

Trust and Reliability

# FIRST

## OPERATOR'S MANUAL

### TM/VS HEAD

LONG CHANG MACHINERY CO., LTD.

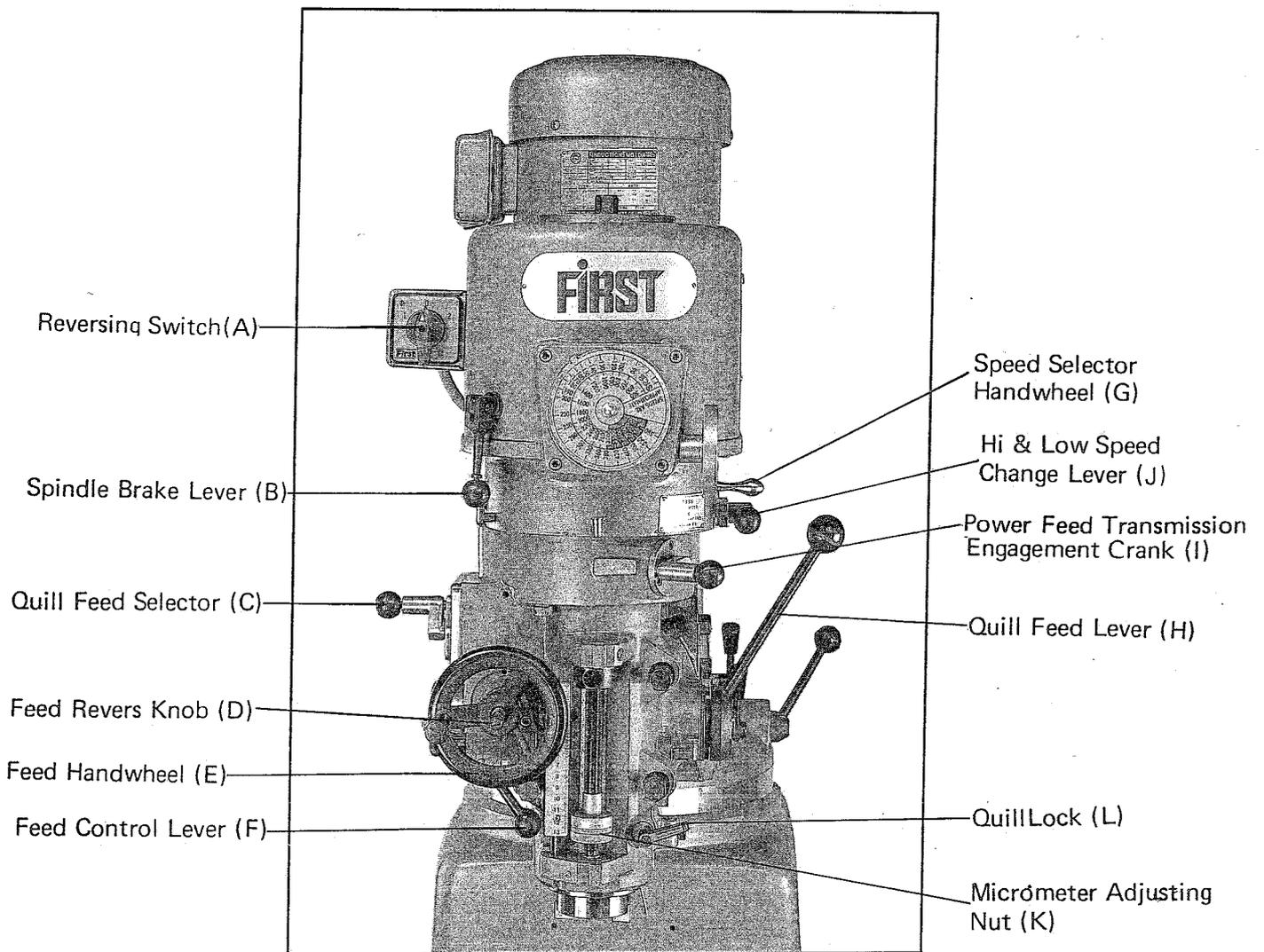
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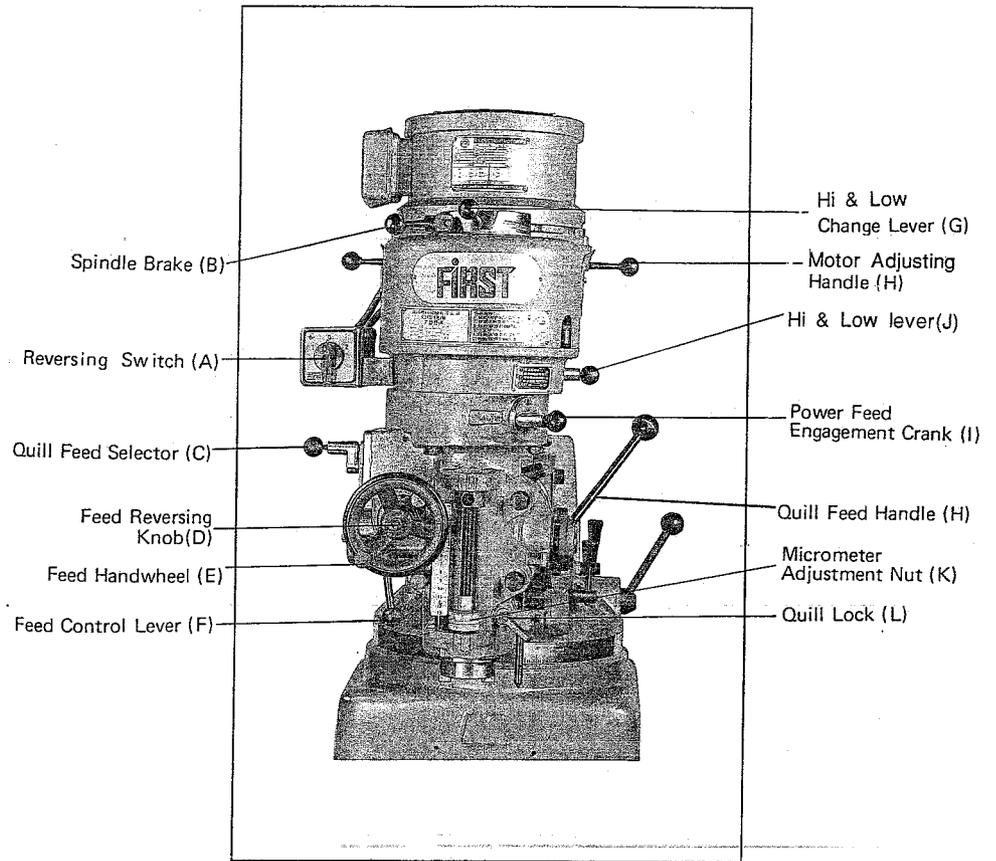
## Headstock

