



## **PREFACE**

This machine have been manufactured with a view to obtain the highest degree of working accuracy and it has been thoroughly tested for the performance to confirm IS 1878 (Part 1) – 1971.

This accuracy of the machine can be achieved and maintained only if the instructions contained in this manual are strictly followed. The users of the machine are therefore, requested to get themselves acquainted with contents of the manual, before installation, operation and maintenance of the machine. It is suggested that a copy of this manual be made available to the operation and maintenance staff on the shop floor, who will be directly handling this machine.

As the machine and accessories are constantly being improved this manual may differ in detail with the machine supplied.

At the time of ordering the spares, please mention the component number as indicated in this manual and serial number of the machine which is stamped on right hand corner of the lathe machine bed.

**Please read Instruction Manual before starting the machine.**

For easy reference and understanding, this manual is divided into following six different sections.

- Section 1 Introduction
- Section 2 Installation
- Section 3 Operation
- Section 4 Settings, Maintenance and Trouble Shootings
- Section 5 Assembly drawing and Spare-part list

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**SECTION-1****INTRODUCTION****1.1 Machine specification**

<b>DESCCRIPTIONS</b>	<b>SPECIFICATIONS</b>
Type of bed.	With out gap bed 2 V & 2 Flat
Length of bed.	1670 mm
Width of bed.	254 mm
Height of centre.	180 mm
Admit between centre	800 mm
Swing over bed.	335 mm
Swing over saddle.	230 mm
Swing over cross slide.	175 mm
No. of spindle speed.	8
Spindle speed range.	45 – 938 RPM
Taper in spindle sleeve	MT-4
Spindle hollow.	42 mm
Spindle nose detail.	A2 SIZE 4
No. of British threads.	36
Range of British threads.	4 to 60 TPI.
No. of Metric threads.	24
Range of Metric threads.	0.5 to 7.5 mm
No. of D.P. threads.	36
Range of D.P. threads.	8 To 120
No. of module threads.	16
Range of module threads.	0.25 to 3.75
No. of feeds.	36
Range of long. feeds	0.068 To 1.020 mm / rev.
Range of trans. feeds.	0.012 To 0.185 mm / rev.
Lead screw.	31.75 mm X 4 TPI
Tail stock quill dia.	Ø50.8 mm
Taper in tail stock quill.	MT – 4



<b>DESCCRIPTIONS</b>	<b>SPECIFICATIONS</b>
Cross slide travel.	200 mm
Compound slide travel.	140 mm
Tail stock sleeve travel.	130 mm
Tool shank size.	16 X 16 mm
Motor HP / KW.	2 / 1.5
Motor RPM.	1410
Net weight. (Approx.)	800 Kg.
Gross weight. (Approx.)	950 Kg.
Floor space occupied.	1700 X 940 mm



1.2 PACKING SLIP

Machine Model : 1050/	Machine specification : All gear lathe
Machine Sr. No. : E -	Date :

STANDARD ACCESSORIES			EXTRA ACCESSORIES		
1	Hardened guide ways	1No.	1	Face plate	No.
2	Center adopter	1No.	2	Steady rest	No.
3	Dead center MT-4	2No.	3	Follow rest	No.
4	Carrier plate	1No.	4	Coolant equipment with tank & fitting Make: Rajamane	No.
5	Instruction manual	1No.		H.P.:0.1, R.P.M.:2800,	
6	Norton gear box	1No.		Sr. No.:	
7	Change gear fitted with machine: 44-51-52-88-100T	5No.	5	3 jaw self centering chuck with flange Ø	No.
	Change gear packing with machine :- 62 T	1No.	6	4 jaw dog chuck with flange Ø	No.
8	Oil can	1No.	7	Extra chuck flange	No.
9	Screw driver	1No.	8	Taper turning attachment	No.
10	Allen keys: 3/32",5/32",1/8", 3/16",7/32", 8 mm	6No.	9	Machine lamp C.T.	No.
11	Fixed spanner: 18 x19 mm, 1/4" x5/16", 3/8" x 1/2"	3No.	10	Rear splash guard	No.
12	Long cross slide	1No.	11	Revolving center MT-4	No.
13	Electric motor: Make: H.P.: 2, RPM: 1410 Sr. No.:	1No.	12	Quick change tool post with 5 tool holders	No.
14	V-Belt No.: A -	2No.			
15	R / F switch	1No.			

Mode of packing: \_\_\_\_\_

Name & Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Checked By: \_\_\_\_\_

[NOTE: If any discrepancy is found with regard to the above accessories. It should be immediately notified to us along with machine Sr. No.]



### **1.3 List Of Accessories**

#### **1.3.1 Standard Accessories(to be supplied with machine)**

- Harden guide ways of lathe bed
- Electric motor with V-belt
- Reverse Forward switch
- Carrier plate
- Centre adapter
- Dead center MT-4 – 2 Nos.
- Tool post bolt key
- Change gear for inch / mm threading (for 4 TPI lead screw)
- Oil can
- Screw driver
- Allen keys – 6 Nos.
- Fixed spanner – 3 Nos.

#### **1.3.2 Optional Accessories (to be order along with machine)**

- Electrical coolant pump with tank & fittings
- Rear tool post with tool holder
- Taper turning attachment
- Rear splash guard
- Lever operated front lever collet attachment with collets





### **1.3.3 Optional Accessories (Retro fitting possible)**

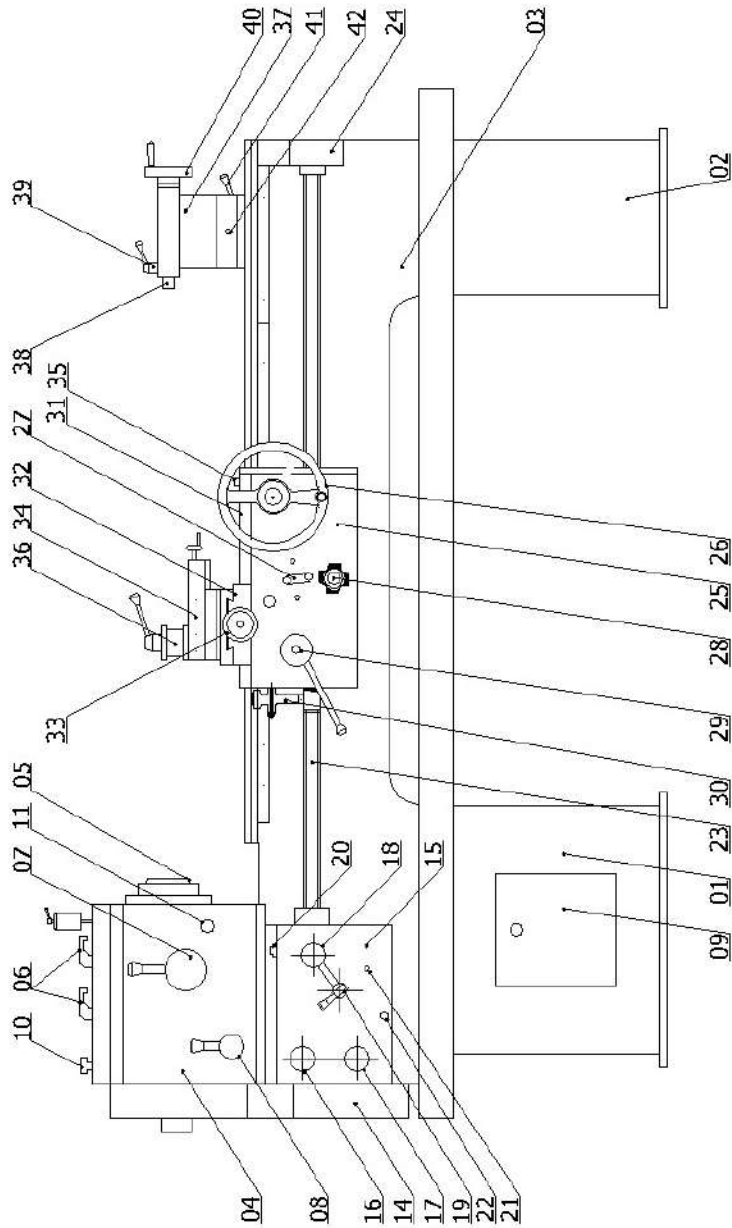
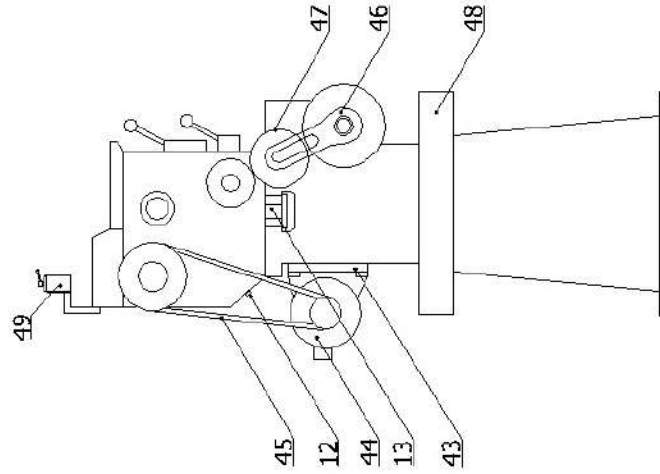
- Face plate
- Steady rest
- Follow rest
- Chuck flange
- Machine lamp
- Quick-change tool post with 5 tool holders
- Revolving center
- 3-Jaw self-centering chuck or 4-Jaw dog chuck
- Change gears and chart for DP & Module threads

### **1.3.4 List Of Change Gears**

- 44-51-52-62-88-100 T



1.4 Legend



**Legend**

- (01) Pedestal (LH)
- (02) Pedestal (RH)
- (03) Bed
- (04) Head Stock
- (05) Spindle
- (06) Speed changing levers. - 2 Nos.
- (07) High-low speed lever
- (08) Feed direction change lever
- (09) Leg window
- (10) Oil filling plug
- (11) Oil sight glass
- (12) Oil drain plug
- (13) Head stock setting bolt
- (14) Change gear cover
- (15) Feed box. (Norton gear box)
- (16) Feed selecting levers
- (17) Feed selecting levers
- (18) Feed selecting levers
- (19) Feed engage / disengage lever
- (20) Oil filling plug
- (21) Oil sight glass
- (22) Oil drain plug
- (23) Lead screw
- (24) Offend bracket
- (25) Apron
- (26) Longitudinal hand feed wheel
- (27) Feed selecting lever
- (28) Feed engaging knob
- (29) Half nut engaging lever
- (30) Thread dial indicator
- (31) Carriage
- (32) Surface slide
- (33) Transverse hand feed wheel
- (34) Compound slide
- (35) Carriage lock bolt



- (36) Tool post
- (37) Tail stock
- (38) Tail stock spindle
- (39) Tail stock spindle locking lever
- (40) Tail stock spindle wheel
- (41) Tail stock clamping Handel
- (42) Tail stock setting bolt
- (43) Motor bracket
- (44) Electric motor
- (45) V Belt
- (46) Arm plate
- (47) Change gears
- (48) Chip tray
- (49) Reverse / Forward switch

**SECTION-2****INSTALLATION****2.1 Unpacking And Cleaning**

Once machine is brought on shop floor, for unpacking of the machine, proper care should be taken. In case of machine with case packing, top directing is marked on wooden case. It is suggested that the packing case is opened soon after its receipt and verification is made for the standard and extra accessories mention in packing slip.

Prior to dispatch, all slides, all unpainted parts, handles etc are coated with oil/grease/rust preventive. This should be carefully removed and wiped dry and then all bright machine parts should be oiled immediately.

**2.2 Slinging The Machine**

While lifting the machine by crane, proper care should be taken to prevent damage of machine paints, components and levers. Use suitable wooden block or felt packing, whenever chances of damage to machine part due to contact of rope or chain are possible. Suitable capacity ropes/chains/nylon belt should be used, while lifting the machine and it should be lift in balance position. For proper balancing of the machine, move tail stock and carriage at appropriate position and clamp on bed.

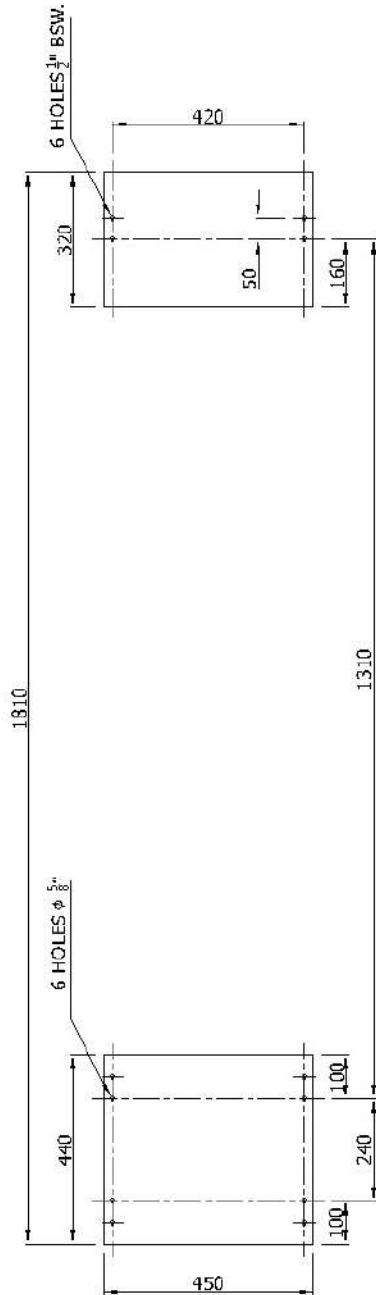
**2.3 Foundation**

The lathe machine can give satisfactory performance only if it is put on proper foundation and proper leveling is done. Foundation should be prepared as per foundation drawing and sufficient time should be allowed for concrete slab to be fully cured and dried. The depth of the foundation slab given in foundation drawing is only recommended and it should be directly decided by the users, depending upon the soil condition and surrounding atmosphere. The load bearing capacity of the soil should be taken in account for preparing foundation.

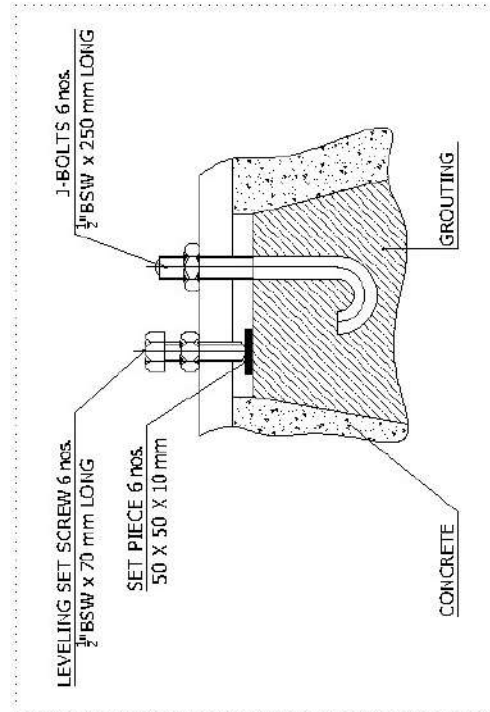
[ **Working Area:** while selecting space and location for setting up the machine, leave enough space for convenient operation and easy accessibility of all parts for maintenance. ]



Foundation Drawing



↑  
OPERATOR SIDE





## **2.4 Leveling**

Leveling is very important and should be carried out with proper care. The accuracy of spirit level, which recommended is 0.050 mm/meter. For leveling follow the procedure given below.

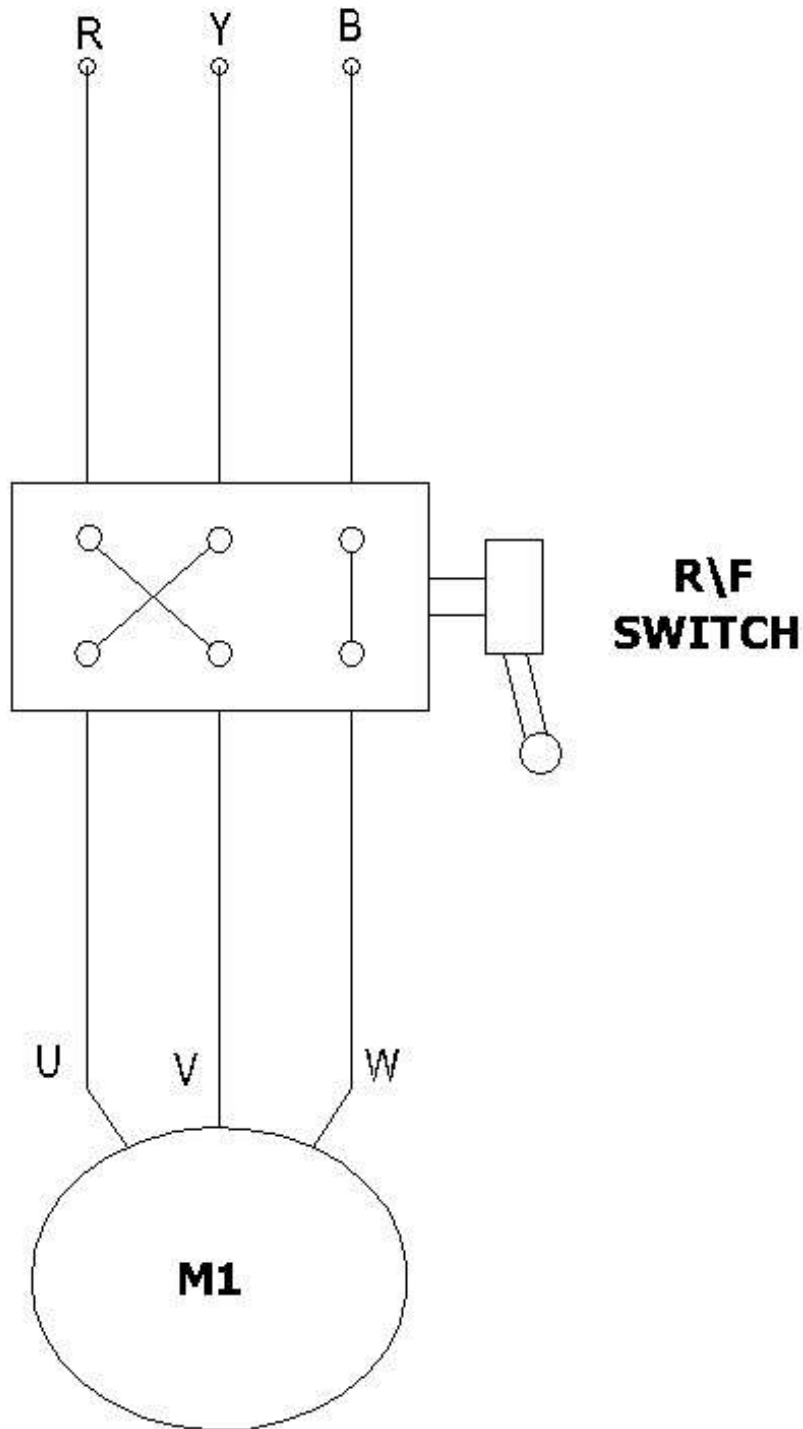
- Keep the precision spirit level on cross slide top face at centre in transverse position.
- Adjust the leveling bolt to make the position of level bubble in centre.
- Move carriage slide without disturbing level towards head stock side and adjust the bubble in level at centre position by adjusting level bolt.
- Move carriage slide toward tail stock side and repeat the procedure.
- Make both the readings at head stock side and tail stock side to be identical
- After setting transverse level, move the carriage to the centre of bed.
- Keep precision level on surface slide top near V-guide ways of bed in longitudinal position
- Ensure the bubble position at centre of level by using thin paper if required
- Move carriage towards head stock slide and then tail stock side and ensure the variation and adjust level if required.
- Recheck the transverse level.

