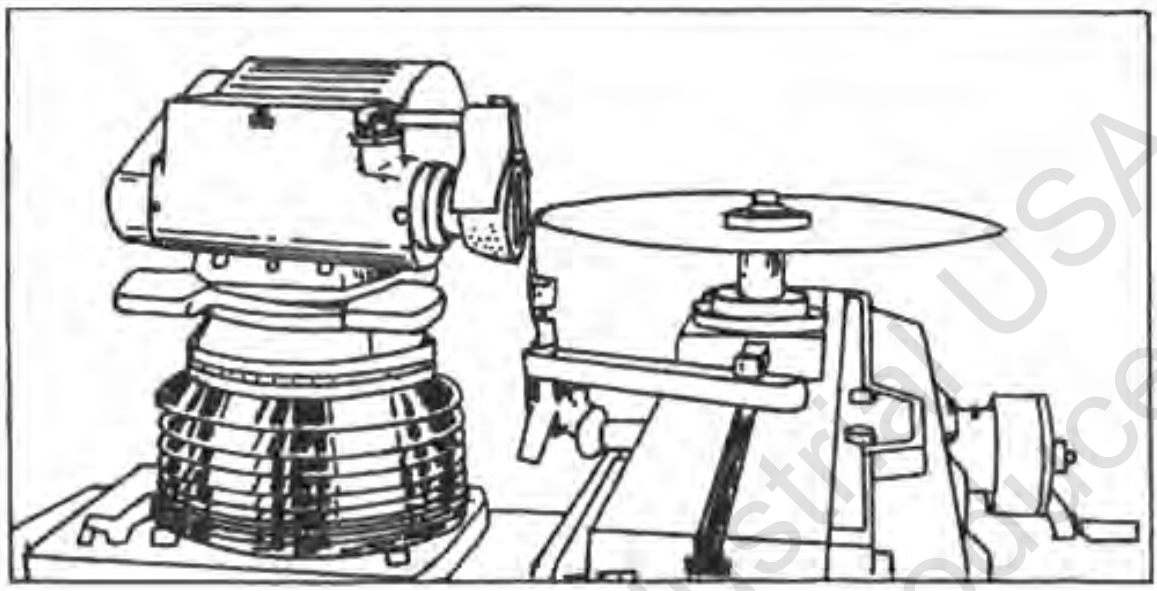

Fig.7.44

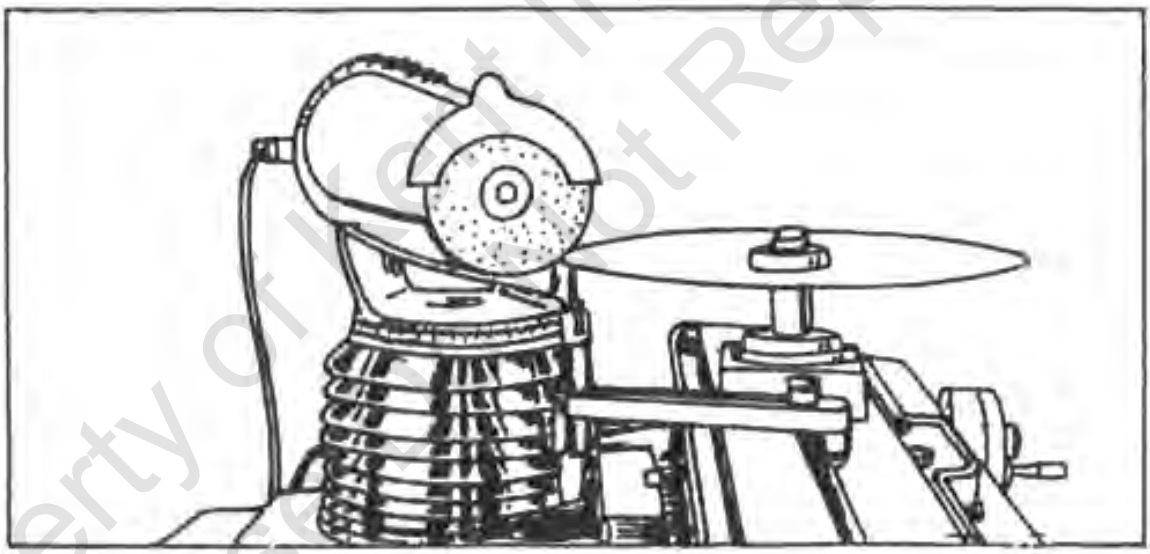

Fig.7.45

7.3.11 Helical Teeth of Grind

Large Helical milling cutter when the peripheral edge, use flat grinding wheel, and rotate the wheel head Chengping angle to get the specific clearance angle. The horizontal angle is much? Refer to Table 7.10 and Figure 7.46, for example, the helix angle of the tool 40 °, of the requirements of the clearance angle of 5 °, the angle of the horizontal adjustment should be 3 ° 15 '. Before grinding shall be equipped with a standard screw rod, the helical direction, lead and tool are the same, but there is a match with the tool shank tapered hole of the tool set with a standard screw rod, then both the top left and right tailstock compliance with the center, the correction wheel spindle, tailstock same height. Press the Grinding wheel mounted on the blade side

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rack, then you can Grinding wheel Yao and began to grind knives. Its spiral blade rack available columns depend on the round part of the follow out, as shown in 7.45, when the skillful, the blade could be replaced by a rack column to emulate.

Large Helical milling cutter blade edge before, then use the tapered surface for grinding Grinding wheel, according to the helix angle of the tool to adjust the Grinding wheel axis.

Table 7.10 Grinding wheel angle be set value of the helical angle when clearance angle

B / A	α							
	3°	4°	5°	6°	7°	8°	9°	10°
30°	1°30'	2°	1°30'	3°	3°30'	4°	4°30'	5°
35°	1°45'	2°15'	3°	3°30'	4°	4°30'	5°15'	5°45'
40°	2°	2°15'	3°15'	4°	4°30'	5°15'	5°45'	6°30'
45°	2°	2°45'	3°30'	4°15'	5°	5°45'	6°30'	7°15'
50°	2°15'	3°	3°45'	4°30'	5°30'	6°15'	7°	7°45'
55°	2°30'	3°15'	4°	5°	5°45'	6°30'	7°30'	8°15'
60°	2°30'	3°30'	4°30'	5°15'	6°	7°	7°45'	8°45'
65°	2°45'	3°45'	4°30'	5°30'	6°30'	7°15'	8°15'	9°
70°	2°45'	3°45'	4°45'	5°45'	6°30'	7°30'	8°31'	9°30'
75°	3°	3°45'	4°45'	5°45'	6°45'	7°45'	7°45'	9°45'

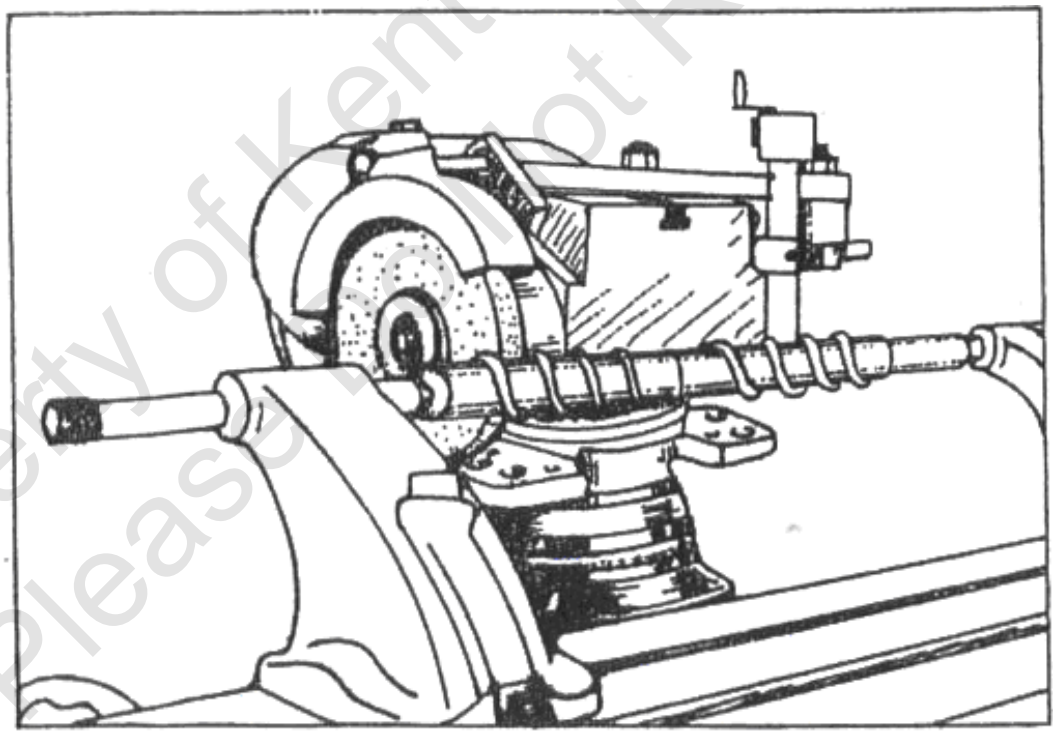

Fig.7.46

7.3.12 Wire Tapping of Grind

Straight groove type of wire tapping, grinding its way to grind milling cutter is substantially the same as those of the type face. See Figure 7.24 and 7.26. Tapping tip

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grinding wheel surface with dish depends Figure 7.27 Setting the measuring method used, will rack at around tailstock two blade tip of the wire-tapping of its type with adjustable rack supported by the blade.

By tapping a slanted angle, the same gauge Setting above the center line of wire-tapping and grinding Grinding wheel surface. Then Figure 7.26 and Table 7.9 Application Grinding wheel shaft displacement method to determine the amount of displacement. Figure 7.47 indicates tapping grinding method.

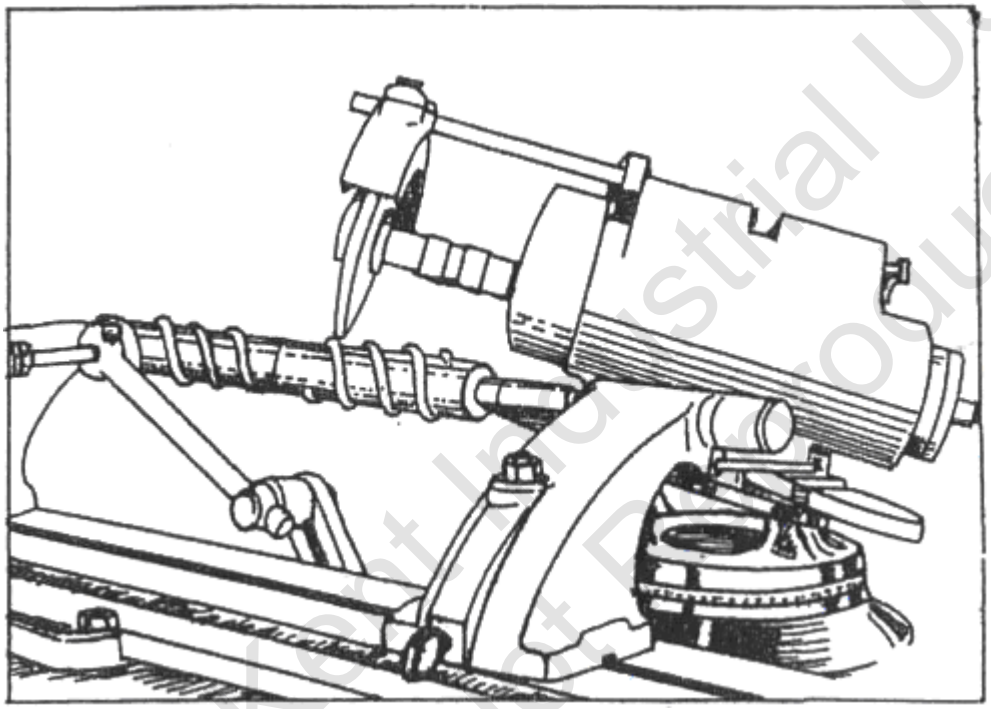

Fig.7.47

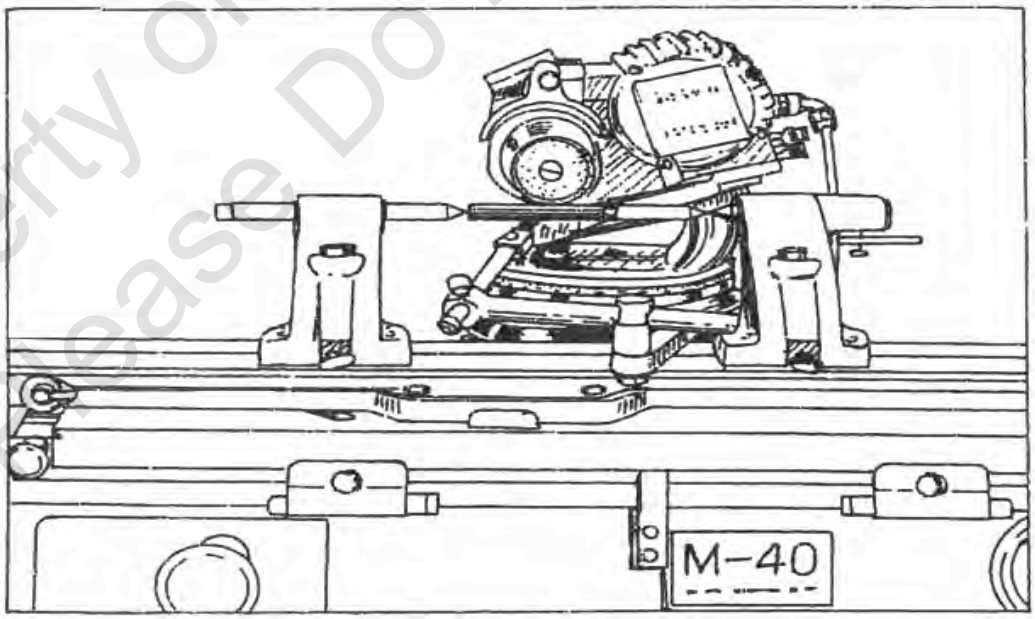

Fig.7.48

7.3.13 Reamer of Grind

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Reamer is generally divided into two categories a machine reamers such as clamp reamer, dwelling reamer, taper reamer Zhou, Mohs taper reamer, adjustable reamer, two for the hand reamer, Reamer is a finishing tool, the size of the demanding precision cutting tools in general different, grinding should be careful.

1. The abrasive reamer straight groove

   In machine reamers and the chamfer portion and tapered hand reamer guide some of the most easy to wear in the office were injured, the extent of even more than straight teeth blade portion, so the dressing of grinding work, mostly for the above areas, but the course of time, its straight-tooth blade is also a circular blade grinding and re-opening of the clearance angle and the surrounding slope angle.

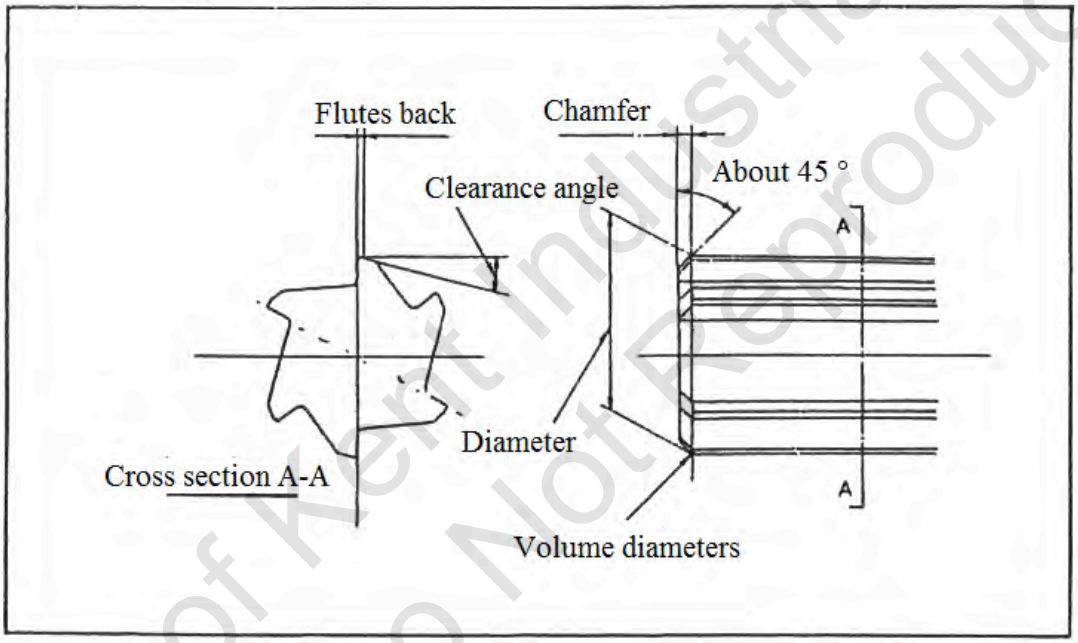

Fig.7.49

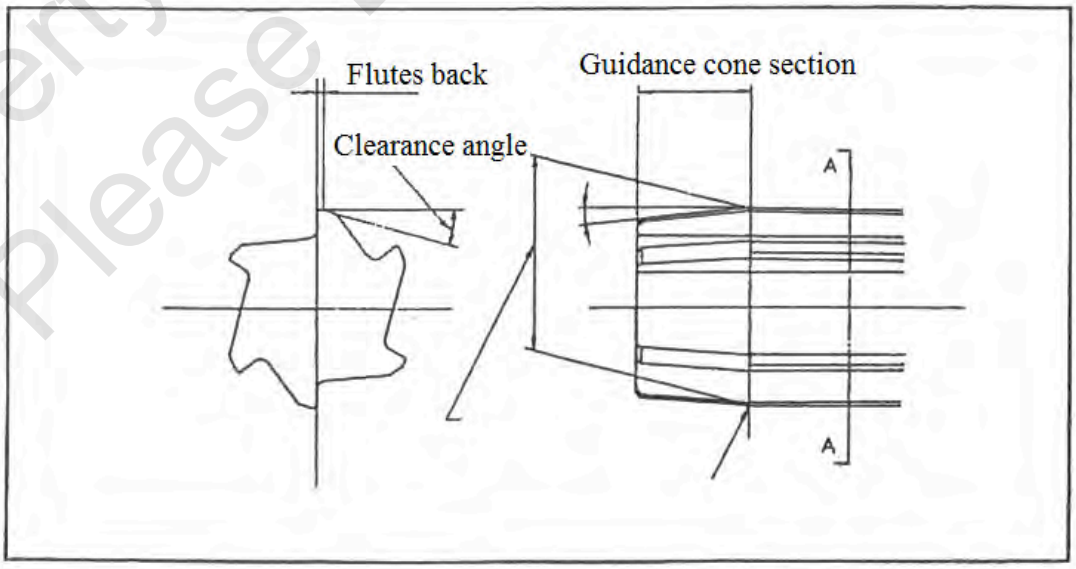

Fig.7.50

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a. Chamfer and pilot pulling back the Grind:

First hinge knife in the left hand and right tailstock, and then poured into a rotating bed sets the number of angles (or guided pulling back angle), then the Grinding wheel axis 5 ~ 10 ° tilt adjustment of the clearance angle and start grinding, chamfered number is usually 45 °, the guide tapered to 1 °. Figure 7.51 represents its ground situation.

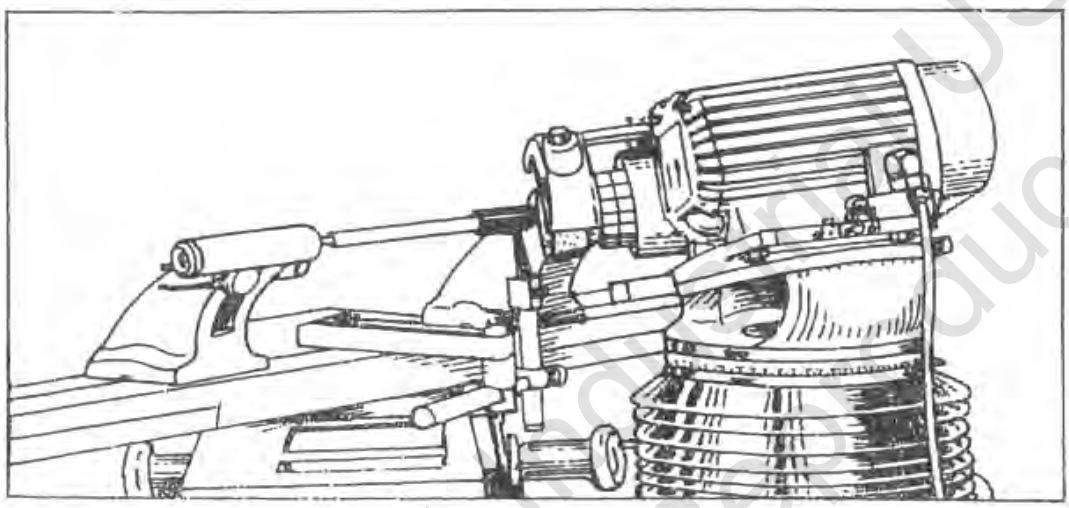

Fig.7.51

b. Portion of the blade straight teeth grinding:

The straight edge reamer section usually has a slight Inclination called retrusion of the push pull, the size of the fish clamped straight shank reamers, shell reamers, taper shank reamer by 0.02 ~ 0.03mmDIA/100mmL, in the week s Reamer and hand reamer by 0.01 ~ 0.015mm/100mmL. Such straight tooth blade grinding teeth, you should fine-tune the angle of the rotary table, the bed table movement direction and become parallel to the blade surface. Its width from the back Flutes 0 ~ 0.6mm, depending on species and reamer diameter varies. Plagioclase cup-shaped grinding wheel and grinding wheel axis tilt device for grinding 5 ~ 10 ° of the clearance angle.

Figure 7.52 indicates that the portion of the ground situation.

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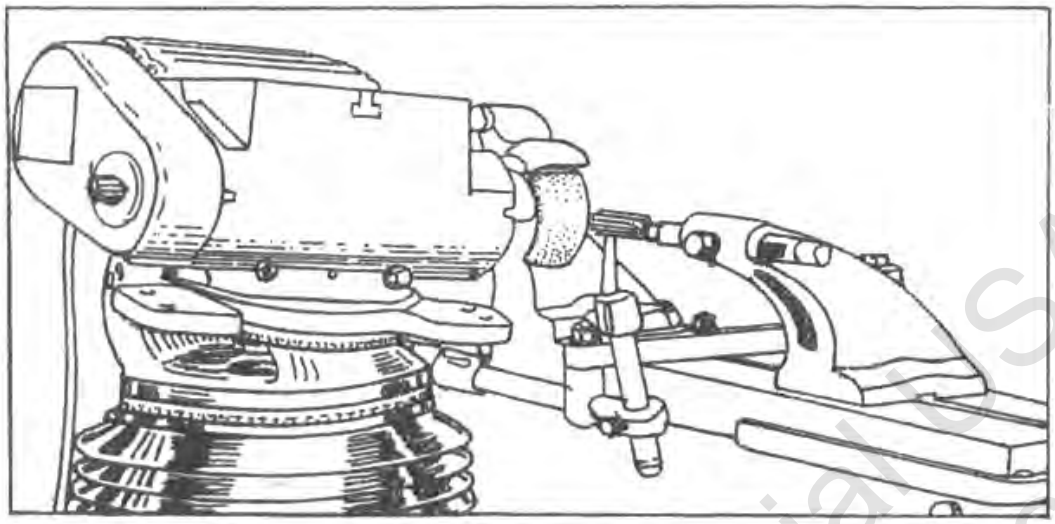

Fig.7.52

c. Miter angle cutting face of the grinding:

In order to avoid reaming fibrillation occurs when the knife and to get a better jump the chamfered edges are usually done its share of unequal distribution, so the blade rack must support the opposite trench abrasive blade as shown in Figure 7.53.

Generally speaking, the oblique angle of 0 ° of figure 7.25. But for the soft metal by its Inclination angle then becomes positive, so that the surface roughness can be obtained better, if things work as hard material object, its Inclination angle then becomes negative, as shown in 7.54, so you can increase the the strength of the blade. Inclination angle of 0 and a positive value, their polishing method according 1) 2 rows of. Inclination angle is negative, its grinding method is first necessary reamer turn a Inclination angle, then the Grinding wheel backward displacement from A reamer centerline distance.

