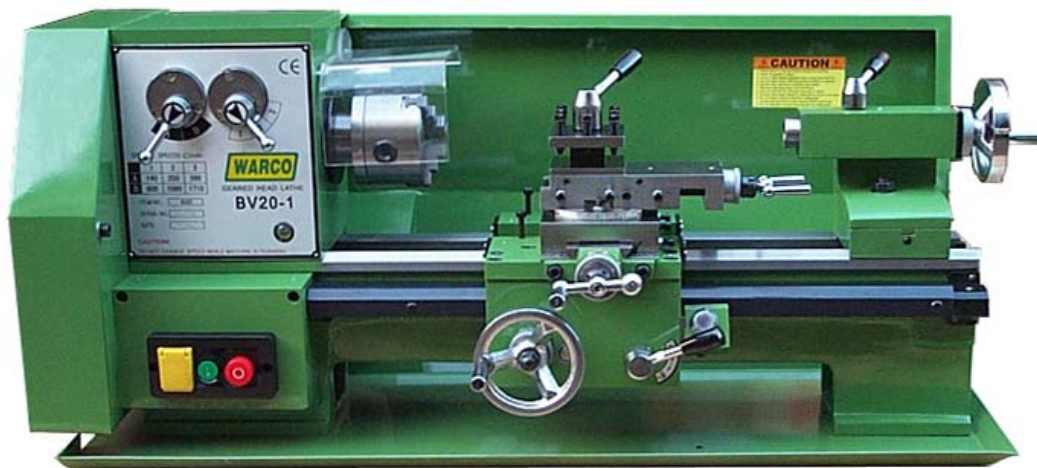




# OPERATOR'S MANUAL

## BV20-1

(IMPERIAL MACHINE)



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## **NOTE**

The information contained in this handbook is intended as a guide to the operation of these machines and does not form part of any contract. The data it contains has been obtained from the machine manufacturer and from other sources. Whilst every effort has been made to ensure the accuracy of these transcriptions it would be impracticable to verify each and every item. Furthermore, development of the machine may mean that the equipment supplied may differ in detail from the descriptions herein. The responsibility therefore lies with the user to satisfy himself that the equipment or process described is suitable for the purpose intended.

## **LIMITED WARRANTY**

Warren Machine Tools Ltd. Makes every effort to assure that its products meet high quality and durability standards and warrants to the original retail consumer/purchaser of our products that each product be free from defects in materials and workmanship as follow: 1 YEAR LIMITED WARRANTY ON ALL PRODUCTS UNLESS SPECIFIED OTHERWISE. This Warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, normal wear-and tear, repair or alterations outside our facilities, or to a lack of maintenance.

We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special, or consequential damages arising from the use of our products.

To take advantage of this warranty, the product or part must be returned to us for examination, postage prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection discloses a defect, we will either repair or replace the product, or refund the purchases price if we cannot readily and quickly provide a repair or replacement, if you are willing to accept a refund. We will return repaired product or replacement at WARCO'S expense, but if it is determined there in no defect, or that the defect resulted from causes not within the scope of WARCO'S warranty, then the user must bear the cost of storing and returning the product.

The manufacturers reserve the right to change specifications at any time as they continually strive to achieve better quality equipment.

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## **WARNING!**

**Read and understand the entire instruction manual before attempting set-up or operation of this drilling machine!**

- 1. This machine is designed and intended for use by properly trained and experienced personnel only.** If you are not familiar with the proper safe use of mills, do not use this machine until proper training and knowledge has been obtained.
- 2. Keep guards in place.** Safety guards must be kept in place and in working order.
- 3. Remove adjusting keys and wrenches.** Before turning on machine, check to see that any adjusting wrenches are removed from the tool.
- 4. Reduce the risk of unintentional starting.** Make sure switch is in the OFF position before plugging in the tool.
- 5. Do not force tool.** Always use a tool at the rate for which it was designed.
- 6. Use the right tool.** Do not force a tool or attachment to do a job for which it was not designed.
- 7. Maintain tools with care.** Keep tools sharp and clean for best and safest performance. Follow instructions for lubrication and changing accessories.
- 8. Always disconnect the machine from the power source before adjusting or servicing.**
- 9. Check for damaged parts.** Check for alignment of moving parts, breakage of parts, mounting, and any other condition that may affect the tools operation. A guard or any part that is damaged should be repaired or replaced.
- 10. Turn power off. Never leave a machine unattended.** Do not leave a machine until it comes to a complete stop.
- 11. Keep work area clean,** Cluttered areas and bench invite accidents.
- 12. Do not use in a dangerous environment.** Do not use machines in damp or wet locations, or expose them to rain. Keep work area well lighted.
- 13. Keep children and visitors away.** All visitors should be kept a safe distance from the work area.
- 14. Make the workshop child proof.** Use padlocks, master switches, and remove starter keys.
- 15. Wear proper apparel.** Loose clothing, gloves, neckties, rings, bracelets, or other jewelry may get caught in moving parts. Non-slip footwear is recommended. Wear protective hair covering to contain long hair. Do not wear any type of glove.
- 16. Always use safety glasses.** Every day glasses only have impact resistant lenses; they are not safety glasses.
- 17. Do not overreach.** Keep proper footing and balance at all times.
- 18. Don not put hands near the cutter while the machine is operating.**
- 19. Do not perform any set-up work while machine is operating.**
- 20. Read and understand all warnings posted on the machine.**
- 21. This manual is intended to familiarize you with the technical aspects of this mill.** It is not nor was it intended to be a training manual.
- 22. Failure to comply with all of these warnings may result in serious injury.**
- 23. Some dust created** by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm.

## SPECIFICATIONS:

### BV20-1

#### Capacities:

Swing Over Bed	200 mm	8"
Swing Over Cross Slide	115 mm	4-3/5"
Distance Between Centers	330 mm	13"

#### Headstock:

Hole Through Spindle	20mm	4/5"
Taper in Spindle Nose	MT3	MT3
Number of Spindle Speeds	6	6
Range of Spindle Speeds	140-1710r.p.m.	140-1710r.p.m

#### Feeding and Threading:

Number of Metric Threads	9	9
Range of Metric Threads	0.4~2mm	0.4~2mm
Number of Imperial Threads	13	13
Range of Imperial Threads	8-32TPI	8-32TPI
Range of Longitudinal Feed	0.002-0.006in/r	0.002-0.006in/r

#### Compound and Carriage:

Tool Post Type	4-Way	4-Way
Maximum Compound Slide Travel	70mm	2-4/5"
Maximum Cross Slide Travel	115mm	4-3/5
Maximum Carriage Travel	350mm	16"

#### Tailstock:

Tailstock Spindle Travel	20mm	4/5"
Taper in Tailstock Spindle	MT2	MT2

#### Miscellaneous:

Main Motor	3/4HP, 1PH, 240V	
Dimension:		
Length	1050mm	42"
Width	580mm	23"
Height	550mm	22"
Weight	105KGS	231LBS

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**⚠ WARNING**

**Read and understand the entire contents of this Manual before attempting set-up or operation!  
Failure to comply may cause serious injury!**

## CONTENTS OF SHIPPING CONTAINER

- 1 Lathe
- 1  $\Phi 100$  Three Jaw Chuck (mounted on lathe)
- 1 Chuck Cover (mounted on lathe)
- 1 Top Rest Cover (mounted on lathe)
- 1 Steady Rest
- 1 Follow Rest
- 1  $\Phi 100$  Four Jaw Chuck
- 1 Face Plate
- 1 Operator Manual
- 1 Threading Dial
- 1 Toolbox & Tools

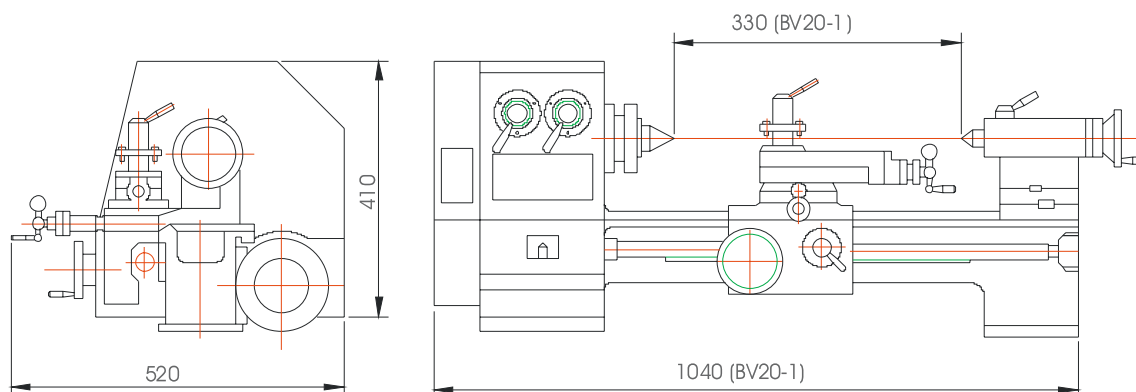
## TOOLBOX CONTENTS (Fig. 1)

- 1 V-belt 0~710
- 1 Center MT 2
- 1 Center MT3
- 1 Chuck Key 6mm
- 1 Hex Socket Wrench 6mm
- 1 Double End Spanner 8-10mm
- 1 Double End Spanner 12-14mm
- 1 Double End Wrench 17~19mm
- 1 Tool-post Square Wrench 8mm
- 15 Change Gears