(a) Names of machine parts:

### 1. Stepless speed Headstock (VS)



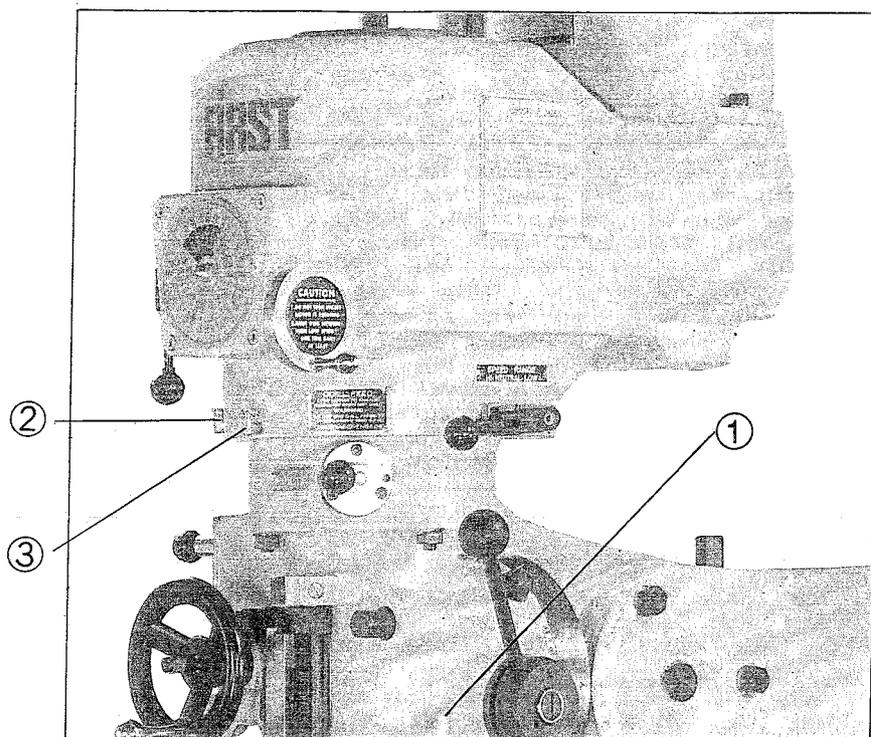
2. Step speed Headstock : (TM)



Vertical main spindle		TM	VS
Spindle speeds (RPM)	50HZ	60-2280	50-3750
	60HZ	80-2760	60-4500
Spindle taper		NST # 30 OR R8	
Quill travel		127mm	
Vertical feeds (per revolution of spindle)		0.04 0.08 0.14	
Head swivel		(R&L)90° (R&B)45°	
Overarm travel		530mm	
Overarm swivel		360°	
Spindle nose to table		0-450mm	
Spindle centerline to column surface		165-690mm	

**(b) Headstock Lubrication:**

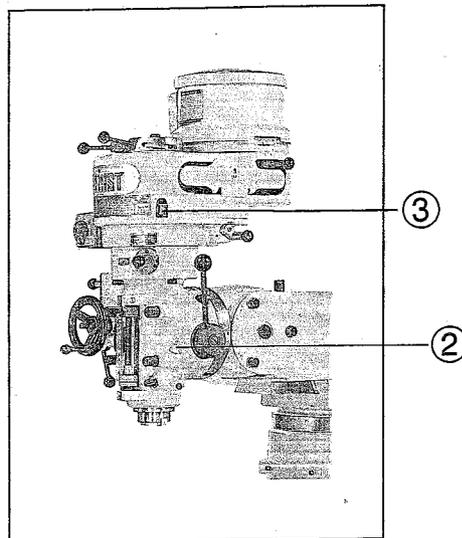
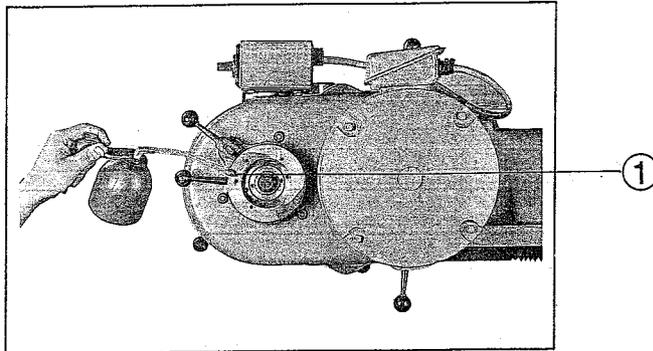
**1. VS Headstock**



Item	Lubricants	Qty	Time	position
1	KUO-KUANG R 68 ESSO FEBIS K 53	Full	Twice Daily	Head Stock Matching Quill Holes
2	GULF WAY 52	Full	Twice Weekly	Bull Gear Bearing Sleeve
3	VACTRA NO.2 SHELL TONNA 33	Full	Once Daily	Counter Shaft Gear Worm gear Cradle

## 2. TM Headstock

Proper lubrication is to ensure the precision degree and longer service life of the machine.