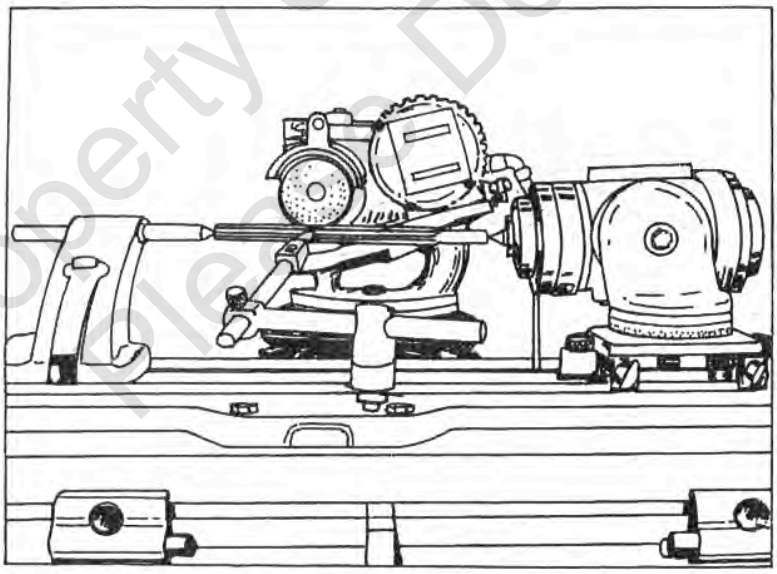

Fig.7.53

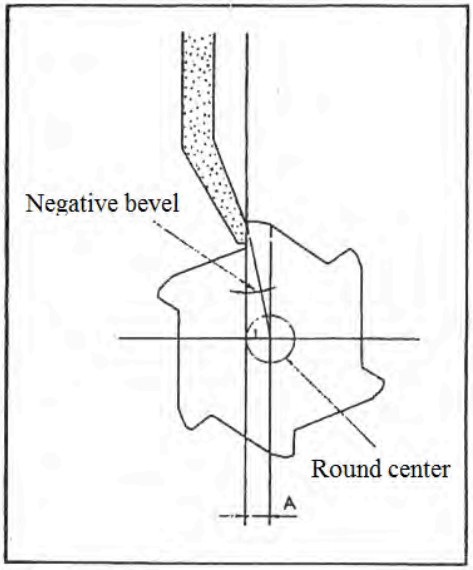

Fig.7.54

2. Taper reamer straight teeth are grinding:

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The abrasive type of reamer should be more careful, solid whose diameter and taper degrees are to be considered simultaneously.

a. Clearance angle of the ground:

Such is usually no Flutes reamer back width, the clearance angle 5 ~ 6 ° of the same ground with 1-a, adjusting the rotation angle and the Grinding wheel bed platform axis tilt angle.

b. Miter angle cutting face of the grinding:

The reamer a top center with the top of the tailstock, another head pin is fixed to the working head of the tapered hole, adjusting the inclination of the working head, so that the blade reamer tip horizontally. Square method similar to the grinding 1-c.

3. Helical taper reamer of grinding:

The reamer with other kinds, this type of grinding reamers best to be careful. Two top thimble not too tight, causing the deformation reamers, grinding up the effect will certainly poor. Similarly, to adjust the bed table The rotary table movement direction and taper reamer face parallel. By using the Grinding wheel dish, grinding methods and 2-a identical and refer to Figure 7.29.

The abrasive such reamers, require a high degree angle on the occasion of the slightest mistake, the high value of the tool will be scrapped, the actual occurrence, the company recommended that users try to use your special device screw grinding, no height skilled technique, you can grind the accuracy of the blade.

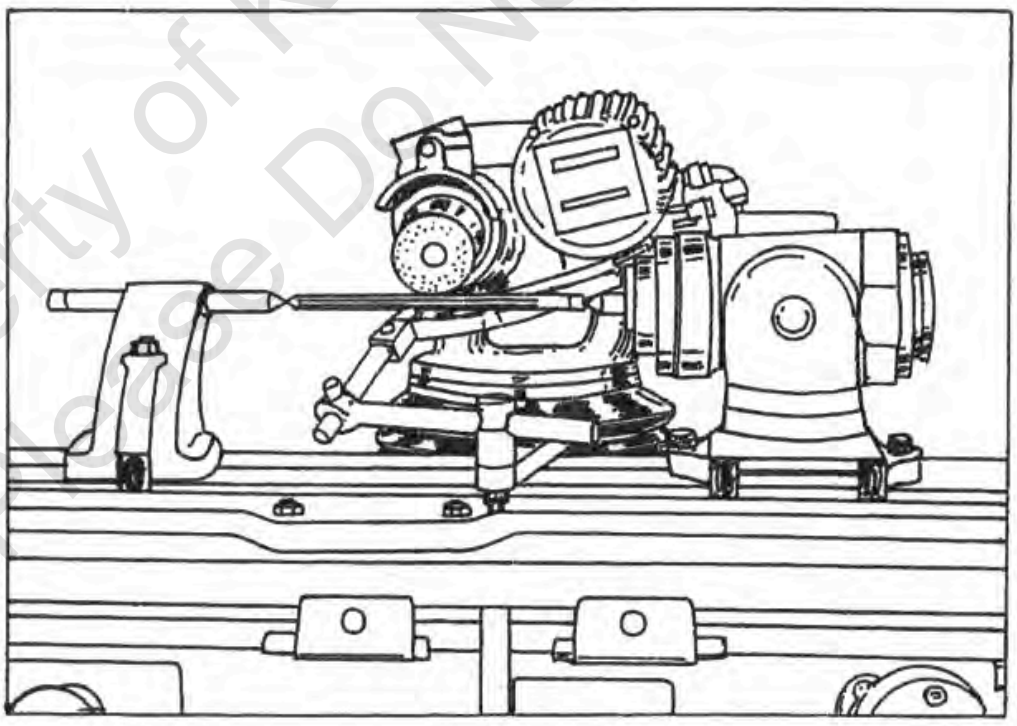

Fig.7.55

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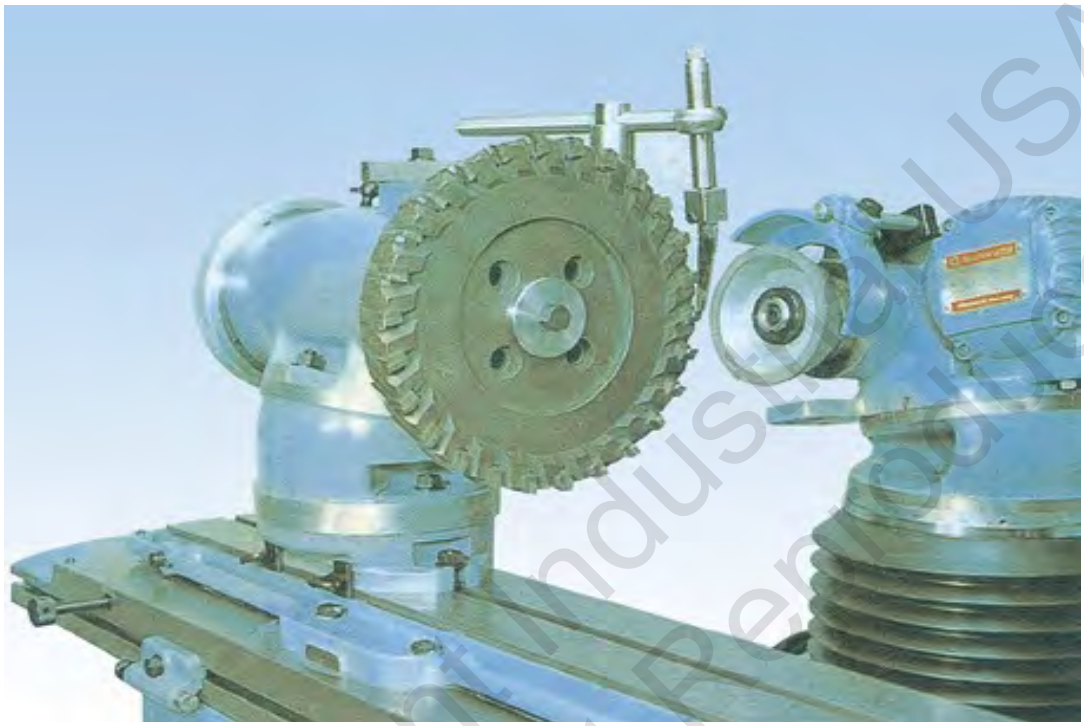
8. Special Accessories

8.1 Face Milling Cutter Grinding Device



1. Introduction

This device is included and bed base and a horizontal rotating platform and rotatable 15 ° seat angle formed by the working head. Such institutions can be very simple to do perspective, increase or decrease. Not only that, this excellent design allows M-40 can grind larger knives and tools.

2. Product Specifications

Grinding radius	0 - 50 mm (0 - 2 in)
Maximum diameter (To worktable)	190 mm (7 - 7/16 in)
Max.grinding radius (To worktable)	45 mm (1 - 3/4 in)
Total stroke horizontal Spindles	
A Type	50 - 175 mm (2 – 6 - 7/8 in)
B Type	105 - 230 mm (4 - 1/8 - 9 in)
Lateral rotation of the deviation	0 - 50 mm (0 - 2 in)
Horizontal rotation angle of Spindles	90°
Vertical Spindles rotation angle	±15°
Spindle taper	B & S 12 (or M.T.5)
Index plate (standard)	24 slots

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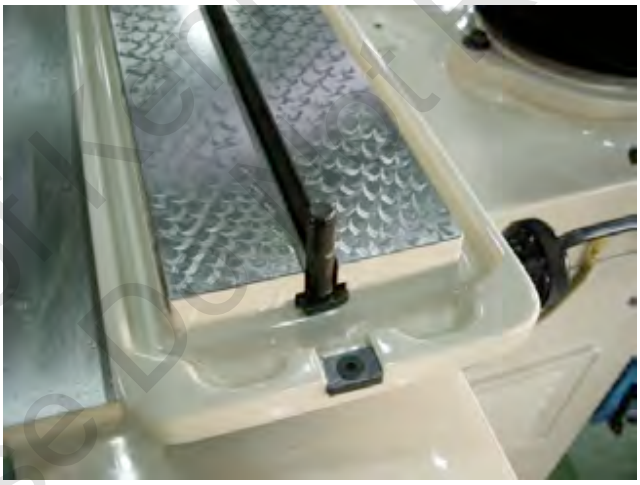
Spindle drive	
Spindle speed	450 rpm
Motor	65W(1/12HP) 4 pole

3. Installation

(a) A Face milling cutter grinding device placed bed table.

(b) Then the T-screw into the M-40 BED stage of the T-slot.



(c) the T-bolts and butterfly-wing locking bolt.

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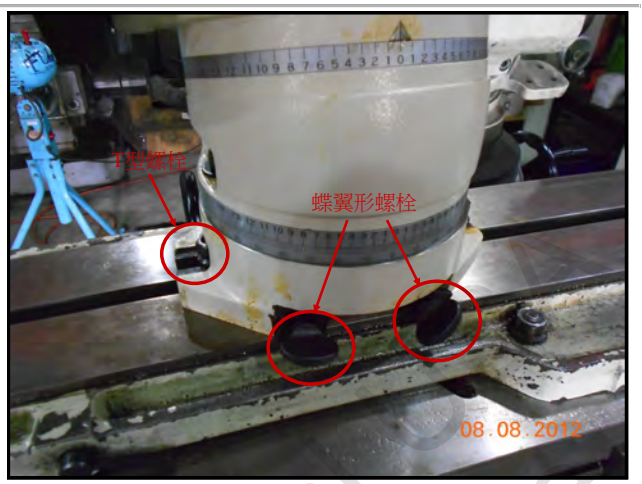

(d) Assembly is completed.

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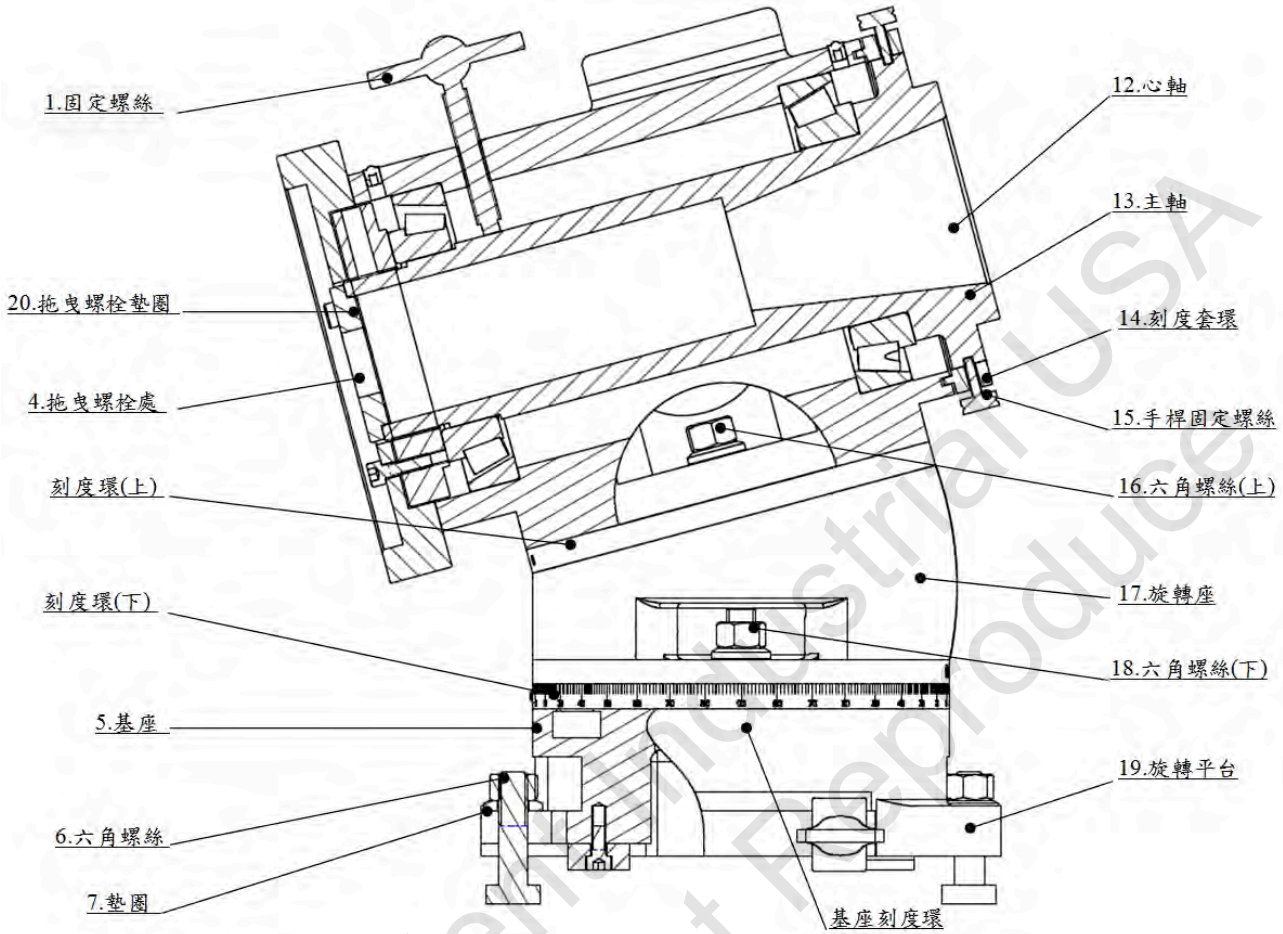
4. Method of operation



The base is provided (5) the turntable and the corresponding (17) of the base. The base can be rotated 360 ° turn in relation to the base (5) and locking hex nut (16). Opportunity Spindles housing base can be turned through 360 degrees in relation to turn base and locking hex nut (16). As an upper surface of the turning base inclined 15 °, Spindles housing can be tilted in the vertical plane ± 15 °.

Spindles (13) by two tapered roller bearings, spindle taper is based on the Japanese JIS610150 (ASA no.50). To set Face milling cutter, handle (12) of the spindle and the ballot draw back the bolt (4). (10) and (11) respectively, hex bolts and washers fastening grinding handlebar.

From the clearance angle of ± 15 ° is set scale ring (14) is given, which is fixed to the spindle by a lock screw (15), the spindle housing B is fixed to the spindle Spindles locking screw (1). The inside of the ring pattern (3) of the knurling, so that the spindle can be manually turned easier (cutting edge cases feed grinding).

Face Milling Cutter Grinding Device Drawing

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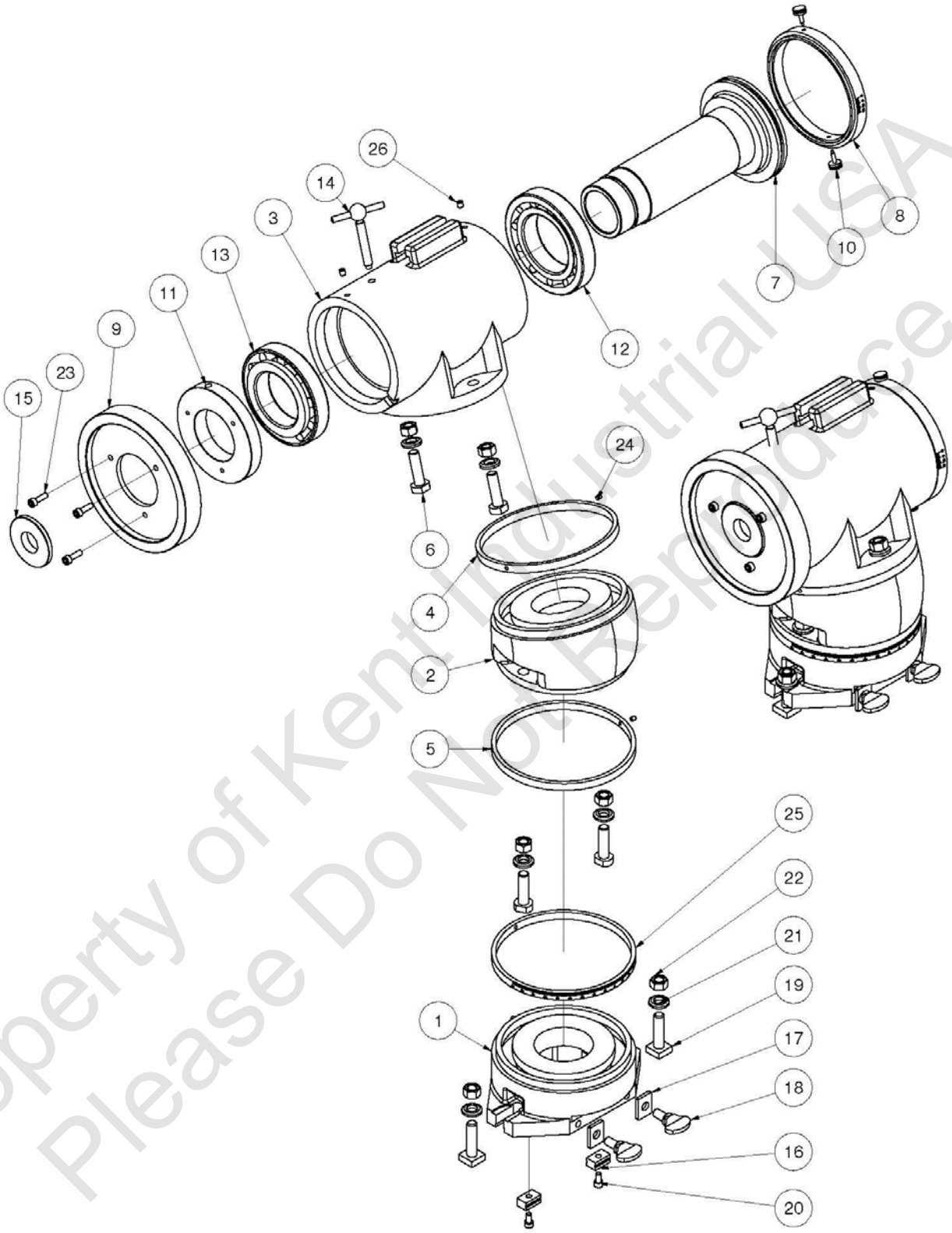

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Face Milling Cutter Grinding Device List

項目	品號	品名	規格	數量
1	M130040**	Base		1
2	M130020**	Rotating seat		1
3	M130010**	WorkHead		1
4	M130030**	Scale ring (Top)		1
5	M130031**	Scale ring (Down)		1
6	M130180**	Bolts		4
7	M130060**	Central axis		1
8	M130090**	Scale dust ring		1
9	M130070**	Handwheel		1
10	M451060**	Hand pole screws		2
11	M130080**	Fixing nut		1
12	GB020075	Tapered Roller Bearings	30215	1
13	GB020062	Tapered Roller Bearings	30214	1
14	M130110**	Screws		1
15	M130120**	Washer		1
16	M450030**	Bond		2
17	M450060**	Clamping block		2
18	M450070**	Butterfly Bolts		2
19	M450080**	T-bolt		2
20	GF011990	Hexagon head screws Order	M6*12	2
21	M490103**	Washer		6
22	GF030360	Hex nut	M12	6
23	GF012003	Hexagon head screws Order	M6*20	3
24	GF010780	Hex screws	M5*6	3
25	M130050**	Base scale ring		1
26	GB050131	Oil beads	Φ1/4	2

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8.2 Circular Arc No. 1

1. Products:

This is the repair rounding end mills and various arcs, the device has two slides, can be through precise scale ring to be adjusted, the work head Spindles is also a M.T.#5 or B&S#12 two kinds of hole , also at work after the first installation of indexing plate mounting surface, as the straight slot cutters indexing purposes.

2. Product Specifications

Grinding radius	0 - 50 mm (0 - 2 in)
Maximum diameter (To worktable)	190 mm (7 - 7/16 in)
Max.grinding radius (To worktable)	45 mm (1 - 3/4 in)
Total stroke horizontal Spindles	
A Type	50 - 175 mm (2 – 6 - 7/8 in)
B Type	105 - 230 mm (4 - 1/8 - 9 in)
Lateral rotation of the deviation	0 - 50 mm (0 - 2 in)
Horizontal rotation angle of Spindles	90°
Vertical Spindles rotation angle	±15°
Spindle taper	B & S 12 (or M.T.5)
Index plate (standard)	24 slots
Spindle drive	
Spindle speed	450 rpm
Motor	65W(1/12HP) 4 pole

3. Installation

(a) The Circular arc No. 1 placed bed table.

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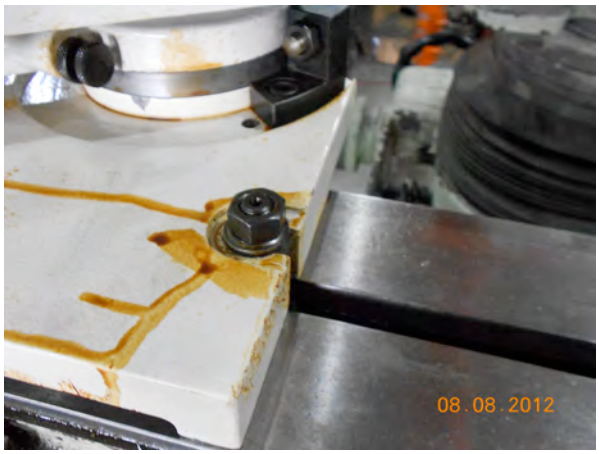
(b) Then the T-screw into the M-40 T-slot worktable.

(c) Tighten the screws on both sides of T-type.



(d) Install and tighten of the motor.

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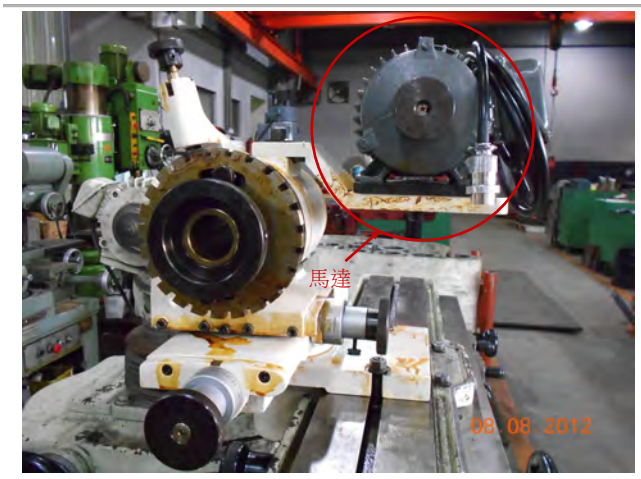
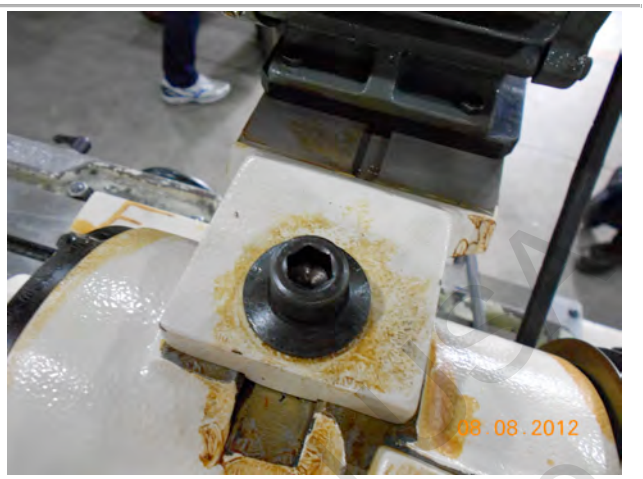
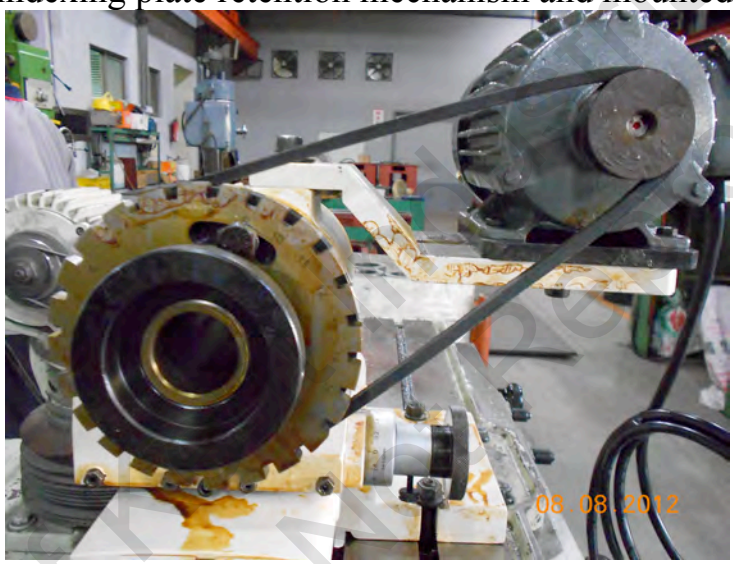




(e) Removing the indexing plate retention mechanism and mounted on a leash.