**Fig. 1**

## OUTLINE OF THE MACHINE TOOL

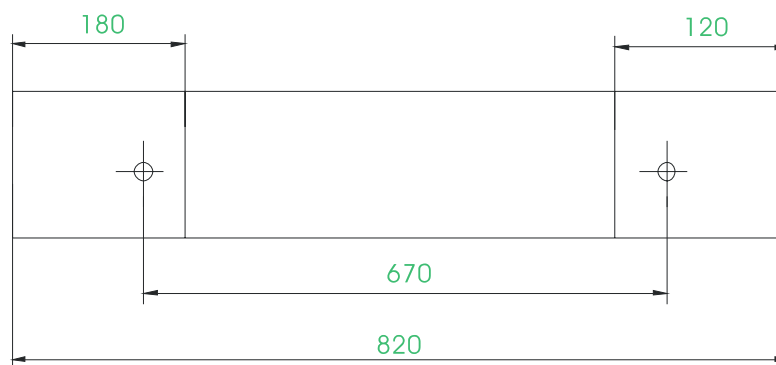


**Fig. 2**

## UNCRATING AND CLEAN-UP

1. Finish removing the wooden crate from around the lathe
2. Check all the accessories of the machine tool according to the packing list.
3. Unbolt the lathe from the shipping crate bottom.
4. Choose a location for the lathe that is dry, has good lighting and has enough room to be able to service the lathe on all four sides.
5. With adequate lifting equipment, slowly raise the lathe off the shipping crate bottom. **Do not lift by spindle.** Make sure lathe is balanced before moving to sturdy bench or stand.
6. To avoid twisting the bed, the lathe's location must be absolutely flat and level. Bolt the lathe to the stand (if used). If using a bench, through bolt for best performance.
7. Clean all rust protected surfaces using a mild commercial solvent, kerosene or diesel fuel. Do not use paint thinner, gasoline or lacquer thinner. These will damage painted surfaces. Cover all cleaned surfaces with a light film of 20W machine oil.
8. Remove the end gear cover. Clean all components of the end gear assembly and coat all gears with a heavy, non-slinging grease.

## FOUNDATION DRAWING



**Fig. 3**

## LUBRICATION

### WARNING!

**Lathe must be serviced at all lubrication points and all reservoirs filled to operating level before the lathe is placed into service!**

**Failure to comply may cause serious damage to the lathe!**

1. **Headstock** - To remove the cover of headstock before fill (A, Fig. 4). Oil must be up to indicator mark in oil sight glasses (B, Fig. 4). Drain oil completely by removing the plug (C, Fig.5) and clean out all residues. Refill after the first months. Then change oil in the headstock every two months.

2. **Change Gears** – Lubricate one oil cup (D, Fig. 5) with 20W machine oil once daily.

3. **Top Slide** - Lubricate two oil cups (E, Fig. 6) with 20W machine oil once daily.

4. **Cross Slide** - Lubricate one oil cups (F, Fig. 6) and one oil cups (G, Fig. 7) with 20W machine oil once daily.

5. **Carriage** - Lubricate Four oil cups (H, Fig. 6) with 20W machine oil once daily.

6. **Tailstock** - Lubricate two oil cups (J, Fig. 8) with 20W machine oil once daily.

7. **Leadscrew** - Lubricate one oil cup (K, Fig. 8) and two oil cups (L, Fig. 4) with 20W machine oil once daily.



Fig. 4

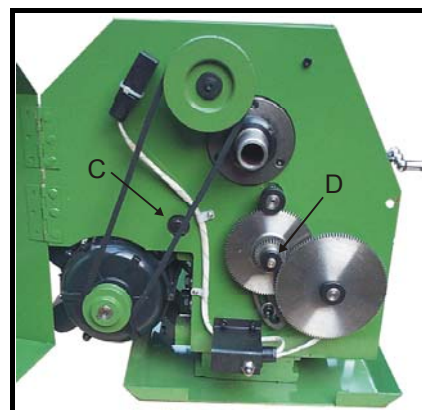


Fig. 5

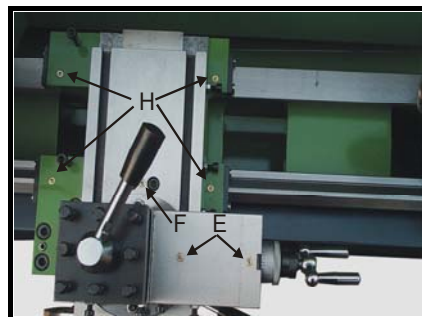


Fig. 6

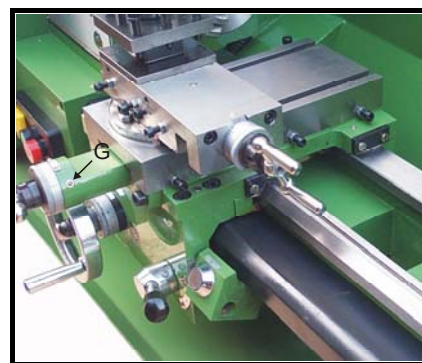


Fig. 7



**WARNING!**

Connection of the lathe and all other electrical work may only be carried out by an authorized electrician!

Failure to comply may cause serious injury and damage to the machinery and property!

**WARNING!**  
Make sure the lathe is properly ground!  
Failure to do so may cause serious injury and  
damage to user!

- 8 -

3. **Chuck Safety Cover** (D, Fig. 10) – mounted on a pivot bar on the rear top front face of the headstock. It can be tipped out of the way to access the chuck when it is stationary and repositioned over the chuck during operation. When it opened, the power will be disconnected by the micro-switch (G, Fig. 11).

4. **Change Gear Safety Cover** (C, Fig. 10) – When you open the cover to change the gear or repair the lathe. It will stop by the micro-switch (F, Fig. 11).

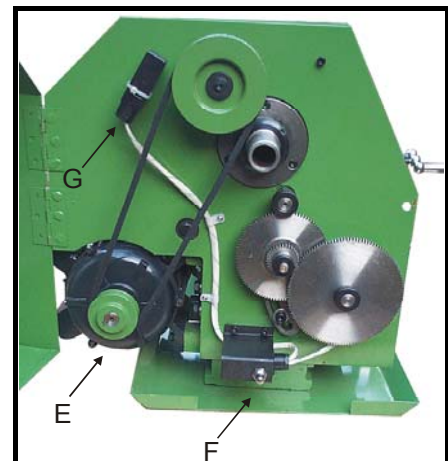
**Finish operation, don't cut off the electricity supply directly, stop the lathe first.**



**Fig. 10**

**WARNING!**

**Disconnect the lathe from power source, during maintenance, commissioning or repair!**  
**Failure to do so may cause serious injury!**



**Fig. 11**

## GENERAL DESCRIPTION

1 **Lathe Bed** - the lathe bed (A, Fig. 12) is made of cast iron with low vibration and high rigidity. The bed integrates the headstock and drive unit, for attaching the lathe saddle and leadscrew and for guiding the lathe saddle and tailstock.

2 **Headstock** - the headstock (B, Fig.12) houses the work spindle with bearing arrangement and the drive unit. The work spindle transmits the main movement during the turning process by gears. It also holds the workpieces by clamping device. The work spindle is driven by motor via pulleys.

3. **Apron** – the apron (C, Fig. 13) is mounted to the carriage. Quick travel of the apron is accomplished by means of rack and pinion which is mounted on the bed, operated by a hand wheel on the apron. Automatic longitudinal feed is accomplished via the leadscrew also.

4. **Carriage** – the carriage (D, Fig. 14) contains the control elements for the different feeds and supports the apron.

5. **Cross Slide** - the cross slide (E, Fig.14) is mounted on the carriage and moves on a dovetailed slide which can be adjusted for play by means of the gib.

6. **Top Slide** – the top slide (F, Fig.14) is mounted on the cross slide by T-screw which can be rotated 360 degree. The top slide moves on a dovetailed slide and has an adjusted gib, locking screw.

7. **Tool Post** – the tool post (G, Fig. 14) is located on a central pivot mounted on the top slide. It has four position 'click' locator that locates it to its major axis. It can be held at any angle by the tool post locking clamp.