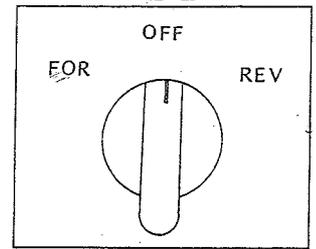


Item	Lubricants	Qty	Time	Position
1	KUO-KUANG R 68 ESSO FEBIS K 53	5-10 Drops	Twice Weekly	Clutch and Bearing Sleeve
2	GULF WAY 52	Full	Twice Daily	Head Stock Matching Quill Holes
3	VACTRA NO.2 SHELL TONNA 33	Full	Twice Daily	Counter Shaft Gear Worm Gear Cradle

### (c) Operations:

#### 1 Reversing Switch:

Motor turning is controlled by the reversing switch (Vide the Figure in the right). When the high-low speed change lever (Vide P.1,2 ) is placed at the high gear position and the switch is on FOR, the motor turns clockwise. When the switch is on REV, the motor turns counterclockwise. When the switch is on OFF, then the power source is cut off.



Note: When the high speed change lever is placed at the low gear position, then, it is just on the opposite.

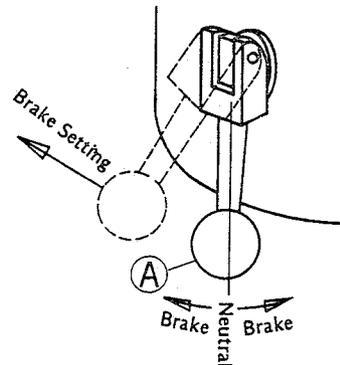
#### (a) Spindle Brake: (VS)

Before braking, the power source must be switched off, and waiting until the spindle speed is lower than 200 RPM before the brake lever (A) (as shown in the figure on the left) is pushed to the left rear or left front to stop the turning and effectuate the bracking. Push the brake lever (A) upward and the quill is braked to a full stop for easy cutter tool change

#### (b) Spindle Brake: (TM)

Before braking, the power source must be switched off, and waiting until the spindle speed is lower than 200 RPM before the brake lever (A) (Vide Fig below) is pushed to the left rear or left front to stop the Turning and effectuate the braking. Push the brake lever (A) upward and the quill is braked to a full stop for easy cutter tool change.

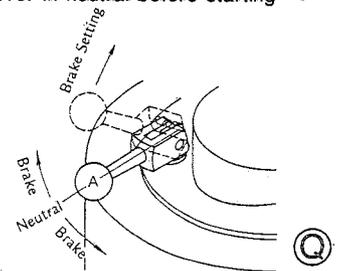
Note: Be sure that the brake lever in neutral before starting motor.



#### 2 Chucking of Tool Shank and Dismantling:

First the spindle must be raised up to its maximum height. The thread of draw bar is right turn. When the screw is turned clockwise, it is for locking of tool shank, and vice-versa. To take out the tool shank, the drawbar must be turned from three to five rounds. Then, use a soft mallet to hit lightly on the drawbar, until the tool shank comes off totally.

Note: According to Spindle Braking, brake the spindle to a Full stop and the tool shank may easily come off or chuck on.



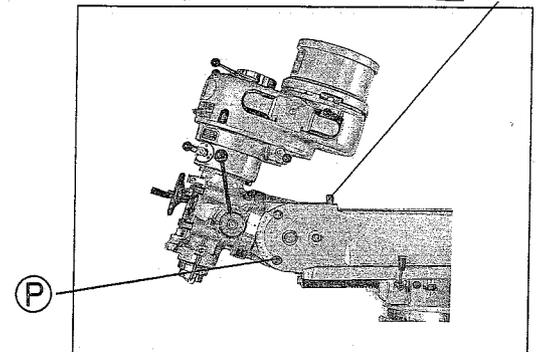
#### 3 Headstock Tilting.

##### (1) In-and-Out Tilting

Turn loose evenly the six adapter locking bolt (P) and turn the vertical adjusting worm shaft (Q) until the angle desired is obtained. Lock up the bolts (P) tightly.

Note:

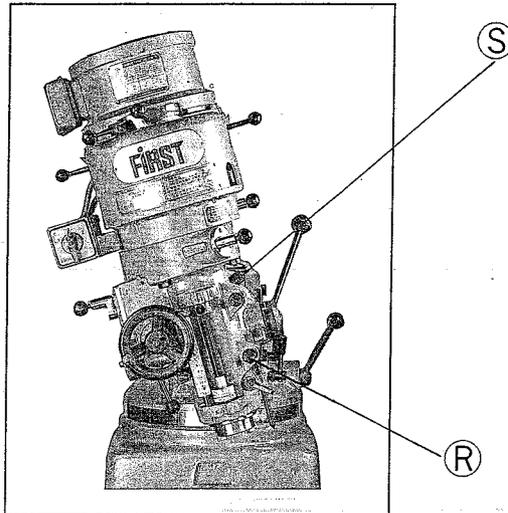
Do not loosen all the headstock bolts totally.



**(2) Cross Tilting**

Loosen evenly the four lock nuts (R) and turn the worm shaft (S) until the desired angle is secured. Then lock up the lock nuts (R) evenly.

Note: 1. Do not loosen the lock nuts (R) totally during the adjustment.



#### 4 Manual Feed.

- (1) The manual feed lever is installed on the right side of headstock (Figure 13, H). The spindle will travel vertically when the lever is turned. There are 12 positions to be chosen. An operator can freely take out the lever and install it again at the position deemed proper and fit.