(f) Install indexing plate retention mechanism and tighten.

(g) Assembly is completed.

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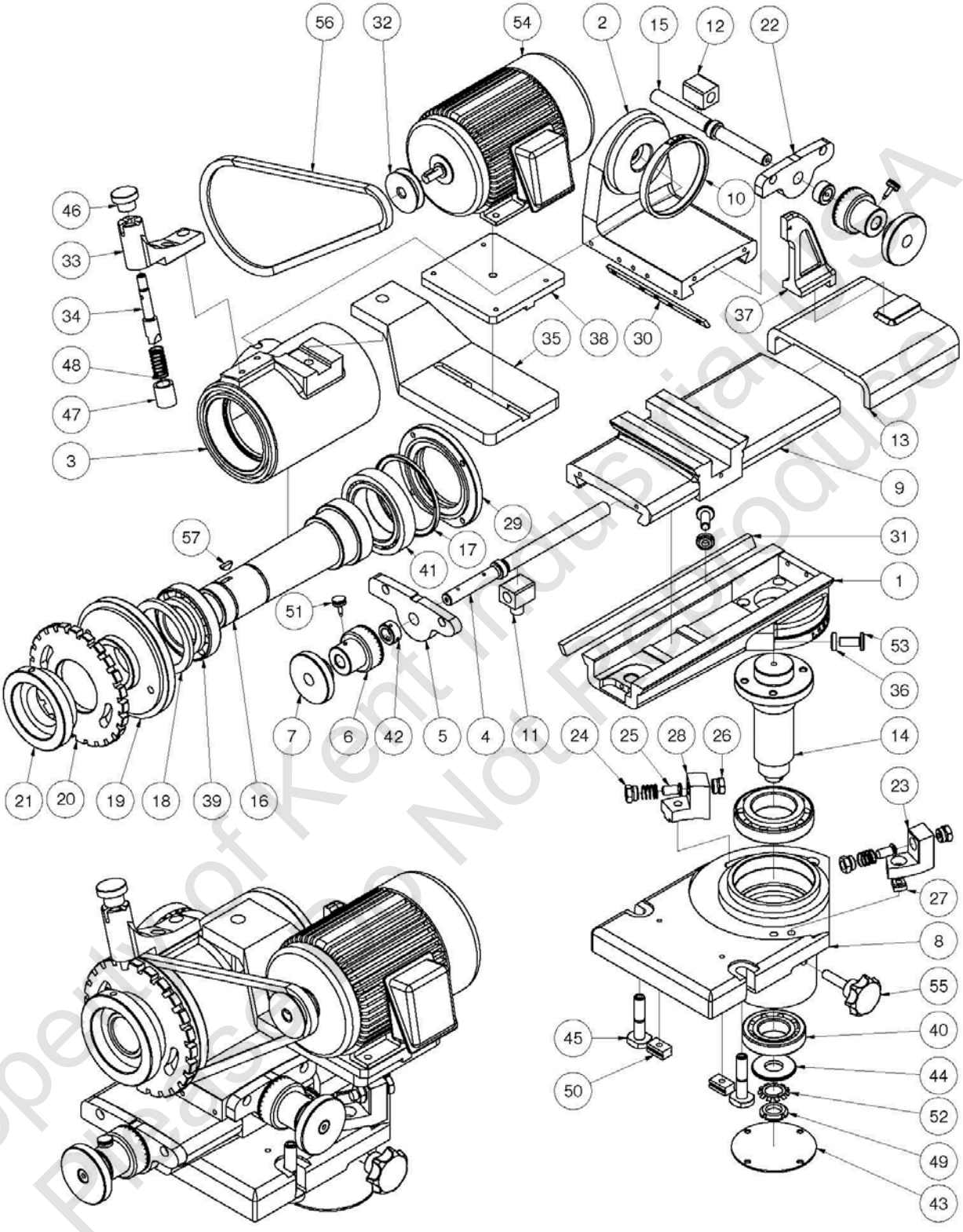
Circular Arc No. 1 Drawing



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Circular Arc No. 1 List

項目	品號	品名	規格	數量

1	M110020**	Slide base		1
2	M110040**	Work-head Slide base		1
3	M110060**	Work-head		1
4	M110078**	Screw		1
5	M110080**	Screw cover		1
6	M110098**	Scale ring (SI)		2
7	M110100**	Fixing ring		2
8	M110010**	Base		1
9	M110030**	Block vertical feed		1
10	M110050**	Scale ring		1
11	M110111**	Angle Nut		1
12	M110118**	Angle Nut		1
13	M110120**	Cover		1
14	M110130**	Rotary axis		1
15	M110148**	Screw		1
16	M110151**	Work head spindle		1
17	M110160**	Bearing cover		1
18	M110170**	Bearing cover		1
19	M110180**	Spindle pulley		1
20	M110190**	Indexing plate		1
21	M110200**	Fixing nut		1
22	M110210**	Screw cover		1
23	M110220**	Stopper block		1
24	M110230**	Pin hole nuts		2
25	M110240**	Cushion pins		2
26	M110250**	Stopper Nuts		2
27	M110260**	Stopper fixed block		1
28	M110270**	Adjust stopper		1
29	M110280**	Working head bearing cap		1
30	M110290**	Down a short article		1
31	M110300**	Down a long article		1
32	M110310**	Motor pulley		1
33	M110320**	Indexing plate holder		1
34	M110330**	Positioning rod		1
35	M110360**	Motor Mount board		1
36	M110380**	Adjust positioning nut		2
37	M110390**	Centres Regulation		1
38	M110350**	Motor fixing board		1
39	GB020033	Tapered Roller Bearings	30210	2
40	GB020020	Tapered Roller Bearings	30207	1
41	GB020101	Tapered Roller Bearings	32013	1

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42	M120100**	Retaining collar		2
43	M120130**	Bearing cap		1
44	M120140**	Washer		1
45	M120260**	Bolt		2
46	M170010**	Slotting head		1
47	M170020**	Bushing		1
48	M170080**	Spring		2
49	M430070**	Tighten the nut		1
50	M450030**	Bond		2
51	M451060**	Hand pole screws		2
52	GE010269	Rolling Nuts with washers (sun washers)	20	1
53		Adjustment screws		
54	M110370**	Motor		2
55	GG010078		220V/380V/50HZ/1/4HP/ Reverse	1
56		Star-shaped knob	6050-50-M10-40	
57	GD020415	V-belt	M30	1

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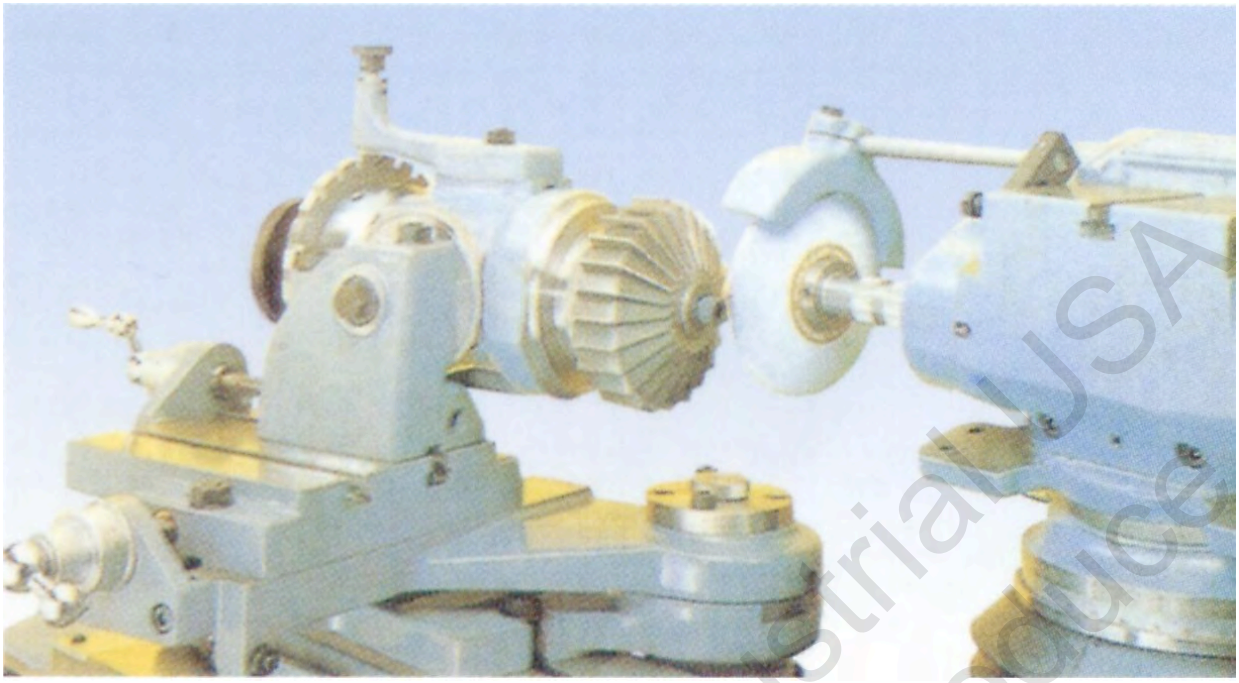
8.3 Circular Arc No. 2



1. Introduction

The device is suitable for side milling cutter milling cutter Circular arc grinding peace, and set the position of the side of a micrometer adjustment to eliminate the grinding error, the operating range of the radius 0-1 "0 to 25mm) and the tool diameter 0-12" (0 to 300mm).

2. Product Specifications

Radius to be ground	0 - 25 mm (0 - 1 in)
Maximum operating range	300 mm (11 - 3/4 in)
Spindle taper	One end ASA #5 Other end B&S #12 (or M.T. #5)
A Type	30 - 115mm (1- 3/16 – 4 - 9/16 in)
B Type	25 – 110mm (1 – 4 3/8 in)
Horizontal rotation between the centerline and the maximum diameter of Spindles centerline	160mm (6 - 5/16 in)
Spindle rotation angle (Horizontally)	90°
Spindle rotation angle (Vertical)	±30°

3. Installation

(a) The first Circular arc NO.2 the main arc placed on M-40 of workbench.

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(b) Then the T-screw into the M-40 T-slot workbench.

(c) Push and insert the base of the 2nd Circular arc groove aligned.

(d) Put the washers.

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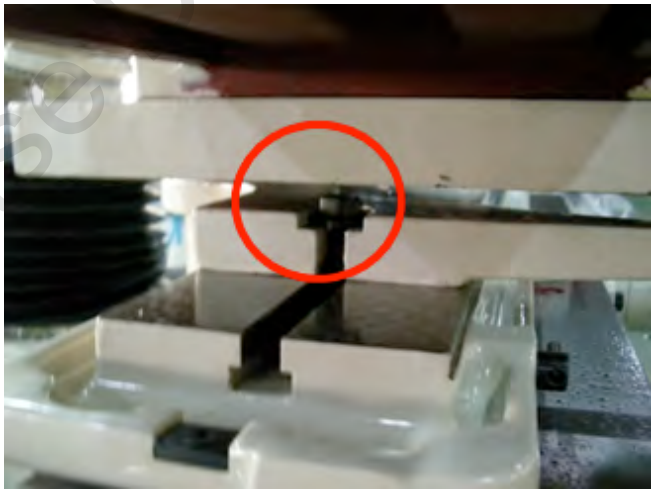
(e) Then tighten the fixing nut.

(f) Other side of the lock fixed in accordance with the above procedure.



(g) Working head and Circular arc NO.2 on the do with.

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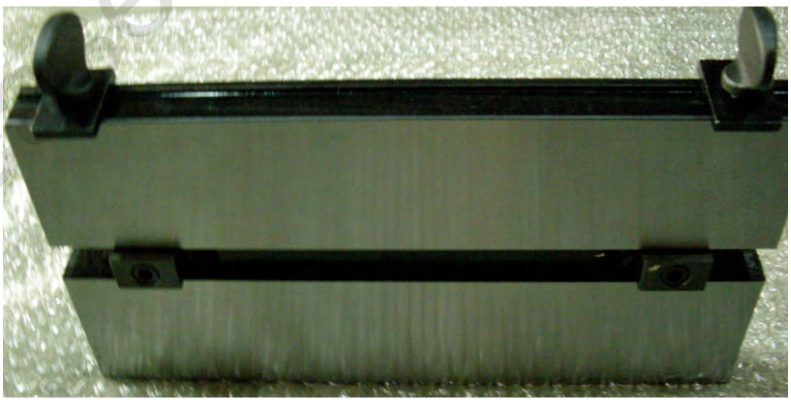
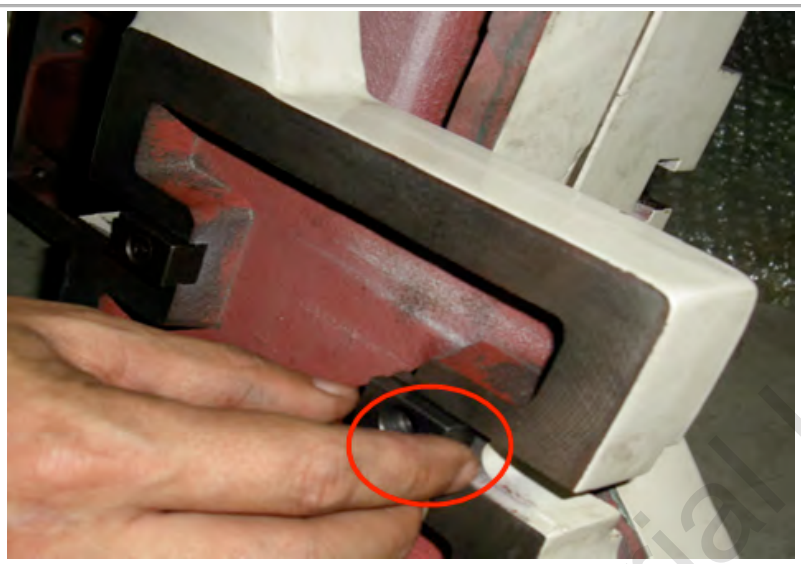
(h) Before use with fixed locking bolts and spring washers to complete the installation.


(i) There are installed with optical ruler must install this one pad.



(j) Remove this fixed block pad for easy installation.



(k) Pad mounted below.

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(l) This has two M12 screws, lock pad use.

(m) After locking.

4. Method of operation

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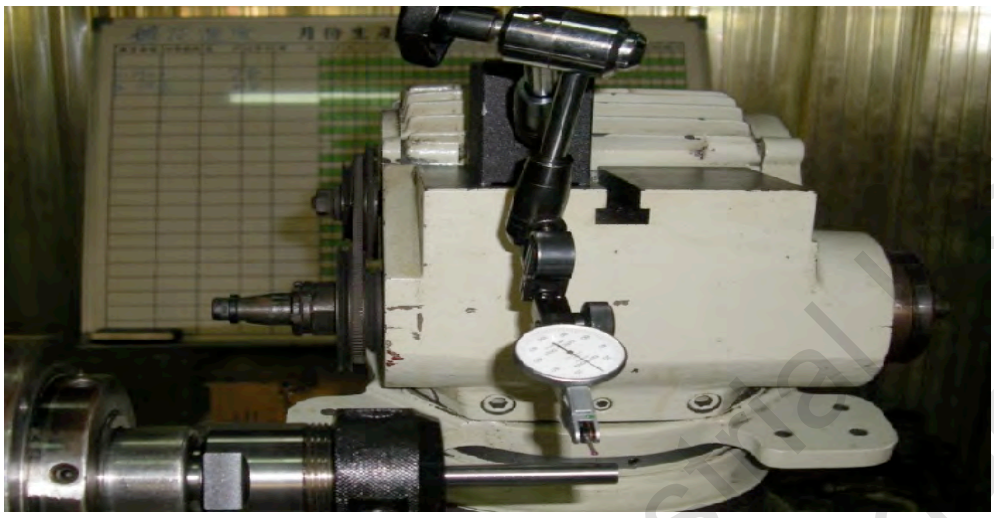
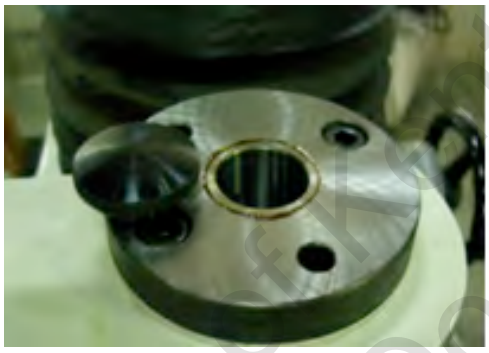
(a) Major correction workpiece level.



(b) Whether the 2nd correction workpiece rotation center, with a center line of this part have attached a random attachment
Member operates as follows: The center of rotation 2 → put the lid open attachments.



(c) 25mm rod clamp on the premise of the center of rotation angle correction set at 0 degrees.

(d) Correction center to move the 2nd short axis (Y-axis) will be the same before and after the correction from the long axis (X-axis) as to interfere with removable attachments.
(e) Mounted on the knife before indexing device.

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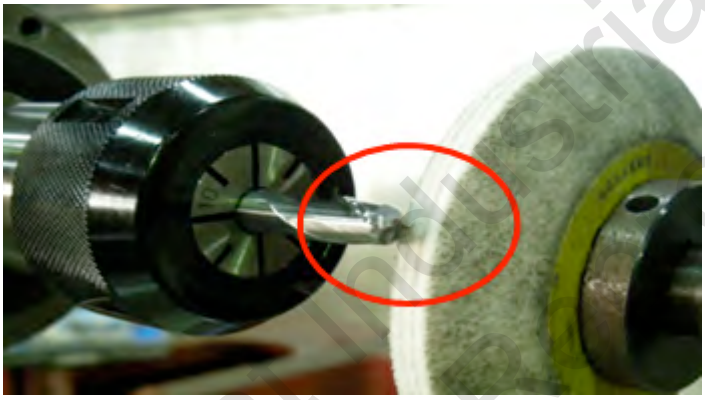
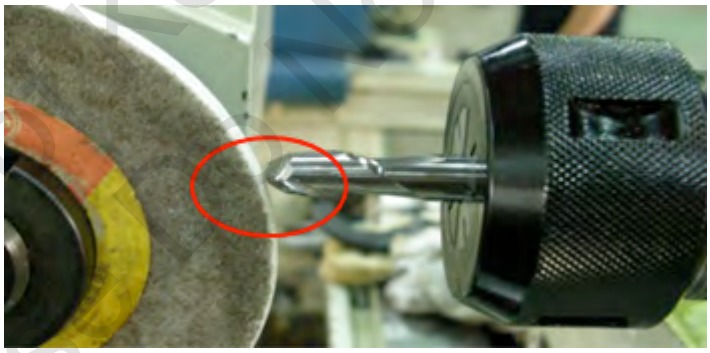
(f) Processing will begin preparing the knife fell to the needs of the Grinding wheel spindle height to grind Circular arc knives.



(g) In the polishing operation 0 degrees to 90 degrees.



(h) 1/4 after a good round for Flutes grinding mill can grind feed Circular arc must BED Y axis feed, is not determinable by two
No. motivated knife or grind is not really the center circle Circular arc to run away.

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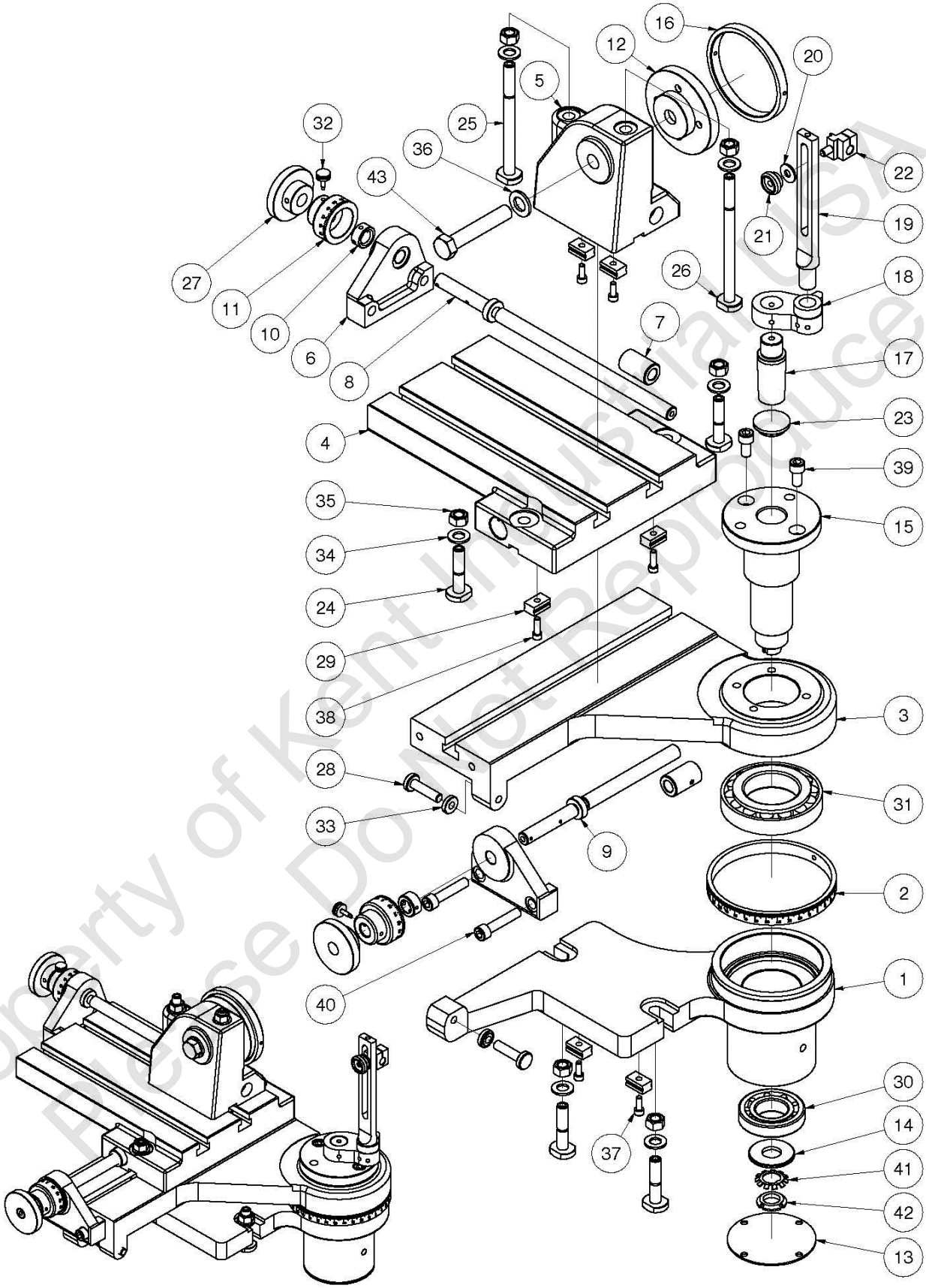
5. Circular Arc No. 2 Drawing



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6. Circular Arc No. 2 List

Project	Product No.	Name	Specification	Quantity
1	M120010**	Fix seat		1
2	M120011**	Scale ring		1
3	M120030**	base		1
4	M120040**	Aspect two seats to mobile		1
5	M120050**	Block feed around		1
6	M120060**	Guides fix seat		2
7	M120078**	Guide nut		2
8	M120088**	Screw pole		1
9	M120098**	Screw pole		1
10	M120100**	Fix collars		2
11	M120118**	Scale ring		2
12	M120120**	Bushings		1
13	M120130**	Bearing cap		1
14	M120140**	Gasket		1
15	M120150**	Axis of rotation		1
16	M120160**	Scale ring		1
17	M120170**	Positioning rod		1
18	M120180**	Support ring		1
19	M120190**	Fulcrum		1
20	M120200**	Gasket		1
21	M120210**	Positioning nut		1
22	M120220**	Clamping block		1
23	M120230**	Dust-proof cover		1
24	M120260**	Bolt		4
25	M120270**	Bolt		1
26	M120280**	Bolt		1
27	M120290**	Handle		2
28	M120300**	Bolt		2
29	M430070**	Fix nut		1
30	M450030**	Key		6
31	GB020020	Tapered Roller Bearings	30207	1
32	GB020059	Tapered Roller Bearings	30212	1
33	M451060**	Hand lever fix screws		2
34	M110380**	Adjust positioning nut		2

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8.4 Helix Angle Grinding Device

1. Introduction

The device is suitable for grinding spiral cutter escape angle and tilt or roll cutter, cutter and center drill, the work head Spindles taper hole M.T.#4.