After proper leveling of machine, run the machine for about 2 hours at various speed and feed and recheck level and reset the level if required.

Then the foundation bolts are grouted in larger holes with 1:3 cement and sand mixture. Sufficient time should be allowed for concrete to cure. The foundation bolts are then tightened without undue force. Periodically check up bed level to ensure continued level accuracy.



Wiring Diagram







## **2.5 Electric Connection**

### **Machine Supplied With Electric Panel**

Refer wiring diagram      Page no. 16

One electrical panel is provided in head stock side leg. Push button box is provided on top face of head stock.

On on/off rotary switch is given on control panel box. For detail wiring refer wiring diagram given on page no. 16

## **2.6 Lubrication**

Proper lubrication of Lathe machine plays vital rolls to retain accuracy and gives satisfactory performance. If the lubrication is neglected the bearing surface may be damage. Impairing the accuracy and shortening the life of the machine.

Lubrication in head stock and Norton gear box and Apron are done by splash lubrication oil level indicator are provided in head stock and Norton gear box and Apron. Check oil level through oil level indicator regularly. If oil level seems down in head stock, than pour oil through oil filling plug.

In initial period, for the first time running oil should be changed after first 300 running hours and then after 500 running hours.

Latter on oil can be used up to 1000 to 1500 running hours. Before filling new oil, the head should be washed with kerosene and thoroughly dried. Quantity of oil and type of oil to be used in head stock and Norton gear box and Apron is shown in lubrication chart given in Introduction section on Page No. 19.

Lubrication of Slide, Lead Screw and tail stock are done by oil can. Various oil holes are provided for lubrication purpose. Refer Page No. 16 for lubrication point. Dirt, chips should be brushed away before oiling to prevent them from entering in to the oil holes.



- |                      |   |
|----------------------|---|
| ➤ Carriage           | 2 oil holes are given on carriage.            |
| ➤ Lead screw bracket | 1 oil holes are given on end bracket.         |
| ➤ Surface screw      | 1 oil holes are given on cross slide.         |
| ➤ Compound Slide     | 1 oil holes is given on compound slide.       |
| ➤ Tail stock sleeve  | 2 oil holes are given on tail stock body.     |
| ➤ Tail stock screw   | 1 oil hole is given on tail stock screw boss. |

### **Norton Gear Box**

One oil level indicator is given in front face of Norton gear box. Pour oil through oil pouring holes given on top face of Norton gear box up to level marked in oil level indicator if required. One oil drain plug is given at the front face of Norton gear box to remove oil from Norton gear box.

### **Apron**

One oil level indicator is given in font face of apron box. Pour oil through oil pouring hole given on front face of apron up to level marked in oil level indicator if required. One oil drain plug is given at the bottom face of apron body to remove oil from apron box.



### 2.6.1 List Of Recommended Lubrication

<b>Sr. No.</b>	<b>Company</b>	<b>Head Stock Feed Box Apron</b>	<b>Guide ways Lead screw Tail stock Apron</b>
1	HPCL	PARTHAN EP 220	WAYLUB 220
2	BPCL	MAK AMOCAM 220	WAYLUB 220
3	ISO GRADE	320	220
4	CASTRO OIL	GEAR OIL 320	MAGNA 220
5	MOBIL OIL	GEAR OIL 632	VACTRA 4
6	SHELL OIL	OMALA 320	TONNA 220

### 2.7 Idle Running Of The Machine

At the time of machine dispatch, speed and feed levers are set for the lowest value. You are requested to ensure that these positions are maintained at the time of starting the machine to avoid accidental switching on at high speed and feed which may damage the machine.

Machine saddle, tail stock spindle etc, are kept locked at the time of machine dispatch. Do not try to move them until they are properly cleaned, lubricated and unlocked.

Ensure you know how to start / stop the machine before starting the machine.



**SECTION-3**  
**OPERATION**

**3.1 Safety**

- (01) Protect your eyes wearing safety glasses.
- (02) Wear shoes with oil resistance soles.
- (03) If you have long hair, tie it back properly.
- (04) Do not wear long sleeved cloths or loose clothing.
- (05) Make sure that your work area should be free from chips, coolant, electric wire, air-hoses, oil or anything that can be get in your way and cause you to fall.
- (06) Make sure that work holding are firm.
- (07) Make sure that tool holding are firm.
- (08) Ensure proper belt tension.
- (09) Refit covers and guards before the machine is put again into operation after opening of any cover or guards.
- (10) Do not file work piece, when they are being rotate under power. This is extremely hazardous.
- (11) Do not touch machine part immediately after machining it may have sharp edges and considerable amount of heat.
- (12) Wear rubber sole shoes while working on electrical cabinet.
- (13) All maintenance work should be done with power off condition.
- (14) Electrical shock can cause serious injury or loss of life. All service and maintenance work within the electrical cabinet should be performed by qualified electricians in power off condition.
- (15) When replacing fuse always replace them with the same type and rating. Do not substitute fuses for higher current or different voltage.
- (16) While working on the machine parts like brake unit, transformer etc. it may be extremely hot. Take sufficient care when handling such parts.
- (17) Do not shift gear in running condition of head stock & Norton gear box.



**3.2 Do, Do Not & Checks**

**Do**

- Check and maintain oil level in head stock, Norton & apron.
- Amplified pitches. Do follow guide line given for amplified pitches.
- The following table gives guideline for selection of maximum spindle speed while cutting high range pitch threading/amplified pitches.
- Clean machine at the end of every shift.

<b>Metric Pitch</b>	<b>English Thread</b>	<b>Spindle Speed</b>
2	12	288
3	8	145
4	6	93
5	5	93
6	4	60

**Do Not**

- Do not shift gears in motion.
- Do not open head stock covers or end feed gear covers while machine is running.
- Do not exceed speeds of chuck or face plate beyond the specified limit.
- Do not exceed more than 30 reversals of the motor switches per hour.
- Do not remove chucks from threaded spindle by rotation spindle in reversed direction(optional)

**Checks**

- Job weight limitation. Do not load jobs weighting more than 200 kg. without steady rest or centre support.
- Do not start the machine at high speed with heavy jobs.
- Sudden reversal of spindle at speed 145 & above rpm is not recommended
- It is recommended that cast iron chucks should not be run at surface speed more than 16 meter/sec. accordingly 360 mm diameter chuck should not run at 835 rpm.



### **3.3 Head Stock**

Head stock pulley is directly driven by the electric motor through two V belts. Power Transmission inside the head stock to the main spindle is through gear arrangement. Total 8 nos. spindle are available for standard machine.

Main spindle RPM is selected by two levers speed changing lever (6) and High-low speed lever (7).

Levers (6) are two levers each lever have 3 position. L.H. lever have position 1, Neutral and 2, similarly R.H. lever have position 3, Neutral and 4, Both levers are interlocked with each other. LH lever will give position 1 or 2, RH lever will give position 3 or 4.

First of all put both levers in Neutral position than rotate any one lever to your required number 1 to 4. Suppose you have select LH speed lever position as no.2. Than RH speed lever having position 3 & 4 will be automatically interlocked. At a time, You can select any one position from 1 to 4 by using both the levers. Now suppose you want to select no.4 speed. Range than put LH lever into Neutral position from position no.2 and then automatically RH lever having position 3 & 4 become free to engage in position no.4 and again LH lever having position 1 & 2 will be locked.

This arrangement will provides safety of interlocking of both levers (6), as well as selection of speed through position from 1 to 4.

High low speed lever (7) have 3 positions A, Neutral and B. Position A will be give low speed range and position B will be give high speed range. For engaging this lever. First of all pull lever outside to disengage locking pin from head stock body and then rotate lever to your desire position A or B and again engage locking pin in head stock body. This locking pin will give positive positioning of lever.

Feed direction changing lever (8) has 3 positions Reverse, Neutral, Forward. You can select any position by rotating this lever.



Oil sight glass (11) is provided to check the oil level inside the head stock. Lubrication of main bearings, gears, shifters and bushes are done by splash lubrication system. It is necessary to keep always proper oil level in head stock to give lubrication to main bearings and gears.

Oil drain plug (12) is given at back side of the head stock bottom face to remove or drain lubricating oil from head stock.

Oil filling plug (10) is given on top cover of head stock to add the lubricating oil inside the head stock.

**3.3.1 RPM Chart**

<b>RPM</b>	<b>FRONT LEVER</b>	<b>TOP LEVER</b>
45	A	1
60	A	2
93	A	3
145	A	4
288	B	1
384	B	2
598	B	3
938	B	4



### **3.4 Norton Gear Box**

Norton gear box provides selection of various feeds and threads. Total 36 types of British threads and 20 types of metric threads can be cut by selecting different levers positions. Total 3 different knobs are given in Norton gear box. Feed selecting knobs (16), (17) and (18). Knobs (16) have two different positions A and B, Knob (17) have two different position C and D and Knob (18) have 8 different positions 1 to 8. For operating knob 18 first of all engage / disengage lever (19) is to be put in disengage position than rotate knob (18) for selecting any position from 1 to 8 and than again put engage / disengage lever (19) in to engage position.

Oil filling plug (18) and oil drain plug (20) is given for adding or removing oil from Norton gear box. Oil sight glass (19) is given for checking oil level in Norton gear box. It is necessary to maintain proper oil level in Norton gear box. Lubrication of Norton gear box is done by splash lubrication system.

### **3.5 End Feed Gears**

At the rear end of the head stock, change gear train is fitted to give longitudinal feed, transverse feed and threading operation. To change the direction of rotation of gear train, feed changing lever (08) is given in head stock.

One arm plate with arm stud is fitted with Norton gear box. Change gears are connected in this arm plate to give drive from head stock output gear to Norton gear box.





3.5.1 Thread Chart (For Machine Having 4 TPI Lead Screw)

BRITISH THREADS									
Gear Train	Lever	1	2	3	4	5	6	7	8
<u>44</u> 88	AD	60	56	52	48	44	40	36	32
	BD	30	28	26	24	22	20	18	16
	AC	15	14	13	12	11	10	9	8
	BC	7.5	7	6.5	6	5.5	5	4.5	4
<u>51</u> 88	AD	-	-	-	-	38	-	-	-
	BD	-	-	-	-	19	-	-	-
	AC	-	-	-	-	9.5	-	-	-
	BC	-	-	-	-	4.75	-	-	-

METRIC THREADS									
Gear Train	Lever	1	2	3	4	5	6	7	8
<u>52</u> 88	AD	0.5	-	-	0.625	-	0.75	-	0.9375
	BD	1	-	-	1.25	-	1.5	-	1.875
	AC	2	-	-	2.5	-	3	-	3.75
	BC	4	-	-	5	-	6	-	7.5
<u>62</u> 100	AD	-	-	-	-	-	-	0.875	-
	BD	-	-	-	-	-	-	1.75	-
	AC	-	-	-	-	-	-	3.5	-
	BC	-	-	-	-	-	-	7	-

**3.5.2 Feed Chart ( Longitudinal feed mm/rev. )**

<b>WITH TPI THREAD SETTING</b>									
<b>Gear Train</b>	<b>Lever</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<u>44</u> 88	AD	0.066	0.071	0.077	0.083	0.091	0.100	0.111	0.125
	BD	0.133	0.143	0.154	0.166	0.181	0.200	0.222	0.250
	AC	0.266	0.285	0.307	0.333	0.363	0.399	0.444	0.499
	BC	0.533	0.571	0.615	0.666	0.726	0.799	0.888	0.999
<u>51</u> 88	AD	-	-	-	-	0.105	-	-	-
	BD	-	-	-	-	0.210	-	-	-
	AC	-	-	-	-	0.420	-	-	-
	BC	-	-	-	-	0.841	-	-	-

<b>WITH METRIC THREAD SETTING</b>									
<b>Gear Train</b>	<b>Lever</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<u>52</u> 88	AD	0.079	-	-	0.098	-	0.118	-	0.147
	BD	0.157	-	-	0.197	-	0.236	-	0.295
	AC	0.315	-	-	0.393	-	0.472	-	0.590
	BC	0.629	-	-	0.786	-	0.944	-	1.180
<u>62</u> 100	AD	-	-	-	-	-	-	0.137	-
	BD	-	-	-	-	-	-	0.275	-
	AC	-	-	-	-	-	-	0.550	-
	BC	-	-	-	-	-	-	1.101	-

**3.5.3 Feed Chart ( Transverse feed mm/rev. )**

<b>WITH TPI THREAD SETTING</b>									
<b>Gear Train</b>	<b>Lever</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<u>44</u> 88	AD	0.016	0.017	0.018	0.020	0.022	0.024	0.026	0.030
	BD	0.032	0.034	0.037	0.040	0.043	0.048	0.053	0.060
	AC	0.064	0.068	0.073	0.080	0.087	0.095	0.106	0.119
	BC	0.127	0.136	0.147	0.159	0.174	0.191	0.212	0.239
<u>51</u> 88	AD	-	-	-	-	0.025	-	-	-
	BD	-	-	-	-	0.050	-	-	-
	AC	-	-	-	-	0.100	-	-	-
	BC	-	-	-	-	0.201	-	-	-

<b>WITH METRIC THREAD SETTING</b>									
<b>Gear Train</b>	<b>Lever</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
<u>52</u> 88	AD	0.019	-	-	0.023	-	0.028	-	0.035
	BD	0.038	-	-	0.047	-	0.056	-	0.070
	AC	0.075	-	-	0.094	-	0.113	-	0.141
	BC	0.150	-	-	0.188	-	0.226	-	0.282
<u>62</u> 100	AD	-	-	-	-	-	-	0.032	-
	BD	-	-	-	-	-	-	0.065	-
	AC	-	-	-	-	-	-	0.131	-
	BC	-	-	-	-	-	-	0.263	-



**3.5.4 Thread Dial Indicator**

Thread dial indicator is used during threading operation. By using thread dial indicator half nut with lead screw can engage at correct position during successive threading cuts, so that tool will follow the original cuts and it will eliminates the necessity of reversing the lathe spindle

**For British Threading**

For all odd and even threads in each inch, close half nuts at any no. on dial. (For example at no. 4, 5, 6 etc.)

For all threads involving one half threads in each size, close half nuts at any alternative no. on dial. ( For example 2, 4, 6 or 1, 3, 5 )

**For Metric Threading**

During metric threading thread dial indicator will not be used and spindle has to run in reverse direction without disengaging half nuts in second and subsequent cuts till threading operation is completed.

**3.5.5 Special Threading Not Indicating In Thread Chart**

**British Threads**

$$\text{Gear train for required TPI} = \text{Gear train of selected TPI} \times \frac{\text{Selected TPI}}{\text{Required TPI}}$$

For example 19 TPI threads required. Than select nearest 18 TPI threads and set levers position as per 18 TPI of Norton gear box, that will be

$$\begin{aligned} \text{BD - 7} &= \frac{44}{88} \times \frac{18}{19} \\ &= \frac{36}{76} \end{aligned}$$



**Metric threads**

Gear train of required pitch = Gear train of selected pitch X  $\frac{\text{Required pitch}}{\text{Selected pitch}}$

For example pitch required is 1.6 mm, than select nearest pitch of 1.5 mm and set levers as per 1.5 mm pitch that will be B D - 6.

$$= \frac{52}{88} \quad X \quad \frac{1.6}{1.5}$$

$$= \frac{52}{60} \quad X \quad \frac{64}{88}$$

**3.6 Carriage**

Carriage slide is fitted on bed top face with one lock piece and setting wedge at rear side and two lock pieces on front side. On the top face of carriage, surface slide fitted on dovetail guide ways with setting wedge. On the side edge of carriage two tapped holes are given to clamp follow rest guide. Fiber vipers with felt are given at all four corners of carriage to prevent to enter dust and chips inside the sliding surface. Two oil cups with cap are provided on top face of carriage slide for lubrication of sliding surface. One lock bolt is provided on carriage surface to lock carriage movement if required.