Note: In manual feed, the feed control handle (F) must be placed at position (F1) as shown in (Fig.13).

#### (2) Manual Micromotion Feed:

To effectuate the manual micromotion feed, the powerfeed transmission engagement crank (J) (Fig.13) shall be placed at "OUT" position, and feed reverse knob (D) at the neutral position.

Feed control lever (F) must be pulled from (F1) to (F2). This is to engage the overload clutch. Turn the feed handwheel (E) clockwise for quill downward feed, and vice-versa.

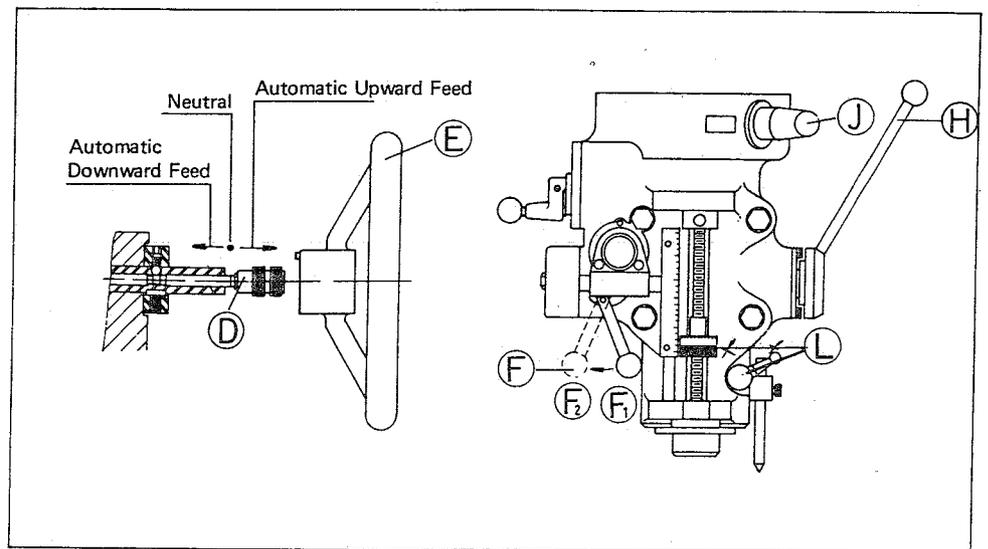


Fig. 13

### 5 Automatic Feed:

For automatic feeding, please take the following steps (Vide P.1 P.2):

- a. Loosen the quill lock (L).
- b. Turn the power feed transmission engagement crank (J) from "OUT" to "IN" position. Make certain to engage the worm gear cradle with the spindle gear hub so that the driving will be directed from the spindle worm and worm gear before it is passed to the speed change gears.
- c. Feed speed is in three stages. H, L and M. Selection may be made by quill feed selector (C). Put feed reverse knob (D) (Fig. 13) on neutral before change feed speed.
- d. Pull the feed control lever (F) from (F<sub>1</sub>) to (F<sub>2</sub>) position (Fig.14) to engage the overload clutch for automatic feed mechanism.
- e. When the feed reverse knob (D) pressed inward (Fig.13), it is for downward feed, and vice-versa. The middle position is neutral.
- f. As shown in (Fig.14), the working depth may be set by micrometer adjustment nuts (K) (each graduation is 0.001" or 0.02mm). When the quill stop block (I) contacts the micrometer adjustment nut (K), the feed control lever (F) may simply jump from (F<sub>2</sub>) back to (F<sub>1</sub>) position owing to the connecting motion between the feed trip lever and feed trip plunger. This will disengage the overload clutch and stop the spindle feed.

#### Note:

1. Maximum drilling capacity in automatic feed is 3/8" or 10mm.
2. The power feed transmission engagement crank (J) (Vide P.1 , P.2) shall be placed at "OUT" position when the automatic feed is not in operation. Do not move the power feed transmission engagement crank when the spindle is in revolution.
3. Very Important !  
Bring quill stop block (I) (Fig.14) at least 5mm downward from the high end position before engage feed control lever (F).

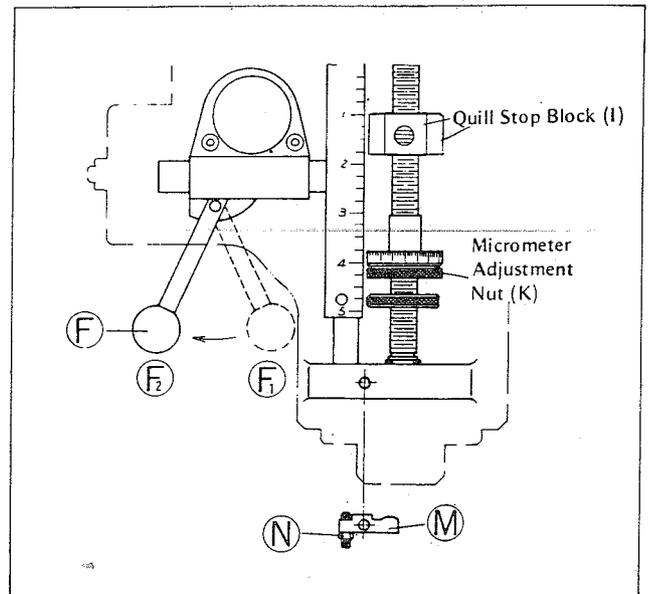


FIG.14

**6 Spindle speed change**

(a) VS

By means of the variation of one set of sliding belt pulley and counter shaft gear (high or low speed), the spindle revolution speed is changed accordingly.

(1) Change of High and Low Speeds:

The speed change may be effectuated by the chosen high and low speed lever (figure 15(J)). When (J) is engaged in the right front, it is for the high speed and the spindle may rotate as high as 500 to 3,000RPM. When (J) is positioned at the right rear, the spindle may have a speed of 60-580RPM. The neutral lever position is in the right down.