2. Product Specifications

Spindle taper of work head	M.T.#4
Indexing plate	24 (Standard)
The maximum diameter of the bed platform to	125 mm (5")
The maximum length of the bed platform	320 mm (12 1/2”) (When Spiral angle = 0)
Max. Module of Hob to be ground	8 (3 Diametral pitch)
Max. Helix Angle of. Hob to be ground	±8°
Dia. of Arbor for mounting Hob	1" (Standard)

3. Installation

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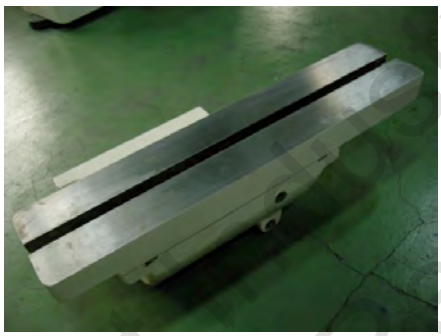
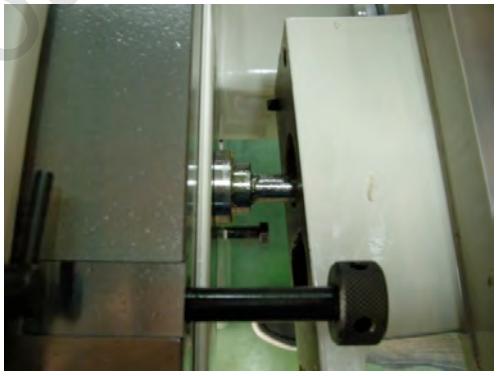
(a) First, the first machine to remove the handle down.

(b) Then this accessory to the device up.



(c) Install with the machine table with the handle.



(d) Once the screws on the first not fully tighten to correct.

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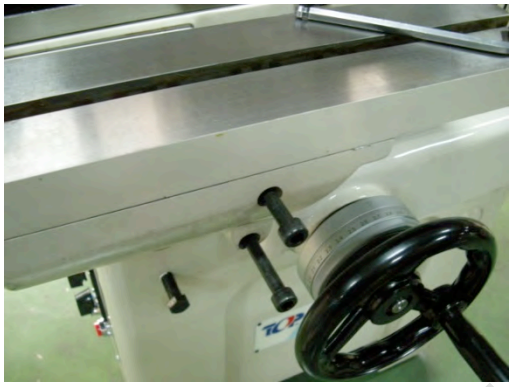
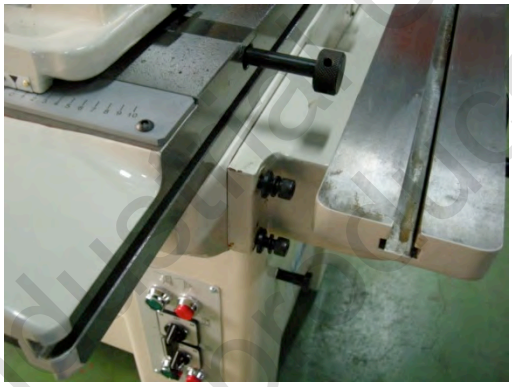
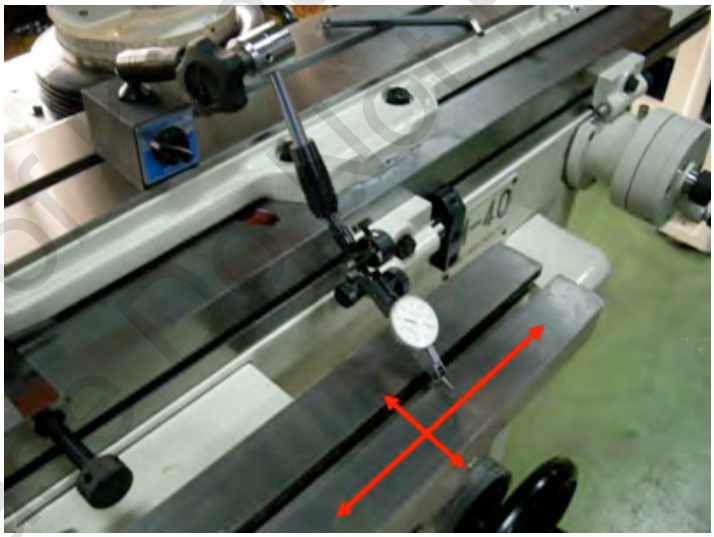



(e) Use Scale Calibration accessories for bed sets parallelism.



(f) In parallel to the before and after correction, if that can be used before and after a large gap in the Annex steel pads and bed side table seams, as it depends on the choice of steel depending on prevailing conditions, the correction after the

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completion of the four screws symmetrically fixed locking.

(g) As previously installed and then slide to put a good platform.

(h) Use the chart screws, locking the rails on the platform.

(i) Augers mounted to the bed and then the stage, the lock screw and fixed.

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4. Use
(a) First, the first slide to adjust the dials on the attachment angle you want.


(b) In the grinding material safety device on the knife.


(c) Guide rod placement angle.
After the dia of cutter to be ground and helix angle of cutter are determined, calculate the lead of cutter and setting angle of guide bar.

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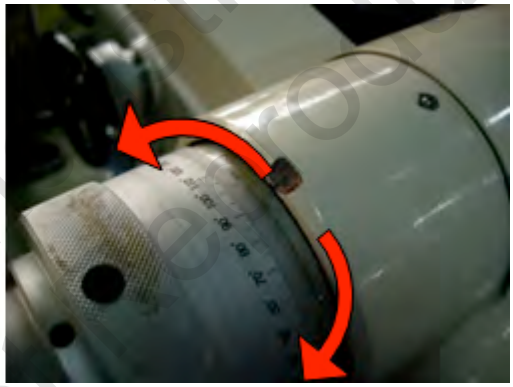
tanθ = D / L……(1)
tanψ= πd / L = 157.08 / L…….. (2)

θ : Helix angle
D : Diameter (mm)
L : Lead (mm)
ψ: Guides set the angle
d : 50 (mm)

From Equation (1) and (2), the placement angle obtained.

(d) With indexing plate can grind want Flutes, pull back the next chart wheel, you can adjust the desired angle.



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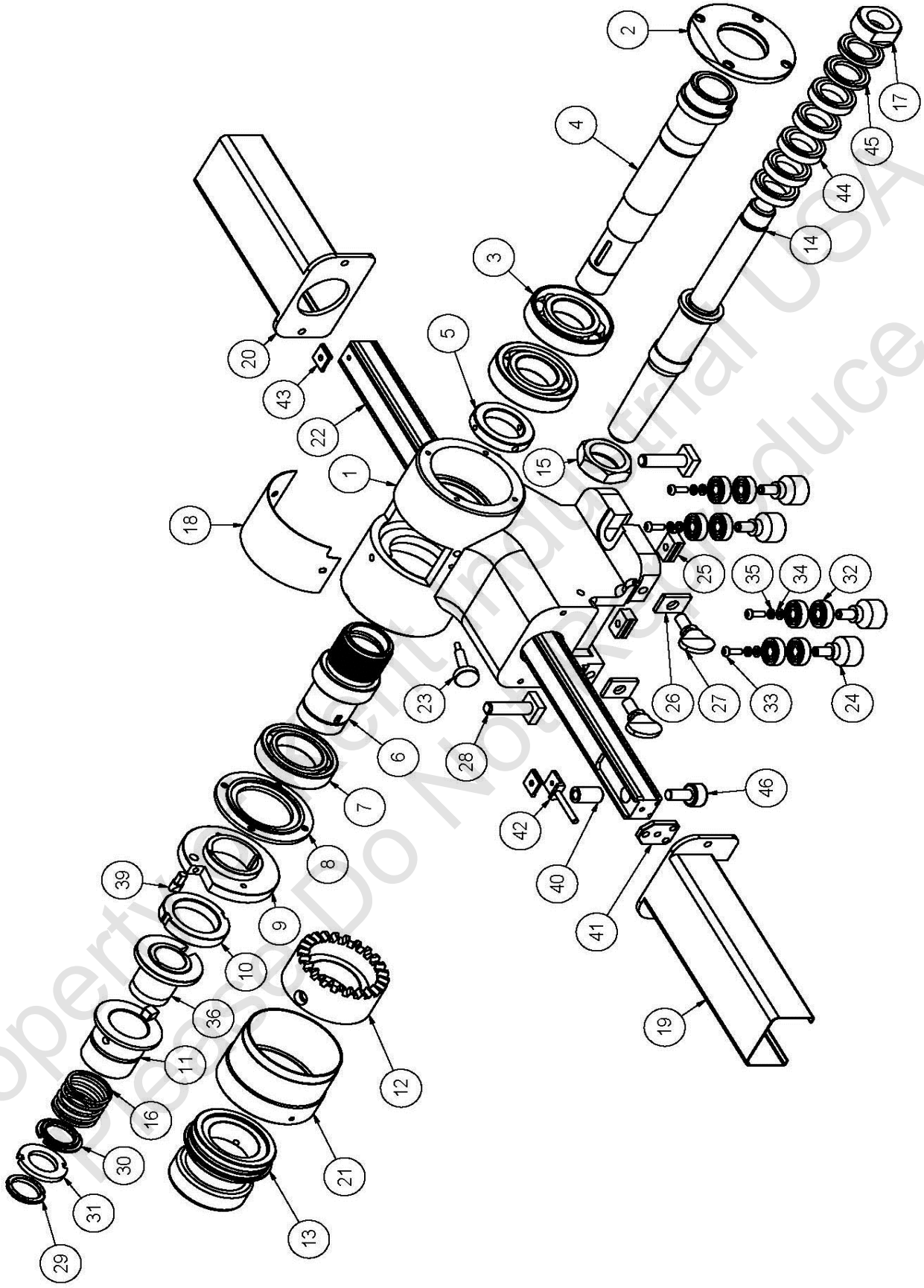
5. Helix Angle Grinding Device Drawing



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6. Helix Angle Grinding Device List

項目	品號	品名	規格	數量
1	M160010**	Screw the seat		1
2	M160180**	Front axle cover		1
3	GB010939	Angular contact ball bearings	7208CTYNSUMP4	2
4	M160020**	Helix angle spindle		1
5	M160030**	Spindle nut		1
6	M160040**	Winding Wheel		1
7	GB010722	Deep groove ball bearing	6009ZZ	1
8	M160050**	Spindle rear axle cover		1
9	M160060**	Positioning tooth plate		1
10	M160080**	Nuts		1
11	M160100**	Retaining collar jacket		1
12	M160110**	Clutch (24T)		1
13	M160170**	Spindle feed shaft		1
14	M160250**	Hob axis		1
15	M160260**	Nuts		1
16	M160160**	Spring		1
17	M160290**	Retaining nut		1
18	M160300**	Screw the seat cover		1
19	M160310**	Cover		1
20	M160320**	Cover		1
21	M160150**	Scale wheel infeed		1
22	M160190**	Rails		1
23	M160330**	Bolt		1
24	M160240**	Bearing lever		4
25	M450030**	Key		2
26	M450060**	Clamping block		2
27	M450070**	Butterfly Bolts		2
28	M450080**	T-bolt		2
29	M160120**	Nuts		1
30	M160130**	Nuts		1
31	M160140**	Nuts		1
32	GB010926	Deep groove ball bearing	629Z	8
33	GF010667	Hex button head screws	M5*16	4
34	GE010214	Washer 5.0 (Black)		4
35	GE020185	Spring washer	M5	4
36	M160090**	Collars		1
37	M160340**	Chuck handle 4 "	MT4	1

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38	M160350**	Tighten the screw		1
39	M160070**	Axis positioning chaining		1
40	M160200**	Chock		1
41	M160210**	Washer		1
42	M160220**	Bolt		1
43	M160230**	Washer		2
44	M160270**	Spacer		5
45	M160280**	Washer		2
46	GB020127	Roller Bearings / CF-shaped cam follower	CF10	1

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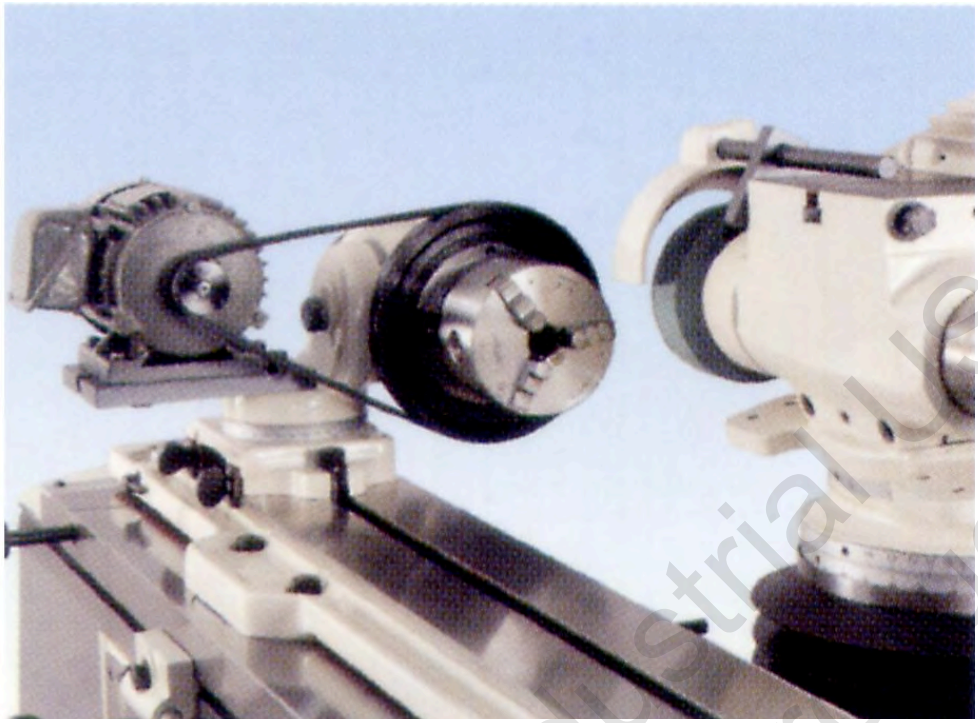
8.5 The Cylindrical Grinding Device



1. Introduction

This device is suitable for straight cylindrical and taper cylindrical grinding, grinding tools can. Grinding cylinder diameter range can be greater than 2 "(50mm), spindle speed: 310rpm, 360rpm, motor speed: 1/4HP-0.2Kw.

2. Product Specifications

(a) a cylindrical grinding diameter can be greater than 2 "(50mm)
(b) Spindle speed: 310rpm, 360rpm
(c) motor speed: 1/4HP-0.2Kw

3. Installation

(a) The working head units put to bed

(b) Then the T-screw into the M-40 work table T-slot and tighten.

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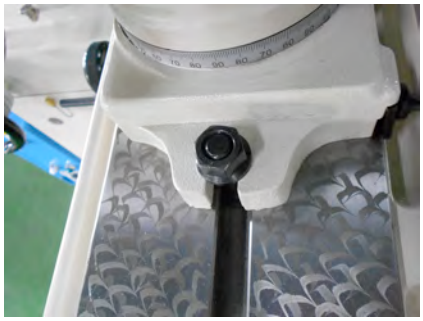
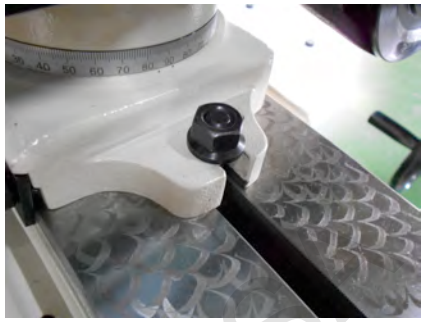
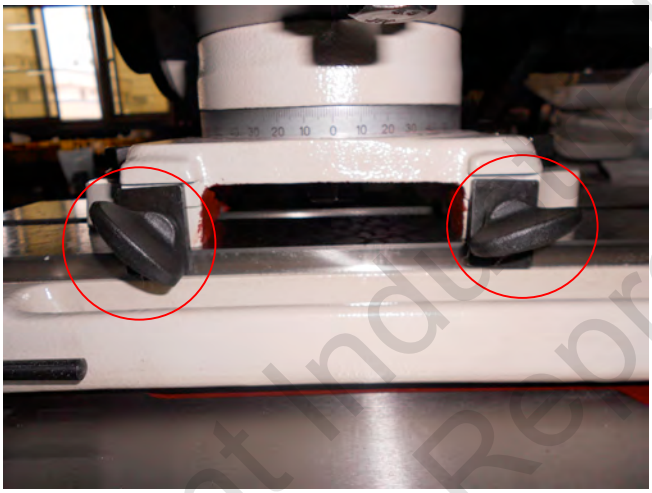
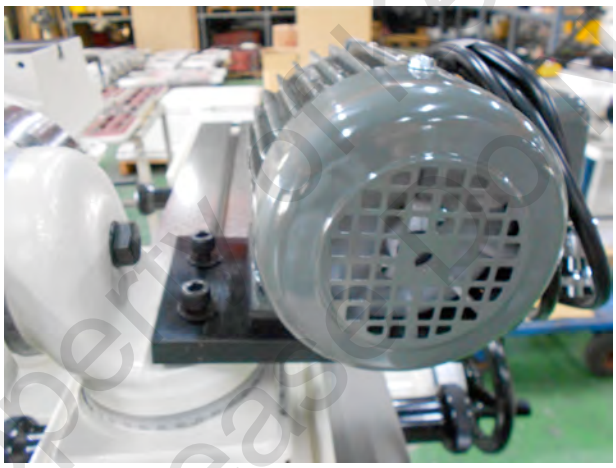
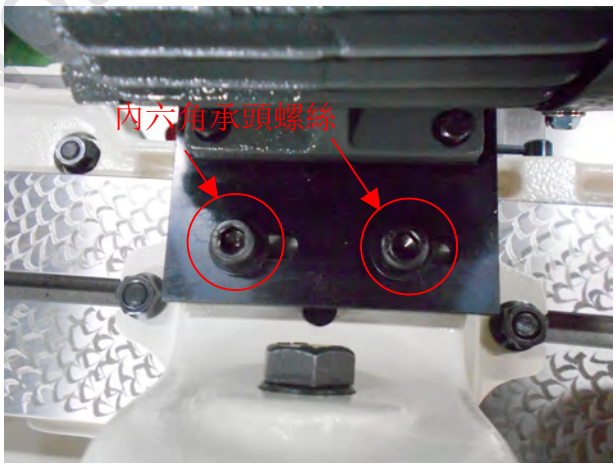



(c) The butterfly-wing locking bolt.



(d) Put up after the motor head screws Hexagon order.

(e) The M-type set into the rear pulley fixed with a fixed block, and then tighten the hexagon socket button head screws.

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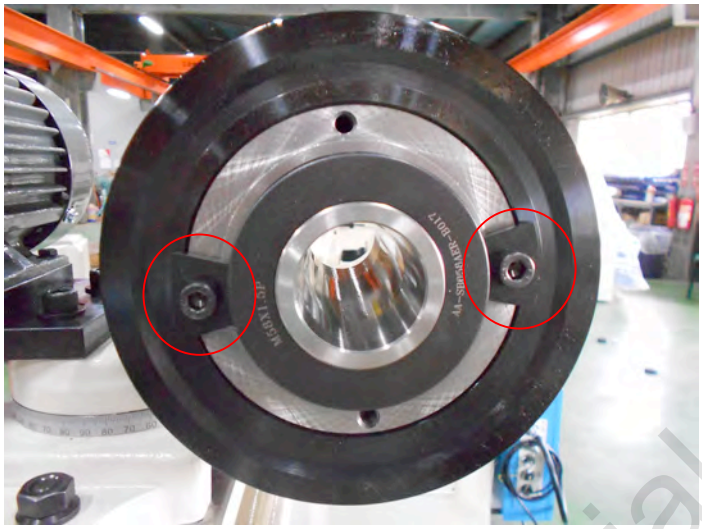

(f) Put the belt.

(g) Fitted with 3-jaw chuck.

(h) Assembly is completed.

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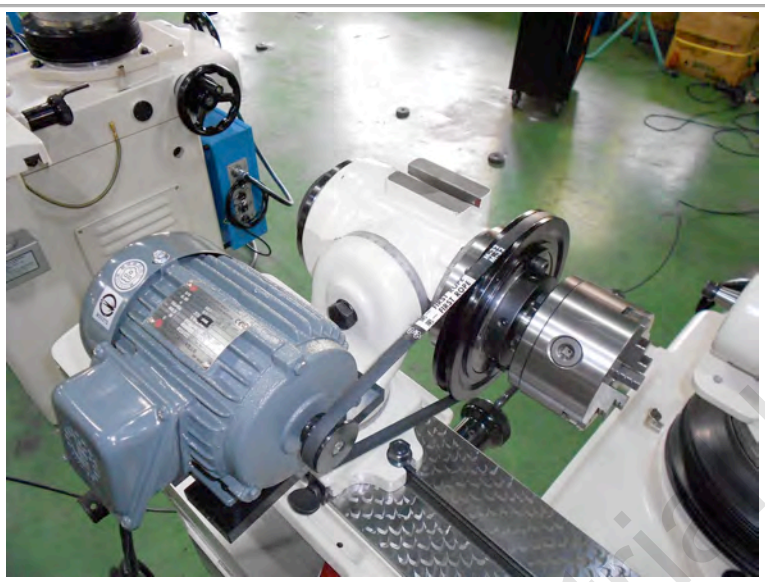

4. Method of operation

I'll Want to take advantage of the processing cylinder fixed jaw chuck can be processed straight cylinder, you can adjust the bottom of the dial can also be machined taper.

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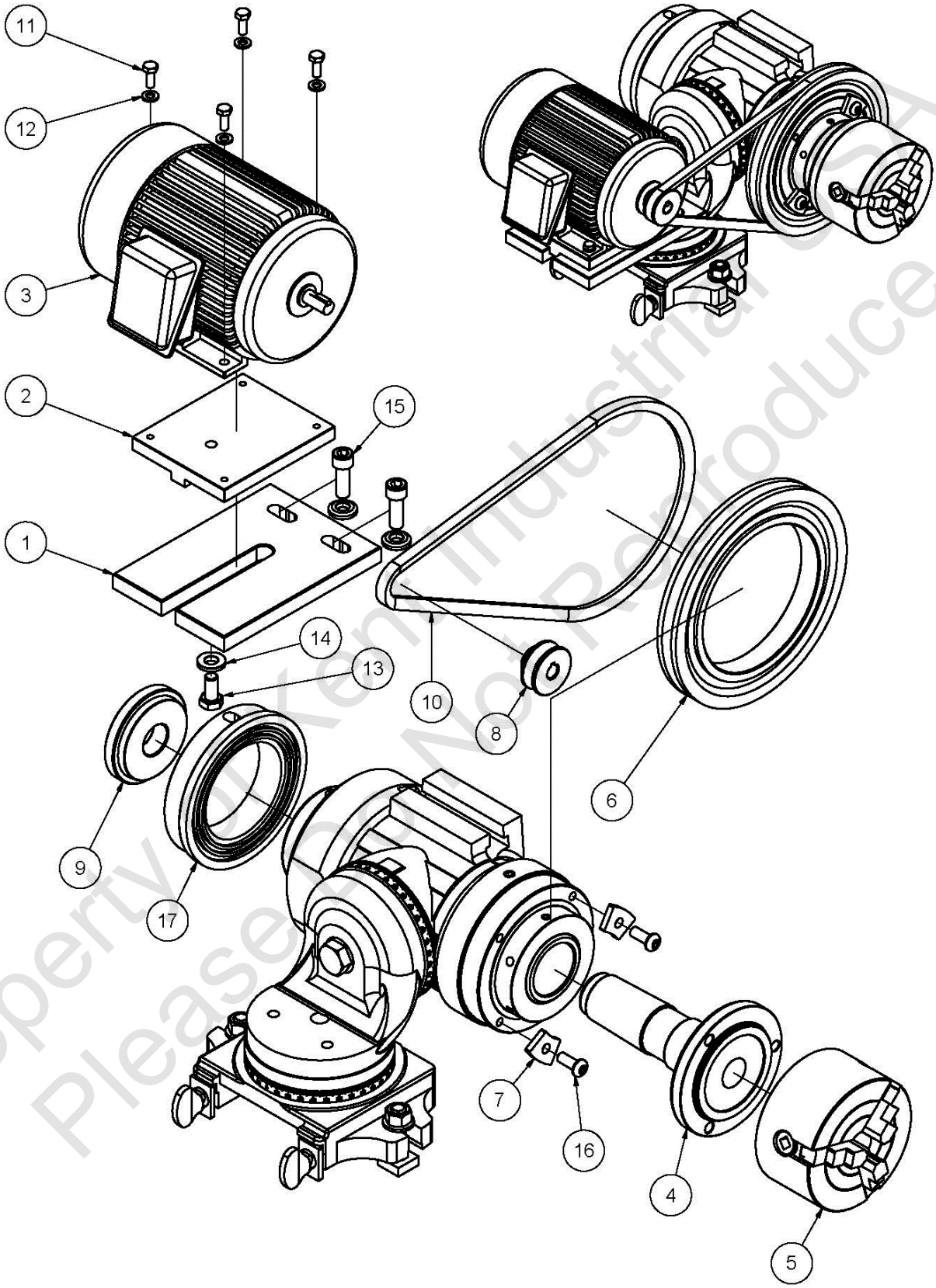
The Cylindrical Grinding Device Drawing



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The Cylindrical Grinding Device List

項目	品號	品名	規格	數量
1	M140030**	Slide		1
2	M140040**	Skateboard		1
3	GG010065	Motor	220V/380V/50HZ/1/4HP/ Forward /IP44	1
4	M140080**	Chuck handle 4”		1
5	GQ010065	4" Common type three-jaw chuck	SC-04(After the Hole)	1
6	M140010**	M-type pulley		1
7	M170070**	Fixed block		2
8	M140020**	M-type pulley		1
9	M140070**	Tensioning screw gasket		1
10	GD030140	V-belt	M32	1
11	GF016665	Hex head screw	M6*16	4
12	GE011068	Washer	6.0(Black)	4
13	GF015824	Hex head screw	M10*20	1
14	M490102**	Washer	D22*d10.5*4.5L	3
15	GF011631	Hex head screws Order	M10*30	2
16	GF014915	Hex button head screws	M8*20	2
17	M450162**	Front inner dust cover		1

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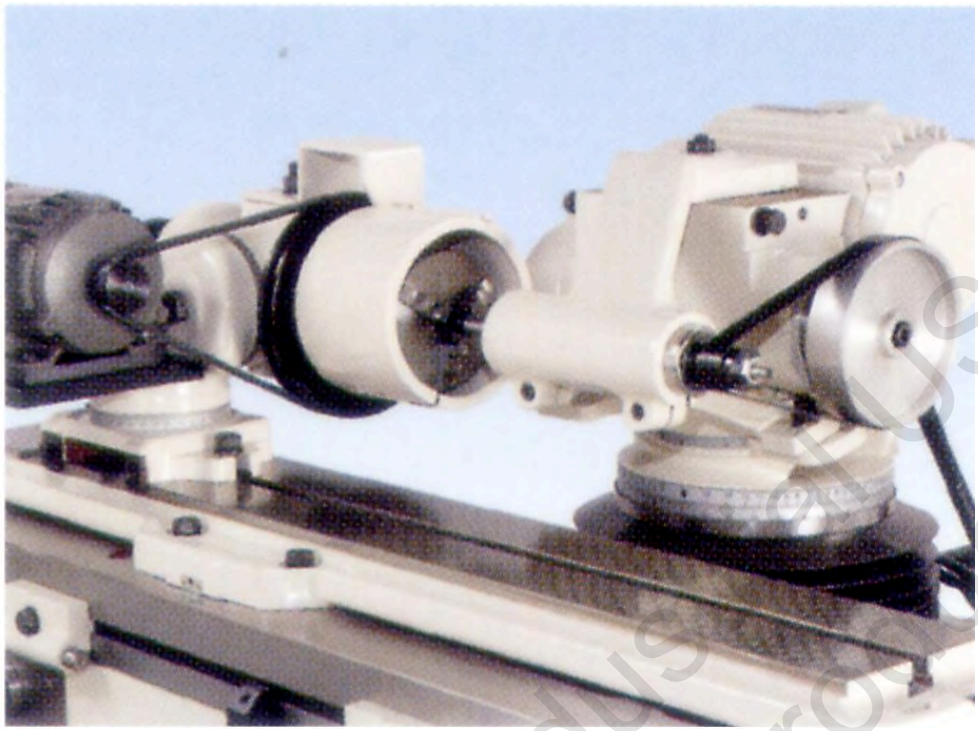
8.6 Bore Grinding Device

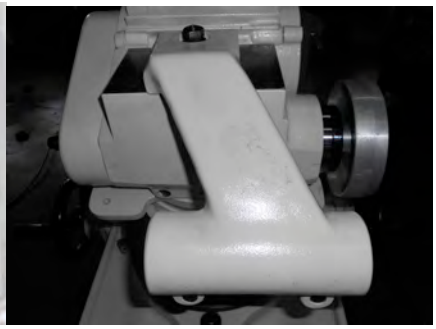


1. Introduction

This device must be used in conjunction with a cylindrical grinding device, wheel axle with 20000rpm, and can grind Taper.