Surface slide is fitted on carriage dovetails. On the front face of carriage one screw boss fitted to guide surface screw and nut. Surface screw and gear is fitted in carriage and surface screw gun metal nut is fitted on bottom face of surface slide. One hand wheel with micro ring is fitted on surface screw to give manual hand feed to surface slide. On the top face of surface slide one circular T-slot is given and angular marking of 180 degree (90 degree on either side.) is done to set compound slide at any desire angular position.

Compound slide assembly is located in center of surface slide and clamped with surface through two nos. T-bolts. One 4 way tool post is fitted on top face of compound slide to hold tools



### **3.7 Apron**

Construction of apron gear box is rigid, oil bath and box type. Apron gear box is fitted at bottom face of carriage. Lead screw is passes through apron gear box worm to give drive to apron box. One thread cutting lever is fitted on left side of apron gear box. This lever operates engage / disengages of half nut on lead screw during threading operation. Thread dial indicator is fitted on left hand side of apron gear box.

Feed selecting lever with spring loaded plunger is provided on apron gear box. These levers have 3 positions Reverse, Neutral & Forward feed. Thread cutting lever and feed selecting lever are interred locked with each other to prevent operating of both levers simultaneously. During thread cutting operation feed selecting lever should in neutral position, otherwise thread cutting lever will not work. Similarly during turning operation thread cutting lever should be in dis. engage condition with lead screw, otherwise feed selecting lever will not work.

One star knob type wheel is given on apron gear box to engage or dis. engage feed. By tightening this star knob wheel feed will engage through taper washer.

One hand wheel is provided to move carriage slide on lathe bed by manual operation.

### **3.8 Tail Stock**

Tail stock is clamped on bed guide ways by tail stock clamping lever (41). You can adjust clamping pressure by loosening or tightening of tail stock clamping stud nut. Clamping of tail stock on lathe bed is cam operated- easy locking system.

Two setting bolts (42) are provided either side of tail stock to shift the tail stock assembly in transverse direction. This setting is become useful in taper turning operation of long job in between centre settings.

Tail stock spindle moves through hand wheel (40). Tail stock spindle clamping lever (39) clamps, Tail stock spindle in tail stock body.



### **3.9 Least Count Of All Hand Wheels.**

Longitudinal movements by Apron hand wheel (26) and least count is 0.140 mm.

Transverse movements by Surface hand wheel (33) and least count is 0.050 mm.

Tail stock spindle movement is by hand wheel (40) and least count is 0.040 mm.

Compound slide hand wheel least count is 0.050 mm.



## **SECTION-4**

### **SETTINGS MAINTENANCE & TROUBLE SHOOTINGS**

Proper care and maintenance of the machine is most important factor to increase life and reliability of machine performance. Following are the few important settings, which needed attention.

#### **4.1 Head Stock**

##### **4.1.1 Taper Setting**

Headstock is clamped on bed by four bolts. To set head stock alignment, first loose bolts slightly and then insert test mandrel of 300 mm length in spindle nose and aligned axis of taper mandrel with longitudinal movements and clamped bolt.

##### **4.1.2 Spindle**

Main spindle runs in two precision back to back taper roller bearing & one needle roller bearing. To adjust radial or axial clearance of spindle tightens check nuts so that the spindle can be rotate by hand with light drag.

##### **4.1.3 V-Belts**

Main electric motor is mounted on motor mounting bracket on backside of lathe bed. Two nos. V-Belts are fitted between motor pulley and head stock pulley. To adjust belt tension, unclamps four bolts of electric motor and readjust the position of motor on motor mounting bracket and clamp bolts.

#### **4.2 Lead Screw**

Lead screw is coupled with output shaft of norton gear box by dowel pin.

#### **4.3 Carriage**

Carriage is fitted on bed with on V guide and one flat surface. Carriage is set on bed guide ways with two keeper blocks on operator side and one keeper late with parallel wedge is rear side.





#### **4.4 Cross Slide And Compound Slide**

Cross slide and compound slide is scraped and matched with guide ways by one wedge & setting bolts are given to set slide wedge clearance.

#### **4.5 Tail Stock**

Taper turning of long job can be done by offsetting of tail stock with respect to head stock center line. In tail stock base two setting bolts are given on either side. By loosen one setting bolt and tighten other setting bolt tail stock body can be set offset.

#### **4.6 Tool Post**

After long use the tool post clamping handle may extend beyond the convenient zone of clamping. To get back proper angle of tool post clamping handle, cut the bottom surface of spacer by required amount.

#### **4.7 Half Nut**

Half nut is guided in prismatic guide ways of apron body. Clearance of guide ways can be set by setting bolts given on left hand side of apron body. First loosen slightly two hex bolts given on prismatic guide ways and complete settings, after completing settings, clamping bolts should be tighten.

**4.8 Trouble Shooting And Remedy**

<b>Sr.</b>	<b>Trouble</b>	<b>Cause</b>	<b>Remedies</b>
1.	Machine vibrates while running	Improper leveling	Level machine properly and tighten on foundation
		Job not balanced	Balance job by adding counter weight and reduce spindle speed and feed
2.	Machine vibrates while machining and chatter mark on job	Improper tension of V-belt	Adjust V-belt tension
		Excessive tool over hang	Reduce overhang of tool and clamp tool rigidly
		Wrong tool	Check proper tool material and tool
		Improper tool center	Adjust correct tool center
		Work holding not rigid.	Check job holding
		Clearance between carriage, surface or compound slide	Adjust proper clearance between all wedges.
		Slender components machine without support	Put proper support on job
		Back plate of chuck is lose	Check back plate of chuck
		Pre loading of main spindle is not correct	Adjust pre loading of spindle
3.	Spindle runs too tight or loose.	Preloading of spindle is not proper	Adjust check nuts given at rear end of head stock such that spindle should rotate by hand with light drag
4.	Machine cuts taper on job	Alignment of head stock is not proper	Align head stock axis with carriage movement
5.	Machine cuts taper on job held between centers	Alignment of tail stock not proper	Aligned tail stock axis
		Improper machine level	Level machine properly
		Tool worn out	Regrind or replace tool



<b>Sr.</b>	<b>Trouble</b>	<b>Cause</b>	<b>Remedies</b>
6.	Gear train in end feed gear train make sound during running	Back lash of change gear is not proper	Adjust backlash of change gears
		Fixing nut bolts not proper tight	Tighten fixing nut and bolts
		Some damage mark on gear teeth	Inspect and remove damage mark from gear
		Lubrication is not sufficient	Provide sufficient lubrication
7.	Machine is not able to take heavy cuts	Belt tension is not proper	Adjust proper belt tension
8.	Threading over lapse	Excessive axial play of lead screw	Set axial play of lead screw
		Excessive play in half nut	Set play of half nuts
		Gear train or Norton lever position is not proper	Set proper gear train or proper lever position of norton gear box
		Engagement of half nut is not proper	Engage half nut as per instruction given in thread dial indicator.
9.	Noise in head stock	Lubricant is not sufficient	Check oil level and maintain proper oil level
		Gear damage	Replace damage gear
		Bearing damage	Replace damage bearing