- Note:
- a. The spindle must be motionless completely during the speed change.
  - b. To shift the high speed into the low one, the spindle must be slightly turned to make it easier for the backrow gear to engage.
  - c. To shift the low speed into the high one, use the brake lever so as to put a stop to the spindle clutch. Then turn the spindle slightly so that the clutch may be engaged feasibly. A "click" sound of engagement may be sensed at this moment.
  - d. The direction of low speed rotation is opposite to that of the high speed. By the reversing switch, the direction may be changed to that of the high speed revolution.

(2) Speed Change Handwheel:

Stepless speed variation between high and low speeds may be controlled by means of the turning handwheel (Figure 15(G)) When it is turned clockwise, it is for higher speed, and vice-versa.

- Note:
- a. Do not change the speed when the spindle stands still.
  - b. Avoid to use it when the speed is in excess of 3,000RPM.
  - c. In the process of speed change from high speed to low speed, and vice-versa, do not change the speed rapidly to safeguard the service life of the internal mechanism.
  - d. It takes roughly 10 to 15 minutes to change from low speed to the high one, and vice-versa.

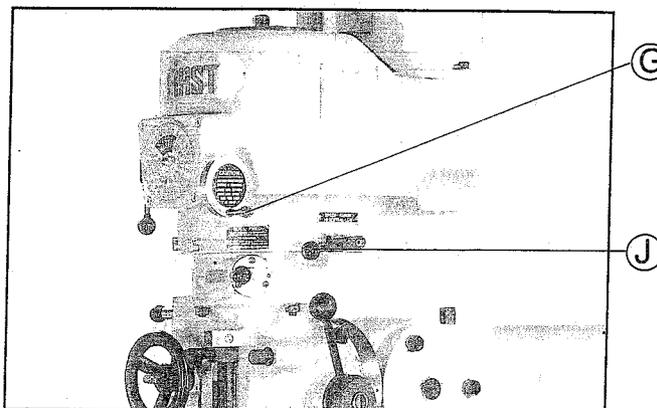


Figure 15

(b) TM

Change speed of spindle can be shift to the desired stage by changing the belt pulley and counter shaft gear (high or low speed).

(1) Adjustment and change of Belt Pulley (Figure 16):

- a. Take off the side cover (A) of front belt pulley.
- b. Loosen the adjusting motor handle (B) as arrowed in the figure and move the motor forward to loosen the belt.
- c. Adjust the V-belt to the pulley groove of the needed rotation speed.
- d. Move the motor backward to regain the proper belt tension before the lever (B) is locked up tightly again.

(2) Change of High and Low Speeds:

Position Speed	Hi-Speed Gear	Low-Speed Gear Clutch Lever (D)		Remarks
	Clutch Lever(C)	IN	OUT	
High	Headstock's Front	OUT		Direct Drive by Clutch 60Hz:650-2,760PRM 50Hz:540-2,280PRM
Low	Headstock Right Side	IN		Counter shaft gear drive 60Hz:80-350RPM 50Hz:68-285RPM
Neutral	"	OUT		
Dead Stop	Headstock's Front	IN		Do not use it.

Note: Low speed turning is in the reverse direction of the high speed. For the same direction of turning, use the reversing switch.

- a. Make certain the spindle is completely motionless for gear shifting.
- b. To change from high to low speed, the spindle must be slightly turned for the engagement of counter shaft gear.
- c. To change from low to high gear, the spindle must be also slightly turned for clutch engagement. A "click" sound will be sensed at the time of engagement.

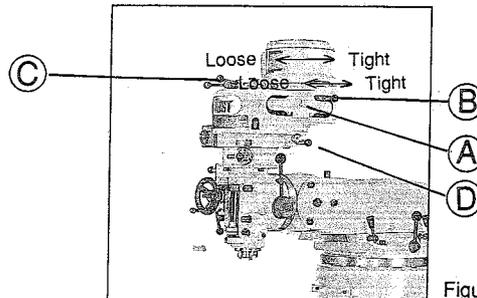


Figure 16

**(d) Trouble Shootings:**

**1. VS Head Stock**

**(1) Dismantling of VS Motor (as shown in Figure 17) :**

- a. Start the motor and turn the speed change handwheel (A) to the position of 60RPM appeared on the indicator to lower down the stationary motor vari-disc to the lowest position.
- b. Cut off the motor power source and take off wire pressboard and reversing switch.
- c. Remove motor pulley cover (B) under the motor shaft. Then, use the two hexagonal concave bolts (C) that locked the bearing housing, to insert into the two holes of the speed change spring pieces (D). Lock into the motor vari-disc (E) and evenly lock up the two bolts (C). Push down the speed change spring(F) so as to separate it from the retainer ring (G).
- d. Take out the retainer ring(G).
- e. Take off the two hexagonal bolts (H) that locked the motor. The motor may be lifted up. Motor vari-disc (E) and speed change belt are still kept inside the belt housing.
- f. Once the motor is replaced, just reverse the order of dismantling.

