

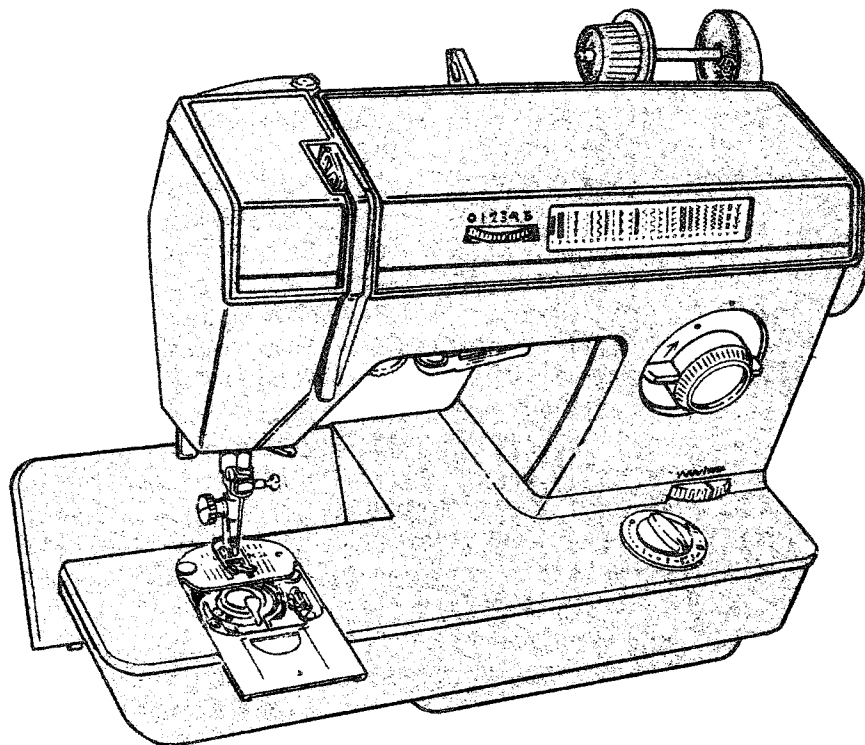
# Service Manual

# SINGER\*

## Model

## 1425

## Machine



Form 21858  
A Publication of  
SPG Product Service

**THE SINGER COMPANY**

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This manual is designed for use by trained and qualified service persons.

The Singer Company will not be responsible for any parts requiring replacement owing to natural wear or to abuse or negligence of the user or in the event the machine is serviced by other than a trained and qualified service person, or if parts are substituted which do not meet applicable specifications.

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SECTION 1.  
ADJUSTMENT PROCEDURES

## 1. ARM SHAFT AND HANDWHEEL PULLEY

### ELIMINATING END PLAY

#### MACHINE SETTING:

Pattern Selector: Straight Stitch

#### PREPARATION:

Remove face plate, arm top cover assembly.

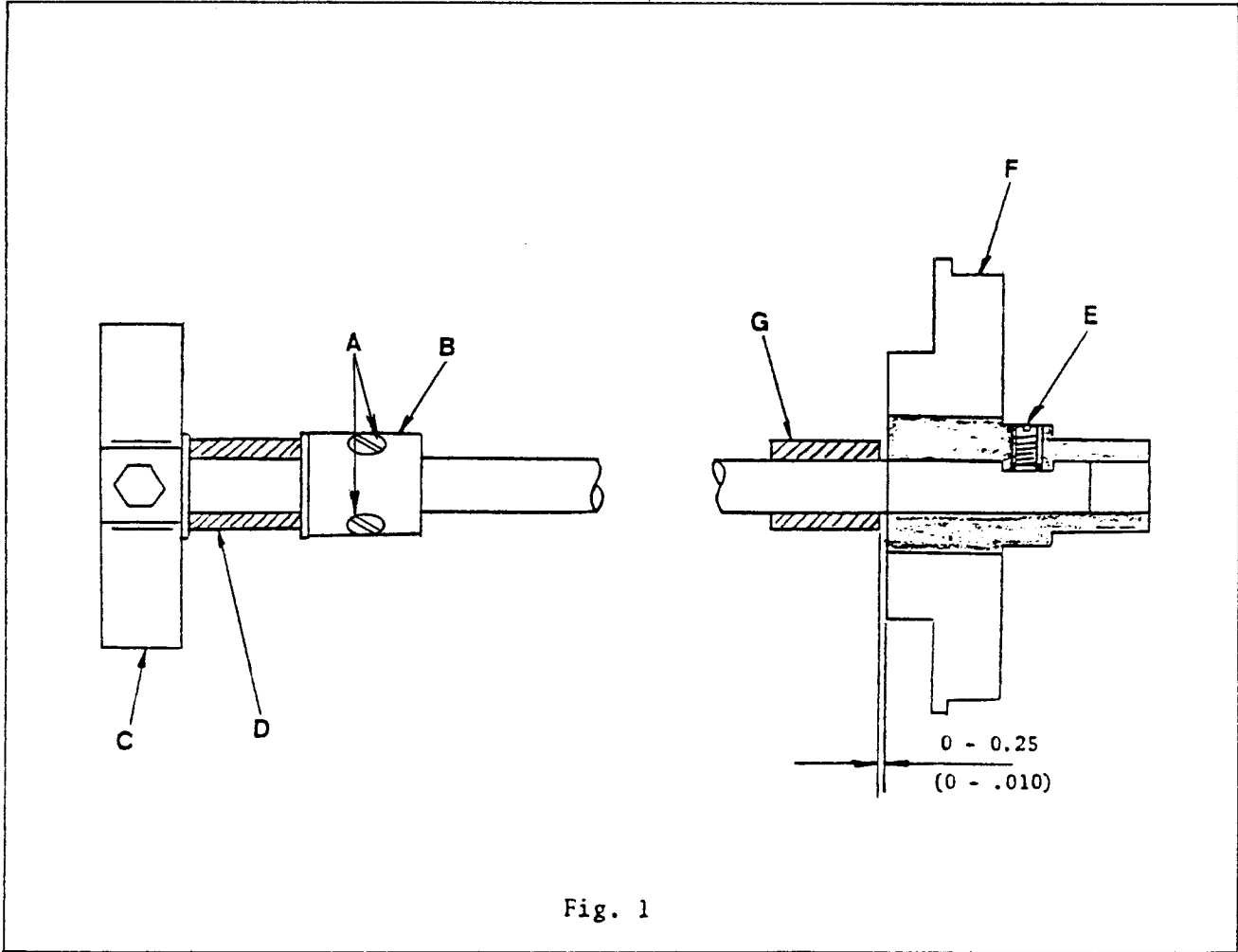
#### CHECK:

Turn arm shaft toward front of machine. Then push in and out on arm shaft by means of handwheel pulley (F). (Fig. 1). Repeat this procedure at three radial positions of the arm shaft, each position being equidistant from the other. If there is one point without end play in a complete rotation of arm shaft, no adjustment is needed even though end play may exist in other positions.

#### ADJUSTMENT:

1. Turn arm shaft toward front of machine until screws (A) that hold arm shaft collar (B) are in position to loosen. Loosen screw (A).
2. While pushing needle bar crank (C) against front bushing (D), slide arm shaft collar (B) until it just touches front bushing (D) and tighten two arm shaft collar set screws (A).
3. Recheck for end play and readjust if necessary. The arm shaft should not bind when turned for one complete rotation.
4. Check for clearance of 0 - 0.25mm (0 - .010) between left face of handwheel pulley (F) and right end of back bushing (G).
5. Readjust if necessary. When readjusted, be sure that the two handwheel pulley set screws (E) are firmly tightened.





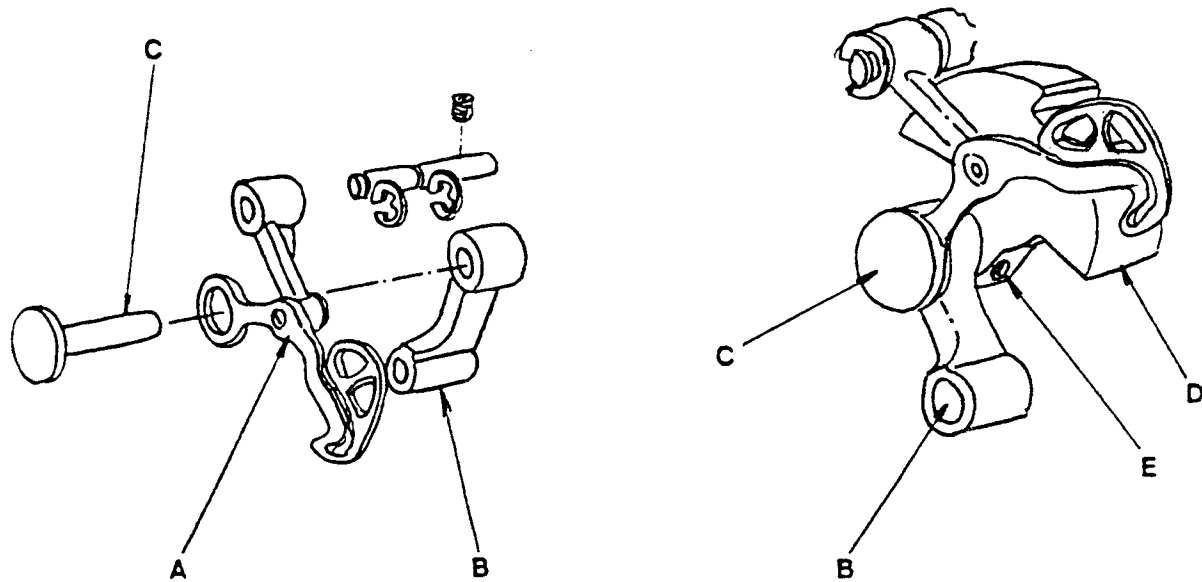


Fig. 2

2. THREAD TAKE-UP LEVER AND NEEDLE BAR CONNECTING LINK

MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Stitch Length Dial: 2

CHECK:

Run machine at high speed and check for rapping noise in head end area.

Check for wear (out of round) in holes of needle bar connecting link (B), with needle bar in down position and by grasping needle bar and working it up and down.

Remove face plate and check for lateral play in thread take-up lever (A); check rivet for tightness. Check that thread take-up stud (C) is properly fastened to needle bar crank (D) with set screw (E). (Fig. 2).

ADJUSTMENT:

1. Adjust wherever required.
2. Replace with a new part if worn. (See Take-up Lever Assembly Removal and Replacement section).

### 3. NEEDLE BAR VIBRATING BRACKET

There should be no vertical looseness, yet the needle bar vibrating bracket (C) must swing freely. (Fig. 3-1).

When pushing the needle bar vibrating bracket toward the hand-wheel until stop, the needle while in descent must not hit the general purpose throat plate.

There should be no vertical looseness in the upper needle bar ball bushing (D) held in the needle bar vibrating bracket (C), yet it must function freely. (Fig. 3-2).

#### MACHINE SETTING:

Pattern Selector: Straight Stitch.

#### PREPARATION:

Remove face plate and arm top cover assembly.

#### CHECK:

1. Check needle bar vibrating bracket (C) for vertical looseness.
2. Check left stop for needle bar vibrating bracket to assure safe penetration of needle.

#### ADJUSTMENT:

1. Remove head end plate assembly.
2. Loosen needle bar vibrating bracket hinge stud collar set screw (A).
3. Push up needle bar vibrating bracket hinge stud collar (B) with fingers. Use just sufficient pressure to eliminate vertical looseness of needle bar vibrating bracket (C) and still allow it to swing freely.
4. Push needle bar vibrating bracket (C) lightly to the right until the needle contacts the left side of the needle hole in general purpose throat plate and while holding the vibrating bracket in this position, turn the needle bar vibrating bracket eccentric hinge stud collar (B) until its set screw (A) is in contact with the lower end of needle bar vibrating bracket ball joint (F), then firmly tighten the collar set screw (A).

Replace needle bar vibrating bracket (C) with new one if there is excessive vertical looseness in upper needle bar ball bushing (D), adjust as instructed above.

When reinserting the needle bar vibrating bracket eccentric hinge stud (E), make sure the eccentric part (the end with the smaller diameter) is toward the right of the machine. (See Fig. 3-1).

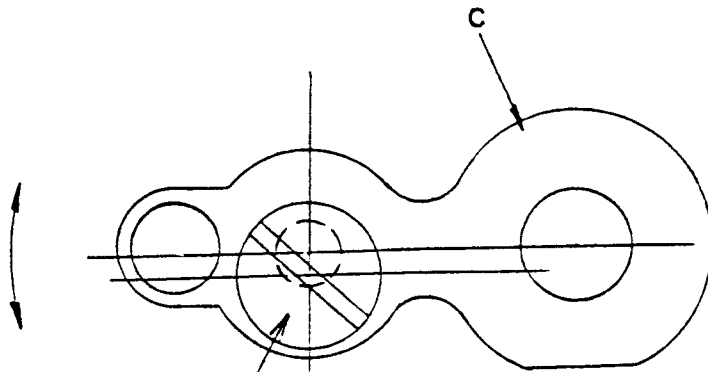


Fig. 3-1

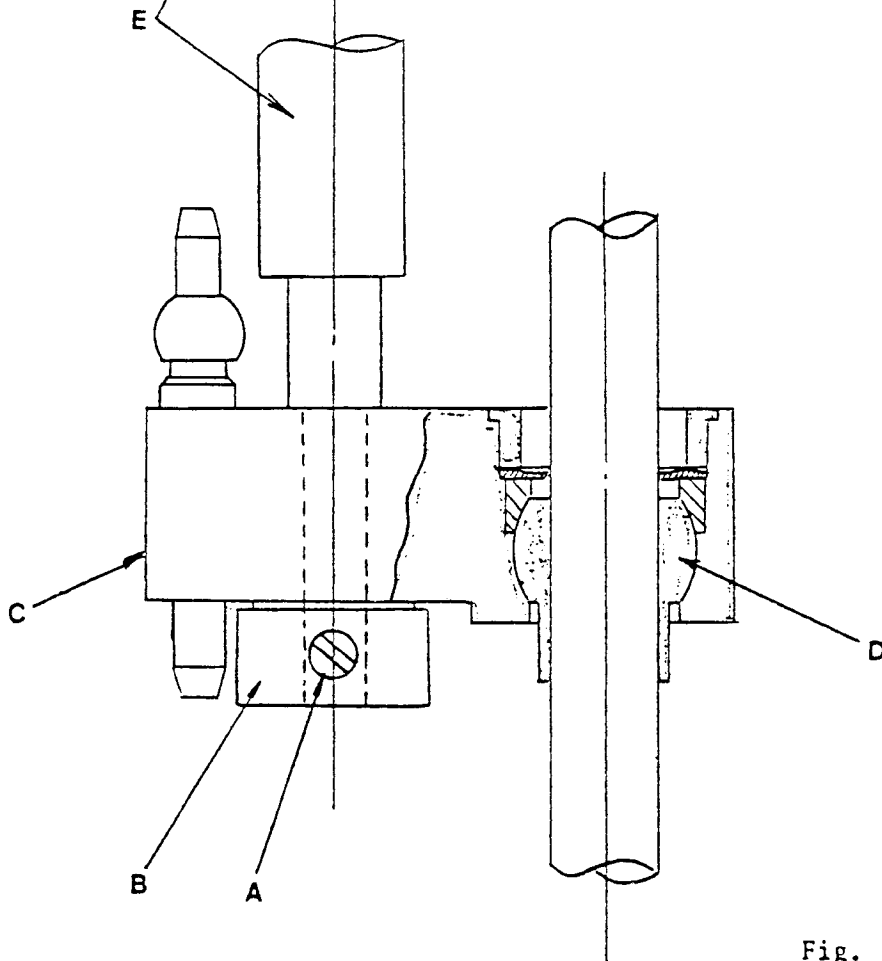


Fig. 3-2

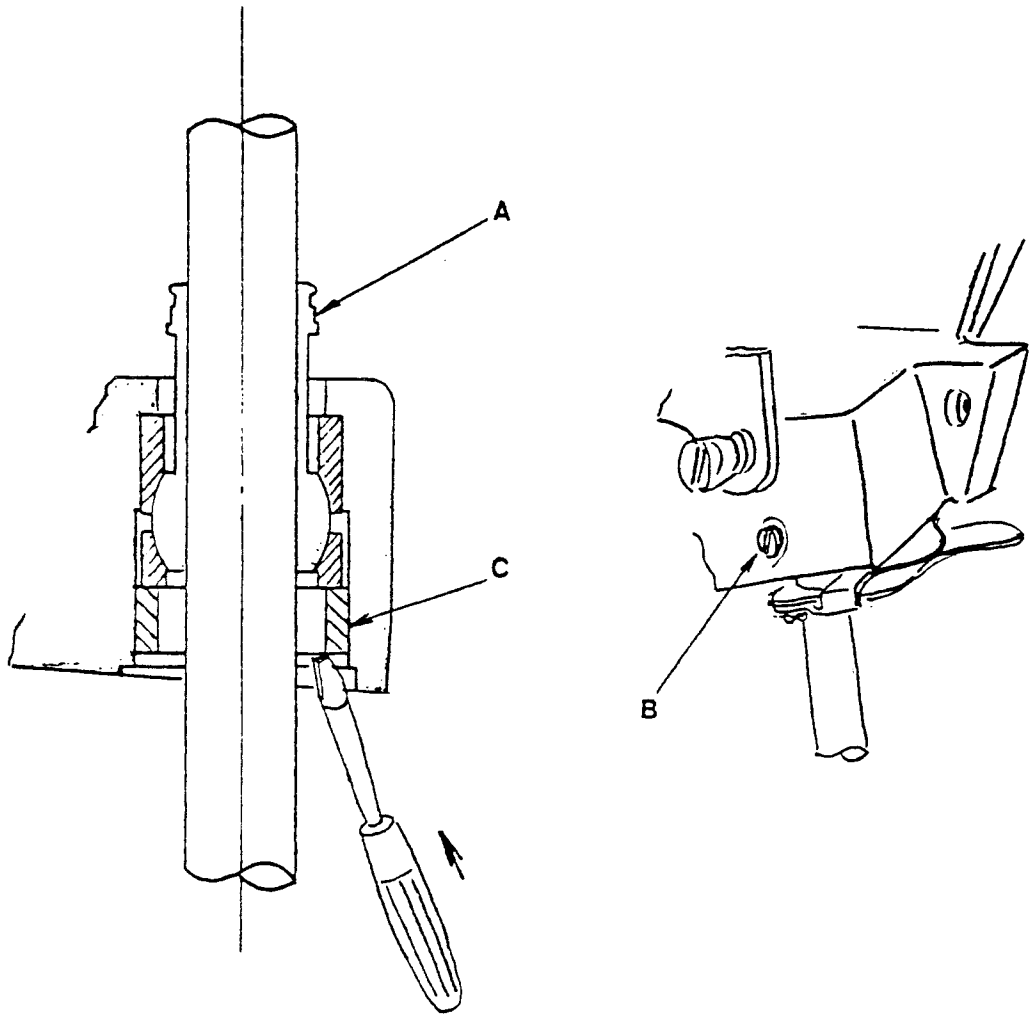


Fig. 4

#### 4. NEEDLE BAR BALL BUSHING (LOWER)

There should be no vertical looseness, yet the lower needle bar ball bushing (A) must function freely. (Fig. 4).

##### MACHINE SETTING:

Pattern Selector: Straight Stitch

##### PREPARATION:

Remove face plate.

Loosen presser bar bushing screw and remove snubber.

##### CHECK:

Check lower needle bar ball bushing (A) for vertical looseness.

##### ADJUSTMENT:

1. Loosen needle bar ball bushing (lower) adjusting collar set screw (B).
2. With a screwdriver, push up needle bar ball bushing (lower) adjusting collar (C). Use just sufficient pressure to eliminate vertical looseness of lower needle bar ball bushing (A) and still allow it to function freely.
3. Tighten set screw (B), and recheck.
4. Check for binding through full left to right swing.
5. Replace snubber and presser bar bushing.

## 5. PARALLELISM OF NEEDLE BAR DRIVING ARM PLATE TO CAM STACK

### FUNCTION

The needle bar driving arm plate (A) must be parallel to cam stack (B) to insure correct tracking of disc follower (C), whether it be at the top of the stack or the bottom to assure correct formation of all patterns. (Fig. 5).

### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Stitch width Dial: 5 Bight

### CHECK:

1. Place a sheet of paper over throat plate and hold it with left hand so that feed dog cannot move it. Turn handwheel toward front of machine to make small needle perforation.
2. Continue holding the paper. Change patten selector to decorative straight stitch. Turn handwheel to make small needle perforation. The needle should enter the previous perforation.
3. If perforations do not match, adjust and recheck.

### PREPARATION:

Remove face plate, arm top cover assembly, arm front cover and pattern selector plate assembly.

### ADJUSTMENT:

1. Loosen set screw (F) in eccentric collar (E) at bottom of disc follower shaft (D).
2. Turn collar (E) as required to balance out needle perforations. The needle should enter the same hole when machine is set in straight or decorative straight stitch setting.

To make the needle perforations as described above, the disc follower (C) may be held in positions noted below by means of placing a magnet on the disc follower shaft (D) just under the follower to prevent it from slipping down and out of position.

For straight stitching - fourth cam from top of cam stack (B). For decorative straight stitching - sixth cam from bottom of cam stack.



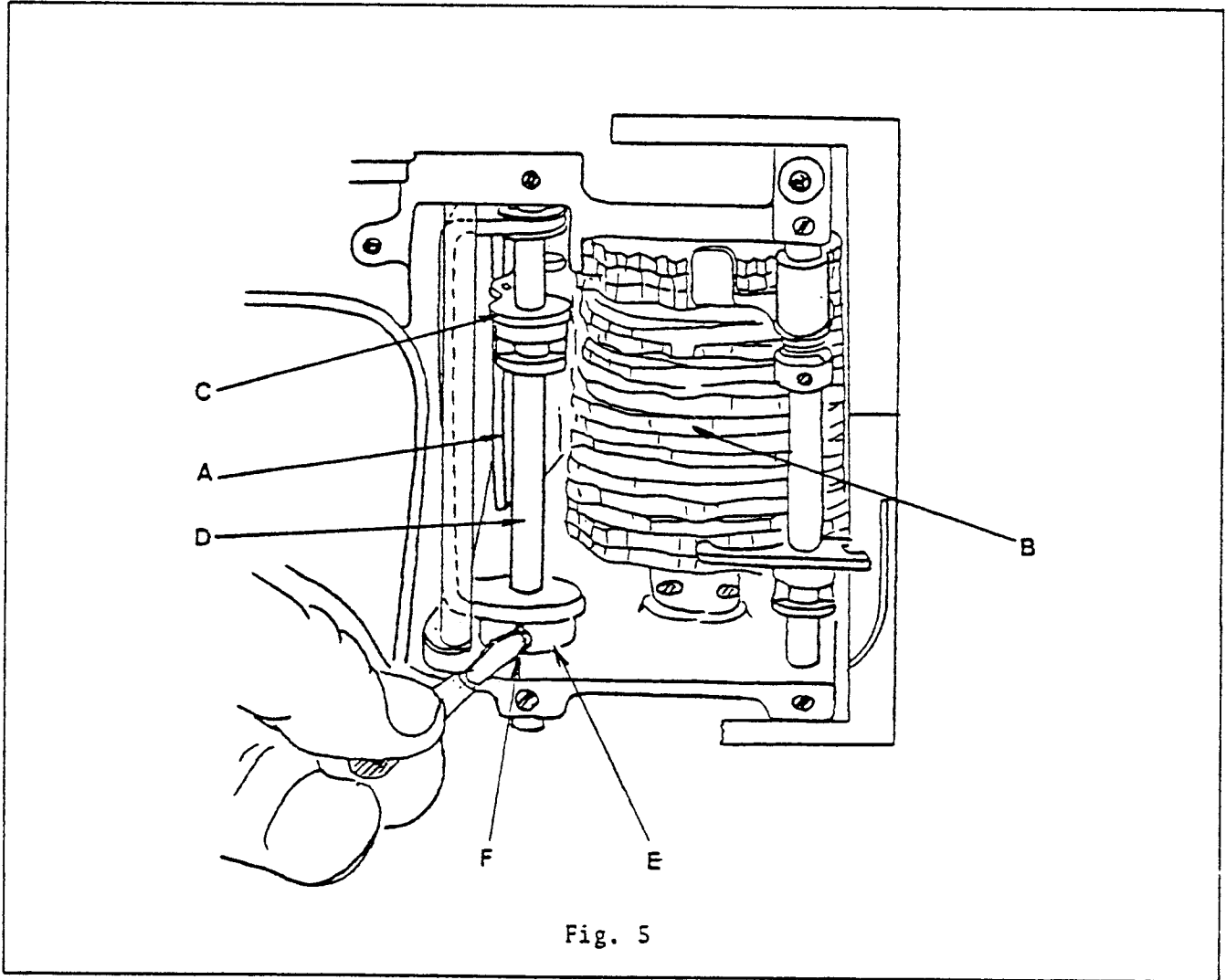
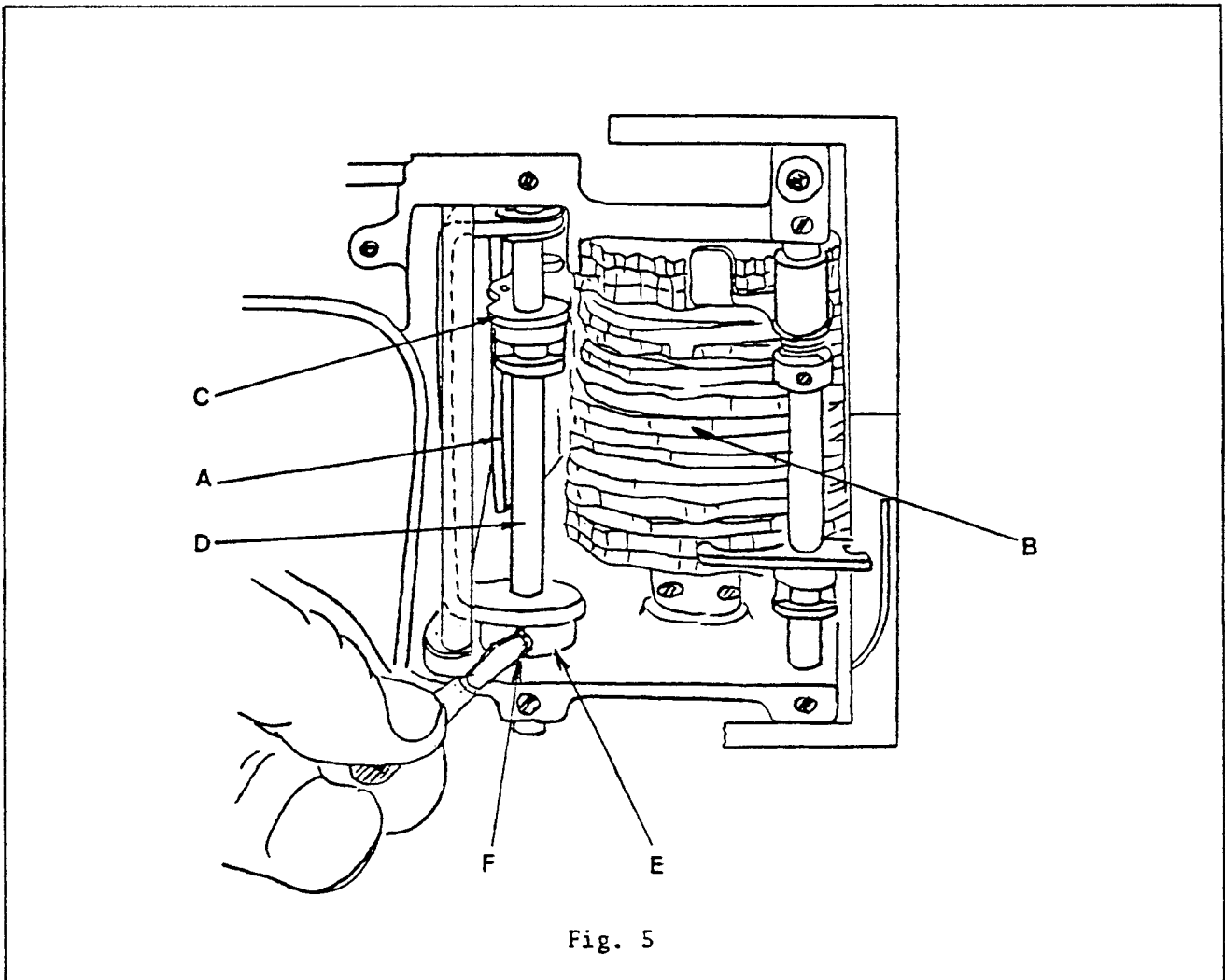


Fig. 5



5. PARALLELISM OF NEEDLE BAR DRIVING ARM PLATE TO CAM STACK (Continued)

NOTE: If needle perforations cannot be balanced out at any setting of eccentric collar (E), make the following checks:

1. Needle bar driving arm (bent)
2. Needle bar driving arm plate hinge bracket (parallelism)
3. Needle bar driving arm plate hinge stud (straightness)
4. Needle bar driving arm plate (parallelism, flatness)

INTERLOCKING EFFECT ON OTHER SYSTEMS:

Failure to correct a parallelism fault can affect:

1. Center needle location.
2. Basting.
3. Buttonholing.
4. Pattern forms.
5. Needle position zeroing out.

6. SETTING ZERO BIGHT STOP

MACHINE SETTINGS:

1. Pattern Selector: Zig-zag
2. Stitch Width Dial: Zero

CHECK:

1. Alignment should exist between indicator line on dial and graphic "0" on arm top cover.

PREPARATION:

Remove face plate and arm top cover assembly.

ADJUSTMENT:

1. Move stitch width dial to the left until stop.
2. Loosen the two stitch width dial set screws (E) taking care not to move dial bracket out of position and adjust dial (A) as required.

7. SETTING MAXIMUM BIGHT STOP

CHECK:

1. Check alignment of indicator line on dial (A) to graphic "0" on arm top cover.
2. Check alignment of indicator line on dial (A) to graphic "5" on arm top cover.

ADJUSTMENT:

1. Loosen stitch width dial stopper set screw (B). (Fig. 7).
2. Replace arm top cover assembly.
3. Set stitch width dial (A) to "5" (maximum) bight.
4. Remove arm top cover assembly taking care not to move dial (A).
5. Set stitch width dial stopper (C) so that it touches the stop portion of the stitch width dial cam (D).
6. Tighten set screw (B).

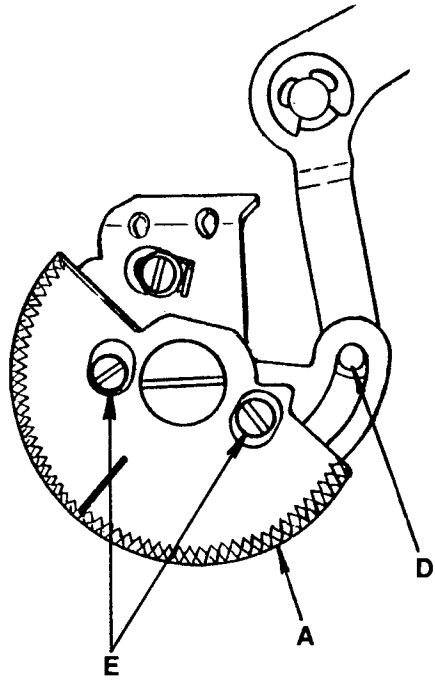


Figure 6

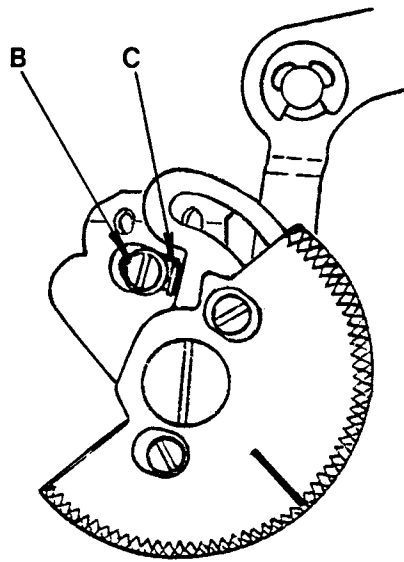


Figure 7

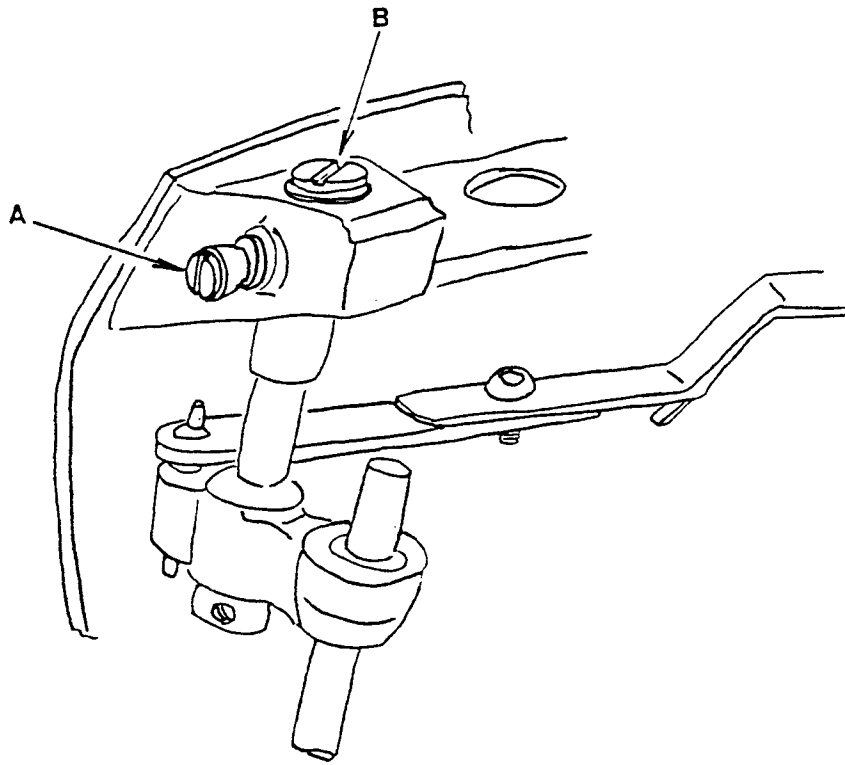
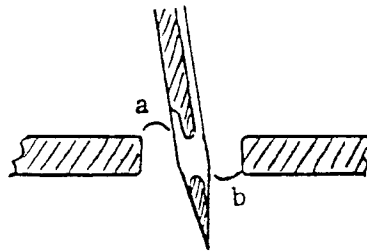


Fig. 8-1



$$a = b$$

Fig. 8-2

## 8. SETTING FRONT-TO-BACK NEEDLE LOCATION

### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Stitch Width Dial: 0 Bight
3. Throat Plate: General Purpose
4. Needle or Plug: Size 18

### CHECK:

Turn handwheel to position needle or tip of plug into needle hole. The distances from needle or plug to top of rear edge and to bottom of front edge of needle hole should be equidistant as shown in Fig. 8-2.

### PREPARATION:

Remove face plate.

### ADJUSTMENT:

1. Loosen face plate positioning screw (A) but pinch slightly for control reasons. (Fig. 8-1).
2. Turn needle bar vibrating bracket hinge stud (eccentric) (B) and position needle in the center (front-to-back) of needle hole in throat plate. (Fig. 8-2).
3. Tighten screw (A).
4. Recheck needle location.
5. Check hook to needle clearance.

NOTE: Refer to Needle Bar Vibrating Bracket section as to the position of eccentric of needle bar vibrating bracket hinge stud and left needle bar vibrating bracket stop.

## 9. ZERO OUT NEEDLE MOTION AND SETTING LEFT-TO-RIGHT NEEDLE LOCATION

### MACHINE SETTINGS:

1. Pattern Selector: Zigzag and Straight Stitch
2. Stitch Width Dial: 5 and 0 Bight
3. Throat Plate: General Purpose and Straight Stitch
4. Needle or Plug: Size 18

### CHECK:

Turn handwheel to position needle or tip of plug into needle hole. The needle or plug should enter the left and right hand side of the needle hole of the general purpose throat plate equally distanced from the center when bight is set at 5 for zigzag stitching. When machine is set for straight stitching, the needle or plug should enter the round needle hole in the center or slightly to the right. See Fig. 9-3.

### PREPARATION:

Remove face plate and arm top cover assembly.

### ADJUSTMENT:

1. Set pattern selector to straight stitching and stitch width dial to 5.
2. Using a 5/64" (2mm) hex-head wrench, loosen socket screw (A) joining the needle bar vibrating bracket ball joint to needle bar driving arm. (Fig. 9-1).
3. Move needle bar vibrating bracket (B) to position needle in center of needle hole of round hole throat plate; then tighten screw (A).
4. Change stitch width dial to 0 bight and loosen needle position lever link adjusting plate screw (C), bring buttonhole needle position follower (D) in contact with the lowest cam track (cam which holds needle bar in center needle position when bight is set at 0) of buttonhole cam (E) and move needle bar driving arm plate hinge stud (F) to the left or right, as required, to position needle in center of needle hole; then tighten screw (C). (Fig. 9-2).
5. Turn stitch width dial back and forth between 0 bight and 5 bight. No motion should occur at needle.
6. Repeat steps 1 to 5 if motion is present at needle.



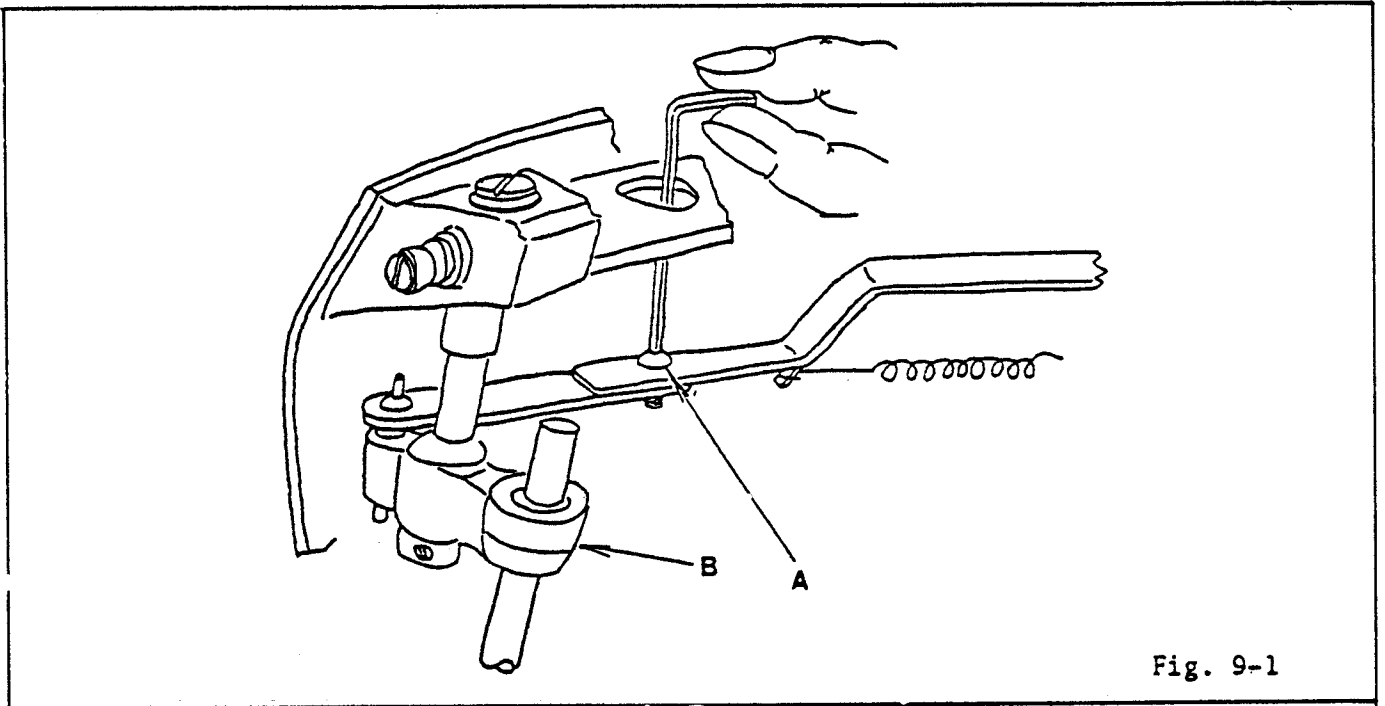


Fig. 9-1

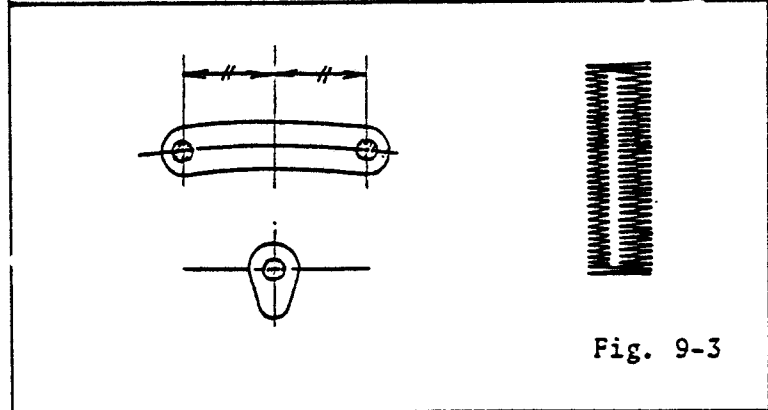


Fig. 9-3

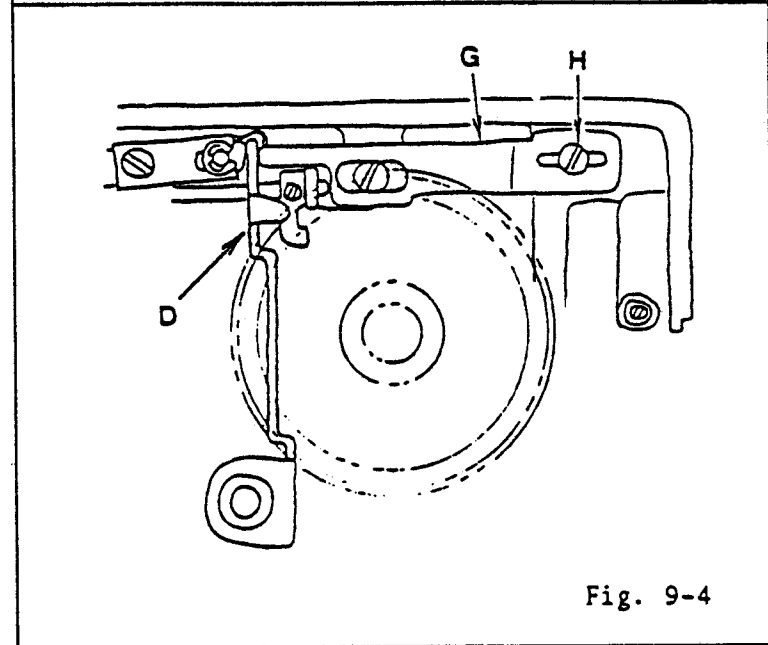


Fig. 9-4

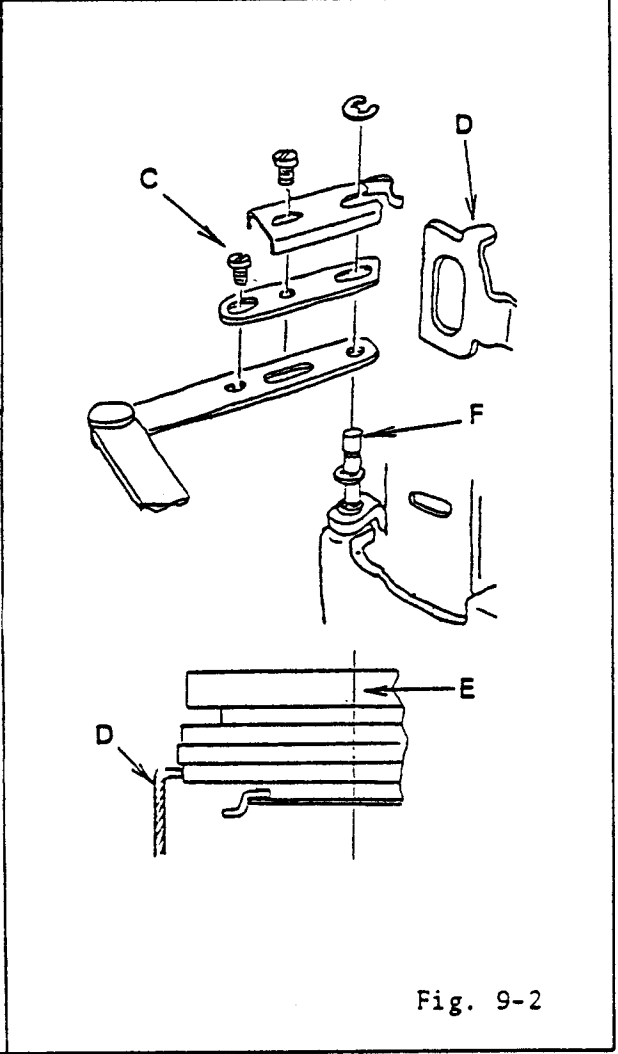


Fig. 9-2

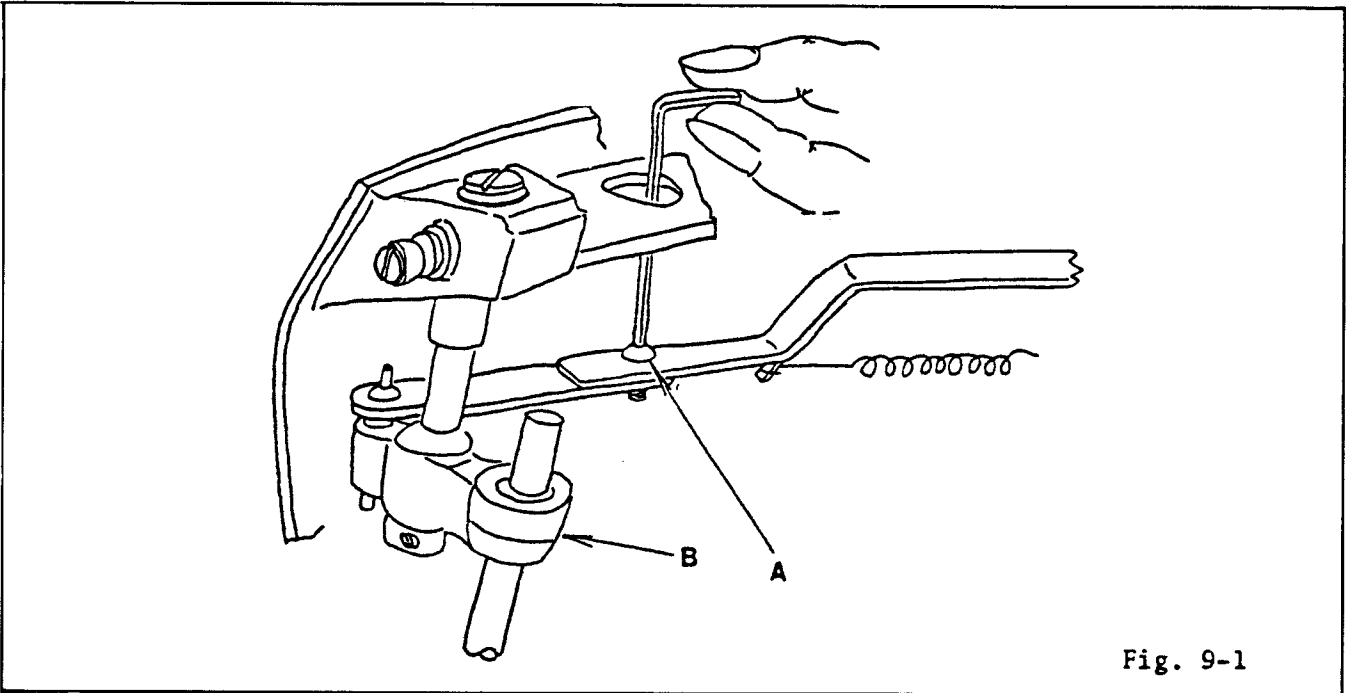


Fig. 9-1

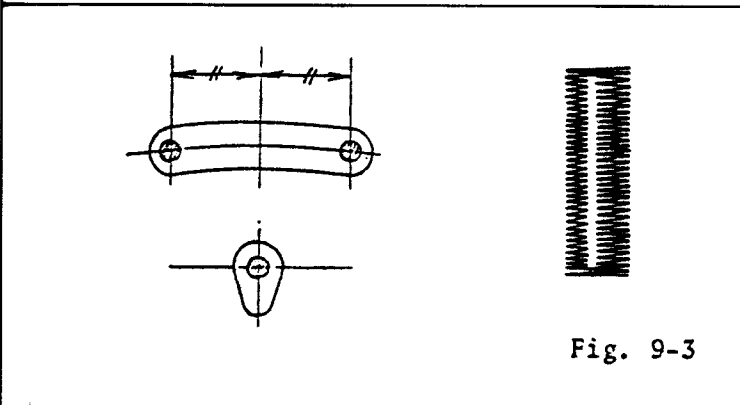


Fig. 9-3

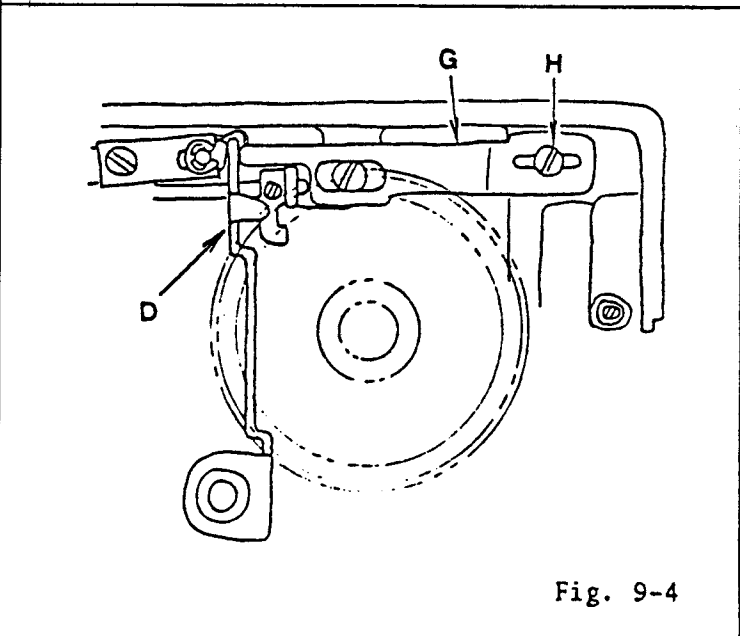


Fig. 9-4

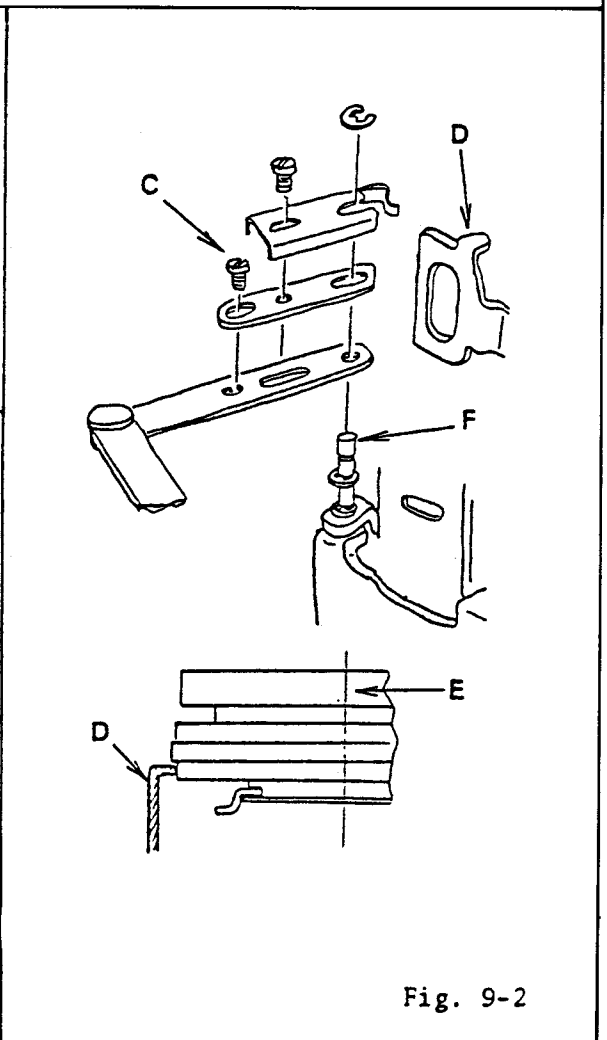


Fig. 9-2

9. ZERO OUT NEEDLE MOTION AND SETTING LEFT-TO-RIGHT NEEDLE LOCATION  
(Continued)

7. Set pattern selector to zigzag stitching and check left and right needle locations. The left and right needle locations should be equidistant from center needle position. (Fig. 9-3).

NOTE: If left and right needle locations are not equidistant from center needle position, adjust as described in Parallelism of Needle Bar Driving Arm Plate to Cam Stack adjustment procedures.

8. Move needle position control plate (G) against buttonhole needle position follower (D) and tighten screw (H). See Fig. 9-4).

NOTE: 1. Recheck zero bight stop (Refer to Setting Zero Bight Stop).

2. Recheck maximum bight stop (Refer to Setting Maximum Bight Stop).

## 10. NEEDLE BAR HEIGHT

### FUNCTION OF TIMING LINES

Two lines are cut into the lower end of needle bar to represent the needle rise required to form a thread loop for hook point seizure.

### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Stitch Width Dial: 5 bight
3. Needle: Size 18

### PREPARATION:

Remove face plate.

### CHECK:

1. Turn handwheel toward front of machine until needle bar is in its lowest position.
2. Observe position of needle bar upper timing mark (B) in relation to presser bar bushing (C). Turn handwheel toward front of machine until needle bar lower timing mark (A) is in the same position as the upper timing mark was in relation to presser bar bushing (C). The point of the hook should be at the center of the needle. Adjust hook timing if necessary.
3. Select zigzag. Turn handwheel to move hook point to rear of needle, when needle is in left zigzag position. The top of the needle eye should be 0,40 mm to 0,80 mm (1/64" to 1/32) below the underside of hook point.

### ADJUSTMENT:

1. Loosen needle bar clamping screw (D) and raise or lower needle bar to suit the left needle position requirements. Tighten screw (D). Needle clamp hub (E) should be parallel with front edge of bed. Tighten screw (D) securely.