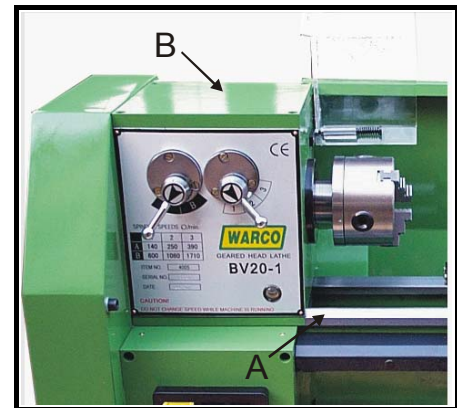


Fig. 12

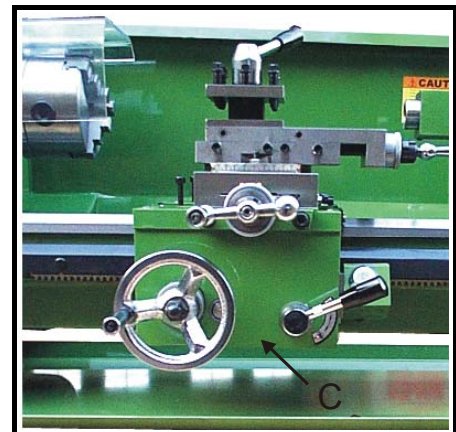


Fig. 13

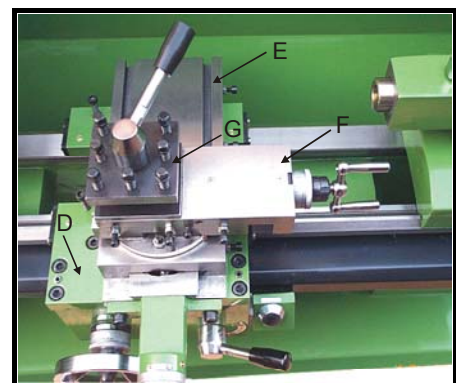


Fig. 14

8. **Tailstock** – the tailstock (H, Fig. 15) can be locked at any location by a bolt. It has a heavy duty quill which can be moved forward or backward. It is used for centring and drilling, supporting long shafts, turning between centres as well as turning long, thin tapers.

9. **Leadscrew** – the leadscrew (I, Fig. 15) under the leadscrew cover through the various gear trains available rotates at selected ratio to the spindle to enable the various threads to be cut, or to provide a feed rate for the saddle when auto feed is selected.

10. **Change Gears Box** – the box (J, Fig. 16) is mounted the side of headstock. It consists of pulleys and change gears. The rotation is transmitted through motor to spindle by pulleys and the feeds or threads are achieved with change gears and leadscrew. **Open the lid case (K, Fig. 16) to make long workpieces!**

11. **Steady Rest** – the steady rest (L, Fig. 17) serves as a support for shafts on the free tailstock end. The steady rest is mounted on the bedway and secured from below with a bolt, nut and locking plate. The sliding fingers require continuous lubrication at the contact points with the workpiece to prevent them from premature wear.

12. **Follow Rest** – the follow rest (M, Fig. 17) is mounted on the saddle and follows the movement of the turning tool. Only two fingers are required as the place of the third is taken by the turning tool. The follow rest is used for turning operations on long, slender workpiece. It prevents the workpiece from flexing under the pressure of the cutting tool.

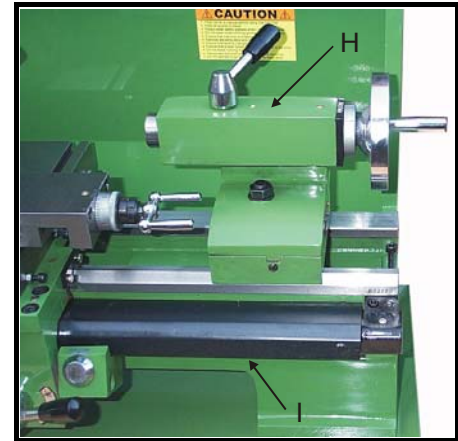


Fig. 15



Fig. 16

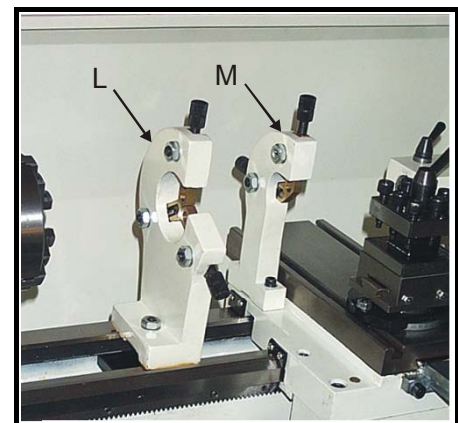


Fig. 17



## OPERATION

### WARNING!

Don't change the speed while the lathe is running!

Failure to comply may cause serious damage to the lathe!

1. **Headstock Gear Change Levers** - located on front top portion of headstock. You can select six kinds of spindle speeds by moving levers (A, B, Fig.18) right or left.

2. **Apron Controls** – the automatic longitudinal feed and thread cutting are achieved by engaging the lever (C, Fig. 19), push lever down to engage, pull lever up to disengage. The handwheel (D, Fig.19) is used to manually traverse the carriage.

3. **Cross Slide Lever** (E, Fig.19) – cross slide is moved forward and backward manually with the lever. Rotate clockwise to forward and counter-clockwise to backward.

4. **Top Slide Levers** (F, Fig.19) – located on the end of top slide. Rotate clockwise or counter-clockwise to move or position. Tool post clamping lever (G, Fig. 19) located on top of tool post. Rotate counter-clockwise to loosen and clockwise to tighten. **Turning tapers with the top slide** – loosen the two nuts (H, Fig.19) to left and right of the top slide. You can then rotate the top slide. After setting the required position, tighten the top slide.

5. **Tailstock Controls** – the tailstock sleeve (H, Fig. 20) is used to hold the tools. The sleeve is clamped with the clamping levers (I, Fig.20), Rotate counter-clockwise to loosen and clockwise to tighten. Rotate the handwheel (G, Fig.20) clockwise to advance the sleeve and counter-clockwise to retract it. The tailstock on the lathe bed can be clamped with the locking nut (K, Fig.20). If the tailstock has a heavy load, tighten the nut at right side on the bed. **Tailstock off-set adjustment** – two screws (L, Fig.20) located on the tailstock base are used to off-set the tailstock for cutting tapers. Loosening one screw while tightening the other will off-set the tailstock.



Fig. 18

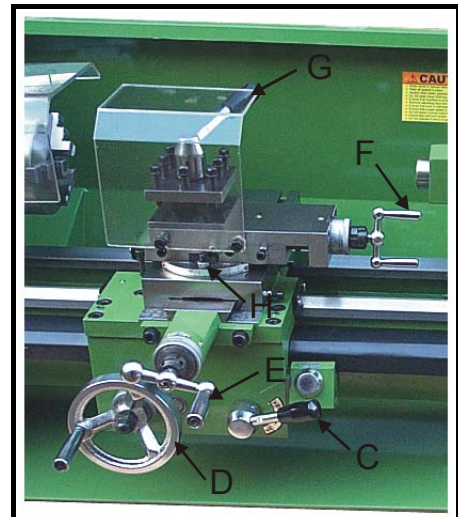


Fig. 19

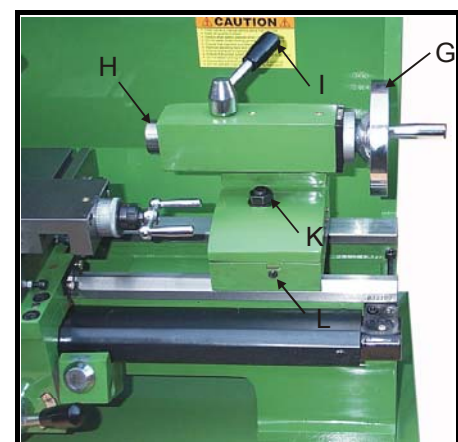


Fig. 20

**The locking nut must be loosened for this purpose.**

In order to avoid accidental extraction of the tailstock out of the lathe bed, a securing screw (M, Fig. 21) has been fitted at the end of the lathe bed.

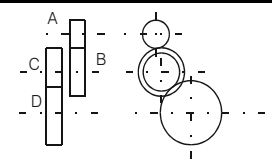



### CAUTION!

**Check clamping of tailstock and sleeve respectively for tuning jobs between centers!**

6. **Spindle Speed** – the label is attached to the headstock. It also shows the speed table (N, Fig. 22). As following table:

<b>A</b>	<b>1</b>	<b>140</b>
	<b>2</b>	<b>250</b>
	<b>3</b>	<b>390</b>
<b>B</b>	<b>1</b>	<b>600</b>
	<b>2</b>	<b>1080</b>
	<b>3</b>	<b>1710</b>

7. **Feed/Thread** – the label (P, Fig. 23) is attached to the change gears cover. It shows the feeds for straight turning, the change gear arrangement for longitudinal feed and for metric/imperial threads cutting. As following table:

	<b>FEEDING</b>		<b>CHANGE GEARS</b>						
	IN/ 	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>				
	<b>0.002</b>	24	96	32	120				
	<b>0.003</b>	24	96	44	120				
	<b>0.004</b>	36	96	40	120				
	<b>0.006</b>	40	63	36	120				
<b>THREAD</b>		<b>CHANGE GEARS</b>		<b>THREAD</b>		<b>CHANGE GEARS</b>			
<b>TPI</b> 	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>MM</b> 	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
8	63	48	120	40	0.4	63	96	68	90
9	63	48	96	36	0.5	63	96	85	90
10	63	48	96	40	0.7	49	40	68	96
11	63	48	96	44	0.8	56	40	68	96
12	63	48	96	48	1.0	63	36	68	96
14	63	48	96	56	1.25	63	96	85	36
16	63	96	96	32	1.5	63	60	85	48
18	63	96	96	36	1.7	60	49	85	48
19	63	96	96	38	2	63	60	85	36
20	63	96	96	40					
24	63	96	96	48					
26	63	96	96	52					
28	63	96	96	56					
32	63	96	96	64					

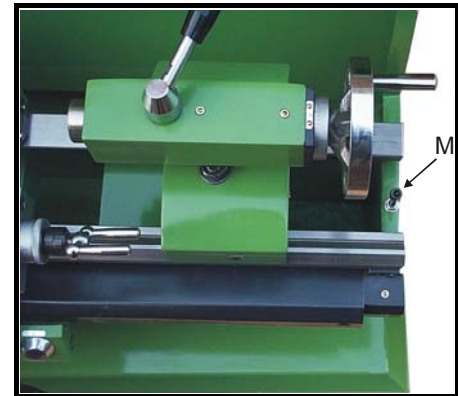


Fig. 21



Fig. 22



Fig. 23

## ADJUSTMENT

### CAUTION!

After a period of time some of the moving components may need to be adjusted due to wear.