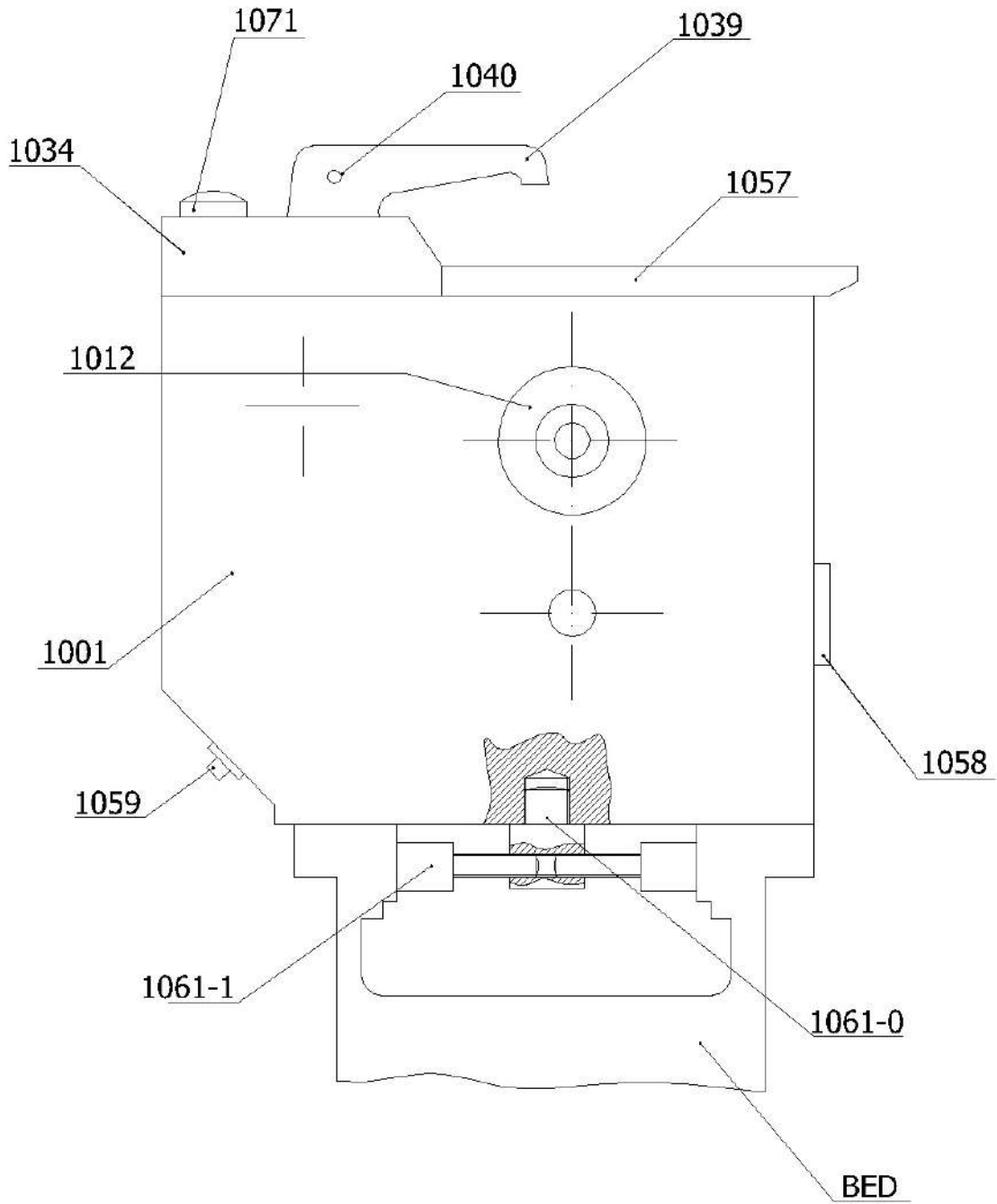


**SECTION-5**

**ASSEMBLY DRAWING AND SPARE PART LIST**

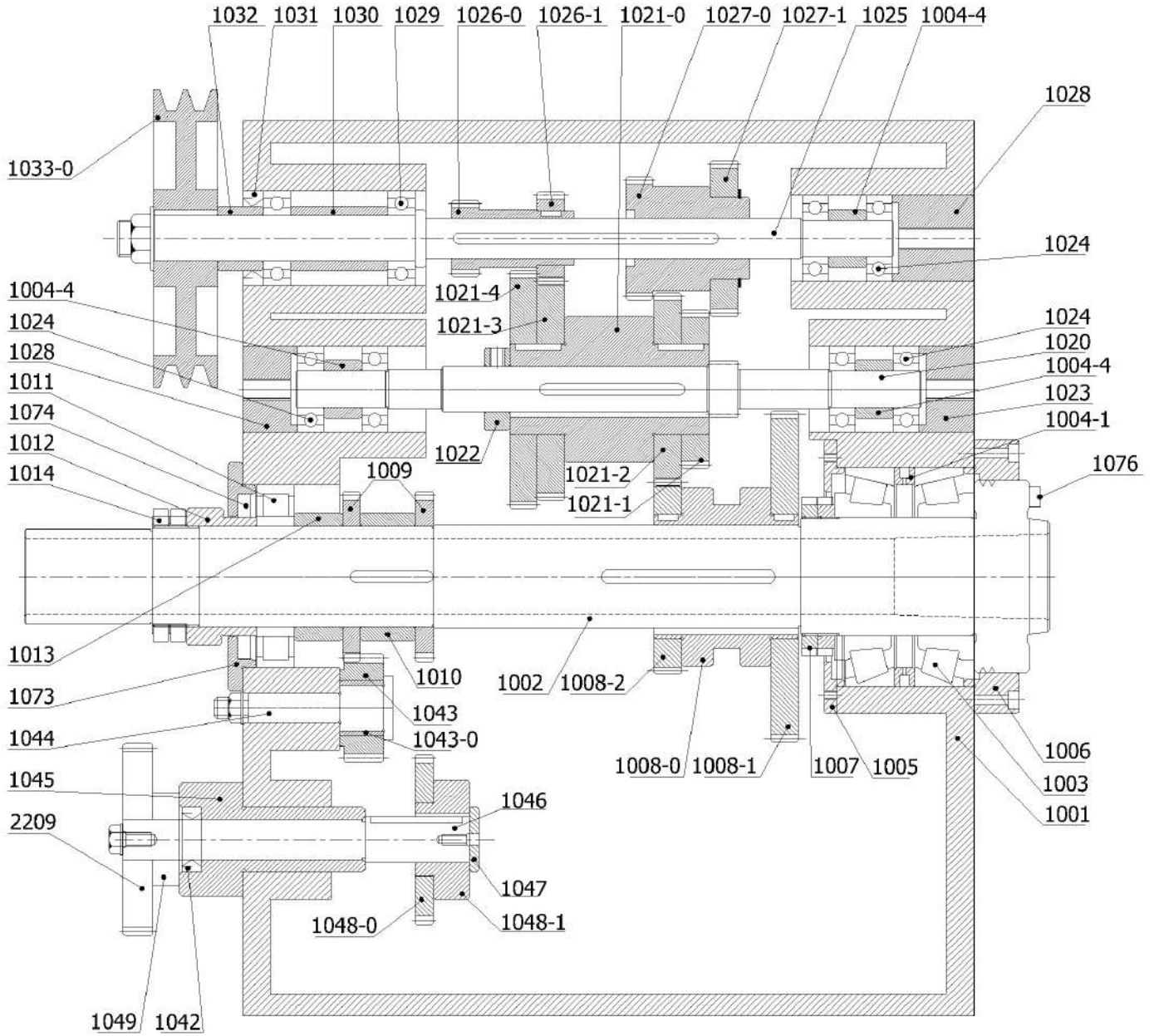


5.1 Head Stock Assembly



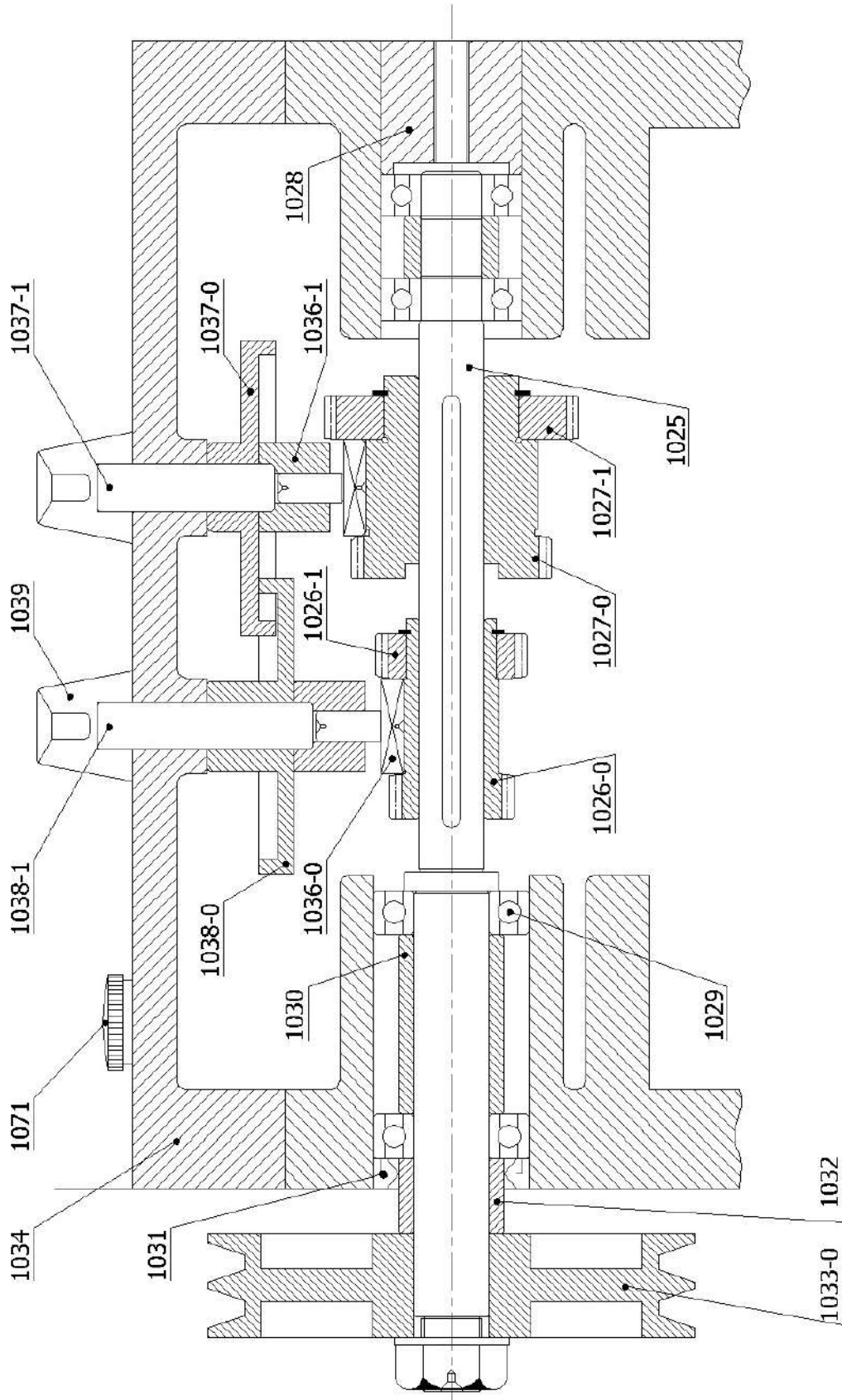


Head Stock Assembly



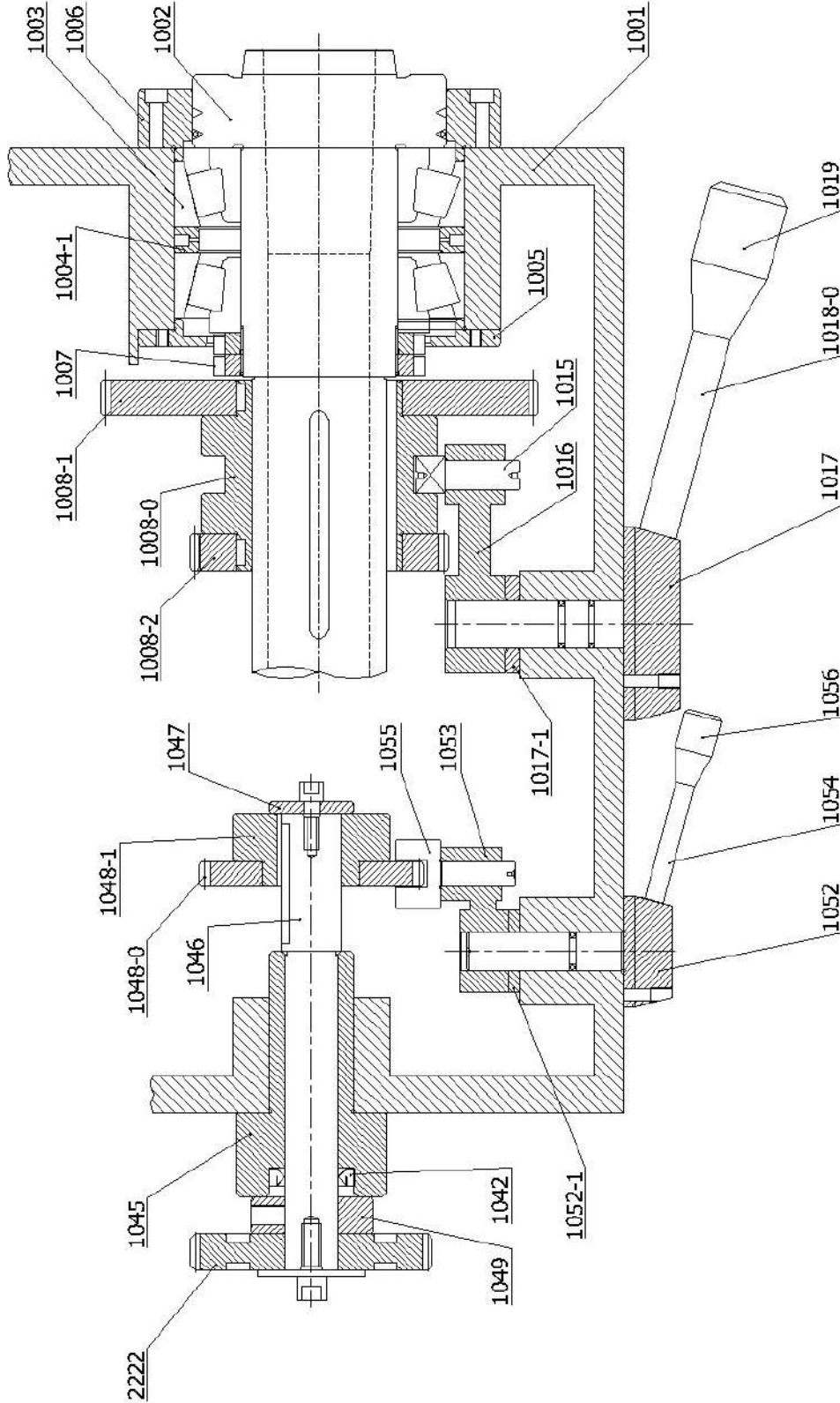


Head Stock Assembly





Head Stock Assembly





**Head Stock Sub Assembly**

<b>Part No.</b>	<b>Part Name</b>	<b>Qty.</b>
1001	Head stock	1
1002	Spindle	1
1003	Angular contact bearing 7213	2
1004-0	Front bearing spacer	1
1004-1	Outer bearing spacer	1
1004-2	Bearing spacer	1
1004-3	Bearing spacer	1
1004-4	Bearing spacer	3
1005	Front bearing inside cover	1
1006	Front bearing outside cover	1
1007	Front bearing check nut	2
1008-0	Spindle gear boss	1
1008-1	Spindle gear 98 Teeth	1
1008-2	Spindle gear 57 Teeth	1
1009	Spindle gear 42 Teeth	2
1010	Gear spacer collar	1
1011	Needle roller bearing N 211	1
1012	Spacer collar for locking	1
1013	Bearing spacer	1
1014	Rear bearing check nut	2
1015	Front lever clutch	1
1016	Front lever clutch bracket	1
1017	Spring	1
1018-0	Front lever clutch handle	1
1018-1	Front lever	1
1019	Bakelite grip	1
1020	Middle shaft gear 15 Teeth	1
1021-0	Compound gear boss	1



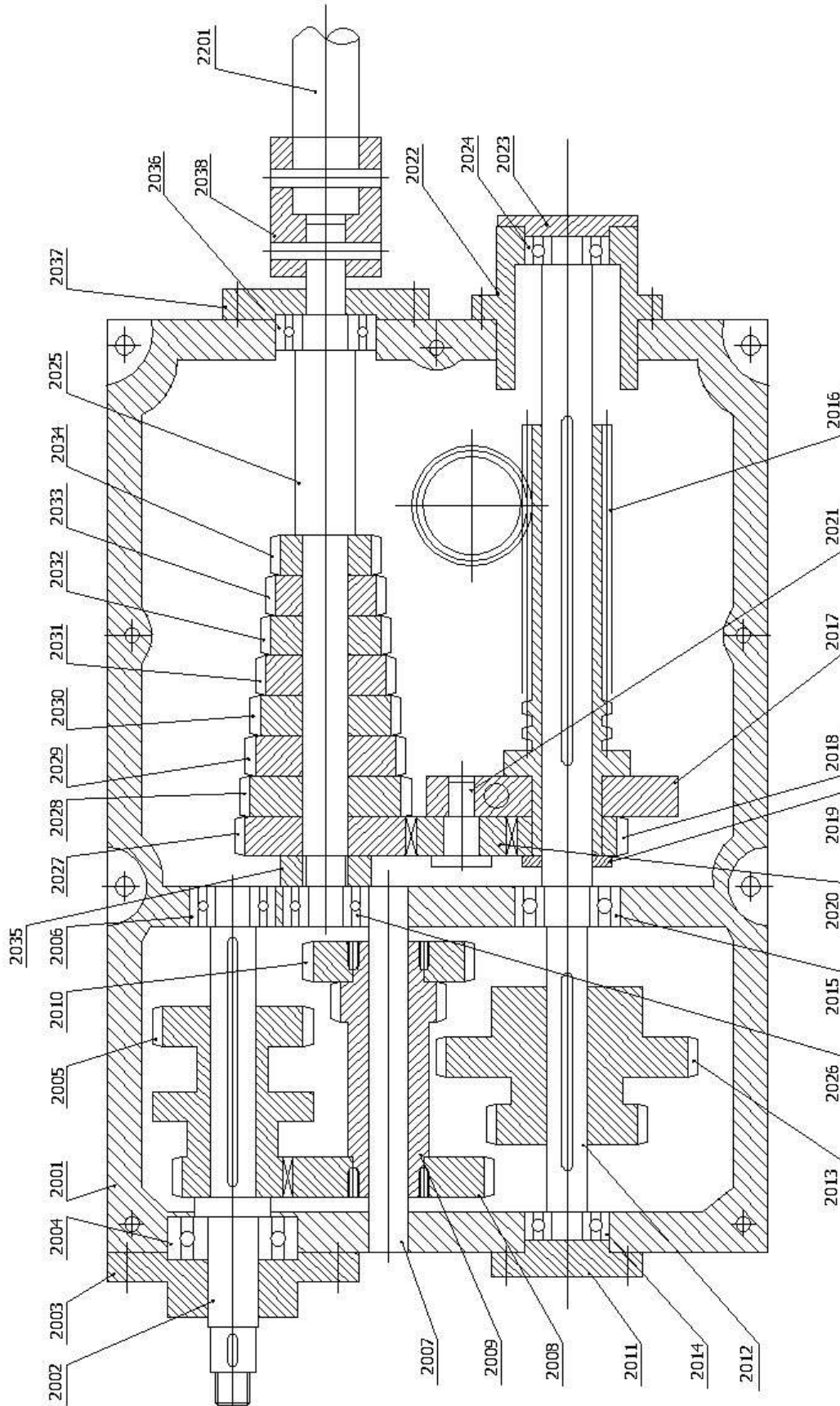
<b>Part No.</b>	<b>Part Name</b>	<b>Qty.</b>
1021-1	Compound gear 46 Teeth	1
1021-2	Compound gear 56 Teeth	1
1021-3	Compound gear 65 Teeth	1
1021-4	Compound gear 70 Teeth	1
1022	Middle shaft collar	1
1023	Middle shaft bush (RII)	1
1024	Ball bearing 6204	6
1025	Driving shaft	1
1026-0	Compound gear 21 Teeth	1
1026-1	Compound gear 26 Teeth	1
1027-0	Compound gear 35 Teeth	1
1027-1	Compound gear 45 Teeth	1
1028	Driving shaft bush	2
1029	Ball bearing 6205	2
1030	Bearing spacer	1
1031	Oil seal 35 × 52 × 10	1
1032	Outer collar	1
1033-0	Driving pulley (Head stock pulley)	1
1033-1	Motor pulley	1
1034	Rear top cover	2
1036-0	T C L pin	2
1036-1	T C L pin bracket	2
1037-0	Interlocking lever (RII)	1
1037-1	Interlocking lever pin (RH)	1
1038-0	Interlocking lever (LH)	1
1038-1	Interlocking lever pin (LH)	1
1039	Top lever handle	2
1040	Top lever set pin	2
1042	Oil seal – 22 × 35 × 7	1



<b>Part No.</b>	<b>Part Name</b>	<b>Qty.</b>
1043	Idle gear 26 Teeth	1
1044	Stud for Idle gear	1
1045	Bush for change gear stud	1
1046	Change gear shaft	2
1047	Washer for stud	2
1048-0	Bottom gear 42 Teeth	1
1048-1	Boss for bottom gear	1
1049	Collar for change gear	1
1050	Change gear key	1
1052	Feed reversing stud	1
1053	Feed reversing lever	1
1054	Feed reversing handle	1
1055	Fork	1
1056	Bakelite grip	1
1057	Front top cover	1
1058	Oil indicator	1
1059	Oil drain plug	1
1060-0	Front H.S. setting block	1
1060-1	Front H.S. setting bolt	2
1061-0	Rear H.S. setting block	1
1061-1	Rear H.S. setting bolt	2
1071	Oil filling plug	1
1073	Rear bearing outside cover	1
1074	Oil seal 65 × 90 × 12	1