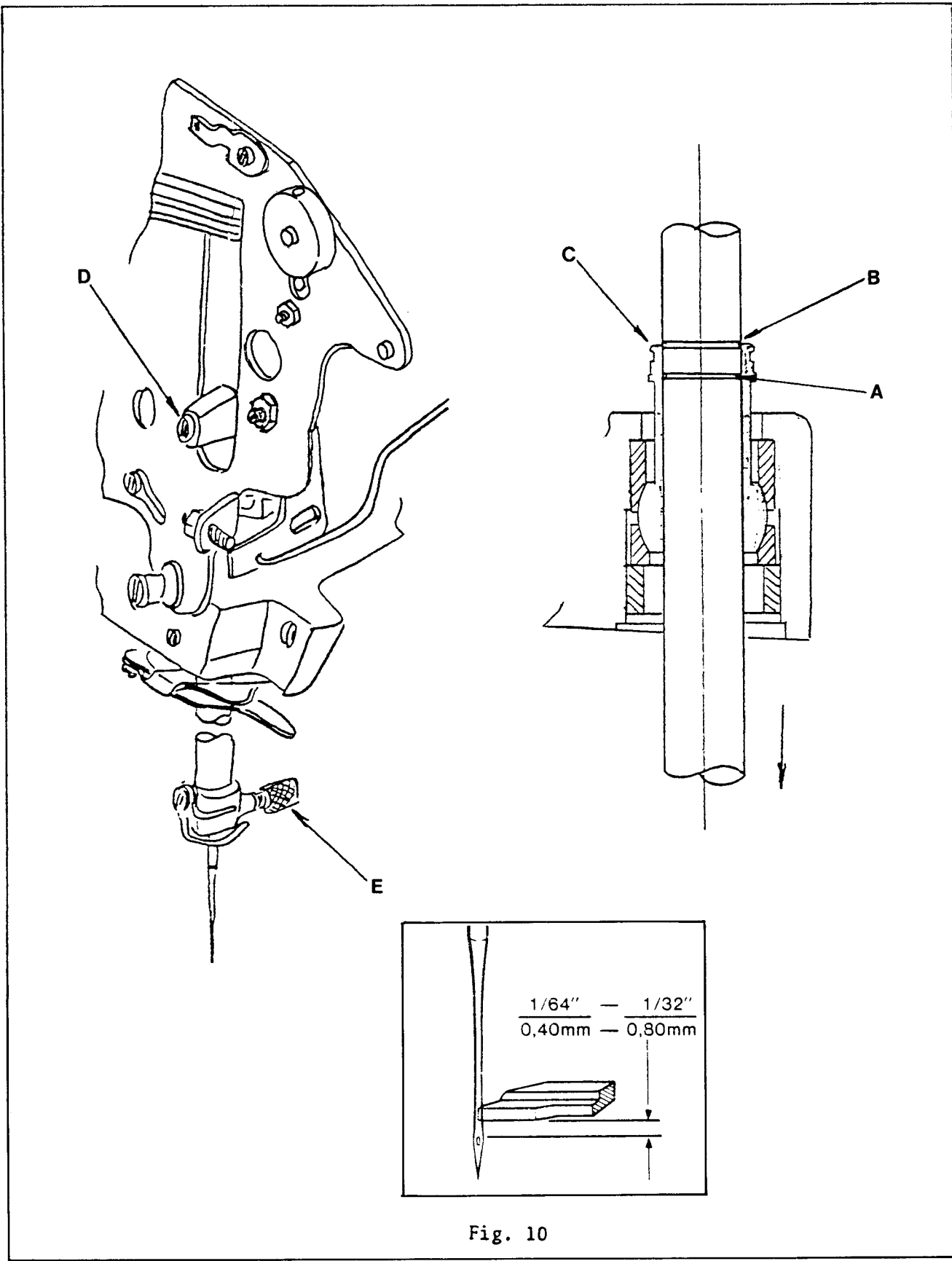


Fig. 10

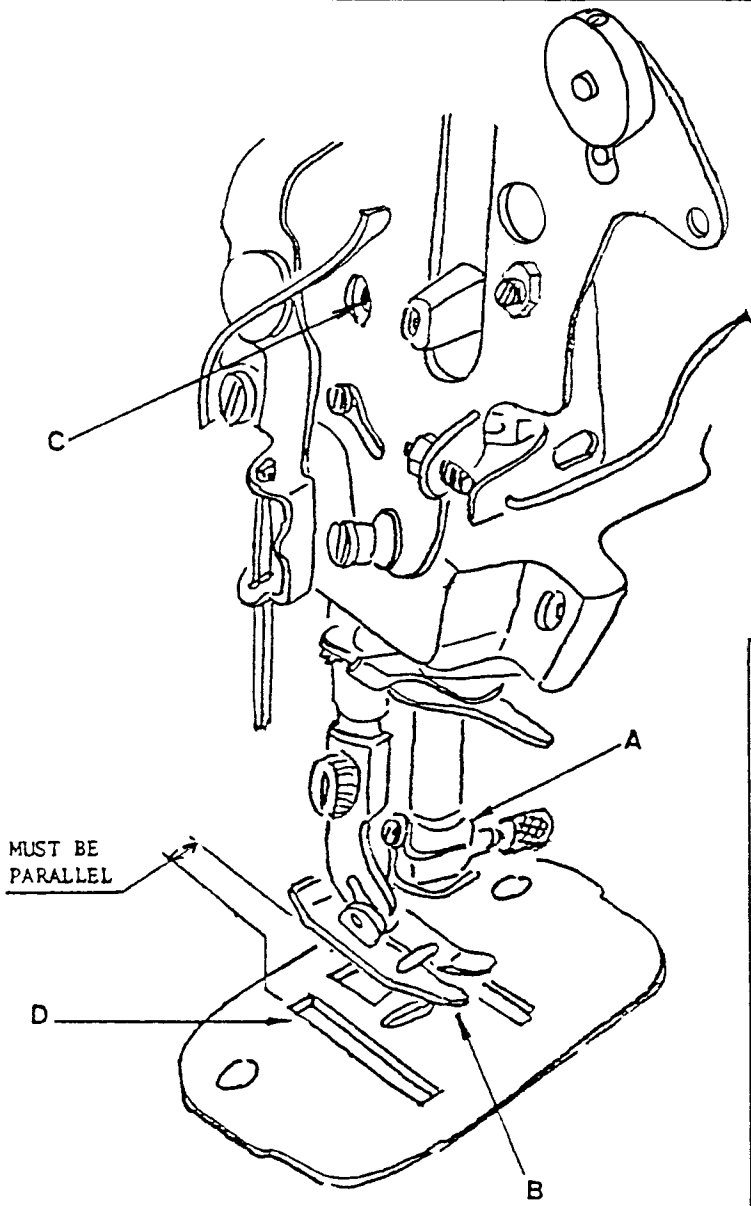


Fig. 11-2

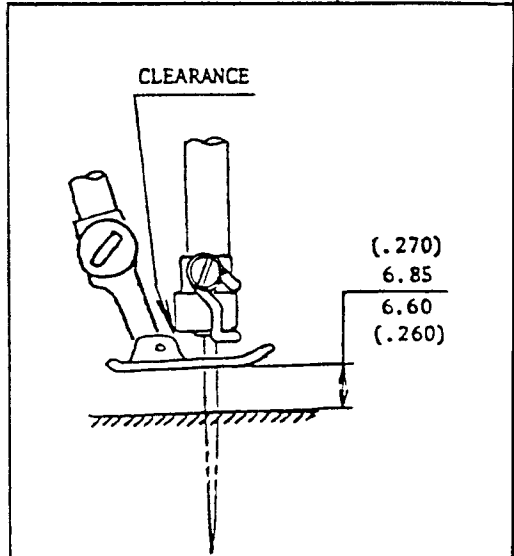


Fig. 11-1

## 11. PRESSER BAR HEIGHT AND ALIGNMENT

### PREPARATION:

Remove face plate.

### PRESSER BAR HEIGHT ADJUSTMENT:

1. Raise presser bar, turn handwheel and check to make sure the back edge of the needle clamp (A) just clears, but does not strike, the presser foot (B) when the needle bar is all the way down.
2. Loosen presser bar guide bracket set screw (C) and adjust height of presser bar if necessary.

The height of presser foot should be 6.60 - 6.85 mm (.260 - .270) from top surface of throat plate to bottom of presser foot. See Fig. 11-1.

3. Tighten set screw (C).

### PRESSER BAR ALIGNMENT ADJUSTMENT:

1. Loosen presser bar guide bracket screw (C) leaving a light pinch on presser bar for control.
2. Align presser foot sides with fee slots (D) in throat plate. (Fig. 11-2).
3. Firmly fasten presser bar guide bracket screw (C).
4. Recheck presser bar height.

## 12. TIMING BELT TENSION

### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Presser Foot: Up
3. Speed Selector Switch: Fast (hare)

### PREPARATION:

Remove arm top cover assembly front cover and needle.

### ADJUSTMENT:

1. Loosen fastening screw (A) that holds idler pulley bracket (B). Maintain a slight pinch on screw (A) for control. (Fig. 12).
2. While running the machine at high speed, push idler pulley bracket (B) to the rear to slow down the machine. Then pull toward the front of the machine as required to adjust belt tension. Note changes in machine speed during this adjustment.
3. Hold bracket (B) and tighten screw (A).
4. Run machine at high speed and check whether speed within specification can be obtained. Repeat adjustment if necessary.
5. Check hook timing and adjust if necessary.

NOTE: Be very careful not to let the idler pulley back off too far while running the machine. This could allow the timing belt to jump off the cam stack driving sprocket, upsetting pendulum and hook timing.



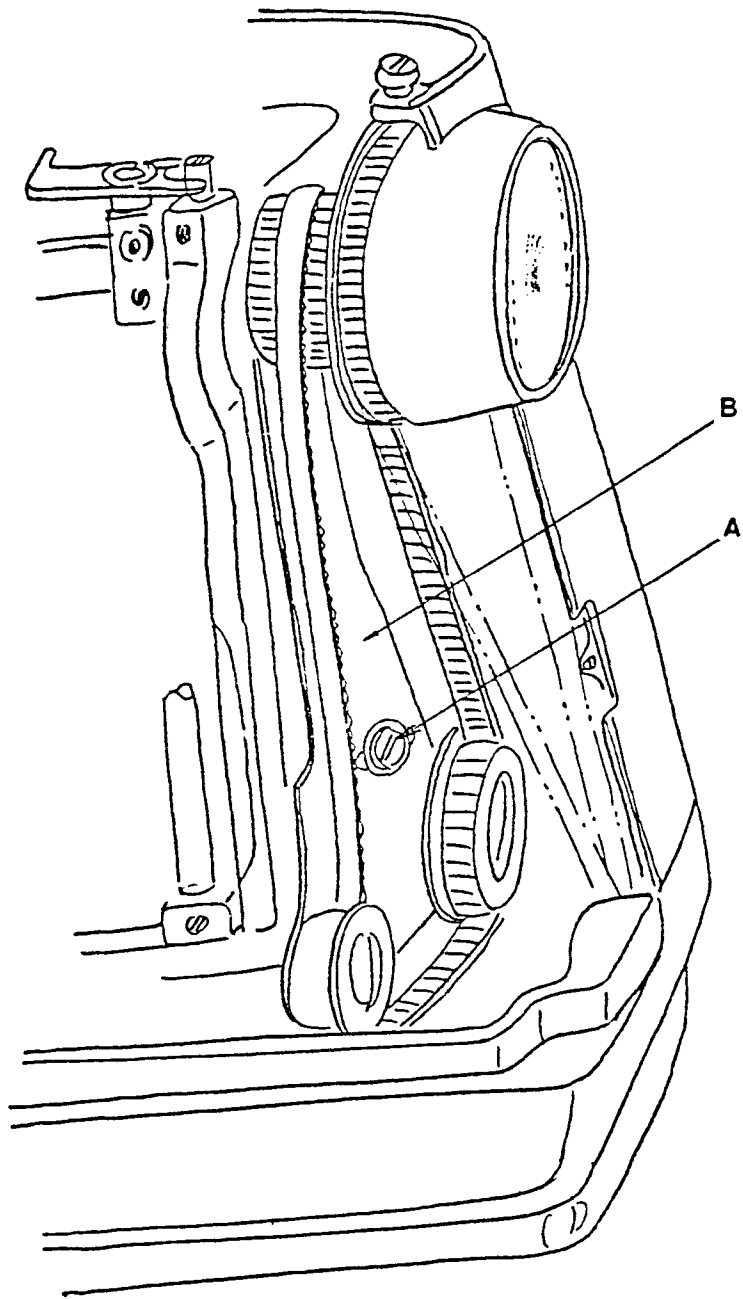


Fig. 12

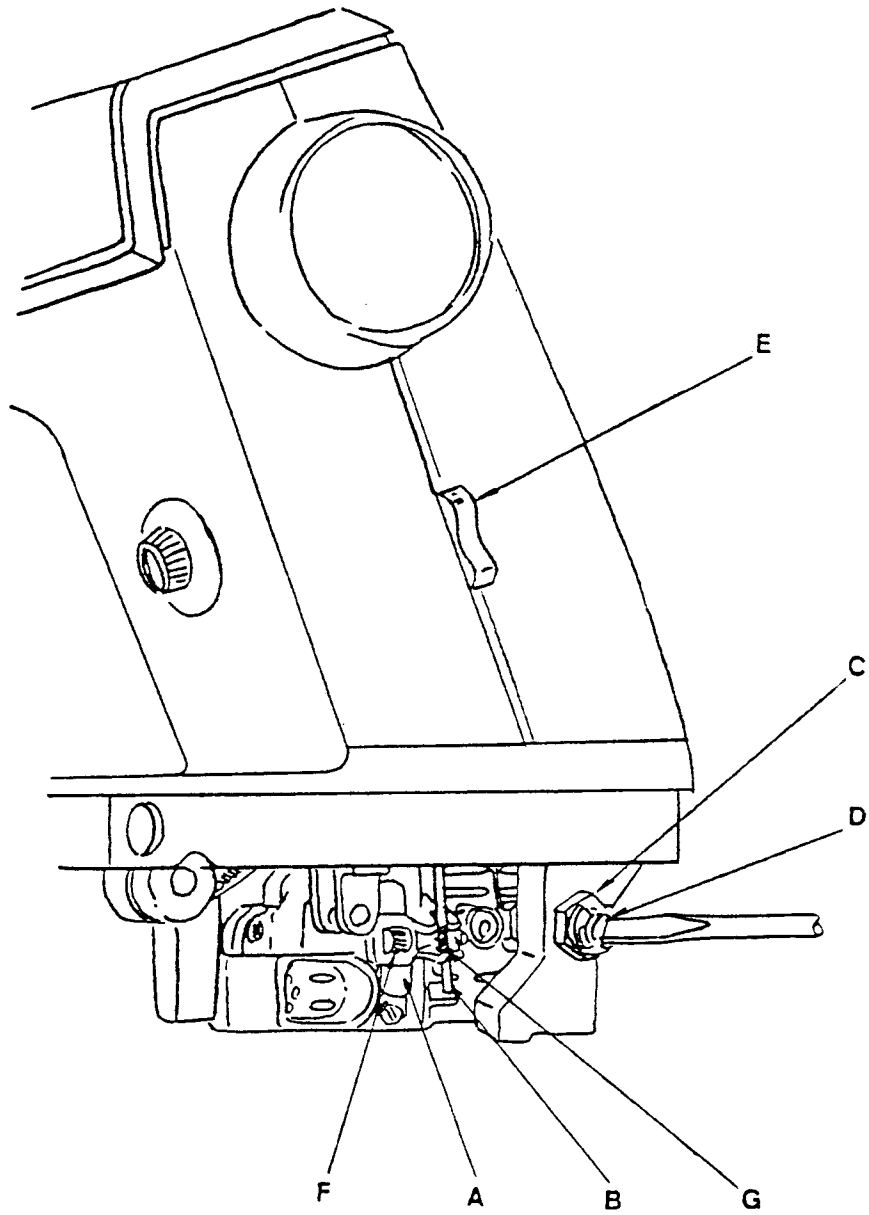


Fig. 13

### 13. MOTOR BELT TENSION

#### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Presser Foot: Up
3. Speed Selector Switch: Fast (hare)

#### PREPARATION:

Remove bottom cover and needle.

#### ADJUSTMENT:

1. Disconnect light switch actuating lever rod (B) from bracket (A).
2. Loosen lock nut (C) on motor adjusting eccentric stud (D).
3. Turn eccentric stud (D) to the left or right to loosen belt until machine attains highest speed.

CAUTION: Be very careful not to loosen the belt too much since this could cause the belt to jump cogs.

4. Tighten lock nut (C).
5. Set rocker switch (E) to "OFF" position. Set switch knob (F) on motor to lowest position. Then set light switch actuating bracket spring clip (G) on light switch actuating lever rod (B) in position and snap rod (B) onto bracket (A) to join rocker switch and switch knob on the motor.

## 14. BUTTONHOLE CAM AND CAM STACK RADIAL AND VERTICAL PLAY

### FUNCTION:

For the buttonhole cam (A) and cam stack (B) to perform reliably, there should be a minimum of radial play consistent with uniform operating tone. There should be no vertical play to prevent double-camming. Double-camming causes irregular pattern stitching.

### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Presser Foot: Up

### PREPARATION:

1. Remove all covers.
2. Remove pattern selector assembly..

### CHECK:

1. Test arm shaft for end play, and handwheel pulley for radial looseness, as instructed under Arm Shaft and handwheel Pulley adjustments.
2. With the thumb (see Fig. 14-1) check the cam stack (B) for radial and vertical play at four equidistant points on a full revolution of the cam stack (B).
3. Check buttonhole cam (A) for radial and vertical play caused by loose or incorrectly seated buttonhole cam stack driver (C).

### ADJUSTMENT: Cam Stack Shaft End Play

#### PREPARATION:

Remove motor.

1. Loosen cam stack shaft collar set screws (D). (Fig. 14-2).
2. Press cam stack shaft downward and while holding it in this position, push cam stack shaft collar up against face of lower bushing to remove end play; then tighten set screws (D).

NOTE: There must be no gap between cam stack shaft retaining ring (E) and face of upper bushing (F).

3. Rotate cam stack through one complete turn and check for binding at four equidistant points. If necessary, readjust for minimum end play without binding.

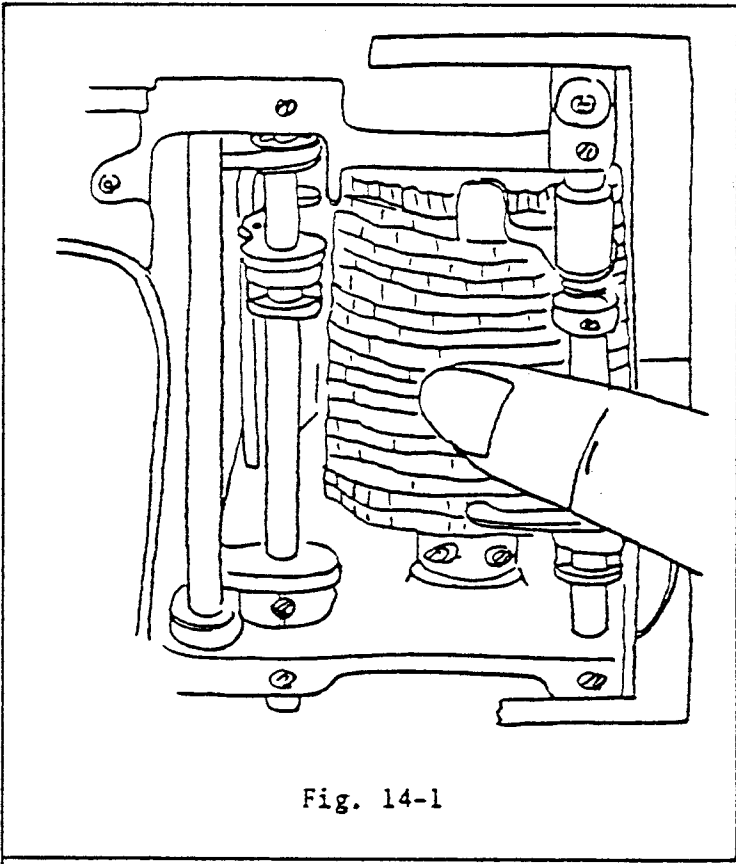


Fig. 14-1

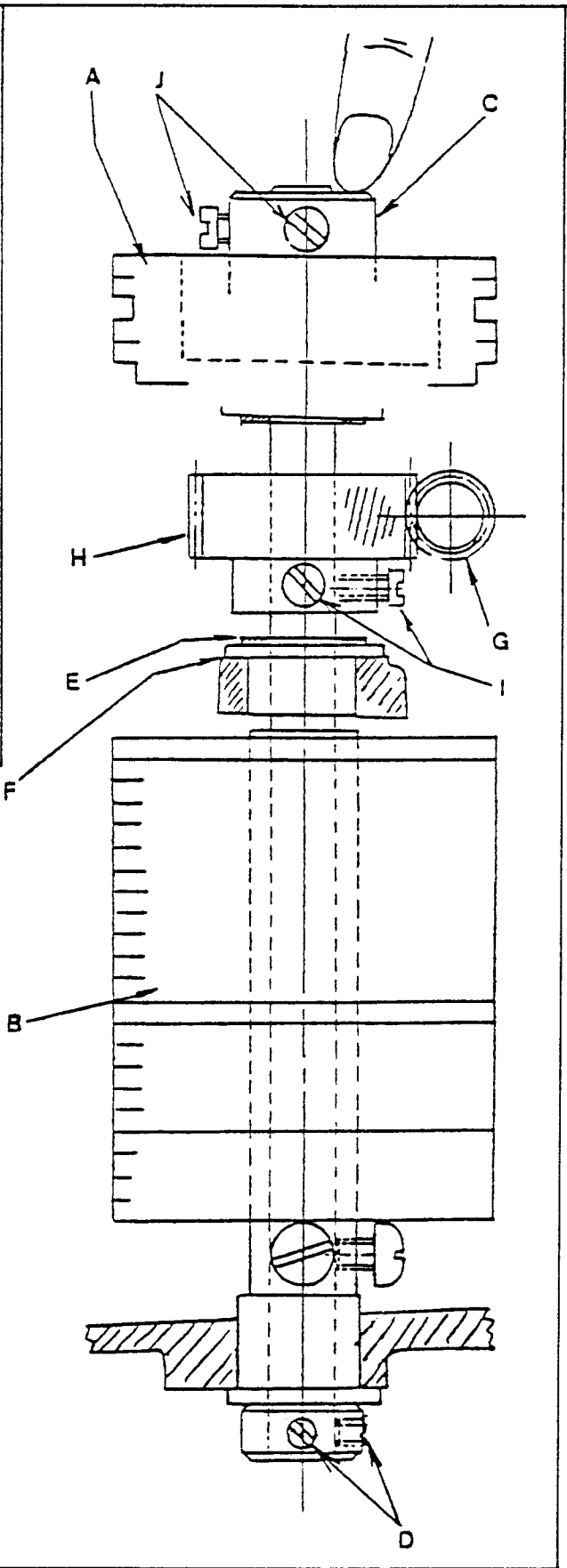
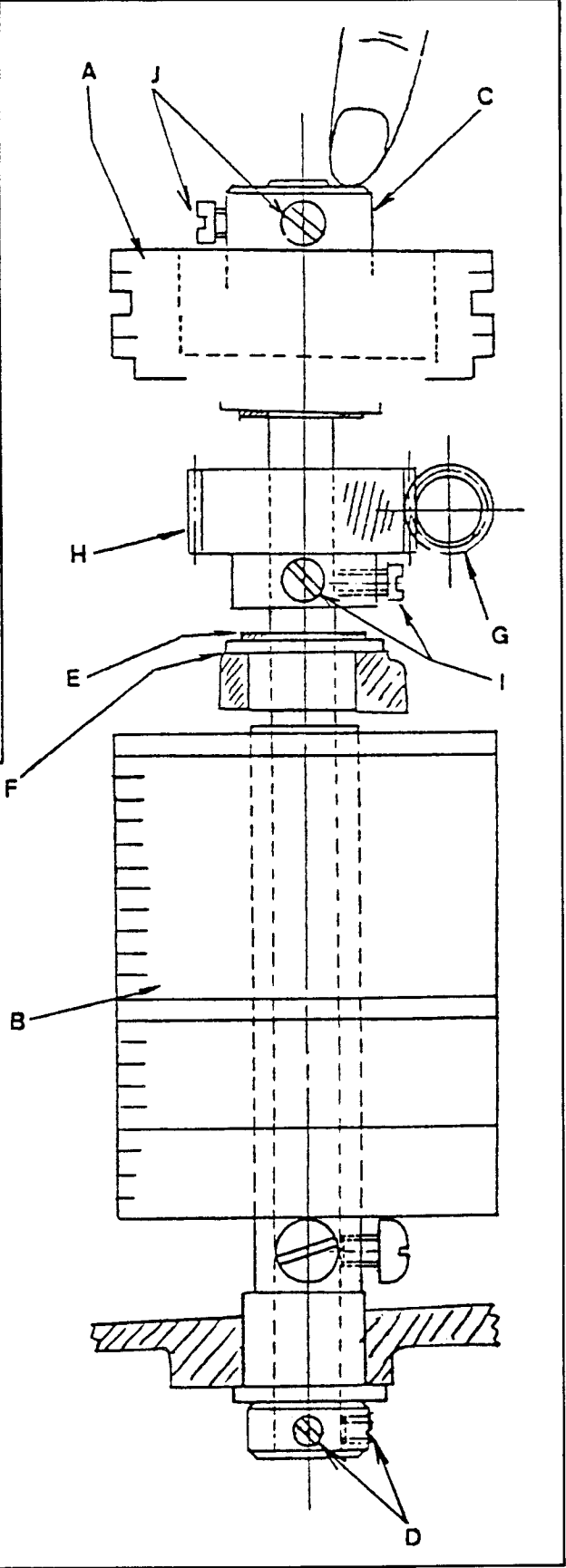
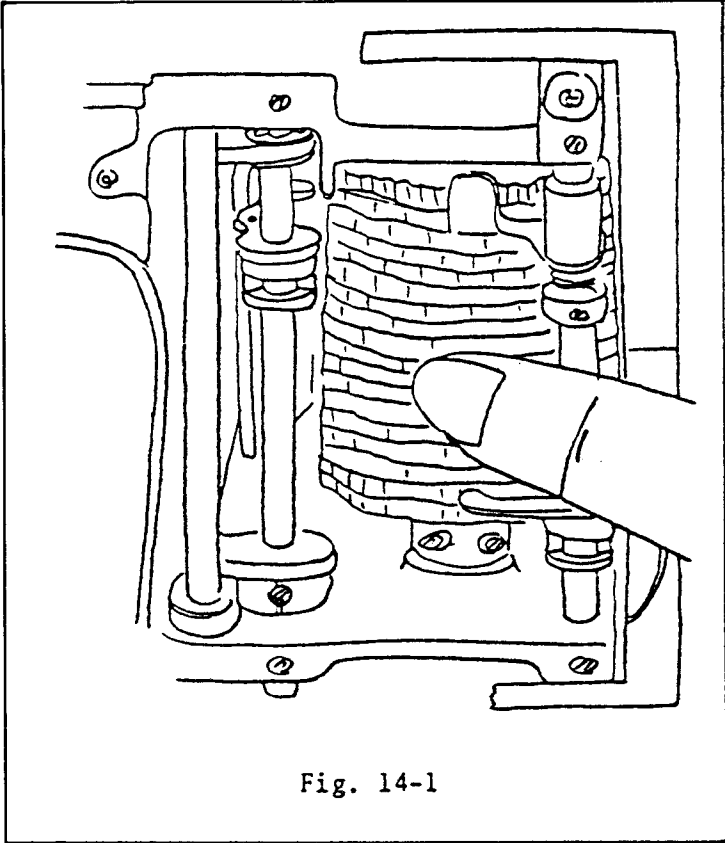


Fig. 14-2



14. BUTTONHOLE CAM AND CAM STACK RADIAL AND VERTICAL PLAY  
(Continued)

ADJUSTMENT: Arm Shaft Worm and Cam Stack Shaft Gear Meshing

1. Loosen the two set screws (I) that hold the cam stack shaft gear (H). Adjust the meshing of cam stack shaft gear (H)(tapered) and arm shaft worm (G) by moving gear (H) up or down, as required. (Fig. 14-2).
2. Tighten both set screws (I) and rotate the cam stack through at least one turn to check that there is minimal or complete desence of rotative play between arm shaft worm and cam stack shaft gear. Run machine to check gear meshing. Readjust if necessary.
3. Check for correct pendulum timing. (See Pendulum Timing Adjustments).

ADJUSTMENT: Buttonhole Cam Play

1. There must be no play between buttonhole cam driver (C) and buttonhole cam (A). If there is any play, either the driver or the buttonhole cam, or both, must be replaced. (Fig. 14-2).
2. Loosen buttonhole cam driver set screws (J). Press buttonhole cam stack driver (C) down firmly to ensure it is seated properly and that there is no vertical play of buttonhole cam (A). Then securely tighten buttonhole cam driver set screws (J).
3. Check for correct pendulum timing. (See Pendulum Timing adjustments).

CAUTION: If buttonhole cam must be replaced, be sure to move the buttonhole cam friction spring out of the way.

INTERLOCKING CHECK LIST:

Changes in cam stack radial play will affect all systems.  
Review all settings.

## 15. PENDULUM TIMING

The two systems, the cam stack system and the buttonhole cam system, have to be timed separately. The cam stack and buttonhole cam must be correctly phased for good buttonhole bar-tack stitching. Good cam stack timing is required to ensure good built-in cam controlled (flexi) feed pattern stitching.

### 15-1 CAM STACK PENDULUM TIMING

#### MACHINE SETTINGS:

1. Pattern Selector: Zigzag
2. Stitch Width Dial: 5 Bight

#### CHECK:

Place a sheet of paper on throat plate and hold in place. Turn handwheel slowly toward the front of machine until the needle penetrates the paper. On downward stroke, all sidewise motion should cease when needle point is approximately 3 mm (.118) above the throat plate. The point of needle should lightly touch the edge of the paper as it leaves the hole.

#### ADJUSTMENT:

1. Remove all covers and pattern selector assembly.
2. Loosen nickel plate camstack screw (B) located at bottom of camstack.
3. Rotate handwheel until black oxide camstack screw (C) is accessible.
4. Place lower needle follower (A) on buttonhole zig-zag cam. (Second plastic cam the top of the camstack).
5. Loosen black oxide screw (C). Rotate camstack clockwise (to the left) to advance camstack timing and counterclockwise (to the right) to retard camstack timing. View needle follower on lobe of buttonhole zig-zag cam from the top of the machine to aid in determining amount of movement when setting camstack. The center of the follower should be just slightly forward of the center of the lobe of the zig-zag cam.
6. Tighten black oxide set screw (C) and recheck pendulum timing. Readjust, if necessary.
7. Tighten nickel plated screw (B).



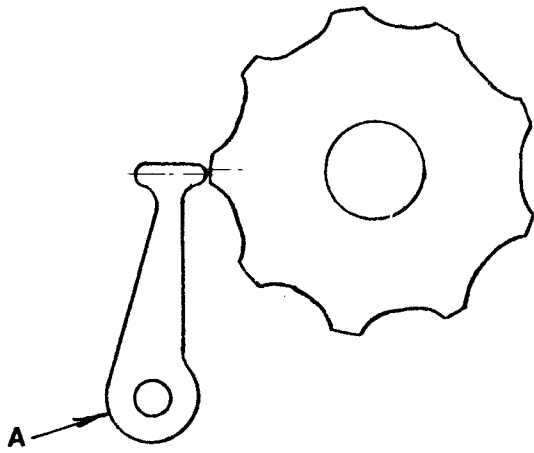


Fig. 15-1

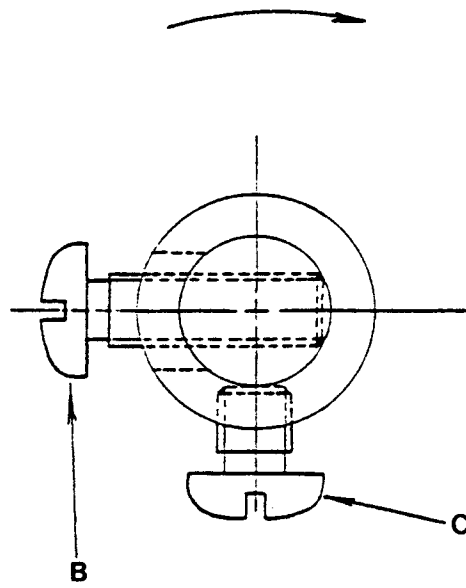


Fig. 15-2

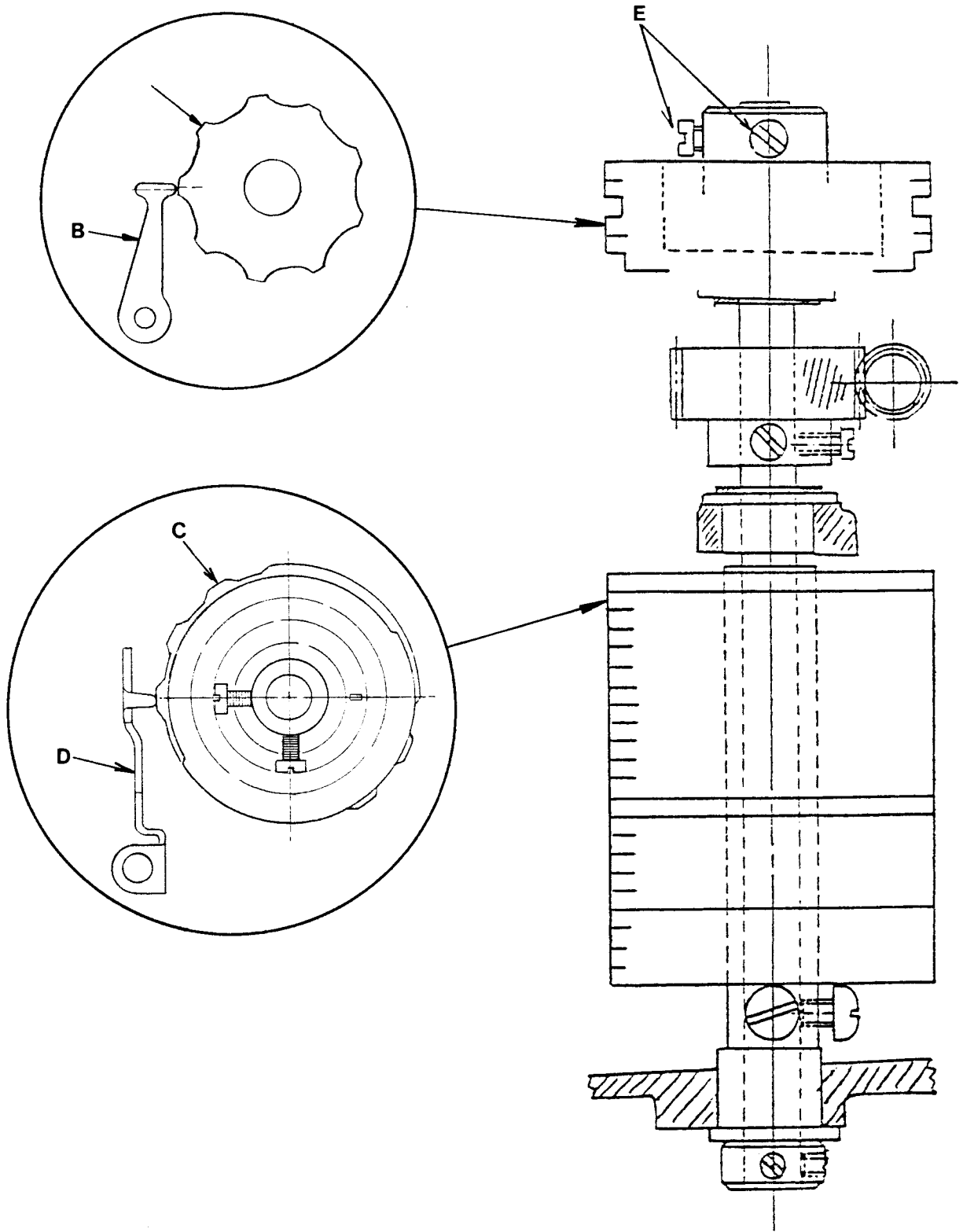


Fig. 15-3

CHECK:

1. The buttonhole cam (C) must be properly phased to the camstack to ensure good buttonhole crossover. That is, the radial location of the buttonhole cam when locked in position must be at a particular point with relation to the camstack. When the lower needle follower (B) is on a lobe of the buttonhole zig-zag cam (A), the buttonhole crossover follower (D) must be on a lobe of the buttonhole crossover cam (C) during the crossover cycle. Observe this relationship from the top of the machine by setting the machine in buttonhole mode and actuating the tripping lever. Turn the machine by hand until both followers are on the lobes of their respective cams.
2. Make paper perforation test to check buttonhole cam pendulum timing. The buttonhole crossover pendulum timing should match that of the regular zig-zag pendulum timing.

ADJUSTMENT:

1. Locate lower needle follower (B) on a lobe of the buttonhole zig-zag cam (A).
2. Loosen buttonhole cam driver set screws (E) and rotate buttonhole cam (C) until the buttonhole crossover follower (D) is on the lobe of the buttonhole crossover cam.
3. Tighten buttonhole cam driver set screws (E) snug tight.
4. Recheck buttonhole crossover pendulum timing.
5. Loosen two buttonhole cam driver set screws (E). Rotate buttonhole cam (C) clockwise (to the left) to advance buttonhole cam timing and counterclockwise (to the right) to retard camstack timing.
6. Tighten buttonhole cam driver set screws (E) and recheck pendulum timing. Readjust, if necessary.

## BUTTONHOLE STITCHING REQUIREMENTS

The following list gives the requirements for good buttonhole stitching.

1. No arm shaft end play.
2. No cam stack shaft vertical play.
3. Minimum cam stack radial play.
4. Correct buttonhole cam to cam stack phasing.
5. Correct center needle location.
6. Correct hook to feed timing.
7. Correct feed throw and feed dog height.
8. Zero Alpha Feed.
9. Six forward stitches to inch (25.4 mm) - 10 stitches in reverse.
10. Properly set buttonhole pawl.
11. Correct needle position and feed control follower heights.
12. Absence of play in Alpha Feed pivot bearings.

## BUTTONHOLE SYSTEM MALFUNCTIONS

The following list gives a number of causes of buttonhole system malfunctions which should be checked before major pendulum timing is started.

1. Buttonhole Bar Tack Irregular:
  - a. Check buttonhole needle position follower retaining spring (A) for pinching. Looped end of spring (A) must provide free up and down action with minimum lateral play of buttonhole needle position follower (B). (Fig. 16-1).
  - b. When bar tack does not span left and right legs of buttonhole as shown in fig. 16-2, buttonhole cam pendulum timing is out of phase with cam stack timing. Correct by adjusting phasing and then recheck buttonhole cam and cam stack pendulum timing.
2. Effect of Double Camming:

The overall width of the buttonhole becomes very narrow, Fig. 16-3, and the width of buttonhole legs are reduced to almost one half or almost to straight stitching. In such case, check height of buttonhole needle position follower (B) and needle position follower (C).

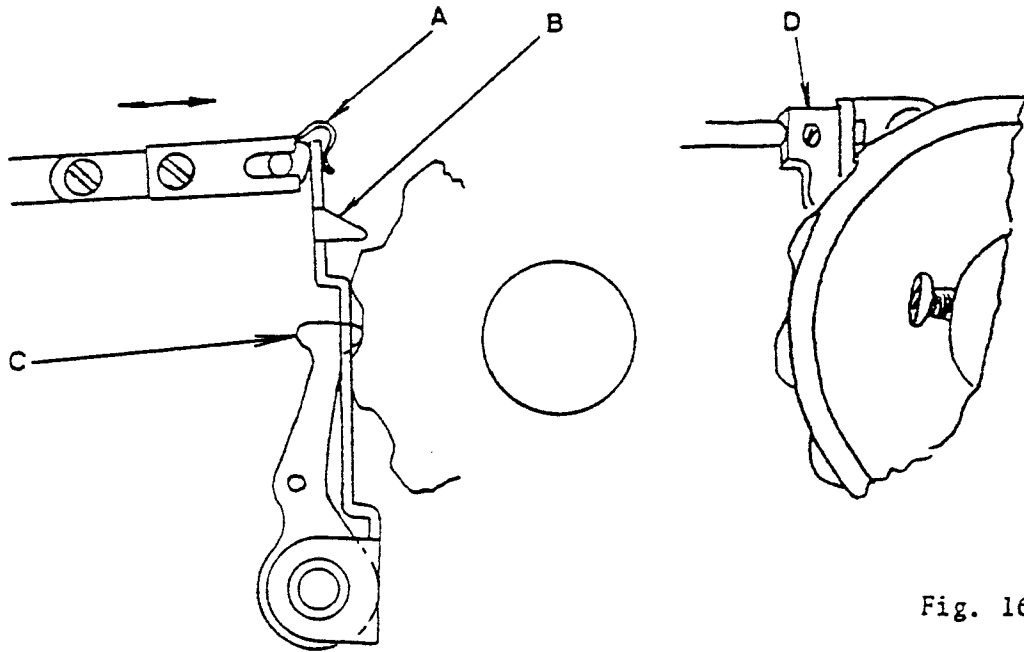


Fig. 16-1



Fig. 16-2

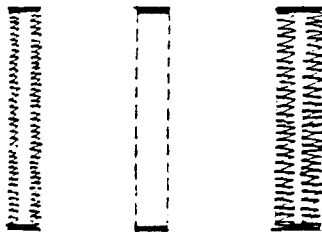


Fig. 16-3



Fig. 16-4



Fig. 16-5

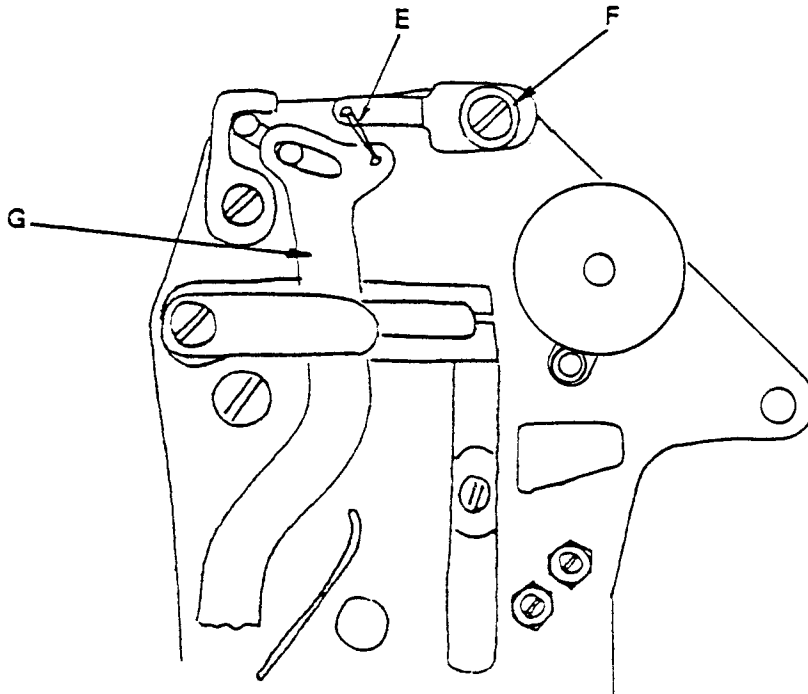


Fig. 16-6

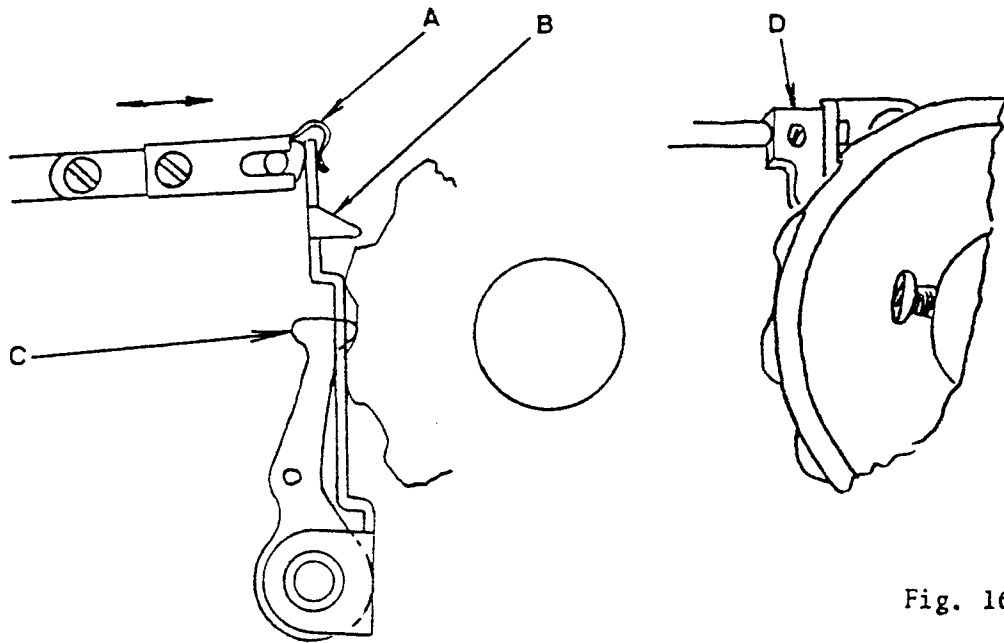


Fig. 16-1

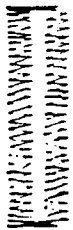


Fig. 16-2

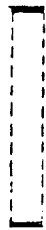
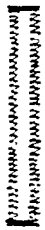


Fig. 16-3



Fig. 16-4



Fig. 16-5

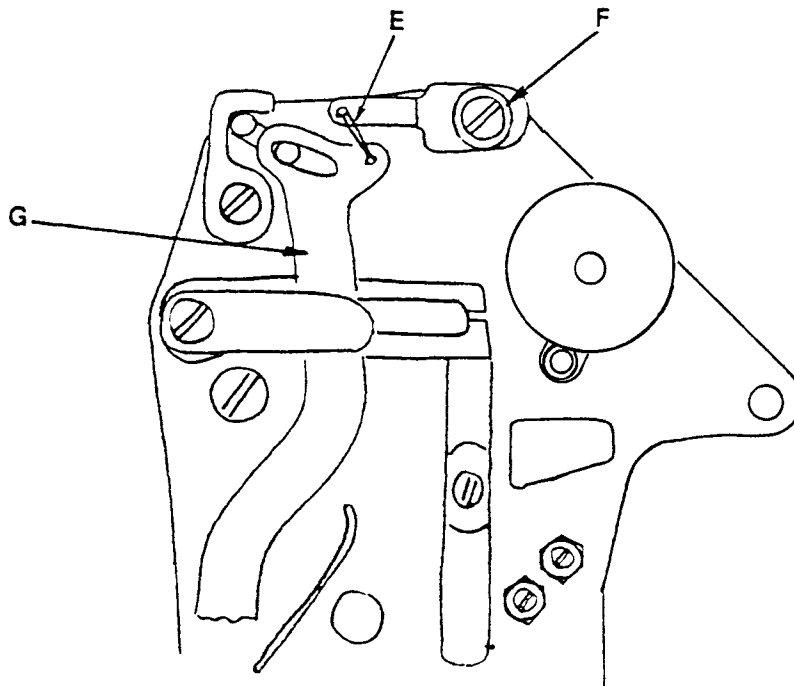


Fig. 16-6

3. Buttonhole Flag/Pawl Recycles Early (Using one-step buttonhole foot):

When the buttonhole flag/pawl recycles before the prescribed length of the buttonhole is finished, Fig. 16-4, check setting of buttonholer kick-out spring (E). Loosen screw (F) and adjust setting of spring (E) in reverse feed position of buttonholer kick-out shaft tripping lever (G) (Flag pushed back). Fig. 16-6.

4. Buttonhole Tear Dropping:

If buttonholes are tear dropping, Fig. 16-5, check for unequal heights of feed dog legs. correct by changing feed dog. Check for binding or looseness in feed dog carrier. See Alpha Feed System Adjustment procedures.

## 16. CAM RELEASE SYSTEM

Proper selection of patterns is impractical without cam release system. When change in pattern is desired, turning of the cam follower releasing dial engages the kick-out lever plate (A) and Kick-out lever locking cam (B) and pulls needle position follower (C), feed control follower (D), as well as needle bar driving arm plate (E), away from the cam stack a sufficient distance for all followers to clear the outer perimeter of the cams. (Fig. 17-1).

If cam release system clearances are properly set, needle position and feed control followers clear the cam stack freely during selection and also track the cams properly to provide the full patterns.

### Insufficient Follower Clearance:

If there is too little clearance, followers interfere with the outer edges of the cams when they are moved from cam to cam.

Check for interferences between followers and cam stack, with stitch width dial at 0 bight and at 5 bight; note if interference is at both 0 bight and 5 bight, or at either 0 bight or 5 bight.

- a. Turn cam follower releasing dial clockwise to engage the kick-out lever plate (A) with kick-out lever locking cam (B).
- b. Turn pattern selector dial through its full range of pattern selection -- from buttonhole (small) to leaf pattern.

### 16-1 BUTTONHOLE NEEDLE POSITION FOLLOWER CLEARANCE ADJUSTMENT

#### PREPARATION:

Remove face plate and arm top cover assembly.

#### MACHINE SETTING:

Pattern Selector: Buttonhole (large)

#### CHECK:

When kick-out lever plate (A) is engaged with kick-out lever locking cam (B), there should be at least 0,5 mm (.020) clearance between buttonhole needle position follower (I) and buttonhole cam (J). (Fig. 17-1).



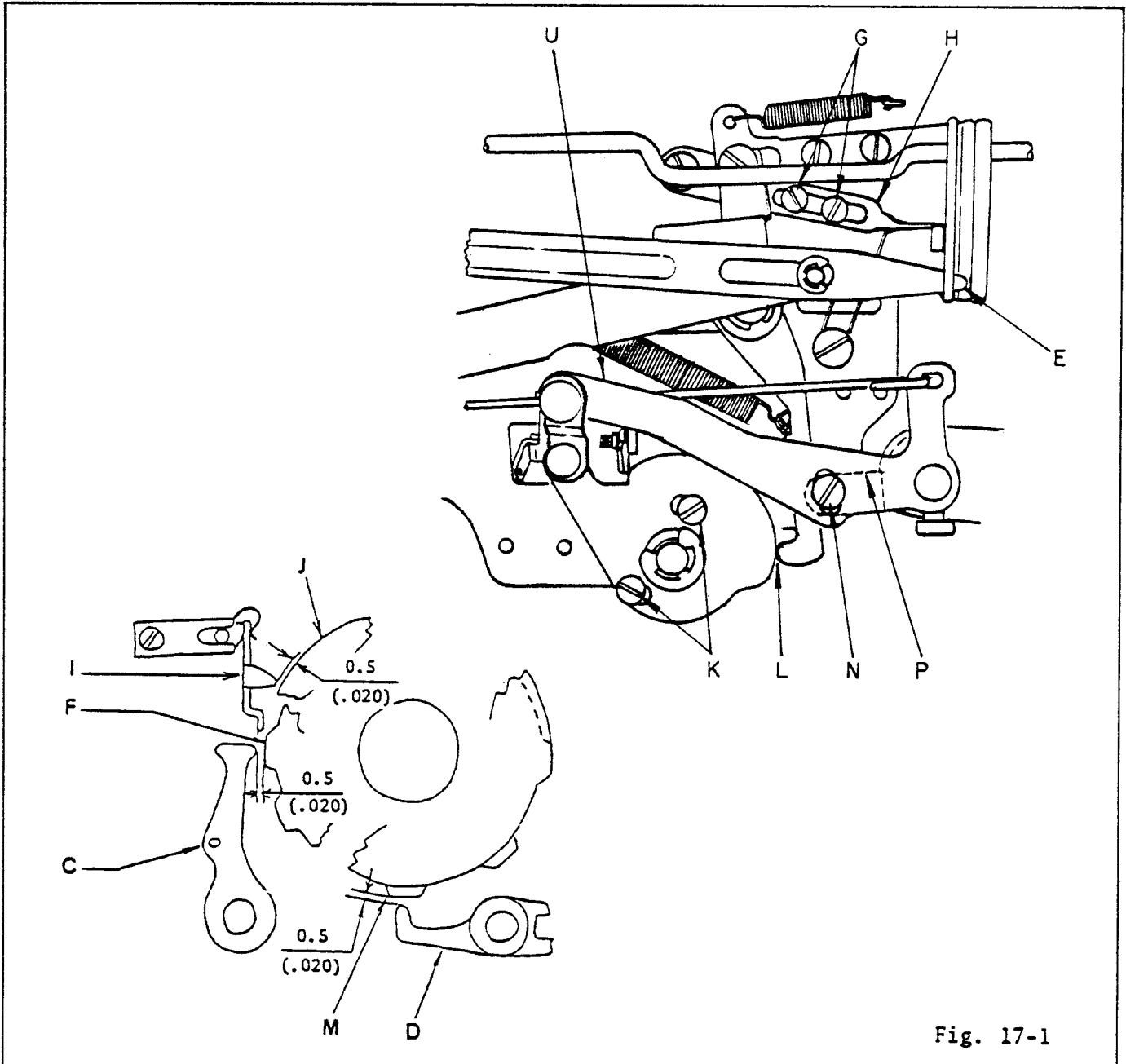


Fig. 17-1

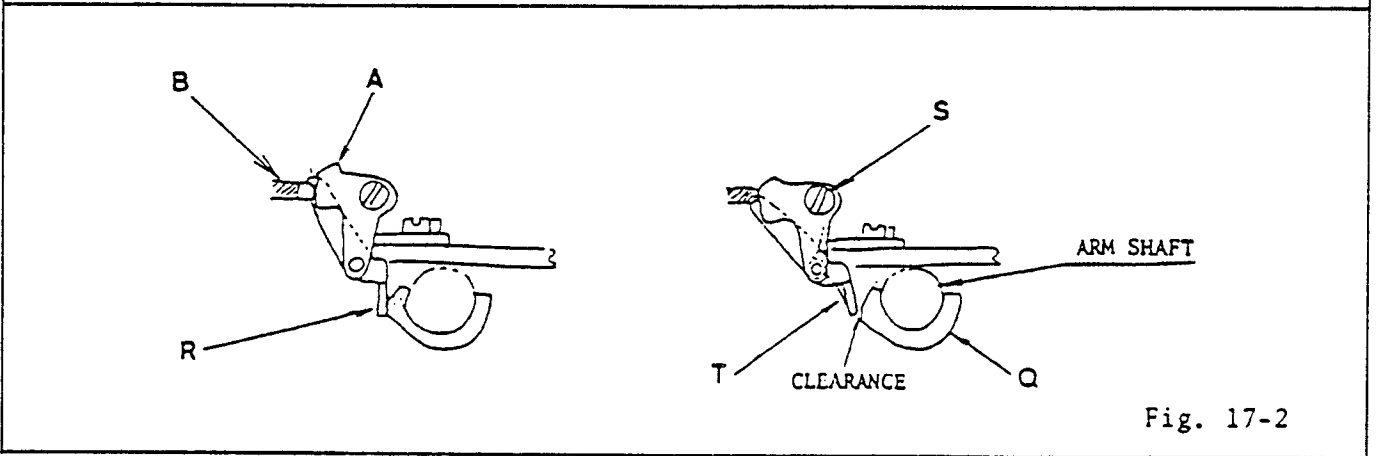
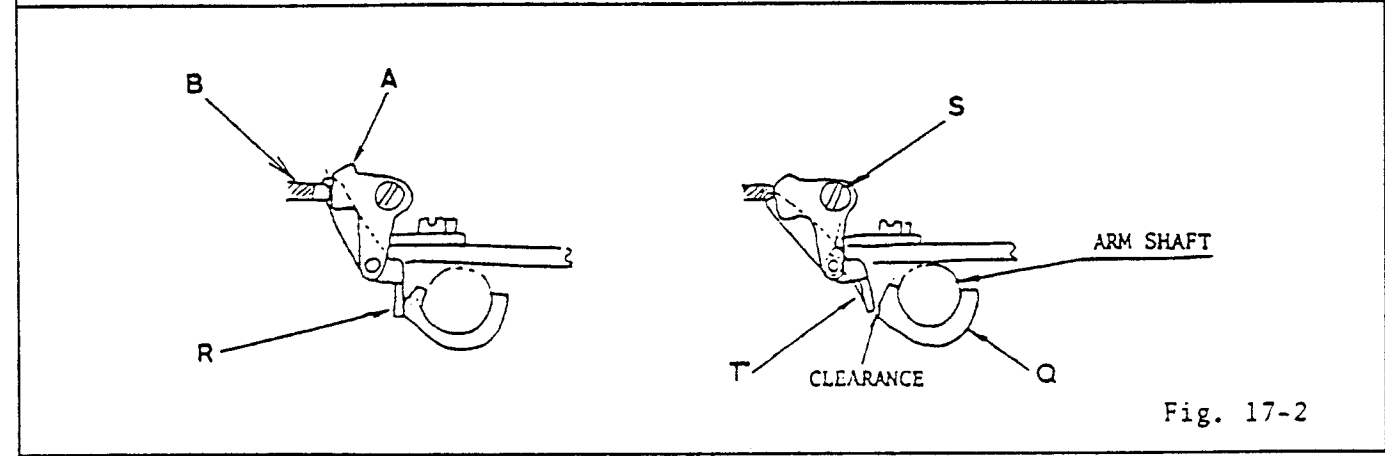
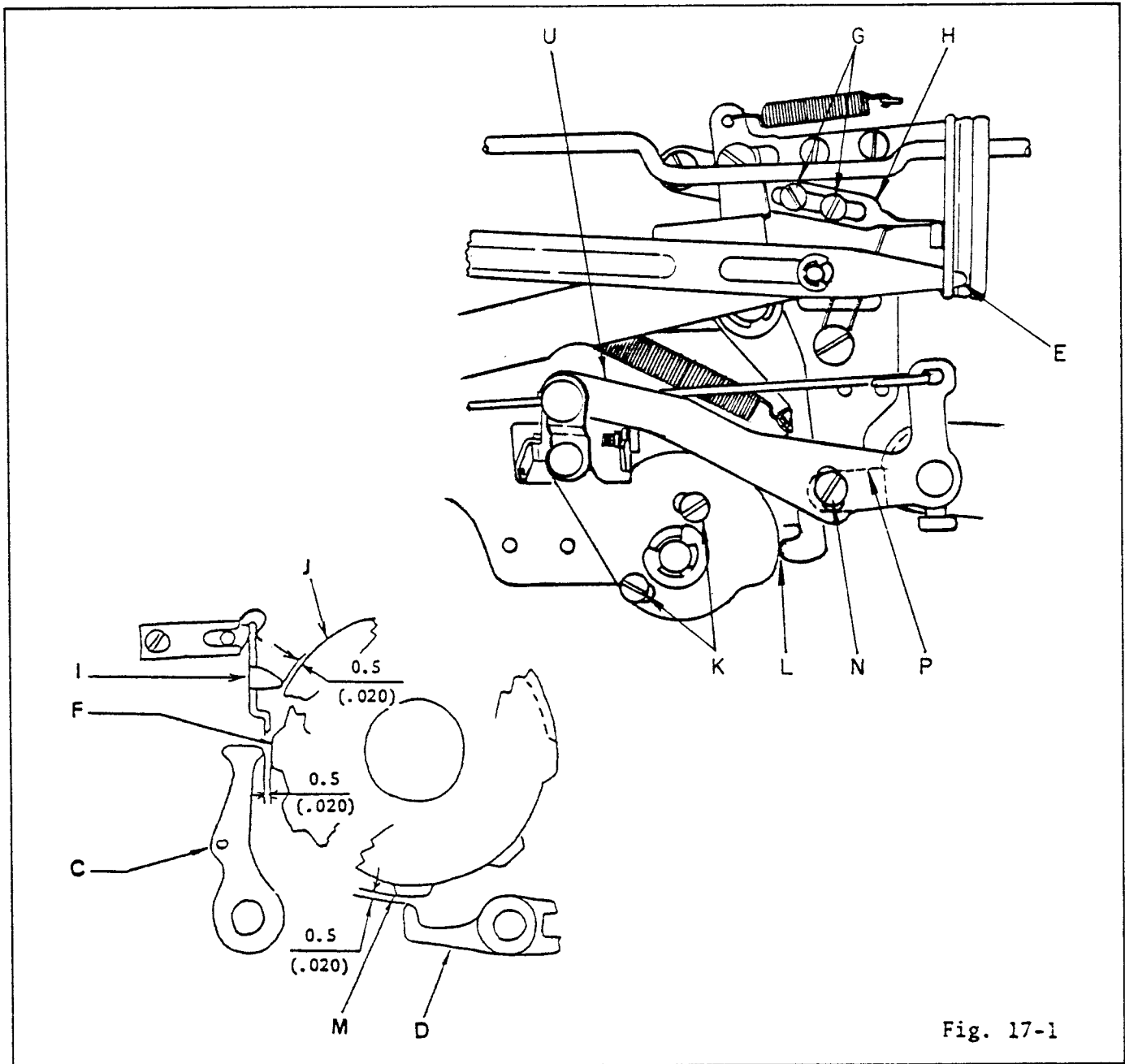


Fig. 17-2



16-1            BUTTONHOLE NEEDLE POSITION FOLLOWER CLEARANCE ADJUSTMENT  
(Continued)

ADJUSTMENT:

1. Turn handwheel toward front of machine until center of lobe of buttonhole cam (J) is aligned with center of buttonhole needle position follower (I).
2. Loosen kick-out lever locking cam set screws (K).
3. Set needle position lever releasing cam (L) so that there is a clearance of 0,5 mm (.020) between buttonhole needle position follower (I) and buttonhole cam (J).
4. Tighten set screws (K).
5. The buttonhole needle position follower (I) must clear the buttonhole cam at all settings of the stitch width dial.