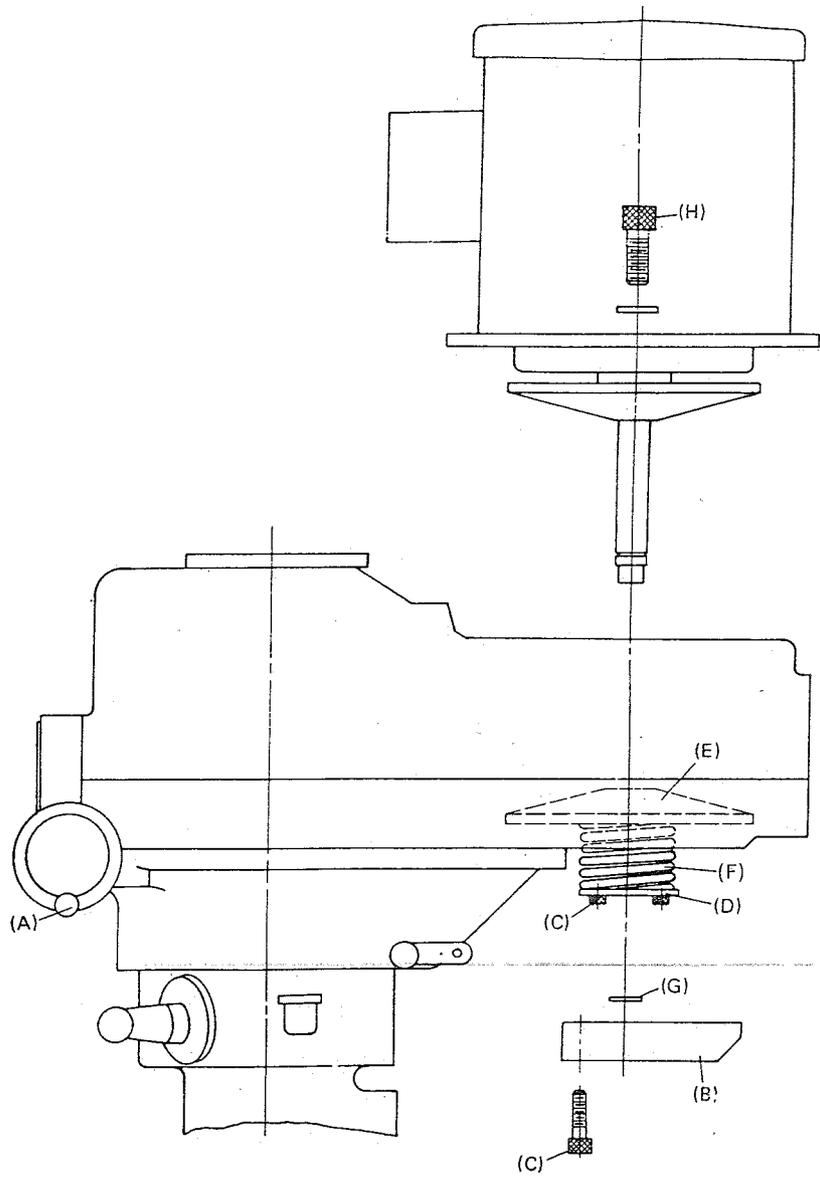


Figure 17

**(2) Replacement of Speed Change Belt (as shown in Figure 18):**

- a. Refer to Step a to e of motor dismantling on P.11
- b. Take off draw bar (i).
- c. Dismantle the three hexagonal concave bolts (j) and use two of them (j) to life the bearing housing (K).
- d. Remove from top the two hexagonal concave bolts (L), fixing the speed change plate, and take off the bolt sleeves (M).
- e. Dismantle four hexagonal concave bolts (N)(O) and the two at the bottom (P).
- f. Take off the two hexagonal concave bolts (S) speed change housing (Q) and gear housing (R).
- g. Use a mallet and hit the upper belt housing (T) lightly so that it will break away from the fix pin (U) for dismantling of the upper belt housing.
- h. When the speed change belt is replaced accordingly, restore the machine by reversing the orders.

Note: The replaced speed change belt shall conform to that of our company specifications.