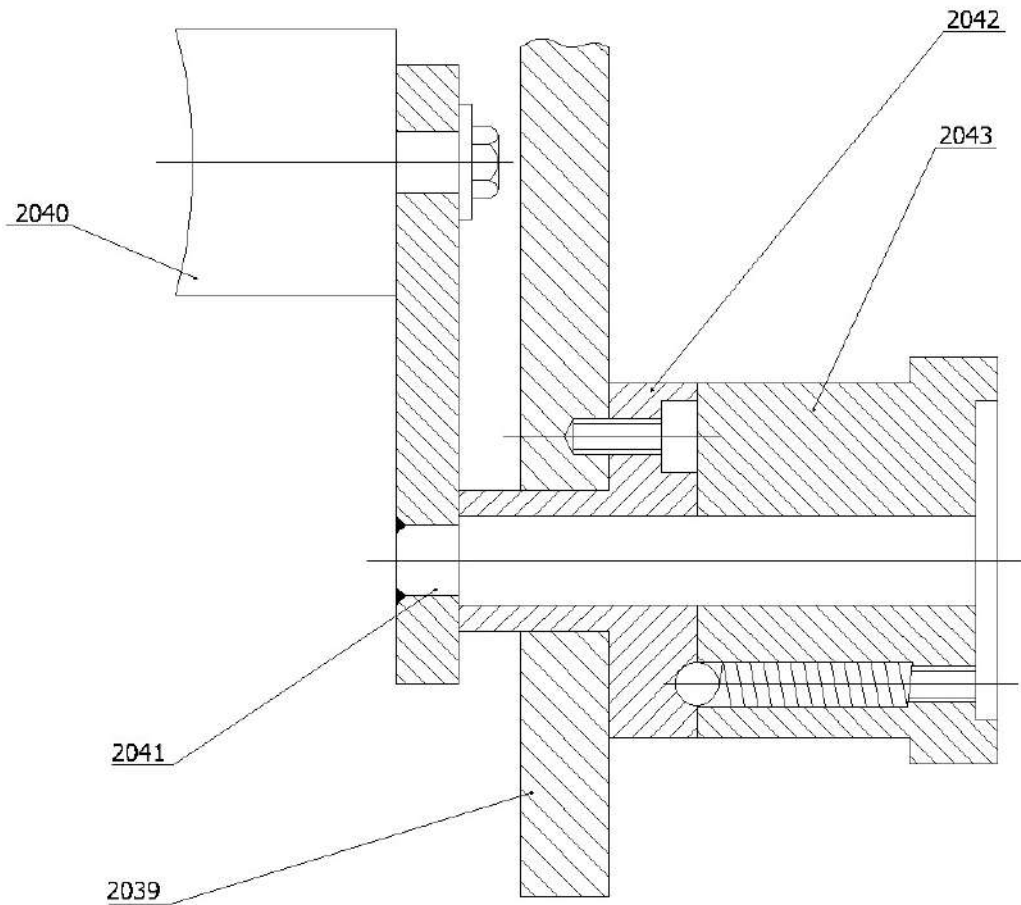


5.2 Norton Gear Box Assembly



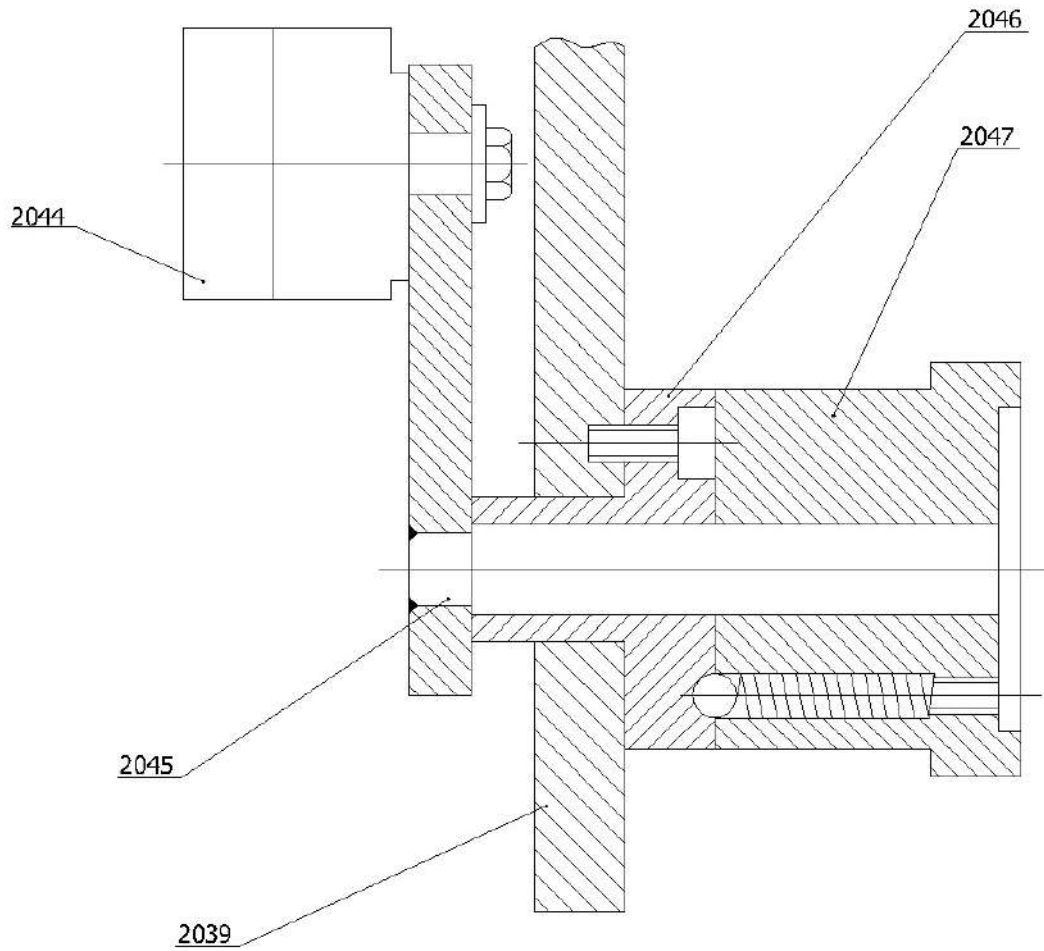


Shifting Lever Assembly A-B



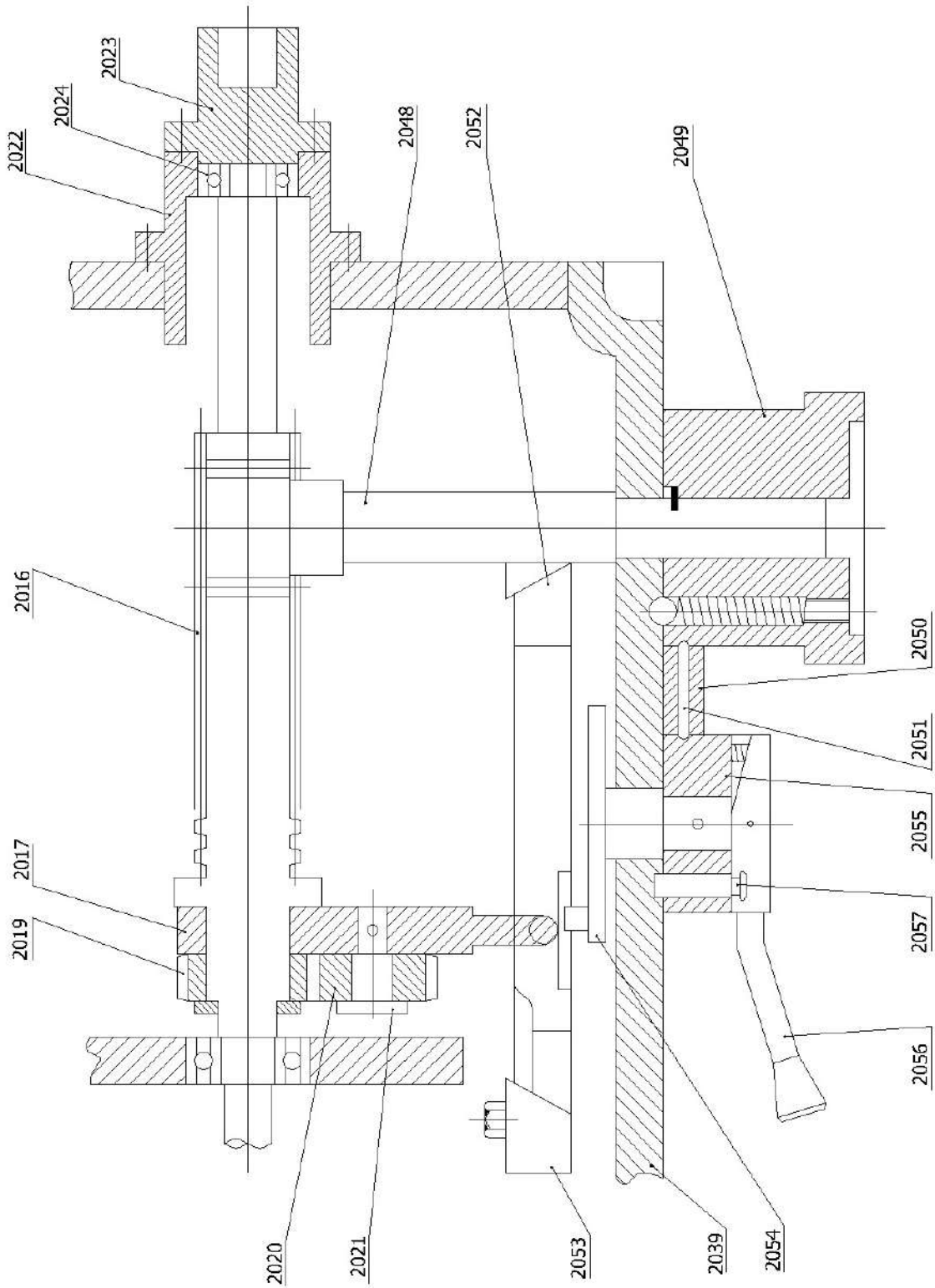


Shifting Lever Assembly C-D



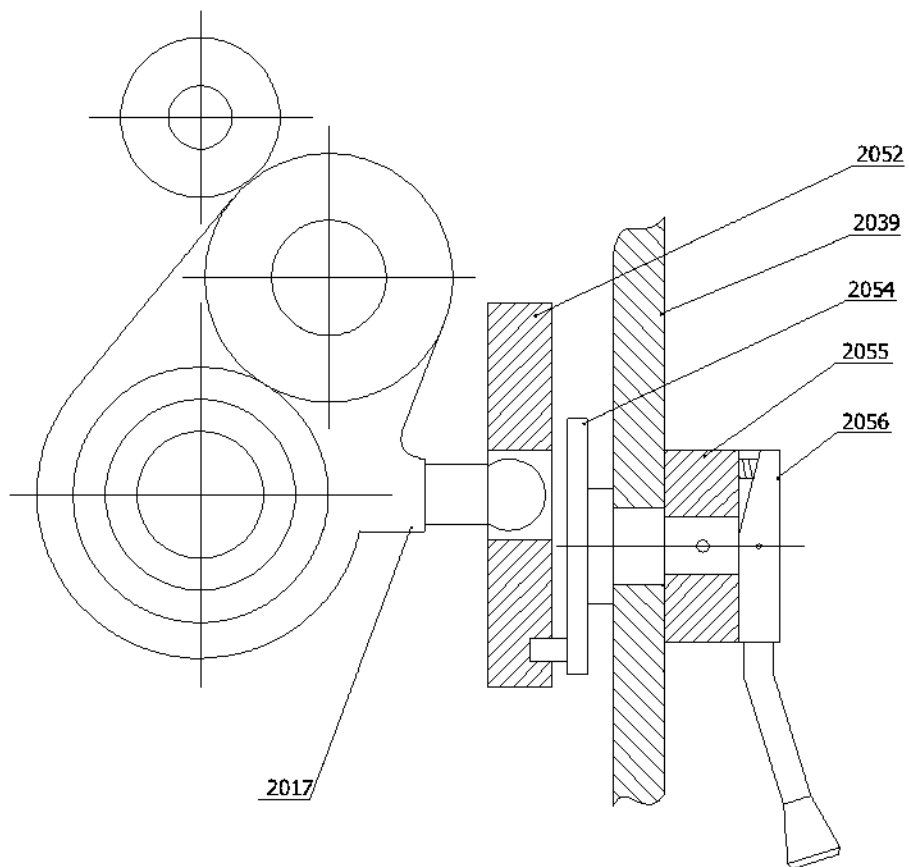


Shifting Lever Assembly 1 TO 8





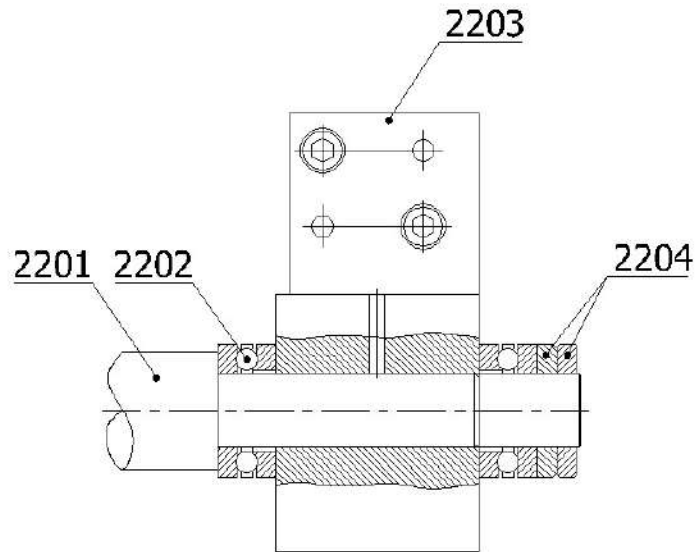
**ENGAGE-DISENGAGE LEVER ASSEMBLY**



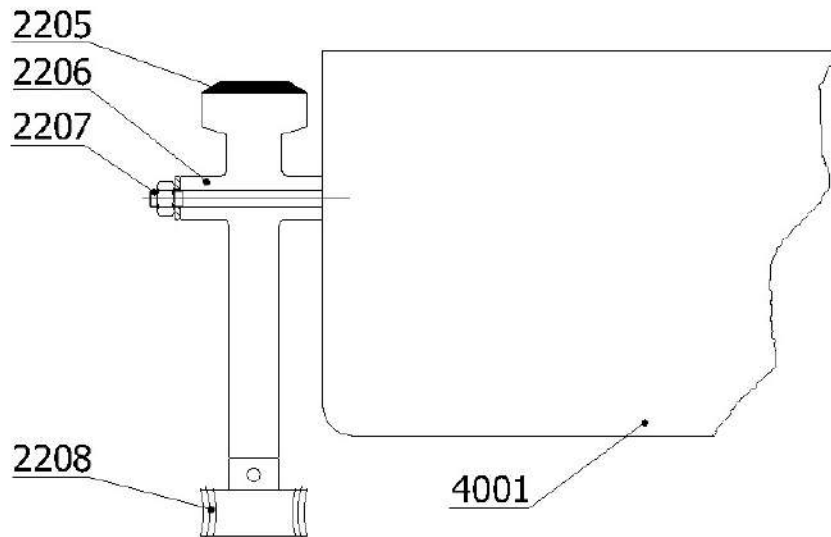




**Off end bracket assembly**

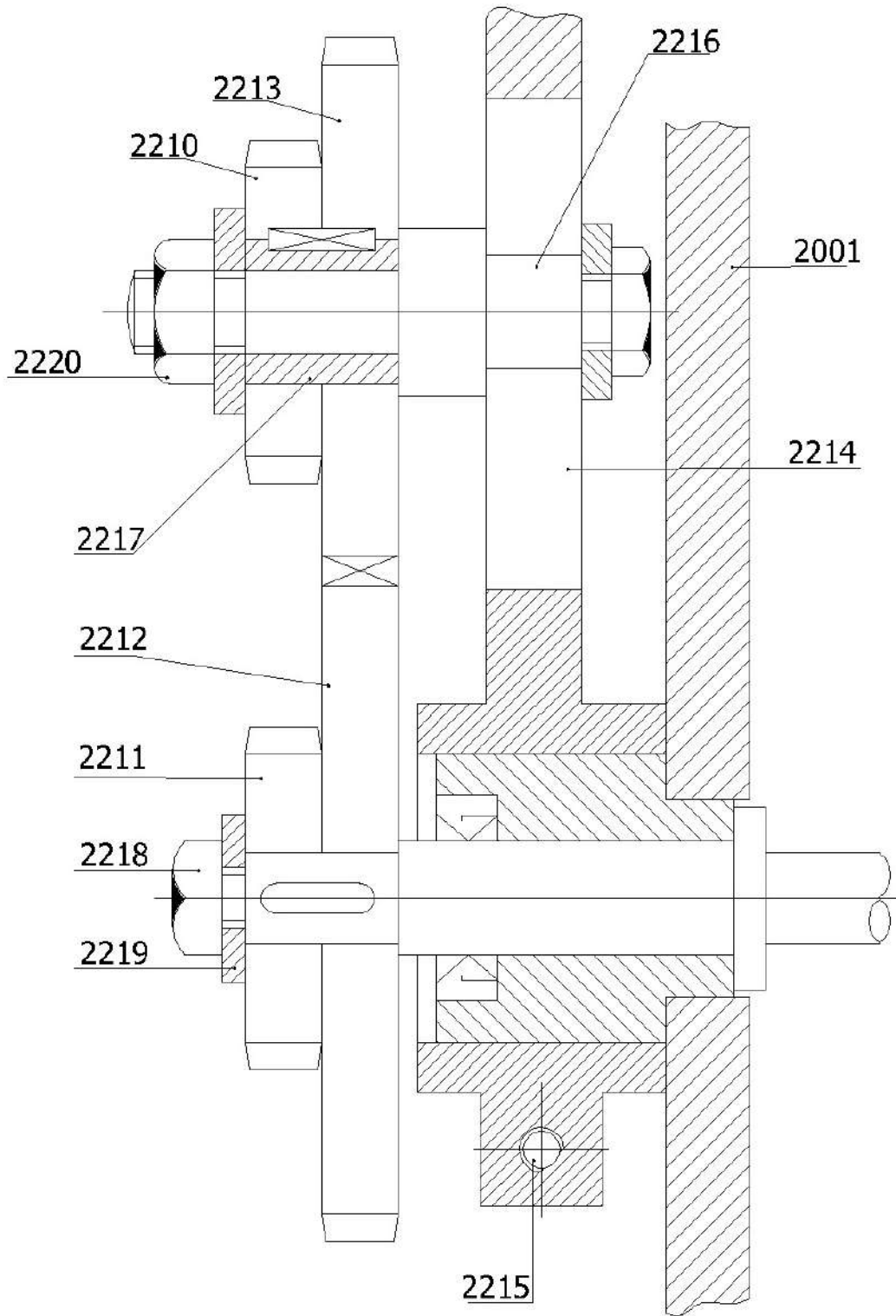


**Thread dial indicator assembly**





End Fitting Assembly



**Norton Gear Box Assembly**

<b>Part</b>	<b>Part Name</b>	<b>Qty.</b>
2001	Main body	1
2002	Input shaft	1
2003	Input shaft housing	1
2004	Input shaft outside bearing	1
2005	Cluster gear teeth 16 / 24	1
2006	Input shaft inside bearing	1
2007	Intermediate shaft	1
2008	Idler gear Teeth 32	1
2009	Idler gear Teeth 14	1
2010	Idler gear Teeth 24	1
2011	Bottom shaft bearing cover	1
2012	Bottom shaft	1
2013	Cluster gear Teeth 24 / 42	1
2014	Bearing LH side	1
2015	Bearing middle	1
2016	Tumbler rake drum	1
2017	Idler gear bracket with ball pin	1
2018	Tumbler rake drum gear Teeth 24	1
2019	Gear locking cover	1
2020	Tumbler gear Teeth 24	1
2021	Locating pin for gear	1
2022	Bearing housing	1
2024	Bearing RH side	1
2025	Out put shaft	1
2026	Bearing LH side	1
2027	Gear Teeth 30	1
2028	Gear Teeth 28	1
2029	Gear Teeth 26	1
2030	Gear Teeth 24	1
2031	Gear Teeth 22	1
2032	Gear Teeth 20	1



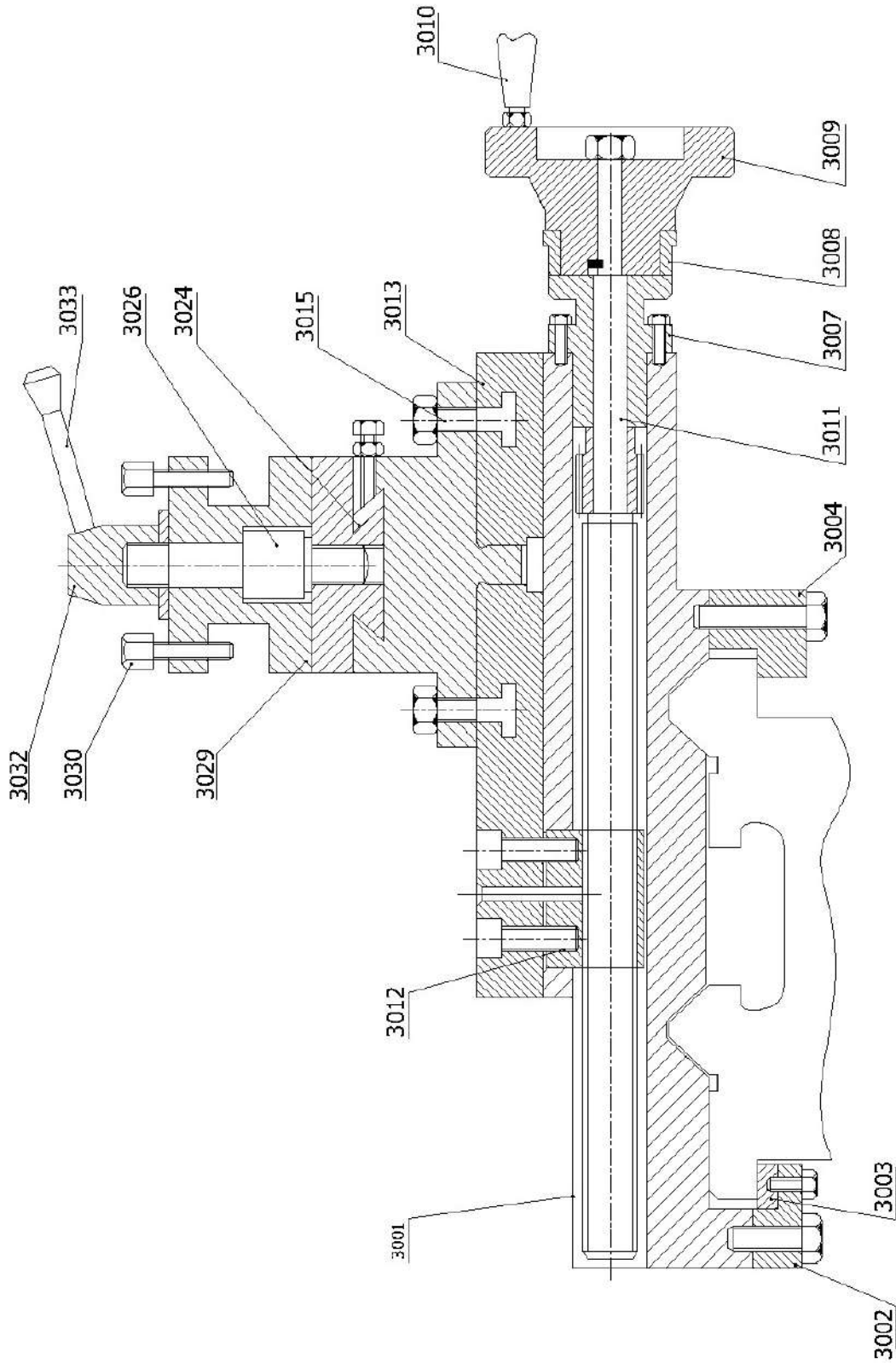
<b>Part NO.</b>	<b>Part Name</b>	<b>Qty.</b>
2033	Gear Teeth 18	1
2034	Gear Teeth 16	1
2035	Gear lock nut	1
2036	Out put shaft bearing RH	1
2037	Out put shaft bearing cover	1
2038	Out put shaft coupler	1
2039	Body cover	1
2040	Shifting fork for position A-B	1
2041	Pin with lever for position A-B	1
2042	Guide bush for position A-B	1
2043	Knob for position A-B	1
2044	Shifting fork for position C-D	1
2045	Pin with lever for position C-D	1
2046	Guide bush for position C-D	1
2047	Knob for position C-D	1
2048	Rake gear shaft 12 Teeth	1
2049	Knob for position 1 to 8	1
2050	Inter locking block	1
2051	Inter locking key	1
2052	Positioning side plat	1
2053	Wedge block	2
2054	Cam with pin	1
2055	Knob for engage / disengage	1
2056	Knob handle	1
2057	Locking pin for engage / disengage	1
2058	Oil filling plug	1
2059	Oil level indicator	1
2060	Oil drain plug	1