16-2            NEEDLE POSITION FOLLOWER CLEARANCE ADJUSTMENT

PREPARATION:

Remove face plate and arm top cover assembly.

MACHINE SETTINGS:

1. Pattern Selector: Zigzag
2. Stitch Width Dial: 5 Bight

CHECK:

When kick-out lever plate (A) is engaged with kick-out lever locking cam (B), there should be at least 0.5 mm (.020) clearance between needle position follower (C) and lobe of zigzag cam (F). (fig. 17-1).

ADJUSTMENT:

1. Turn handwheel toward front of machine until center of lobe of zigzag cam (F) is aligned with center of needle position follower (C).
2. Turn cam follower releasing dial clockwise to engage the kick-out lever plate (A) with kick-out lever locking cam (B).
3. Loosen two screws (G).
4. Move needle bar driving arm plate disengaging lever (H) to left or right as required until there is a 0,5 mm (0,020) clearance between needle position follower (C) and lobe of zigzag cam (F).
5. Tighten screws (G).
6. The needle position follower (C) must clear the cam stack at all settings of the stitch width dial.

## PREPARATION:

Remove all covers and pattern selector dial lock lever assembly.

## MACHINE SETTINGS:

1. Pattern Selector: Feather Stitch (Flexi Patterns)
2. Stitch Length Dial: Maximum

## CHECK:

When kick-out lever plate (A) is engaged with kick-out lever locking cam (B), there should be at least 0,5 mm (.020) clearance between feed control follower (D) and feed control cam (M). (Fig. 17-1).

## ADJUSTMENT:

1. Turn handwheel toward front of machine until center of lobe of feed control cam (M) is aligned with center of feed control follower (D).
2. Actuate cam selector disengaging dial lever (U) to lift follower from cam.
3. Loosen crank shaft lever screw (N).
4. Move crank shaft lever (P) forward or backward to obtain a clearance of 0.5 mm (.020) between feed control follower (D) and feed control cam (M).
5. Tighten screw (N).

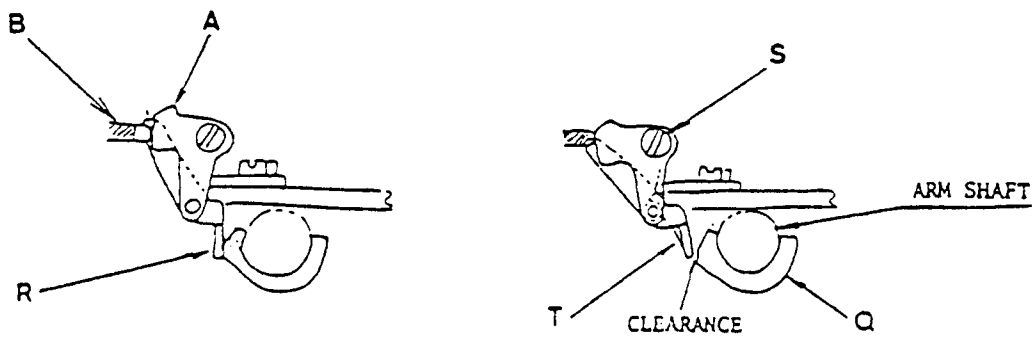
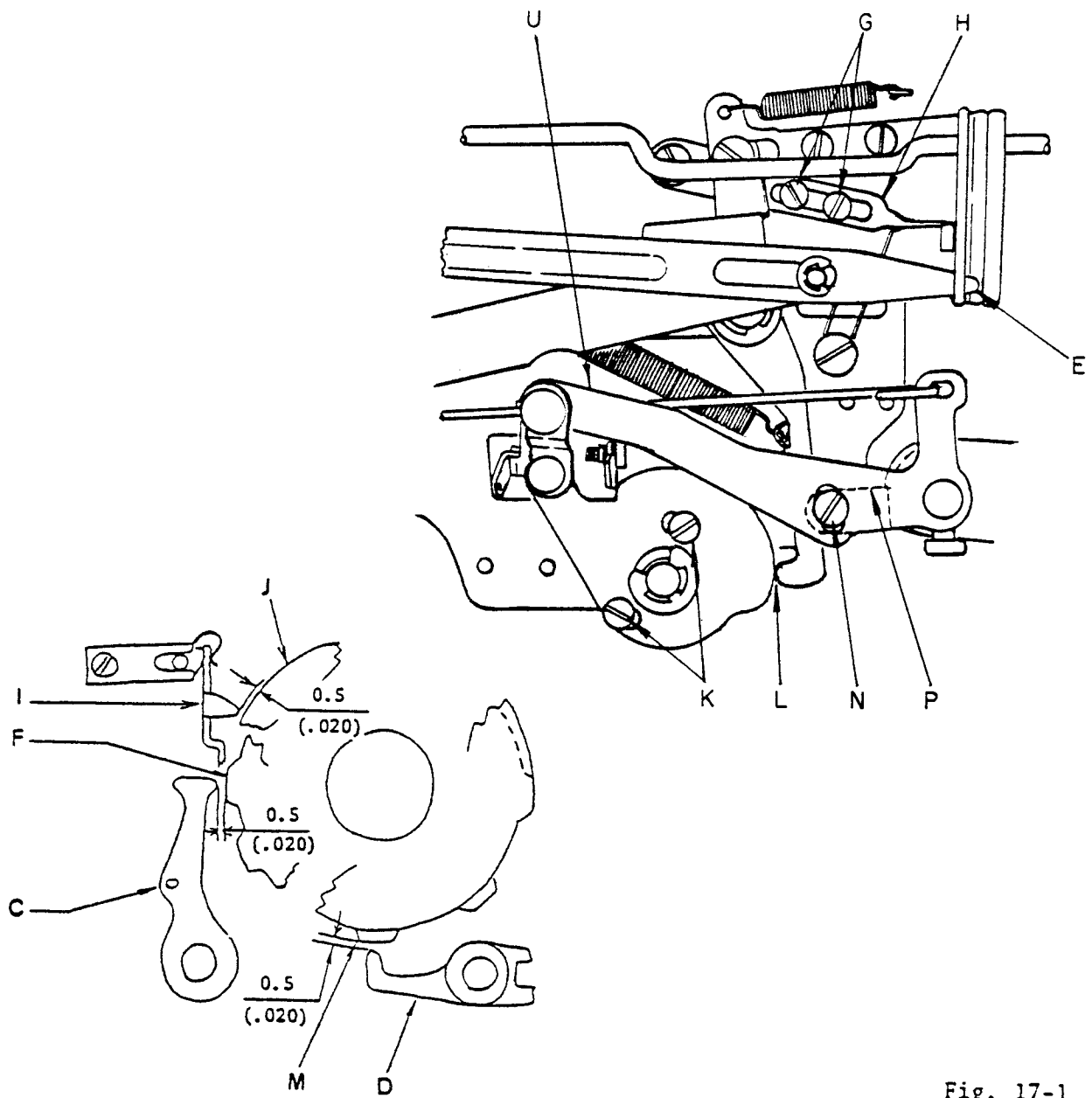
## RECHECK:

Test buttonhole feed control follower for clearance of buttonhole cams. There must be no hang-ups when selecting either the large or small buttonhole stitch settings.

## 16-4 KICK-OUT LEVER SYSTEM SETTING

## FUNCTION

When kick-out lever locking cam (B) is turned clockwise activated by various linkages, the kick-out lever plate (A) is, by means of a spring, pushed into engagement with the notch in the locking cam (B) locking the cam in its kick-out position. When the machine is operated, the lobe on kick-out lever releasing cam (Q) on the arm shaft contacts kick-out lever (R) which kicks kick-out lever plate (A) out of engagement with kick-out lever locking cam (B). The kick-out lever locking cam (B) returns to its normal position. (Fig. 17-2).



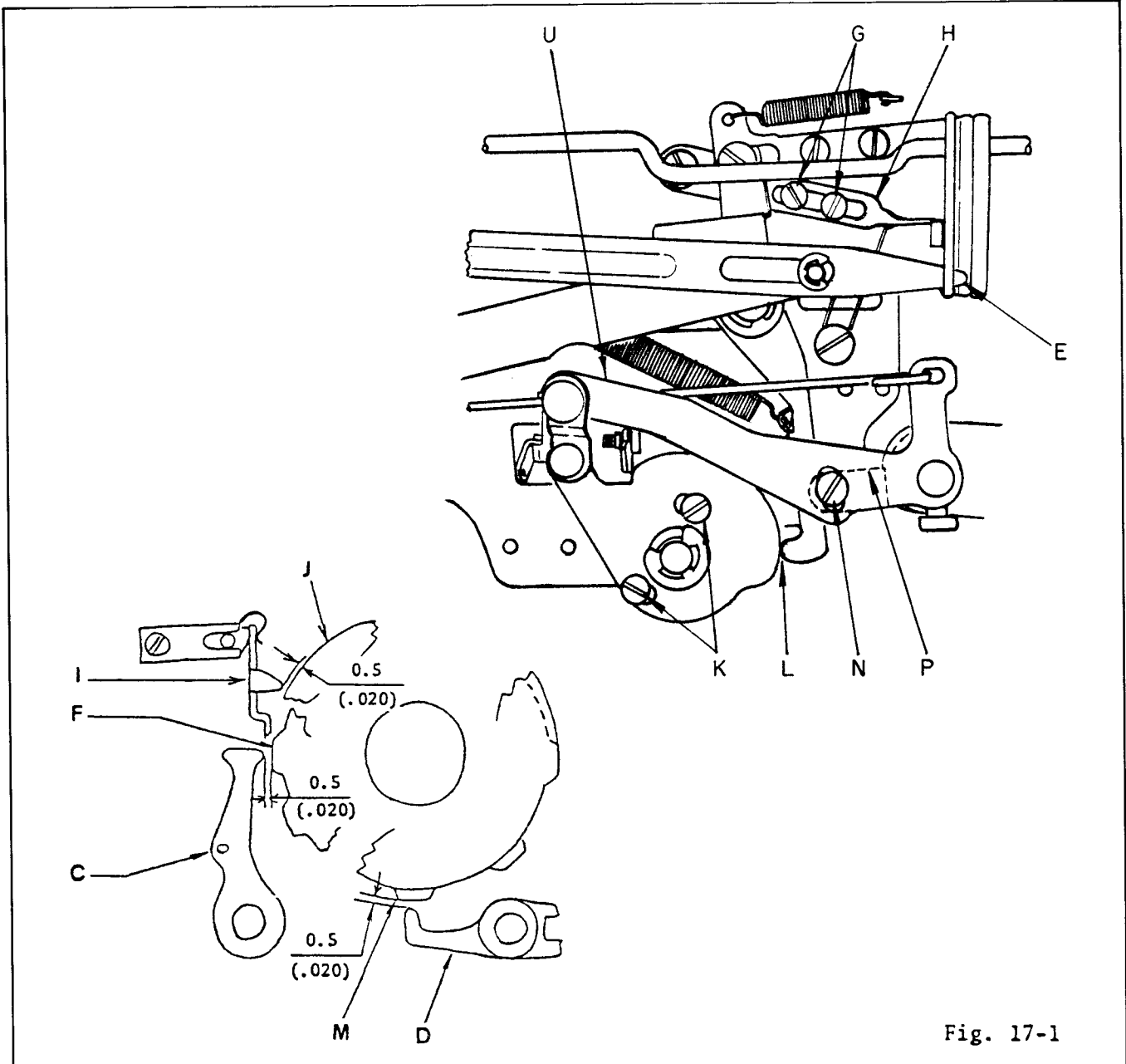


Fig. 17-1

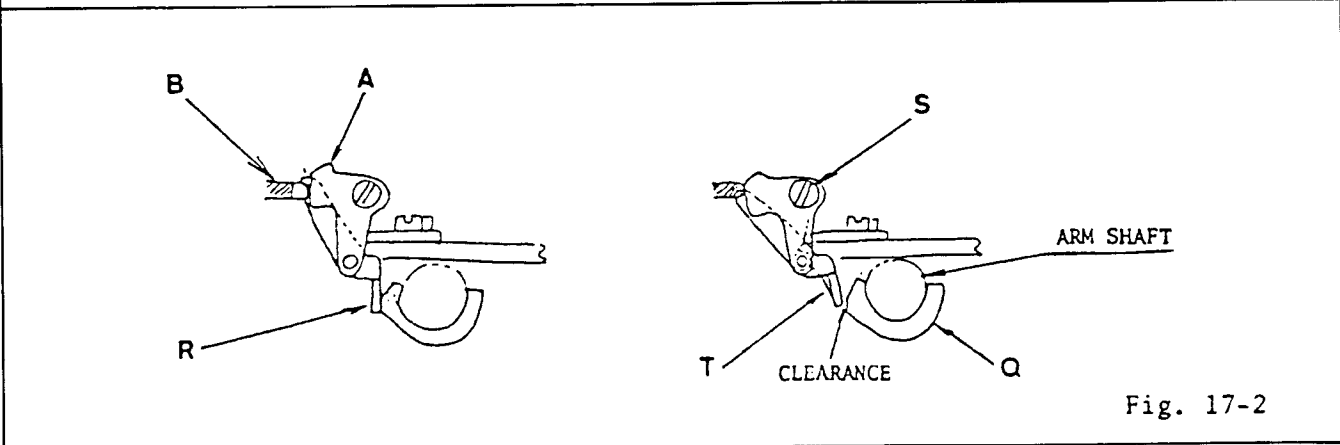


Fig. 17-2

## CHECK:

When the kick-out lever locking cam (B) is in its normal (unlocked) position, there should be sufficient clearance between the high point of the lobe of kick-out lever releasing cam (Q) and kick-out lever (R). If there is no clearance, noise is generated and the kick-out lever locking cam (B) may not lock in its kick-out position. If there is too much clearance, releasing cam (Q) may not be able to kick out kick-out lever (R) to unlock locking cam (B).

## PREPARATION:

Remove all covers.

## ADJUSTMENT:

1. Loosen kick-out lever plate screw (S) and move kick-out lever plate (A) forward or backward, as required, to obtain clearance between high point of the lobe of releasing cam (Q) and kick-out lever (R).
2. Tighten screw (S).
3. Recheck for noise during machine operation, and ability to lock and unlock kick-out lever locking cam (B).

NOTE: If clearance, and position of kick-out lever locking cam (B) is correct and cam (B) cannot be locked in its kick-out position, check for weak or broken kick-out lever plate spring (T).

## 16-5

## PATTERN SELECTOR

## FUNCTION

The design calls for retracting needle position and feed control followers away from the cam stack to allow vertical selection to the desired pattern. If the operator forgets to turn cam follower releasing dial before pattern selection, this system locks the dial before any damage is done to the pattern selection system.

## CHECK:

Turn cam follower releasing dial clockwise until stop to place the machine in kick-out position. When machine is in kick-out position, the pattern selector dial must turn freely. Turn handwheel to place machine in sewing position and check that the pattern selector dial cannot be turned for pattern selection.

## PREPARATION:

Remove all covers.

ADJUSTMENT:

1. Turn cam follower releasing dial clockwise to place the machine in kick-out position.
2. Loosen set screw (A). (Fig. 18-2).
3. Push end of pattern selector dial lock lever disengaging lever (B) against pattern selector dial lock lever (C) and set clearance between front face of pattern selector cam (D) and rear face of lock lever (C) to 0.5 - 1.0 mm (.020 - .039), and then tighten set screw (A). (Fig. 18-3).
4. The pattern selector cam spring (E) should locate firmly in the notch of pattern selector cam (D), Fig. 18-1, when pattern selector cam (D) is turned to left and right as far as it will go. If adjustment is necessary, loosen screw (G) and move spring (E) to left or right as required; then tighten screw (G).
5. Loosen pattern selector dial lock lever bracket screw (F).
6. Set lock lever (C) so that there is a little clearance between its tip and cam spring (E), then tighten bracket screw (F).
7. Recheck that the pattern selector dial turns freely when machine is in kick-out position and does not turn when machine is in sewing position. (Refer to CHECK above).



Fig. 18-1

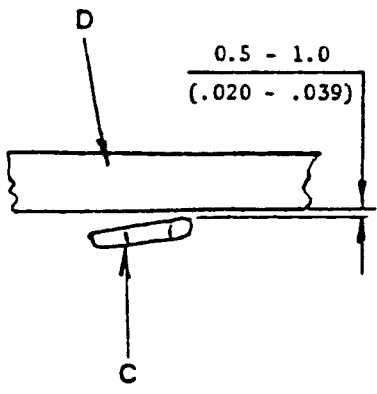
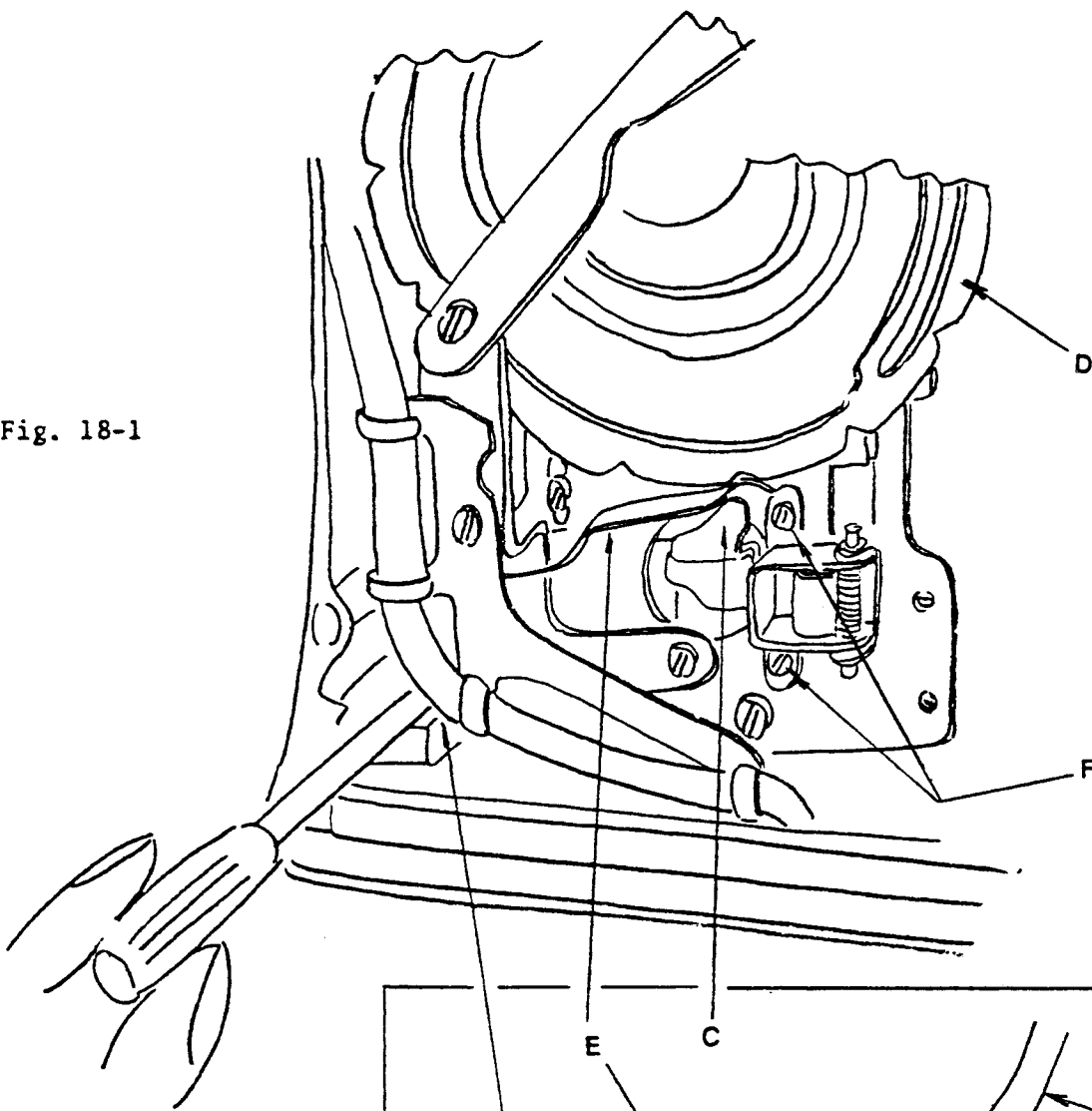


Fig. 18-3

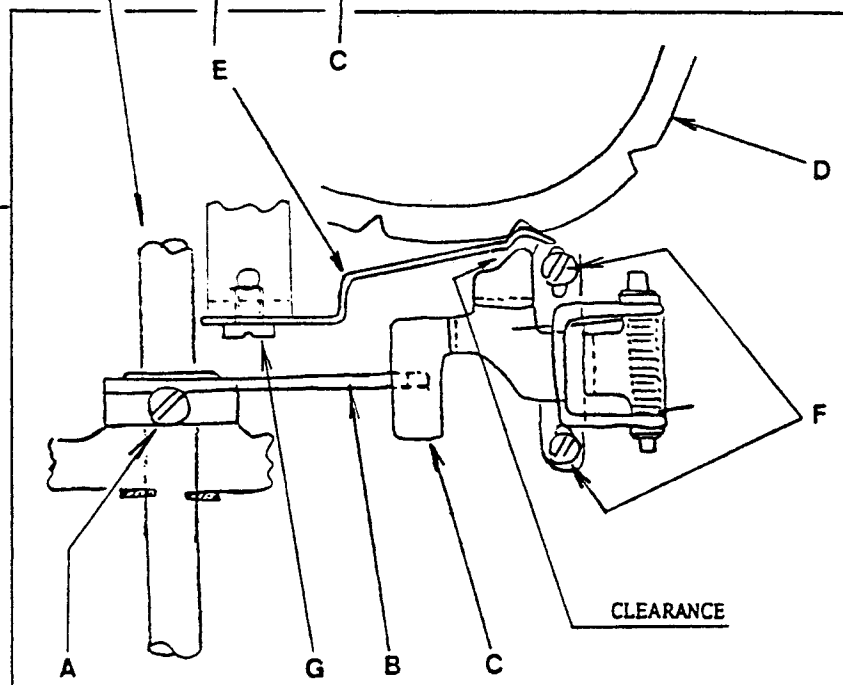


Fig. 18-2

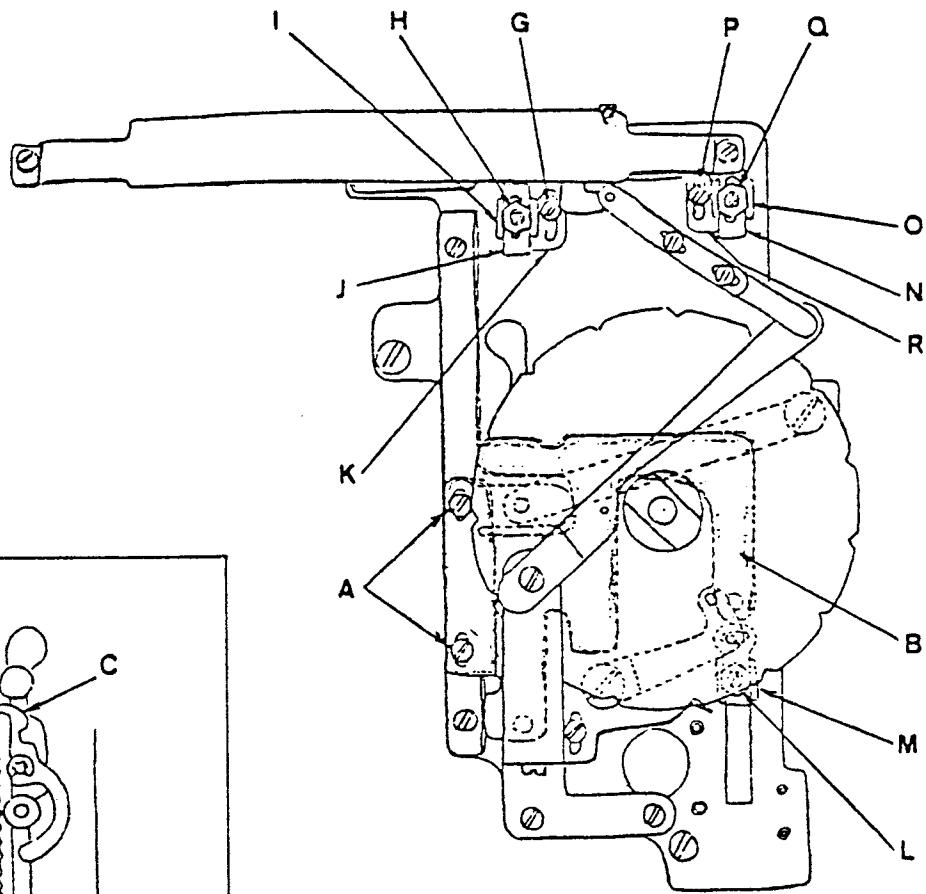


Fig. 19-2

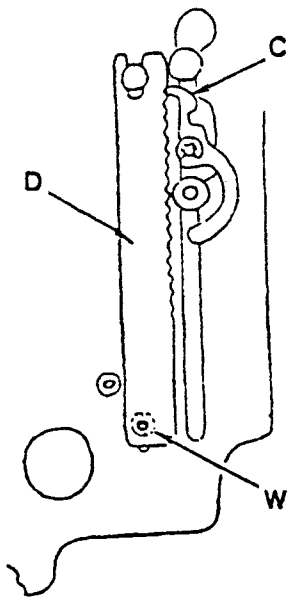


Fig. 19-3

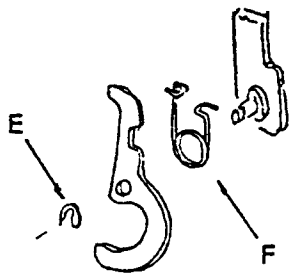


Fig. 19-4

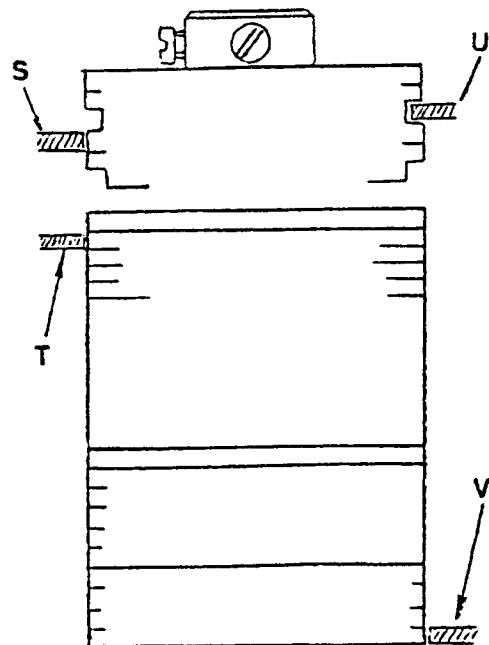


Fig. 19-1

## 17. NEEDLE POSITION AND FEED CONTROL FOLLOWER HEIGHTS

### FUNCTION

There are two needle position followers -- buttonhole needle position (S) and needle position (T) followers, both on the left side of the cam stack. There are two feed control followers -- buttonhole feed control (U) and feed control (V) followers, both on the right side of the cam stack. (Fig. 19-1).

### NEEDLE POSITION FOLLOWERS

Buttonhole needle position follower (S) tracks the bottom cam path of the buttonhole cam to form the upper and lower bar tacks.

Needle position follower (T) tracks the zigzag cam to form the stitching of each buttonhole leg. It also tracks the remaining Fashion and Flexi stitch needle position cams to form all the patterns shown on the pattern selector index panel.

### FEED CONTROL FOLLOWERS

Buttonhole feed control follower (U) tracks the uppermost cam path of the buttonhole cam to provide the feed motion for each leg of the buttonhole.

Feed control follower (V) tracks the Flexi stitch cams to provide Flexi feed motion required to form the Flexi stitch patterns.

PREPARATION:

Remove all covers.

MACHINE SETTING:

Pattern Selector: Buttonhole (small) (turn dial to left as far as it will go).

CHECK:

When needle position follower (T) is centered on the track of second cam (plastic) from top of cam stack, the selector positioning pawl (c) should locate in the uppermost notch of selector positioning rack (D). (Figs. 19-1 and 19-3).

NOTE: Improperly set needle position follower height will result in causing double camming.

ADJUSTMENT:

1. Loosen two screws (A) and move disc follower actuating plate (B) up or down until top surface of needle position follower (T) is located 0.1 mm (.004) from top of buttonhole (small) cam (second cam from top of cam stack). (figs. 19-1 and 19-2).
2. Tighten two screws (A) and recheck.
3. Loosen screw (W) and move toothed positioning rack (D) up or down so that positioning pawl (C) connected to disc follower actuating plate (B) will locate in the uppermost notch of positioning rack (D). (Fig. 19-3).

NOTE: If necessary, remove pattern selector plate assembly to make above adjustment.

4. Tighten screw (W).
5. Check that positioning pawl spring (F) is not broken and retaining ring (E) is not missing from positioning pawl pin. Any fault in either or both will cause erratic follower action. (Fig. 19-4).
6. Check heights of other followers since adjustment of needle position follower height affects their settings.

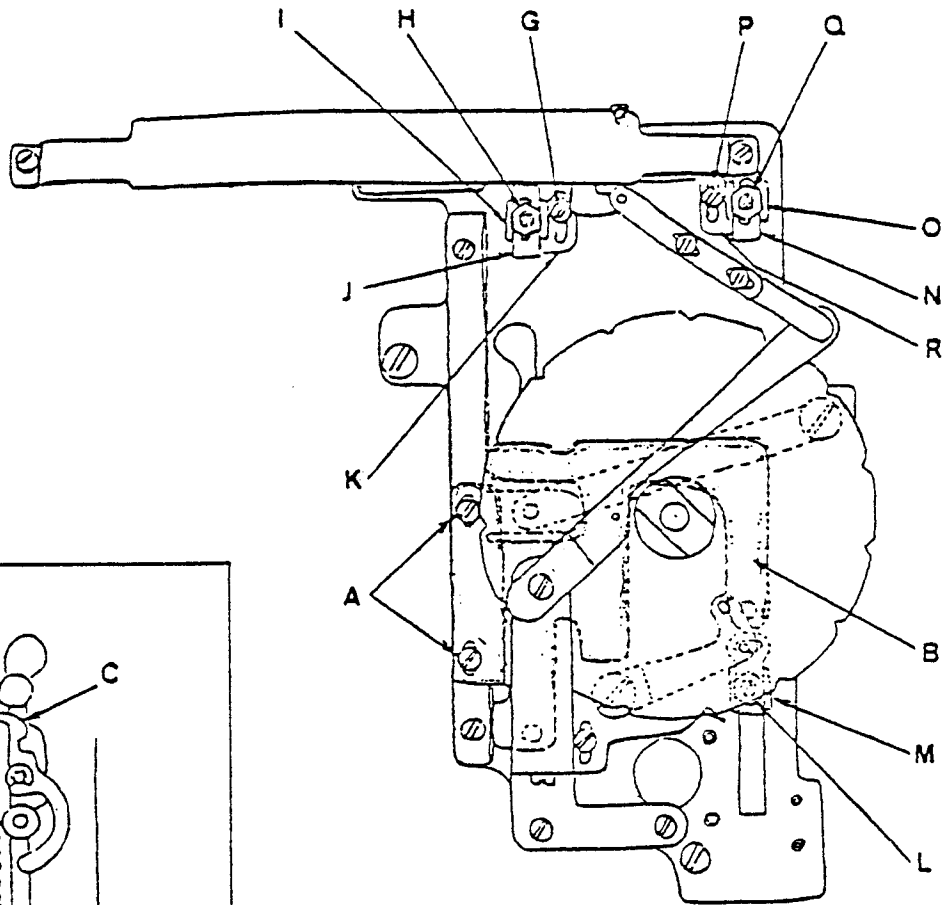


Fig. 19-2

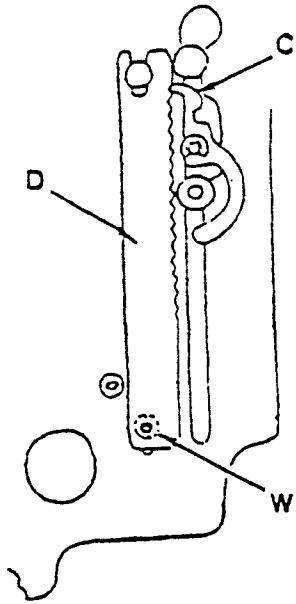


Fig. 19-3

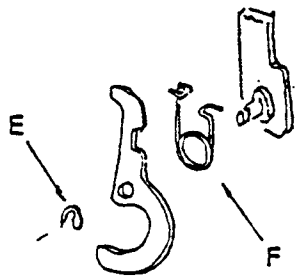


Fig. 19-4

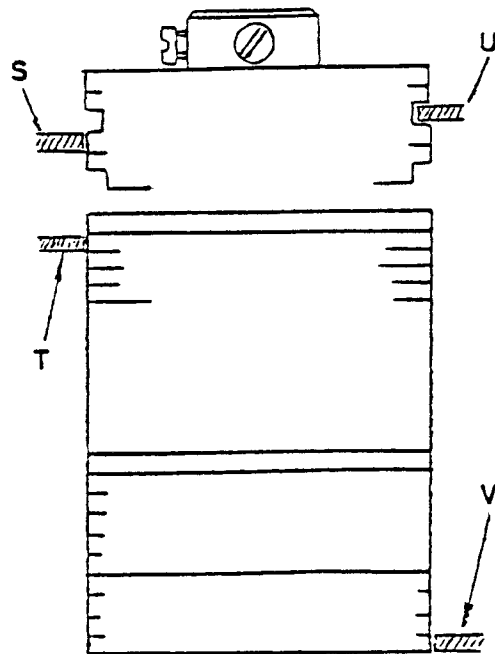


Fig. 19-1

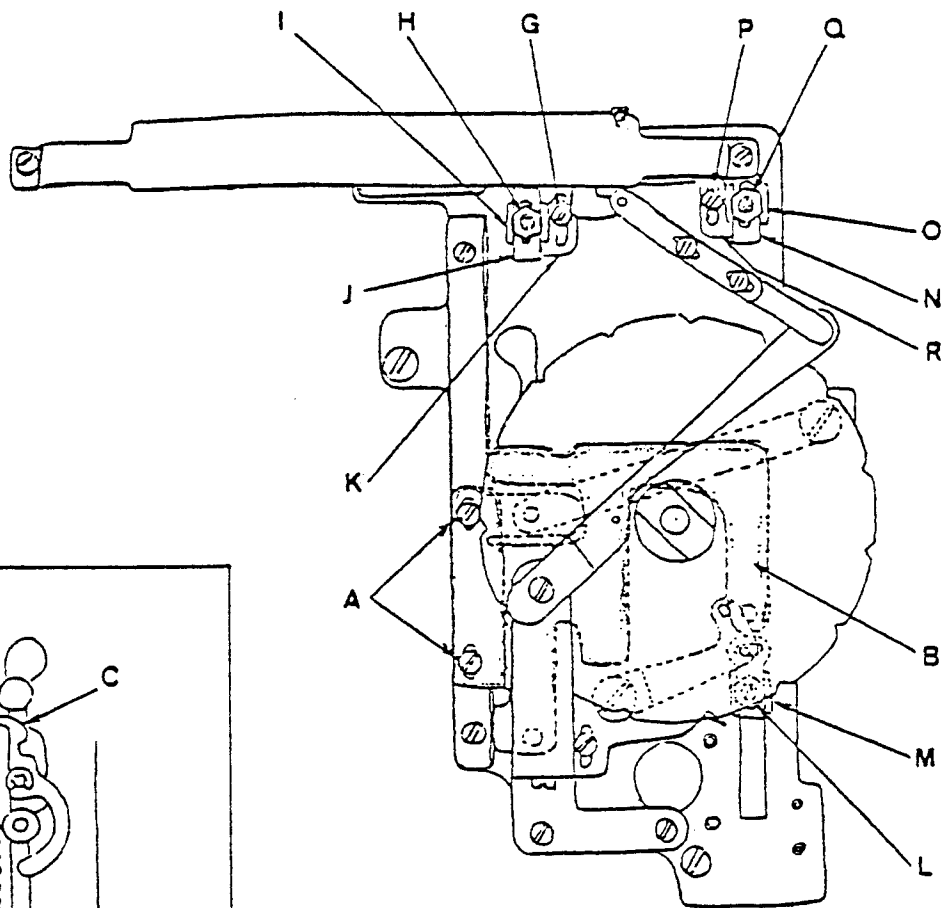


Fig. 19-2

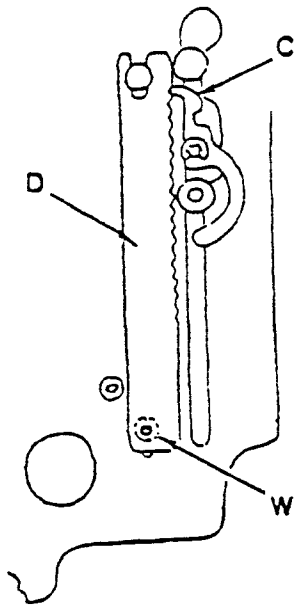


Fig. 19-3

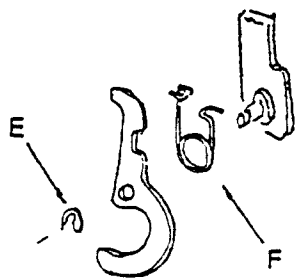


Fig. 19-4

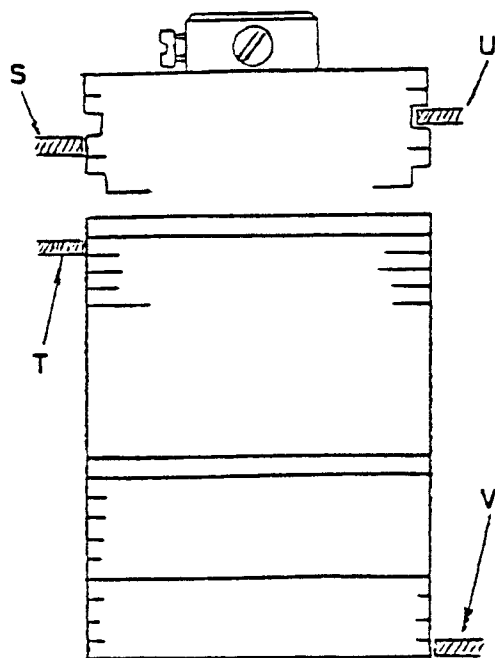


Fig. 19-1

17-2            BUTTONHOLE NEEDLE POSITION FOLLOWER HEIGHT

PREPARATION:

Remove all covers.

MACHINE SETTING:

Pattern Selector: Buttonhole (small) (Turn dial to left as far as it will go).

CHECK:

Buttonhole needle position follower (S) should be centered on the second from bottom cam track of the buttonhole cam. (Fig. 19-1).

1. Loosen disc follower selector stud nut (H).
2. Move slide block (I) up or down to achieve the desired height. Hold slide block in position and move slide block adjusting plate (J) down so that its lower end is in contact with the upper edge of disc follower actuating plate (B).
3. Tighten selector stud nut (H).
4. Check slide block (I) for binding that may be caused by over-tightening of selector stud nut (H).

17-3 FEED CONTROL FOLLOWER HEIGHT

PREPARATION:

1. Remove all covers.
2. Remove pattern selector dial lock lever assembly.

MACHINE SETTING:

Pattern Selector: Ric-Rac

CHECK:

Feed control follower (V) should be centered on the lowermost track of the four steel cams.

ADJUSTMENT:

1. Loosen disc follower selector stud nut (L). (Fig. 19-2).
2. Move slide block (M) up or down to achieve the desired height.
3. Tighten selector stud nut (L).
4. Check slide block (M) for binding that may be caused by over-tightening of selector stud nut (L).
5. Replace pattern selector dial lock lever assembly. (See Pattern Selector Dial Lock Lever Setting adjustments).



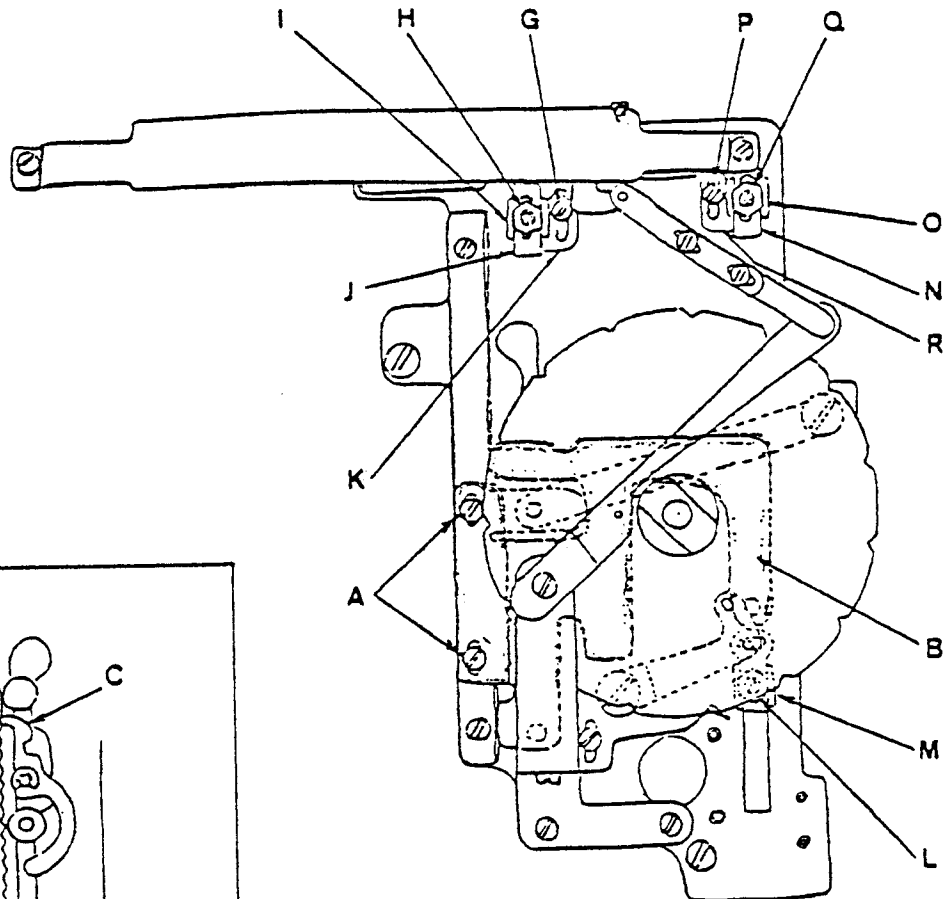


Fig. 19-2

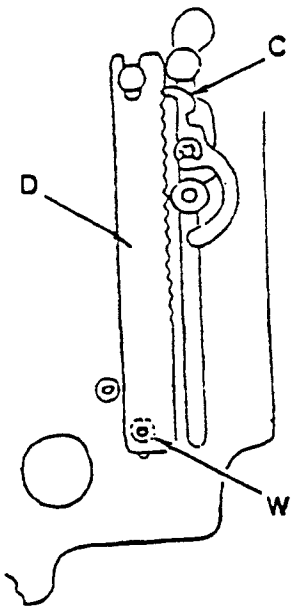


Fig. 19-3

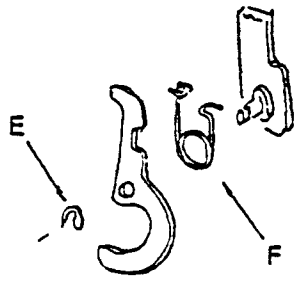


Fig. 19-4

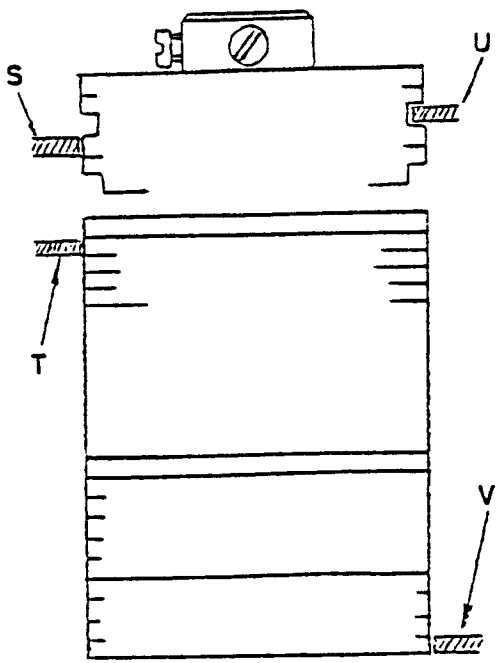


Fig. 19-1

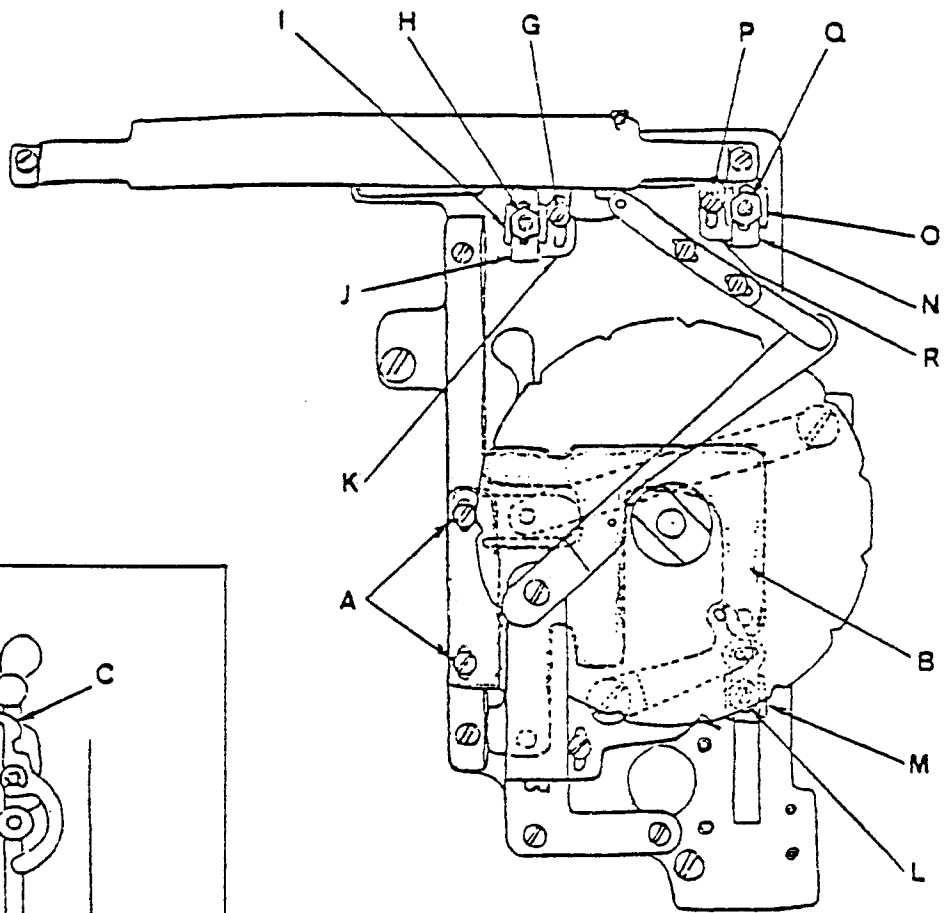


Fig. 19-2

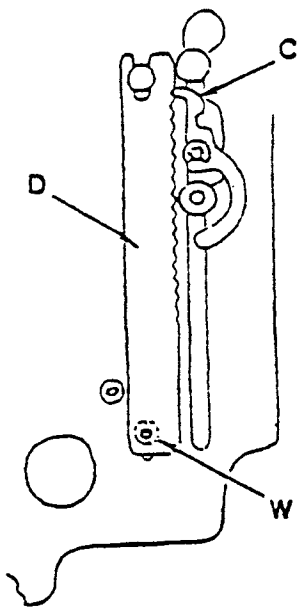


Fig. 19-3

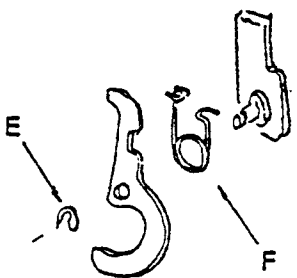


Fig. 19-4

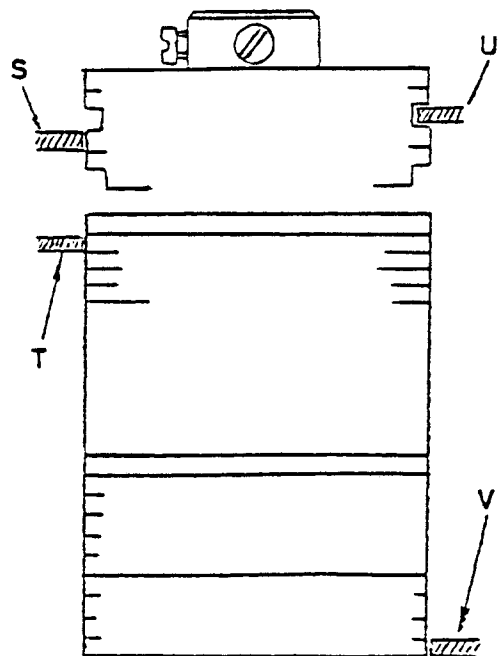


Fig. 19-1

PREPARATION:

Remove all covers.

MACHINE SETTING:

Pattern Selector:    Straight Stitch

CHECK:

Buttonhole feed control follower (U) should be located at the center of the recess portion of buttonhole cam and lower end of slide block adjusting plate (N) in contact with the upper edge of disc follower actuating plate (B). (Figs. 19-1 and 19-2).

ADJUSTMENT:

1.    Loosen disc follower selector stud nut (Q).
2.    Move slide block (O) up or down to position buttonhole feed control follower (U) in center of the recess portion of buttonhole cam.
3.    Move slide block adjusting plate (N) down until its lower end contacts the upper edge of disc follower actuating plate (B) and tighten selector stud nut (Q).
4.    Check slide block (O) for binding that may be caused by over-tightening of selector stud nut (Q).