1. **Gib Of The Top Slide** – loosen the nuts and readjust the screws (A, Fig.24) clockwise slightly. Then retighten the nuts. The top slide can be immobilised with the locking screw (B, Fig.24).

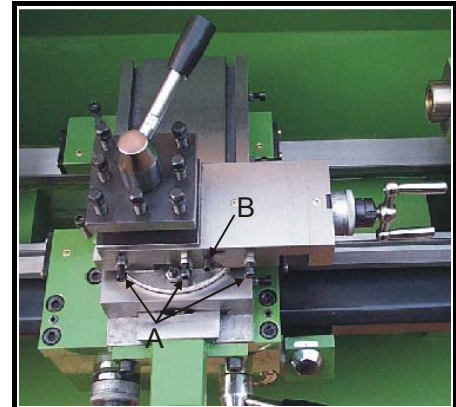


Fig. 24

2. **Gib Of Cross Slide** - loosen the nuts and readjust the screws (C, Fig.25) clockwise slightly. Then retighten the nuts. The cross slide can be immobilised with the locking screw (D, Fig.25) to prevent it moving axially during process.

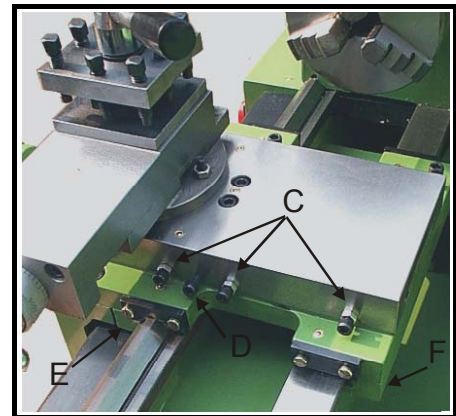


Fig. 25

3. **Clamping Plate Of Carriage** – Two front clamp plate of carriage (E, Fig.25) are mounted on two side of carriage with four hex screws. Loosen the screws, dismount the clamping plate and regrind it. One back clamping plate are mounted on the carriage with four hex screws. Loosen the screws, dismount the clamping plate and regrind it. To prevent the carriage from moving axially during the facing process, the carriage can be immobilised with locking screw (G, Fig.26) when marking recesses, we also recommend that you immobilizes the carriage.

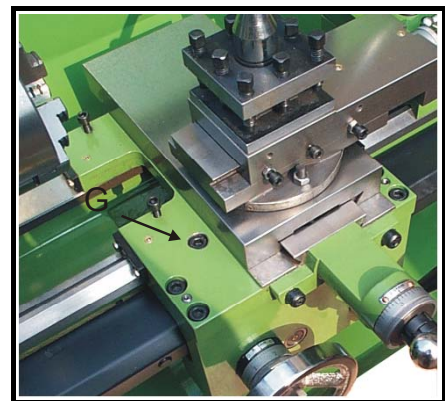


Fig. 26

## DRIVING SYSTEM

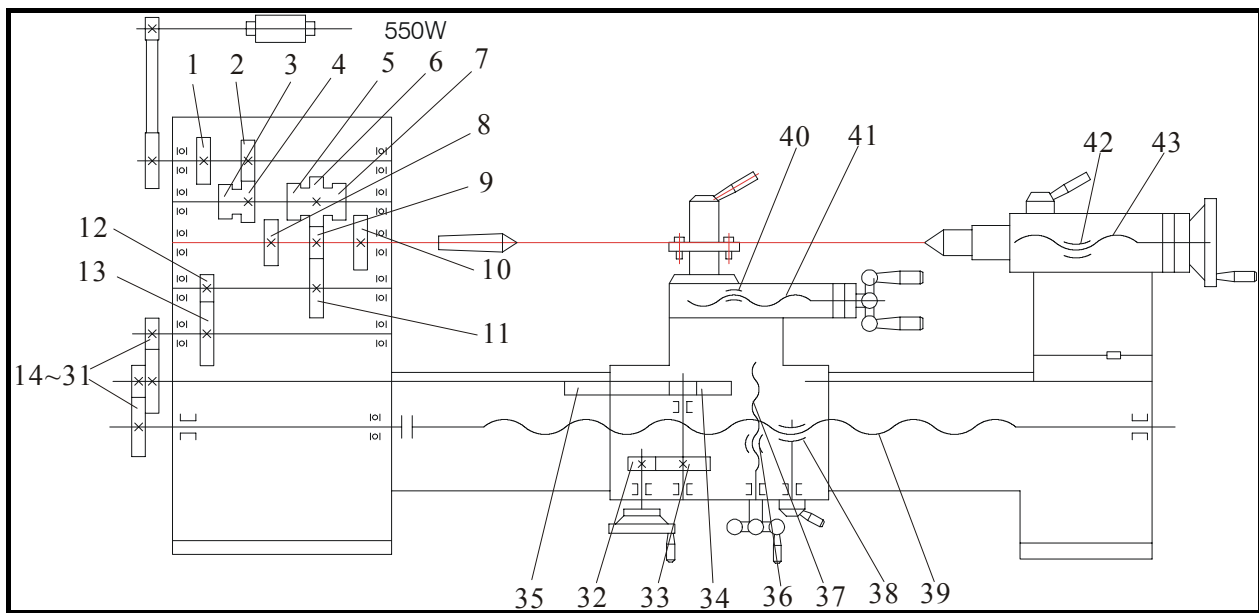


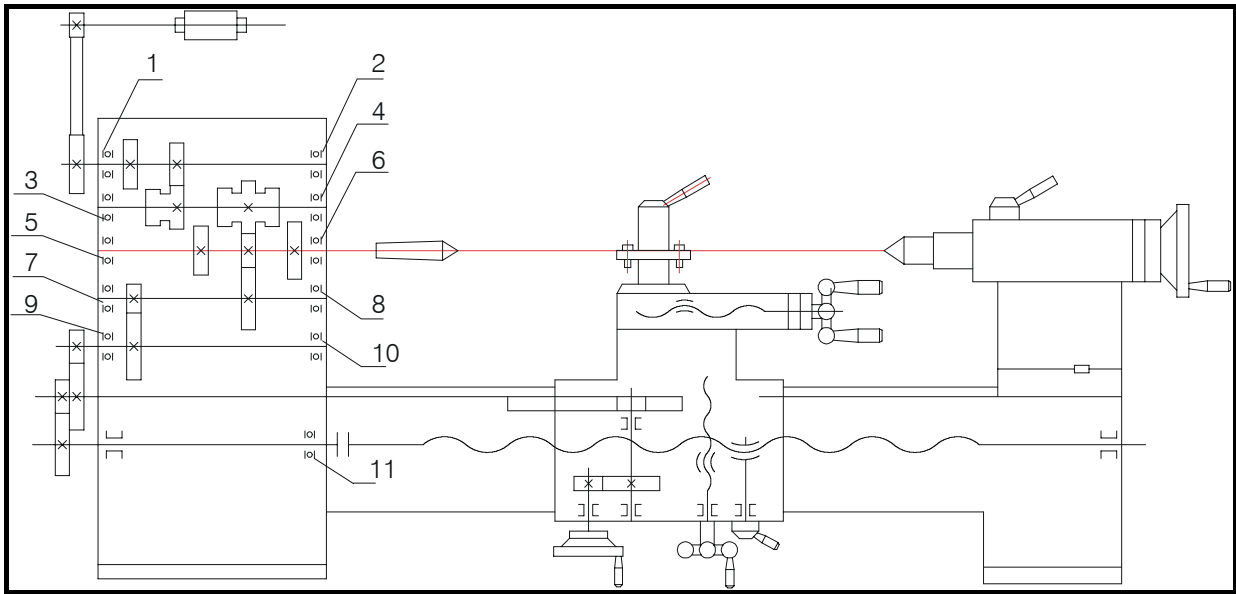
Fig. 27

Description of Gears, Screws and Nuts, as following table:

Assembly	Headstcok														
Parts No.	1	2	3	4	5	6	7	8	9	10	11	12	13		
Parts Name	Gear														
Specification	44T	19T	28T	52T	36T	45T	25T	44T	35T	55T	45T	18T	30T		
Assembly	Change Gear														
Parts No.	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Parts Name	Gear														
Specification	24T	32T	36T	38T	40T	44T	48T	48T	49T	56T	60T	63T	64T	68T	85T
Assembly	Change Gear			Apron				Cross Slide		Leadscrew		Top Slide		Tailstock	
Parts No.	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Parts Name	Gear			Gear			Rack	Nut	Bolt	Nut	Bolt	Nut	Bolt	Nut	Bolt
Specification	90T	96T	120T	17T	51T	17T		10TPI		7TPI		10TPI		10TPI	
Remark															



## BEARING ARRANGEMENT



**Fig. 28**

**Details of Bearing as following table:**

Parts No.	Model No.	Name	Specification	Quantity
1	104	Deep Slood Ball Bearing	20×42×12	1
2	104	Deep Slood Ball Bearing	20×42×12	1
3	103	Deep Slood Ball Bearing	17×35×10	1
4	103	Deep Slood Ball Bearing	17×35×10	1
5	46107	Agular Contact Ball Bearing	35×62×14	1
6	46108	Agular Contact Ball Bearing	40×68×15	1
7	103	Deep Slood Ball Bearing	17×35×10	1
8	103	Deep Slood Ball Bearing	17×35×10	1
9	103	Deep Slood Ball Bearing	17×35×10	1
10	103	Deep Slood Ball Bearing	17×35×10	1
11	8104	Thrust Ball Bearing	20×35×10	2

## MAINTENANCE

Keep the maintenance of the machine tool during the operation to guarantee the accuracy and service life of the machine tool.