<b>Part NO.</b>	<b>Part Name</b>	<b>Qty.</b>
2201	Lead screw	1
2202	Thrust bearing	2
2203	Offend bracket	1
2204	Check nut	2
2205	Thread dial indicator pin	1
2206	Thread dial indicator body	1
2207	Thread dial indicator clamping stud	1
2208	Thread dial indicator gear (Z=16)	1
2209	Change gear (Z=44)	1
2210	Change gear (Z=51)	1
2211	Change gear (Z=52)	1
2212	Change gear (Z=88)	1
2213	Change gear (Z=100)	1
2214	Arm plate	1
2215	Arm clamping bolt	1
2216	Arm stud	1
2217	Arm stud bush	1
2218	Hex nut	1
2219	Washer	1
2220	Hex nut	1

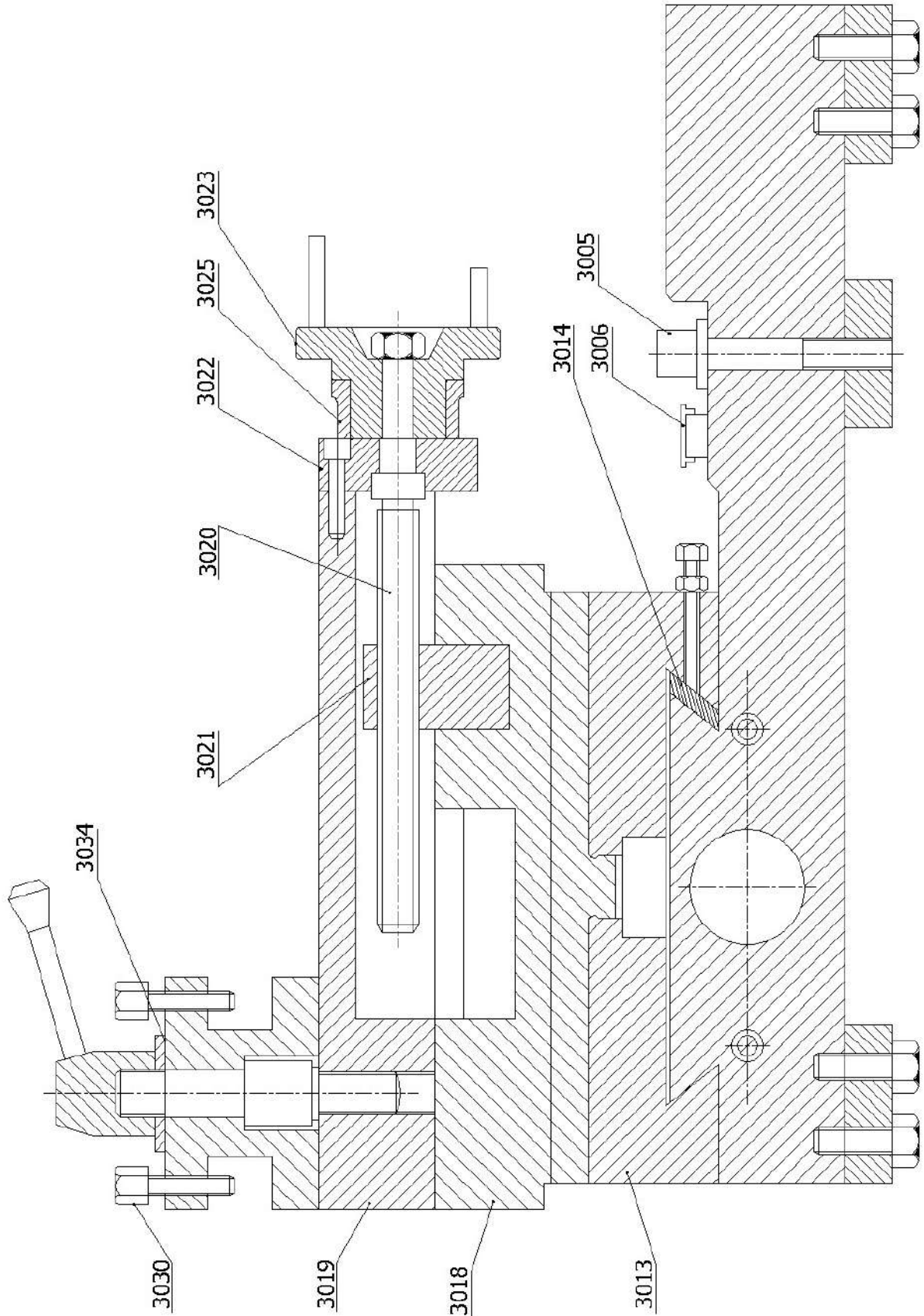


5.3 Carriage Slide Assembly





Carriage Slide Assembly



**Carriage Slide Assembly**

<b>Part No.</b>	<b>Part Name</b>	<b>Qty.</b>
3001	Carriage	1
3002	Rear keeper plate	1
3003	Setting wedge	1
3004	Front keeper blocks	2
3005	Clamping bolt	1
3006	Oil cups	2
3007	Surface boss	1
3008	Micro ring	1
3009	Surface slide hand wheel	1
3010	Plastic handle grip with stud	1
3011	Surface screw with gear (Z=12)	1
3012	Surface screw gun metal nut	1
3013	Surface slide	1
3014	Surface wedge	1
3015	T bolts	2
3018	Compound slide base	1
3019	Compound slide	1
3020	Compound screw	1
3021	Compound screw nut	1
3022	Compound slide boss	1
3023	Compound slide handle	1
3024	Compound slide wedge	1
3025	Compound slide micro ring	1

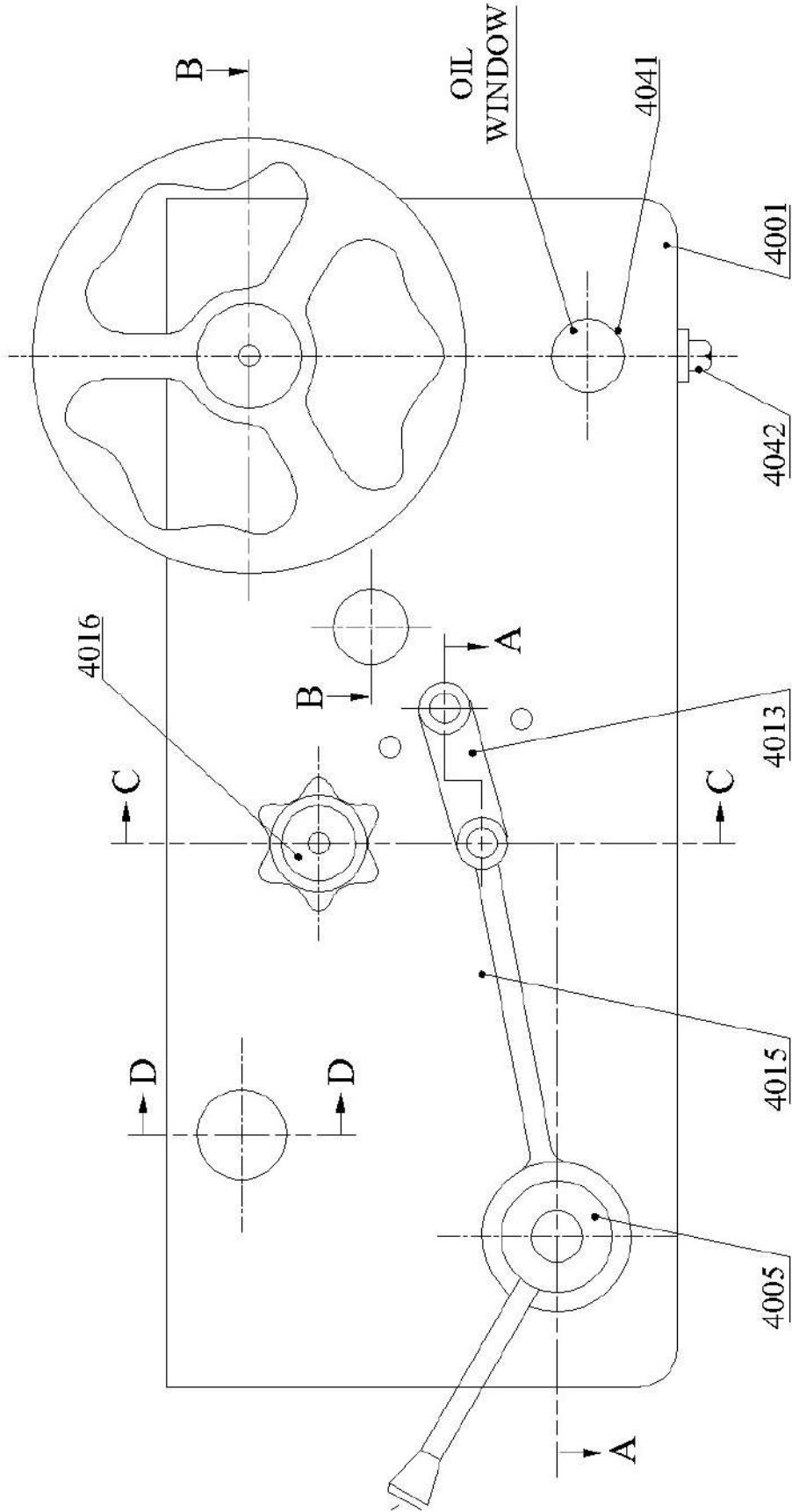




<b>Part No.</b>	<b>Part Name</b>	<b>Qty.</b>
3026	Tool post stud	1
3029	Tool post	1
3030	Tool clamping bolts	8
3031	Tool post bolts key	1
3032	Tool post clamping boss	1
3033	Tool post clamping handle with plastic grip	1
3034	Washer	1
3035	Wiper front square	1
3036	Wiper front V	1
3037	Wiper rear square	1
3038	Wiper rear V	1

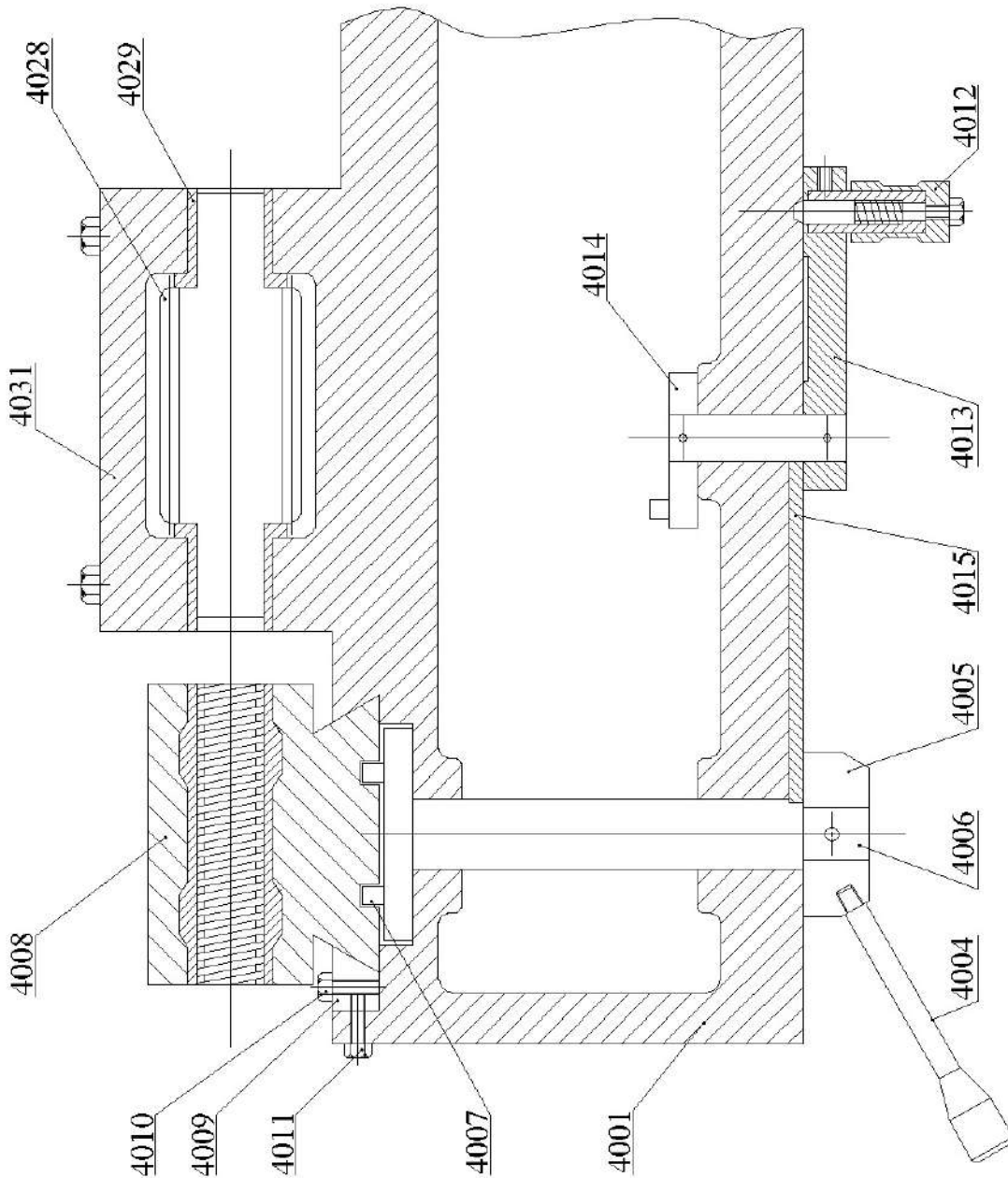


5.4 Apron Assembly





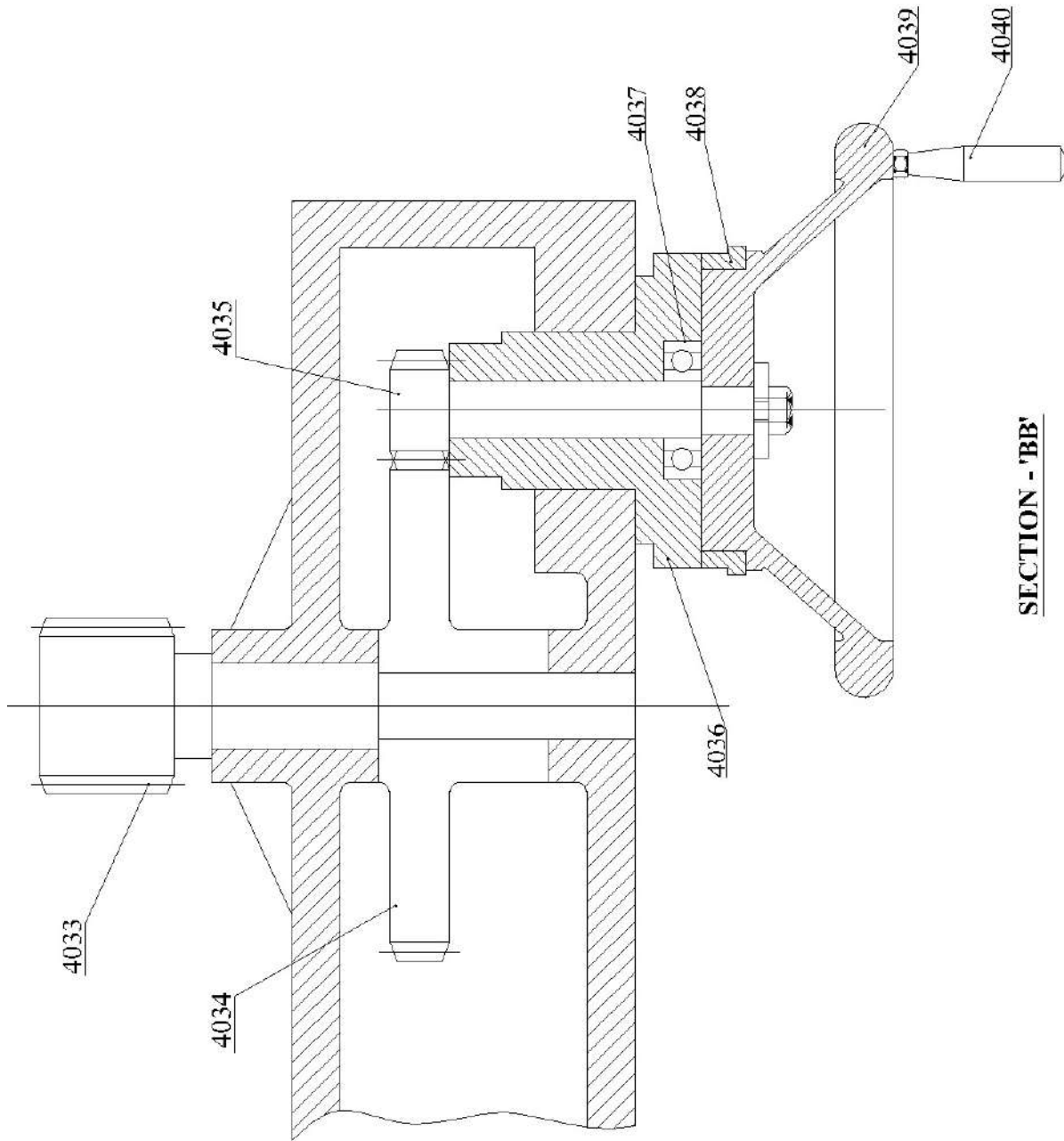
Apron Assembly



SECTION - 'AA'