## 18. BUTTONHOLE PAWL HEIGHT

### FUNCTION

When the buttonhole flag (B) (Fig. 20-1) is in raised position, buttonhole pawl (E) is set in its upper storage position holding clutch stop (C) (Fig. 20-2). The sprocket (I) on the buttonhole cam driver (G) (Fig. 20-3) is disengaged, allowing the cam driver to rotate while the buttonhole cam (H) (Fig. 20-4) remains stationary.

When the buttonhole flag (B) is pulled down and drawn forward, it turns kick-out shaft (F) which sets buttonhole pawl (E) to its lower position releasing upper clutch stop (C) (fig. 20-2). The clutch (C) engages with sprocket (I), and buttonhole cam (H) rotates a half revolution until the next clutch stop (D) is held by buttonhole pawl (E), disengaging the clutch (C). During this half revolution the buttonhole needle position follower tracks the first half of lower track of buttonhole cam (H) to form the upper bar tack and the positions the needle for stitching the left leg of the buttonhole. The needle position follower tracks the zigzag cam of the cam stack to give the 2.0 mm (.079) and/or 1.25 mm (.049) bight for width of left leg. The buttonhole feed control follower tracks the upper cam path of the buttonhole cam and controls the forward feed.

When the end of the left leg of the buttonhole is reached, the buttonhole flag (B) is pushed back either manually by the operator, or automatically by a tab on the buttonhole foot. The kick-out shaft (F) turns, positioning buttonhole pawl (E) to its upper position and releasing clutch stop (D). The clutch (C) engages with sprocket (I) of the cam driver and buttonhole cam (H) rotates a half revolution until the next clutch stop (C) is held by buttonhole pawl (E), disengaging the clutch. During this second half revolution, the buttonhole needle position follower tracks the second half of lower track of the buttonhole cam, to form the lower bar tack and then positions the needle for stitching the right leg of the buttonhole.

The needle position follower tracks the zigzag cam of the cam stack to give the 2.0 mm (.079) and/or 1.25 mm (.049) bight for width of right leg. The buttonhole feed control follower tracks the upper track of the buttonhole cam and controls the reverse feed.

### PREPARATION:

Remove face plate and arm top cover assembly.

### MACHINE SETTINGS:

1. Pattern Selector: Buttonhole (large)
2. Stitch Length Dial: Buttonhole Graphic
3. Buttonhole Flag: Down and Pushed Back

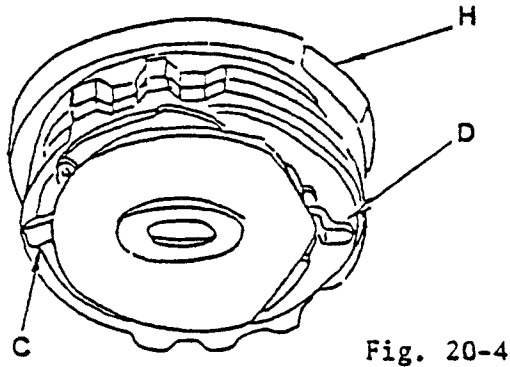


Fig. 20-4

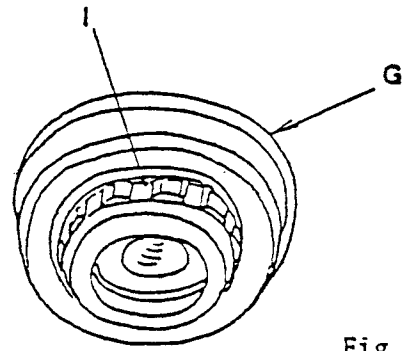


Fig. 20-3

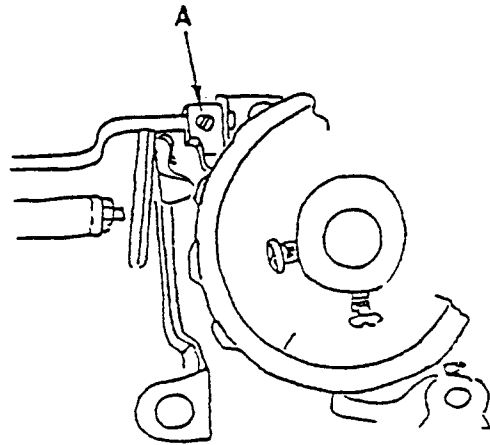
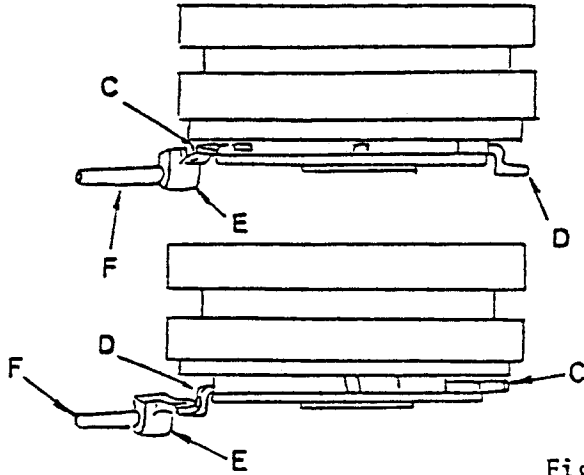


Fig. 20-2

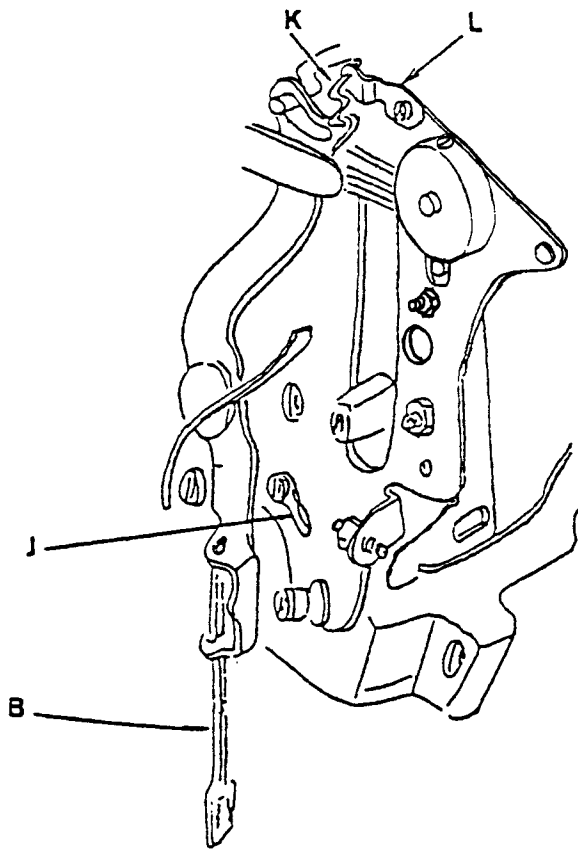


Fig. 20-1

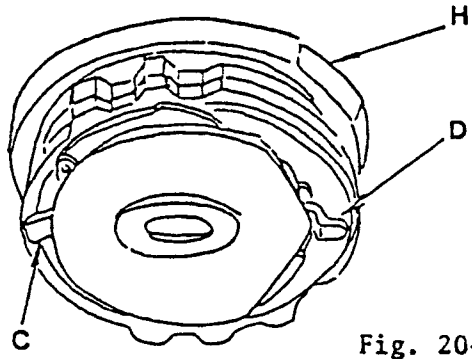


Fig. 20-4

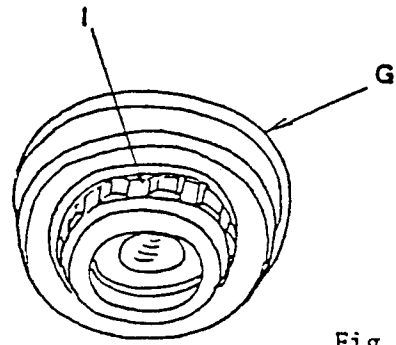


Fig. 20-3

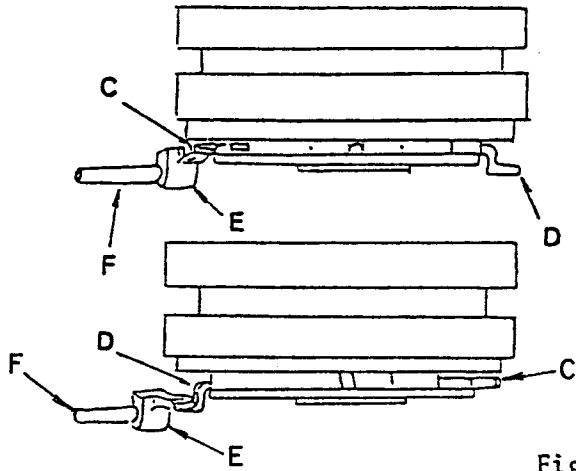


Fig. 20-2

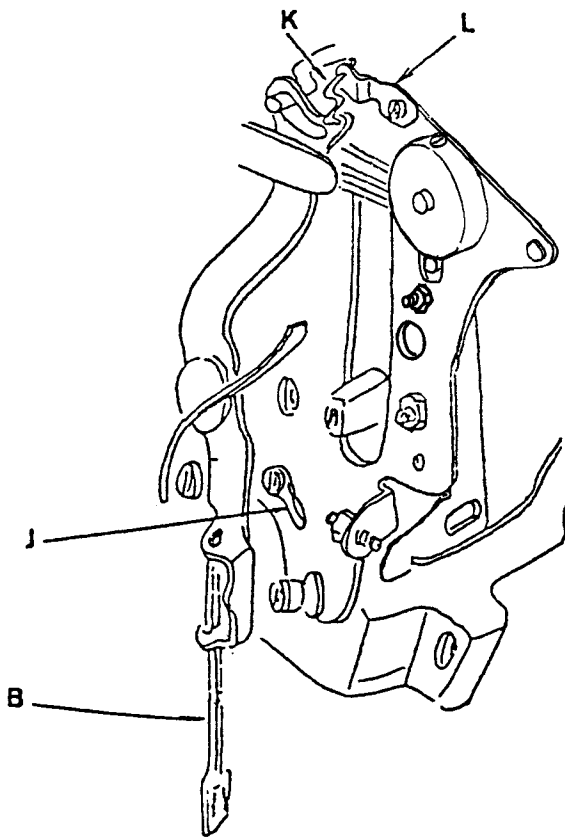
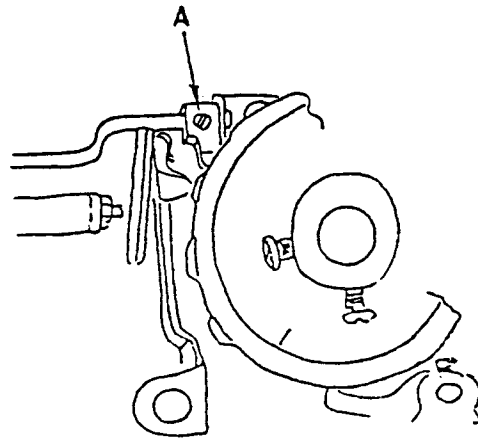


Fig. 20-1

18. BUTTONHOLE PAWL HEIGHT (Continued)

CHECK:

Clearance between underside of buttonhole cam and top of buttonhole pawl (E) should be approximately 1.5 mm (.059).

ADJUSTMENT:

1. Loosen buttonhole pawl set screw (A).
2. Move buttonhole pawl (E) as required for a clearance of approximately 1.5 mm (.059) between top of pawl and underside of buttonhole cam.
3. Tighten set screw (A).

RECHECK:

Always test buttonhole performance with the one-step buttonhole foot. This test establishes the reliability of the various one-step buttonhole components. If a satisfactory buttonhole cannot be obtained, check the following points.

1. Check buttonhole flag (B) for correct tripping action.
  - a. If adjustment is necessary, set spring (K) by adjusting setting of bracket (L).
  - b. Make at least five buttonholes to be sure tripping action is reliable.
2. Check the length of buttonhole using a one inch (25.4 mm) button. Buttonhole length should be  $28.6 \pm 1.6$  mm ( $1.126 \pm .063$ ). If length is incorrect, adjust setting of kick-out shaft tripping lever adjusting washer (J) as follows.

To shorten length of buttonhole, adjust washer (J) to bring buttonhole flag (B) toward front of machine.

To lengthen the buttonhole, adjust washer (J) to bring buttonhole flag toward rear of machine.

## 19. BASTING STITCH SYSTEM

### 19-1 NEEDLE BAR SUPPORTING PLATE SETTING

Needle bar supporting plate (A) must be set close to needle bar latch carrier socket (B). (Fig. 21-2).

#### MACHINE SETTING:

Pattern Selector: Straight Stitch

#### PREPARATION:

Remove face plate.

#### ADJUSTMENT:

1. Turn handwheel toward front of machine until needle bar is at its highest position.
2. Loosen needle bar supporting plate screw (C) and supporting plate bracket screw (V). Set needle bar supporting plate bracket screw (V). Set needle bar supporting plate (A) so that it is set close to needle bar latch carrier socket (B).
3. Firmly tighten screw (C). (Fig. 21-1).
4. Adjust supporting plate bracket (W) so that it contacts the needle bar supporting plate (A).
5. Tighten screw (V) securely.

### 19-2 NEEDLE BAR LATCH RELEASING LEVER STOPPER SETTING

#### FUNCTION

Needle bar latch releasing lever stop screw (G) is set to actuate needle bar latch releasing lever (F) to open needle bar latch (E) and disengage needle bar connecting stud (D) when the needle position follower is on the low (trough) dwell of the basting stitch cam, when the machine is set for basting, stitch width dial at 5 bight. Needle bar latch (E) must not disengage in other stitching modes. (Fig 21-1).



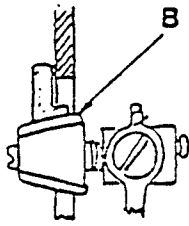
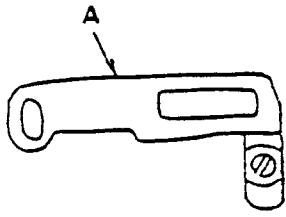


Fig. 21-2

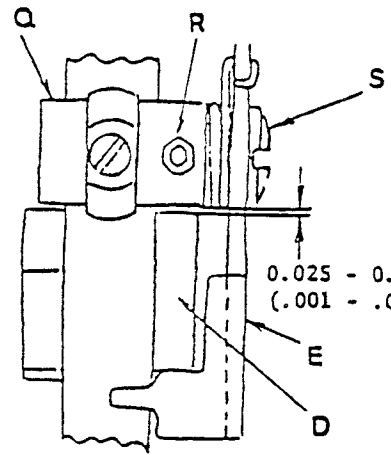


Fig. 21-3

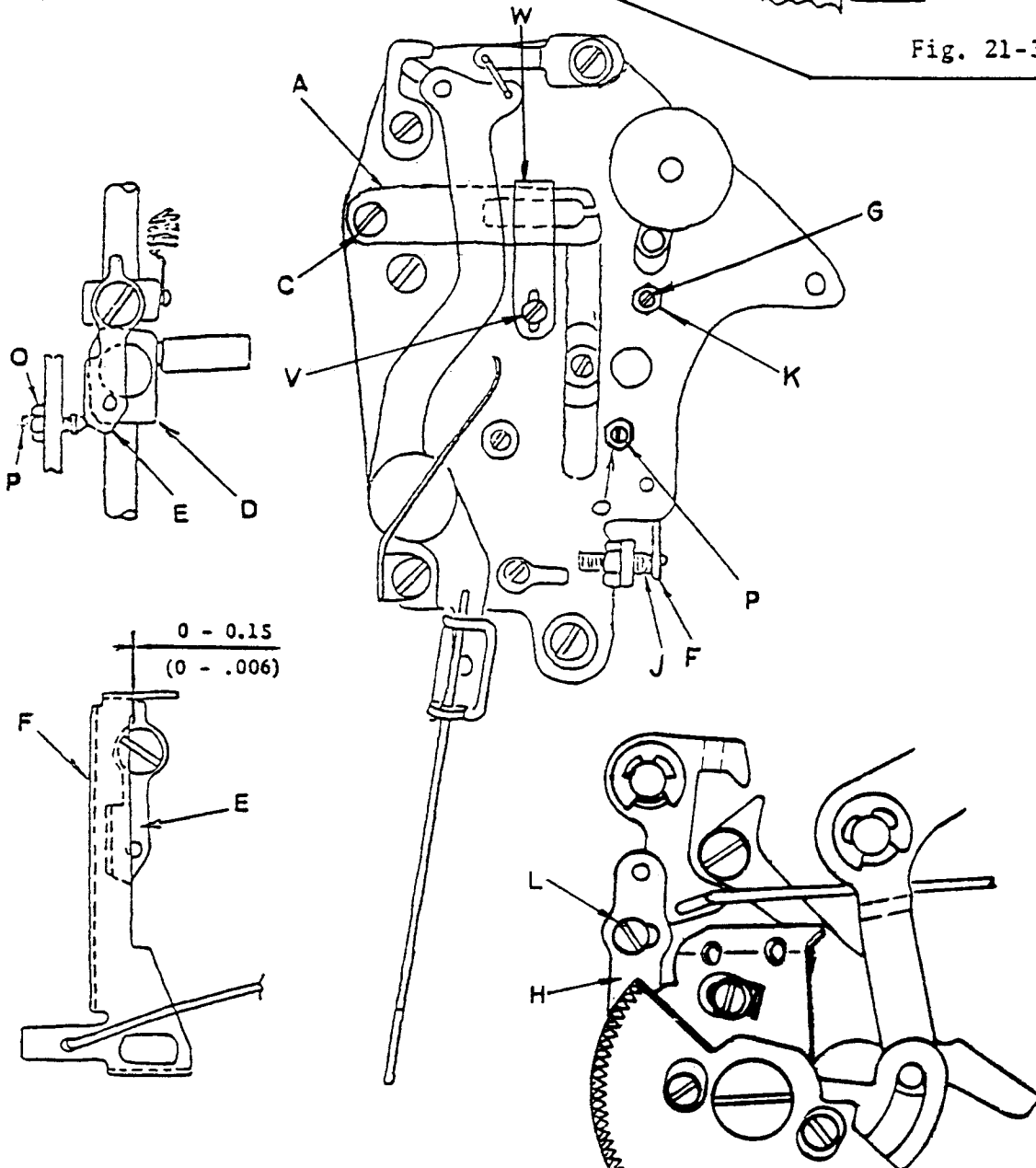


Fig. 21-1

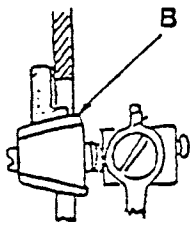
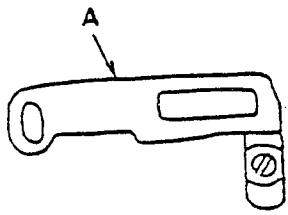


Fig. 21-2

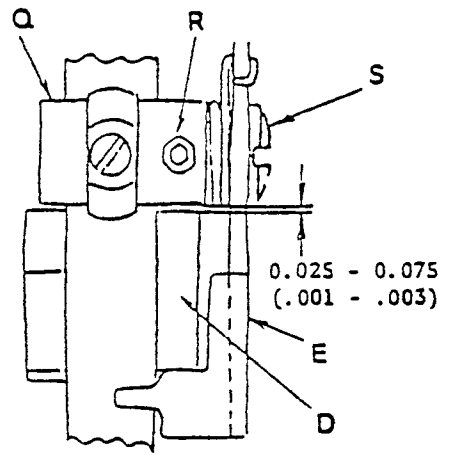


Fig. 21-3

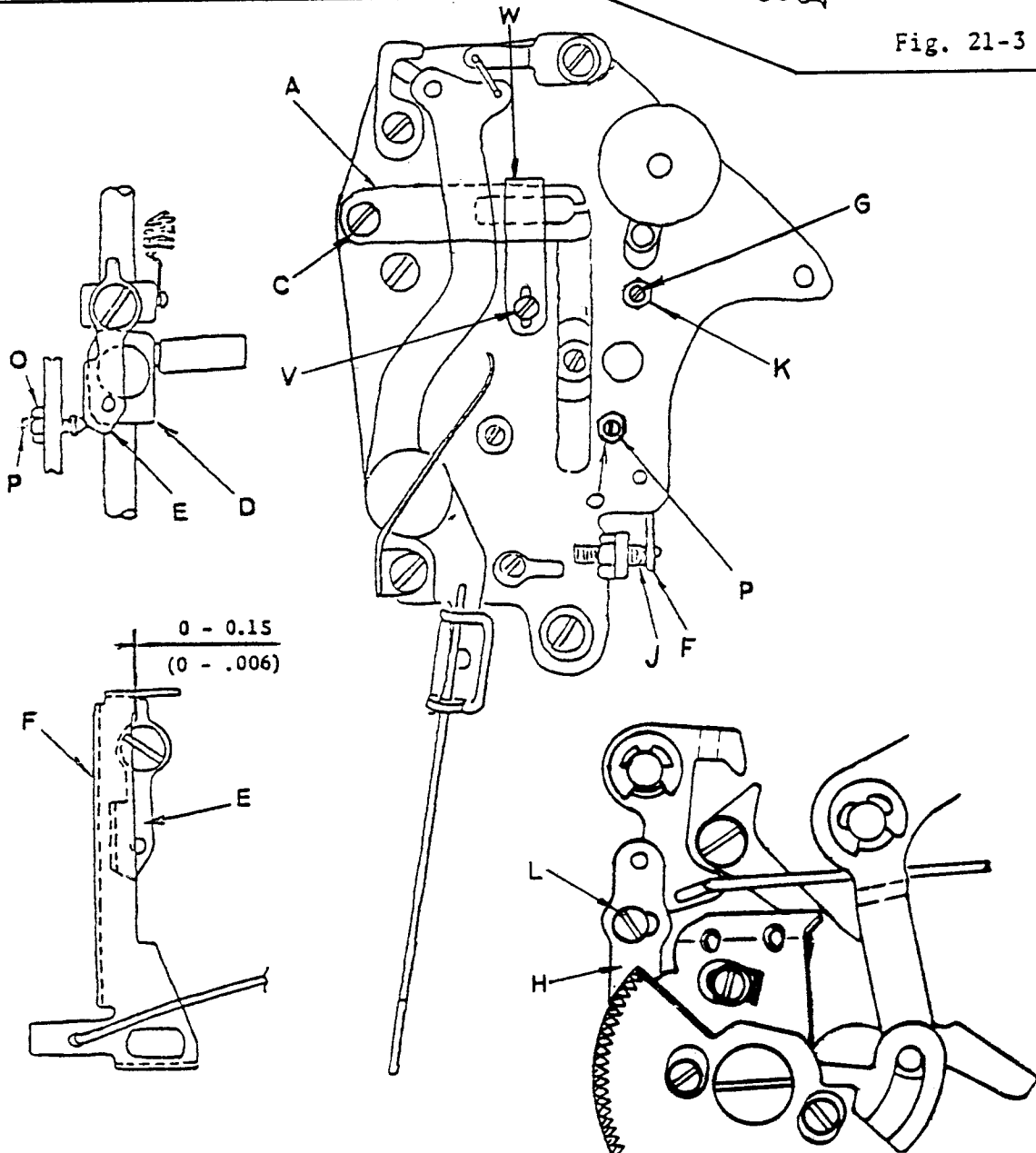


Fig. 21-1

The following are some of the causes of double latching.

1. Incorrect center needle location.
2. Needle bar driving arm plate out of parallel.
3. Needle bar driving arm interfering with other parts.
4. Needle bar driving arm incorrectly located.
5. Incorrect needle position follower location.
6. Incorrect pendulum timing.
7. Incorrect needle bar latch clearance setting.
8. Binding between tongue on needle bar latch body and needle bar connecting stud.
9. Binding in needle bar vibrating bracket.

Run a complete check for double latching, test in the following stitching modes.

1. Basting stitch
2. Decorative basting stitch
3. Feather stitch
4. Maxi-Stretch stitch
5. Zig-zig stitch
6. Shell Tack stitch

#### PREPARATION:

1. Remove face plate and arm top cover assembly.
2. Loosen needle bar releasing lever extension plate set screw (H).

#### ADJUSTMENT:

1. Set machine into straight stitching position.
  - a. Turn handwheel toward front of machine until needle bar is at its highest position.
  - b. By adjusting the extension at the needle bar latch releasing lever (F) set clearance between needle bar latch (E) and needle bar latch releasing lever (F) as shown in Fig. 21-1.
2. Set pattern selector to basting stitch position.
  - a. Loosen needle bar latch releasing lever stop screw lock nut (K). (Fig. 21-1).
  - b. Adjust needle bar latch releasing lever stop screw (G) so that it is set to open needle bar latch (E) and disengage needle bar connecting stud (D).
  - c. Tighten lock nut (K).

19-3 DOUBLE LATCHING (Continued)

3. Setting of needle bar releasing lever extension plate (L).
  - a. Turn cam follower releasing dial and place machine in kick-out position.
  - b. Turn handwheel toward front of machine until the needle bar is near its lowest position.
  - c. Pull needle bar releasing lever extension plate (L) to the right to release needle bar. (Fig. 21-1).
  - d. Tighten needle bar releasing lever extension plate set screw (H).

CHECK:

1. Set pattern selector to basting stitch position and stitch width dial to 5 bight.
2. Run machine at low speed to check basting stitch performance.
3. If satisfactory basting stitch performance can not be obtained, recheck Basting Stitch System adjustments.

19-4 NEEDLE BAR LATCH GUIDE SCREW SETTING

The needle bar latch guide screw is provided to prevent the needle striking the presser foot and breaking caused by double latching. (Refer to item 19-3 Double Latching for causes of double latching).

ADJUSTMENT:

1. Loosen needle bar latch guide screw lock nut (O). (Fig. 21-1).
2. The needle bar latch guide screw (P) must be set so that when the needle bar is manually pulled down (with needle bar latch released), the needle will descend through needle slot in presser foot rubbing the right edge of the slot.
3. Tighten lock nut (O).

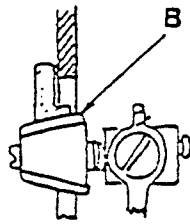
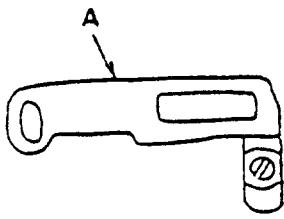


Fig. 21-2

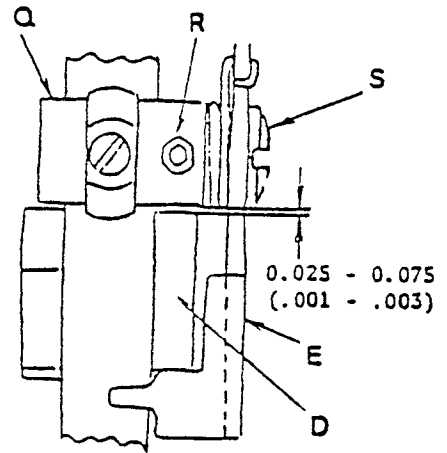


Fig. 21-3

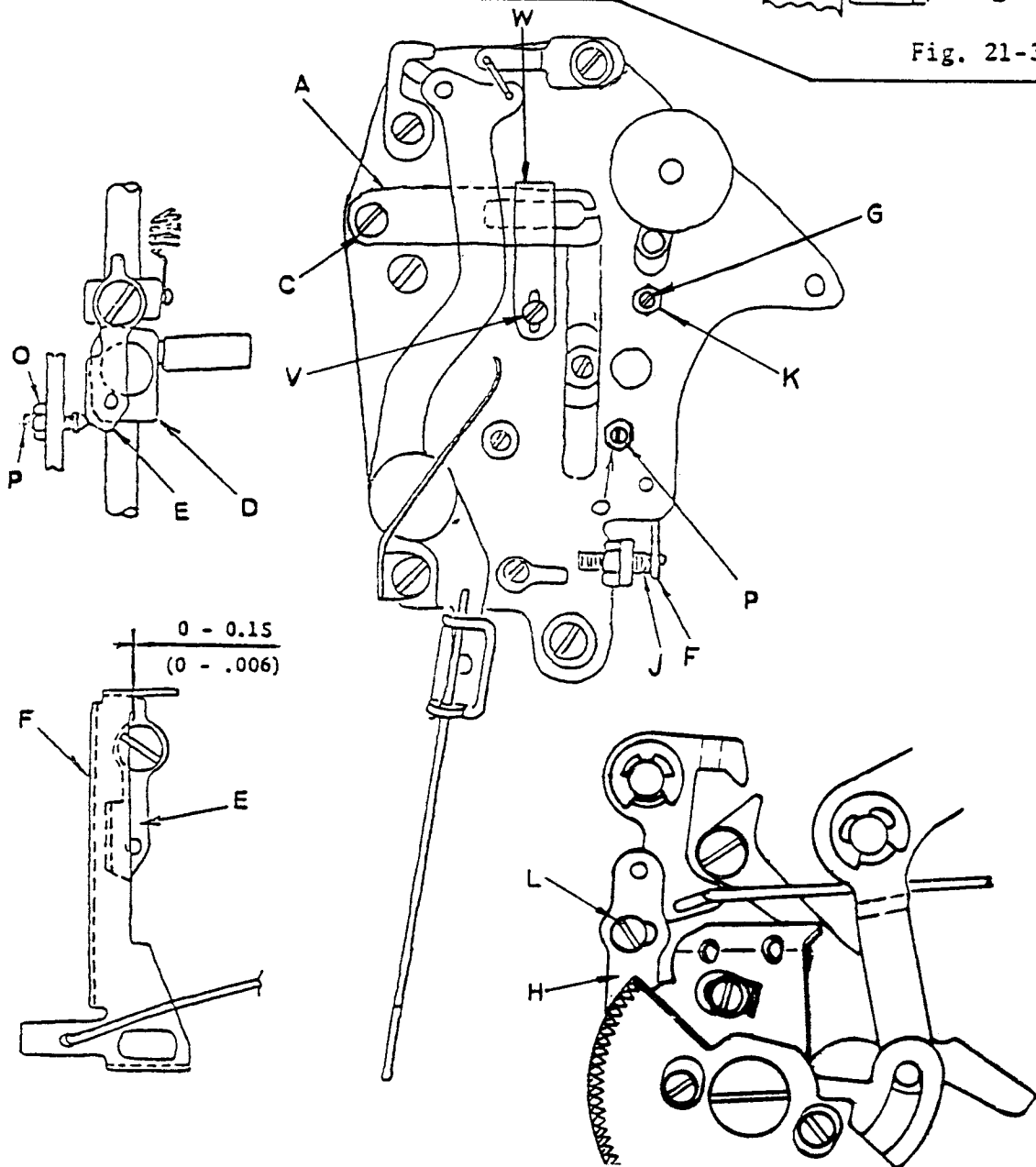


Fig. 21-1

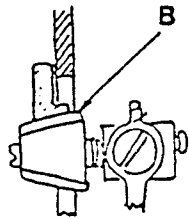
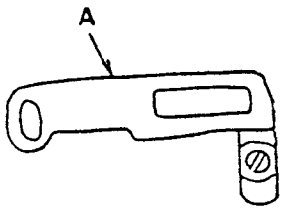


Fig. 21-2

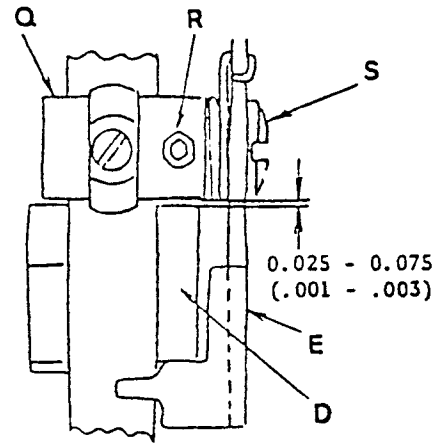


Fig. 21-3

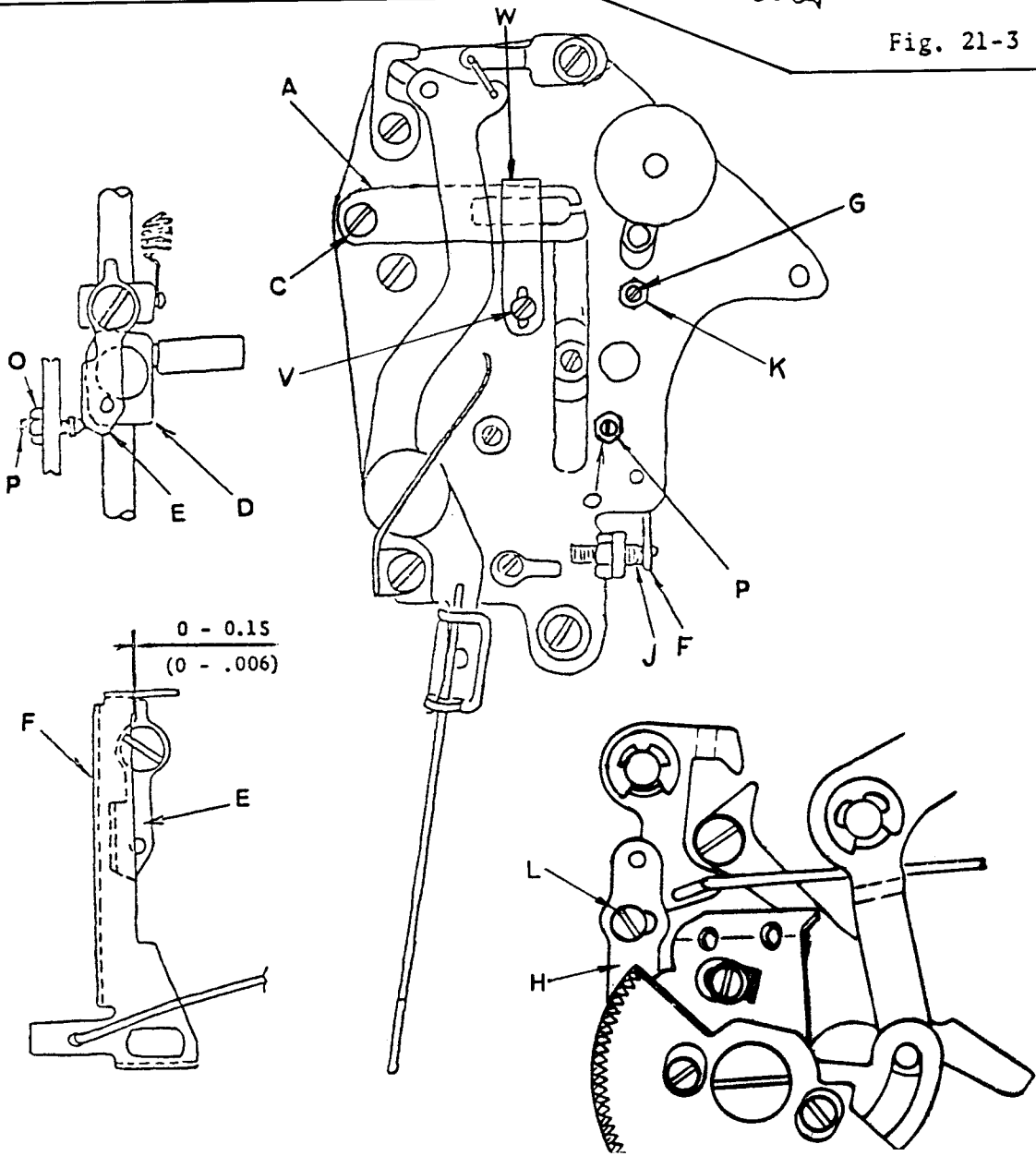


Fig. 21-1

19-5            NEEDLE BAR LATCH CARRIER SETTING

PREPARATION:

Remove face plate.

MACHINE SETTING:

Pattern Selector:    Straight Stitch

CHECK:

1. Needle bar latch (E) must disengage and return into latched position without binds, hesitations or malfunctions when latch is released gently.
2. Clearance between underside of needle bar latch carrier (Q) and top of needle bar connecting stud (D) must be 0.025 - 0.075 mm (.001 - .003) when they are latched together. (Fig. 21-3).

ADJUSTMENT:

1. Turn handwheel toward front of machine until needle bar is almost at its highest position.
2. Loosen eccentric set screw (R).
3. Turn needle bar latch eccentric (S) at left-hand side until a clearance of 0,025 to 0.075 mm (.001 - .003) is obtained between underside of latch carrier (Q) and top of connecting stud (D).
4. Tighten set screw (R) firmly.
5. Check machine in basting stitch, shell tack stitch and feather stitch modes.

## 20. HOOK AND FEED TIMING

### 20-1 HOOK TIMING

Before attempting to time the hook, timing belt tension must be correct and set screws tight in handwheel pulley. Hook-to-needle relationship must be correct.

#### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Needle: Size 18

#### PREPARATION:

1. Remove all covers.
2. Remove throat plate and presser foot.

#### CHECK:

1. Check meshing of hook gear (F). For adjustments see hook Removal and Replacement procedure. (Fig. 22-2).
2. Turn handwheel toward front of machine until needle bar is at its lowest position.
3. Observe position of needle bar upper timing line (A) in relation to lower needle bar ball bushing (B). Turn handwheel toward front of machine until lower timing line (C) is in the same position as the upper timing line was in relation to lower needle bar ball bushing (B). The point of hook (D) should be at center of needle (E). (Fig. 22-1).
4. If hook point is not at center of needle, note the following possible causes.
  - a. If hook time is slow up to half an inch (approximately 12.7 mm), it is an indication of possible loose tension of timing belt, or timing belt has jumped cogs.
  - b. If hook time is fast, up to half an inch (approximately 12.7 mm), timing belt tension may be too tight.
  - c. When hook time is slow up to one inch (approximately 25.4 mm), it is an indication that rotating hook drive shaft belt pulley (J) possibly has slipped. (Fig. 22-2).
  - d. When pendulum timing is out of time up to 180 degrees, it indicates that timing belt has jumped cogs or belt pulley (J) has turned on the hook driving shaft.



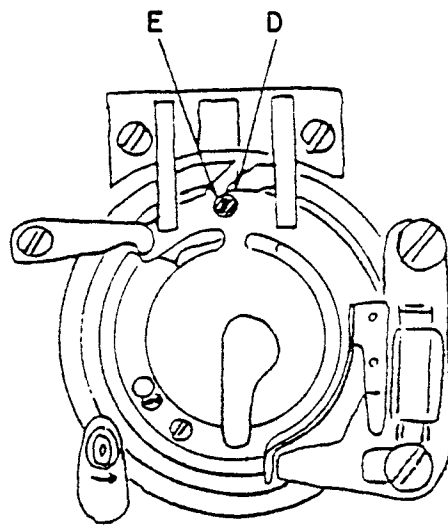
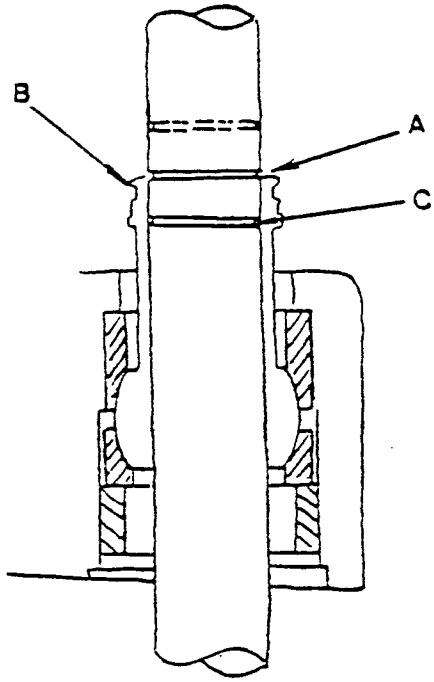


Fig. 22-1

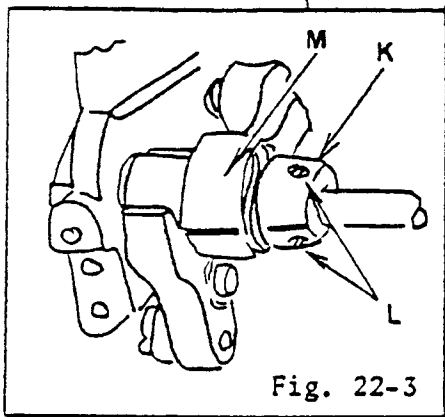
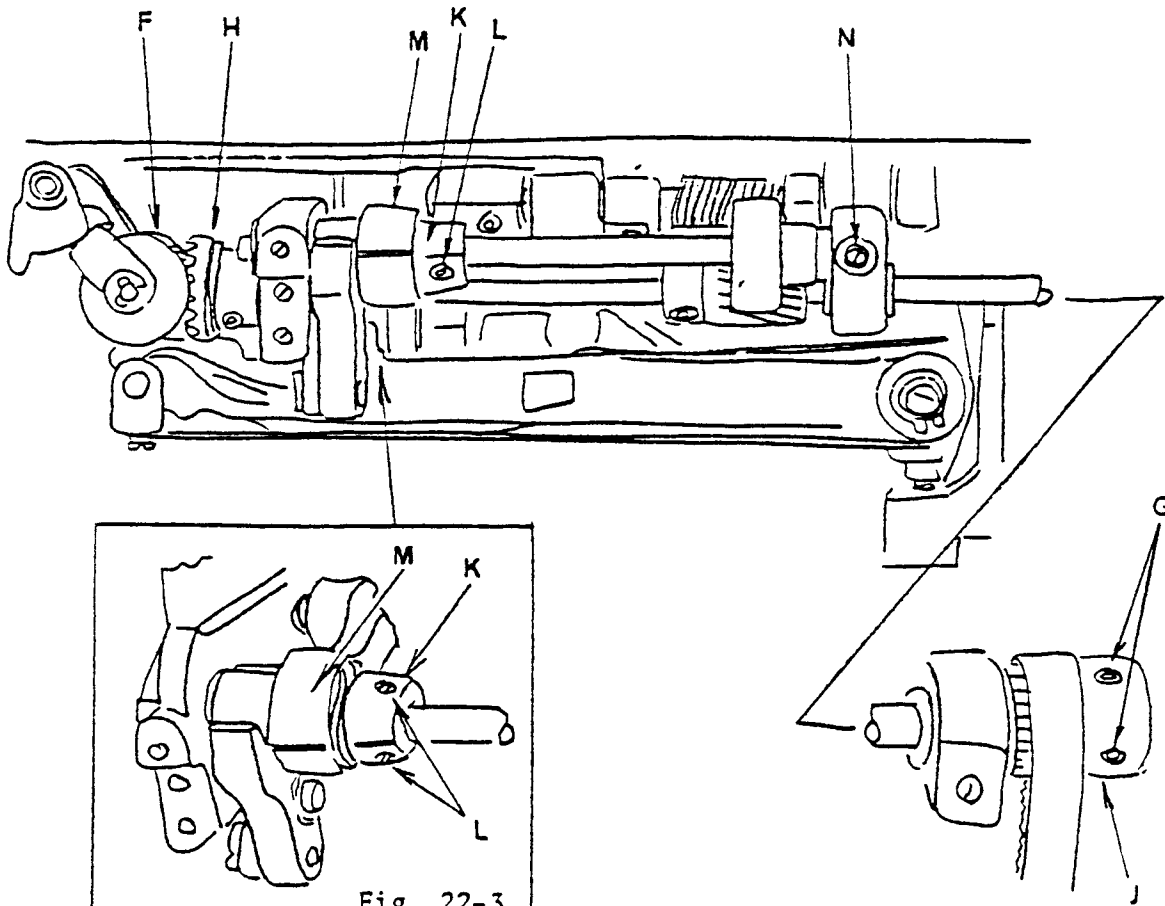


Fig. 22-3

Fig. 22-2

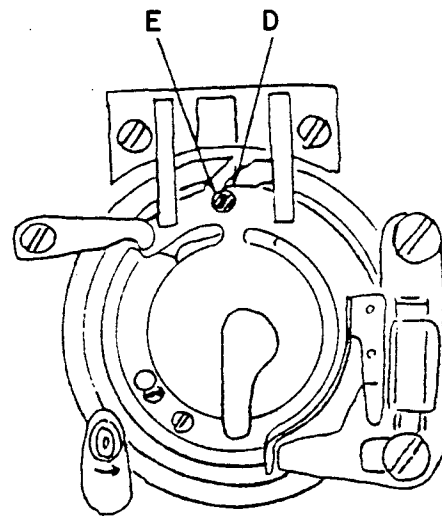
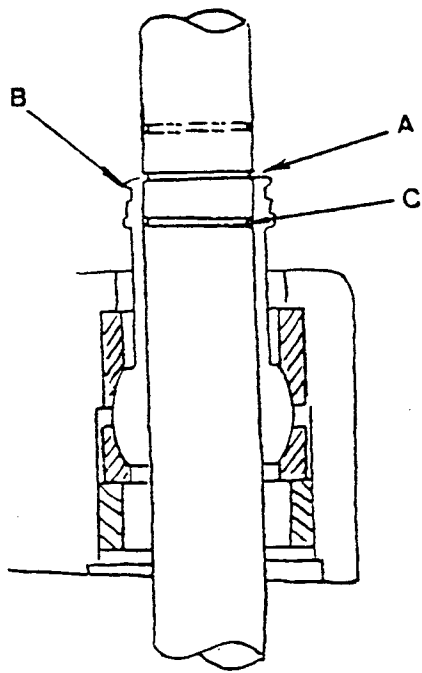


Fig. 22-1

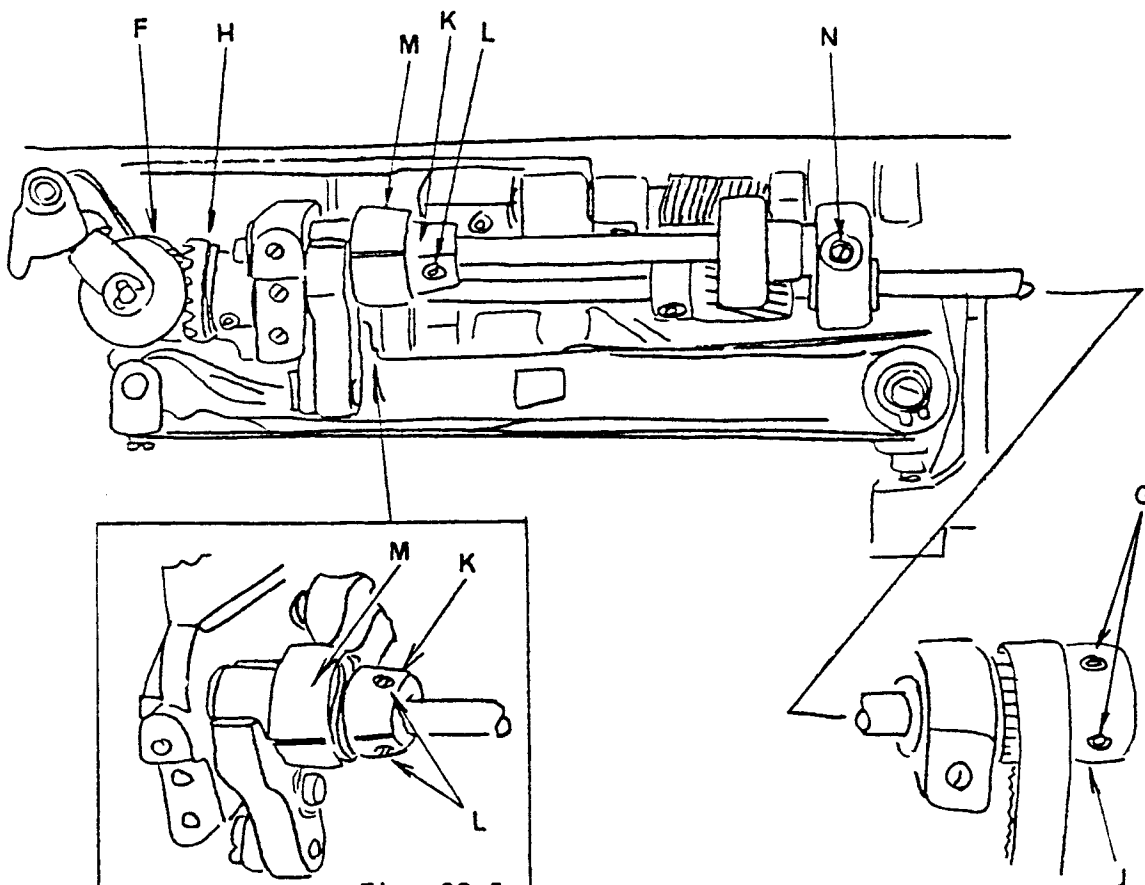


Fig. 22-2

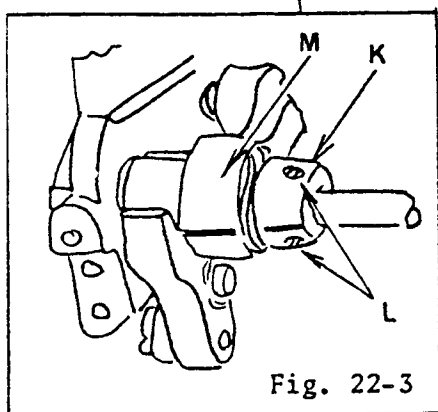


Fig. 22-3

20-1 HOOK TIMING (Continued)

ADJUSTMENT:

1. Loosen the two set screws (G) in the hook drive shaft belt pulley (J).
2. While maintaining position of needle bar lower timing line (C) in relation to lower needle bar ball bushing (B), turn rotating hook bevel gear (H) at end of shaft until point of hook (D) is at center of needle.
3. Firmly tighten both set screws (G) in belt pulley (J), making sure that the belt pulley is clear of bushing and/or the bed.
4. Check feed timing and adjust if necessary.

20-2 FEED TIMING

MACHINE SETTING:

Patter Selector: Straight Stitch

ADJUSTMENT:

1. Verify hook timing before attempting any adjustment in feed timing.
2. Feed timing is checked by means of timing lines on needle bar, the same as hook timing. (Fig 22-1).
3. Loosen both set screws (L) in feed lifting cam (eccentric) (K).
4. Turn handwheel toward front of machine until needle bar is at its lowest position. Observe position of upper timing line (A) in relation to lower needle bar ball bushing (B).
5. Turn handwheel toward front of machine until lower timing line (C) on needle bar is in the same position as the upper timing line was in relation to lower needle bar ball bushing (B).
6. Turn feed lifting cam (K) until timing mark on cam is aligned with timing mark on feed regulator slide block drive connection (M). See Fig. 22-3.
7. Tighten both set screws (L) in feed lifting cam (K) and recheck.
8. Check for binding between feed lifting cam (eccentric) (K) and feed regulator slide block drive connection (M). If necessary, loosen set screw (N) and move bushing with feed drive shaft to the left or right to eliminate binding. Tighten set screw (N).

## 21. HOOK-TO-NEEDLE RELATIONSHIP

### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Needle: Size 18

### PREPARATION:

1. Verify correct needle (or plug) location in round hole throat plate.
2. Remove bottom cover.
3. Remove bobbin case.
4. Remove throat plate.
5. Remove presser foot.

### CHECK:

1. Make sure that needle is straight.
2. Turn handwheel slowly toward front of machine until point of hook is behind and in the center of size 18 needle.
3. Check for clearance of 0 - 0.05 mm (0 - .002) between hook and needle. (Fig. 23-1).

### ADJUSTMENT:

1. Loosen set screw (B) that holds rotating hook shaft eccentric bushing (A). (fig. 23-1).

NOTE: The slot of eccentric bushing must be facing the front of the machine. (Fig. 23-2).

2. Insert small screwdriver through access hole in bobbin driver (C) into slot in eccentric bushing (A). Turn eccentric bushing clockwise to increase clearance and counterclockwise to decrease clearance.
3. Set clearance between hook and needle to 0 - 0.05 mm (0 - .002) and tighten eccentric bushing set screw (B).
4. Set machine into zigzag stitching position. Check clearance between point of hook and needle at left and right needle locations. There should be no more than 0.05 mm (.002) clearance between point of hook and needle, and no interference, at both left and right needle locations. Readjust if necessary.
5. Check hook gear (D) mesh and adjust if necessary. (See hook Removal and Replacement procedure.