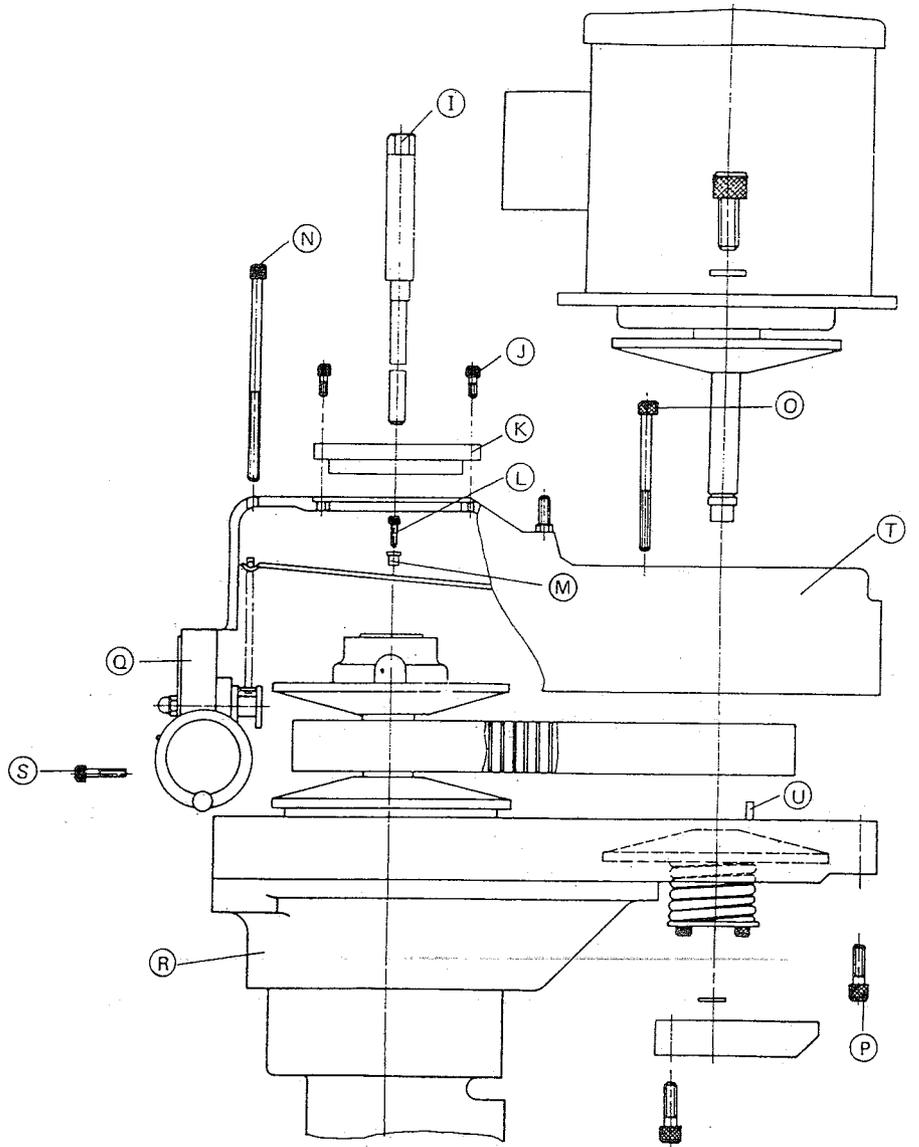


Figure 18

**(3) Replacement of Brake Block (Figure 19):**

- a. Refer to Step a to a on P.11 on motor dismatling.
- b. Refer to step b to g on P.13 on replacement of speed change belt to dismantle the upper-belt housing.
- c. As shown in Figure 20, take off the connected gear housing (R) and the four hexagonal concave bolts (V) bottom belt housing (T1).
- d. Use a soft mallet and hit the bottom belt housing lightly to disengage it with the fix pin (W) to dismantle the bottom belt housing (T1) as shown in Figure 20.
- e. Take off the hexagonal concave bolt (X) of the two setting bearing housing and remove the front vari-disc assembly set (E1). Brake block (Y) can be replaced then.
- f. reverse the order to restore the machine assembly after the brake block is replaced.

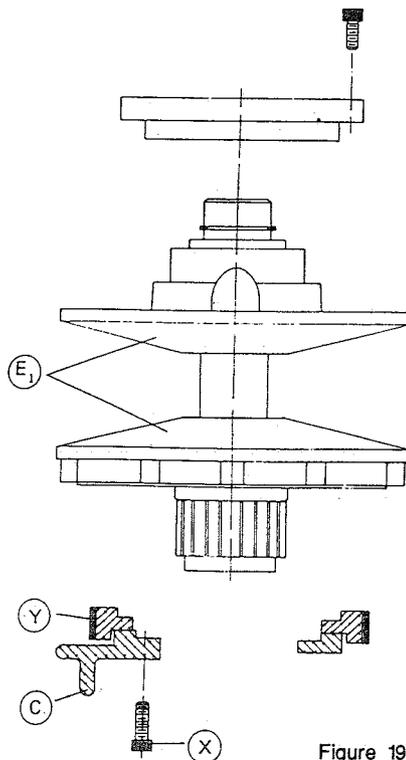


Figure 19

#### (4) Replacement of Timing Belt:

- a. Refer to Step a to e of motor dismantling on P.14
- b. Refer to Step b to g speed change belt replacement on P.26 to take off the upper belt housing.
- c. Refer to Step c to d on P.18 replacement of brake block for the dismantling of bottom belt housing and change the timing belt as shown in Figure 28.
- d. Restore the machine structure by reversing the steps once the timing belt is replaced.

Note : Belt to be replaced shall conform to the manufacturer's specs.

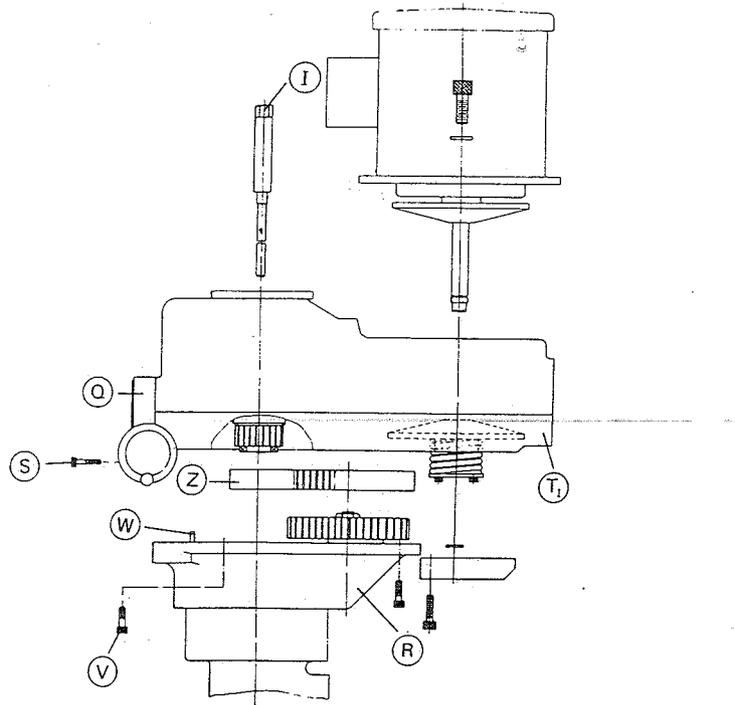


Figure 20

## 2. TM Head Stock

### (1) Replacement of V-Belt and Timing Belt of TM.

- a. Take off the wire grip and reversing switch.
- b. Take off the side cover of belt housing.
- c. As illustrated Fig.21 , loosen Adjusting motor handle (B) and move the motor forward to loosen the belt. Turn the V-Belt and let it slip off the belt wheel.
- d. Take off the two hexagonal nuts (C) for motor dismounting.
- e. Take out the drawbar (D) and drop the quill down to the lowest position.
- f. Push the hi-low speed selector (E) to the right front position.
- g. Dismantle the six concave bolts (H) connecting the belt housing (F) and gear housing (G). Strike upward the belt housing. V-Belt and timing belt are therefore replaced.
- h. Reverse the steps and restore the mechanism once both belts are replaced.

Note: Replacement of V-Belt and timing belt shall conform to the manufacturer's specs.