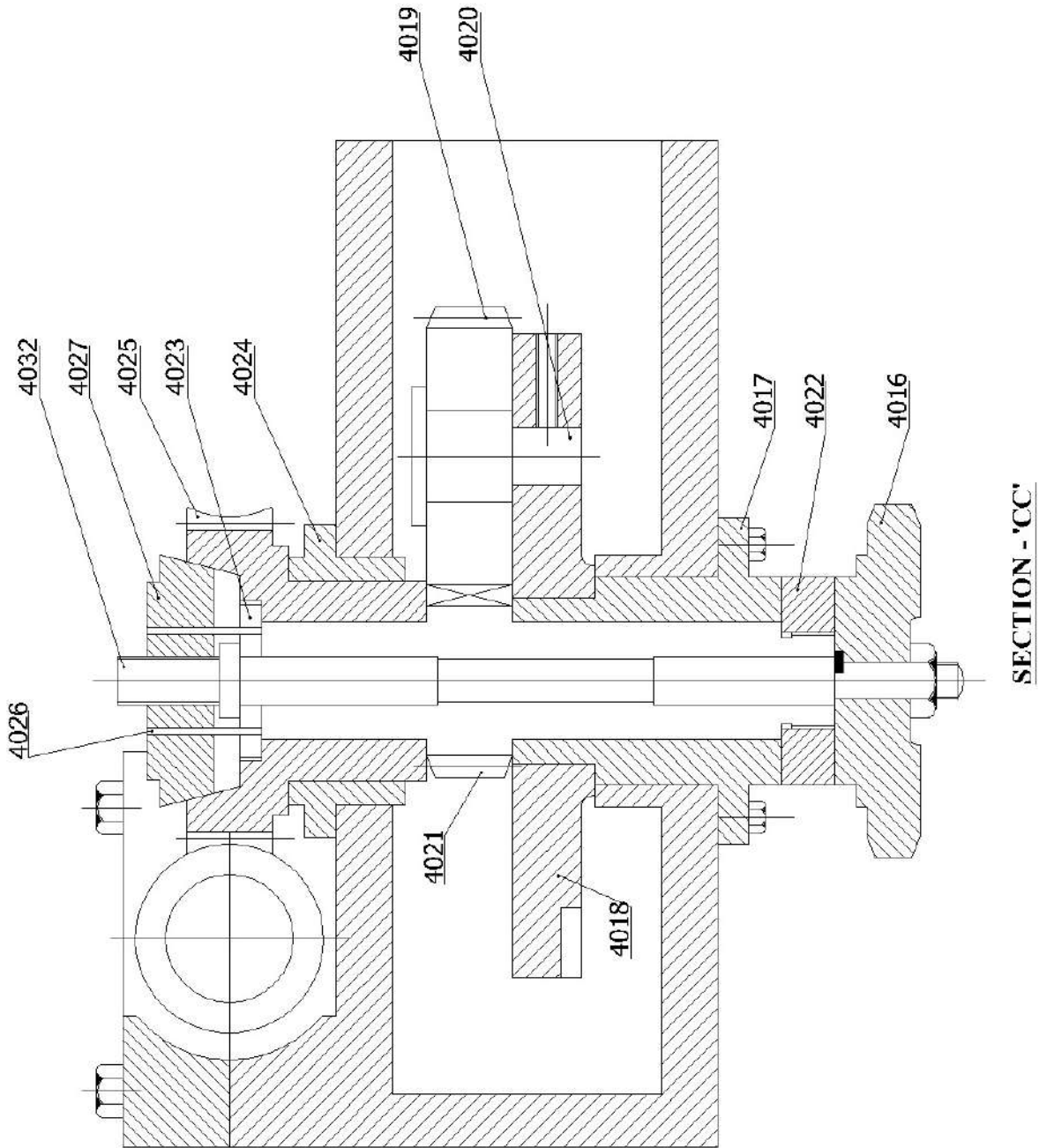
Apron Assembly



SECTION - 'BB'



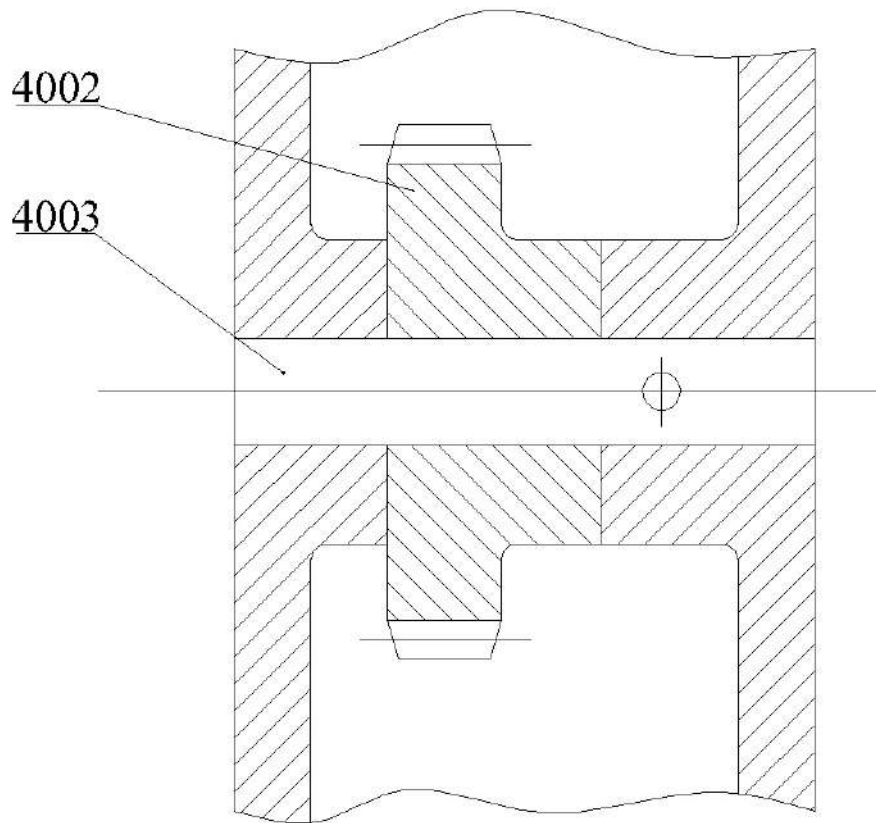
Apron Assembly



SECTION - 'CC'



**Apron Assembly**



**SECTION = 'DD'**

**Apron Assembly**

<b>Part NO.</b>	<b>Part Name</b>	<b>Qty.</b>
4001	Apron body	1
4002	Surface feed gear Z=30 teeth	1
4003	Surface gear pin	1
4004	Half nut engaging handle with plastic grip	1
4005	Half nut shaft cap	1
4006	Half nut shaft	1
4007	Half nut operating cap with studs	1
4008	Half nuts	1
4009	Half nut setting wedge	1
4010	Setting wedge clamping bolts	2
4011	Setting bolts for wedge	3
4012	Feed selecting handle with pin and spring	1
4013	Feed selecting lever	1
4014	Eccentric pin of feed selecting lever	1
4015	Inter locking key	1
4016	Feed engaging knob	1
4017	Feed engage shaft boss	1
4018	Connecting arm	1
4019	Connecting arm gear Z=22 teeth	1
4020	Connecting arm gear pin	1
4021	Boss gear Z=16 teeth	1
4022	Check nut for boss gear	1
4023	Washer	1
4024	Worm wheel support	1
4025	Worm wheel Z=29 teeth	1
4026	Pin	1
4027	Taper washer	1
4028	Worm single start	1

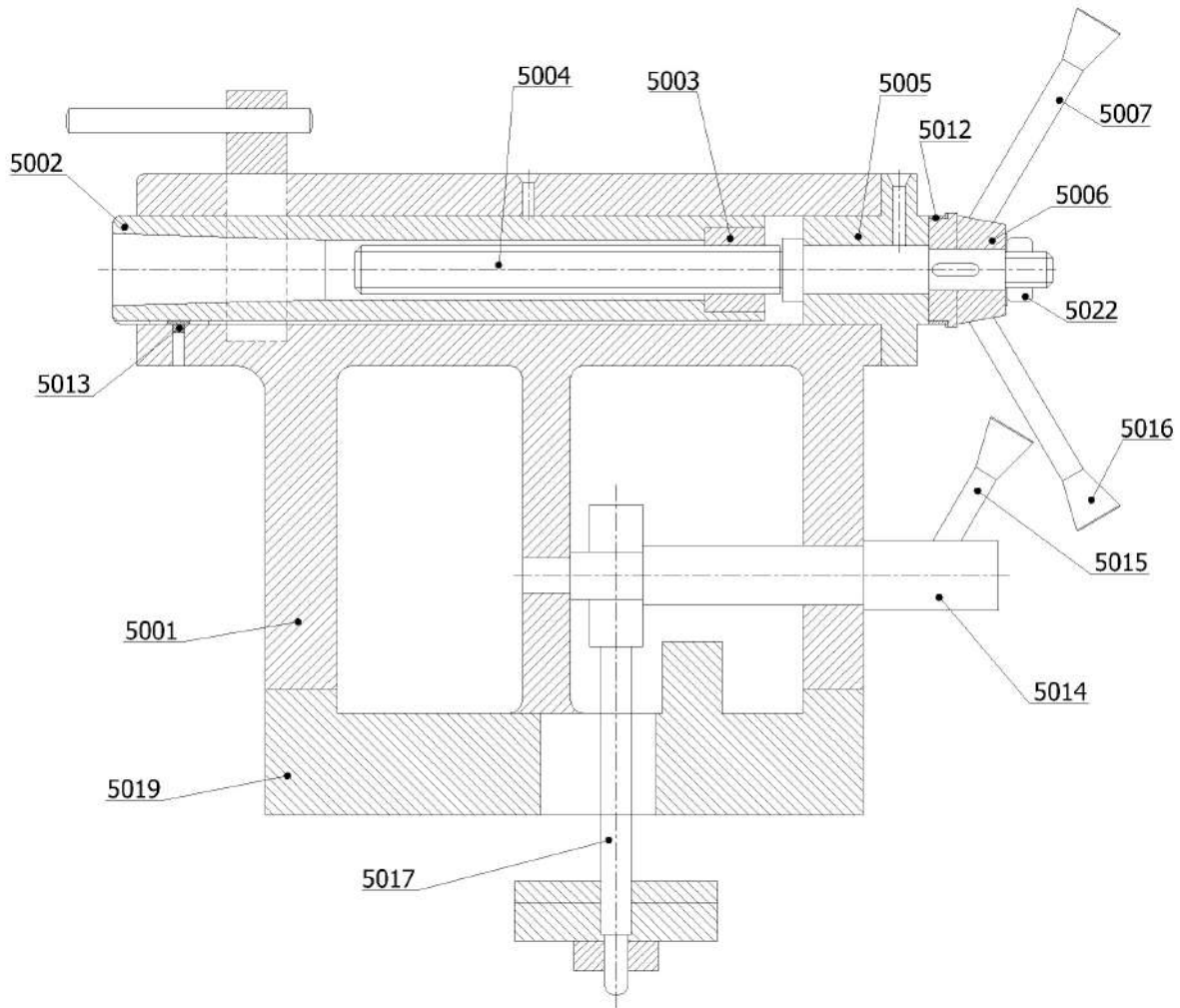


<b>Part NO.</b>	<b>Part Name</b>	<b>Qty.</b>
4029	Bush	1
4031	Worm unit cap	1
4032	Feed engaging stud	1
4033	Rake pinion shaft Z=18 teeth	1
4034	Gear Z=66 teeth	1
4035	Hand operated gear shaft Z=12 teeth	1
4036	Gear shaft boss	1
4037	Ball bearing - 6004	1
4038	Micro ring	1
4039	Hand wheel	1
4040	Plastic grip with handle shaft	1
4041	Oil level indicator	1
4042	Oil drain plug	1