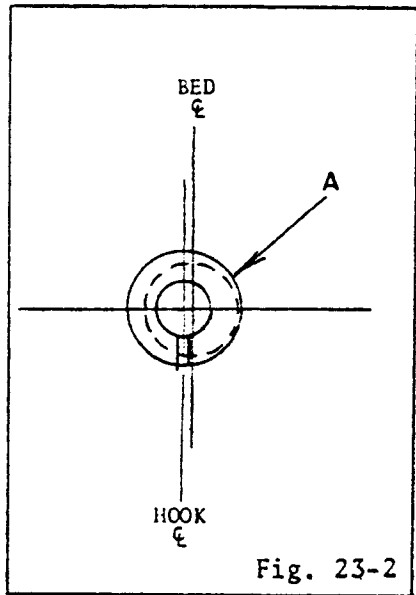


Fig. 23-2

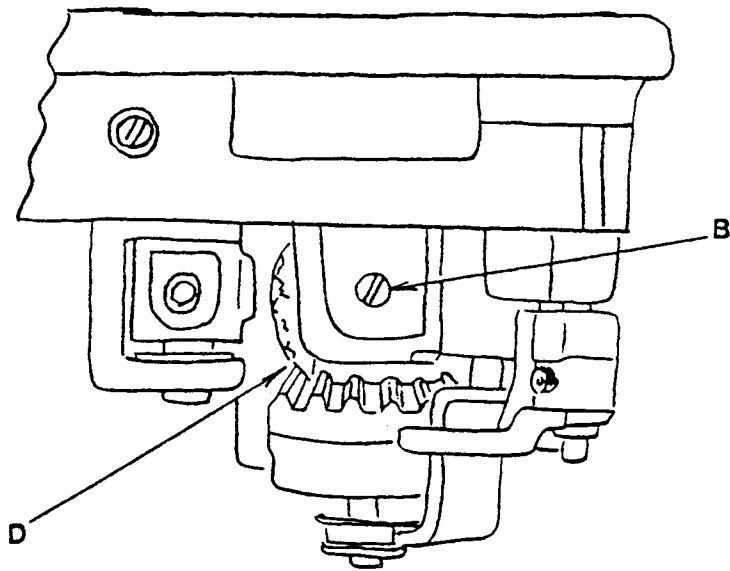
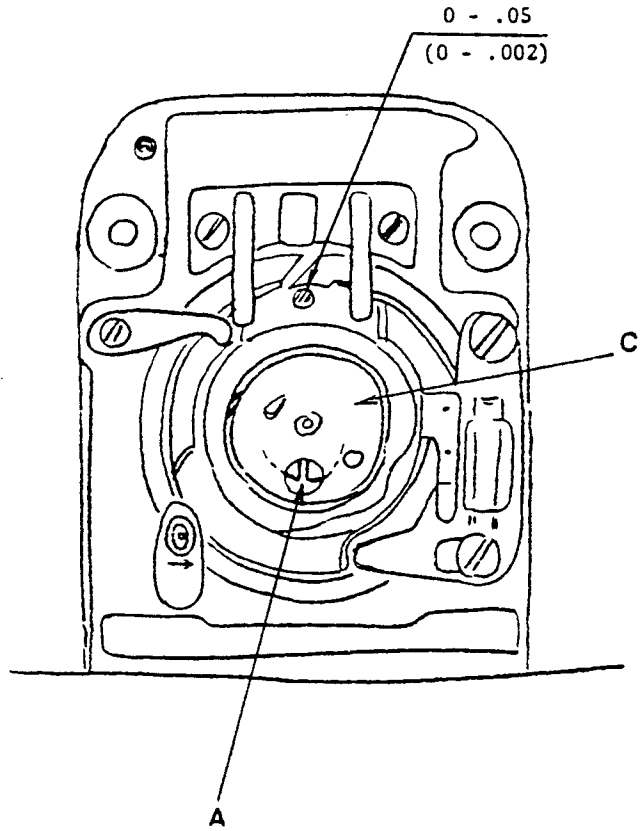


Fig. 23-1

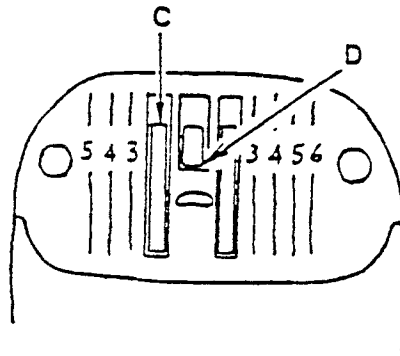


Fig. 25-1

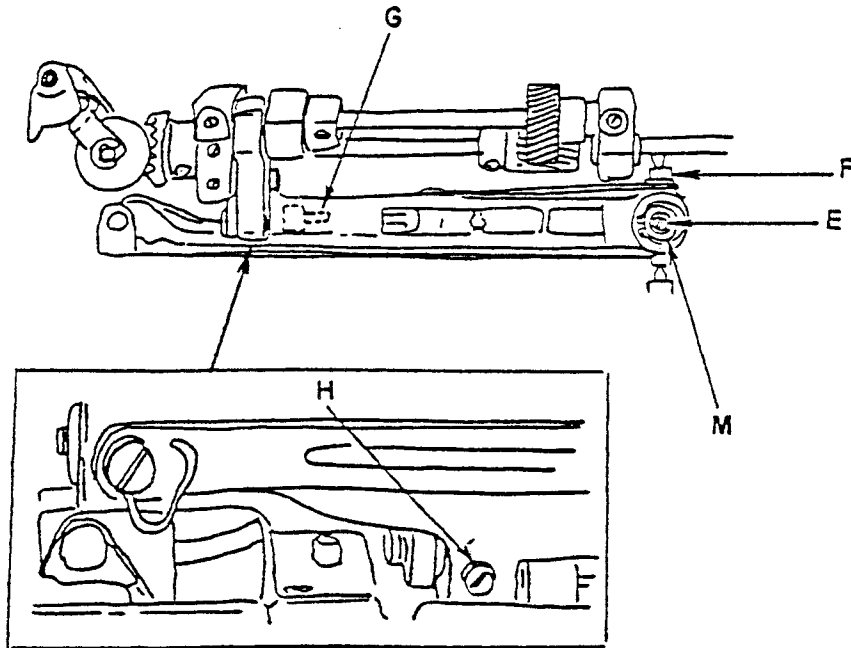


Fig. 25-3

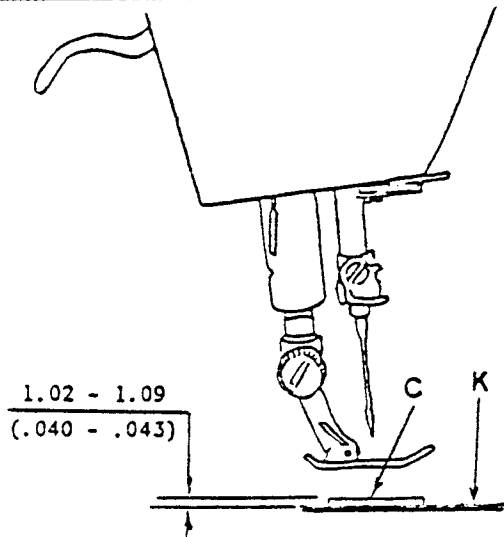


Fig. 25-5

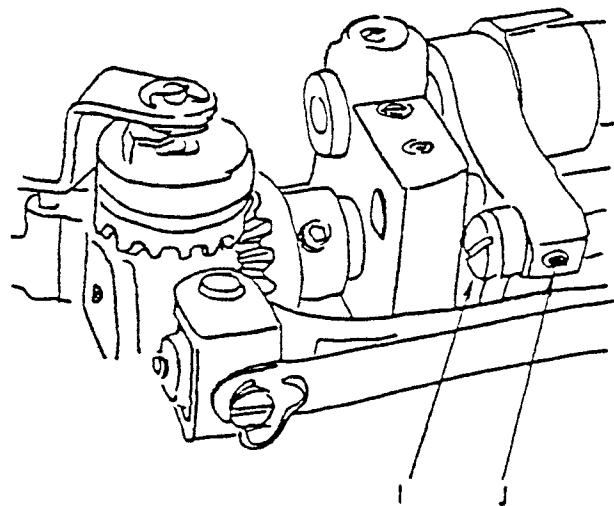


Fig. 25-4

## 22. ALPHA FEED

### PREPARATION:

Remove bottom cover.

### CHECK:

Before making adjustments, check the following Alpha Feed bearing points.

1. Pivot bearings for looseness or binding.
2. Presence of pulse movement of feed bar on hinge stud.
3. Absence of vertical looseness of feed dog holder.
4. Feed slide block and feed regulator - absence of looseness or binding.
5. Feed connecting links - minimum looseness.

### 22-1 FEED DOG CENTRALIZING

#### MACHINE SETTING:

Stitch Length Dial: 2

#### ADJUSTMENT:

1. Turn handwheel toward front of machine until feed dog (C) is at its highest position.
2. Loosen set screw (E) that holds feed bar pivot hinge eccentric (F). (Fig. 25-3).
3. Turn feed bar pivot hinge eccentric (F) until feed dog (C) is centrally located in throat plate slots (left to right).
4. Tighten set screw (E).
5. Check for binding or looseness of hinge stud (M) and eccentric (F).
6. Check for correct positioning of feed regulator.

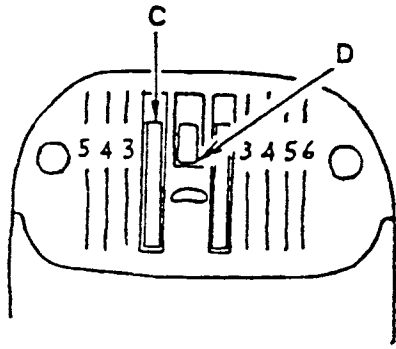


Fig. 25-1

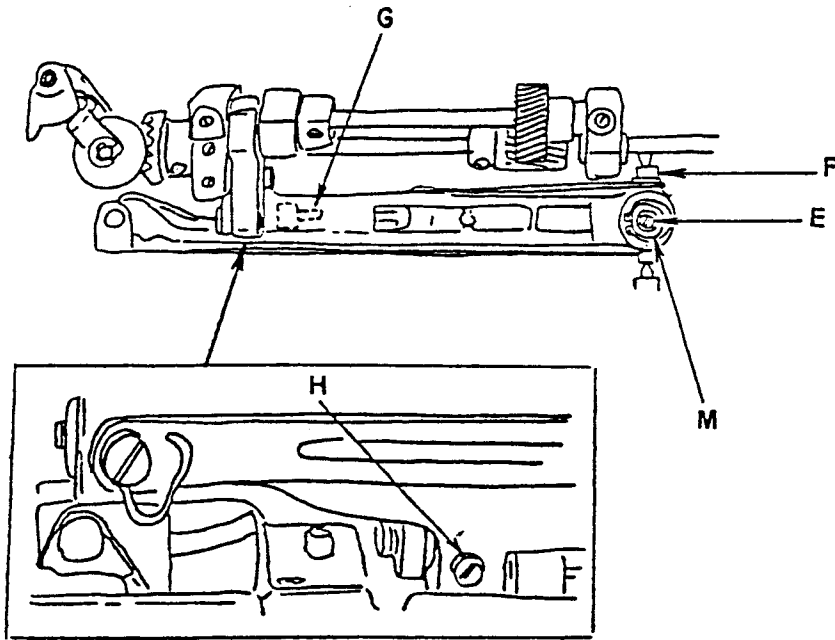


Fig. 25-3

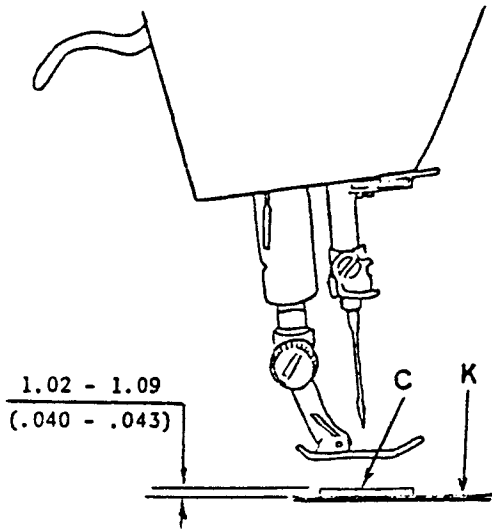


Fig. 25-5

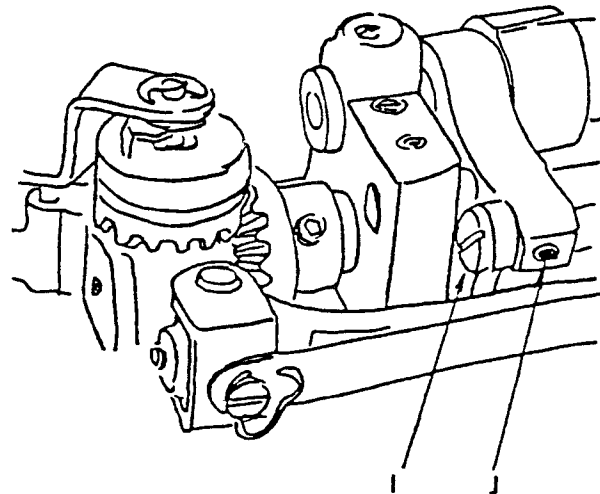


Fig. 25-4



22-2 FEED DOG THROW

MACHINE SETTING:

Stitch Length Dial: Maximum (4.2 mm)

ADJUSTMENT:

1. Turn handwheel toward front of machine until center bar (D) (Fig. 25-1) of feed dog is in its most forward position in center slot of throat plate.
2. Loosen set screw (H) holding feed bar connection eccentric (G) and turn eccentric (G) until center bar (D) of feed dog is as close as possible to throat plate without striking it. (Fig. 25-3).
3. Tighten set screw (H).

22-3 FEED DOG HEIGHT

MACHINE SETTING:

Stitch Length Dial: Maximum (4.2 mm)

ADJUSTMENT:

1. Turn handwheel toward front of machine until feed dog (C) is at its highest position.
2. Loosen set screw (J) holding feed lifting fork connection hinge stud (eccentric) (I). (Fig. 25-4).
3. Turn eccentric hinge stud (I) until top of feed dog (C) is 1.02 to 1.09 mm (.040 - .043) above throat plate (K). (Fig. 25-5).
4. Tighten set screw (J).
5. Recheck feed dog height.

22-4 FEED CONTROL CAM SUPPORT SETTING

ADJUSTMENT:

1. Loosen screw (A). (Fig. 26-1).
2. Push feed control cam support (B), very lightly, into contact with feed control cam.
3. Tighten screw (A).

## 23. ALPHA FEED ZEROING

### CHECK:

1. Place a sheet of paper on the throat plate.
2. Lower presser foot.
3. Set stitch length dial to zero.
4. Set pattern selector to straight stitch.
5. Run machine at full speed. There should be no forward or reverse feed.

On occasion, there may be a machine where absolute zero feed may be difficult to achieve. In such cases, forward paper movement must not exceed 25.4 mm in one minute (1 inch per minute).

### ADJUSTMENT:

1. Loosen feed regulator shaft crank set screw (C). (Fig. 26-1).
2. Insert allen key through access hole and loosen second set screw (D) just enough to turn the feed regulator (E). (Fig. 26-2).
3. Run machine at full speed and watch movement of paper.
4. While holding feed regulator shaft crank (F) steady, in its most raised position, with an allen key turn feed regulator (E) up or down with left hand to achieve zero feed motion.
5. When there is no feed motion, tighten set screw (D) and then set screw (C).

NOTE: Make sure that feed regulator shaft crank (F) has not moved to the left out of its correct position since this may cause hang-ups in the linkages.

6. Recheck for zero feed.

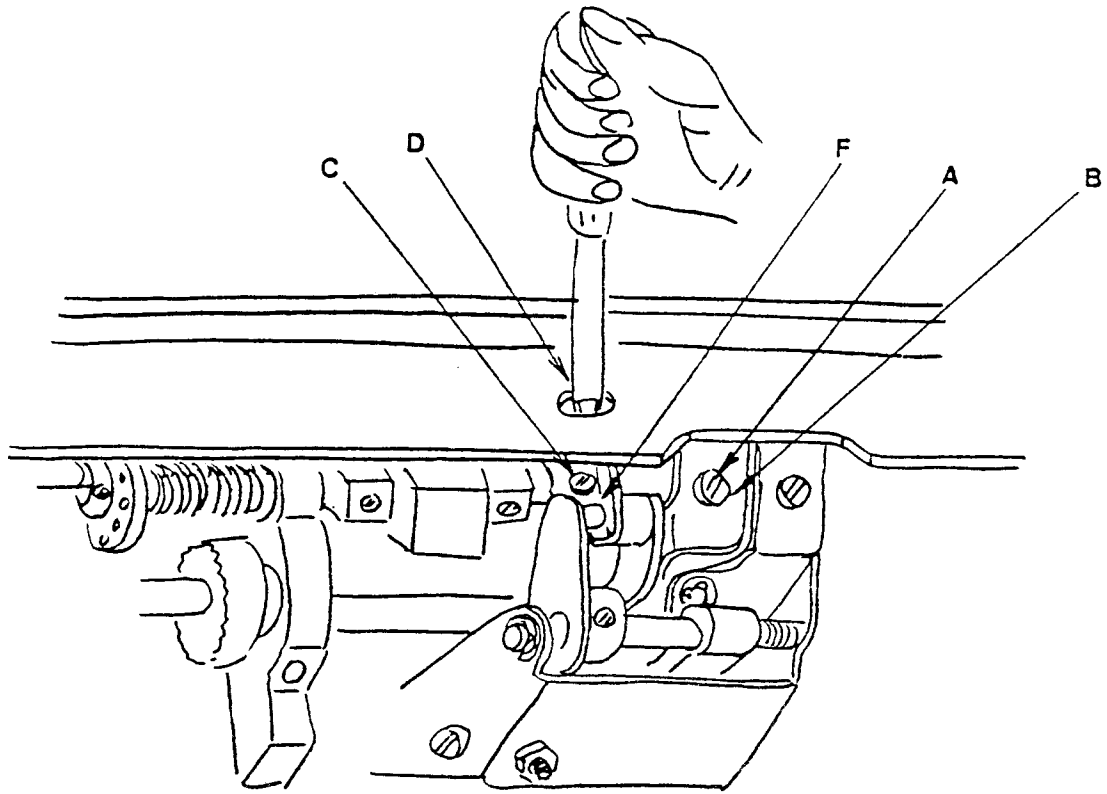


Fig. 26-1

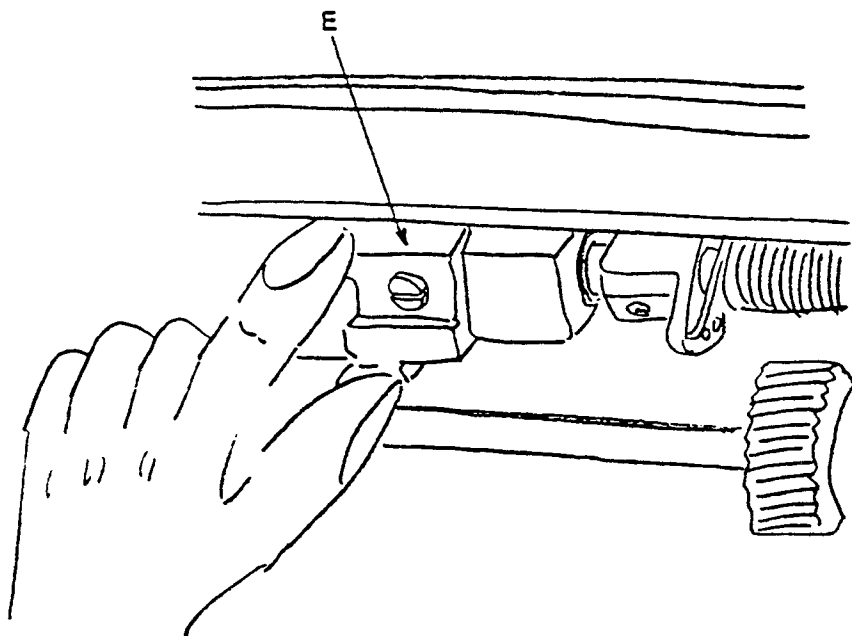


Fig. 26-2

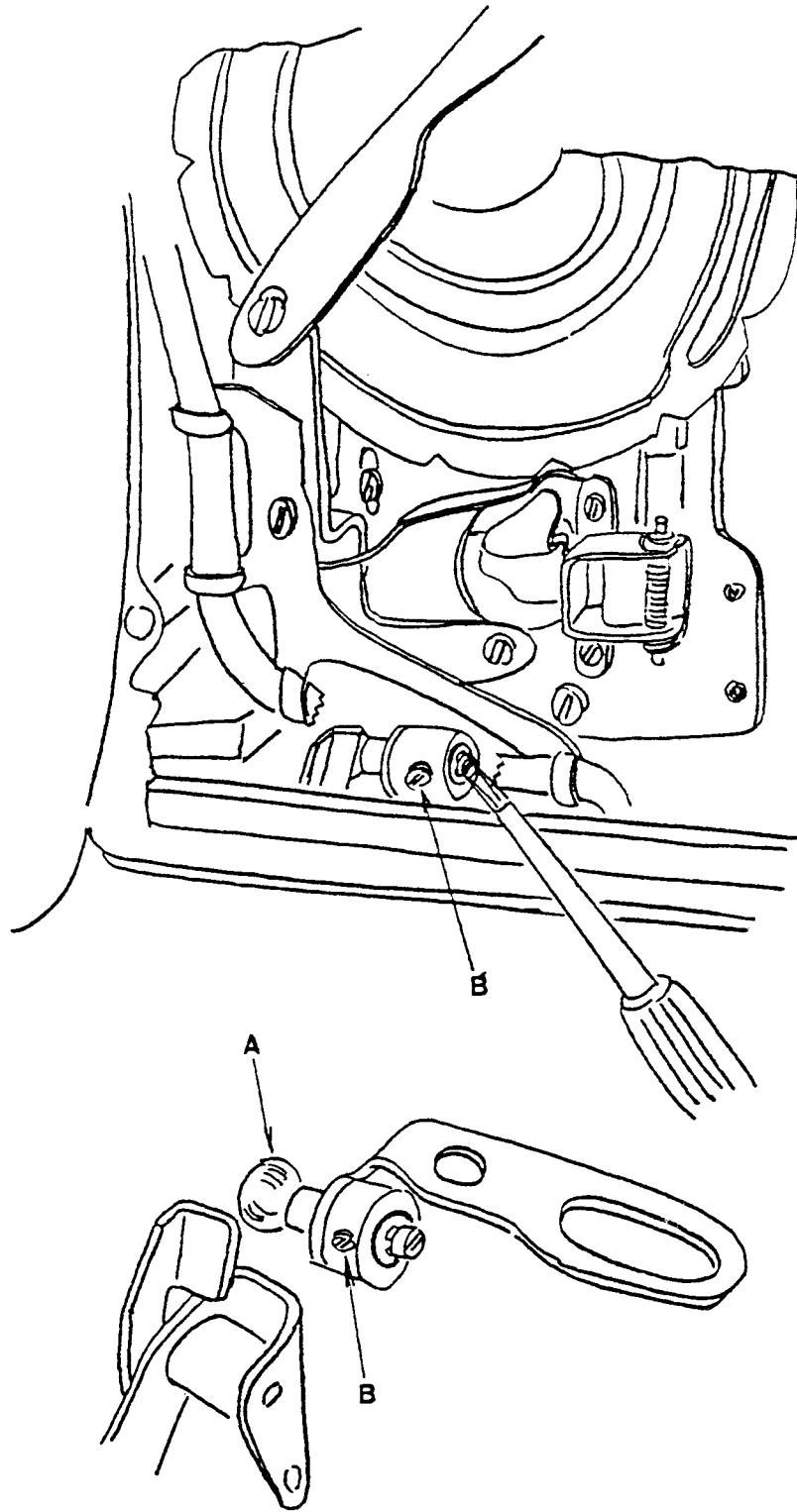


Fig. 28

PREPARATION:

1. Remove all covers.
2. Insert a size 14 needle in the needle holder.

SEQUENTIAL CHECK:

1. Feed dog correctly centered in throat plate slots.
2. Correct feed throw, front-to-back in throat plate.
3. Correct height of feed dog on maximum stitch length.
4. Correct feed time.
5. Correct presser bar, alignment and height.
6. With presser bar up, verify that feed regulator shaft crank swings freely and does not bind.
7. Ability to obtain not less than six stitches to the inch forward and ten stitches in reverse. Use paper perforation test to verify feeding quality.
8. Paper test Alpha feed for zero feed motion.
9. Paper test for correct pendulum timing of both built-in cams and buttonhole cam.
10. Correct feed control follower clearance.

MACHINE SETTINGS:

- |                          |                |
|--------------------------|----------------|
| 1. Pattern Selector:     | Feather Stitch |
| 2. Stitch Width Dial:    | 0 Bight        |
| 3. Stitch Length Dial:   | Maximum        |
| 4. Balance Control Dial: | Neutral        |
| 5. Needle:               | Size 14        |

ADJUSTMENT:

1. Place a sheet of paper on the throat plate and lower presser foot.
2. Run machine slowly and watch needle perforations.
3. A correctly adjusted machine should produce two penetrations forward and one in reverse. The reverse penetration should enter the previous hole.
4. Loosen set screw (B) holding cam controlled feed crank actuating lever ball stud (eccentric) (A). (Fig. 28).
5. Turn eccentric ball stud (A) clockwise to lengthen forward stitch length, and counterclockwise to lengthen reverse stitch. When setting is balanced, tighten set screw (B).
6. Recheck balance of flexi stitch.

When flexi feed balance is difficult to zero out, verify zero Alpha feed, pendulum timing, and stitch length settings.

23-2            STITCH LENGTH SETTING

MACHINE SETTING:

1.    Pattern Selector:      Straight Stitch
2.    Stitch Length Dial:    Maximum

CHECK:

Place a sheet of paper on the throat plate. Run machine and make seven perforations. These perforations should measure one inch and six stitches.

ADJUSTMENT:

1.    Set stitch length dial to "0".
2.    The center of feed regulator shaft crank link pin (A) should be aligned with fulcrum of cam controlled feed control lever (B), and perimeter (A) of feed regulator shaft crank link pin (A) must also be in contact with the curved face (C) of cam controlled feed control lever (B). (Fig. 29-1).
3.    Set stitch length dial to maximum stitch length.
4.    Feed regulator shaft crank (D) should be in contact with feed regulator shaft crank stopper pin (E). (Fig. 29-2).
5.    Test for six stitches per inch.
6.    Test for flexi stitch zero feed motion.
7.    Replace assembly if not functioning properly.

After completing the above adjustments, adjust reverse feed stitch length setting.

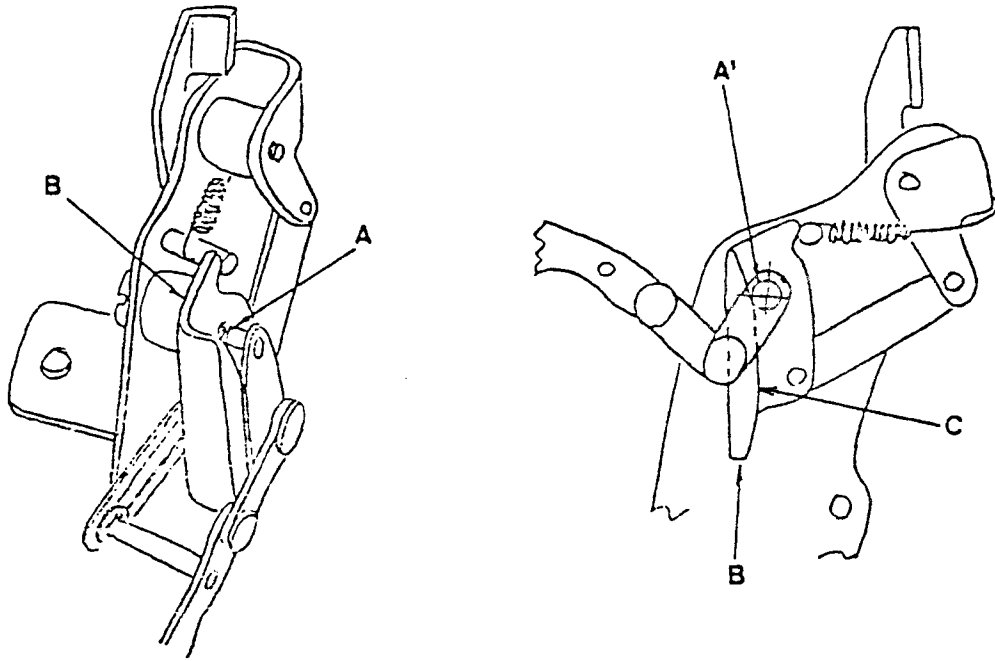


Fig. 29-1

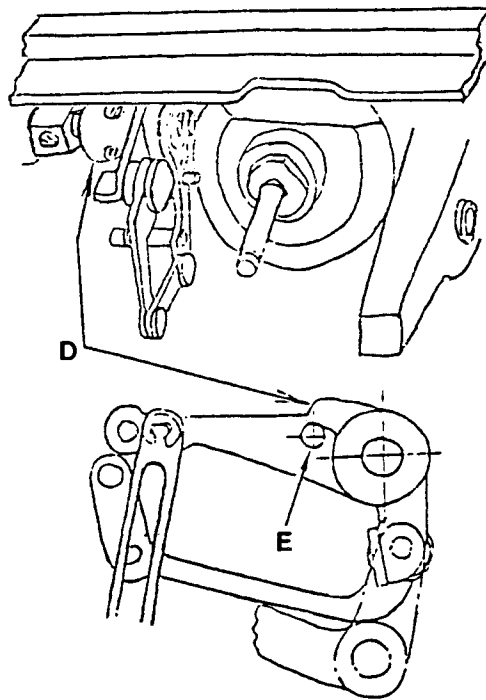


Fig. 29-2

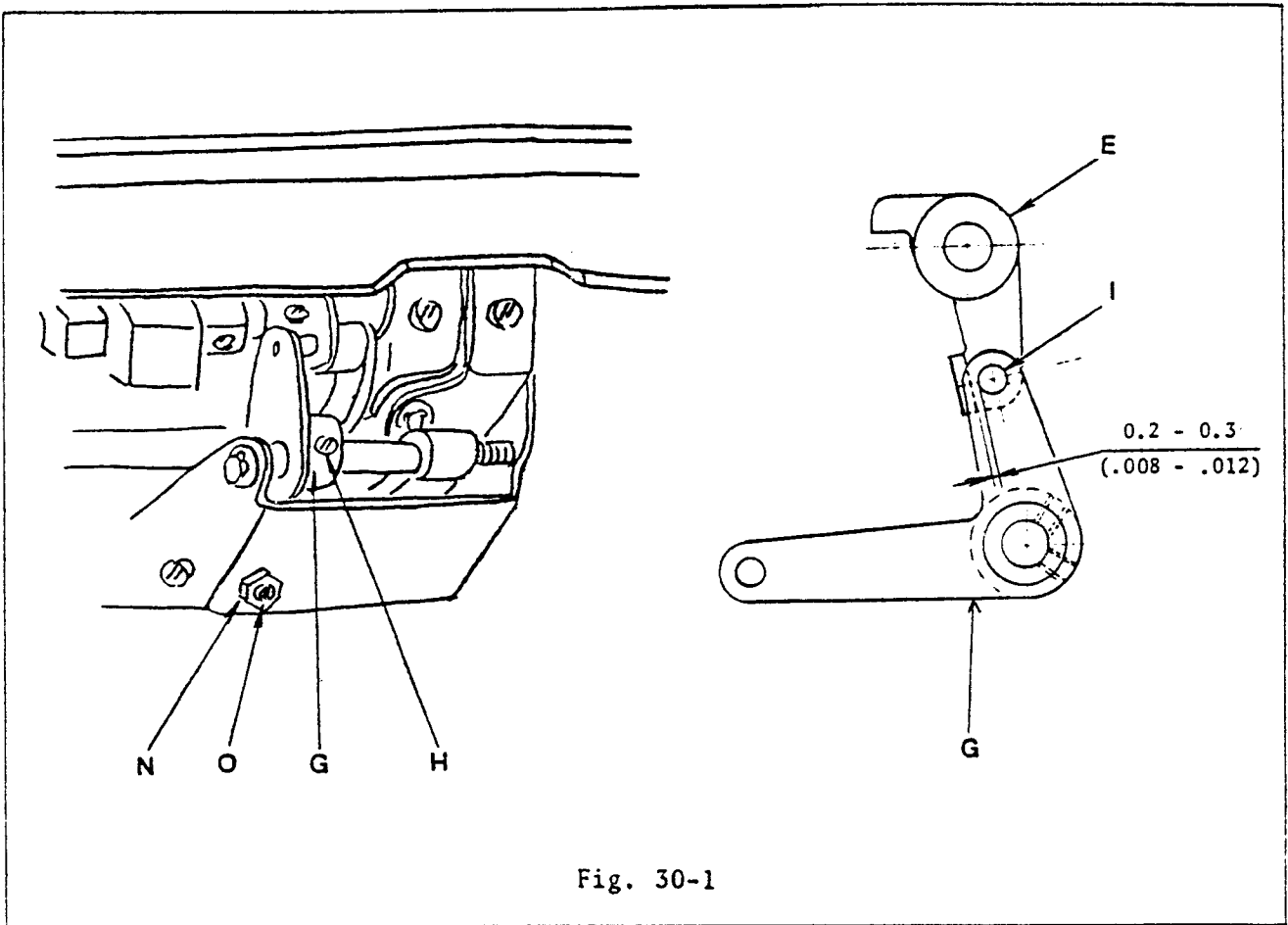


Fig. 30-1



23-3 REVERSE FEED STITCH LENGTH SETTING

ADJUSTMENT:

1. Set pattern selector to straight stitch and stitch length dial to maximum.
2. Depress reverse feed button and loosen one set screw (H) holding the reverse feed crank (G); then release reverse feed button and loosen second set screw (H). (Fig. 30-1).
3. Set clearance between feed regulator shaft crank (E) and reverse feed crank pin (I) to 0.2 - 0.3 mm (.008 - .012).
4. Tighten both set screws (H).

23-4 REVERSE FEED CRANK STOPPER SCREW SETTING

ADJUSTMENT:

1. Set feed control knob (stitch length dial) to 2.5.
2. Loosen lock nut (N) and turn reverse feed crank stopper screw (O) as required to achieve ten stitches per inch in reverse, then tighten lock nut (N). (Fig. 30-1).
3. Test for ten stitches per inch in reverse.

MACHINE SETTINGS:

1. Pattern Selector: Buttonhole (large)
2. Stitch Length Dial: Buttonhole Graphic
3. Buttonhole Flag: Down and Forward
4. Needle: Size 14
5. Balance Control Dial: Neutral

PREPARATION:

1. Attach one-step buttonhole foot.
2. Insert one inch button into buttonhole foot.
3. Slide a sheet of paper under buttonhole.

CHECK:

Run machine slowly, watching the needle perforations at the bar tack and formation of left leg. Observe tripping action and the reverse step. Complete buttonhole and check the following.

1. Upper and lower bar tacks must span width of left and right buttonhole legs.
2. Spacing of stitching in each leg is controlled by balance dial (A). If spacing cannot be balanced with dial (A), make note of this for corrective adjustment.
3. Cutting space between the legs should be uniform. Any "tear-dropping", (See Fig. 31-1), is an indication of looseness or stickiness in Alpha feed system.
4. Cycling - reversing direction of feed before leg is completed calls for resetting of buttonholer tripper spring (B) to assure that the buttonholer tripping lever is not too loose. (Fig. 31-2). Also check for proper adjustment of the buttonhole pawl.

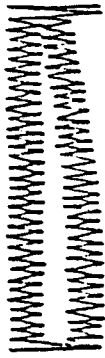


Fig. 31-1

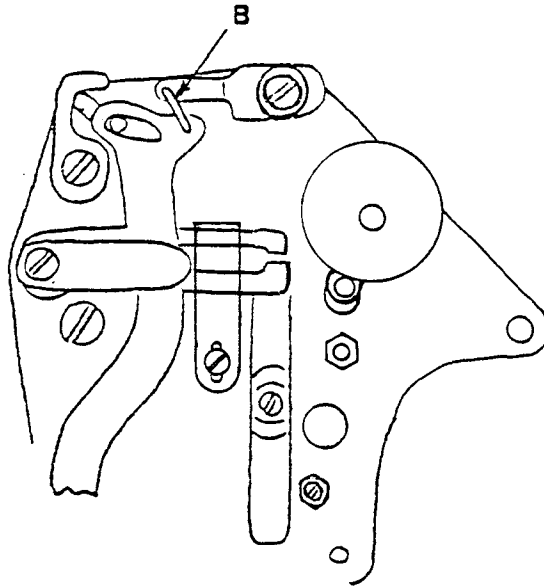


Fig. 31-2

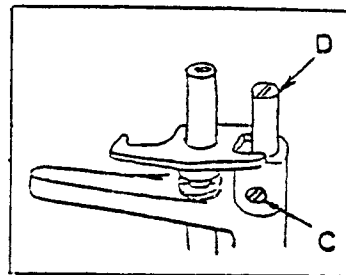
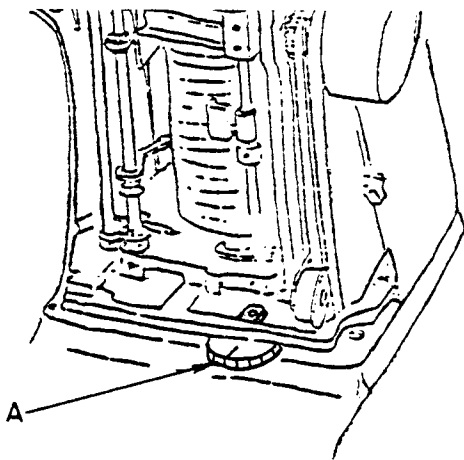


Fig. 31-3

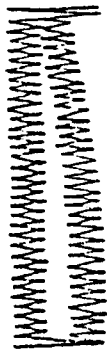


Fig. 31-1

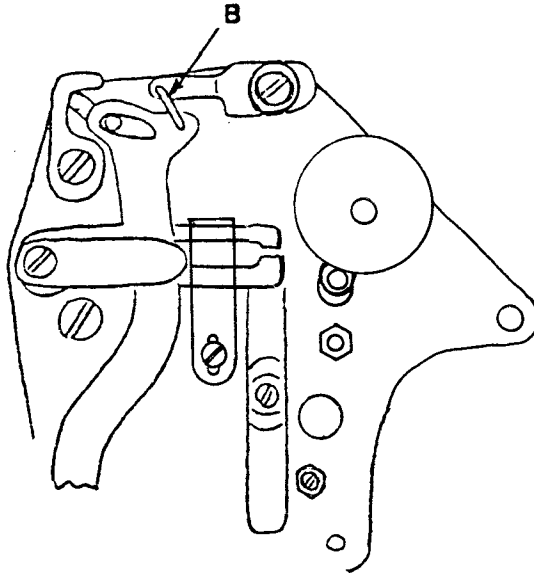


Fig. 31-2

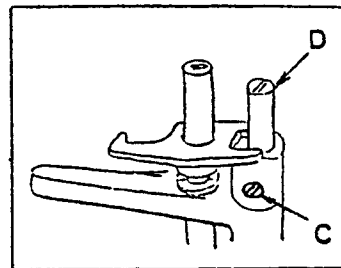
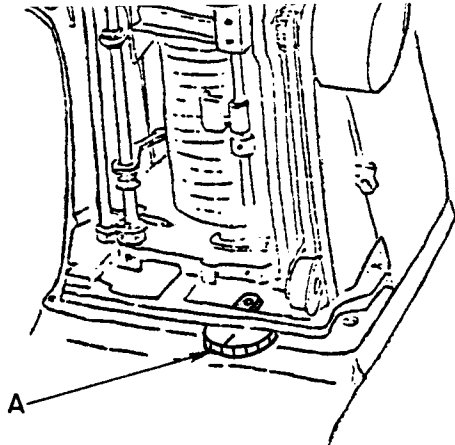


Fig. 31-3

ADJUSTMENT:

The primary function of the balance control dial (A), Fig. 31-3, is to achieve buttonhole balance in neutral position of the dial. This quality of balance provides a greater range of balance adjustment for balancing flexi-stitch cam patterns, which call for a combination of balance dial and stitch length dial adjustments.

1. Set controls in large buttonhole mode.
2. Set balance control dial (A) to neutral.
3. If stitches are not balanced, loosen set screw (C) holding slotted eccentric stud (D).
4. Turn eccentric stud (D) a small amount to left or right until desired feed is obtained.
5. Tighten set screw (C)..
6. A balanced forward and reverse stitches must be obtained by adjusting the balance control dial when machine is set for sewing small buttonhole.

## 25. BOBBIN CASE THREAD CLEARANCE

### MACHINE SETTINGS:

1. Pattern Selector: Straight Stitch
2. Needle: Size 18

### PREPARATION:

1. Remove bottom cover.
2. Remove throat plate, presser foot and bobbin.

### ADJUSTMENT:

1. Turn handwheel toward front of machine until needle bar is at its lowest position.
2. Turn bobbin case (A) counterclockwise against cushion spring (B) so that the left edge of thread slot is aligned within the range from center to right side of size 18 needle (or aligning plug). See Fig. 32-1.
  - a. Turn bobbin case (A) counterclockwise so that it just touches, but not depress, the cushion spring (B).
  - b. Loosen set screw (D) holding eccentric adjusting stud (C). Turn eccentric adjusting stud (C) to left or right until left edge of thread slot in bobbin case is aligned within the range from center to right side of size 18 needle; then tighten set screw (D). (Fig. 32-2).

NOTE: High point of eccentric should be facing front of machine as shown in Fig. 32-2.

3. Loosen LEFT-HAND THREAD set screw (F) holding bobbin case position finger (E). Move position finger (E) forward or backward to set 0.3 to 0.46 mm (.012 - .018) (Fig. 32-3) and 0.3 to 0.5 mm (.012 - .020) (Fig. 32-3) clearances between bobbin case (A) and position finger (E). Then tighten LEFT-HAND THREAD set screw (F).
4. Turn handwheel over toward rear of machine until bobbin case (A) is touching position finger (E) and check for clearance of 0.3 to 0.46 mm (.012 - .018) between bobbin case (A) cushion spring (B). Adjust if necessary. See Fig. 32-4.

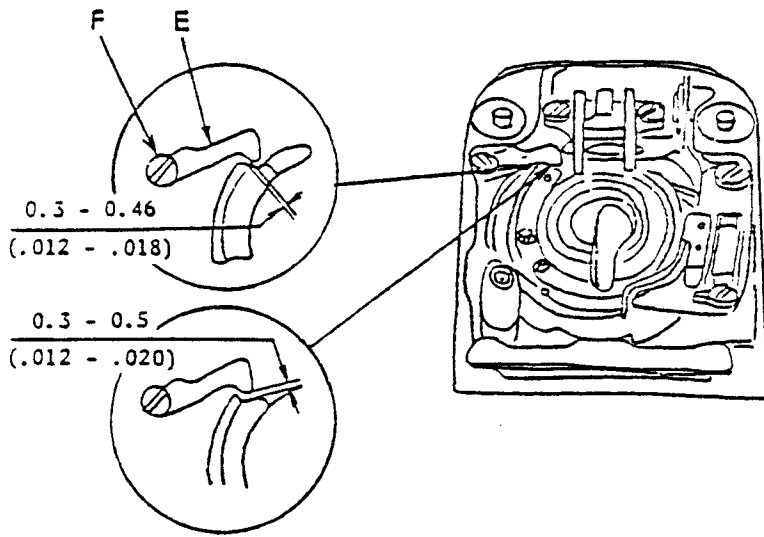


Fig. 32-3

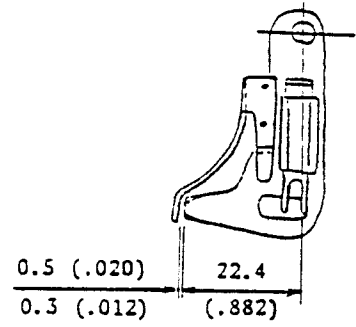


Fig. 32-5

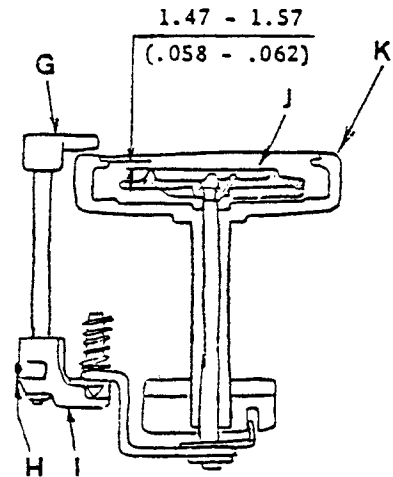


Fig. 32-8

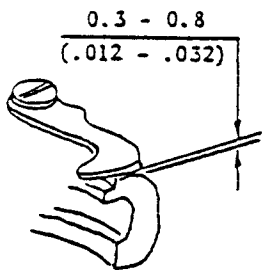


Fig. 32-7

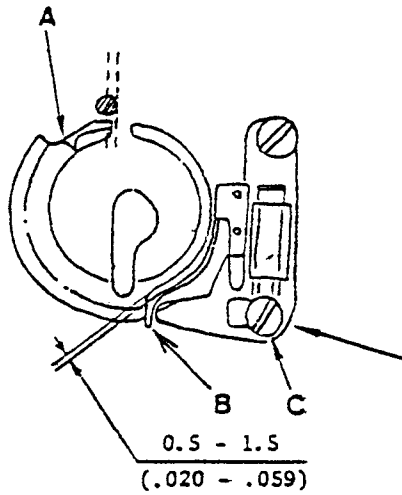


Fig. 32-1

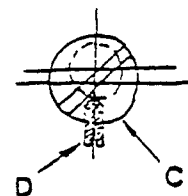


Fig. 32-2

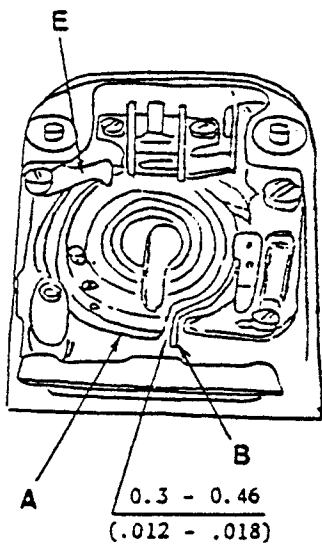


Fig. 32-4

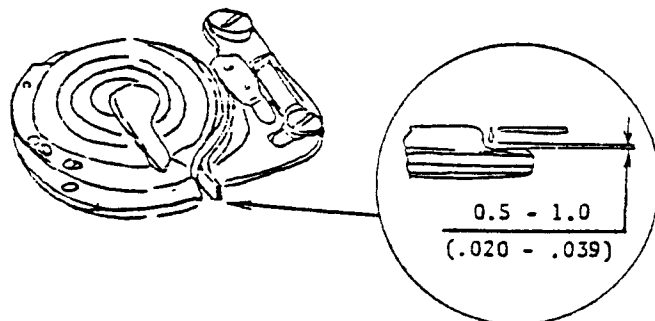


Fig. 32-6

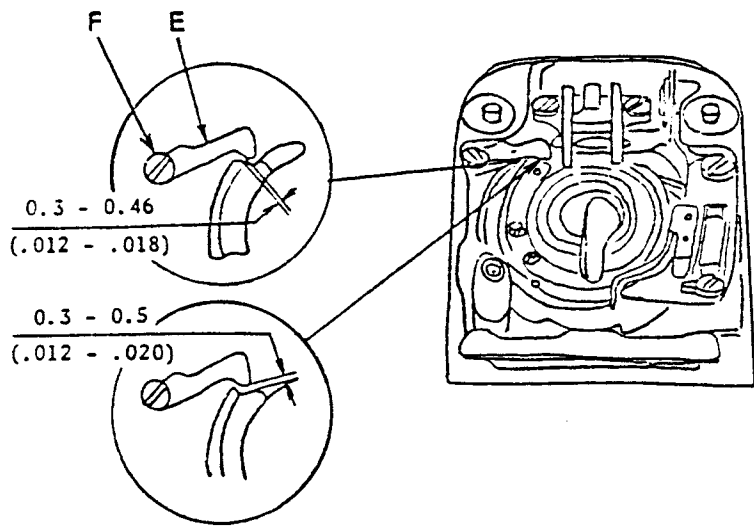


Fig. 32-3

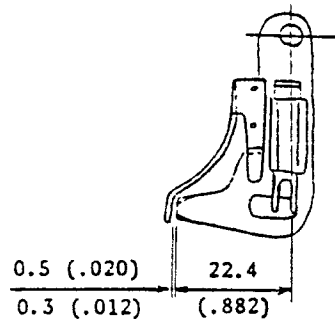


Fig. 32-5

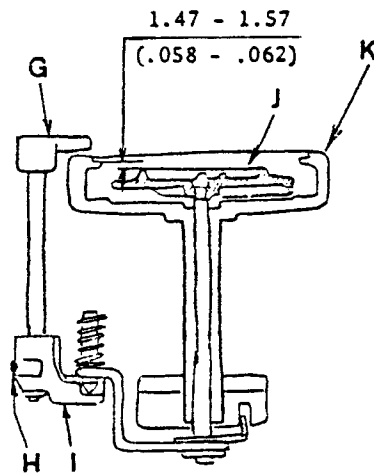


Fig. 32-8

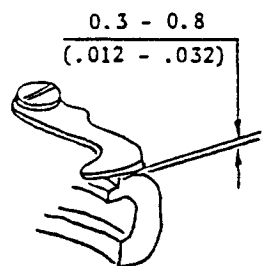


Fig. 32-7

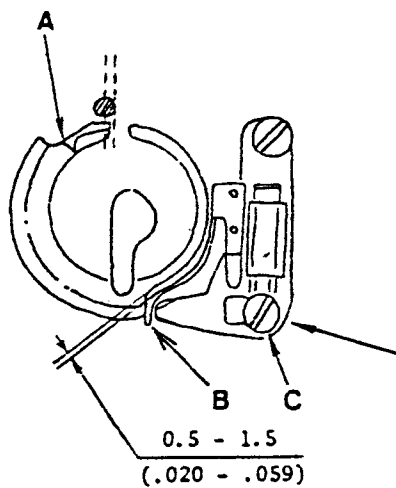


Fig. 32-1

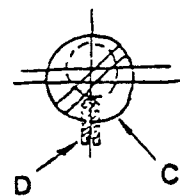


Fig. 32-2

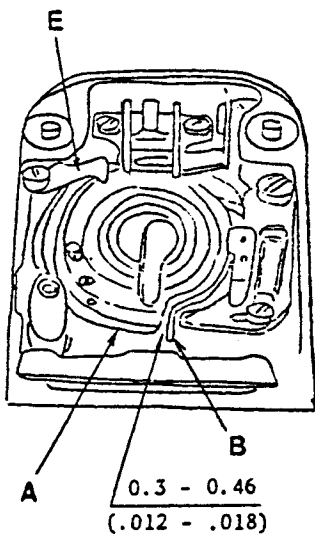


Fig. 32-4

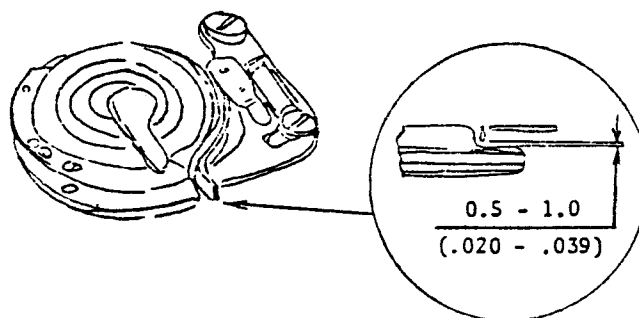


Fig. 32-6



## 25. BOBBIN CASE THREAD CLEARANCE (Continued)

5. The following requirements must also be met.
  - a. Clearance of 0.3 to 0.5 mm (.012 - .020) between bobbin case cushion spring bracket and cushion spring. See Fig. 32-5.
  - b. Clearance of 0.5 to 1.5 mm (.012 - .059) between cushion spring and corner position of bobbin case. See Fig. 32-1.
  - c. Clearance of 0.5 to 1.0 mm (.012 - .039) between underside of cushion spring and top of bobbin case. See Fig. 32-6.
  - d. Clearance of 0.3 to 0.8 mm (.012 - .032) between underside of position finger and top of rotating hook. See Fig. 32-7.

### 25-1 BOBBIN DRIVER HEIGHT SETTING (Fig. 32-8)

#### PREPARATION:

1. Remove bottom cover.
2. Remove throat plate, bed slide, and presser foot.

#### ADJUSTMENT:

1. Place bobbin winder actuating lever shaft (G) in winding position.
2. Loosen bobbin winder actuating lever shaft cam set screw (H).
3. Move bobbin winder actuating lever shaft cam (I) up or down until the top ridge of bobbin driver (J) is located 1.47 to 1.57 mm (.058 - .062) below top of raceway of rotating hook (K).
4. Tighten set screw (H).
5. Place actuating lever shaft in bobbin winding position and close bed slide to make sure actuating lever shaft release is working properly.

#### Causes and indication of bobbin winding failure:

Bobbin winder set too low does not engage with bobbin in winding cycle.

Bobbin winder set too high causes snagging or breaking of thread during sewing.

25-2            POSITION OF THREAD RULL-OFF FINGER (Fig. 33-1)

PREPARATION:

1.    Remove bottom cover.
2.    Remove bed slide and presser foot.

CHECK:

1.    Bring needle bar to its lowest position.
2.    Distance from center of ball (C) on bobbin case tension latch to front edge of pull-off finger to be  $16,575 \pm 0,1$  mm (See Fig. 33-1).

ADJUSTMENT:

1.    Loosen set screw (B).
2.    Move thread pull-off finger (A) front to rear to achieve required distance from center of ball (C) to front edge of pull-off finger (See Fig. 33-1).
3.    Tighten set screw (B).

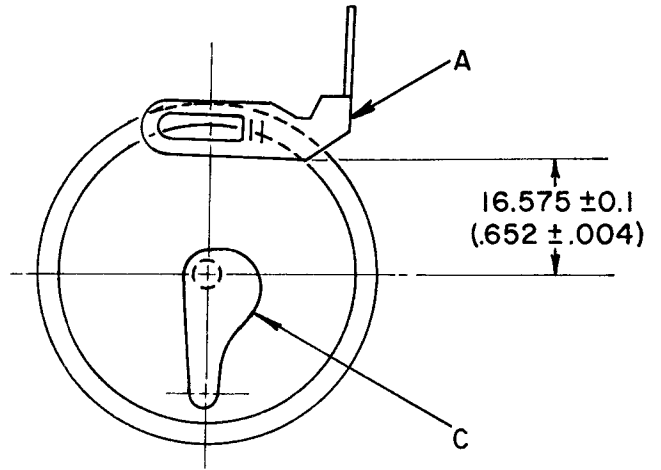
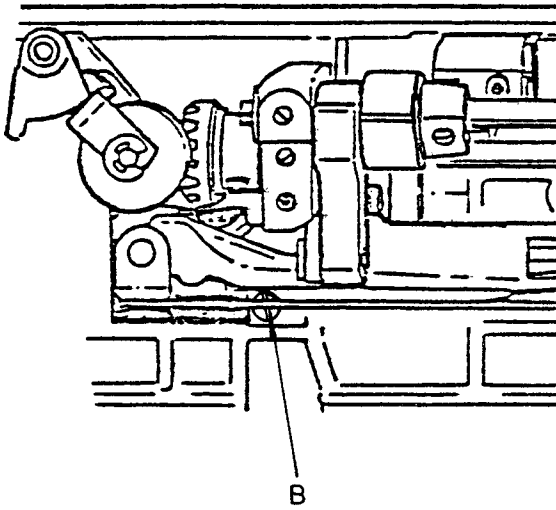


Fig. 33-1

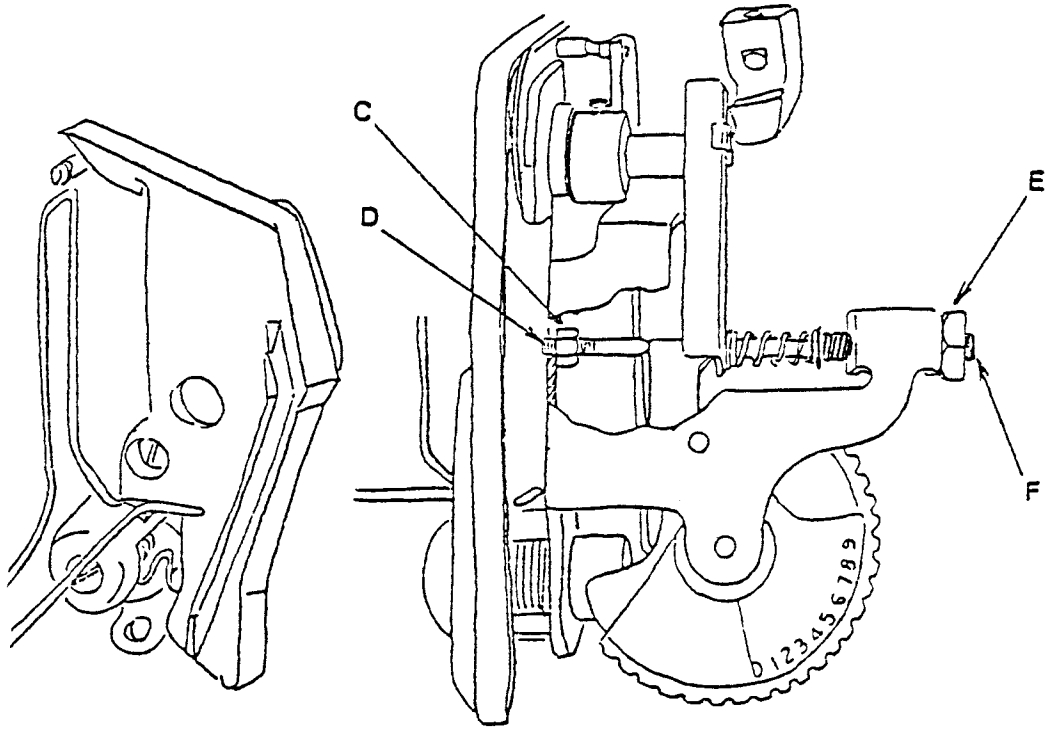


Fig. 33-2

## 26. TENSION

### FUNCTION

The two tension assemblies supply two separate tension values as follows:

1. Pre-tension of 5 to 10 grams for bobbin winding.
2. Sewing tension of 5 to 490 grams (tension dial setting 0 - 9).

Before attempting any corrective changes, be sure that pressure on tension disc pressure pin in tension assembly is released when tension dial is turned to "0" position or when presser bar is raised.

When presser bar is raised or tension dial is set to "0", the pre-tension supplies 5 to 10 grams of control on the needle thread. Bobbins that are soft to the fingernail test or have snarled coils of thread signify very low or non-existent pre-tension values.

Excessive pre-tension can cause thread breakage.