2. Installation

(a) The first bolt into the T-slot, and then use the keypad to insert the outer groove. Put a flat washer, then six Angle locking nut.



(b) Put the pulley and tighten.

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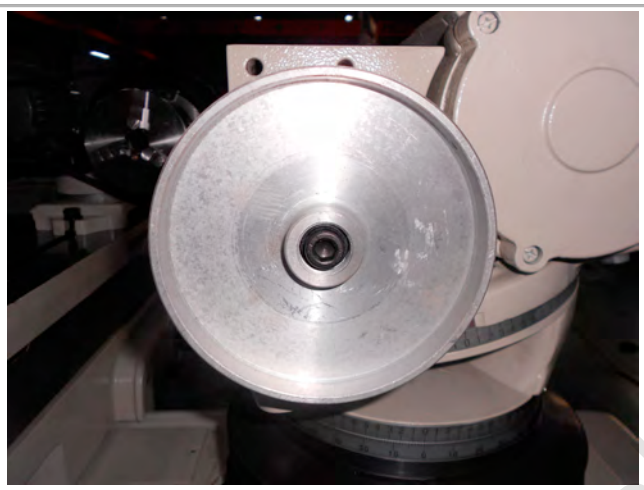
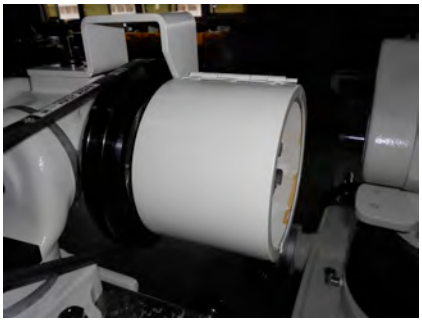


(c) The grinding spindle bore into the outer hole, and put on the pulley.

(d) Put a T-bolt, fitted bore grinding cover, and then put the hex nut locking washer.



(e) Put positioning fixed block and tighten.

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(f) Assembly is completed.

3. Method of operation

Work piece will be clamped jaw chuck, the use of T locking plate can be hand polished bore, if you adjust the dials below can grind taper bore.

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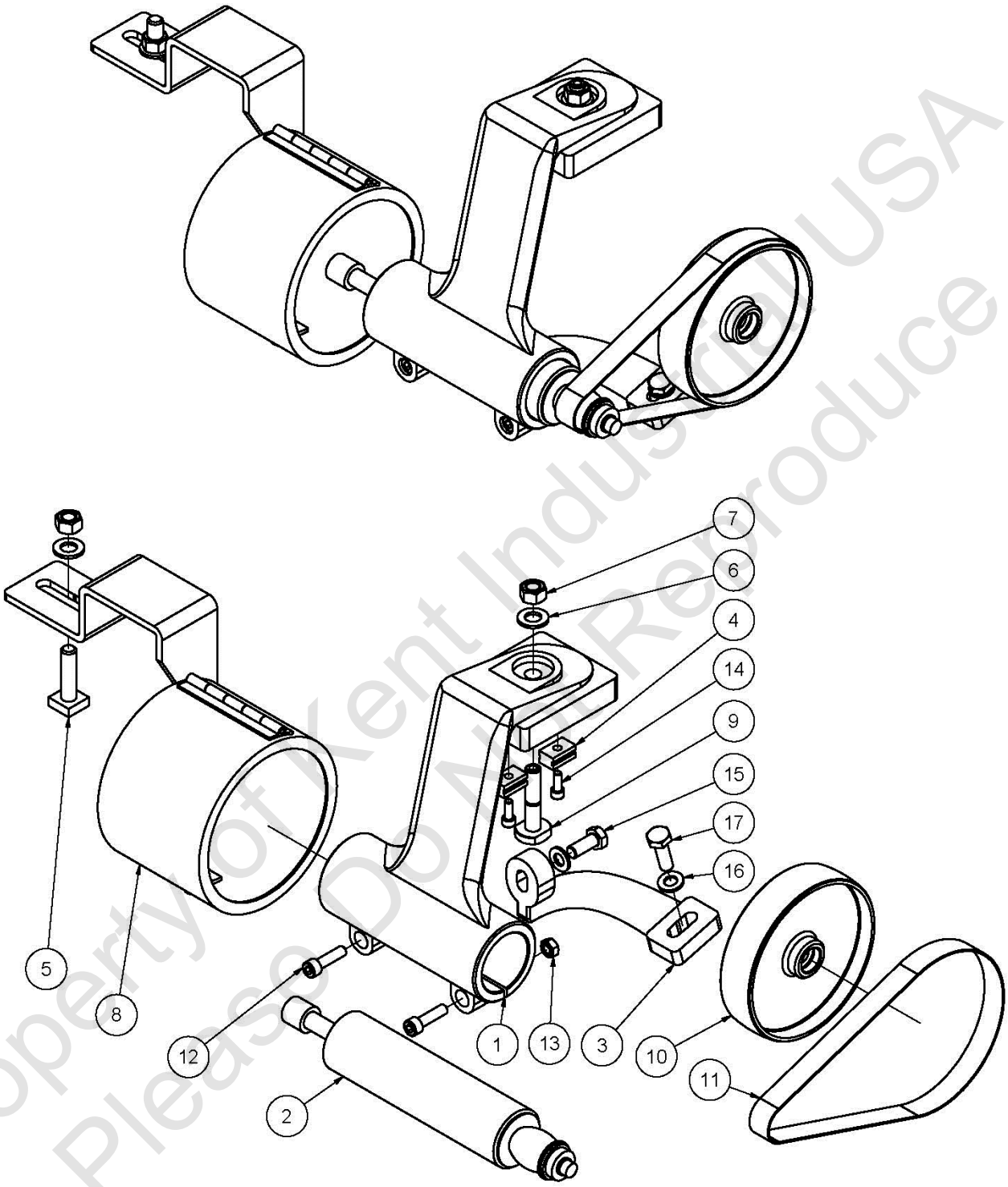
Bore Grinding Device Drawing



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Bore Grinding Device List

項目	品號	品名	規格	數量
1	M150010**	Outer		1
2	M150160**	Internal grinding spindle		1
3	M150140**	Positioning fixed block		1
4	M450030**	Key		2
5	M450080**	T-bolt		1
6	GE011644	Washer	12(Black)	2
7	GF030360	Hex nut	M12	2
8	M150170**	Internal grinding cover		1
9	M120260**	Bolt		1
10	M150130**	Pulley (10°30')		1
11	GD030111	Leather belt	FL630W20	1
12	GF011495	Hex head screws Order	M8*30	2
13	GF030386	Hex nut	M8	2
14	GF012016	Hex head screws Order	M6*16	2
15	GF016050	Hex head screw	M10*25	1
16	GE011055	Washer	10(Black)	2
17	GF016759	Hex head screw	M10*30	1

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8.7 Working Head Indexing Device

1. Introduction

This device universal work to do in the head, can easily quickly and accurately set out the grinding tool to replace the blade angle of the aliquot guide rod, standard specifications for the 24 divisions.

General Specifications: 24 parts

Special specifications: 12T, 14T, 16T, 18T, 20T, 21T, 22T, 32T, 44T, 48T, 36T, 40T, 60T, 72T, 4T, 26T, 28T, 30T.

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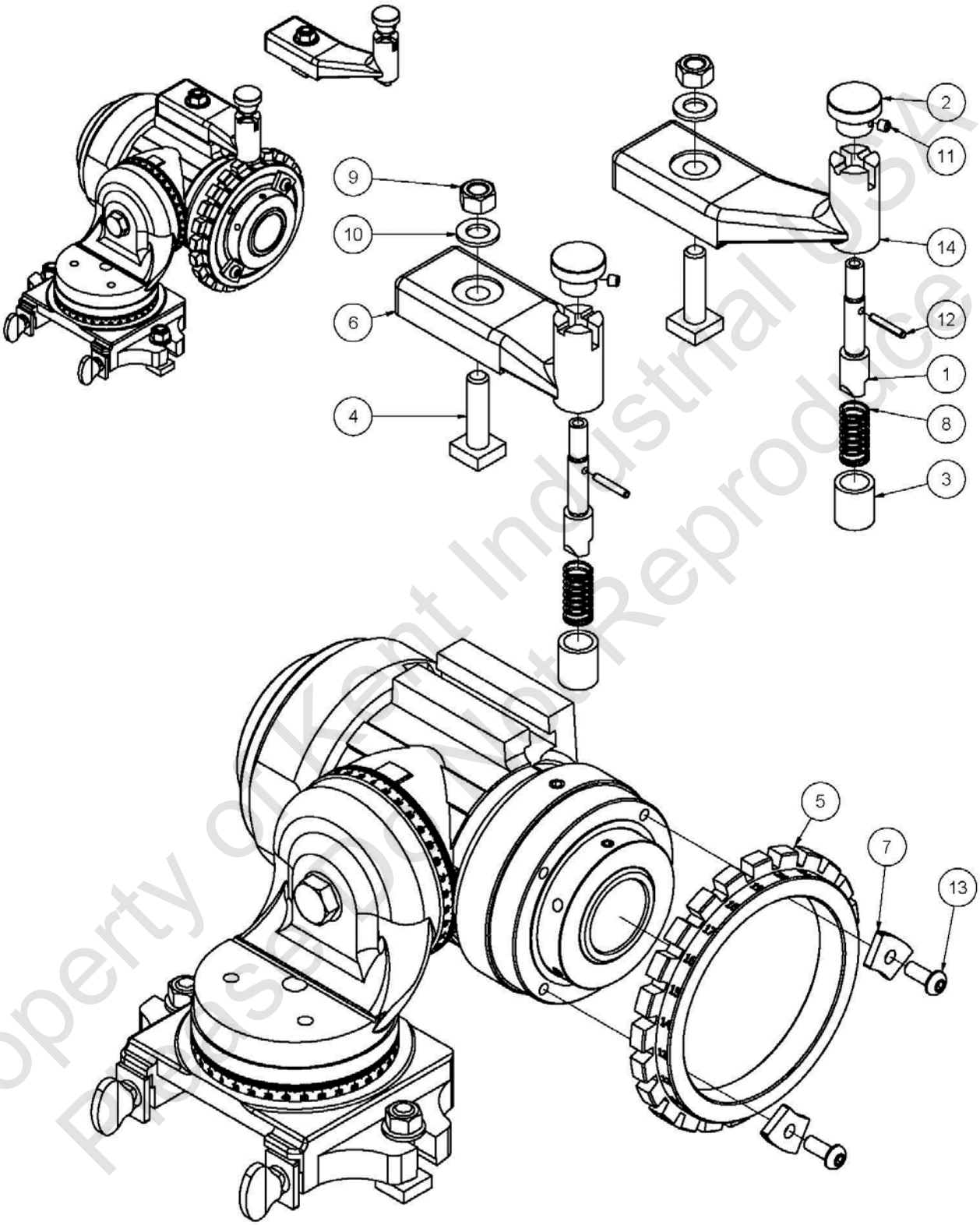
Working Head Indexing Device Drawing



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Working Head Indexing Device List

項目	品號	品名	規格	數量
1	M170050**	Plunge		2
2	M170010**	Plunge head		2
3	M170020**	Bushing		2
4	M450080**	T-bolt		2
5	M17006***	Indexing plate		1
6	M170040**	Jumper Block (Left)		1
7	M170070**	Fixed block		2
8	M170080**	Spring		2
9	GF030360	Hex nut	M12	2
10	GE011644	Washer	12(Black)	2
11	GF010230	Hex screws	M6*6	2
12	GC030357	Spring pin	4*25	2
13	GF014915	Hex button head screws	M8*20	2
14	M170030**	Jumper Block (Right)		1

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8.8 Wheel Spindle Elongation

1. Introduction

The axis of the grinding wheel diameter the same specifications and standards, replacement convenience, can be used as a small object plane polishing. Main purpose is to increase the long axis length, helps to avoid interference problems processing.

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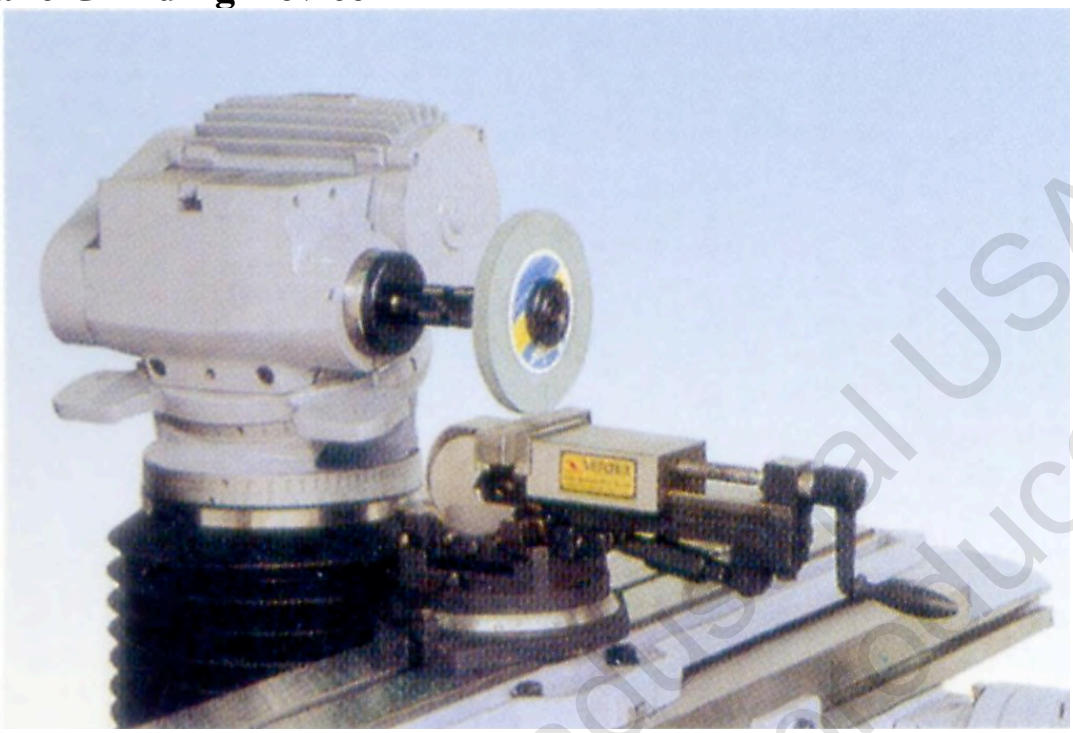
8.9 Plane Grinding Device



1. Introduction
Such devices have to do universal vise, the universal bench vise assembly to the bed, as its function and surface grinding ideal for smaller surface grinding.

2. Installation
Three methods of operation. This device is rotatable vise and a vise and the base may be able to single-handedly support between the seat formed by the rotation, rotating seat allows for horizontal and vertical vise 360 ▫ rotation, so the work can be simple to make a variety of angles clamping and grinding.

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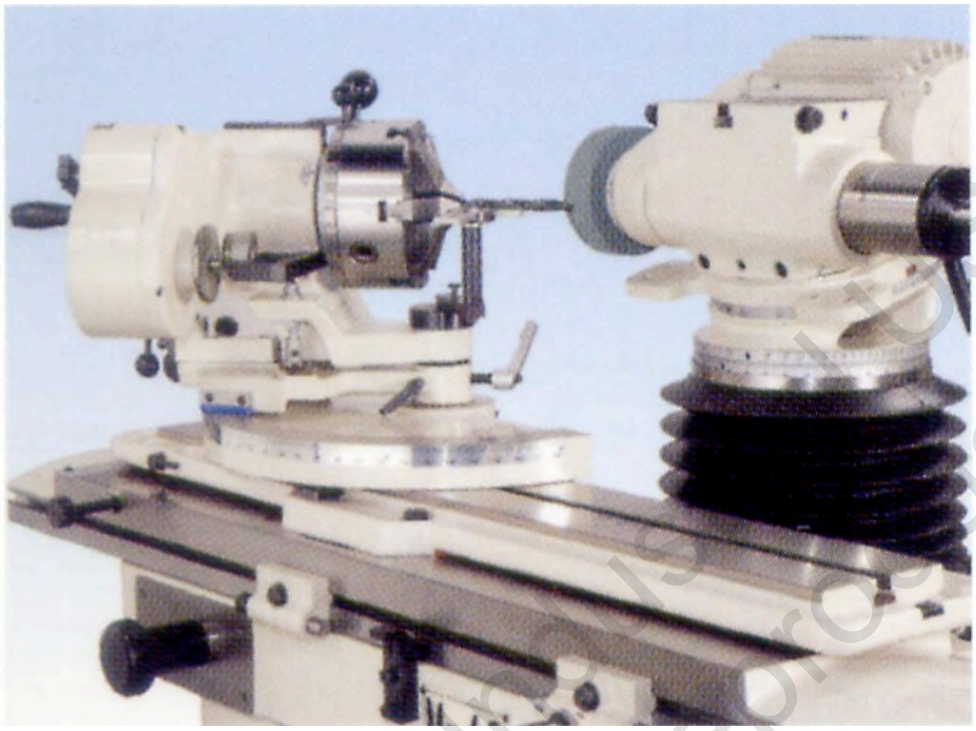
8.10 Drill Grinding Device



1. Introduction

Device can accurately grind precision drill and tools, this drill grinding machine system consists of a motor and grinding wheel head composed of the drill tool in a precision six claw clip manual chuck, and with a rotatable operating handle, when swing operation handle, that produce the following actions:

(A) The rotation of the drill blade in contact with the wheel.
(B) Drill bit to the forward movement of the wheel, which is determined by a simple plane caused by the cam and the drive arm.
(C) By the rotation of the operation 1 and 2 together, can produce about necessary, Forward and backward rotation, and rotation of the left and right around the vertical arm by means of proper adjustment of the cam drive for grinding.

2. Installation

Three methods of operation
(A) By the arrows in the slider on the scale required in the angle, and then tighten (12) handles. Pulled the latch position behind the locking screws, remember locking.
(B) Fitted inside the grinding cam 6, the upper fixed block (2) on the green slot.
(C) After setting the required bevel adjustment (1) handle rake angle 0 ° ~ 18 ° can be adjusted after the oblique angle is larger, thinner blade. The higher the hardness of the material to be cut, then the posterior oblique angle should be smaller; lower the hardness of the material to be cut, then the posterior oblique

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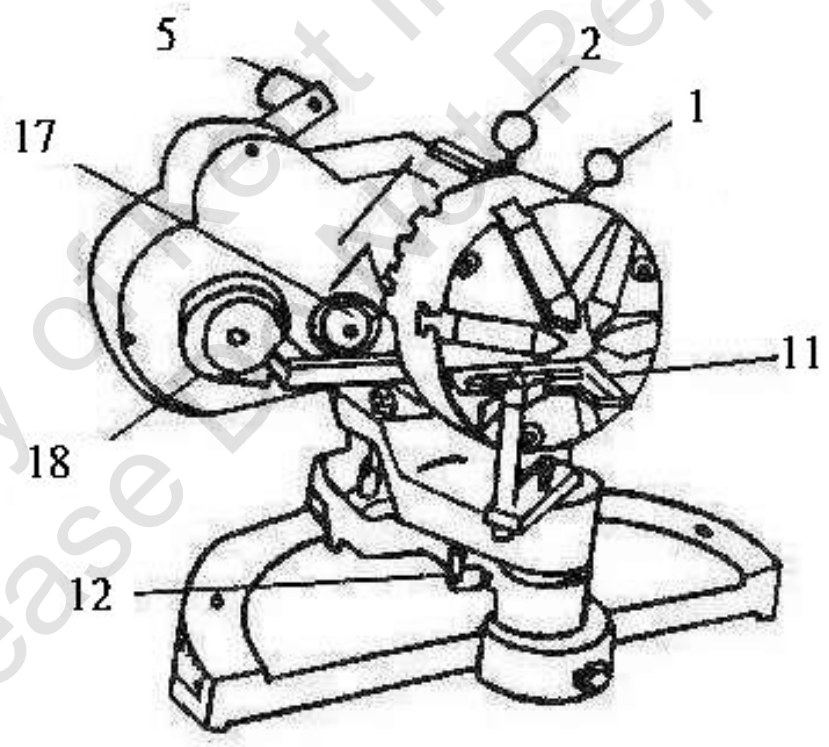
angle should be larger.

(D) If a straight shank drill bit, then caught in six claw clip directly to the head; such as slope handle, is mounted on the right sleeve of Mohs, and then to six claw tip drill chuck clamping, which can center of the drill grinding more solid and more accurate.

(E) Using the drill center setting gauge (11), the cutting edge of drill lips gently touch (11) at the center of the ladder of regulation, while the length of drill chuck sticking out than the drill diameter is about small 2MM. Drill stretched longer, the latter angle smaller; outstretched shorter, the latter angle gets.

(F) The drill bit tip angle. Rake set up, drill length extending six jaw chuck and drill lip height fixed Well, then the fixed block (2) board from six jaw chuck green tank, rotation (5) Handle, working head that is swinging around. Rotary and forth movement three movements.

(G) Operations before and right hand wheel, the wheel near the drill bit, and then start switch, grinding wheel that is fast turning, the wheel head before turning left hand wheel, right hand rotation (5) working head handle, has been ground to both sides of the diamond polished lip and all that available. To stop grinding, you must no longer feed wheel, the drill ground to be removed when no spark drill.



(1) Front Angle 80 ° ~ 180 ° Grinding

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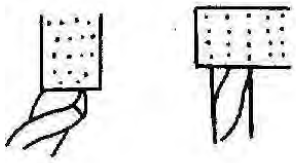

(a) By the arrows in the slider on the scale required in the angle, and then tighten (12) handles. Pulled the latch position behind the locking screws, remember locking.
(b) A grinding unit mounted on the inside of the cam on the 4th, the upper fixed block (2) on the green slot.
(c) After setting the required bevel adjustment (1) handle rake angle 0 ° ~ 80 ° can be adjusted after the oblique angle is larger, thinner blade. The higher the hardness of the material to be cut, then the posterior oblique angle should be smaller; lower the hardness of the material to be cut, then the posterior oblique angle should be larger.
(d) If a straight shank drill bit, then caught in six claw clip directly to the head; such as slope handle, is mounted on the right sleeve of Mohs, and then to six claw tip drill chuck clamping, which can center of the drill grinding more solid and more accurate.
(e) Using a drill center setting gauge (11), the diamond cutting edge lightly touch the lip (11) at the center of the step gauge and length of the drill chuck projecting approximately smaller than the drill diameter 2MM. Drill stretched longer, the latter angle smaller; outstretched shorter, the latter angle gets.
(f) The drill bit tip angle. rake set up, drill length extending six jaw chuck and drill lip height fixed Well, then the fixed block (2) board from six jaw chuck green tank, rotation (5) handle, working head that is swinging around. rotary and forth movement three movements.
(g) Operations before and right hand wheel, the wheel near the drill bit, and then start switch, rotary grinding wheel that is fast,

Turn left front wheel pedestal hand wheel, right hand rotation (5) working hand, has been ground to both sides of the entire drill lip Polishing can be. To stop grinding, you must no longer feed wheel, the drill ground to no sparks when desirable The next bit.