1. In order to retain the machine's precision and functionality, it is essential to treat it with care, keep it clean and grease and lubricate it regularly. Only through good care, you can be sure that the working quality of the machine will remain constant. **Disconnect the machine plug from the mains supply whenever you carry out cleaning, maintenance or repair work!**
2. Lubrication all slideways lightly before every use. The change gears and the leadscrew must also be lightly lubricated with lithium base grease.
3. During the operation, the chips which falls onto the sliding surface should be cleaned timely, and the inspection should be often made to prevent chips falling into the position between the machine tool saddle and lathe bed guide way. Asphalt felt should be cleaned at certain time. **Do not remove the chips with your bare hands. There is a risk of cuts due to sharp-edged chips.**
4. After the operation every day, eliminate all the chips and clean different part of the machine tool and apply machine tool oil to prevent rusting.
5. In order to maintain the machining accuracy, take care of the center, the surface of the machine tool for the chuck and the guide way and avoid mechanical damage and the wear due to improper guide.
6. If the damage is found, the maintenance should be done immediately.

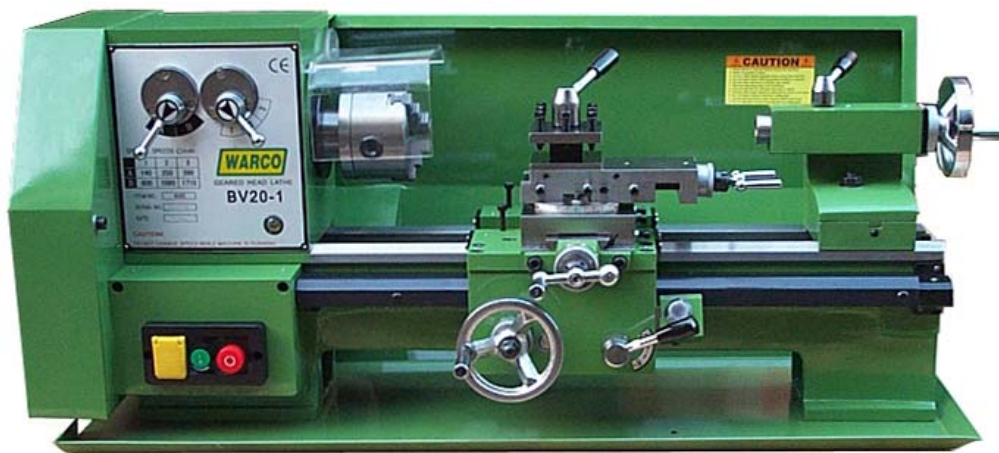
## TROUBLE SOLUTION

Problem	Possible Cause	Solution
surface of workpiece too rough	tool blunt tool springs feed too high radius at the tool tip too small	resharpen tool clamp tool with less overhang reduce feed increase radius
workpiece becomes cone	centres are not aligned top slide not aligned well	adjust tailstock to the centre align top slide well
lathe is chatter	feed too high spindle bearings is loosen	reduce feed readjusted the bearings
centre runs hot	workpiece has expanded	loosen tailstock centre
edge of tool has a short life	cutting speed too high cross feed too high	reduce cutting speed lower cross feed
cutting edge breaks off	wedge angle too small spindle bearings is loosen	increase wedge angle readjusted the bearings
cut thread is wrong	tool is clamped incorrectly wrong pitch wrong diameter	adjust tool to the center adjust the right pitch change workpiece to correct size



## PARTS LISTS

### BV20-1 BENCH LATHE



#### Warren Machine Tools Ltd

Warco House, Fisher Lane, Chiddingfold, Surrey GU84TD

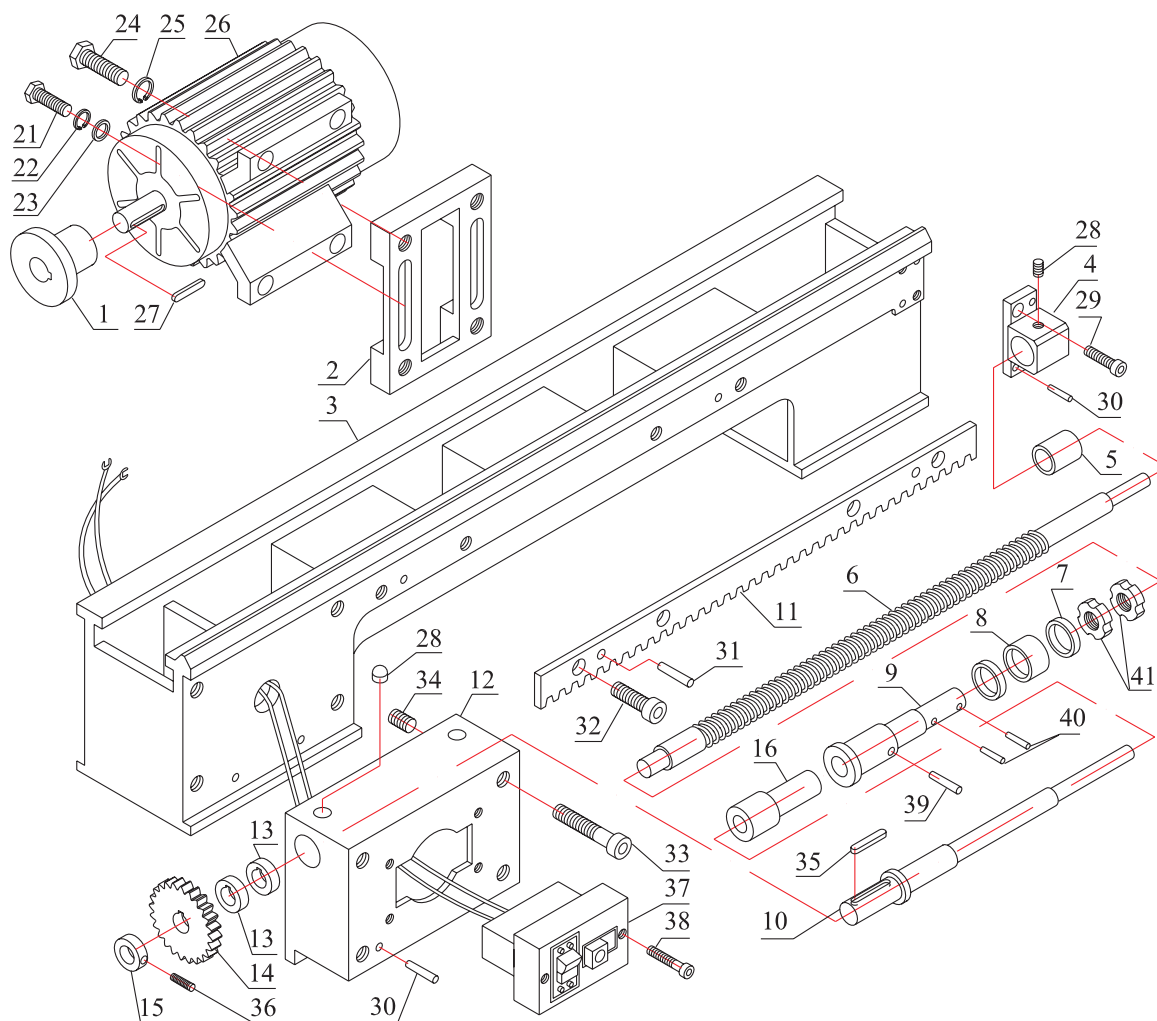
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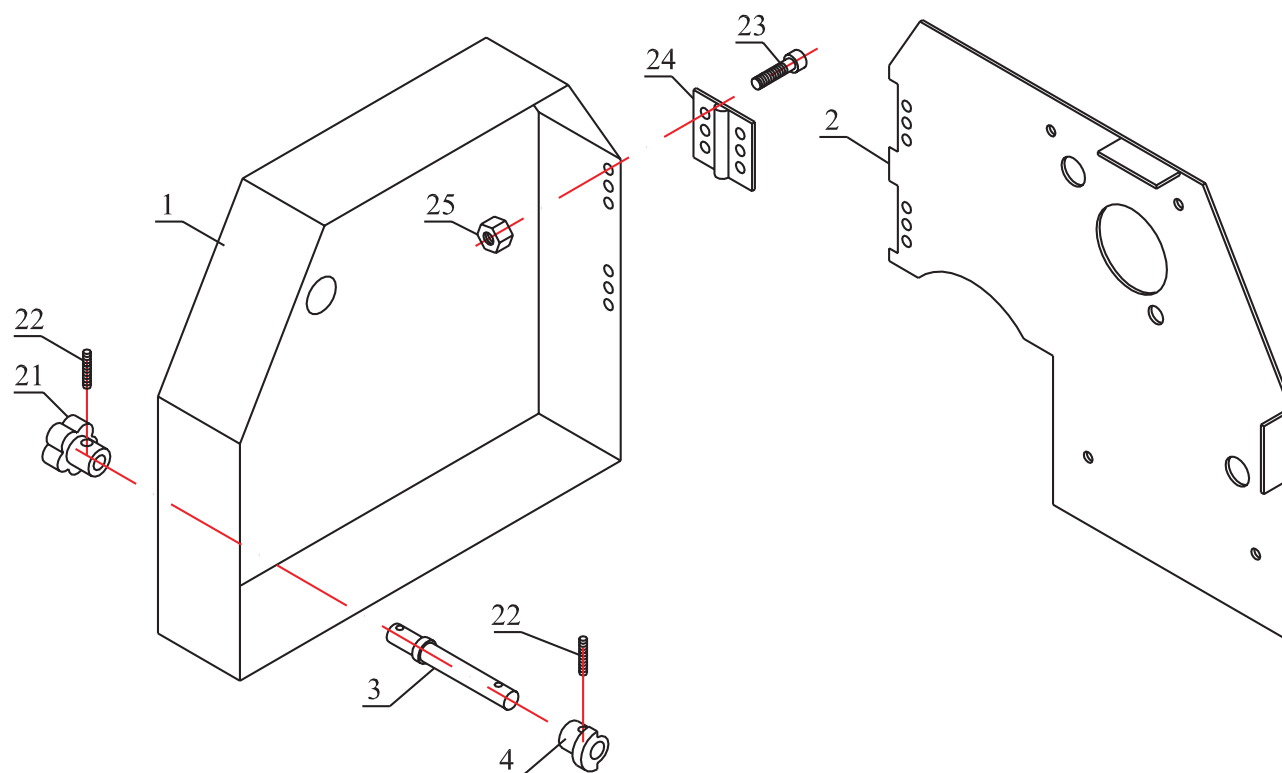
## BV20-1 lathe bed assembly