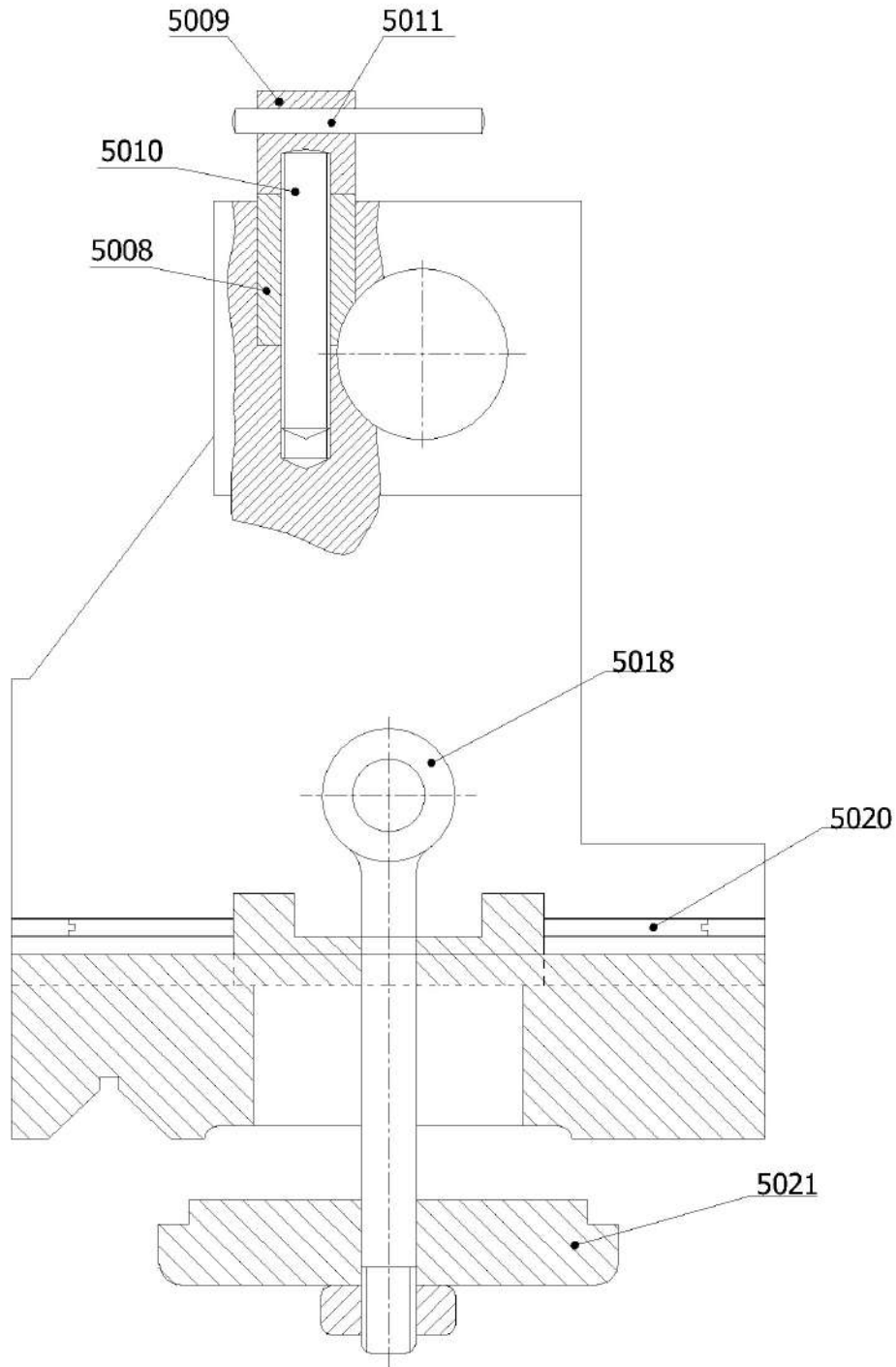


5.5 Tail stock Assembly





Tail stock Assembly



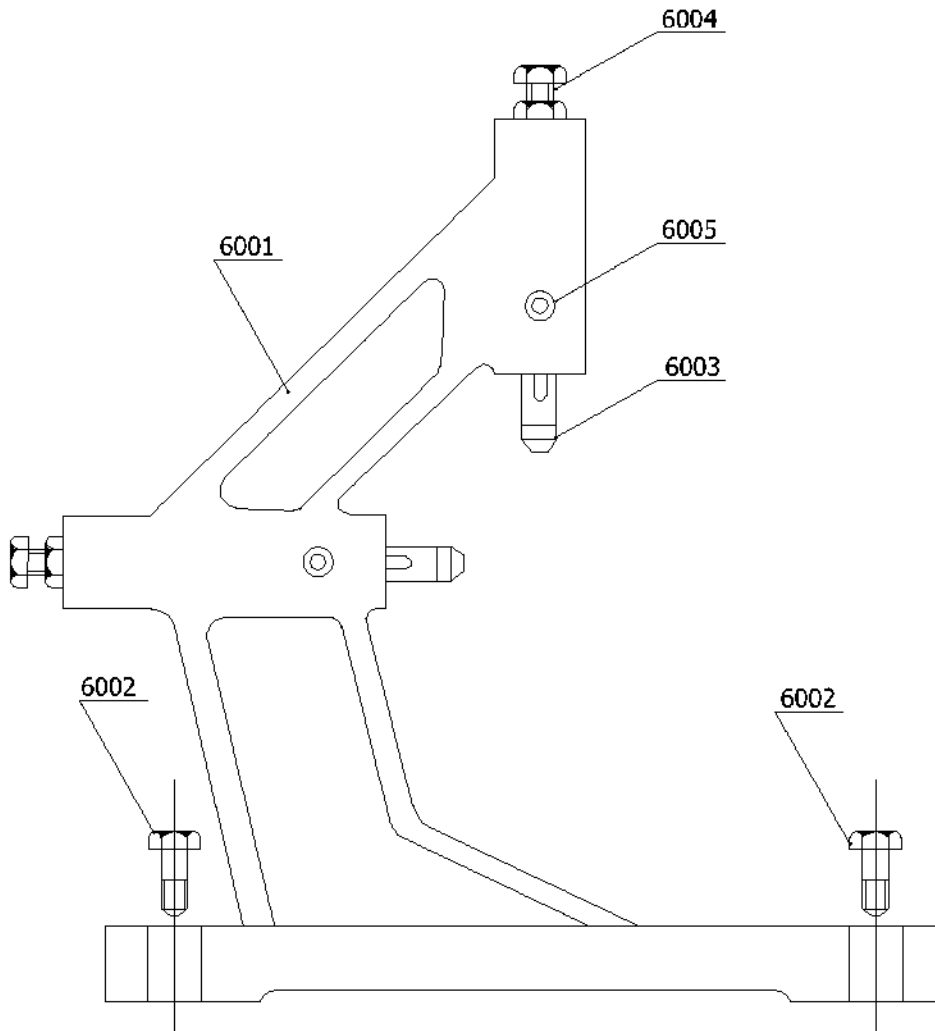
**Tail Stock Assembly**

<b>Part No.</b>	<b>Part Name</b>	<b>Qty.</b>
5001	Tail stock body	1
5002	Tail stock spindle	1
5003	Tail stock screw nut	1
5004	Tail stock screw	1
5005	Tail stock boss	1
5006	Tail stock hand wheel boss	1
5007	Handle	3
5008	Spindle locking bush	1
5009	Spindle locking boss	1
5010	Spindle locking stud	1
5011	Locking handle	1
5012	Micro ring	1
5013	Key for tail stock spindle	1
5014	Eccentric shaft	1
5015	Eccentric shaft handle	1
5016	Bakelite grip	4
5017	Clamping stud	1
5018	Clamping stud collar	1
5019	Tail stock base	1
5020	Adjusting bolt	1
5021	Clamping plate	1
5022	Nut	2



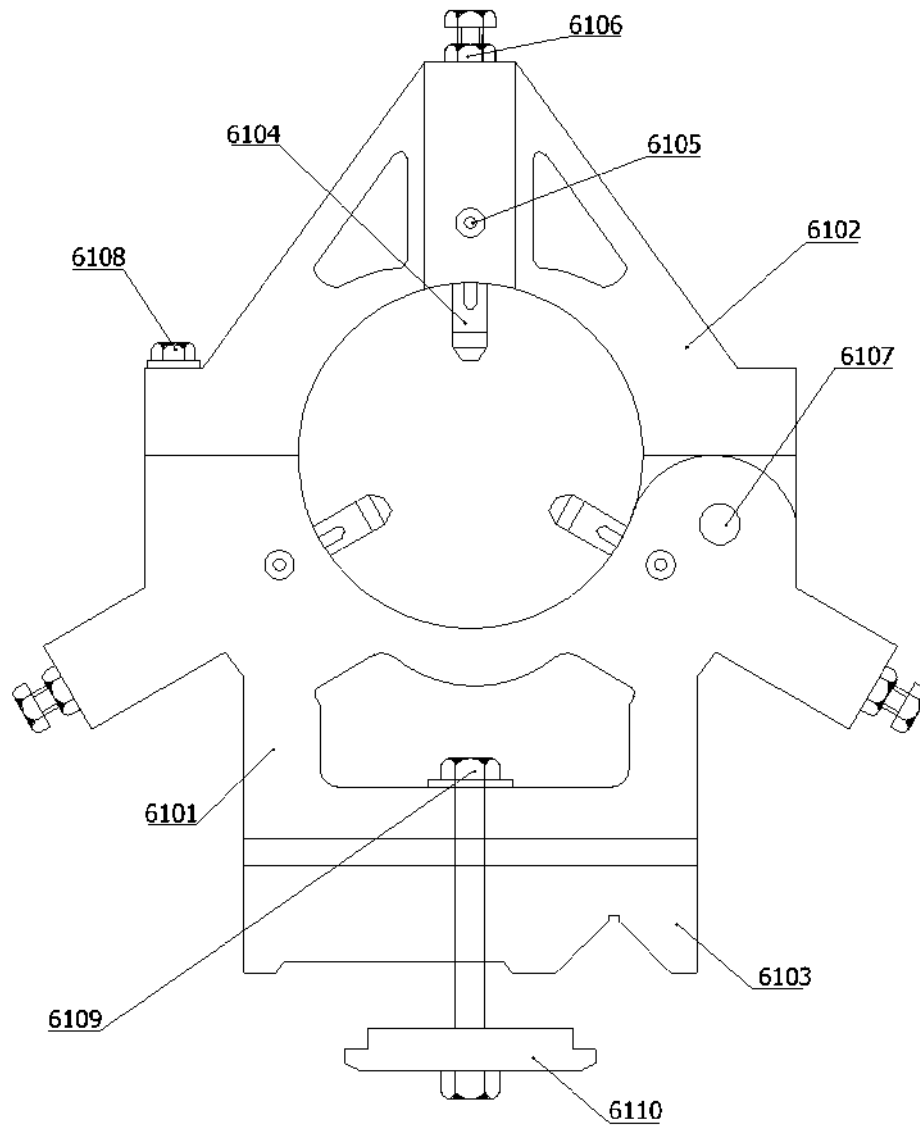
5.6 Accessories (Optional)

**FOLLOW REST ASSEMBLY**





**STEADY REST ASSEMBLY**

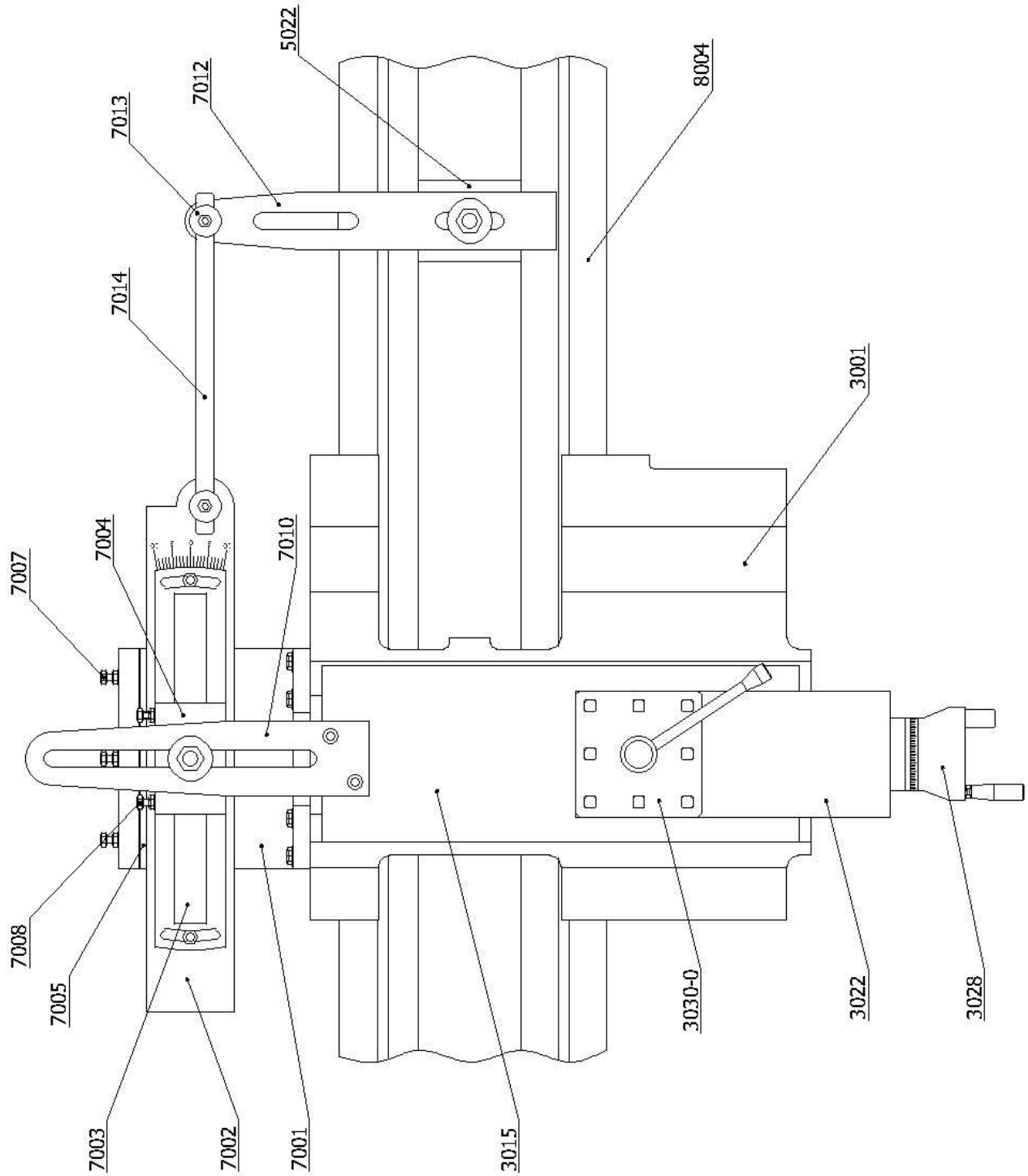


**Follow Rest & Steady Rest Assembly**

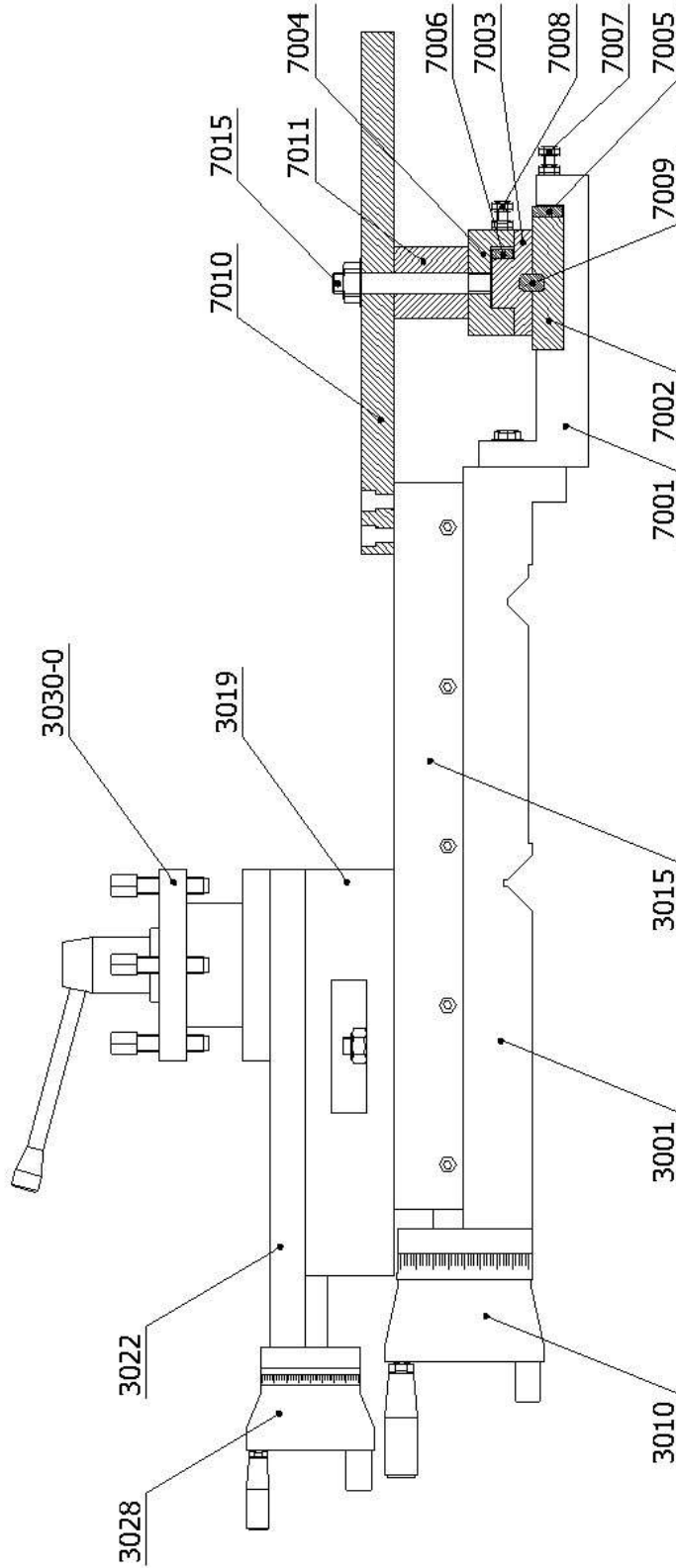
<b>Part No.</b>	<b>Part Name</b>	<b>Qty.</b>
6001	Follow rest body	1
6002	Clamping bolt	2
6003	Guide jaw with G.M. pad	2
6004	Adjusting bolt with check nuts	2
6005	Guide jaw clamping bolt	2
6101	Steady rest body lover	1
6102	Steady rest body upper	1
6103	Steady rest base	1
6104	Guide jaw with G.M. pad	3
6105	Guide jaw clamping bolt	3
6106	Guide jaw adj. bolt with lock nut	3
6107	Hinge pin	1
6108	Upper & Lower half clamping bolt	1
6109	Steady rest clamping stud	1



Taper turning attachment



Taper turning attachment



Tapper turning attachment





<b>Part No.</b>	<b>Part Name</b>	<b>Qty.</b>
7001	Angle bracket	1
7002	Bracket guide	1
7003	Swivel guide	1
7004	Guide block	1
7005	Wedge for bracket guide	1
7006	Wedge for guide block	1
7007	Setting bolt for wedge	3
7008	Setting bolt for wedge	2
7009	Location plug	1
7010	Surface clamp	1
7011	Height piece	1
7012	Bed clamp	1
7013	Clamp pad	2
7014	Clamp rod	1
7015	Stud	1





TEST CHART

SR.	FIGURE	OBJECTS	PERMISSIBLE DEVIATIONS	ACTUAL ERROR
1		Straightness of carriage slide ways (a) In longitudinal direction (b) In transverse direction.	0.03 (Convex) 0.04	
2		Straightness of carriage movement in horizontal plane.	0.02mm	
3		Parallelism of tailstock movement to carriage movement (a) In horizontal plane (b) In vertical plane	0.03 mm 0.03 mm	
4		(a) Periodic axial slip (b) Comming of the face plate mounting surface	(a) 0.01mm (b) 0.02 mm	
5		Runout or spindle nose	0.01 mm	
6		True running of taper bore of spindle (a) Near to the spindle (b) At a list. 300 mm	0.01 mm 0.02 mm	
7		Parallelism of spindle axis to the carriage movement (a) In horizontal plane (b) In vertical plane	(a) 0.015/300 (towards tool only) (b) 0.02/300 (upwards only)	



SR.	FIGURE	OBJECTS	PERMISSIBLE DEVIATIONS	ACTUAL ERROR
8		Parallelism of external surface of tailstock sleeve to carriage movement (a) In horizontal plane (b) In vertical plane	(a) 0.015/100 (towards tool only) (b) 0.02/100 (upwards only)	
9		Parallelism of taper bore of tailstock sleeve to carriage movement (a) In horizontal plane (b) In vertical plane	(a) 0.03/300 (towards tool only) (b) 0.03/300 (upwards only)	
10		Difference in height between headstock and tailstock centre	0.04 mm (Tailstock centre higher than head stock centre)	
11		Parallelism of the longitudinal movement of the tool slide to the spindle axis	0.04/300 upwards only	
12		Squareness of the transverse movement of the cross slide to spindle axis	0.02/300 mm	
13		Axial slip	0.015 mm	
14		Accuracy of the pitch generated by the lead screw	(a) 0.04/300 (b) 0.015/50	

**PRACTICAL TEST**

SR.	FIGURE	OBJECTS	PERMISSIBLE DEVIATIONS	ACTUAL ERROR
1		Turning of cylindrical test piece held in chuck (a) Roundness (b) Cylindricity	(a) 0.01 (b) 0.04/300	
2		Facing of cylindrical test piece held in chuck (Flat or Concave only.)	0.025/300 dia.	
3		Thread cutting a cylindrical test piece (a) Deviation over length or 300 (b) Deviation over length of 50	(a) 0.04 mm (b) 0.015 mm	
4		Hardness of lathe bed (a) Standard bed (b) Flame harden bed	180 BHN min. 300 BHN min.	--

- **THE MACHINE CONFIRMS TO GRADE – 1 STANDARD OF ACCURACY AS PRESCRIBED BY D.O. (TOOLS).**
- **THE TEST CHART USED IS TO IS : 1878 (PART – 1) – 1971.**

- INSPECTION DEPT : \_\_\_\_\_.

**For, Gujarat Lathe Mfg. Co. Pvt. Ltd.  
Shapar (Dist. Rajkot)**