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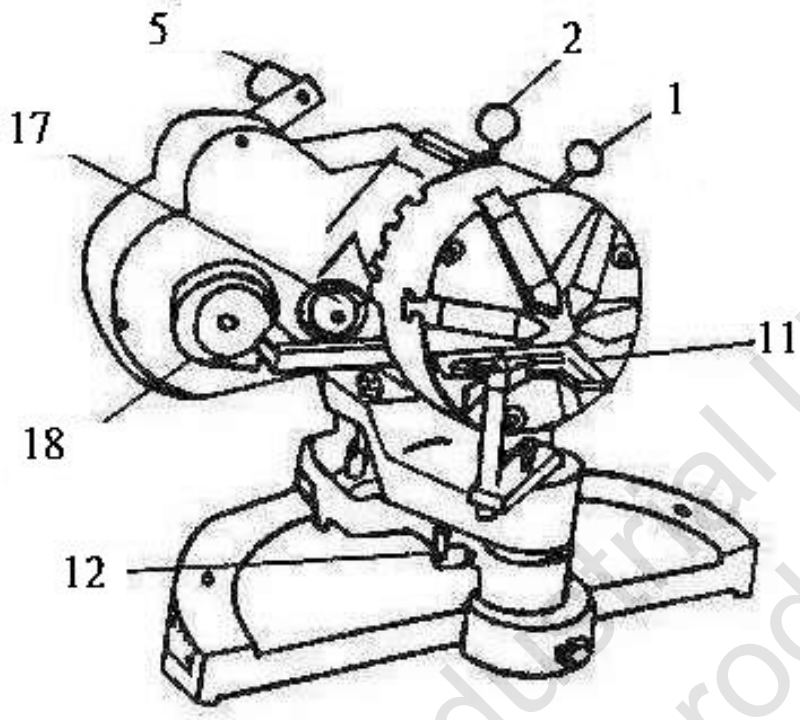

(2) Front Angle 40 ° ~ 80 ° Grinding

Drill front wheel angle in the side as shown:

(a) To 6 grinding unit mounted on the inside of the cam.

(b) The release handle swing arm regulating pin placed in the seat position adjustment.

(c) Determine the set position on the right side of the chuck on the ruler.

(d) To (12) fixed to the handle screw loosen host header, and go all the required half angle, then (12) fixed to Hand screw the host header locked.

(e) If the angle and the end angle is not required at the same time, the bit is set in the normal operation of the blade tip angle grinding until

The same position with the required date, when the angle obtained when the drill along the (11) side of the scale away and then continue grinding.

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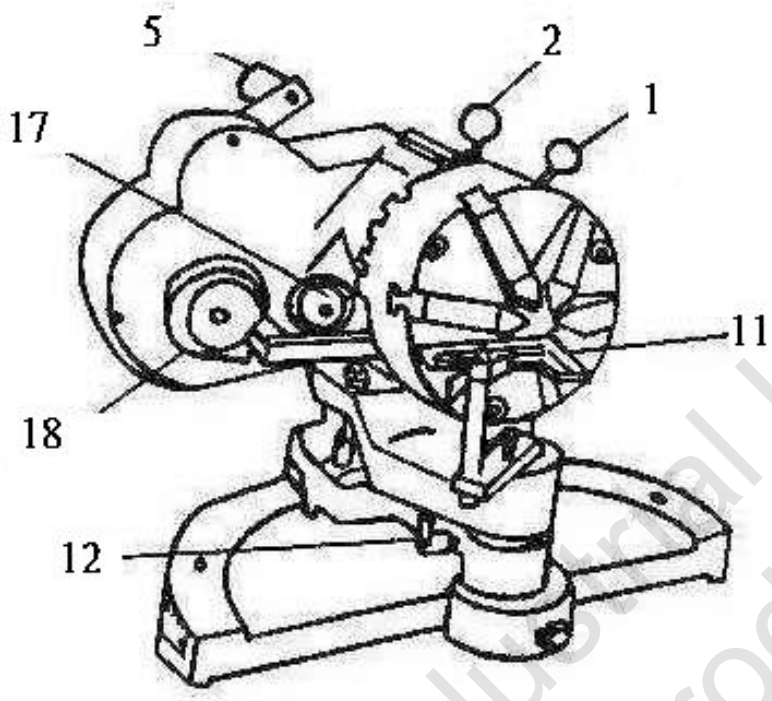
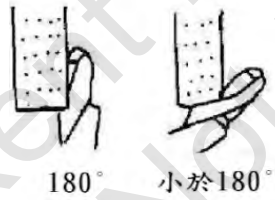


(3) Class drill grinding

Working head from side to side, just before and after exercise.



(a) Loaded on the 6th cam inside the grinding pedestal.

(b) Relaxation (12) fixed to the handle screw, adjust the angle by moving the handle to the desired position.

(c) Check whether the bolt in position, that pin is inserted in the working head of the pin hole, so that clip

Head does not produce rocking action, only a fixed rotation.

(d) Less than 180 ° drill hierarchy, then fixed the same way as normal abrasive grinding will be (12) to tighten the screws.

(e) First class drill cutting edge aligned (11) Regulation of the ladder at the drill center, aligning manner and grinding the same way as ordinary drill.

(f) After a good bit fixed, at the wheel turn the handle to move the ladder drill, rotary drill bit that is done and moves back and forth on both sides to remove the drill after drill grinding lip.

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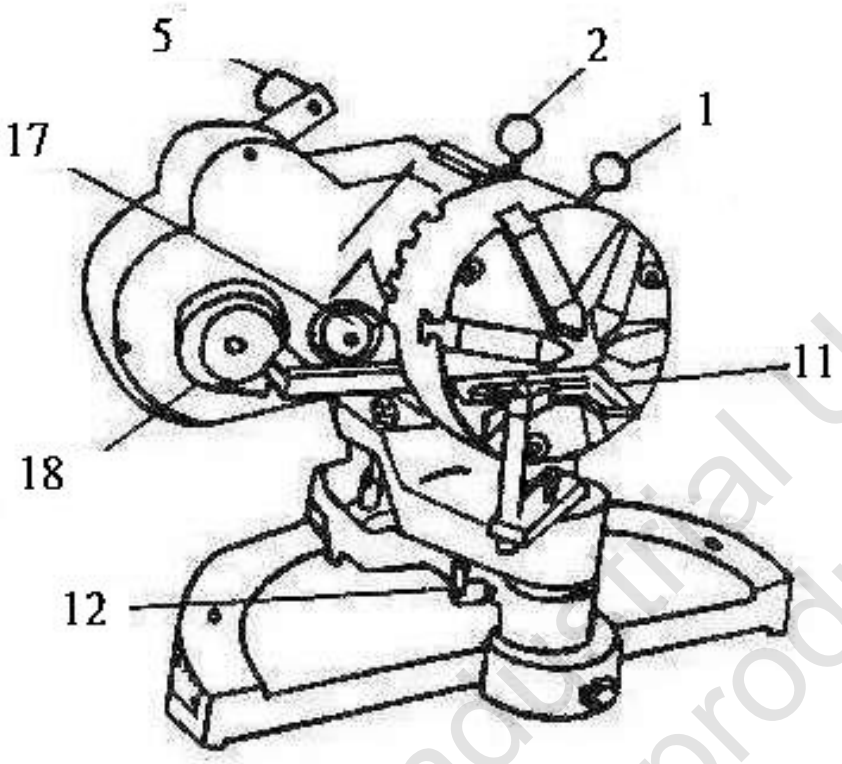


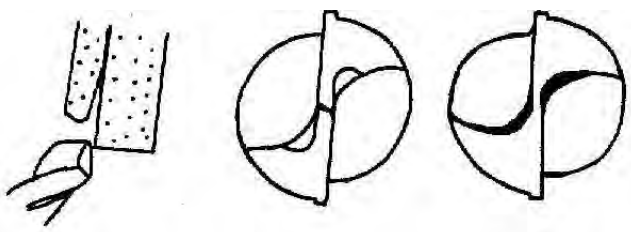
(4) Center thinning

Drill grinding is complete, do not remove, you can move forward and thinning action:

(a) To (2) Chuck fixed block placed in the six-claw chuck groove (1 to 12) of any one trench, the trench is marked with LH drill grinding L switch.

(b) A wheel fell indicators ruler about 25mm place. Before and after using the left and right wheels, deep dish wheel to move the drill bit at the belly. Well, when the left position adjustment, followed by the use of front and rear wheel infeed depth determined after a good, then remember that scored above the handwheel.

(c) When the first plane After grinding, left and right wheels (infeed) does not move, the use of front and rear hand wheel (vertical) to wheel back, chuck rotates 180 ° for edge-to-digital (eg: two pairs of 8 or 1 pair 7), re-do the plunging, and the same as the first side.



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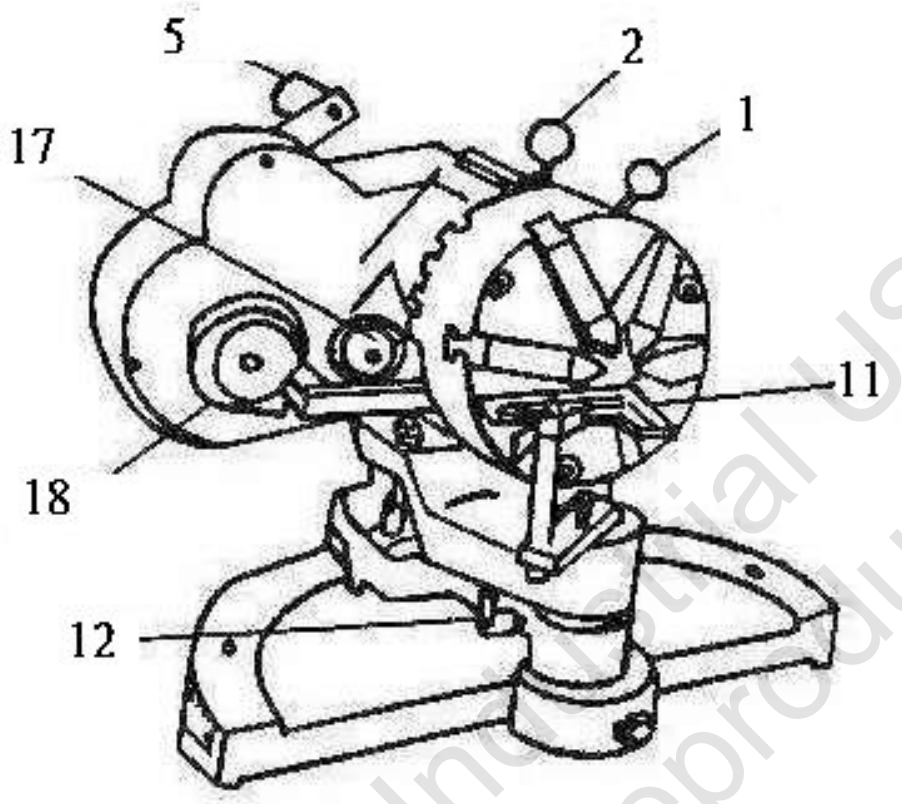
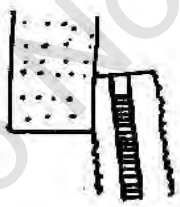


(5) 4 Flute Taps

Chuck only rotary and forth movement, no rocking movement.



(a) A cam mounted on the 8th seat inside the grinding, the use of wheel side grinding.
(b) Checking whether to loosen locking screw, bolt is placed in position.
(c) Moving the carriage to the desired angle, then (12) fixed to the handle screws.
(d) The chuck (2) fixed to the block is placed in the green channel.
(e) The screw attack trimming encounter (11) at the center of the ladder rules and methods and general drill set the same, but the extended length limit.
(f) After the bevel size is determined by (1) is determined after the bevel adjustment lever.
(g) Turn left and right wheels and rotary (5) working head can handle grinding.

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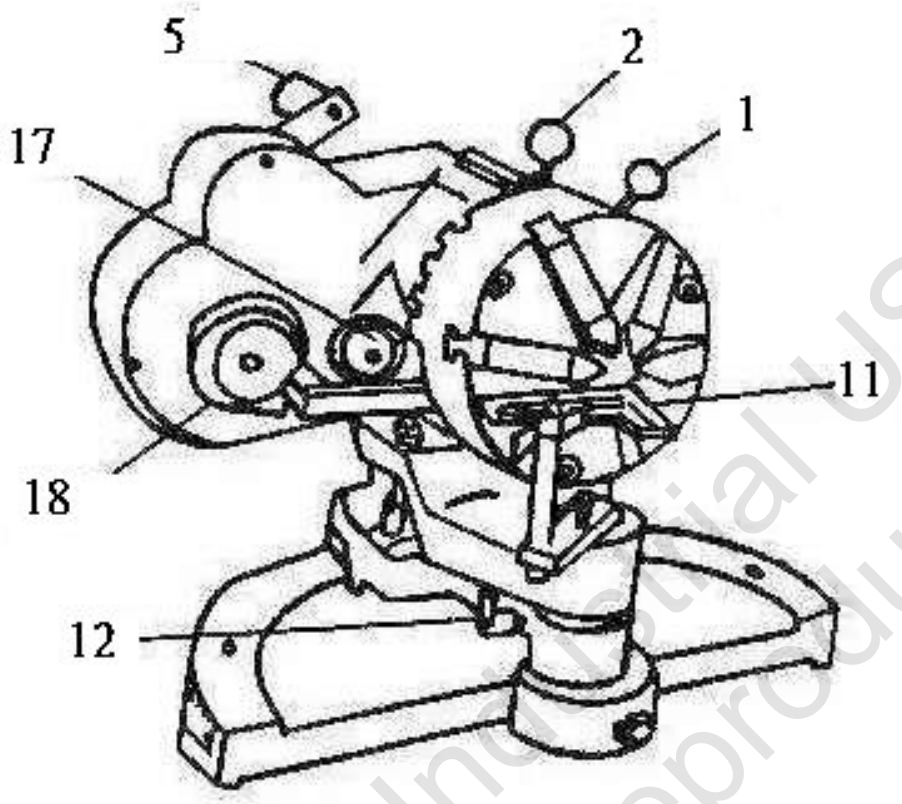

(6) 3 blade screw attack
Chuck only rotary and forth movement, no rocking movement.

(a) Loaded on the 9th cam grinding seat on the outside, using the grinding wheel side.
(b) Checking whether the relaxation locking screw, bolt is placed in position.
(c) Moving the carriage to the desired angle, then (12) fixed to the handle screws.
(d) The chuck (2) is fixed on the block is placed in the green channel (12 ~ House No.1).
(e) The screw attack trimming, aligning chuck groove marks at the green, because it is a single-edged knife, so I do not Jiong drill bit set (drill Flutes as a double-edged).
(f) After the bevel size is determined by (1) is determined after the bevel adjustment lever.
(g) Turn left and right wheels and rotary (5) working head can handle grinding.

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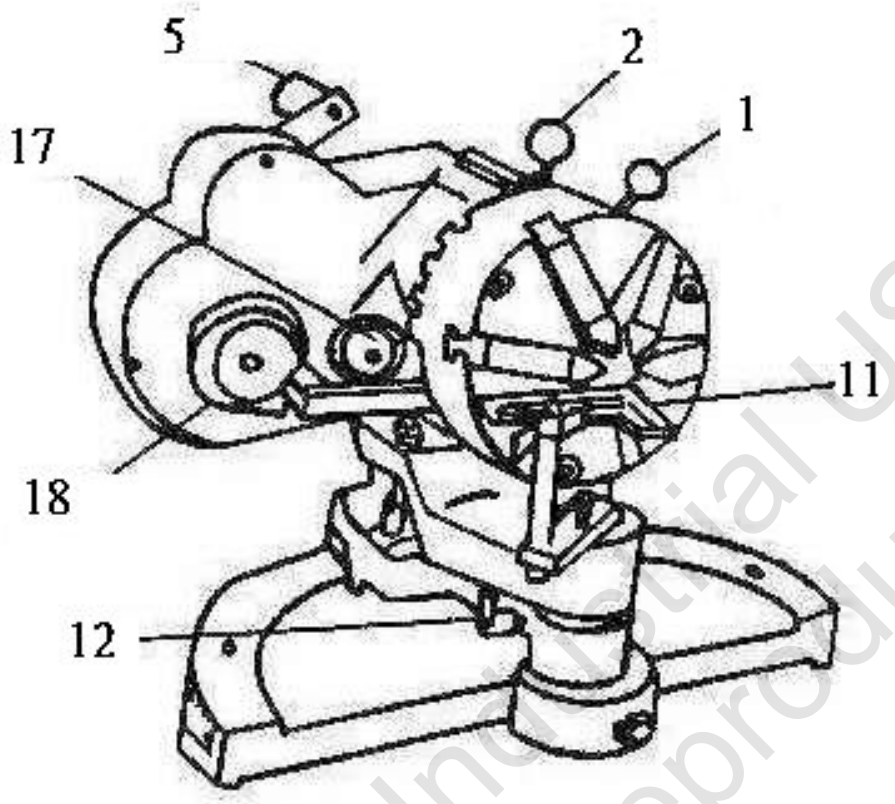

(7) Chamfering cutter

(a) No. A2 cam mounted on the outside of the grinding pedestal, the use of grinding wheel can be front or side.
(b) Checking whether the relaxation locking screw, bolt is placed in position.
(c) Moving the carriage to the desired angle, then (12) fixed to the handle screws.
(d) The chuck (2) fixed to the block is placed in the green channel.
(e) The chamfer knife cutting, aligning chuck groove marks at the green, because it is a single-edged knife, so different drill bit set (drill Flutes as a double-edged).
(f) After the bevel size is determined by (1) is determined after the bevel adjustment lever.
(g) Turn left and right wheels and rotary (5) working head can handle grinding.

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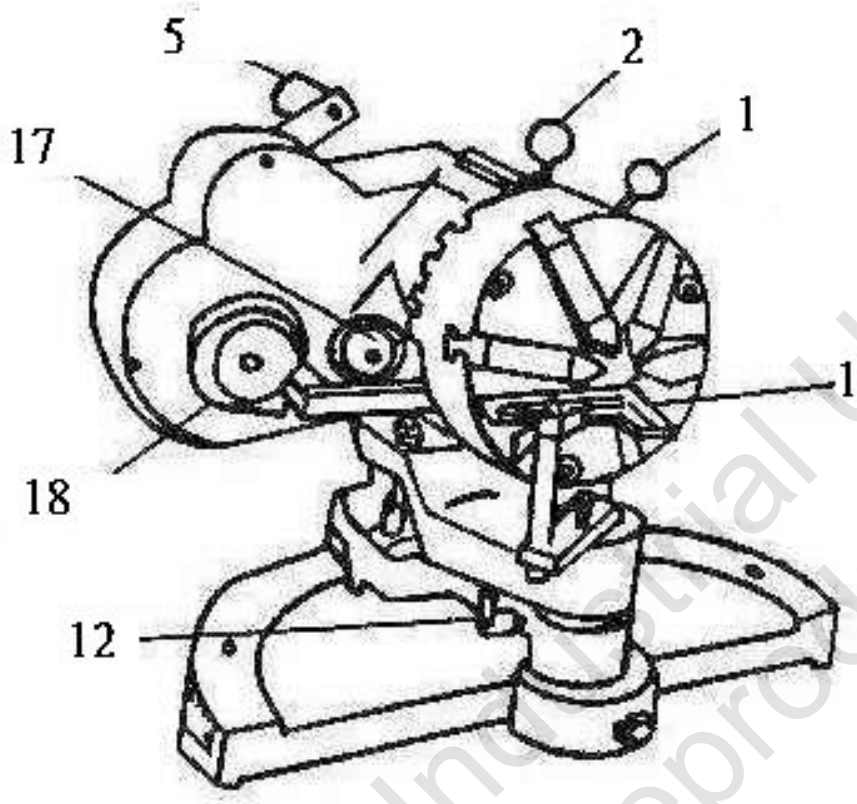

(8) center split (chop Ministry angle grinding)

Center split in two parts operation, we recommend that all drills, first set up in accordance with tradition, then the center of Split.

(a) in accordance with the traditional way of grinding center, but keep the clearance angle at 9 °. Cut angle section 90 ° ~ 100 °, between the center point in the 130 ° ~ 140 °.

(b) to 6 "diameter center partition representative of the general grinding wheel grinding. (fine grinding wheel to be used, but the wheel angle must be 90 °).

(c) moving the polishing head to 60 ° vertical ladder. Will be adjusted to increase the pin to position the rotation movement.

(d) grinding the working head to the side at a 20 ° angle, which is to move the center of the scale at the left 150 °, which angle can be set to a V-shape, and according to the changes required.

(e) to (2) Chuck Green set bolt placed among relying seam 1 and 12. The drill bit into the chuck, rotary drill lip to set the blade, and set the number to 44, turn the clamps and take the blade.

(f) Open the chuck, the index to the red seam and then relying on the chuck bolt.

(g) both left and right and front and rear feed, the grinding wheel moves RH edge angle corner cut portion. Carefully feed to the left until the big wheel edge just right across the like. Until then previously backward knife cut corners rubbed off about half of the department so far.

(h) set about infeed axis to the "0" and take grinding wheel clamp placed on red relying seam split across and around the infeed axis until the infeed axis to "0"

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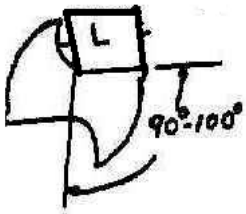
so far.

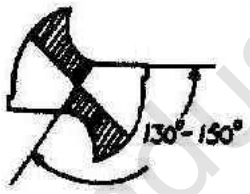
(i) for the front left and right feed and feed are required to complete the center segmentation using indexing plate, unless a small quiet spot in the center, otherwise all angles cut portion must be removed.

(j) around the feed axis is set to "0" and remove the wheel, do not touch (9) into the left hand wheel.

(k) Loosen the chuck, release drills, so feed through until the "0", the second side of the cut portion can be split grinding Well, be careful not to move around or left and right wheels.

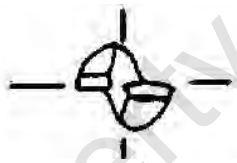
Sustainable need to split the center wheel dressing up.





(9) 180 ° drill bit and the end of the grinding mill

(2.3.4.6.12 of the sheet-shaped end mill) (remove the drill bit can be freely rotated cam)



(a) Check to make sure the screws loosen the handle, and the adjustment pin in position.

(b) Relaxing the host header, and to align the front angle of 180 ° of the position of the latches engage the pin holes at the position On.

(c) The adjustment bolt (2) engages in the nip gap (1) inside.

(d) Until it clenched claw clasp tied endpoint Therefore, the blade should be ground in a horizontal line (Figure).

(e) The grinding wheel head to lift the ruler lowest position.

(f) When grinding, the use of front and rear wheel and right-hand man, so that the endpoints of the blade inside the wheel, and the transverse feed, so the second facet finish grinding (when grinding other facets, will not touch the front hand wheel).

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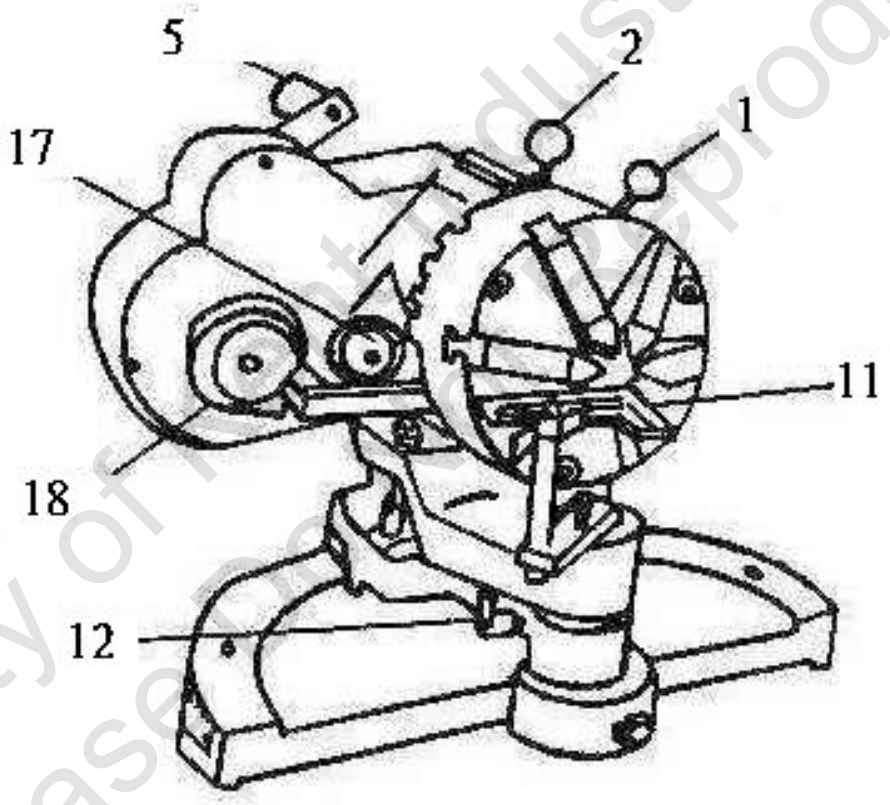
(g) Pick up (2) adjusting bolt, replace the other blade surface, chuck rotate 180 °, the adjustment bolt (2) to rely on seam (7) within Engagement.