Parts No.	Description	Specification	QTY'
1	Motor Pulley		1
2	Motor Mounting Plate		1
3	Bed		1
4	Bracket		1
5	Sleeve		1
6	Leadscrew		1
7	Pushing Ring		1
8	Sleeve		1
9	Connection Ring		1
10	Shaft		1
11	Rack		1
12	Cover		1
13	Washer		2
14	Change Gear		
15	Washer		1
16	Flange		1
21	Screw	M8X20	4
22	Spring Washer	8	4

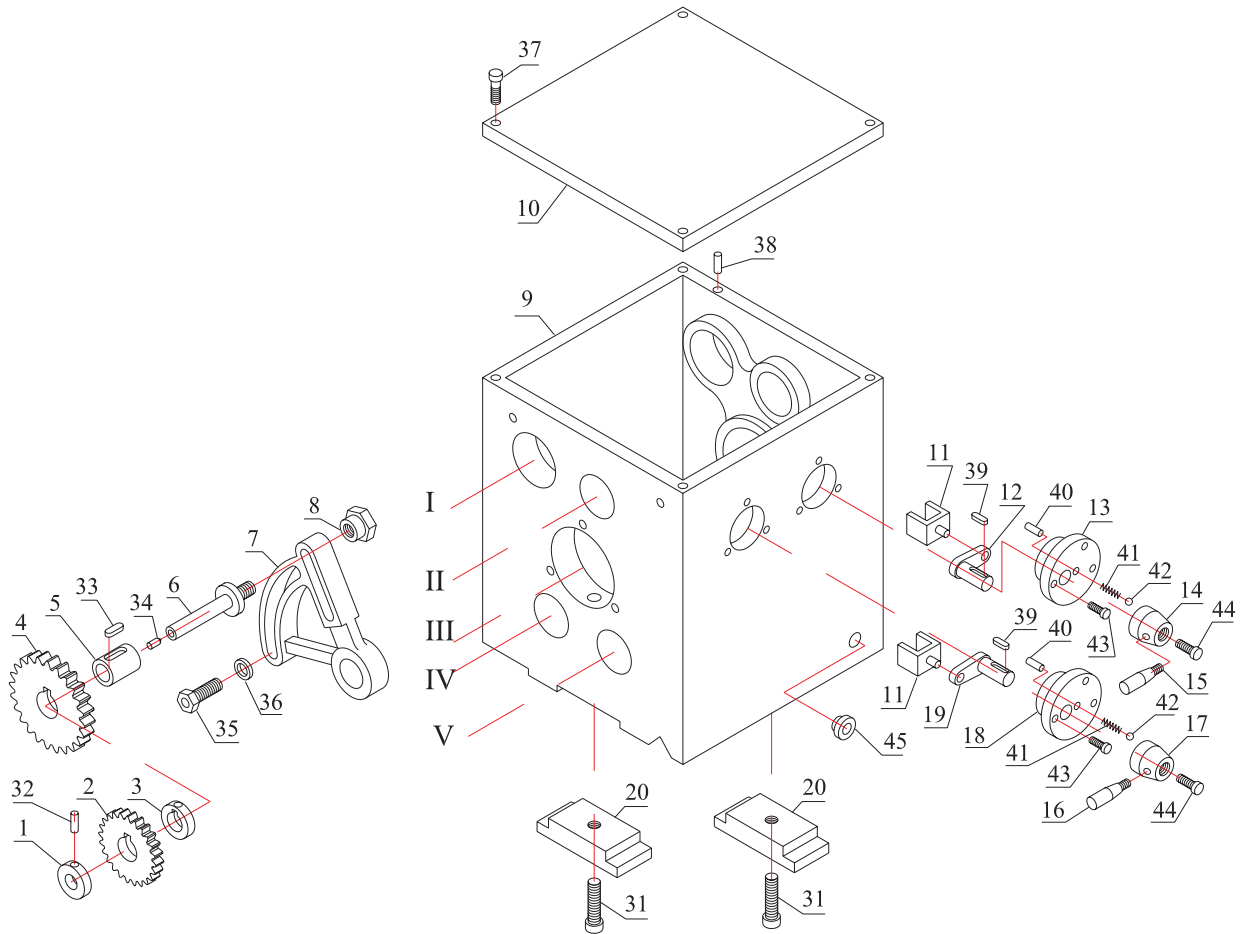
Parts No.	Description	Specification	QTY'
23	Washer	8	4
24	Screw	M6X18	4
25	Spring Washer	6	4
26	Motor	550W	1
27	Key		
28	Oil Cup	6	3
29	Screw	M5X16	2
30	Taper Pin	5X20	4
31	Taper Pin	6X20	2
32	Screw	M5X12	4
33	Screw	M5X50	4
34	Screw	M5X10	2
35	Key	4X25	1
36	Screw	M5X10	1
37	Switch		1
38	Screw	M5X16	2
39	Taper Pin	2X5	1
40	Pin	4X16	2
41	Round Nut	M18X1.5	2

## BV20-1 lathe cover assembly



Parts No.	Description	Specification	QTY'
1	Cover		1
2	Cover Braket		1
3	Shaft		1
4	Knob		1
21	Handle	10X40	1
22	Pin	3X25	2
23	Screw	M3X8	12
24	Hinge	50	2
25	Nut	M3	12