### PREPARATION:

Remove face plate and arm top cover assembly.

#### 26-1 DIAL TENSION

Before attempting to make any corrective changes in tension, make sure tension release is working correctly.

If there is no appreciable change in tension between "0" and "1", turn dial from "0" to "9" and note at what numeral tension begins to increase, and make adjustments as follows.

- a. If tension does not appear before "4" or "5":
  1. Return dial to "1".
  2. Loosen nut (C) and turn tension regulating slide adjusting screw (D) 1/8 turn at a time, until 16 to 30 grams of tension is felt at this point. (Fig. 33-2).
  3. Hold adjusting screw (D) and tighten nut (C).

- b. If tension at "9" seems to be below 490 grams:
  - 1. Loosen nut (E) and turn tension spring screw (F) to achieve the minimum tension of 490 grams.
  - 2. While holding tension spring (F), securely tighten nut (E).
  - 3. Recheck setting at dial setting of "1".
  - 4. Turn dial setting half-way between "4" and "5" and check tension. Between 90 to 140 grams of tension should be obtained at this dial setting.

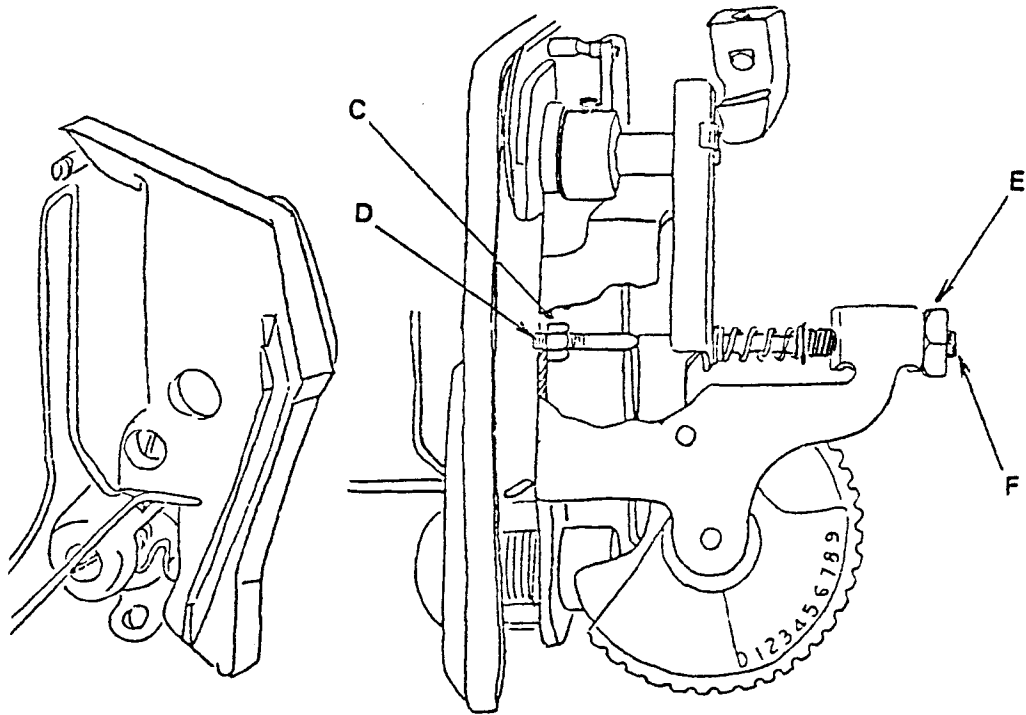


Fig. 33-2

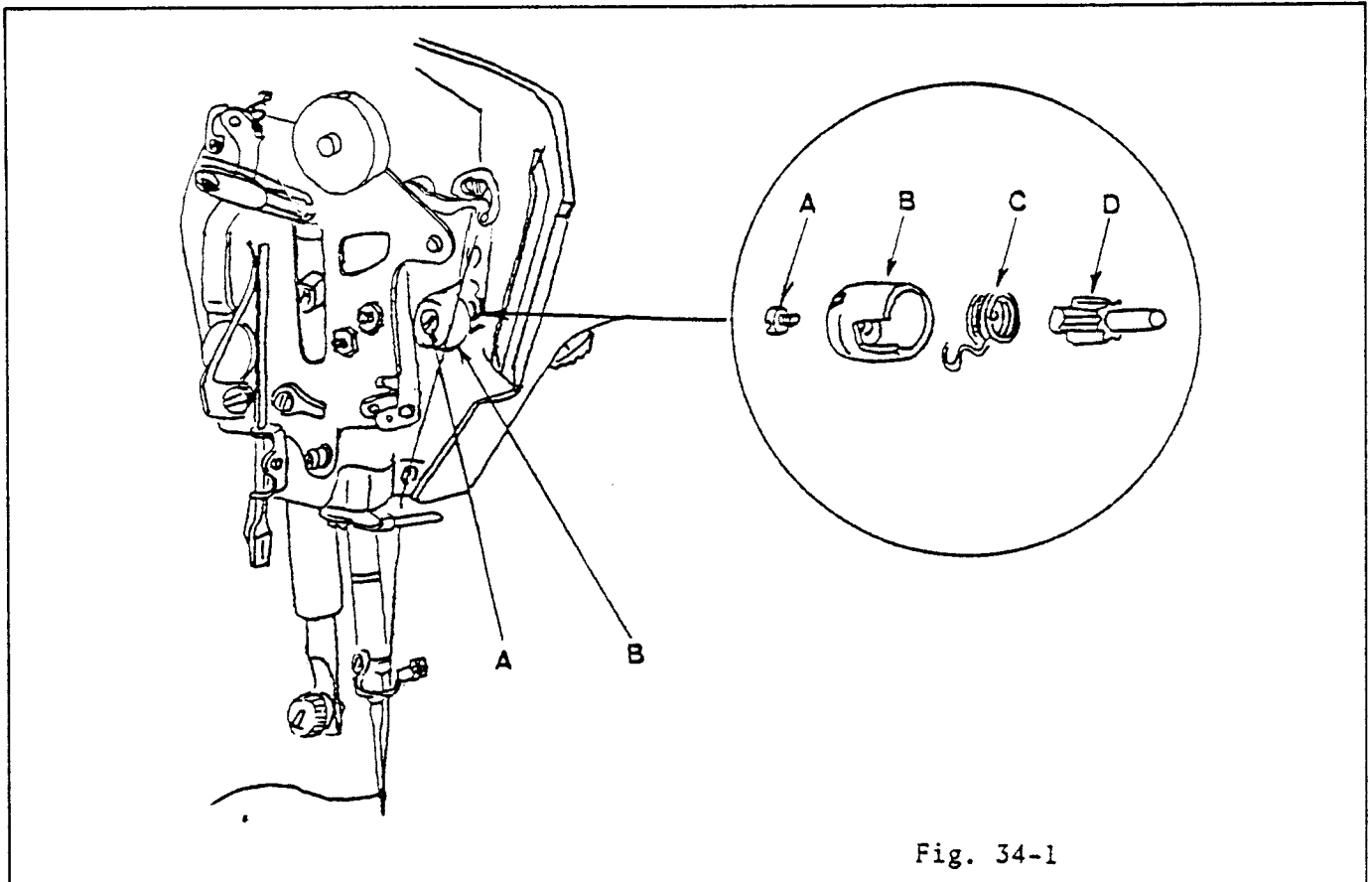


Fig. 34-1

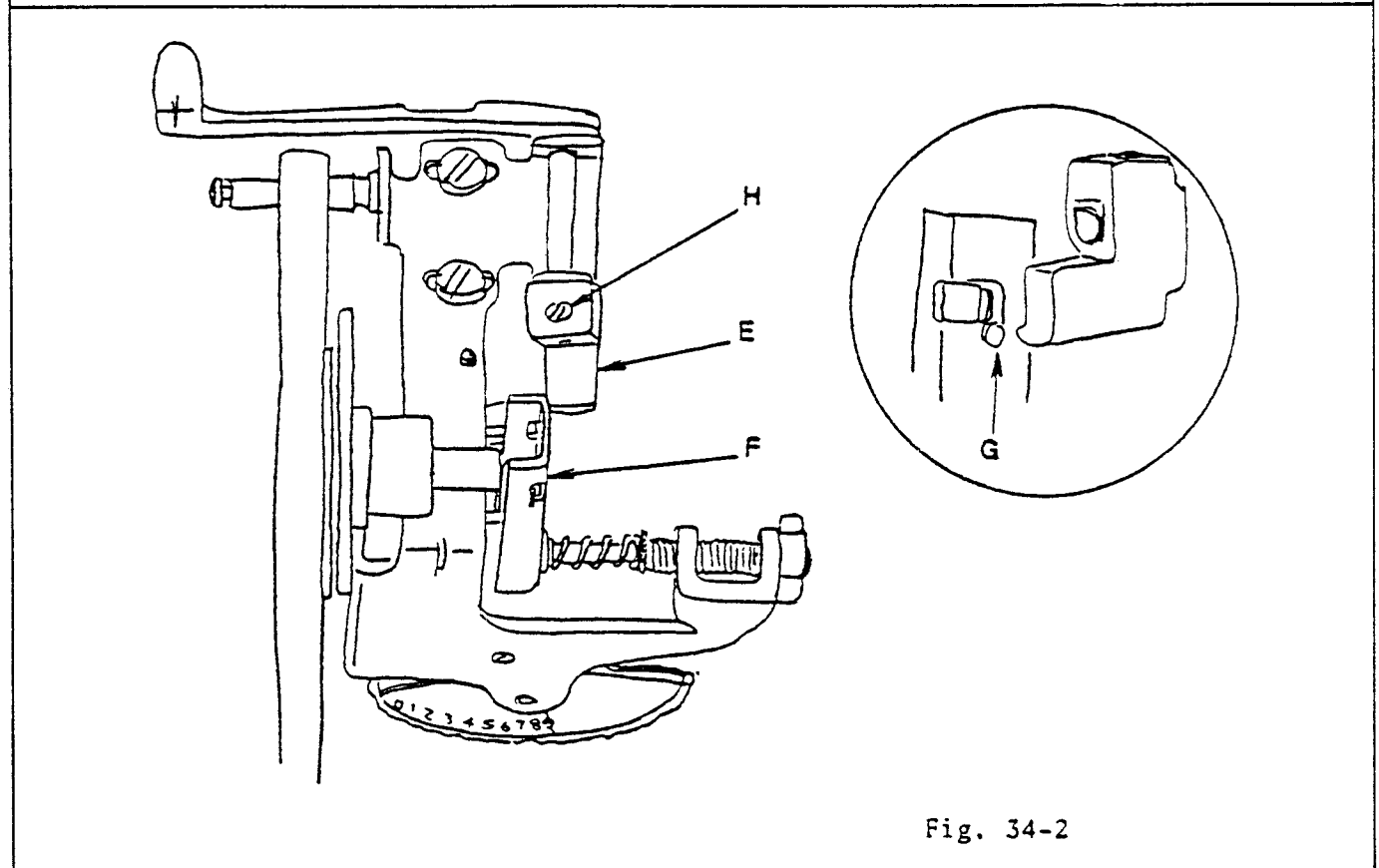


Fig. 34-2



The thread take-up spring functions as a control on the thread during needle descent and after cast-off as well as setting of stitch.

To control the thread, the spring must be wound to a desirable tension value. It must be just enough for the needle thread to hug the needle on its descent, also, take up the slack thread after cast off so as to prevent its snagging in the hook, bobbin case, position finger areas.

Light to medium fabrics of sheer-to-medium density require a light take-up spring tension. Densely (tightly) woven fabrics - vinyls - leathers require greater spring tension to help set the stitch.

The machine is set to a specification of 10 to 15 grams. This setting should not be changed for the customer doing "occasional" stitching on vinyls and suede leather materials.

- a. To set take-up spring tension:
  1. Remove screw (A). (Fig. 34-1).
  2. Remove cap (B).
  3. Remove take-up spring (C) from spring position collar (D).
  4. Replace take-up spring (C) on position collar (D) with inside tail of spring into groove of position collar at approximately 8:00 - 8:30 clock-hand position.
  5. Replace cap (B) and screw (A); Do not tighten screw (A) until stroke of take-up spring has been set.

26-2            THREAD TAKE-UP SPRING (Continued)

b.    To set stroke of take-up spring:

1.    Set pattern selector to straight stitch.
2.    Place a piece of fabric under presser foot and lower presser foot.
3.    With machine threaded, sew at stitch length of 2 mm (12.7 SPI), and set tension to produce a balanced pattern.
4.    Turn handwheel toward front of machine.
5.    After the needle point has penetrated approximately 1.6 mm (.063) into the fabric, the take-up spring (C) should come to rest. Turn cap (B) to make this adjustment. (Fig. 34-1).
6.    Tighten screw (A).

26-3            TENSION RELEASE

To set tension release:

1.    Turn tension dial to "9".
2.    Raise presser bar.
3.    Loosen screw (H) and move tension releasing lever (E) to the left, until it pushes tension regulating slide (F) and unloads tension on tension disc pressure pin (G). (Fig. 34-2).
4.    Tighten screw (H).
5.    Check for clearance between tension releasing lever (E) and tension regulating slide (F) throughout full range of tension dial settings. Tension must not release when presser bar is down.

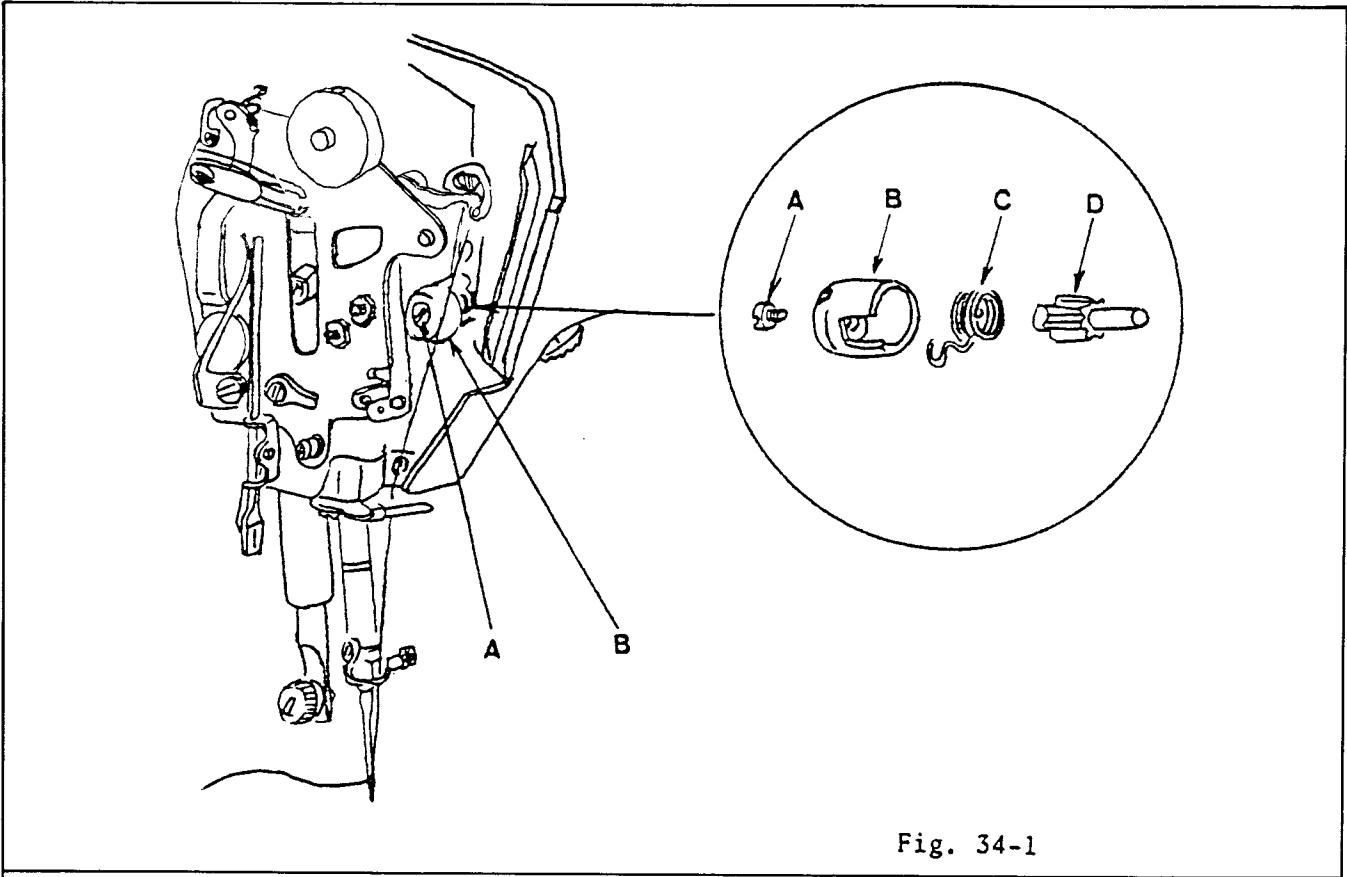


Fig. 34-1

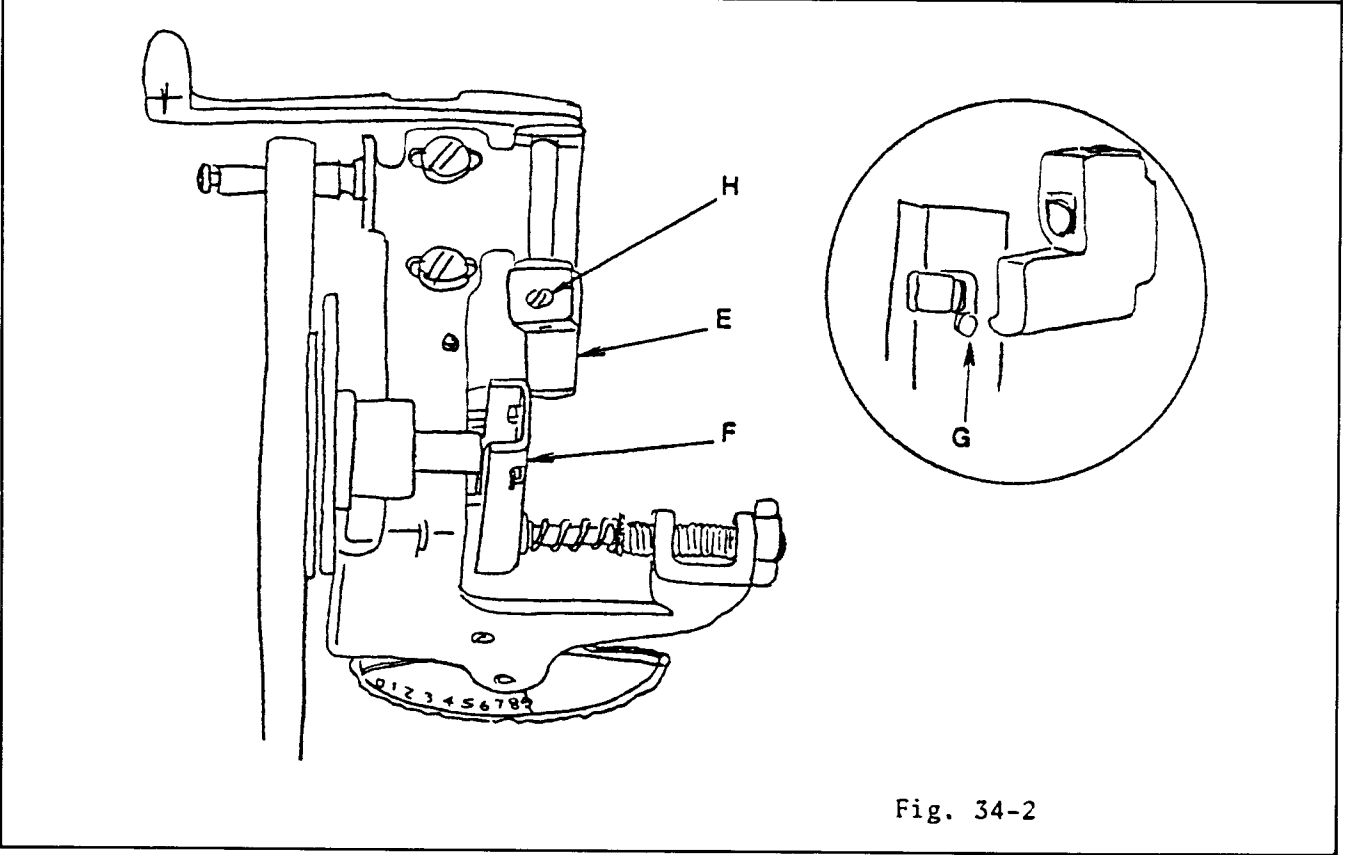
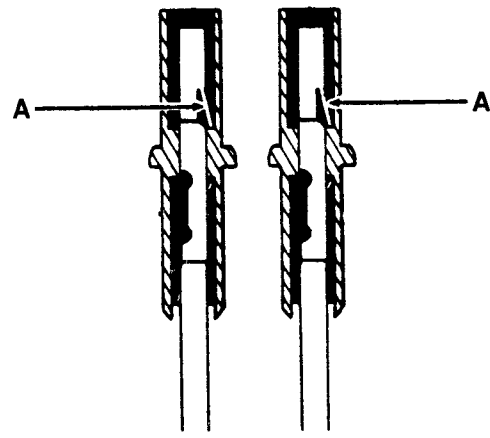
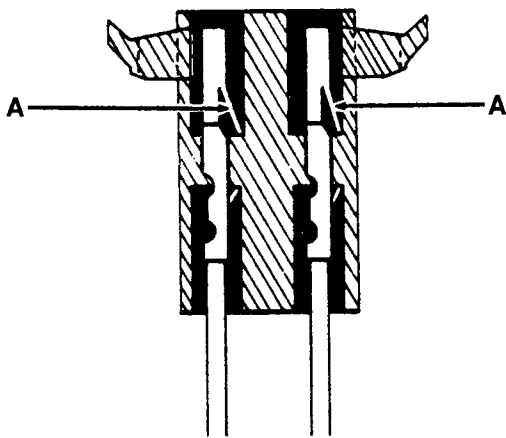
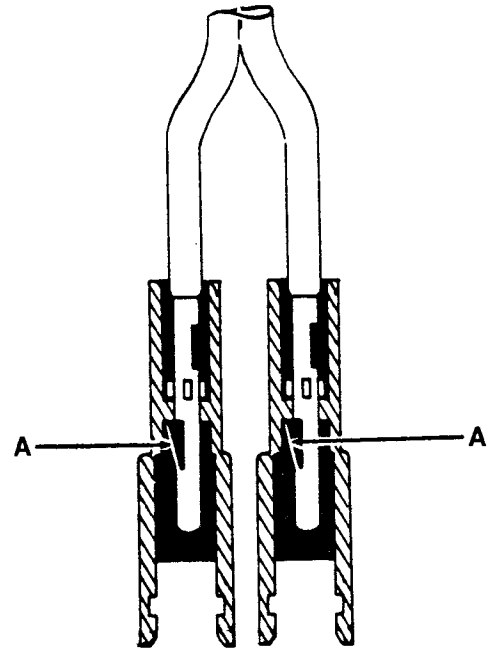
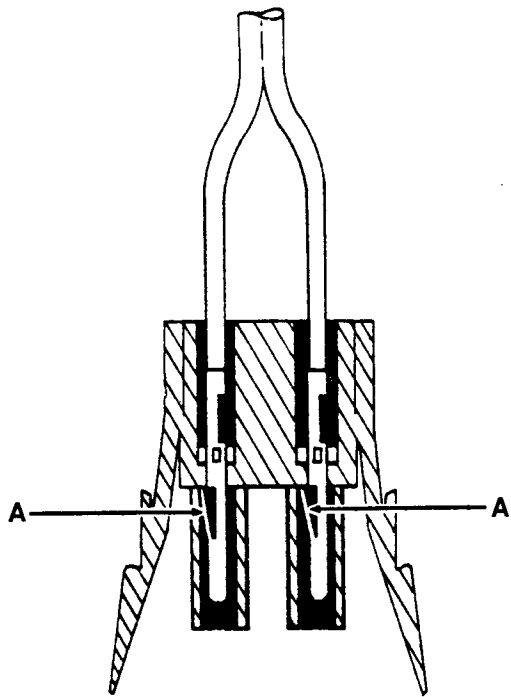


Fig. 34-2



## 27. ELECTRICAL SYSTEM

### DESCRIPTION

The 1425 machine operates from an alternating current supply of 110-120 volts AC, 50 - 60 Hertz (cycles).

### 27-1 ELECTRICAL CONTROL SYSTEM

The electrical control system may be divided into following three groups.

1. Motor with following electrical system:
  - a. A built-in light and power switch with high and low speed range.
  - b. A five-pin receptacle.
  - c. A two-pin receptacle housing for sewing light connections.
2. A foot controller with five-pin machine connector plug.
3. A sewing light assembly including a harness with one two-circuit connector.

### 27-2 SEWING LIGHT CONNECTOR

In the removal and replacement of motors or sewing light harness assemblies, mismatch combinations of motor sewing light connectors and sewing light harness connectors may occur. However, any mismatch is in the housings only. Salvage sewing light connector housings for use with replacement motors and sewing light harnesses.

To remove a terminal from a housing, use a tension screwdriver to bend inward tang (A) until it clears the shoulder inside the housing, then carefully pull out the terminal.

To replace a terminal in a housing, bend outward tang (A), insert the terminal into the correct housing, pushing it into the housing until it is secured in place by the tang (A).

### 27-3 FOOT CONTROLLER AND MOTOR COMBINATION

Make sure the proper controller is used with corresponding motor.

#### 27-4 MOTOR MOUNTS

To insure quiet and resilient operation, the motors are fitted with urethane sleeves which mate with the motor hinge pins. When replacing a motor, use care when pressing the hinge pins into the sleeves. Excessive pressure can push a sleeve into the motor housing, requiring dismantling of the motor housing to retrieve the sleeve.

#### 27-5 MACHINE SPEED

With motor switch set for maximum speed and machine set for straight stitch, presser foot up, the machine should run between 900 and 1100 RPM. Adjust trim potentiometer R-4 as required to obtain proper machine speed. Access to R-4 can be gained through opening in motor housing.

#### 27-6 NO POWER

When power fails to come on, check rocker switch actuating rod setting. It may be preventing full travel of switch slide. Reset actuating rod at switch bracket.

Check motor terminal pins to make sure they are not pushed inside of motor housing.

When motor runs erratically, check carbon brush contact, and also motor cover for crack causing misalignment of motor bearings.

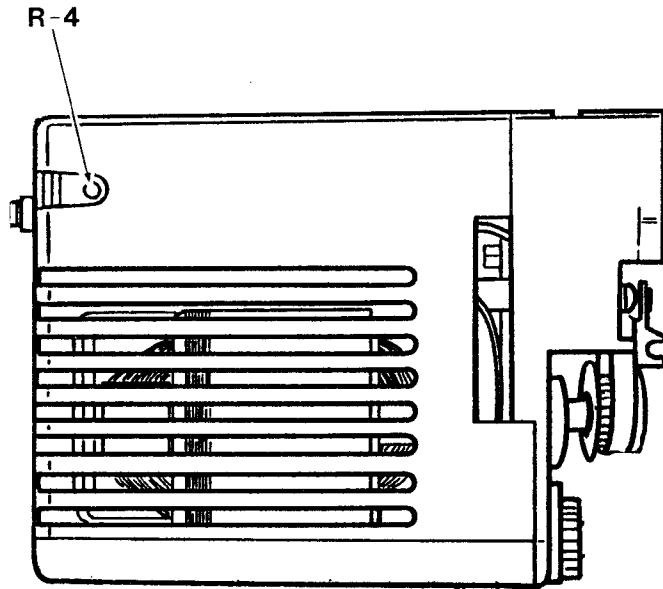


Fig. 39

## 28. LUBRICATION

To reliably meet the customer non-lubrication requirements, the machine must be lubricated as described in the following paragraphs.

Use only Singer oil and Singer grease.

Use of paraffin based oil, or non-silicon type grease, will create a build-up of residue on the bearing surfaces. The self lubricating properties of the sintered metal bearings will be defeated by clogging of the pores in the bearings if such oil is used.

All thread, lint, or any foreign matter must be removed before lubrication.

1. Additional oil (2 or 3 drops) is to be applied to sintered metal bushings, such as rotating shaft bushings, presser bar bushing inserts, and rotating hook shaft bushing.
2. Cam Controlled (flexi) Feed System:  
  
Apply a small amount of grease at points indicated on Fig. 42-1. Lubricated all other frictional areas with a few drops of oil.
3. Alpha Feed System:  
  
Apply a small amount of grease to the gears and feed lifting fork. Lubricate all other frictional areas with a few drops on oil, at points indicated on Fig. 42-2.
4. Cam Stack and Followers:  
  
Apply a small amount of grease and a few drops of oil to areas indicated on Fig. 43-1. Grease both sides of the feed follower slots. Grease all the cam stack cams.
5. Head End:  
  
Apply a small amount of grease to the slot of head end plate, and a few drops of oil to the needle bar, as indicated on Fig. 43-2.
6. Apply a few drops of oil to the take-up lever assembly and needle bar latch as indicated on Fig. 43-3.
7. Apply a small amount of grease to the cam release mechanism and zigzag mechanism as indicated on Fig. 44-1. Lubricate other frictional areas with a few drops of oil.
8. Apply a small amount of grease to the pattern selection mechanism as indicated on Fig. 44-2, and lubricated other areas wherever necessary with a few drops of oil.



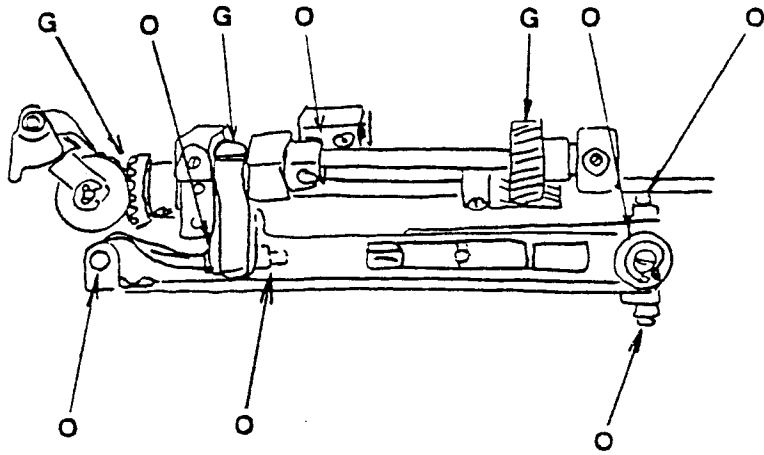


Fig. 42-2

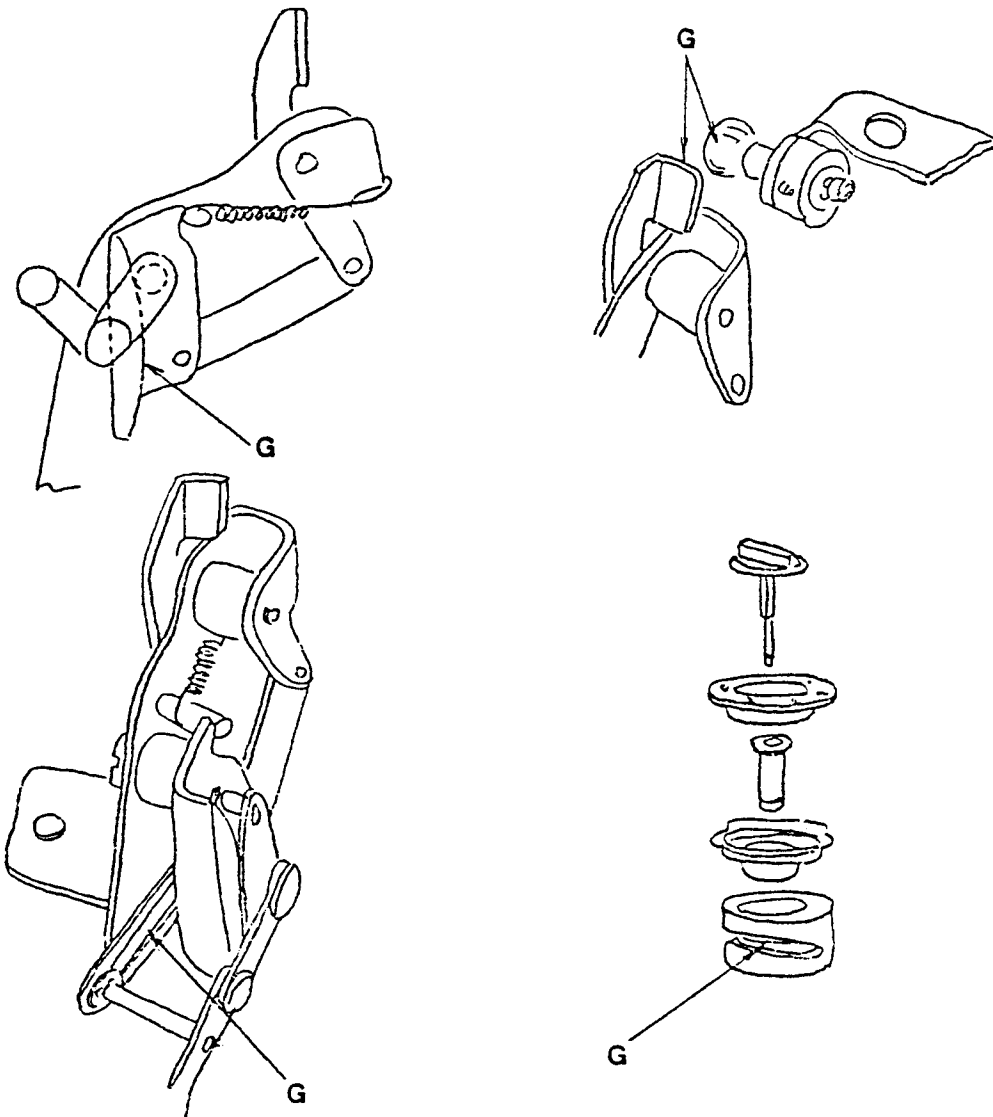


Fig. 42-1

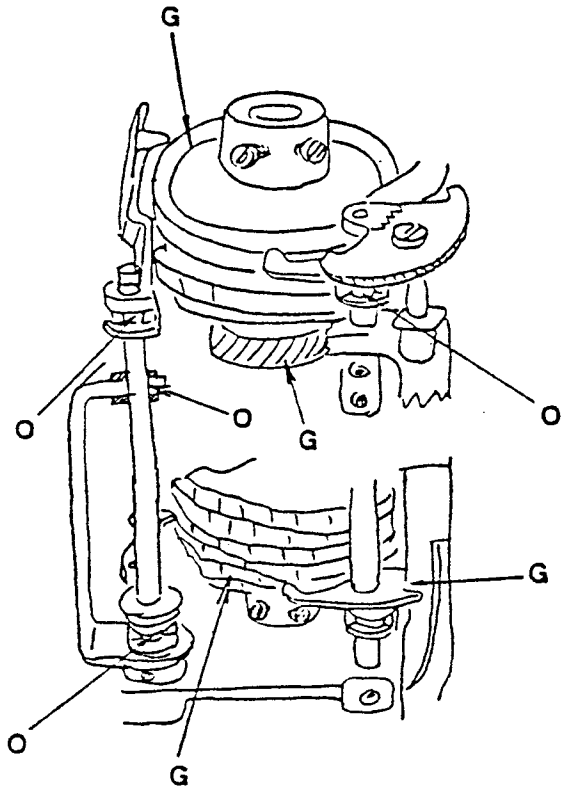


Fig. 43-1

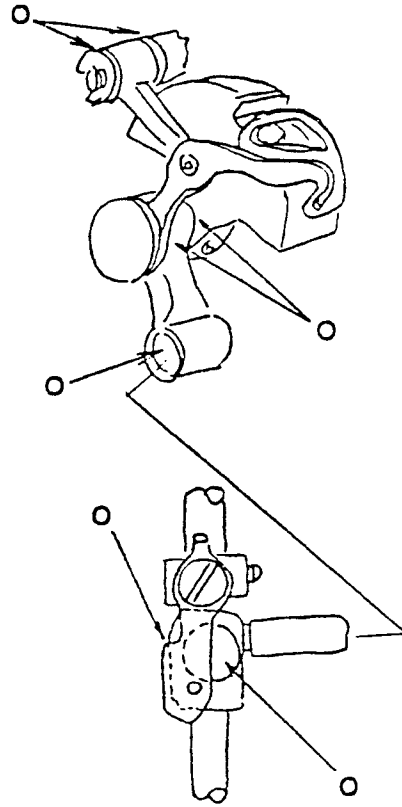


Fig. 43-3

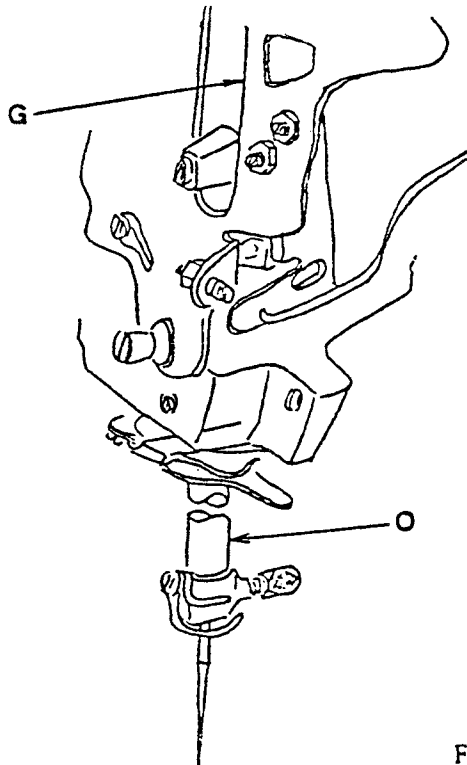


Fig. 43-2

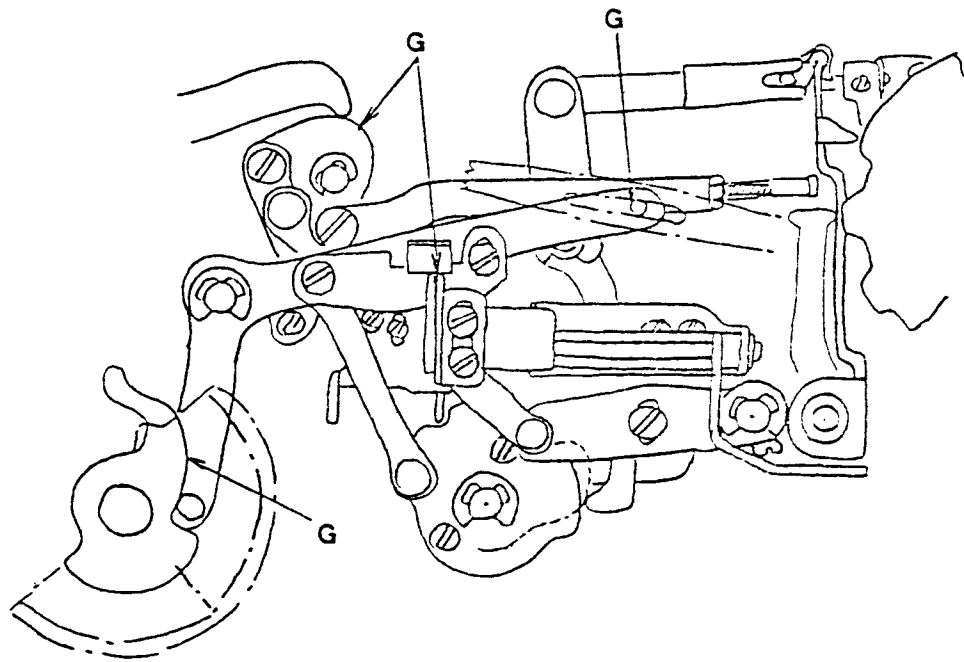


Fig. 44-1

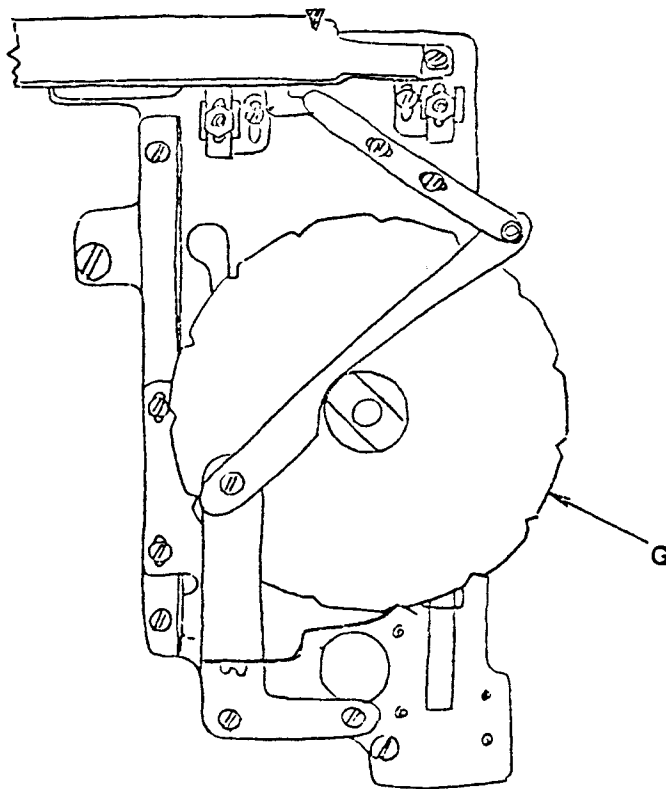


Fig. 44-2

## 29. SEW-IN TEST

### TEST PROCEDURE:

Use two plies of material and polyester thread.

1. Set machine for straight stitching.
2. Attach general purpose presser foot and general purpose throat plate.
3. Thread machine and wind bobbin.
4. Sew one line each 20 cm (8 inches) long, of the following stitches: (Fig. 45-1).
  - a. Straight stitch 4-2-1 (6-12-20) stitches and back tack 1.2 cm (1/2 inch) on 2 and 1 (12 and 20) stitch lengths at the beginning, middle and end.
  - b. Sew half a line basting stitch and half a line blindstitch (1 mm (20 SPI) stitch length and slow speed for both).
  - c. Zigzag (1 mm (20 SPI) stitch length and 0 to 5 bight).
5. Sew the following stitches at SLOW speed:
  - a. One line of feather stitch 20 cm (8 inches) long, 5 bight, and move balance control dial from one end to the other to assure that there are no binds in balance control dial movement. See Fig. 46-1.
  - b. Sew half a line of maxi-stretch stitch.
  - c. Set pattern selector to honeycomb, then sew half a line of honeycomb pattern and balance pattern.
  - d. Sew buttonholes (large and small) using one step buttonhole foot.
  - e. Balance buttonhole as shown in Fig. 45-2 and leave balance control dial in this position.

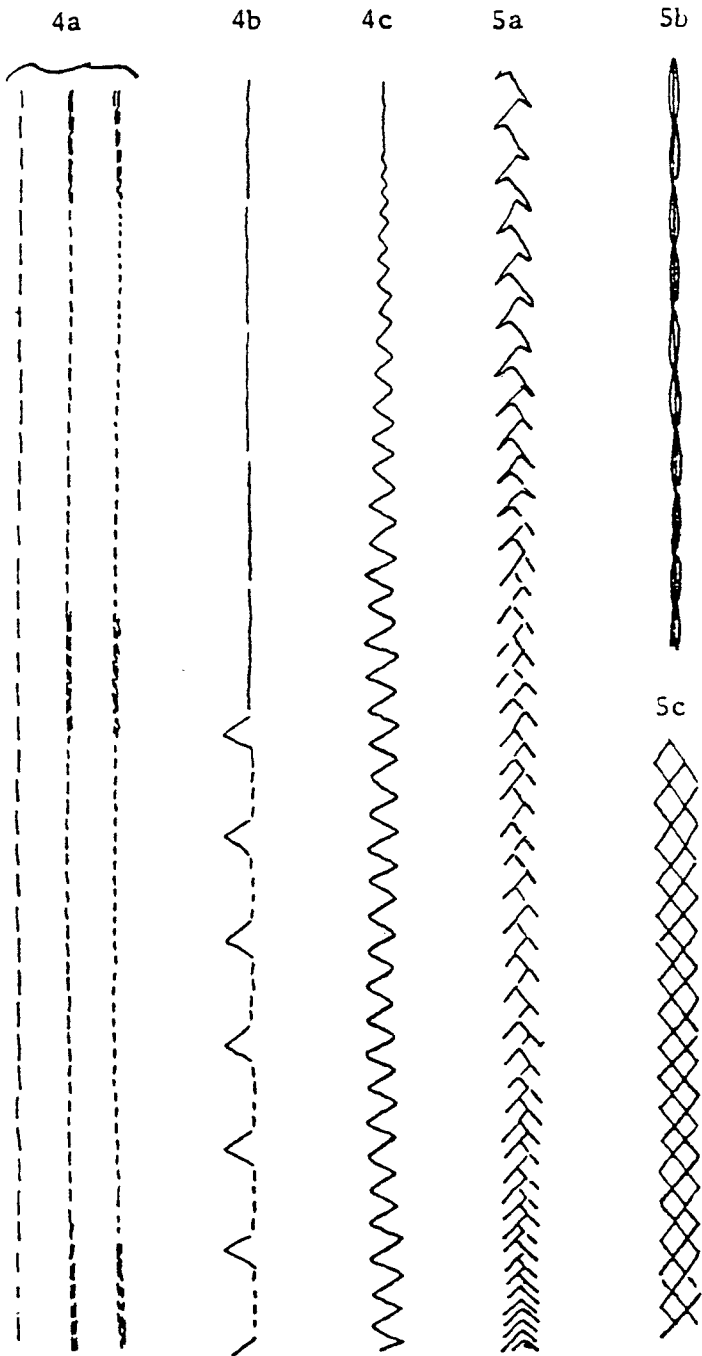


Fig. 45-1

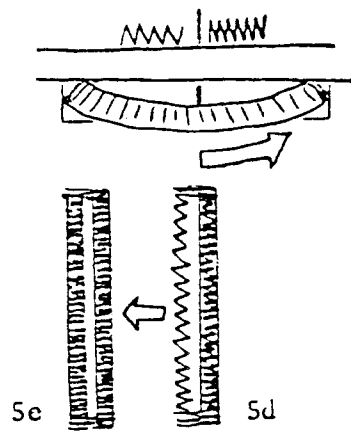
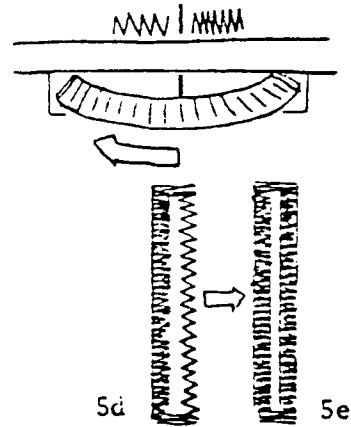


Fig. 45-2



SECTION 2 .  
PARTS REMOVAL  
AND  
REPLACEMENT

1. FACE PLATE

REMOVAL:

1. Remove screw (A).
2. Tilt bottom of face plate slightly away from machine and lift face plate from vibrating bracket (ecc.) screw (B).

REPLACEMENT:

1. Replace face plate to fit over vibrating bracket (ecc.) screw (B).
2. Replace and tighten screw (A).

2. ARM TOP COVER

REMOVAL:

1. Remove screws (C) and (D).
2. Remove arm top cover.

REPLACEMENT:

1. Align arm top cover to arm and tighten screws (C) and (D).



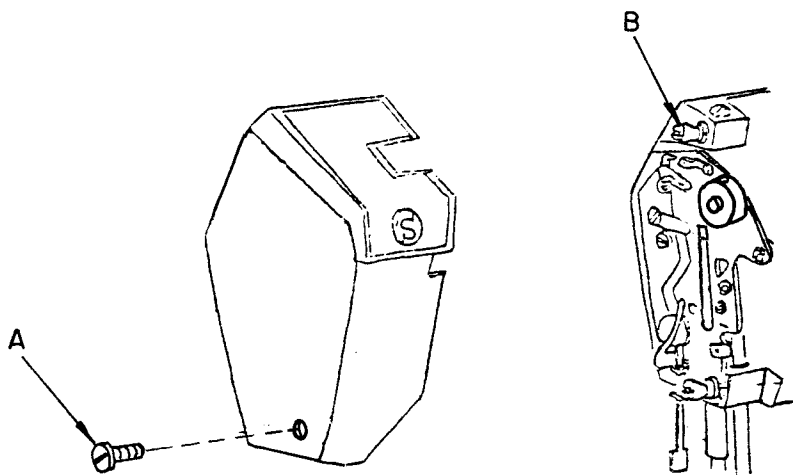


Fig. 1

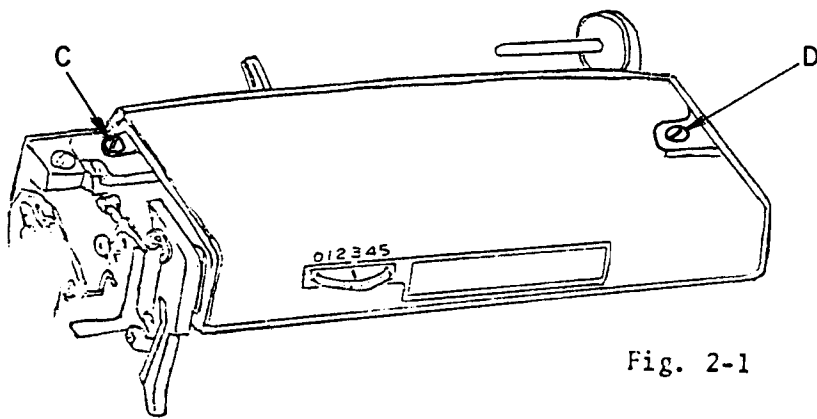


Fig. 2-1

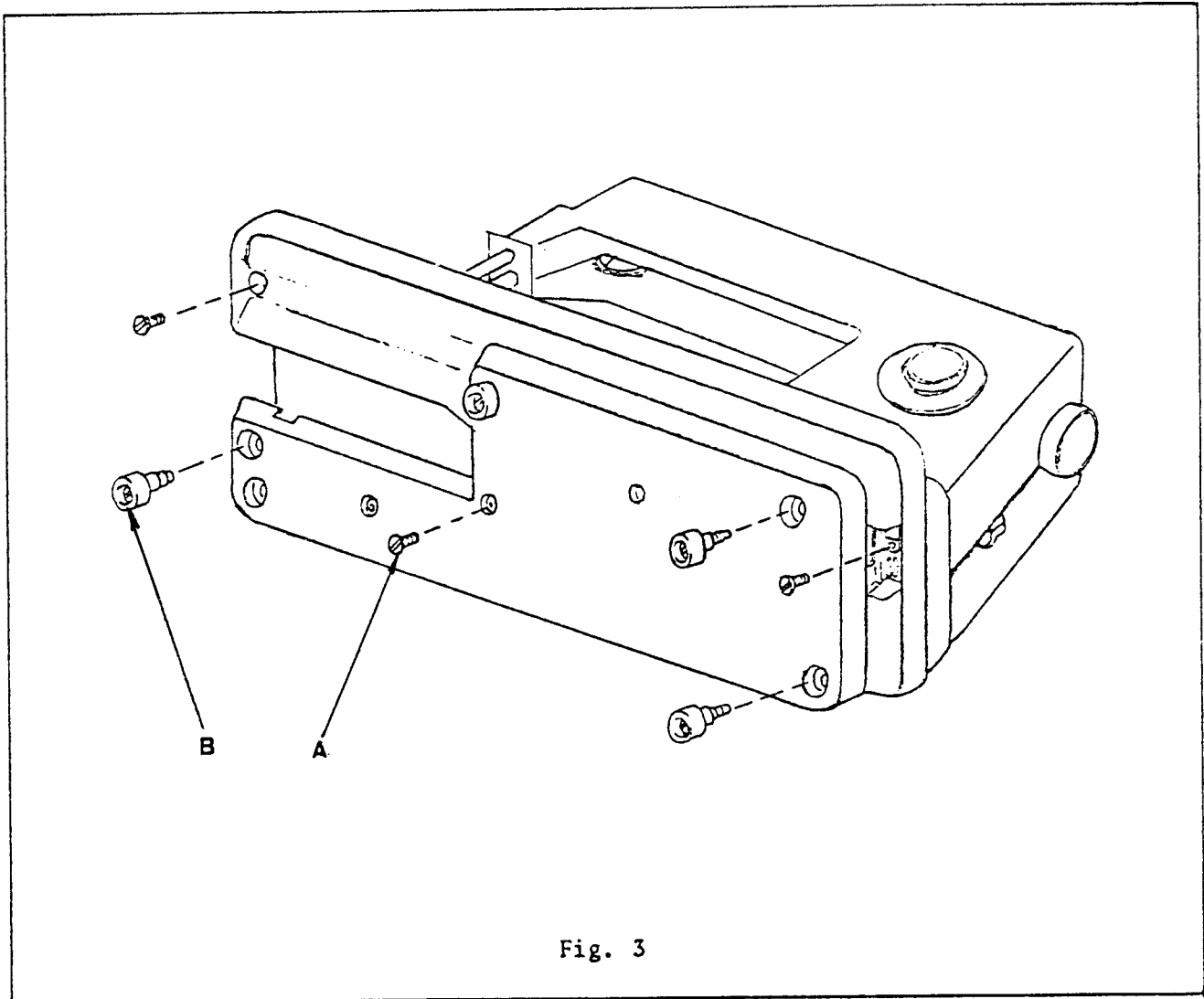


Fig. 3

3. BOTTOM COVER

REMOVAL:

1. Lay machine on its back on a soft cloth, remove three screws (A) and three cushions (B).
2. Draw bottom cover off the machine.

NOTE: If work is to be done on machine, mount the three bed cushions and screws on the legs of machine to avoid resting the machine on the motor when machine is in the upright position.

REPLACEMENT:

Replacement is the same as removal but in reverse order.

#### 4. HANDWHEEL

##### REMOVAL:

1. Remove arm top cover assembly.
2. Turn handwheel toward front of machine until screw (A) is visible. (Fig. 4).
3. Remove set screw (A) from handwheel.
4. Pull handwheel straight out.

##### REPLACEMENT:

1. Insert handwheel key (B) in sprocket keyway (C).
2. Replace and tighten screw (A) in handwheel. Do not overtighten screw.
3. Replace arm top cover assembly.