For example:
2 end mill: Use rely seam 1.7.
3 end mill: Using relying seam 1.5.9
4 end mill: Using relying seam 1.4.7.10
6 end mill: Using relying seam 1.3.5.7.9

(h) After completion of the second facet, will adjust the bolt in relying seam (1) to re-engage inside, move up to the vertical standard grinding head

Ruler, both left and right and front and rear feed this second edge, a third edge ..... and so on, will and so on.



(10) drill grinding Conditions

4.8 mm drill bit diameter less suitable M80 wheel. If successive grinding small drill bit, you must use fine grinding wheel.

Clearance angle adjustment in three ways:

(a) extend the drill chuck longer, the latter angle smaller; Conversely, the shorter the drill bit stretched, then rake gets.

(b) drill lip ratio (11) center gauge height is low, the latter angle greater; drill lip ratio (11) center gauge height is high, then the smaller rake angle, as shown.

(c) Adjustment (1) after adjustment lever angle setting gauge, 0 ° ~ 18 ° can easily

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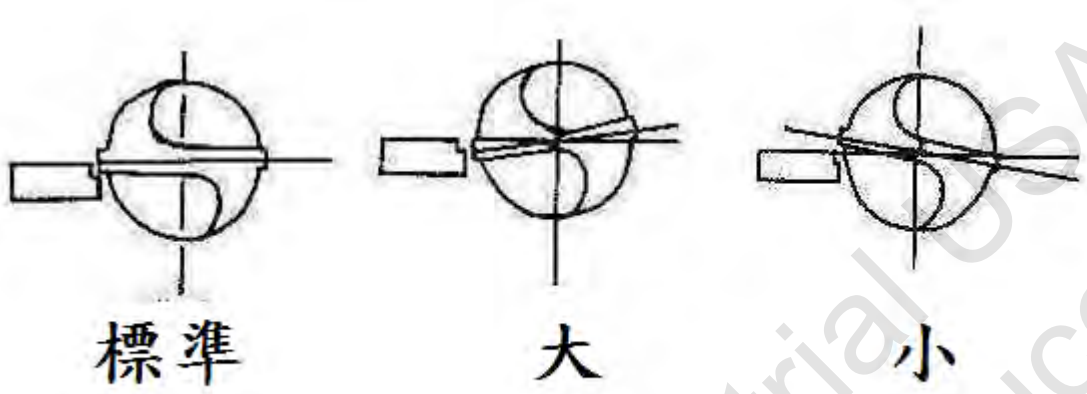
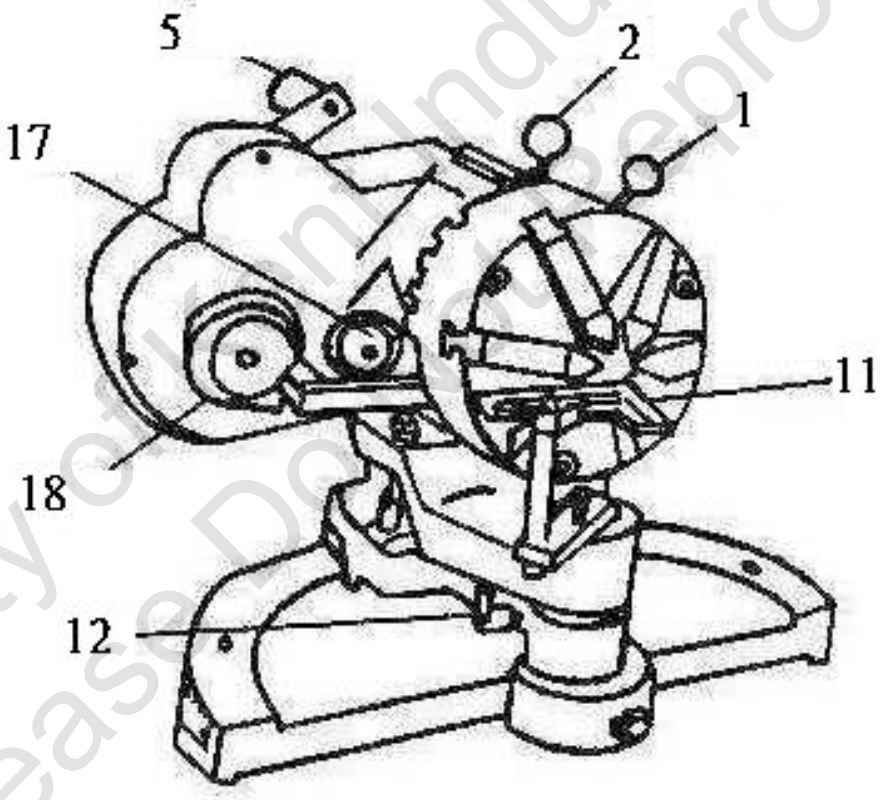
adjust the angle is larger, the larger the rake angle.





(11) Dresser

(1) plane Dresser

(a) placing the drill and the wheel at approximately right angles.

(b) The Diamond Dresser caught in the chuck locking.

(c) Using (8) before and after the hand wheel to move the diamond Diamond Dresser place, then use the left and right wheel left or right direction.

(2) side trim (right angle)

The Diamond Dresser caught in the chuck, make use of the working head bolt

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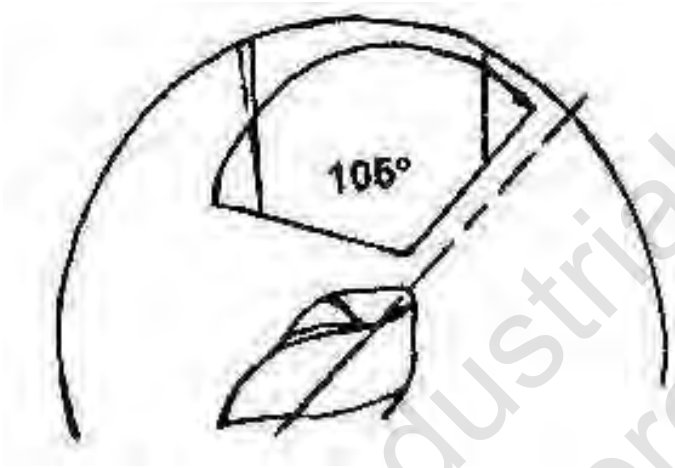
fixed at 180 ° place before and after the hand wheel to make use of the plunging can.

(3) the angle trim (diamond blade thinning of the dressing wheel)

Center thinning with wheel dressing method and angle trim France the same, but the angle wheel side must drill into parallel, while the total wheel angle will be for 105 °, and the front wheel must have a little arc, as shown.



(12) Guidebooks

(a) wheel dressing, you must use paper or other cover will chuck wrap, then reveal only repair diamond knife, so to avoid wheel miscellaneous debris into the folder within the gap.

(b) drill chuck grip, you can not be too hard, as long as you can gently tighten.

(c) spindle bore must always remain bright, otherwise it will rust.

(d) there are two injection hole at skateboarding, you must refuel once a week, any brand of lubricants can be. Machine if the continuous daily use, is about 2 to 3 months time the dust cover must be opened skateboard, check inside is kept clean.

(e) There are two ball head base supports, ball point must always be kept in the sliding lubrication.

(f) the cam surface must be kept clean and lubricate.

(g) use of cooling fluid, must be green polishing liquid, high viscosity can not be used for cutting fluid.

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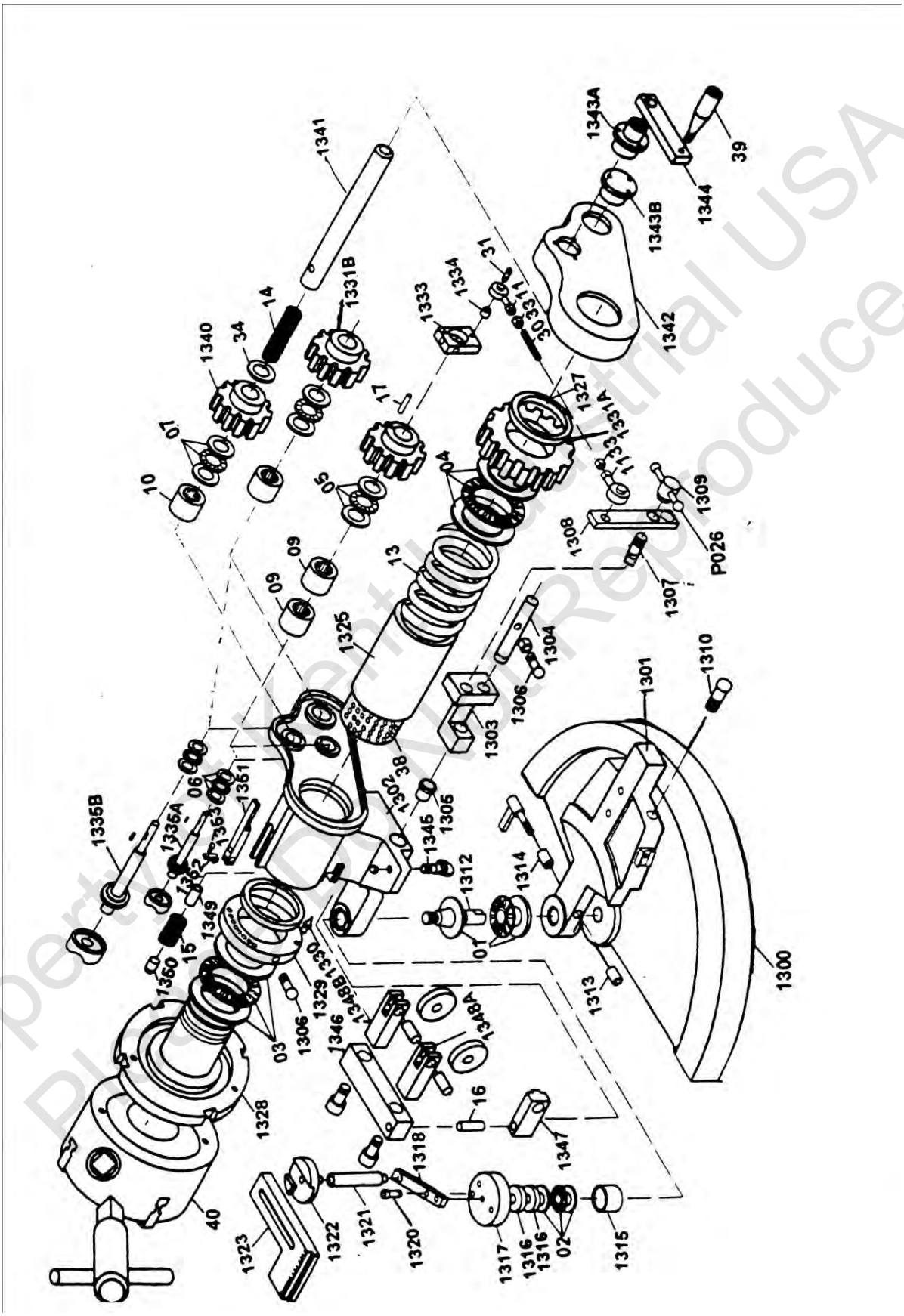
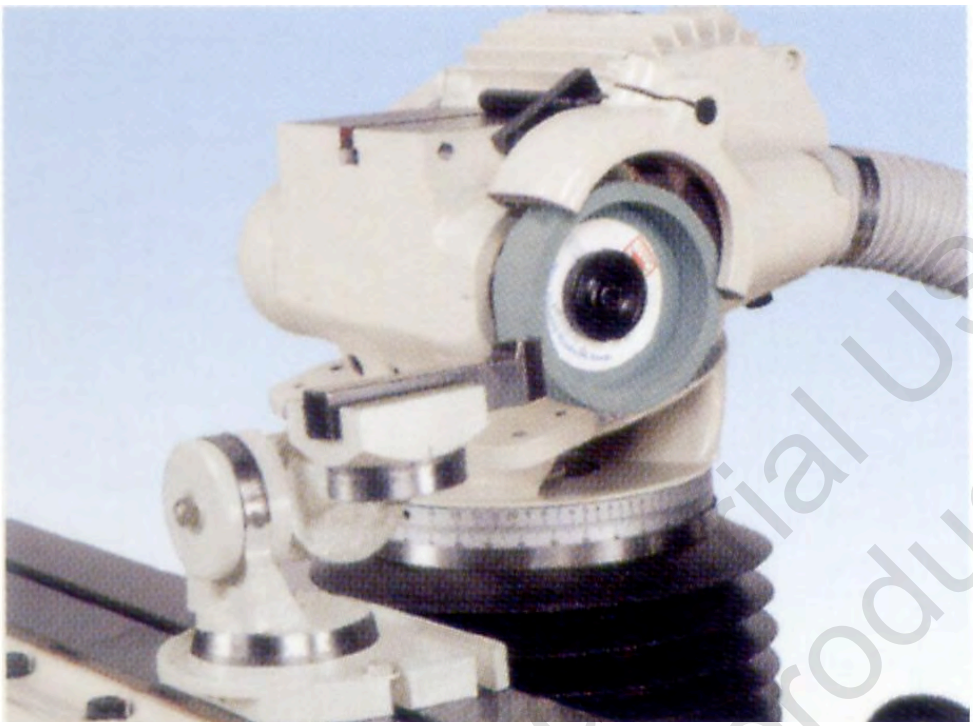
2. parts exploded diagram

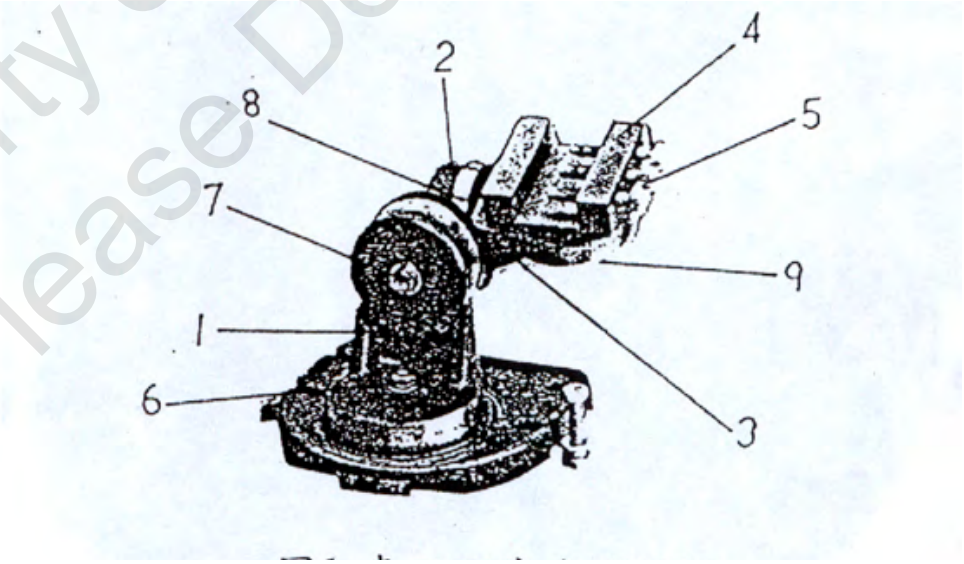


8.11 Turning and Planning Grinding Device



1. Introduction
This device can be easily fixed on the table, lightweight sliding angle easy to adjust, can be used for turning, planing angle of inclination of the escape grinding.

(a) Functional: Specifications Blade Grinding
(b) grinding range: high speed steel blade, tungsten steel blades are turning
(c) with accessories: AW101, AW102 diamond grinding wheel, AW15 cup grinding wheel
(d) the major part of the name:



1	Swivel base	6	Swivel base lock nut

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2	Universal rotating seat	7	Vientiane nut rotating seat
3	Swivel seats with fixed blade slot	8	Swivel seats with fixed blade slot nut
4	Fixed blade slot	9	Fixed blade slot nut
5	Blade clamping screw		

2.Method of operation

(1) Grinding Procedure

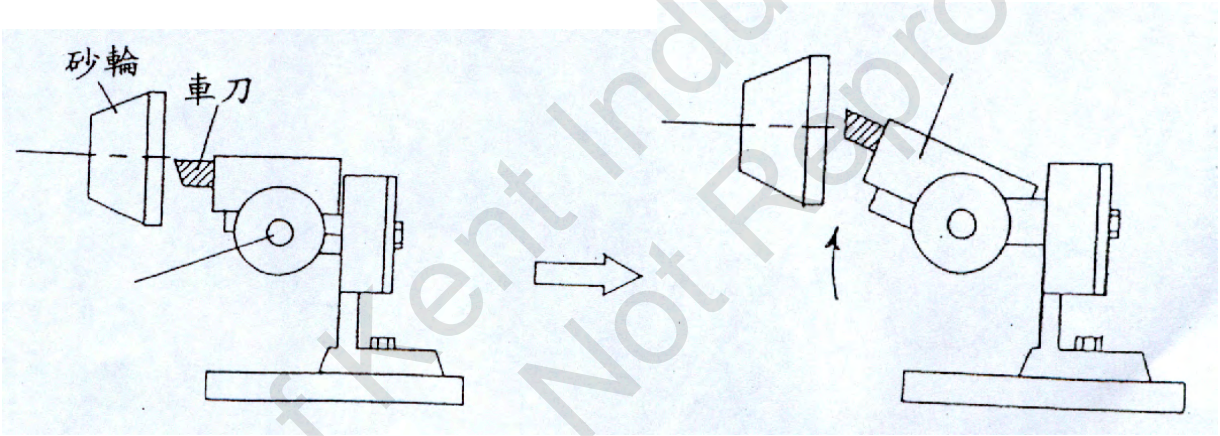
(a) by turning the material selection of different cup wheel.

(b) a table C2LH grinding unit locked in the center.

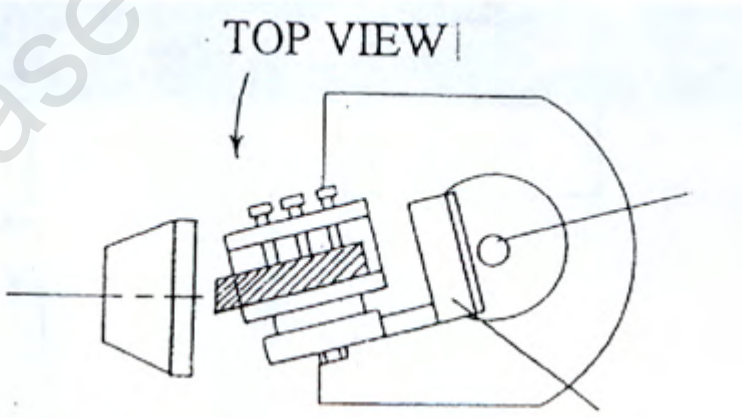
(c) will be installed in a fixed groove turning and turning the clamping screws.

(d) adjusting wheel height, and turning around the center of the wheel alignment.

(e) loosen lock nut A, adjust the brake fixed spin rotation slot Block B, before the brake clearance angle parallel with the wheel, as shown.



(f) Loosen lock nut A, adjust the swivel base seat B, fled before the brake clearance angle parallel with the wheel, as shown.



(g) start grinding wheel, grinding wheel slightly in contact with the brake, turn the hand wheel to move around the table start polishing.

(2) Side clearance angle of the grinding

(a) grinding the side clearance angle, the need to remove the grinding wheel

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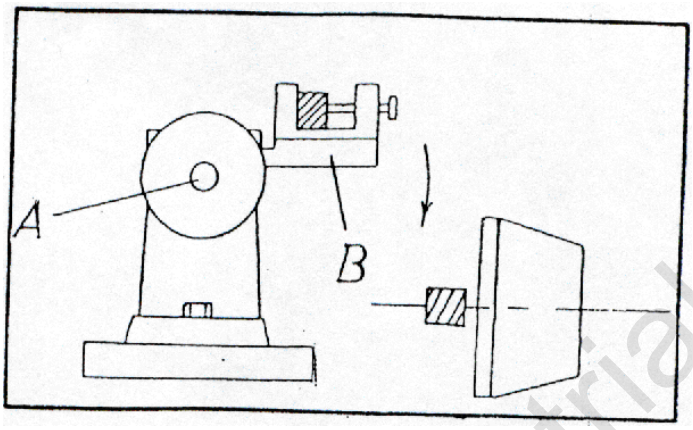
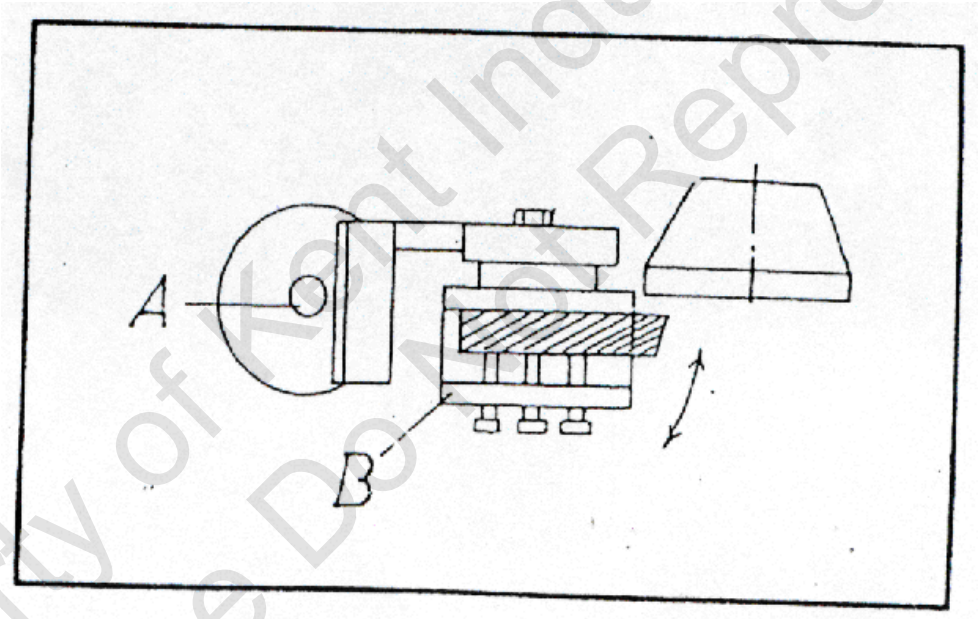
guard seat to the left.

(b) loosen the locking nut A, and B vertically adjusted so that the side of the brake and wheel clearance angle parallel to the surface, as shown.



(c) Loosen lock nut A, the B so adjusted so that the side of the escape brake clearance angle and the wheel parallel to the surface, as shown.



(d) starter wheel (reversed) to move around the left and right wheel polishing.

(e) grinding angle adjustment according to the grinding or firmware according to the hardness of the workpiece material to adjust its angle from the size of the gap.