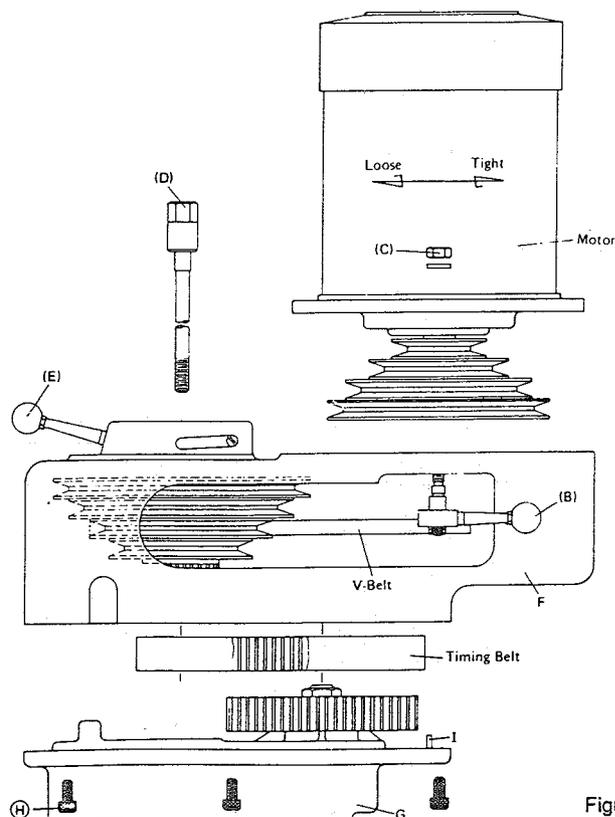


Figure 21

## (2) Replacement of Brake Block

- a. It is the same with the replacement step a to g of V-Belt and timing belt to take out the belt housing (F).
- b. Take off two M3 setting screws (J), two convex ring screws (K) and convex ring (L). Separate the belt housing (F) and front belt pulley set (M) and take out the four pressure springs (G).
- c. Remove the nuts (P) of three brake block and take off the bolts (R) as shown in Figure 22. Then replace the brake block (S).

- d. Restore the mechanism by reversing the steps once the new brake ring is installed.

Note: The front belt pulley set (M) is stopped by the four (4) pressure springs (G). Therefore, it is necessary to press down, not turning, the springs vertically before the front belt wheel set is installed. This is to keep the springs in an upright state.

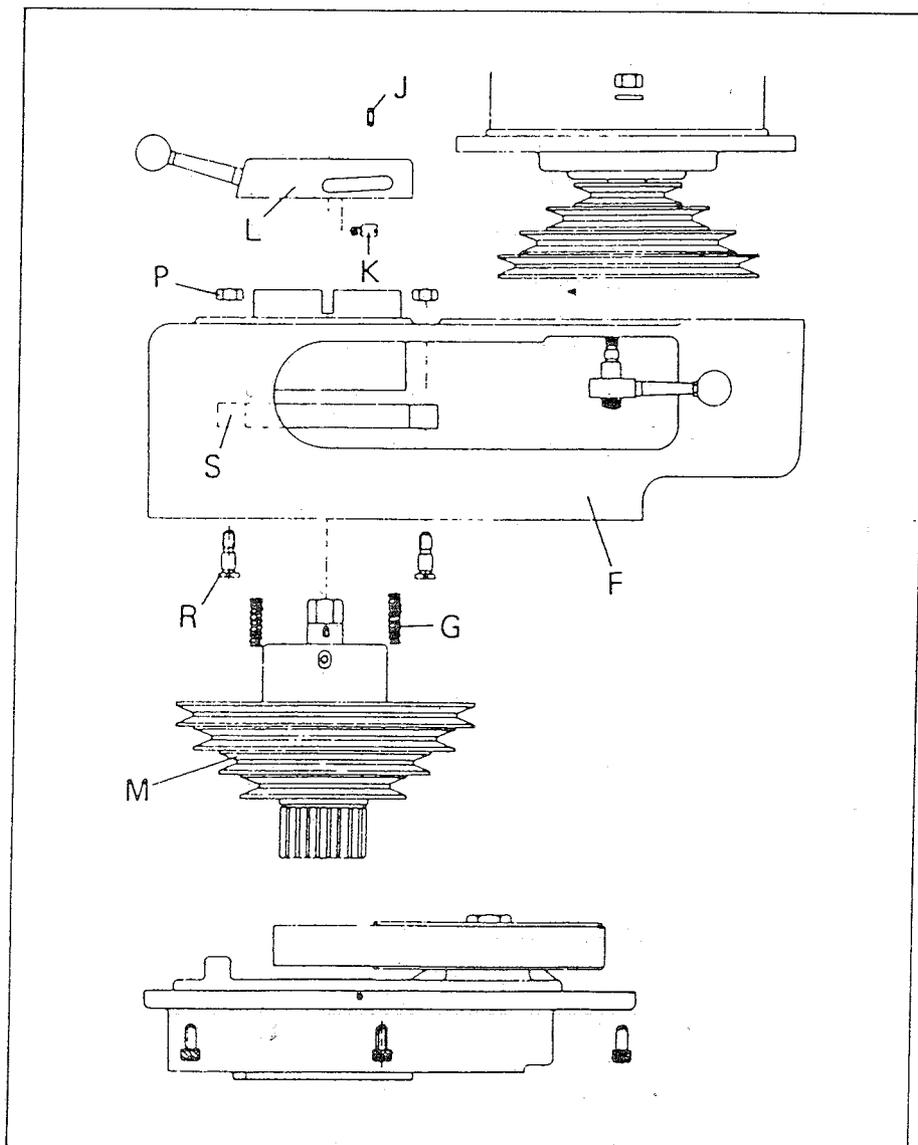


Figure 22