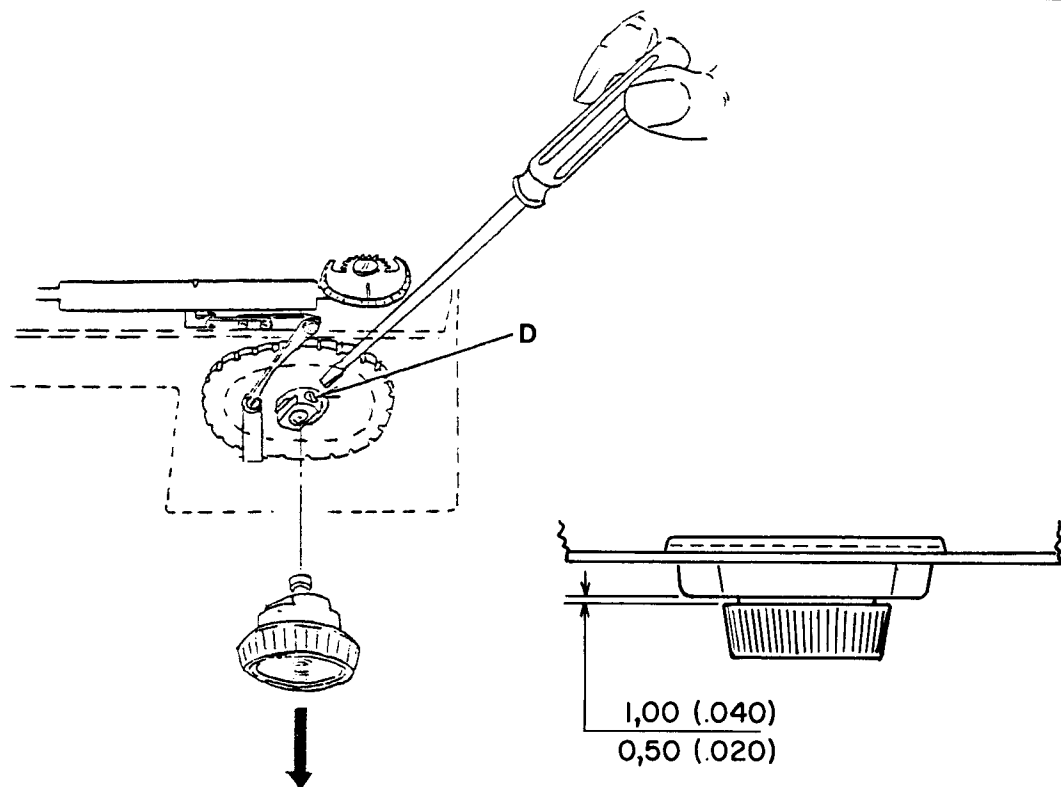
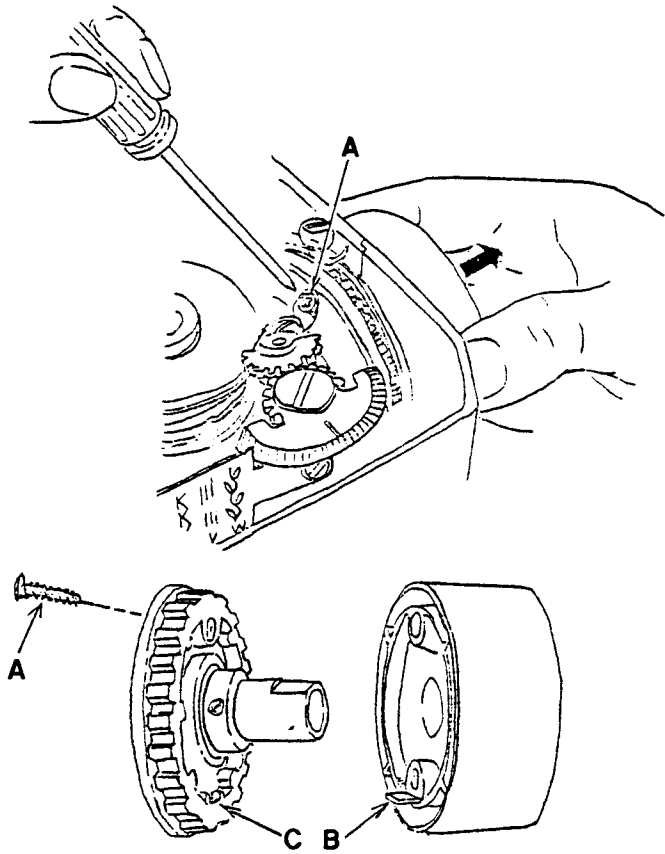
#### 5. PATTERN SELECTOR DIAL

##### REMOVAL:

1. Remove arm top cover assembly.
2. Turn dial until screw (C) is visible from top of arm and loosen screw (C).
3. Pull pattern selector dial straight out.

##### REPLACEMENT:

1. Insert pattern selector dial.
2. Tighten screw (C) making sure its end is located in the recessed portion of pattern selector dial insert. There should be a clearance of .020" - .040" (0,5 mm - 1,0 mm) between the surfaces of the pattern selector dial and the disc follower releasing dial.
3. Replace arm top cover assembly.



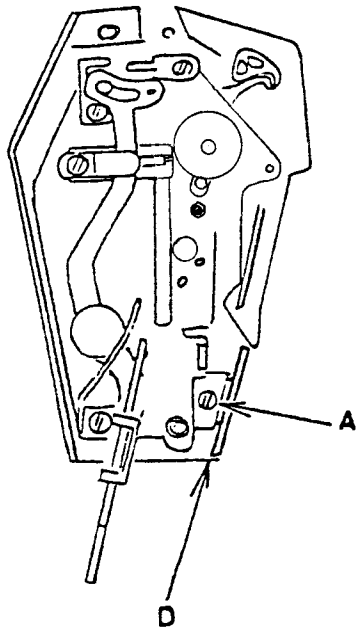


Fig. 6-2

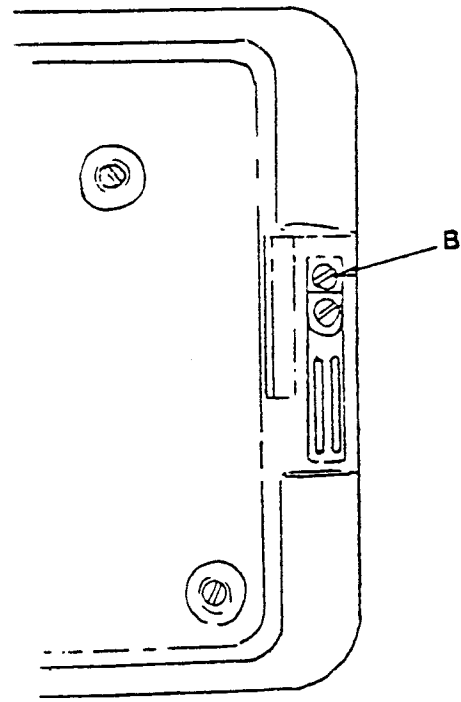


Fig. 6-1

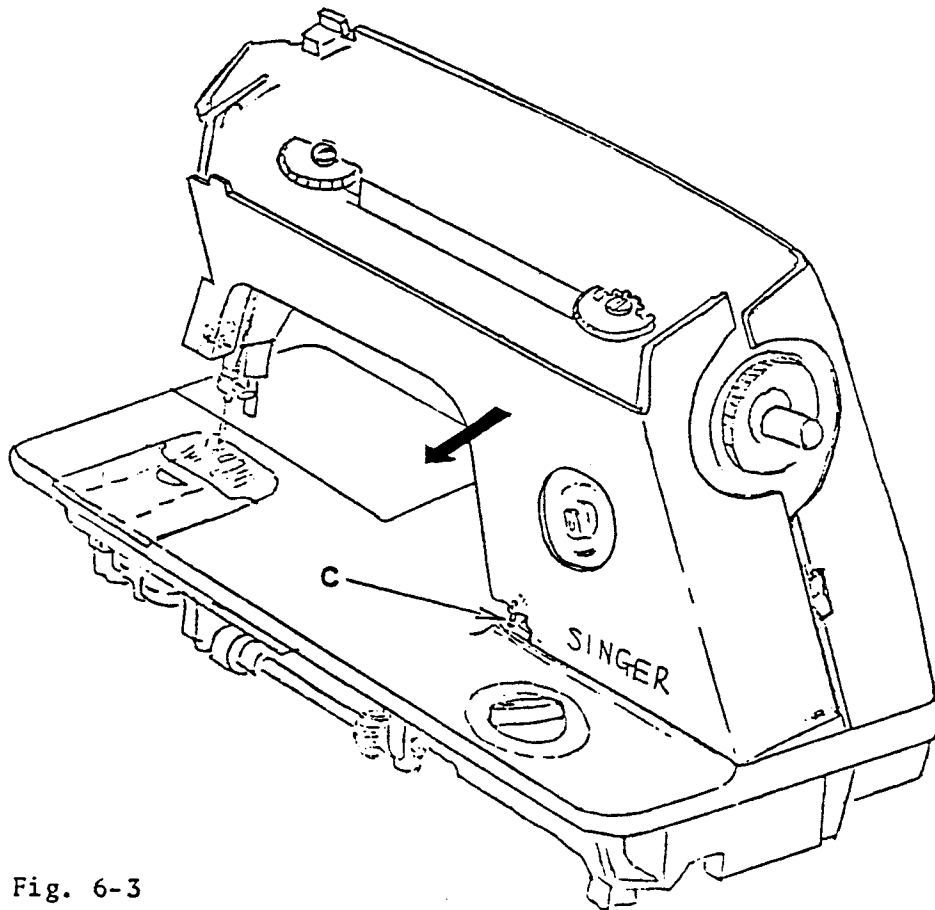


Fig. 6-3

6. ARM FRONT COVER

REMOVAL:

1. Remove face plate, arm top cover and bottom cover.

NOTE: Arm front cover screw (B), Fig. 6-1, can be removed without removing the bottom cover if "quick-driver" is available at hand.

2. Remove handwheel. (Handwheel should be removed to prevent it from being marred when removing front cover.
3. Remove pattern selector dial.
4. Remove screw (A) from inside needle head end. (Fig. 6-2).
5. Remove screw (B) at underside of bed at handwheel end.
6. Grasp front cover with both hands and tilt it to clear needle thread tension dial, draw cover off toward the front of machine and unlock cam follower release connecting rod.

REPLACEMENT:

Replacement is the same as removal except in reverse order.

Be sure to:

- a. Place front cover with its guiding hole over guide pin (C) in bed. (Fig. 6-3).
- b. Loop of cam follower release connecting rod must be toward the front of the machine.

## 7. STITCH LENGTH DIAL RING

### REMOVAL:

1. Place vinyl, leather or cloth on bed to protect finish. Rest screwdriver on bed and place blade in recess (A) provided and lift to free dial ring. Note, the locating pin on the underside of the dial ring must be inserted into the corresponding hole in the bed. (Fig. 7).
2. Pick ring straight up.

### REPLACEMENT:

1. Align locating pin (B) with matching hole (C) in bed.
2. Press ring straight down on bed until it is firmly seated and locating pin is in hole.

## 8. BED SLIDE

### MACHINE SETTINGS:

1. Presser Bar: Raised
2. Needle Bar: At highest position

### REMOVAL:

1. Remove throat plate.
2. Lift bed slide end (A) and pull out toward rear of machine. (Fig. 8-1).

### REPLACEMENT:

1. Using a screwdriver, insert both ends of bed slide spring in groove provided on bed slide and pull bed slide toward front of machine into correct position. (Fig. 8-2).
2. Replace throat plate.



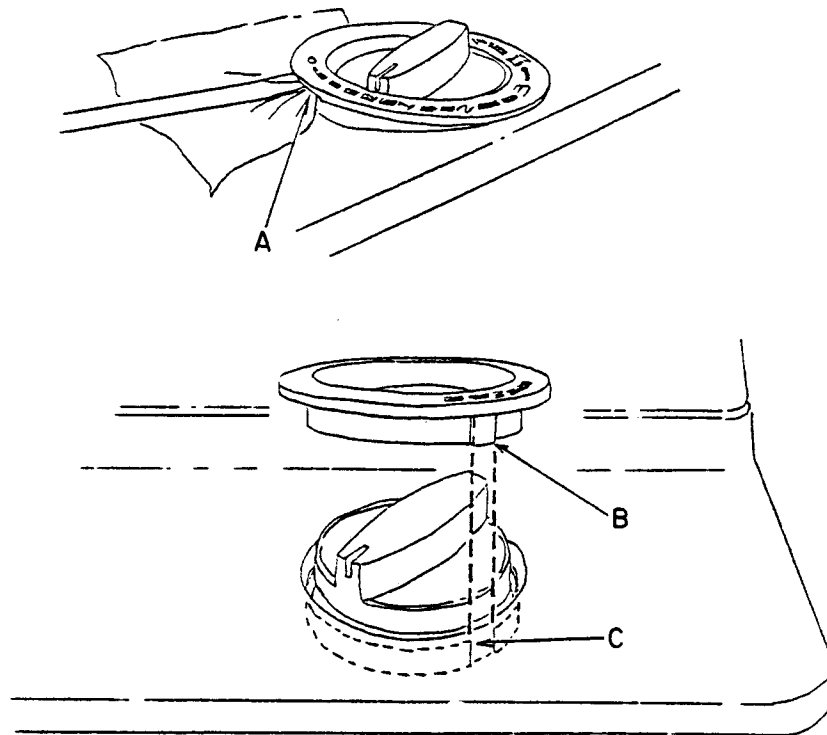


Fig. 7

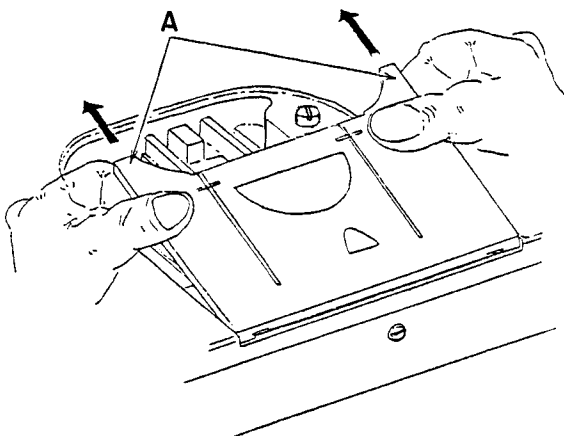


Fig. 8-1

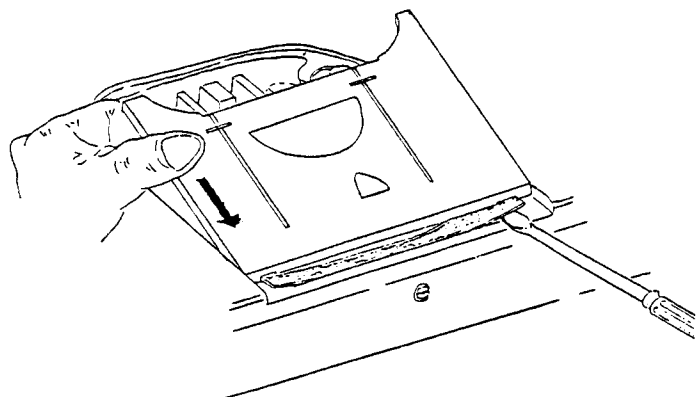


Fig. 8-2

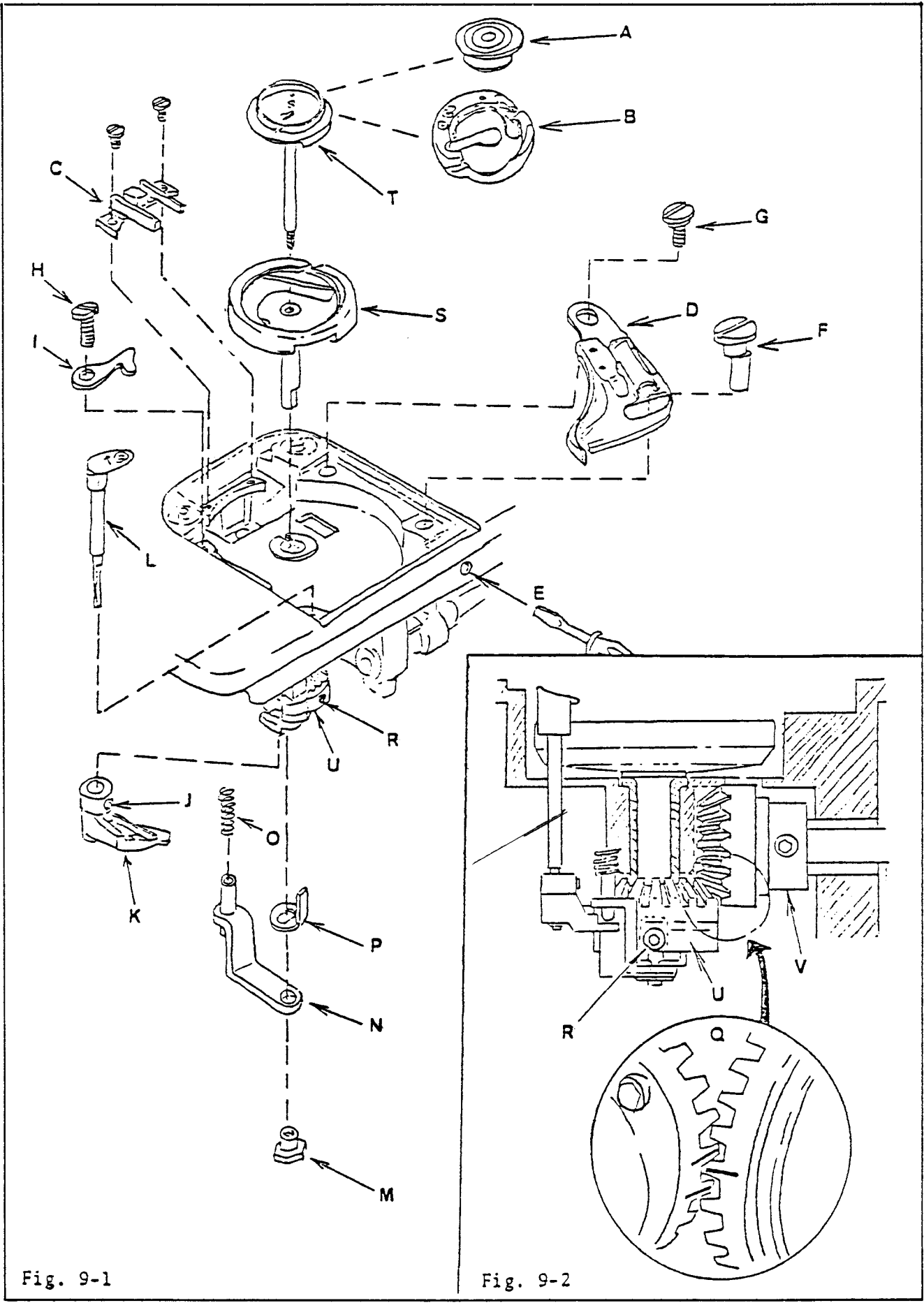


Fig. 9-1

Fig. 9-2

9. ROTATING HOOK

REMOVAL:

1. Remove bottom cover from machine.
2. Remove needle, presser foot, throat plate and bed slide.
3. Remove bobbin (A) and bobbin case (B).
4. Remove feed dog (C).
5. Remove rotating hook bobbin case cushion spring bracket assembly (D).
  - a. Loosen eccentric stud set screw (E).
  - b. Pull cushion spring bracket eccentric stud (F) up and out of machine.
  - c. Remove cushion spring bracket hinge screw (G).

NOTE: Be careful not to lose cushion spring bracket lock slide spring.

6. Turn position finger set screw (H) (left hand thread) CLOCKWISE to unscrew. Remove set screw (H) and position finger (I). (Fig. 9-1).
7. Loosen set screw (J) and remove actuating lever shaft cam (K) and actuating lever shaft (L).
8. Turn bobbin driver locator nut (M) (left hand thread) CLOCKWISE to unscrew. Remove nut (M), bobbin winder lifting bracket (N), actuating lever shaft cam follower spring (O) and bobbin driver locator (P).
9. Mark bevel gears (Q). Mark two teeth on one gear and one tooth on other gear where teeth mesh. (Fig. 9-2).
10. Loosen set screw (R) in rotating hook bevel gear (U) and remove hook (S) and bobbin driver (T).

REPLACEMENT:

1. Replace hook (S) and turn until flat on hook shaft is aligned with set screw (R) in bevel gear (U).
2. Align gears (Q) using marks on teeth to assure proper mesh.

9. ROTATING HOOK (Continued)

3. Hold hook down and bring hook shaft gear (U) in mesh with hook driving gear (V). Tightens set screw (R) in hook shaft gear (U).
4. Run machine and observe inside diameter of hook for runout. There should be no observable hook wobbling; this impression is given when the hook shaft is not perpendicular to the hook face. If runout is observed, replace the hook with a new one.
5. Check for correct hook timing. If hook timing is incorrect, re-time hook and feed. (Refer to Hook and Feed Timing procedure).
6. If gears are noisy, recheck gear mesh.
7. Replace bobbin driver (T). Be sure the bobbin driver is firmly seated on the bottom of rotating hook.
8. Replace bobbin locator (P). Be sure the oblong shaped portion at lower end of bobbin driver (T) is inserted in the mating hole in locator (P) and the tab of locator (P) is in the hole in bevel gear (U).
9. Replace actuating lever shaft cam follower spring (O), bobbin winder lifting bracket (N) and bobbin winder locator nut (M). Turn locator nut (M) COUNTERCLOCKWISE to tighten.
10. Replace actuating lever shaft (L) and actuating lever shaft cam (K) and set bobbin driver height. (Refer to Bobbin Driver Height Setting procedures).
11. Replace position finger (I) and turn set screw (H) COUNTERCLOCKWISE to tighten. Replace bobbin case cushion spring bracket assembly (D), cushion spring bracket hinge screw (G) and cushion spring bracket eccentric stud (F). Replace feed dog (C) and bobbin case (B), and adjust thread clearance. (Refer to Bobbin Case Thread Clearance adjustment procedures).
12. Replace throat plate. Check setting of feed dog in relation to throat plate slots.
13. Replace bed slide.
14. Run machine and check bobbin winding and thread cast off.

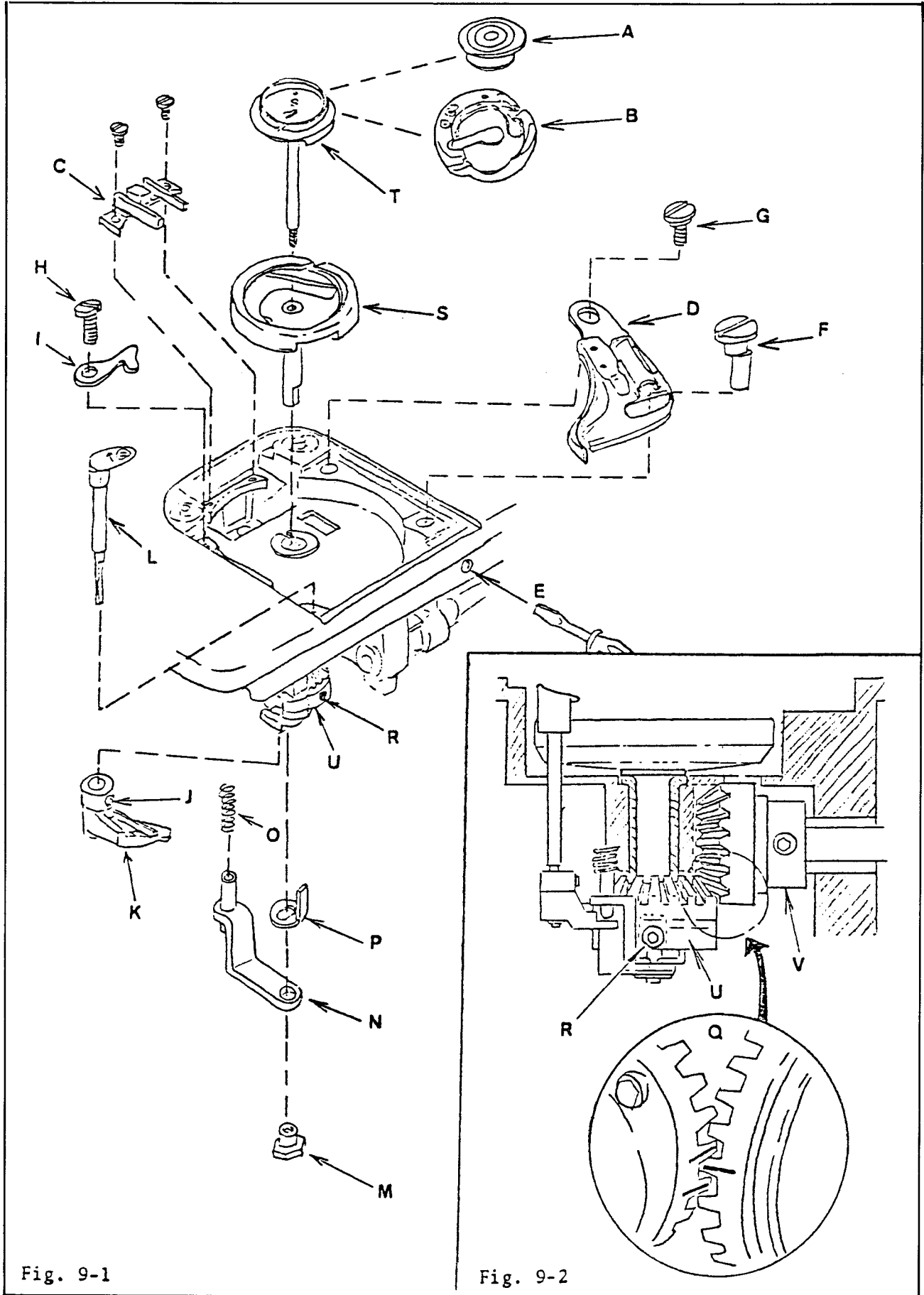


Fig. 9-1

Fig. 9-2

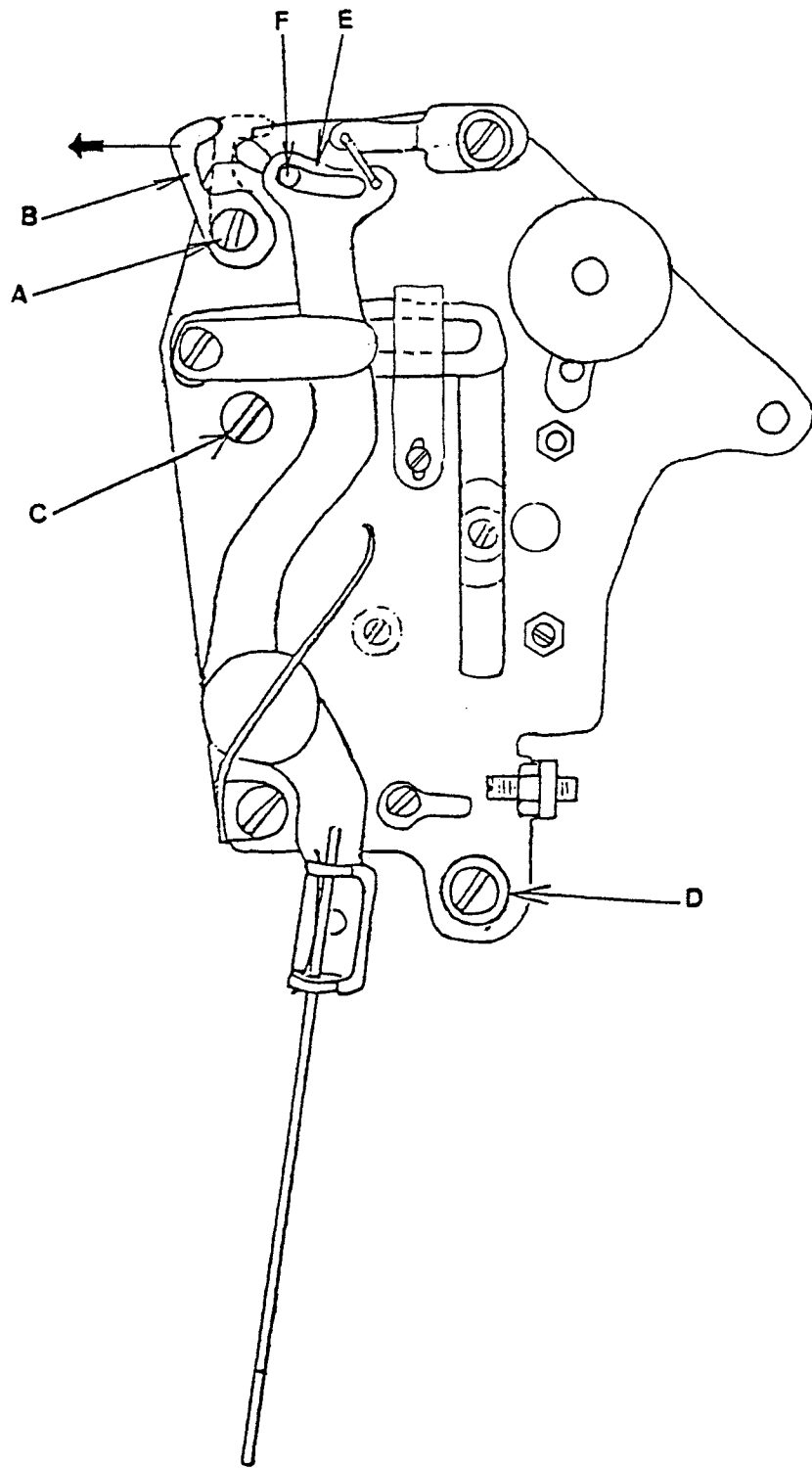


Fig. 10

## 10. HEAD END PLATE ASSEMBLY

### REMOVAL:

1. Remove face plate.
2. Loosen screw (A) holding the buttonholer kick-out shaft supporter (B) and swing supporter (B) to the left. (Fig. 10).
3. Remove screws (C) and (D) holding the head end plate assembly.
4. Carefully turn and tilt head end plate until buttonholer kick-out shaft (F) is disengaged from the slot in buttonholer kick-out shaft tripping lever (E).

CAUTION: Do not lose spacers between face plate and casting when removing screws (C) and (D).

### REPLACEMENT:

Replacement is the same as removal except in reverse order.

NOTE: Check for free operation of buttonholer kick-out shaft (F) after securing kick-out shaft supporter (B) in position.

## 11. NEEDLE BAR

### REMOVAL:

1. Remove face plate.
2. Remove needle bar latch carrier spring (A).
3. Remove needle and needle clamp (B) taking care not to lose needle clamp gib (C). (Fig. 11-2).
4. Loosen needle bar latch carrier screw stud (D) and pull needle bar up and out of machine. (Fig. 11-1).

### REPLACEMENT:

1. Replace needle bar.
2. Replace needle clamp gib (C) and needle clamp (B). See Fig. 12-1.
3. Reset:
  - a. Needle bar height with cut-out for needle clamp gib facing front of machine and groove for needle facing handwheel end of machine. See Fig. 12-2.
  - b. Correct needle location.
4. Check that needle bar latch engages properly.
5. Replace face plate.



Fig. 11-1

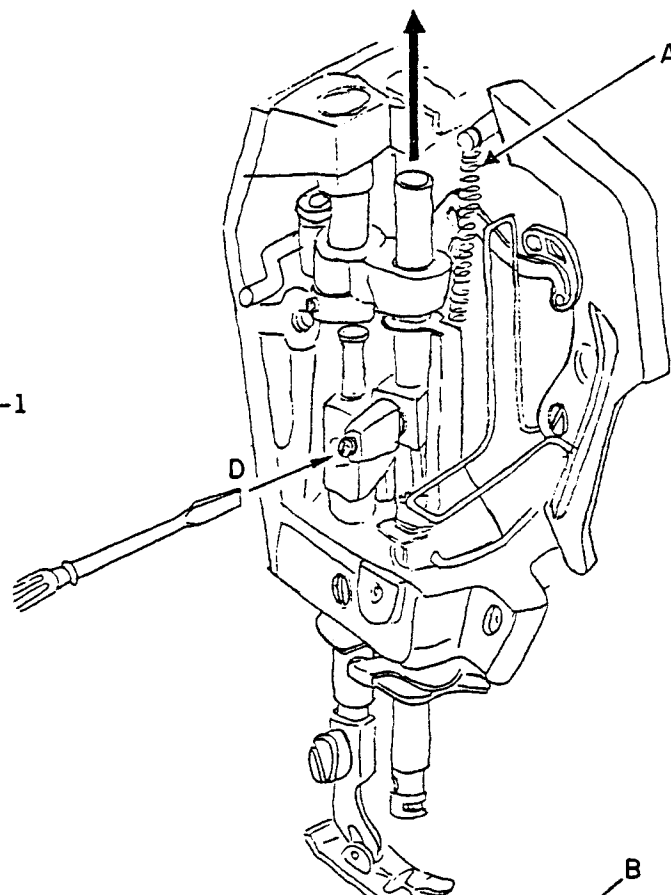


Fig. 11-2

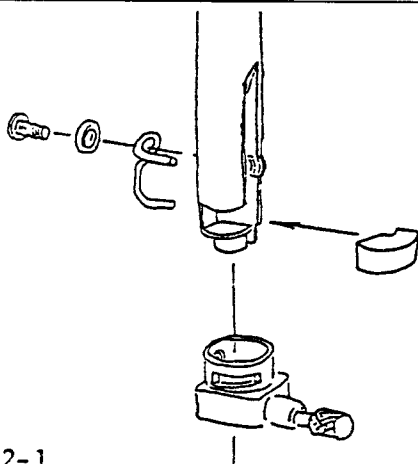
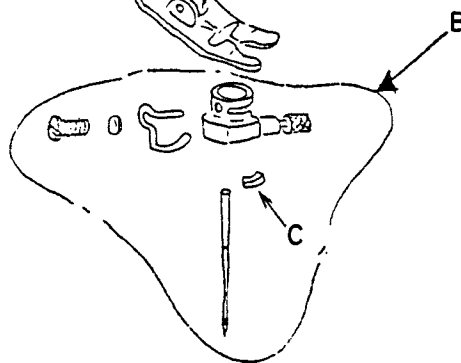


Fig. 12-1

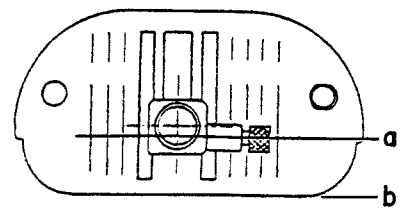


Fig. 12-2

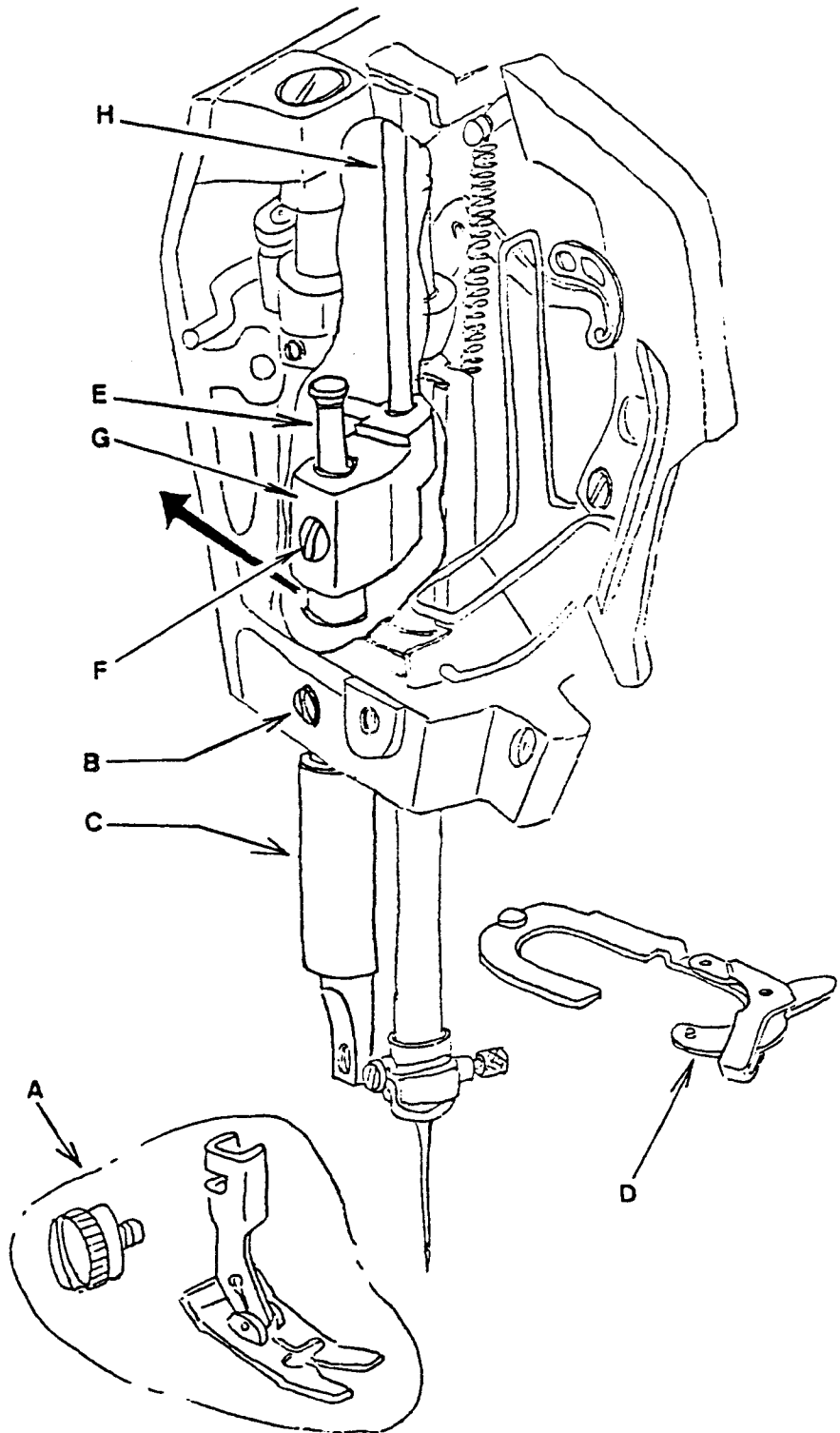


Fig. 13

## 12. PRESSER BAR

### REMOVAL:

1. Remove face plate.
2. Remove presser foot thumb screw and presser foot (A).
3. Remove head end plate assembly.
4. Loosen set screw (B) and pull presser bar bushing (C) down a little.
5. Turn handwheel until needle bar is at its lowest position. Pull snubber (D) toward front of machine and swing it to the right to clear the needle bar; then push snubber toward rear of machine and off the presser bar bushing.
6. Remove pressure regulating extension pin (E). Loosen presser bar guide bracket set screw (F) and remove presser bar guide bracket (G) and tension releasing pin (H).
7. Pull presser bar up, and bushing (C) down and out of machine.

### REPLACEMENT:

1. Replacement is the same as removal except in reverse order.

NOTE: Be sure the locating boss on snubber (D) is in the locating hole in the arm.

2. Adjust presser bar height, alignment and pressure and check. Refer to Presser Bar Height, Alignment and Pressure adjustment procedures.

13. TENSION MODULE

REMOVAL:

1. Remove face plate, arm top cover assembly and front cover.
2. Remove needle bar latch carrier spring (A) and releasing lever spring (B). (Fig. 14).
3. Remove lower tension mounting screw (C).
4. Remove the two upper tension mounting bracket screws (D).
5. Remove tension regulating slide plate supporting plate (F); then lift off tension module.

REPLACEMENT:

1. Replace tension module, tension regulating slide plate supporting plate (F) then temporarily tighten two screws (D).
2. Tighten screw (C), then securely tighten two screws (D).
3. Replace needle bar latch carrier spring (A) and releasing lever spring (B).
4. Replace front cover, arm top cover assembly and face plate.

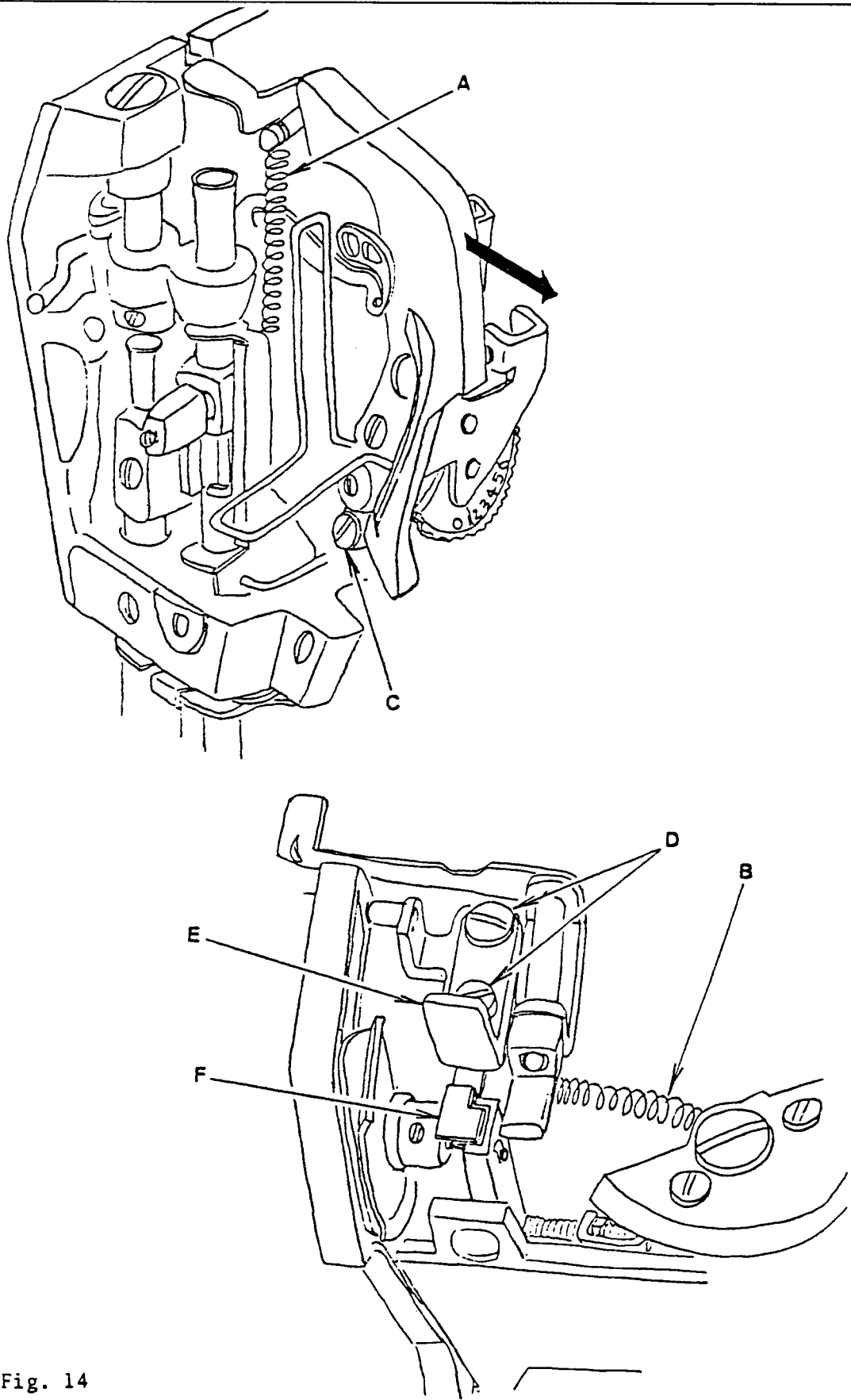


Fig. 14

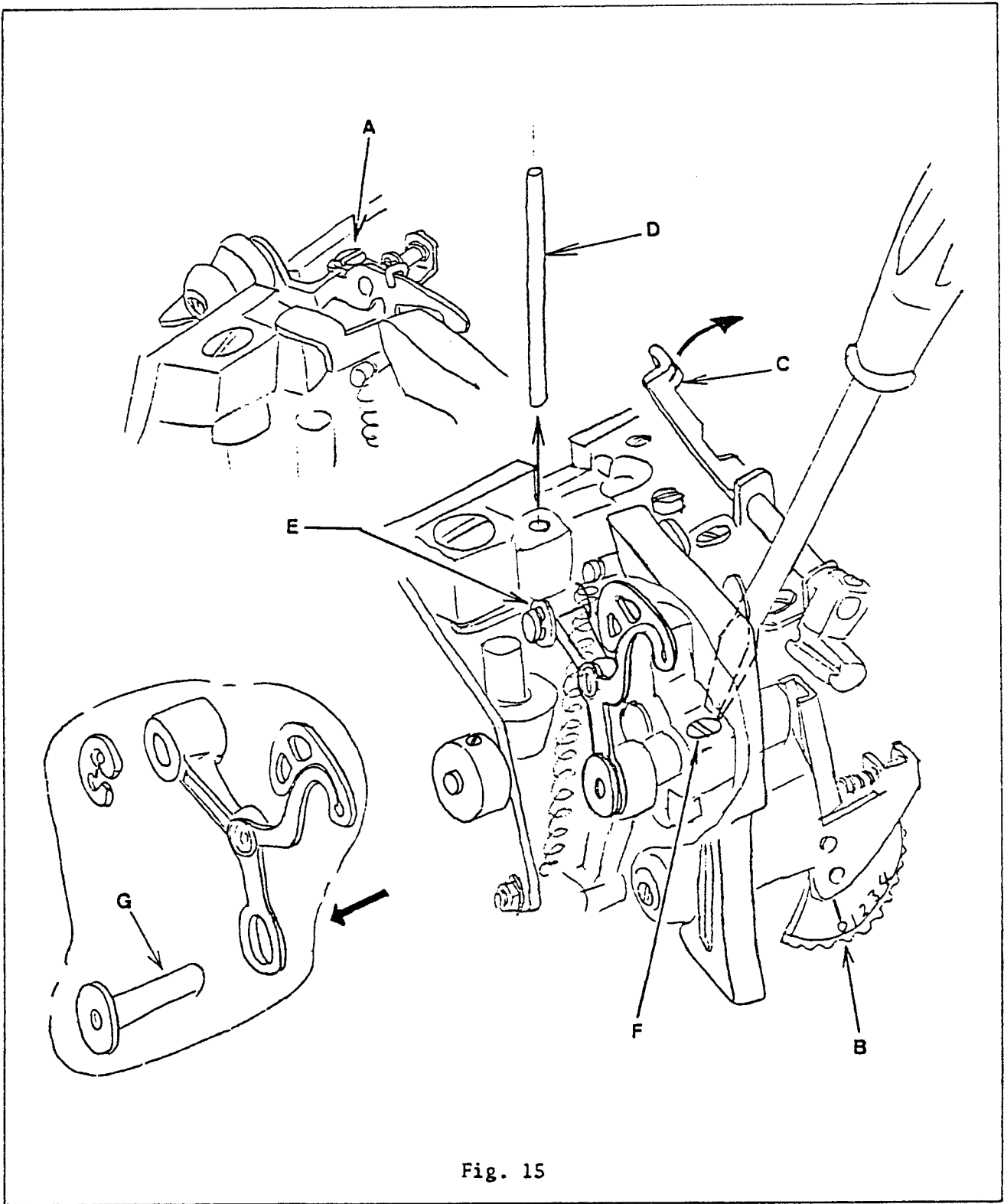


Fig. 15

14. TAKE-UP LEVER ASSEMBLY

REMOVAL:

1. Remove face plate and arm top cover assembly.
2. Loosen screw (A). (Fig. 15).
3. Set tension dial (B) to "0", swing tension release actuating lever (C) up and to the right (Fig. 15). Remove retaining ring (H) and pull tension releasing pin (D) up and out of machine.
4. Remove retaining ring (E) from take-up lever link hinge stud.
5. Loosen needle bar crank shaft set screw (F).
6. Hold needle bar connecting link and ease out thread take-up stud (G) and take-up lever assembly.

REPLACEMENT:

Replacement is the same as removal except in reverse order.

NOTE: Care should be taken in assembling so that the take-up lever would function smoothly without play.

15. BELT IDLER PULLEY BRACKET ASSEMBLY

REMOVAL:

1. Remove all covers.
2. Remove idler pulley bracket screw (B) and washer (C).
3. Slip timing belt (D) off from idler pulley. Pull idler pulley bracket (A) down and tilt upper end toward front of machine, and lift it up and out of machine.

REPLACEMENT:

1. Replacement is the same as removal except in reverse order.
2. Reset:
  - a. Belt tension.
  - b. Hook and feed timing.
  - c. Hook-to-needle relationship.



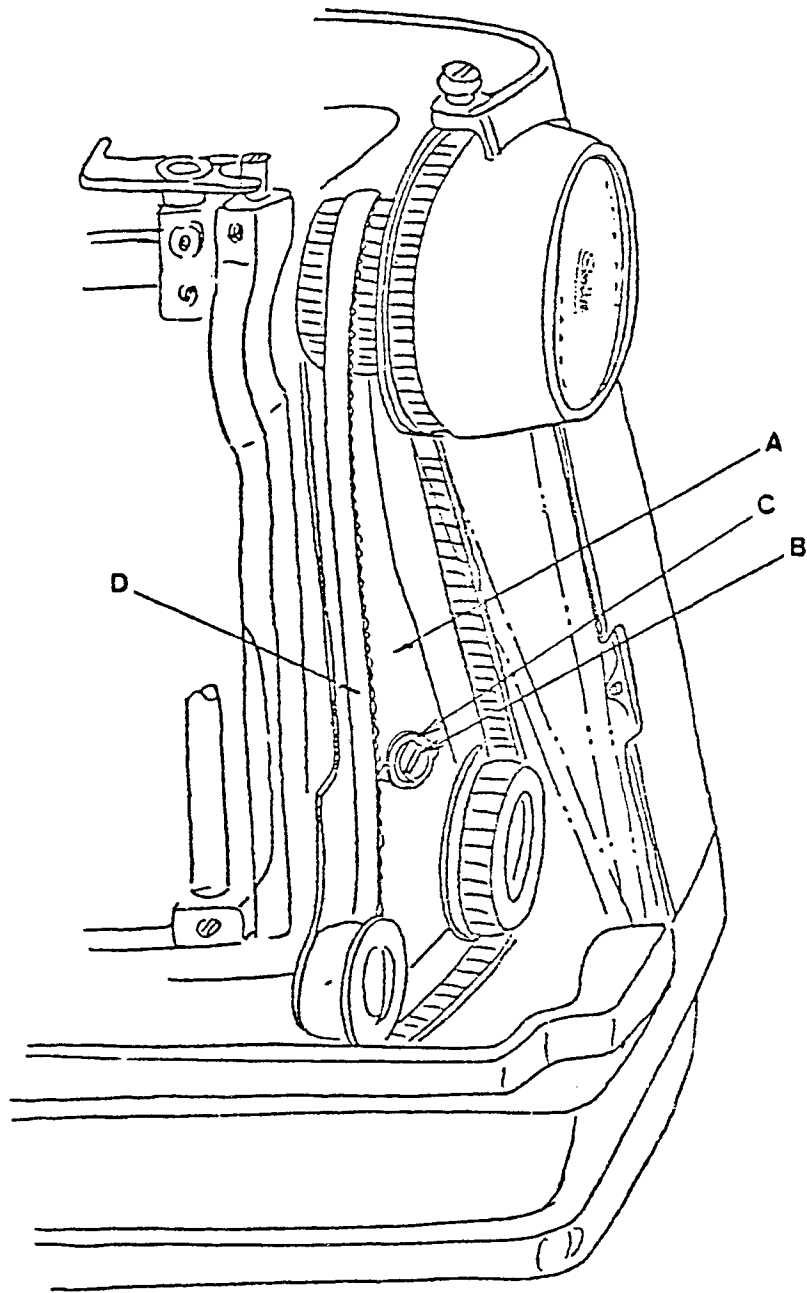


Fig. 16

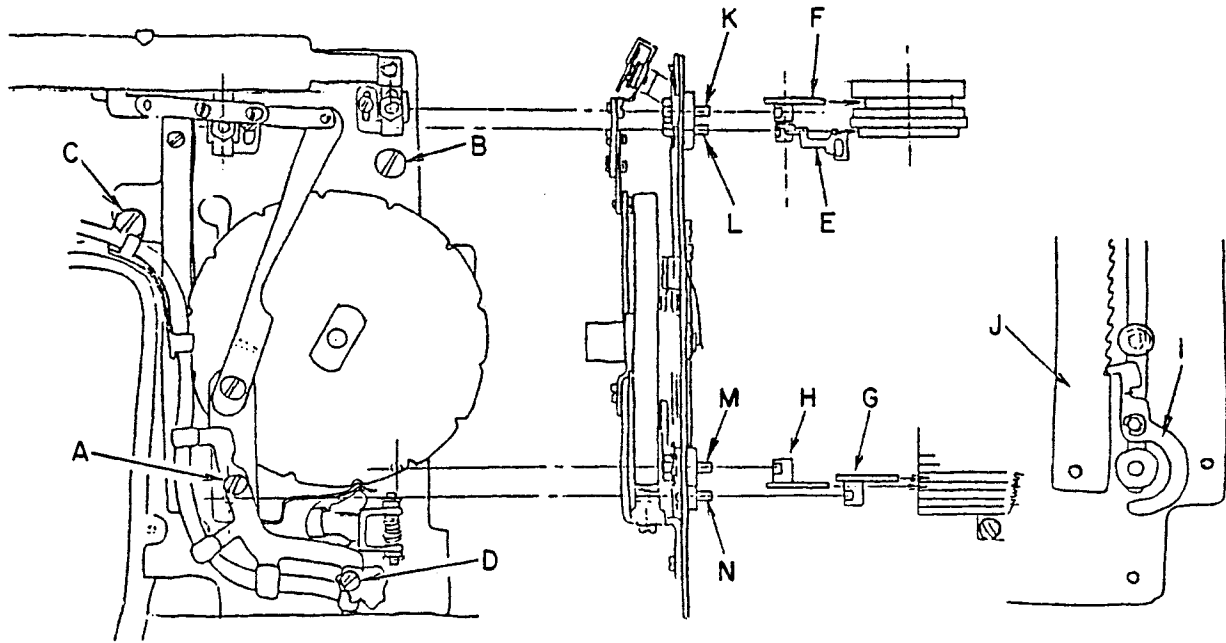


Fig. 17-1

Fig. 17-2

Fig. 17-3

## 16. PATTERN SELECTOR ASSEMBLY

### REMOVAL:

1. Remove face plate, arm top cover assembly and front cover.
2. Remove light cord harness bracket screw (A).
3. If disc follower actuating plate or pattern indicator actuating lever is obstructing access to screw (B), release (manually) pattern selector mechanism and turn pattern selector cam until screw (B) is accessible. (Fig. 17-1).
4. Remove three screws (B), (C), and (D).
5. Push cord and harness bracket to the left to be out of the way and ease pattern selector assembly away from arm.

### REPLACEMENT:

1. Lay machine on its back on a cloth (to protect finish).
2. Set buttonhole needle position follower (E) and buttonhole feed control follower (F) at their lowest positions. (fig. 17-2).
3. Set needle position follower (G) on fifth cam (plastic) from bottom of cam stack, and feed control follower (H) on fourth cam (steel) from bottom of cam stack. (Fig. 17-2).

CAUTION: It is possible at this time for needle position follower (G) to drop down to the eccentric collar, disengaging its return spring from the needle bar driving arm plate. If this occurs, be sure to relocate spring and follower.

4. Turn pattern selector cam until pattern indicator is set on (leaf pattern). Check that selector positioning pawl (I) is in the lowest notch of rack (J). (Fig. 17-3).
5. Carefully lower pattern selector assembly on to arm casting, making sure follower selector studs (K), (L), (M) and (N) properly engage slots in follower hubs. (Fig. 17-2).

NOTE: When studs are properly engaged, pattern selector assembly seats properly on the arm without forcing.

16. PATTERN SELECTOR ASSEMBLY (Continued)

6. Replace screws (C) and (D) and tighten temporarily.

NOTE: Be sure to secure harness bracket when replacing screw (C).

7. Turn pattern selector cam until hole in arm casting for screw (B) is visible.
8. Replace screw (B) and tighten. Tighten screws (C) and (D).
9. Replace light cord harness bracket and secure with screw (A).
10. Replace pattern selector dial temporarily and check pattern selector for proper operation. Check that buttonhole needle position and buttonhole feed control followers move freely under their spring pressure to their storage positions when not in use. If followers are binding, make sure that their lock nuts are not over-tightened.
11. Check, and if necessary, adjust needle position and feed control follower heights.
12. Replace front cover, arm top cover assembly and face plate.