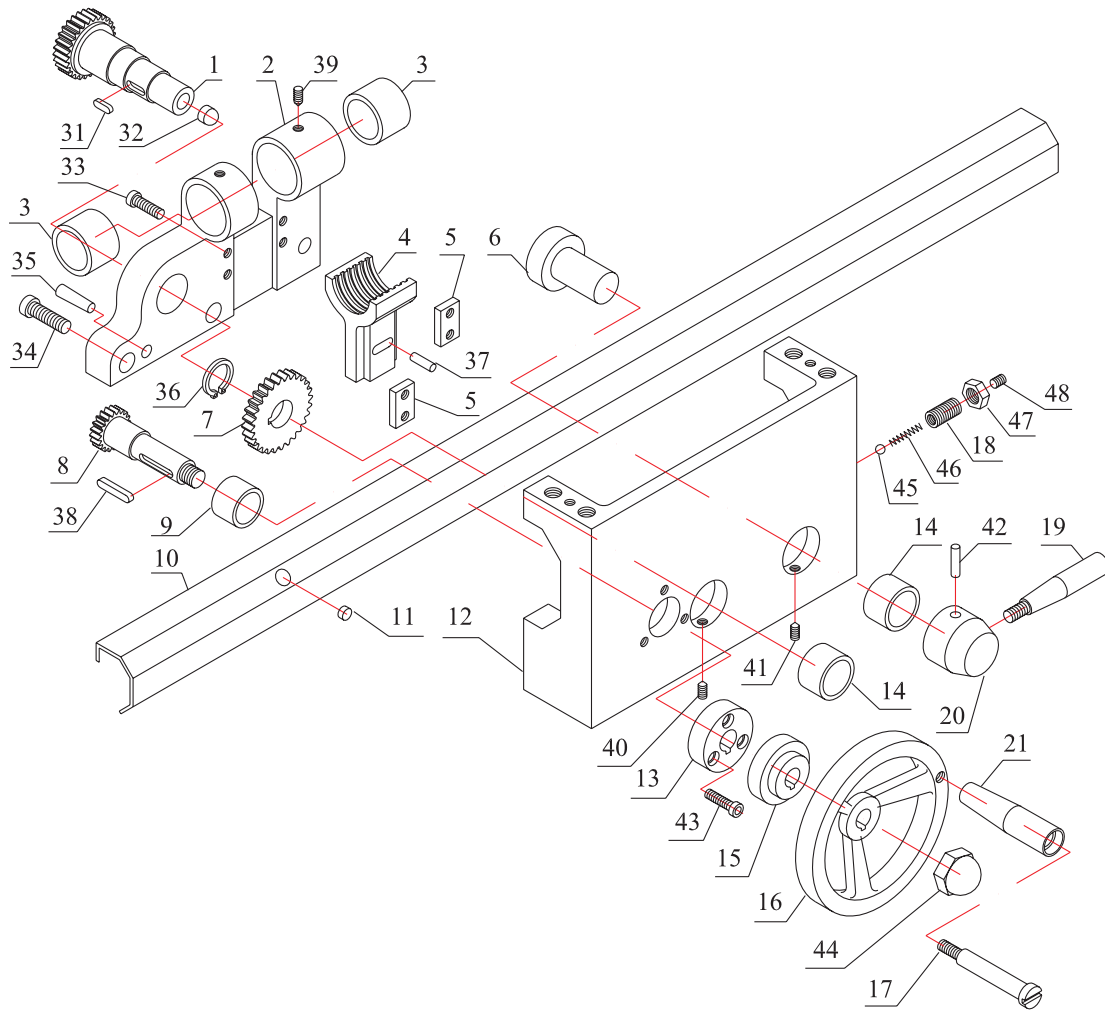
## BV20-1 lathe headstock assembly



Parts No.	Description	Specification	QTY'
1	Washer		1
2	Change Gear		1
3	Washer		1
4	Change Gear		1
5	Bushing		1
6	Shaft		1
7	Quadrant		1
8	Nut		1
9	Main Casting		1
10	Cover		1
11	Shift Fork		2
12	Shaft Collar		1
13	Shift Hub		1
14	Handle Base		1
15	Handle		1
16	Handle		1
17	Handle Base		1
18	Shift Hub		1

Parts No.	Description	Specification	QTY'
19	Shaft Collar		1
20	Plate		2
31	Screw	M5X16	2
32	Screw	M3X8	1
33	Key	4X6	1
34	Oil Cup	6	1
35	Bolt	M8X20	1
36	Washer	8	1
37	Screw	M5X15	1
38	Screw	M5X15	4
39	Screw	M5X6	1
40	Screw	M5X12	2
41	Spring		2
42	Steel Ball	5	2
43	Screw	M5X10	6
44	Screw	M5X10	2
45	Oil Window	M16X1.5	1

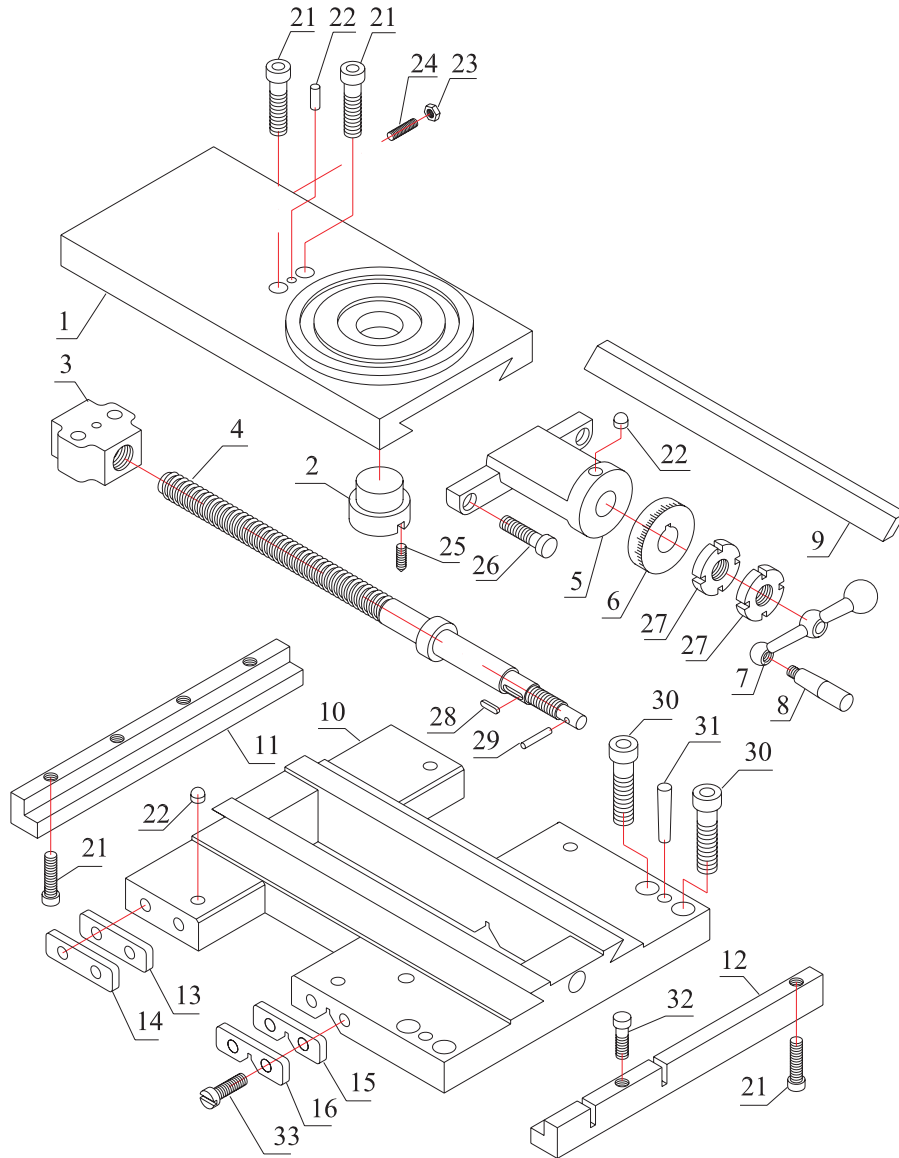
## BV20-1 lathe apron assembly



Parts No.	Description	Specification	QTY'
1	Gear Shaft		1
2	Bracket		
3	Sleeve		1
4	Hulf Nut		2
5	Guide		1
6	Half Nut Cam		2
7	Gear		1
8	Shaft		1
9	Sleeve		1
10	Leadscrew Cover		1
11	Plug		1
12	Main Casting		2
13	Wheel Flange		1
14	Sleeve		1
15	Scale Ring		2
16	Handwheel		1
17	Bolt		1
18	Adjust Screw		1
19	Handle		1

Parts No.	Description	Specification	QTY'
20	Handle Base		1
21	Handle		1
31	Key	5X10	1
32	Oil Cup	6	1
33	Screw	M5X18	4
34	Screw	M8X20	3
35	Pin	6X25	2
36	CClip	16	1
37	Pin	8X25	1
38	Key	4X28	1
39	Screw	M4X6	2
40	Screw	M5X22	1
41	Screw	M5X15	1
42	Screw	5X25	1
43	Screw	M5X12	3
44	Nut	M10	1
45	Ball	6	1
46	Spring	0.8X6X25	1
47	Nut	M12X1.25	1
48	Screw	M8X10	1