3. Appendix (tool presentation)

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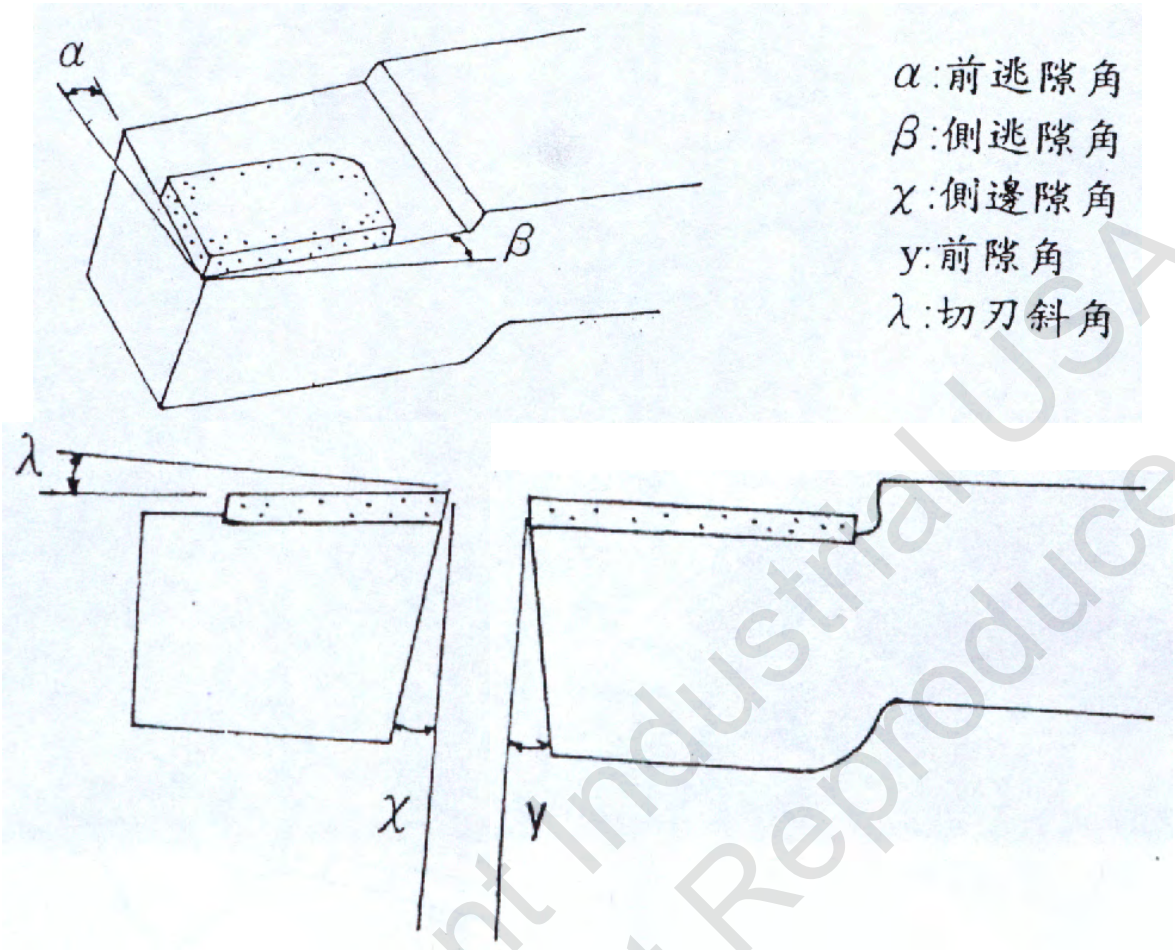

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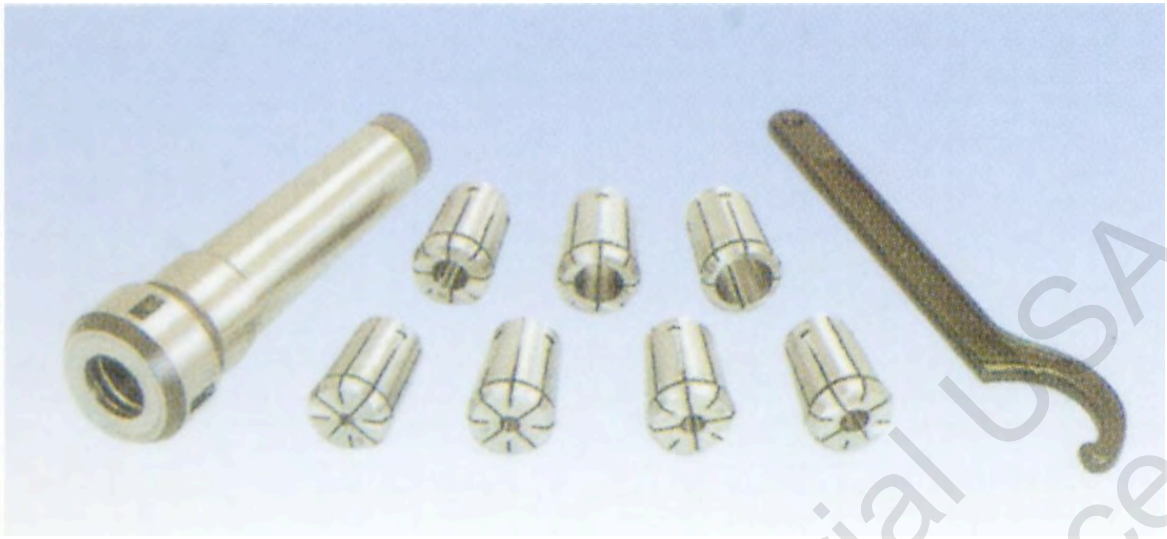
8.12 Tension Bush Chuck



1. Introduction

This chuck mounted directly on the work of the first tapered bore ASA NO.50 for a variety of grinding mill is a non-Form an integral unit. (Hostage range: Ø6 ~ Ø25)

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8.13 Water Cooling Device and Water Tray Device

1. Introduction

This device is also called "cooling unit" for the cylinder bore, plane grinding and various props, when cooling is required to use.

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8.14 Dust Collecting Attachment

1 Introduction

This device is a powerful cleaning device, wear debris can be gathered in order to waive the operation of the machine by the health hazards, and to keep the surroundings clean and tidy work environment. (Motor power 0.4kw)

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11. Coolant System

11.1 Dust Collect System

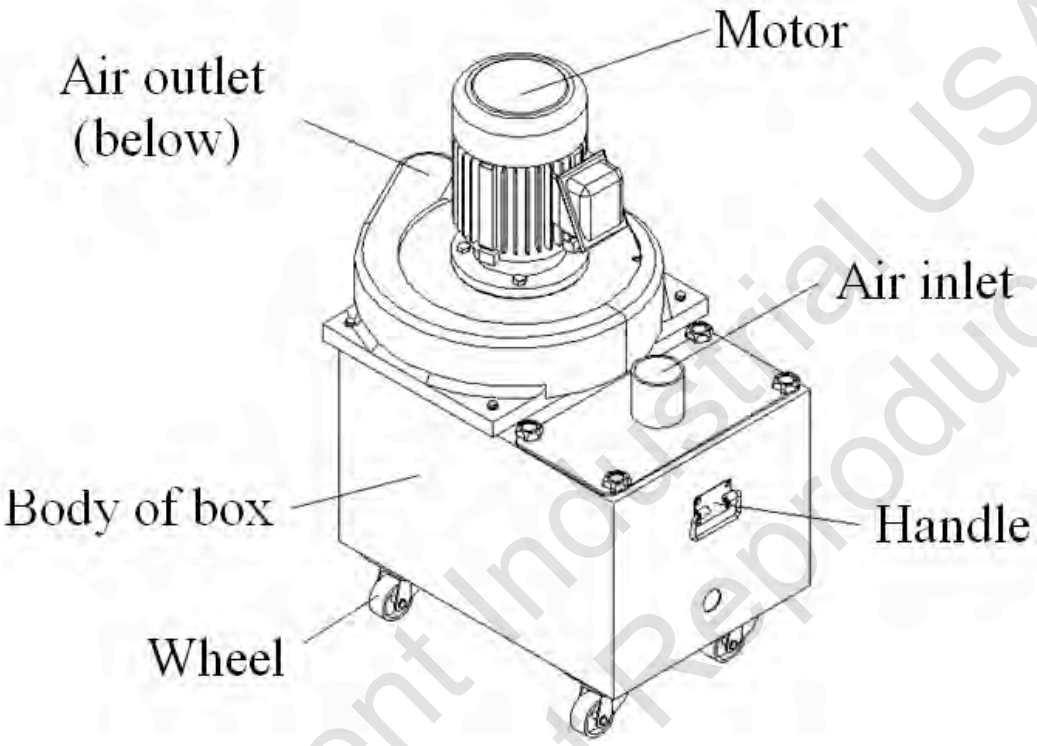

Fig 11.1 Part list of dust collect system

11.1.1 System of Configuration

Put vacuum cover at the left side of wheel head and connected with the hose and placed the machine cannot interfere, like Fig 11.2. Another ways can also setting like with Fig 11.3.

Fig 11.2 vacuum cover layout

Fig 11.3 setting vacuum hose layout

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11.1.2 Electrical connection system

Confirm when the power vacuum recovery system of operating voltage and the socket are consistent or not. The voltage sticker was fixed at the vacuum's body, shown Fig 11.4. After that going to check the coolant system and the motor rotated direction is correct or not, as shown in Fig 11.5 and Fig11.6. In the Fig11.5, the white button is a vacuum system power on and the red button is a power off.

Fig11.4 vacuum device operating voltage and connected layout

Fig 11.5 the position of vacuum button

Fig 11.6 motor rotation layout

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11.1.3 Maintenance

To care and maintenance cleaning devices must be note the following matters:

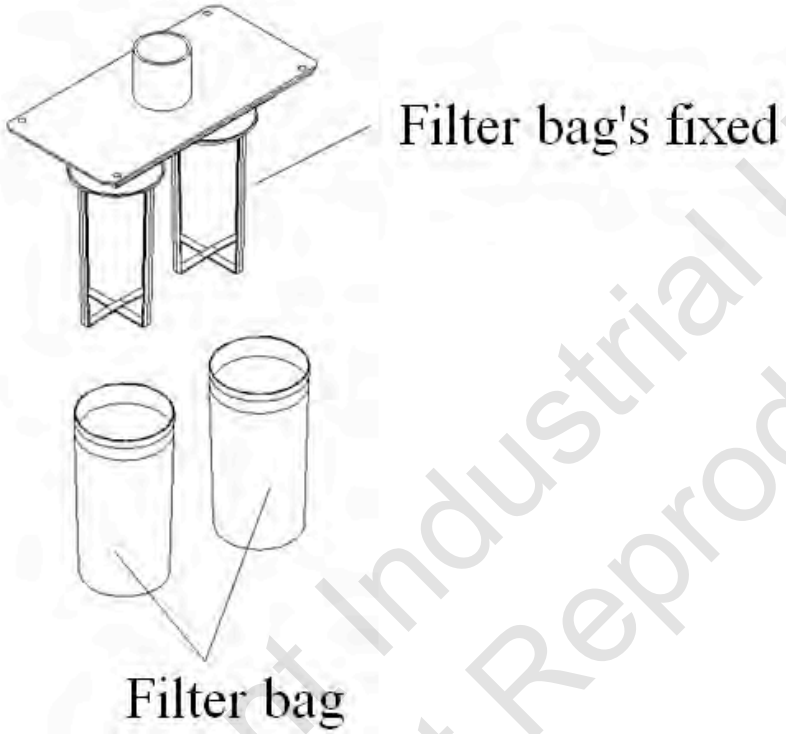

Fig 11.7 schematic diagram of the filter of vacuum recovery system

When vacuuming device starts the motor was vacuum the dust drawn into recycling bins and the excess air was discharged through into the filter bags. Its better and need to clean the filter bags when feels the vacuum of air was reduce. Show in Fig 11.7 can be loosen off the upper cover of four screws and clean the filter bags. You can also using the water to washed the mesh and using the fir guns to dry. Do not directly to give the sun exposure to dry.

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11.2 Wet grinding attachment

Fig 11.9 Wet grinding attachment

11.2.1 Attachment Configure

Please put the water tube on the top of grinding wheel head, and arrange the hose in the place won't be touched by the machine as shown in Fig 11.10, and the hose could be put at the right side as shown in Fig 11.11.

Fig 11.10 Water tube setting on the grinding wheel head

Fig 11.11 put the right side status

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If the grinding wheel head had attached the other optional attachment, you could also fix it next to the machine as shown in Fig 11.12.

Fig 11.12 The water tube setting on the left side of grinding wheel head

If the machine is not equipped with water proof plate, the user could connect the recycle pipe from the saddle water exclude hole to wet grinding tank hole, as shown in Fig 11.13. And if the machine equipped with water proof plate, the user could connect the recycle pipe from the plate water exclude hole to wet grinding tank hole as shown in Fig11.14.

Fig 11.13 connect the pipe to saddle

Fig 11.14 connect the pipe to water proof plate

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11.2.2 Power connection

Before connect the wet grinding attachment, please confirm the power source is coordinate. The power is noted on the tank, as shown in Fig 11.15.

Fig 11.15 power connected and Power source sign

After confirm the power source, press the white button shown in Fig 11.16 to turn on the wet grinding attachment, and the red button is to stop. Observe the motor center spinning direction is the same as the red arrow direction, if not, it's may be the power wire connection is wrong.

Fig 11.16 Wet grinding attachment buttons

Fig 11.17 motor spinning direction

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11.2.3 Maintenance

Please make sure the liquid level in all 3 tanks is higher than the oil exclude hole, so the wet grinding attachment could function well. Also clean the dust in the tank and check the level height every week.

Fig11.18 Inside the wet grinding attachment tank

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12. Appendix

12.1 PLC Hydraulic System Description

12.1.1 Operating Instructions

Turn on the power and click the top of the left side panel of HMI boot. After that , turn on the two emergency button which are the right and left side of the machine. Then , can start by using with HMI screen .

12.1.2 HMI Operating

In HMI screen have five mode of display button as shown in fig.12.1. Processing parameter setting button, Auto mode button, Manual mode button Home search button and change language button are divided。

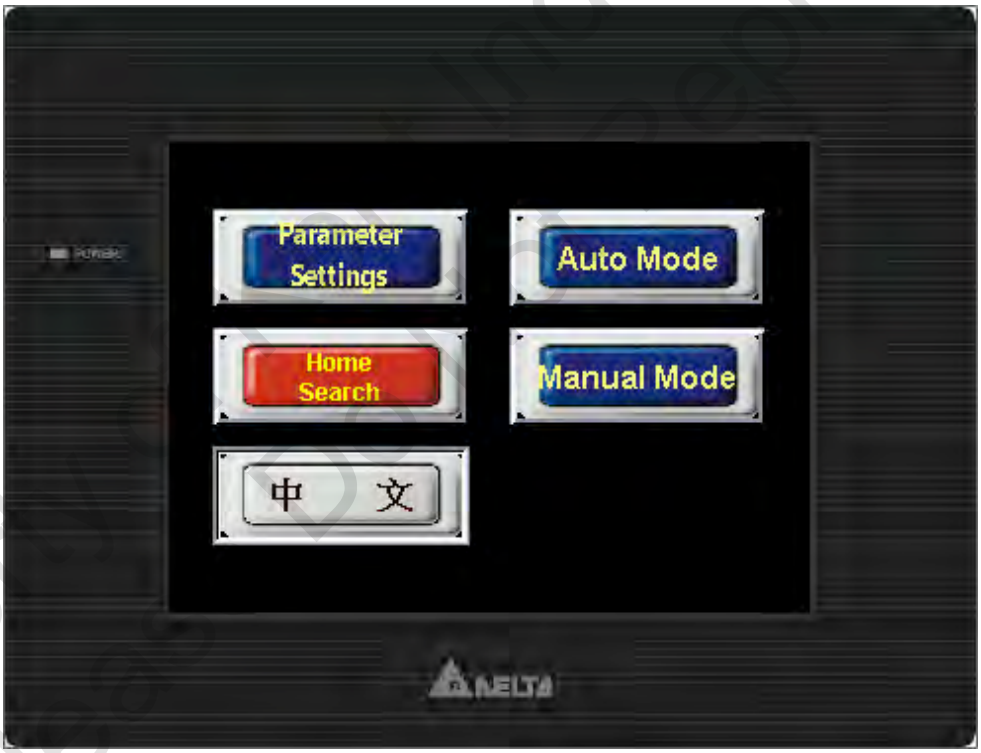

Fig 12.1 HMI main screen

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I. Grinding of parameter setting page

Click the Parameter Setting button , the password detail will appear and as show in fig12.2. After complete the password and press enter then setting parameter page 1 will appear, shown in fig.12.3.

Fig 12.2password parameter window

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Fig 12.3 setting parameter page1

 data save  data read

 number of data can setting 0~49 and almost 50 data.

 give the file name can use English title or count.

 can setting 0~999 times

 setting delay timing 0~60 sec

 working point setting from 20 mm ~ -200 mm

 setting single feed grinding -500µm ~ 500µm

 setting grinding feed time 1~99 unit

 setting grinding feed speed 0.1 ~ 6.0 m

 setting retract point from20 mm ~ -200 mm

 Jog mode can shown in fig12.4.

 click next button , was going to setting parameter page2, shown fig12.5.

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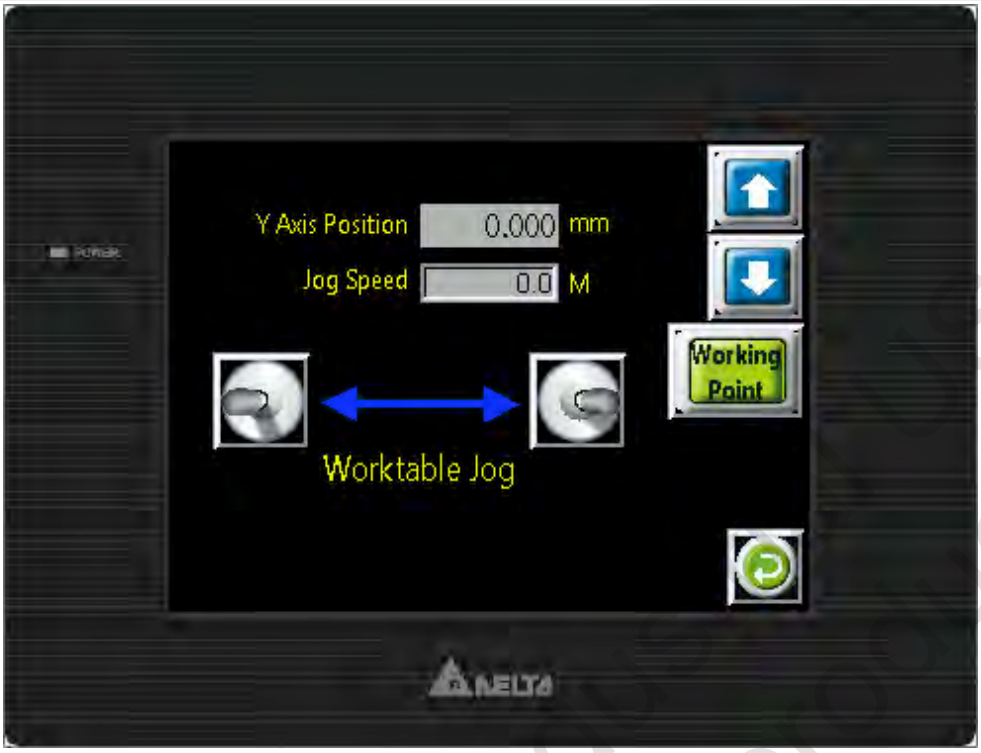

Fig 12.4 Jog Mode page

Y-axis Jog mode

set starting and working point

return setting parameter page1

show Y-axis position, units is mm.

setting and adjustment of jog speed, units is m.

worktable moving left or right with jog.

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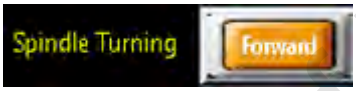
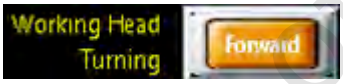
Fig 12.5 Setting parameter page 2

 **can choose two ways of grinding mode, unilateral or bilateral.**

 **worktable move from left or right side grinding.**

 **spindle turn clockwise or counter clockwise**

 **working head turn clockwise or counter clockwise**

 **return setting parameter page1**

 **return HMI main screen**

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II. Auto mode setting page

Fig 12.6 auto mode setting parameter page1

Fig 12.7 enter code to read the file page

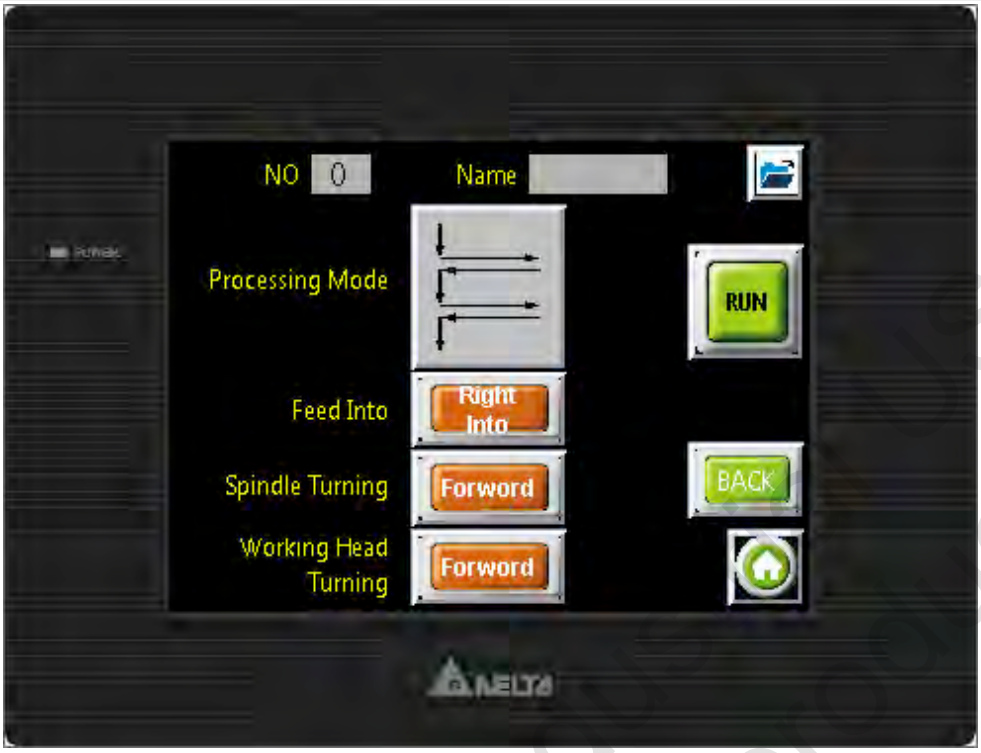

Fig 12.8 auto mode setting parameter page2

program was run with auto

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III. Manual mode setting page

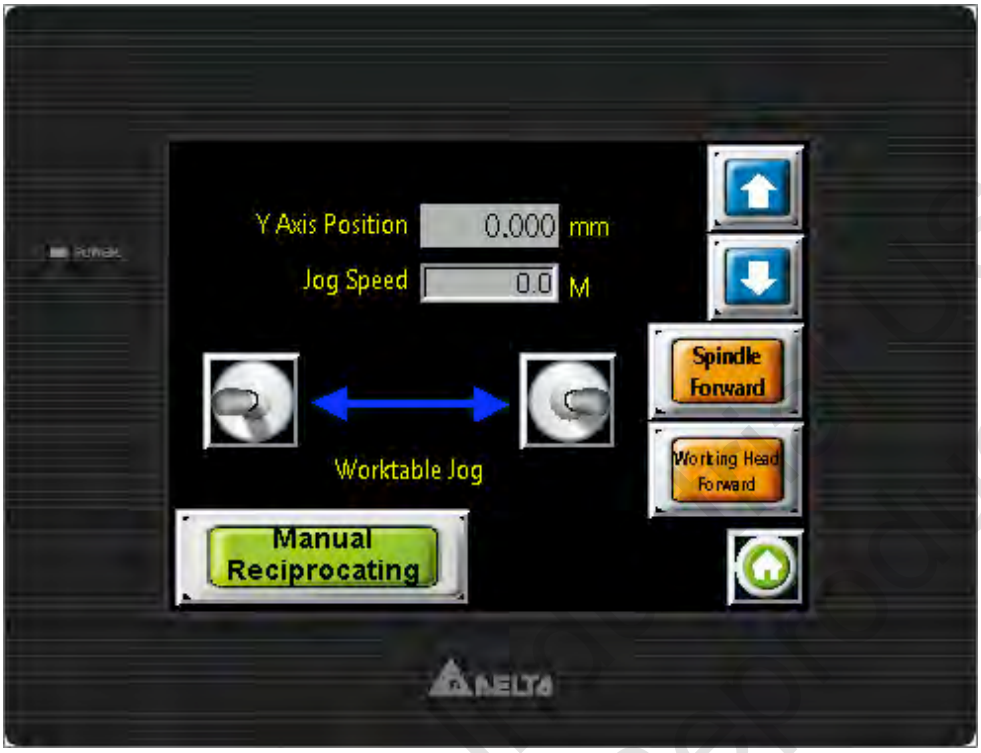

Fig 12.9 manual mode setting parameter page

spindle turn clock wise or counter clock wise

working head turn clock wise or counter clock wise

change worktable move manual or auto button

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IV. Machine go home or Ref point

Fig 12.10 the screen of after Ref point(Chinese page)

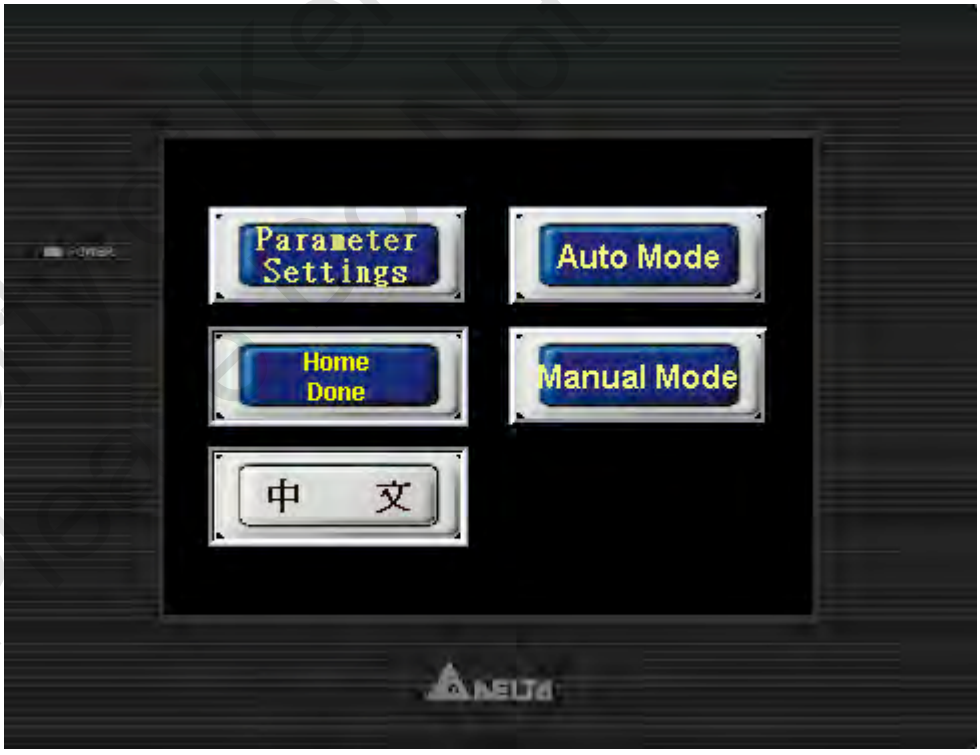

Fig 12.11 the screen of after Ref point(English page)