## BV20-1 lathe cross slide assembly

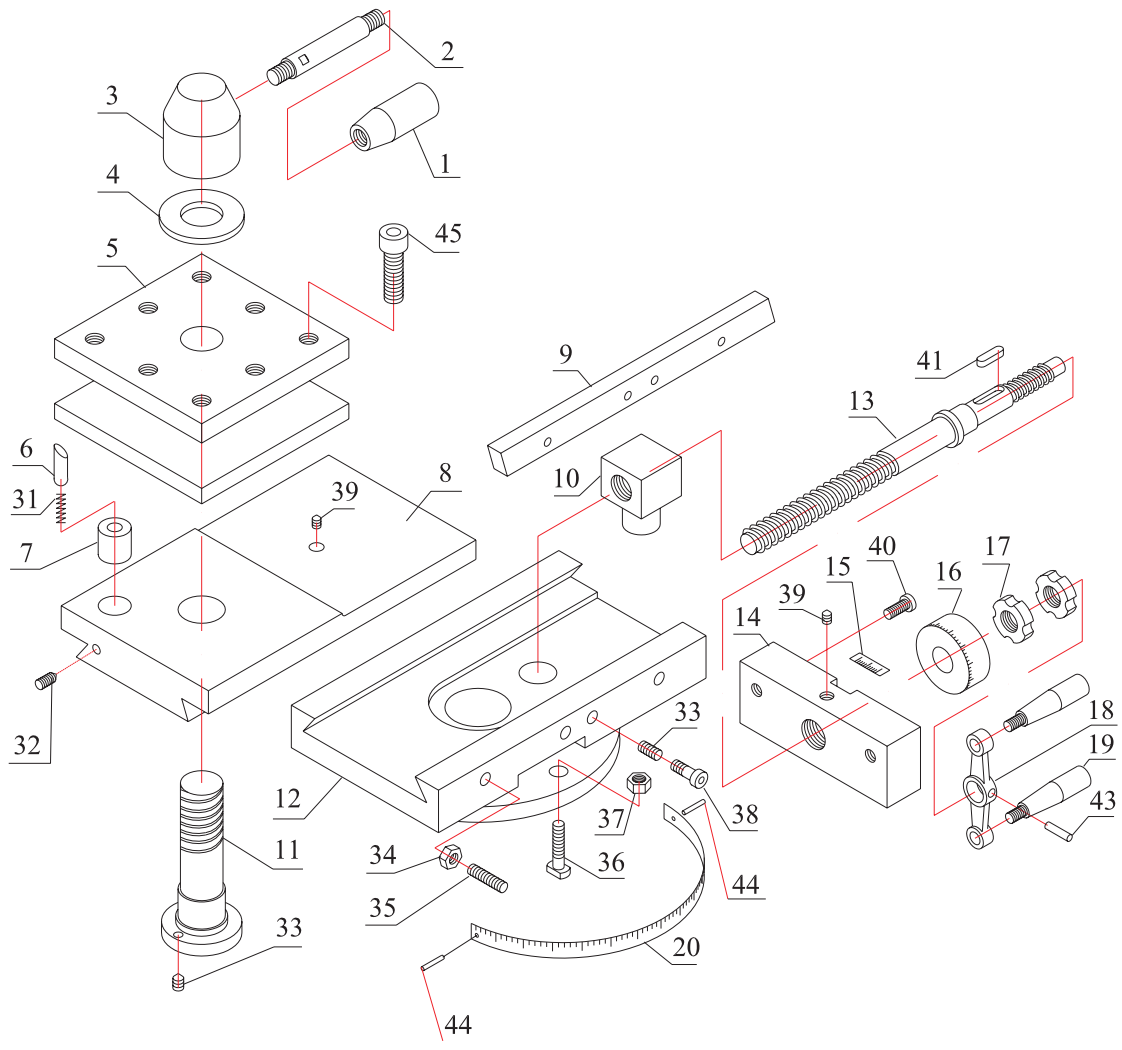


Parts No.	Description	Specification	QTY'
1	Cross Slide		1
2	Shaft		1
3	Cross Nut		1
4	Cross Screw		1
5	Hub		1
6	Scale Ring		1
7	Handle Body		1
8	Handle		1
9	Gib		1
10	Saddle		1
11	Strip		1
12	Front Strip		1
13	Wiper		2
14	Plate		2
15	Wiper		2

Parts No.	Description	Specification	QTY'
16	Plate		
21	Screw	M6X25	10
22	Oil Cup	6	6
23	Nut	M6	4
24	Set Screw	M5X30	4
25	Set Screw	M6X10	1
26	Screw	M6X25	2
27	Lock Nut	M10X1.5	2
28	Key	4X22	1
29	Taper Pin	2X12	1
30	Screw	M8X25	4
31	Taper Pin	6X32	2
32	Screw	M8X32	1
33	Screw	M5X12	8



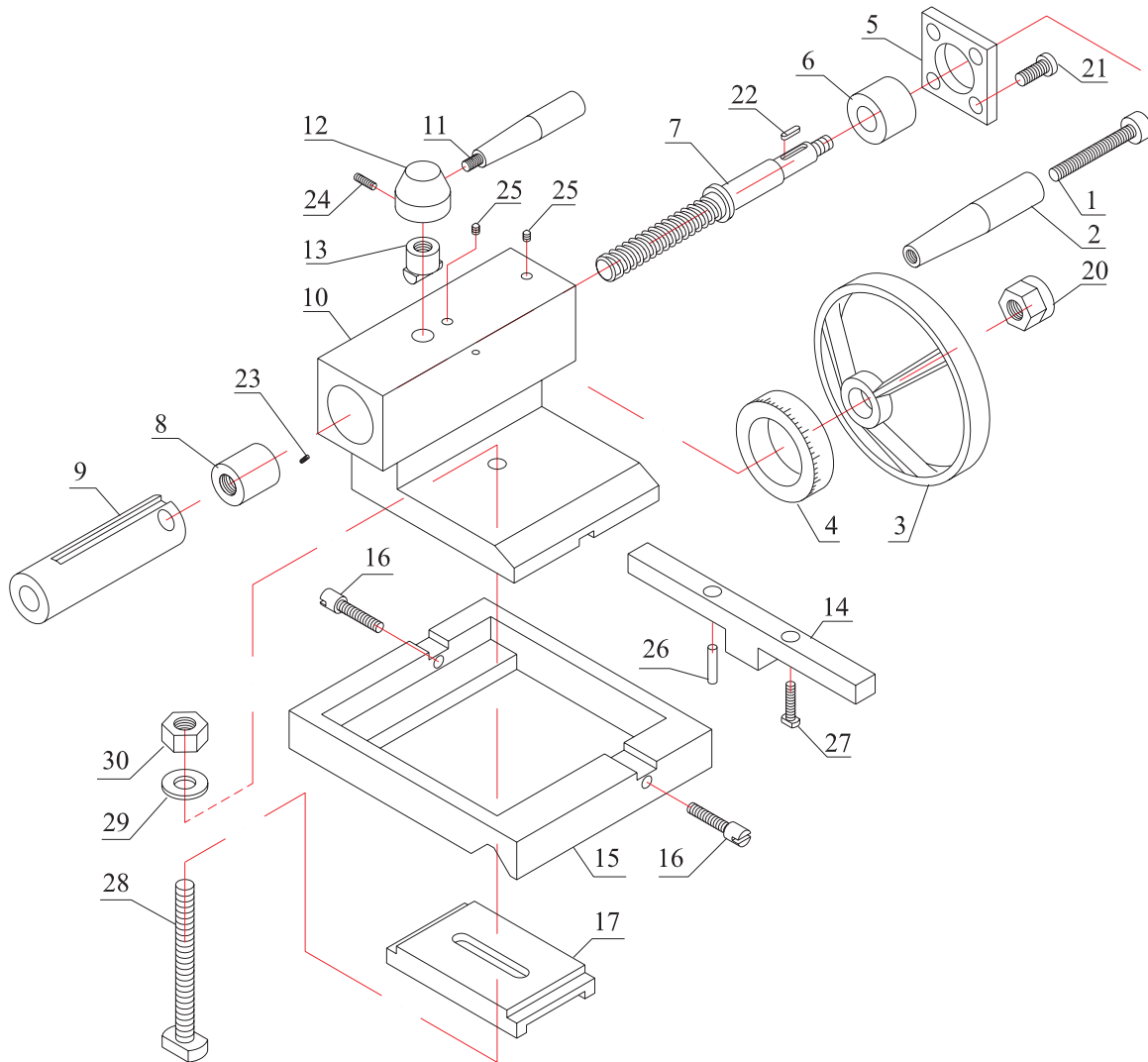
## BV20-1 lathe top slide assembly



Parts No.	Description	Specification	QTY'
1	Knob		1
2	Handle Shaft		1
3	Handle Base		1
4	Washer		1
5	Post Base		1
6	Stop		1
7	Sleeve		1
8	Compound Slide		1
9	Gib		1
10	Nut		1
11	Screw		1
12	Swivel Slide		1
13	Compound Screw		1
14	Frame		1
15	Scale Plate		1
16	Scale Ring		1
17	Handle Body		1

Parts No.	Description	Specification	QTY'
19	Handle		2
20	Scale Label		1
31	Spring	0.8X5X8	1
32	Set Screw	M4X10	1
33	Set Screw	M5X6	2
34	Nut	M5	1
35	Set Screw	M5X18	1
36	TBolt	M6X20	2
37	Nut	M6	2
38	Allen Screw	M5X20	1
39	Set Screw	6	2
40	Screw	M5X20	2
41	Key		1
42	Lock Nut	M10X1	2
43	Taper pin	3X16	1
44	Rivet	2X6	2
45	Screw		8

## BV20-1 lathe tailstock assembly



Parts No.	Description	Specification	QTY'
1	Bolt		1
2	Handle		1
3	Handwheel		1
4	Scale Ring		1
5	Flange		1
6	Sleeve		1
7	Screw		1
8	Nut		1
9	Quill		1
10	Body		1
11	Handle		1
12	Handle Base		1
13	Nut		1
14	Bracket		1

Parts No.	Description	Specification	QTY'
15	Base		1
16	Screw		1
17	Clamp Plate		1
20	Nut	M8	1
21	Screw	M4X10	4
22	Key	4X6	1
23	Screw	M5X10	1
24	Screw	M6X8	1
25	Oil Cup	6	2
26	Taper Pin	4X6	1
27	Screw	M6X18	1
28	TBolt	M12X90	1
29	Washer	12	1
30	Nut	M12	1