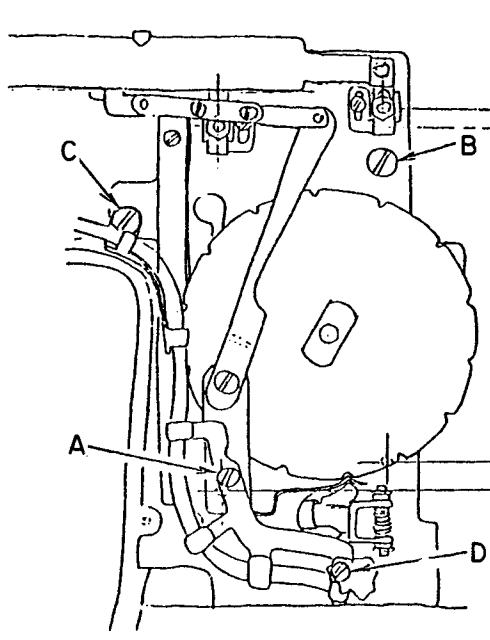


Fig. 17-1

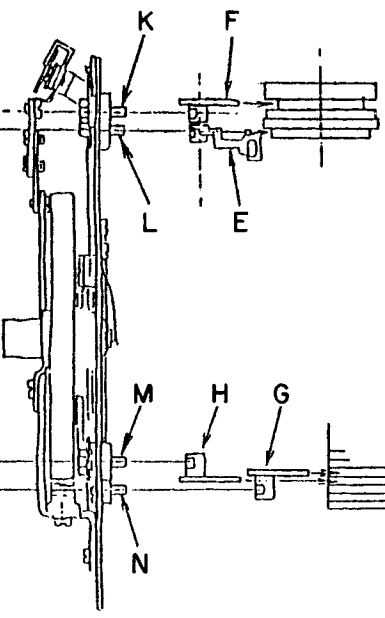


Fig. 17-2

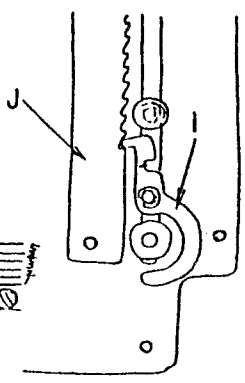


Fig. 17-3

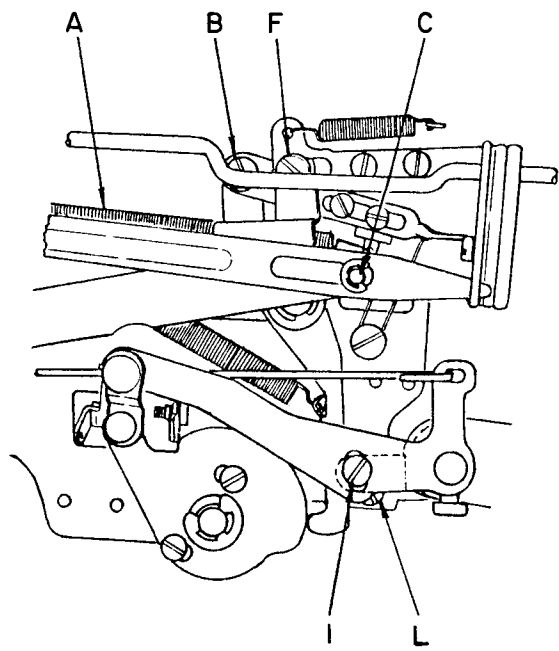
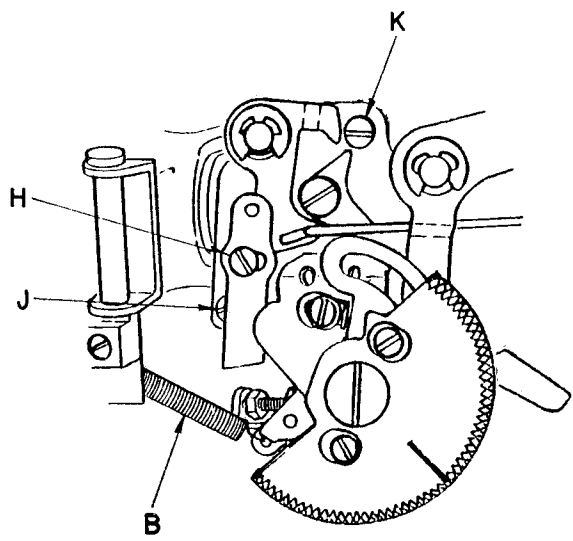


Fig. 18

17. BIGHT CONTROL DIAL BRACKET ASSEMBLY

REMOVAL:

1. Remove face plate, arm top cover assembly and front cover.
2. Remove needle bar driving arm return spring (A). Disengage releasing lever return spring (B).
3. Remove needle bar driving arm retaining ring (C).
4. Remove needle position releasing lever link hinge screw (F), needle bar driving arm plate disengaging link hinge screw (G), needle bar releasing lever extension plate set screw (H) and crank shaft lever extension plate screw (I).
5. Remove three bight control dial bracket screws (J), (K) and (L). To remove screw (L), set stitch length dial at "0" and push crank shaft lever back away from screw; then unscrew screw (L) while holding back the crank shaft lever.
6. Carefully lift bight control dial bracket assembly out of machine.

REPLACEMENT:

1. Replacement is the same as removal except in reverse order.

18. MOTOR

REMOVAL:

1. Remove bottom cover. Disconnect terminals (A) connected to sewing light harness.
2. Loosen lock nut (C) on eccentric stud (B).
3. Turn eccentric stud (B) for maximum looseness of motor belt.
4. Set power switch of OFF position.
5. Disengage switch actuating bracket (D), which is connected to power switch with switch actuating lever rod (E), from motor switch.
6. Loosen screw (F) in bed holding left hinge pin (G). Ease pin (G), to the left, away from motor housing until it disengages from housing.
7. Position motor to allow belt to be slipped off motor pulley.

CAUTION: DO NOT PRY BELT OFF PULLEY WITH A SCREWDRIVER OR OTHER SHARP OBJECT. The belts have glass fibers which crack, causing belt failure, when belts are pried over a pulley. Also, for the same reason, belts must not be subjected to sharp bends between the fingers.

8. Remove motor from machine.

REPLACEMENT:

1. Check that urethane sleeves are in place at left and right hinge holes in motor case. Check that urethane motor adjusting block is in place in its slot in motor housing.
2. Position motor to allow belt to be slipped on to motor pulley. Set motor in its cavity in bed, pushing it to the right as far as it will go. Then push left hinge pin (G) into left urethane sleeve in motor housing and tighten screw (F).
3. Screw in eccentric stud (B), making sure that its tip properly engages urethane motor adjusting block.
4. Set power switch to OFF position and motor switch to its lowest position. Engage switch actuating bracket (D) with motor switch.



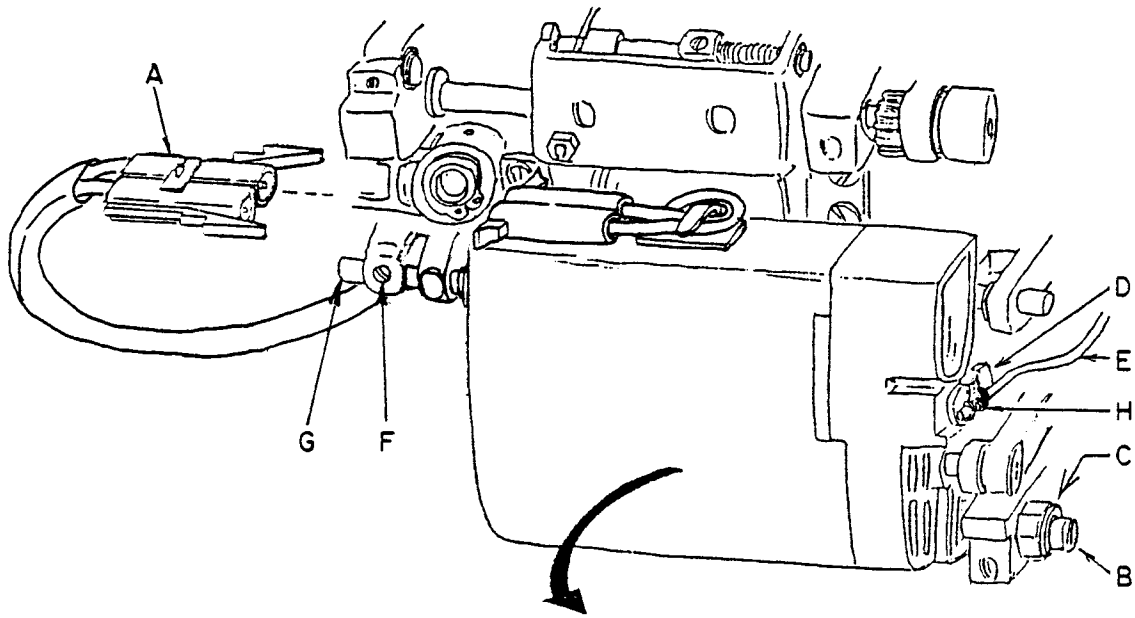


Fig. 19

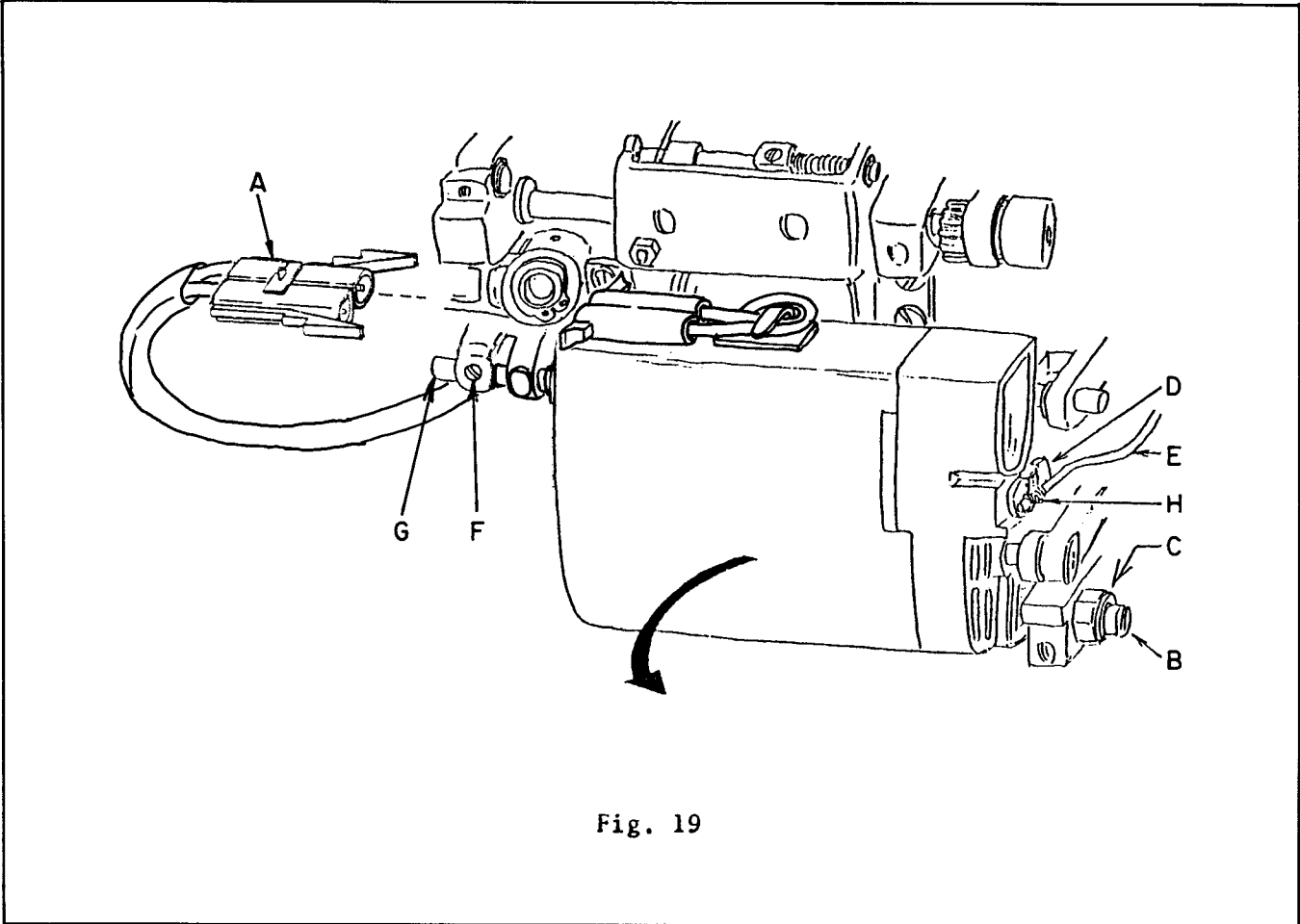


Fig. 19

18. MOTOR (Continued)

5. Connect plug (A) to terminals on sewing light harness. Refer to Electrical System.
6. Set machine for straight stitching and raise presser foot.
7. Set power switch to FAST (hare) position. Power machine, and turn eccentric stud (B) left or right to tighten belt (this will slow down machine). Turn eccentric stud (B) left or right to loosen belt until machine JUST attains highest speed.
8. Tighten lock nut (C).
9. With power switch in FAST (hare) position, check that switch on motor is in its highest (fast) position. If adjustment is necessary, move spring clip (H) up or down as required until the two switches are in corresponding positions.
10. Replace bottom cover.

## 19. SEWING LIGHT ASSEMBLY

### REMOVAL:

1. Remove face plate, arm top cover assembly, front cover and bottom cover.
2. Disconnect plug (A) from terminal on motor.
3. Remove motor from machine.
4. Remove screws (B), (C) and (D) holding sewing light harness brackets.
5. Remove light bracket clip (E).
6. Remove sewing light from machine.

### REPLACEMENT:

1. Attach light bracket to arm with clip (E).
2. Pass plug end of cord down through opening at right side of bridge of arm.
3. Secure sewing light harness brackets with screws (B), (C) and (D).
4. Check that sewing light cord does not bulge out. A bulging cord can interfere with pattern selection and proper seating of front cover after front cover is replaced.
5. Replace motor.
6. Connect plug (A) to terminal on motor.
7. Replace bottom cover, front cover, arm top cover assembly and face plate.

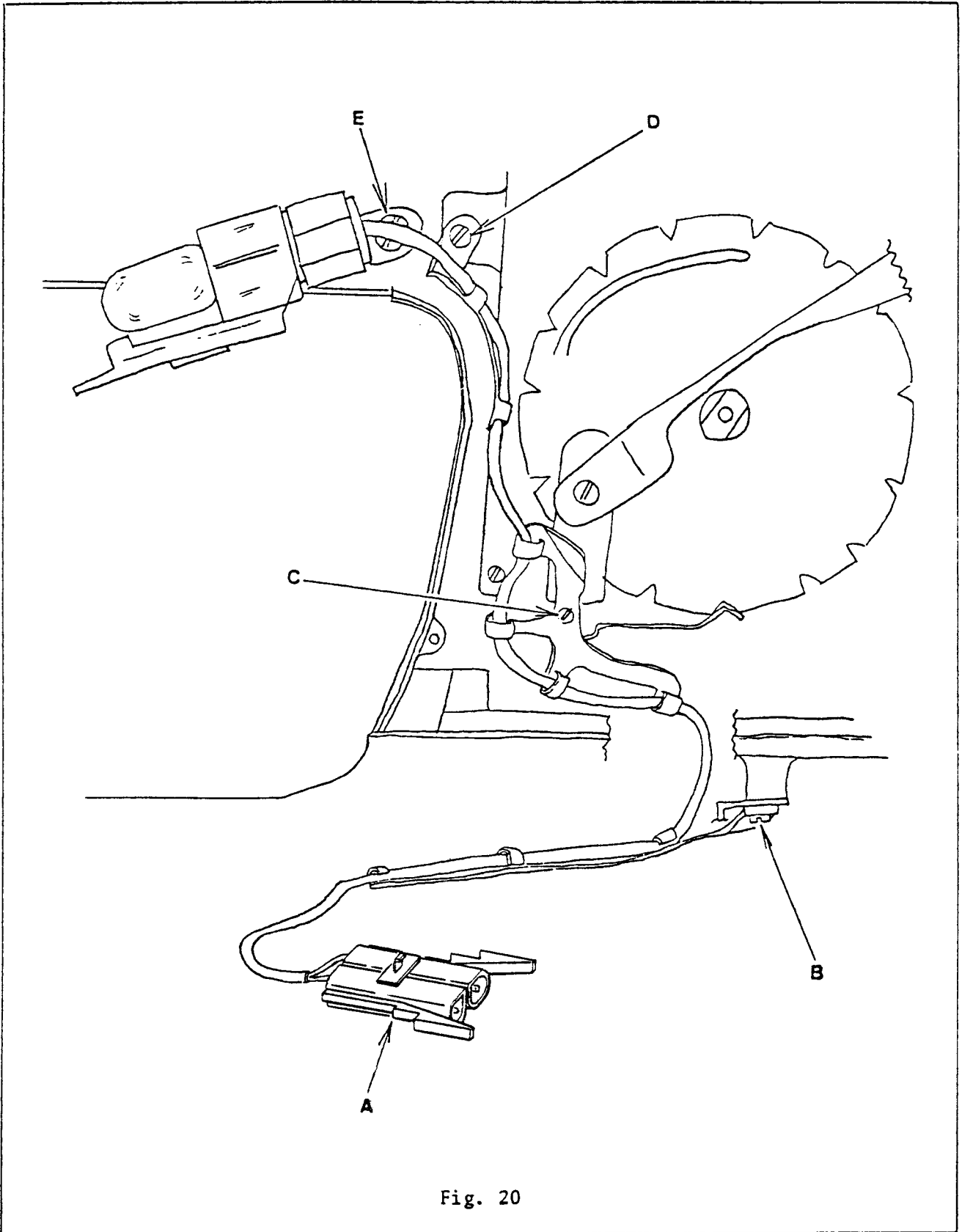


Fig. 20

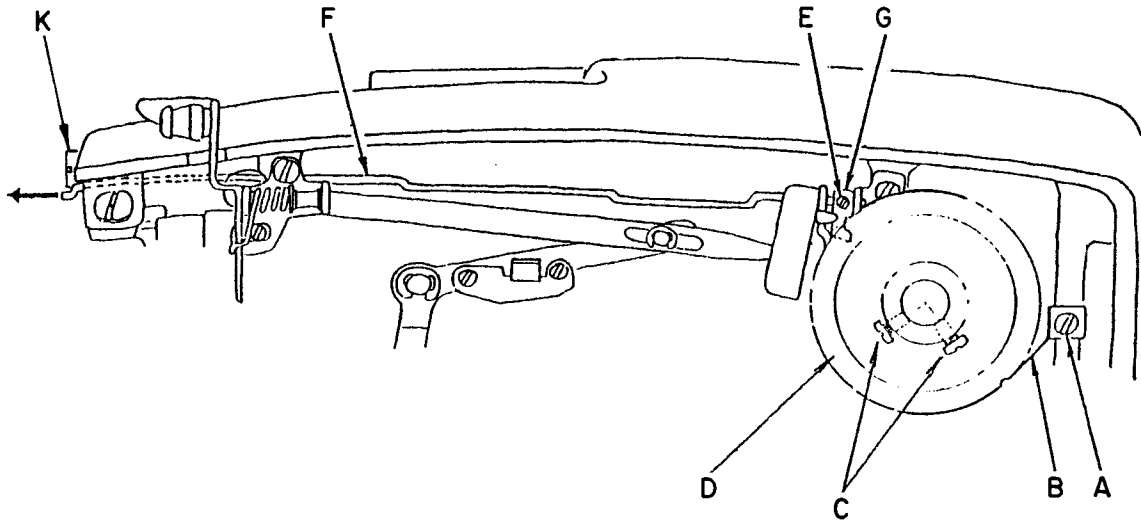


Fig. 23

20. BUTTONHOLER KICK-OUT SHAFT

REMOVAL:

1. Remove face plate and arm top cover assembly.
2. Loosen locking bracket screw (K) to unlock buttonhole kick-out shaft.
3. Unscrew buttonhole cam friction spring screw (A) and remove friction spring (B).
4. Loosen two set screws (C) holding the buttonhole cam driver.
5. Pull buttonhole cam assembly (D) up and out of machine.
6. Loosen screw (E) holding buttonhole pawl (G).
7. Slide buttonholer kick-out shaft (F) to the left and remove pawl (G) with screw (E).

REPLACEMENT:

1. Replace buttonholer kick-out shaft (F) with buttonhole pawl (G) and screw (E).
2. Replace locking bracket over buttonhole kick-out shaft and tighten locking bracket screw (K). Check for free operation of buttonholer kick-out shaft tripping lever.
3. Replace buttonhole cam assembly (D) and adjust height of buttonhole pawl (G). Adjust buttonhole cam play and buttonhole cam pendulum timing. Refer to adjustment procedures on Buttonhole Pawl Height, Buttonhole Cam Play and Buttonhole Cam Pendulum Timing.
4. Secure friction spring (B) to arm with screw (A) so that it is pressing against the buttonhole cam.
5. Replace face plate and arm top cover assembly.

21. NEEDLE BAR DRIVING ARM PLATE AND NEEDLE POSITION FOLLOWERS

REMOVAL:

1. Remove face plate and arm top cover assembly and front cover.
2. Remove pattern selector assembly.
3. Remove buttonholer kick-out shaft.
4. Remove retaining ring (A), and then remove buttonhole needle position follower spring (B) and buttonhole needle position follower (C).
5. Remove retaining ring (E) and needle position releasing lever link hinge screw (F); then lift needle position releasing lever link assembly (G) up and off needle bar driving arm plate hinge stud (D).
6. Remove link hinge screw (H) and turn needle bar driving arm plate disengaging link (I) 90 degrees to disengage it from needle bar driving arm plate (V).
7. Remove needle bar driving arm return spring (J) and retaining ring (K); then move needle bar driving arm (L) to the left.
8. Remove retaining rings (M), (N) and (O) from needle position follower shaft (T).
9. Loosen set screw (Q) in eccentric collar (P).
10. Loosen needle position follower shaft set screws (R) and (S).
11. Pull up and remove needle position follower shaft (T).
12. Remove needle bar driving arm plate hinge bracket (U) with needle bar driving arm plate (V) attached.

REPLACEMENT:

1. Position needle bar driving arm plate hinge bracket (U) and needle bar driving arm plate (V) in position to left of cam stack.
2. Push needle position follower shaft (T) down through hole in arm casting, upper hinge hole of needle bar driving arm plate hinge bracket (U), hole in needle position follower (W), eccentric collar (P) in lower hinge hole of hinge bracket (U), and into hole in arm casting.

NOTE: Be sure that needle position follower return spring is in position behind needle bar driving arm plate (V).



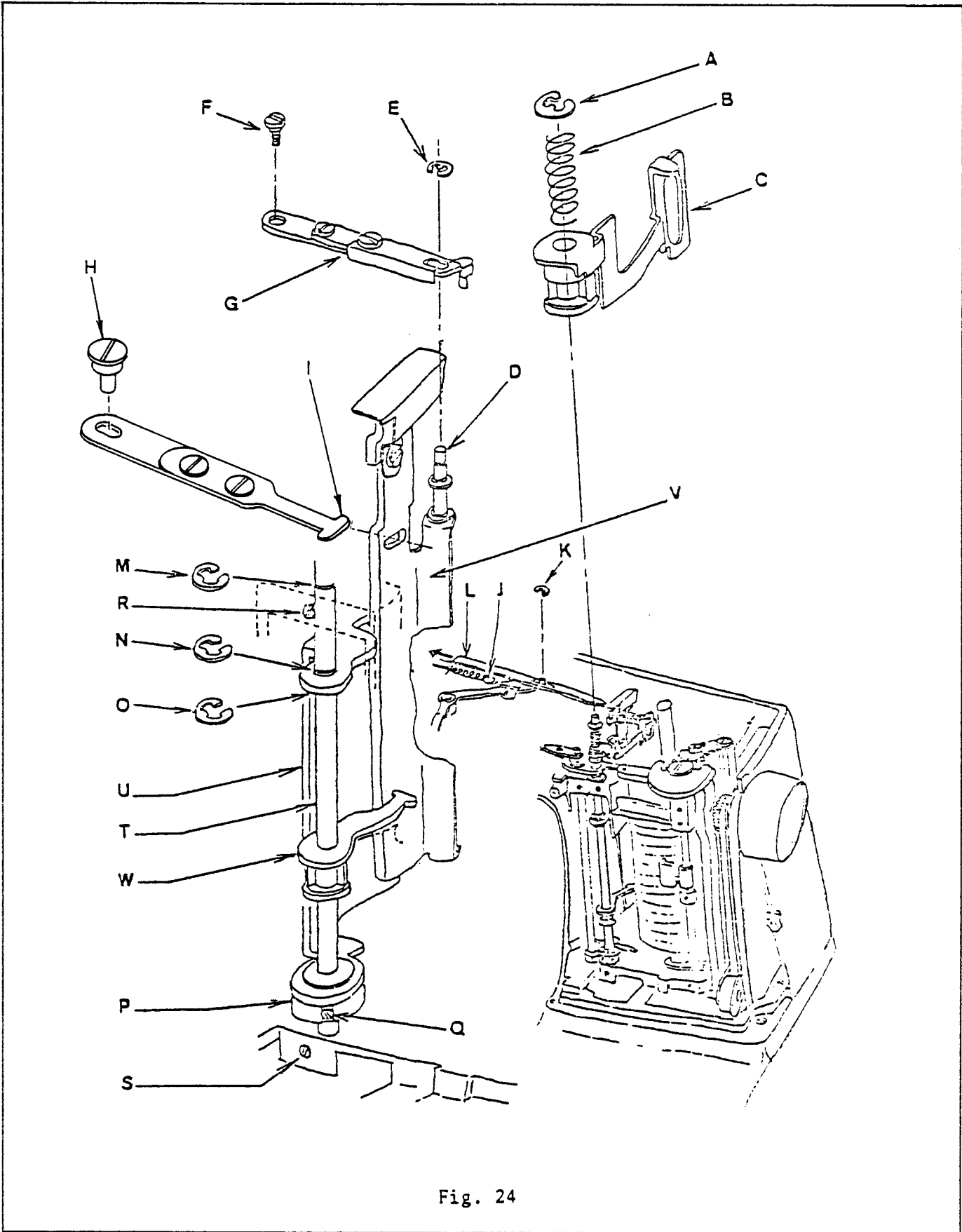


Fig. 24

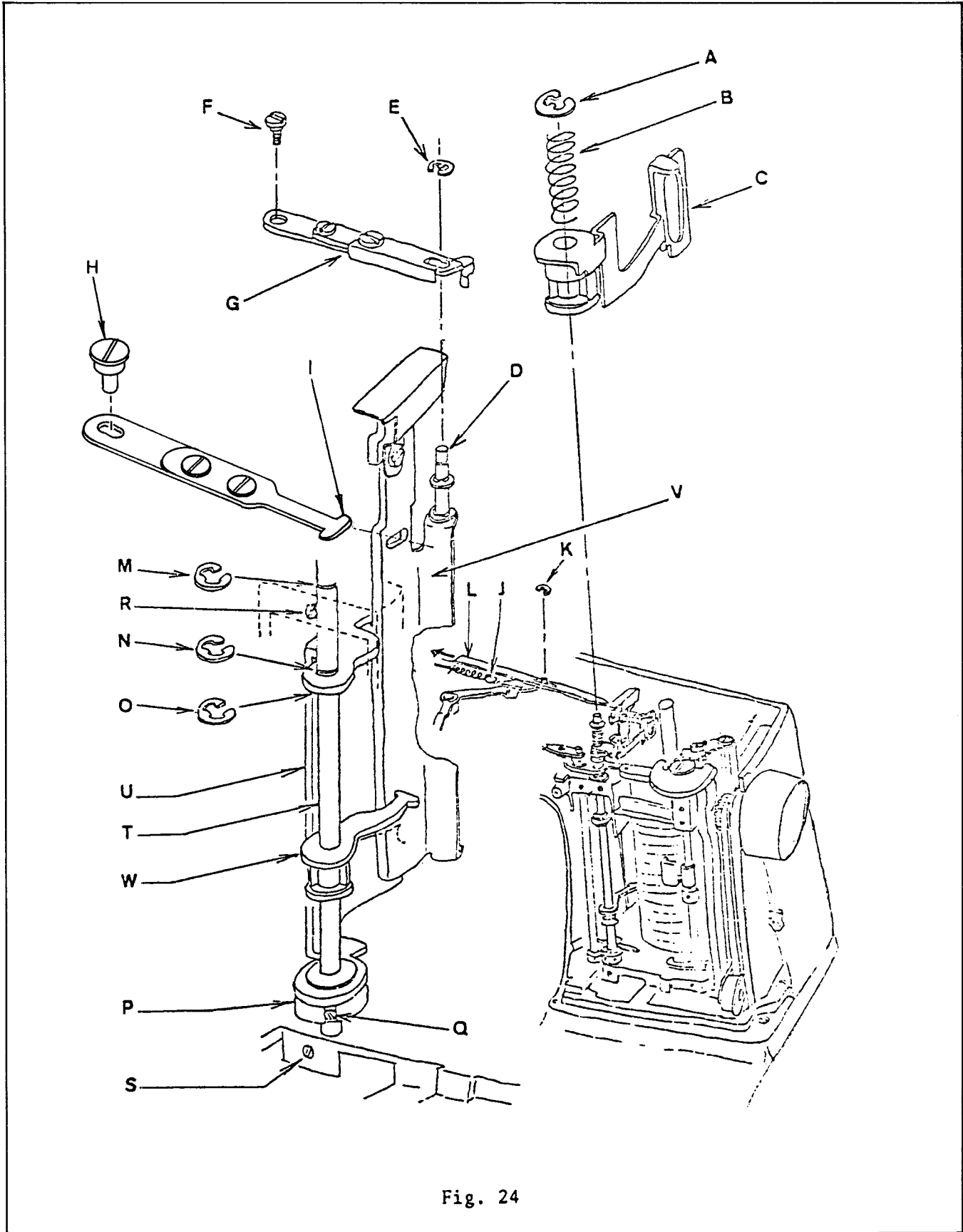


Fig. 24

21. NEEDLE BAR DRIVING ARM PLATE AND NEEDLE POSITION FOLLOWERS  
(Continued)

3. Replace retaining ring (M) on needle position follower shaft (T).
4. Replace retaining rings (N) and (O) on needle position follower shaft (T), with needle bar driving arm plate hinge bracket (U) positioned in between the rings.
5. Push needle position follower shaft (T) down until retaining ring (M) is fully seated on arm casting; then tighten set screws (R) and (S).
6. Tighten set screws (Q) in eccentric collar. Refer to Parallelism of Needle Bar Driving Arm Plate to Cam Stack.
7. Insert needle bar driving arm plate disengaging link (I) into slot in driving arm plate (V) and turn it 90 degrees so that its head will catch on edge of slot, replace screw (H).
8. Replace needle bar driving arm (L) and retaining ring (K).
9. Replace needle bar driving arm return spring (J).
10. Engage right end of needle position releasing lever link assembly (G) with needle bar driving arm plate hinge stud (D) and secure in place with retaining ring (L).
11. Fasten left end of needle position releasing lever link (G) to needle position releasing lever with hinge screw (F).
12. Replace buttonhole needle position follower (C). Make sure the slot portion of follower (C) is engaged with hook portion of needle position follower retaining spring.
13. Replace buttonhole needle position follower spring (B) and retaining ring (A).
14. Replace buttonholer kick-out shaft.
15. Replace pattern selector assembly.
16. Check following, and adjust if necessary.
  - a. Needle location setting  
Left-to right needle location setting.
  - b. Needle position follower (W) and buttonhole needle position follower (C) clearances.
17. Replace front cover, arm top cover assembly and face plate.

## 22. CAM CONTROLLED FEED CRANK ACTUATING LEVER BRACKET

### REMOVAL:

1. Remove all covers.
2. Remove pattern selector assembly.
3. Remove motor.
4. Remove retaining ring (B) and spring (A).
5. Remove buttonhole feed control follower (F).
6. Unscrew feed balancing dial set screw (D) and remove feed balancing dial (E).
7. Remove retaining ring (J) from feed control follower shaft (G).
8. Loosen set screws (L) and (M) holding feed control follower shaft (G).
9. Pull feed control follower shaft (G) down and out of machine.
10. Remove feed control follower (P).
11. Remove cam controlled feed crank actuating lever bracket (Q).

### REPLACEMENT:

1. Insert feed control follower shaft (G) through its hole in the lower arm of feed lever bracket (Q) and its lower hole in arm casting.
2. Push feed control follower shaft (G) up sufficiently to insert spring (C) and feed control follower (P). Continue to push feed control follower shaft (G) up through its upper hole in the arm casting and its hole in the upper arm of feed lever bracket (Q).
3. Position feed control follower shaft (G) so that retaining ring (J) can be snapped into its groove on shaft (G), between the bottom of arm casting and top of lower arm of feed lever bracket (Q). Replace retaining ring (J) and tighten set screws (L) and (M). Check for free operation of feed lever bracket (Q) after set screws (L) and (M) are tightened.
4. Replace retaining rings (H) and (I) in their grooves on shaft (G).

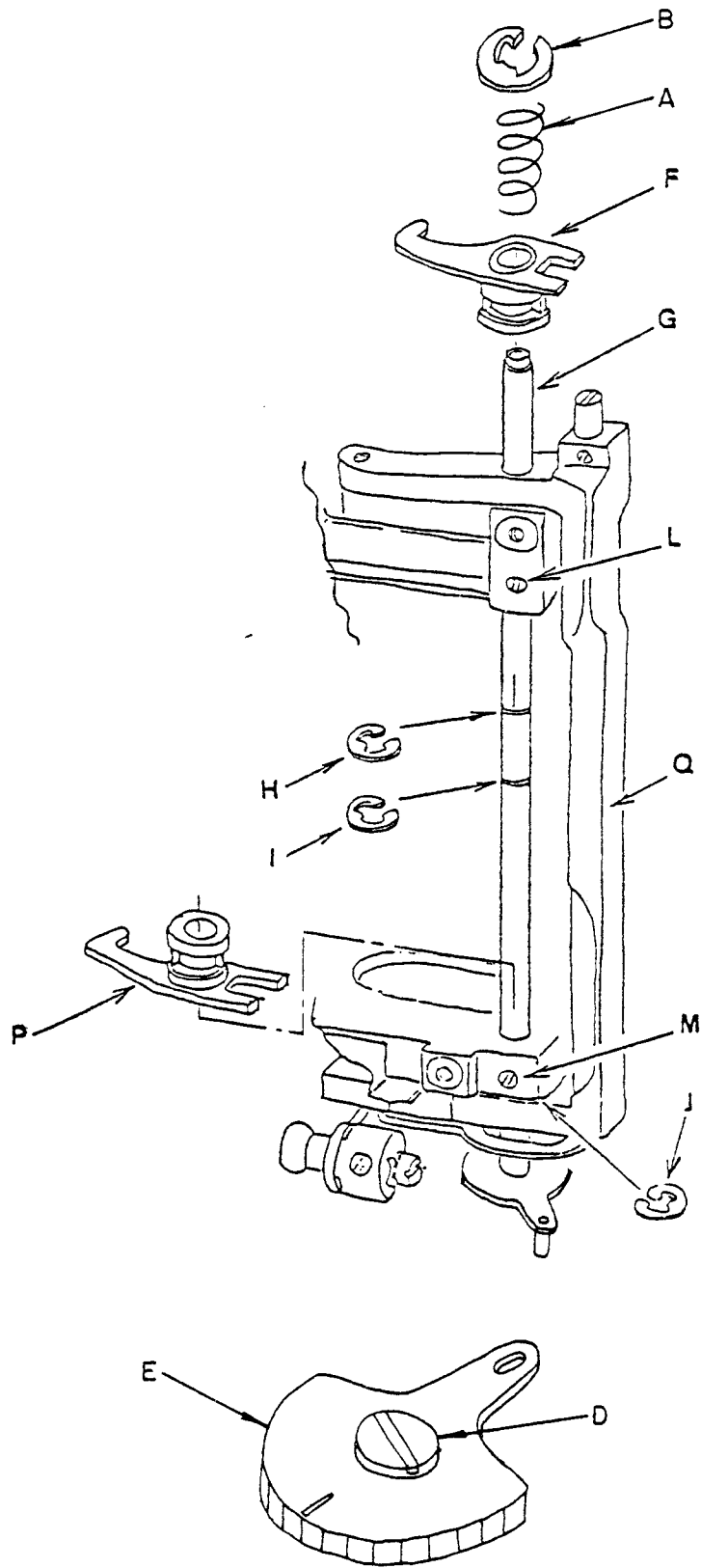


Fig. 25

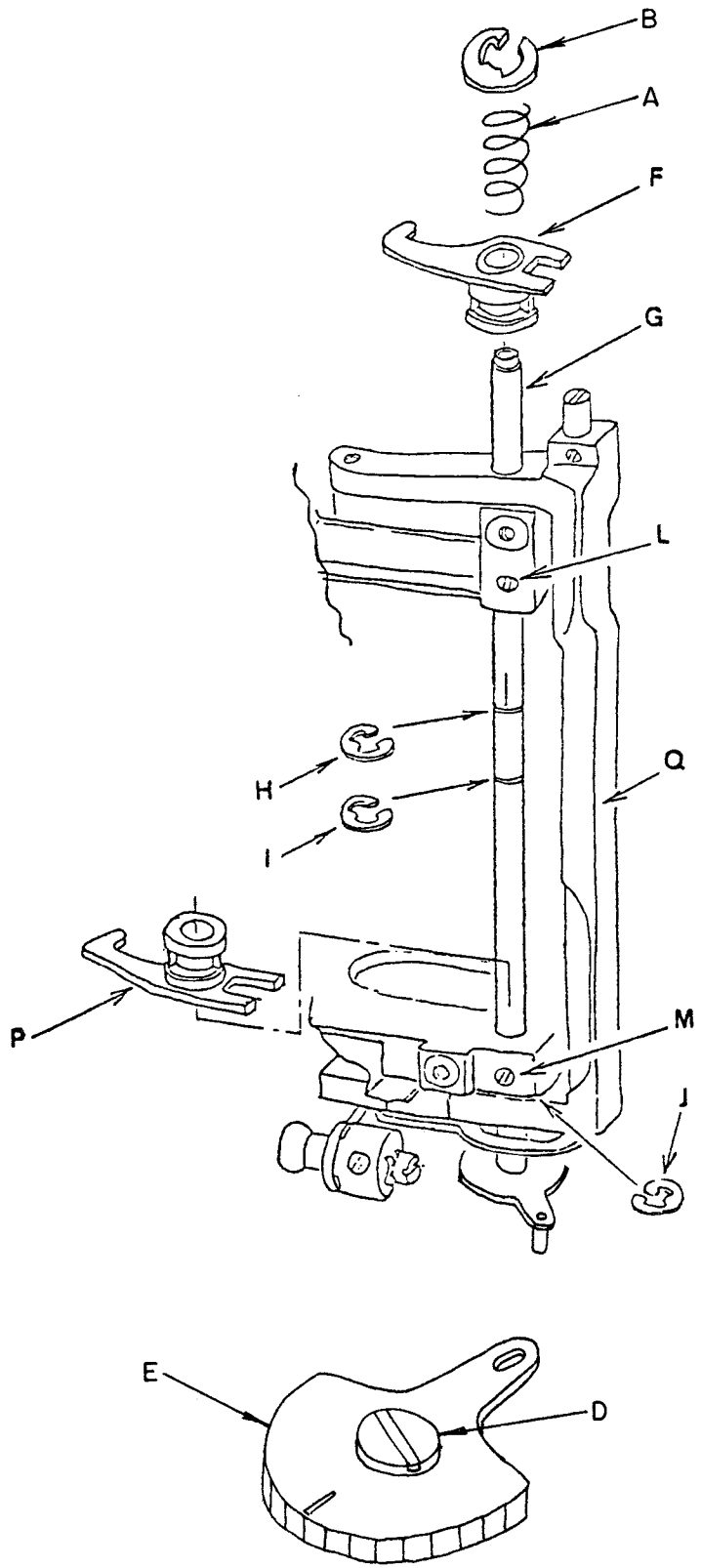


Fig. 25

5. Replace buttonhole feed control follower (F).
6. Replace feed balancing dial and secure it with set screw (D).
7. Replace motor.
8. Replace pattern selector assembly.
9. Check and adjust feed control follower (P) clearance.
10. Check and adjust cam feed zero position. Refer to Cam Controlled (flexi) Feed System adjustment procedures.
11. Check function of one-step buttonhole mechanism and adjust if necessary. Refer to One-Step Buttonhole System Check.
12. Replace all covers.

## 23. CAM STACK ASSEMBLY

### REMOVAL:

1. Remove all covers.
2. Remove pattern selector assembly.
3. Remove motor.
4. Remove cam controlled feed crank actuating lever bracket. Refer to Cam Controlled Feed Crank Actuating Lever Bracket Removal and Replacement procedures.
5. Remove buttonhole cam assembly. Refer to Buttonhole Kick-Out Shaft Removal and replacement procedures.
6. Remove silver screw and loosen black screw (B) holding cam stack assembly (A).
7. Loosen two set screws (C) and remove cam stack shaft collar (D).
8. Pull cam stack shaft (E), with cam stack shaft gear (F) attached, up and out of machine.
9. Remove cam stack assembly (A).

### REPLACEMENT:

1. Mount cam stack assembly (A) on cam stack shaft lower bushing and insert cam stack shaft (E), with gear (F) attached, into upper bushing and continue to push it down through cam stack assembly (A), and through its lower bushing; then install collar (D) on lower end of cam stack shaft (E). Refer to Cam Stack Shaft Eng Play adjustment procedures.
2. Adjust the meshing of arm shaft worm and cam stack shaft gear as described in Arm Shaft Worm and Cam Stack Shaft Gear Meshing adjustment procedures.
3. Adjust cam stack pendulum timing as described in Cam Stack Pendulum Timing adjustment procedures.
4. Replace buttonhole cam assembly. Refer to Buttonhole Cam Play, and Buttonhole Cam Pendulum Timing adjustment procedures.
5. Replace cam controlled feed crank actuating lever bracket. Refer to Cam Controlled Feed Crank Actuating Lever Bracket Removal and Replacement procedures.
6. Replace motor - Refer to Motor Removal and Replacement procedures.
7. Replace pattern selector assembly. Refer to Pattern Selector Assembly Removal and Replacement procedures.
8. Replace all covers.



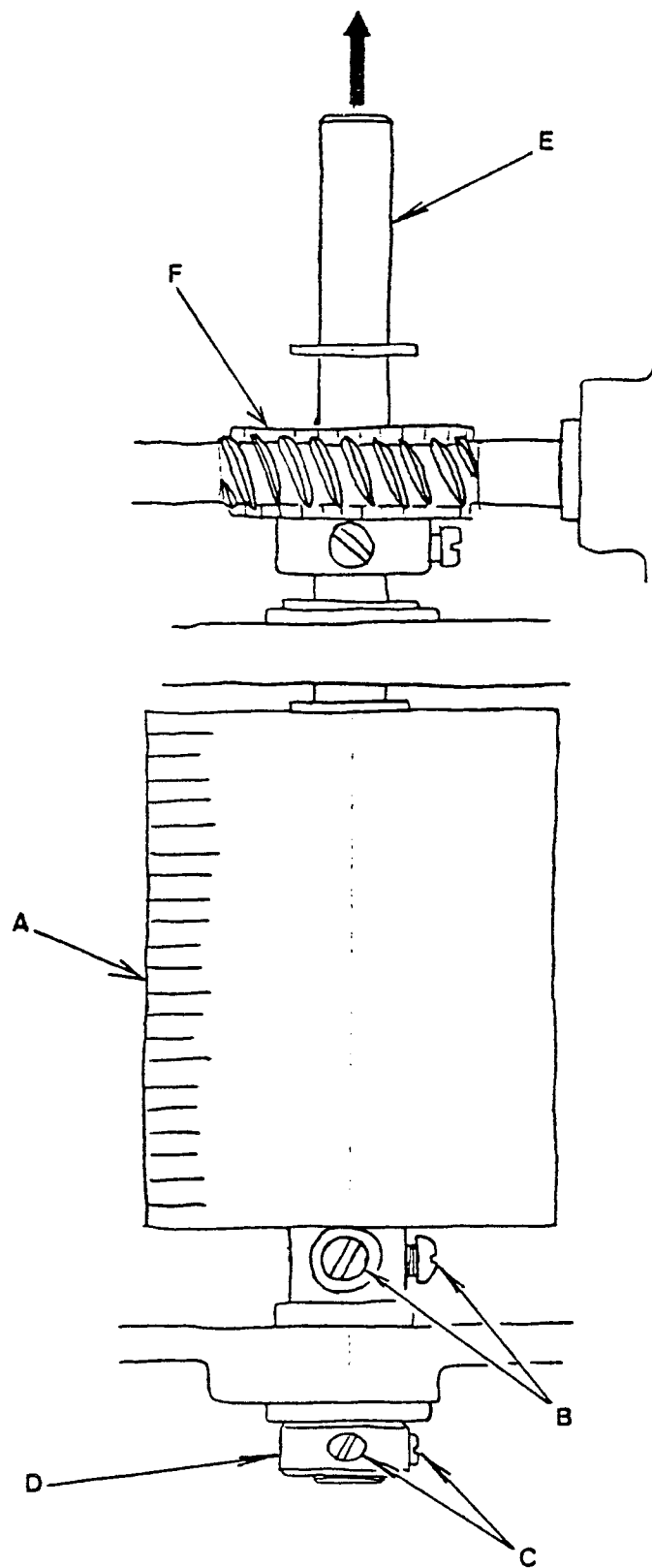


Fig. 26

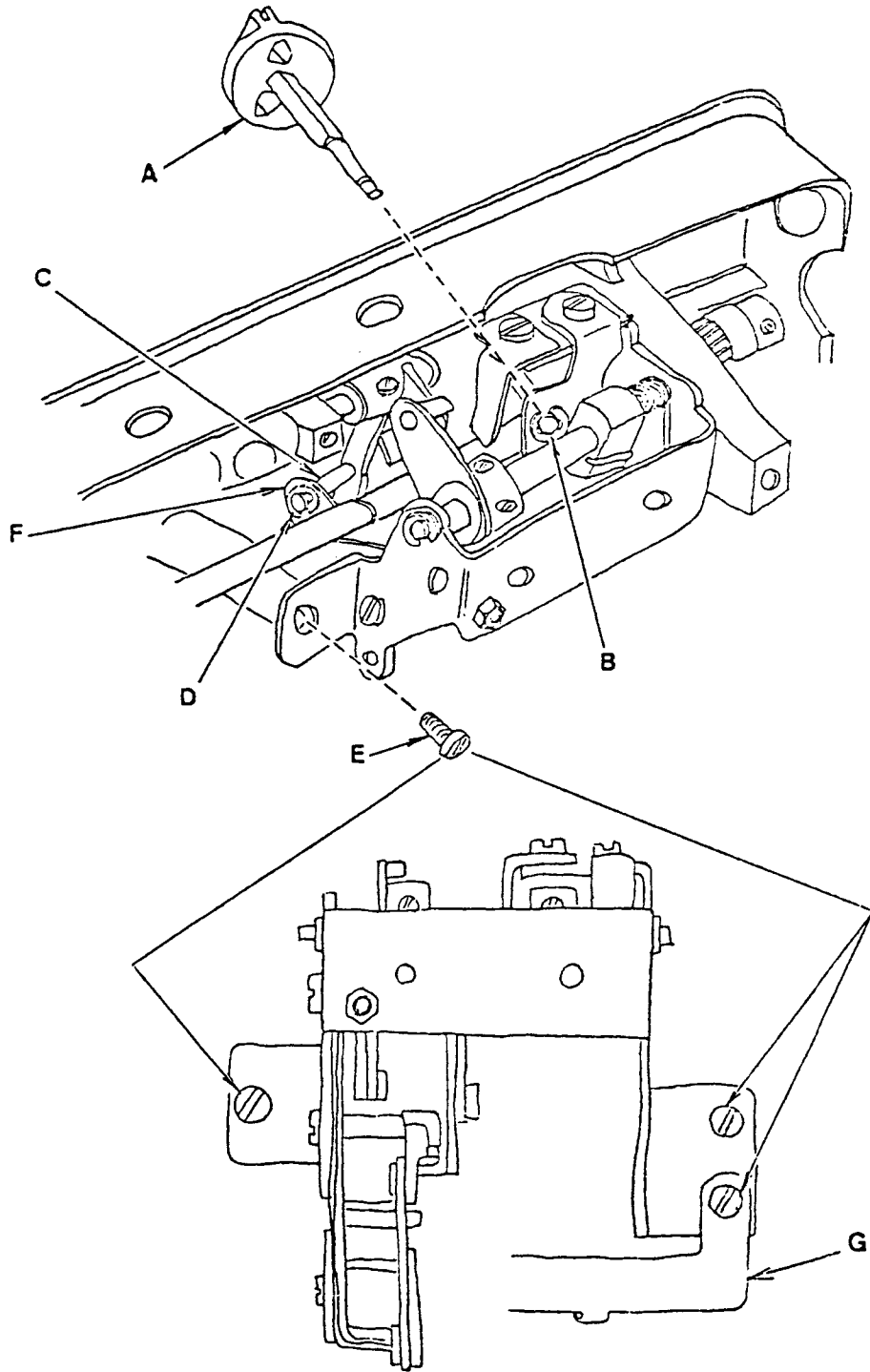


Fig. 27

## 24. FEED CONTROL MOUNTING BRACKET

### REMOVAL:

1. Remove bottom cover.
2. Remove motor.
3. Set feed control knob (A) (stitch length dial) to "0".
4. Remove retaining ring (B) from feed control knob shaft and pull feed control knob and shaft (A) up and out of machine.
5. Remove three screws (E) holding feed control mounting bracket and remove feed control mounting bracket.

NOTE: Removal of above screws will also unfasten sewing light harness bracket (G). (Fig. 27).

### REPLACEMENT:

1. Replacement is the same as removal except in reverse order.

NOTE: Be sure to secure sewing light harness bracket (G) and check that harness bracket (G) is free of interference with motor and other components.

2. Check alpha feed system and adjust if necessary.
3. Check feed control mechanism and adjust if necessary.

## 25. FEED DRIVE SHAFT

### REMOVAL:

1. Remove bottom cover.
2. Set stitch length dial to 4 and pattern selector dial to any pattern between (A) and (N).
3. Loosen set screw (B) in feed drive shaft driving gear (A) until it clears recess in rotating hook drive shaft (C).
4. Loosen two set screws (E) in feed timing eccentric (D). Be sure screws are clear of recess in feed drive shaft (F).
5. Loosen set screw (H) in feed drive shaft gear (G) until it clears recess in feed drive shaft (F).
6. Slide feed drive shaft (F) to the right and remove retaining ring (I).
7. Loosen set screw (J) and slide rear feed drive shaft bushing (K) to the right and out of machine.
8. Loosen set screw (L) and remove feed lifting fork hinge stud (M).
9. Disengage feed lifting fork (N) from feed timing eccentric (D).
10. Slide feed drive shaft (F) to the right until it is out of its hole in feed timing eccentric (D); then pull feed drive shaft (F), with gear (G) attached, to the left and out of machine.

### REPLACEMENT:

1. Insert feed drive shaft (F) through feed drive shaft gear (G), and slide right end of shaft (F) through hole in bed casting for rear bushing (K); then slide shaft (F) to the left into feed timing eccentric (D).
2. Engage feed lifting fork (N) with feed timing eccentric (D).
3. Slide feed drive shaft to the left and into front feed drive shaft bushing (O).
4. Insert rear bushing (K) into its hole in bed casting and temporarily secure in position with set screw (J).

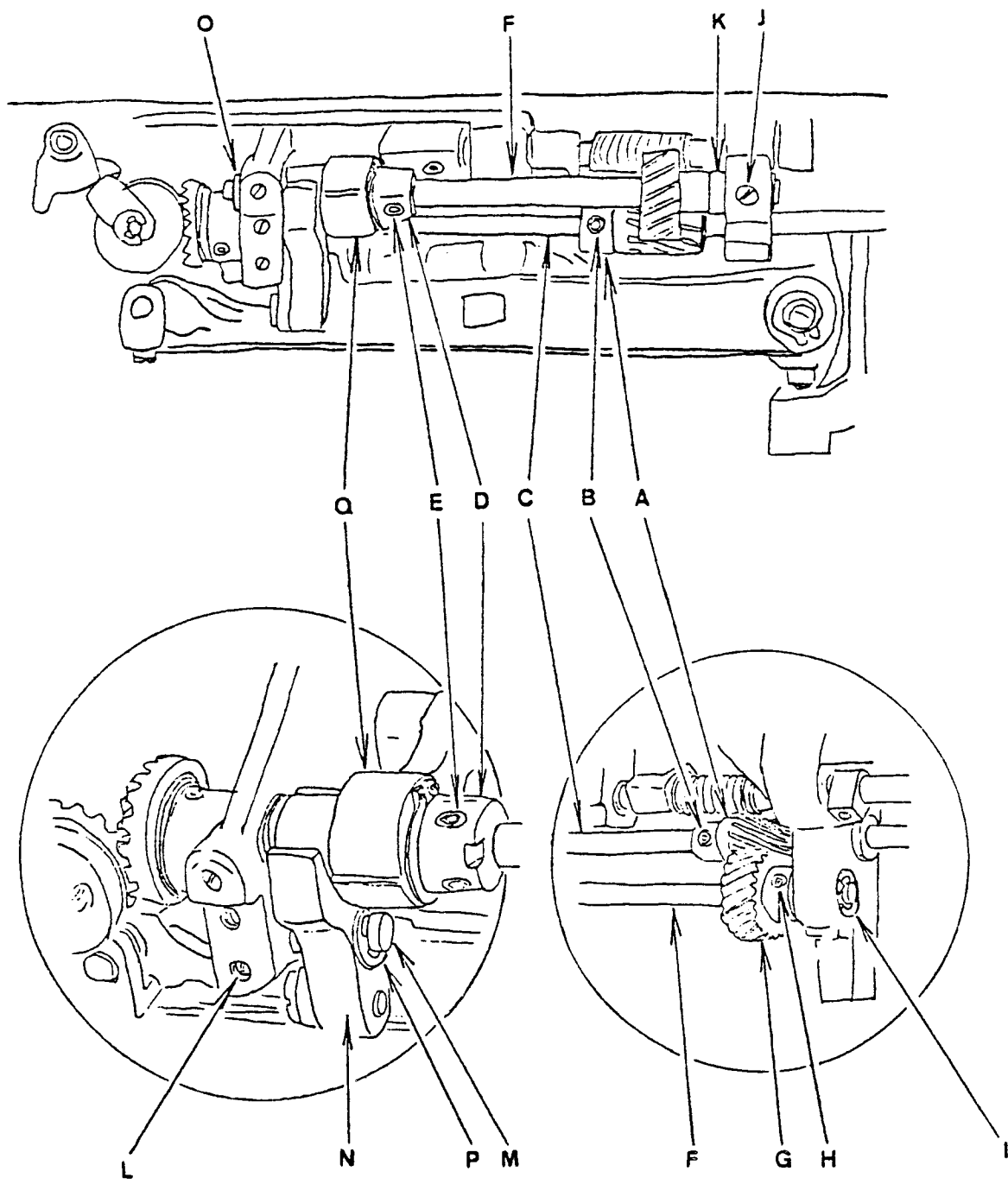


Fig. 28

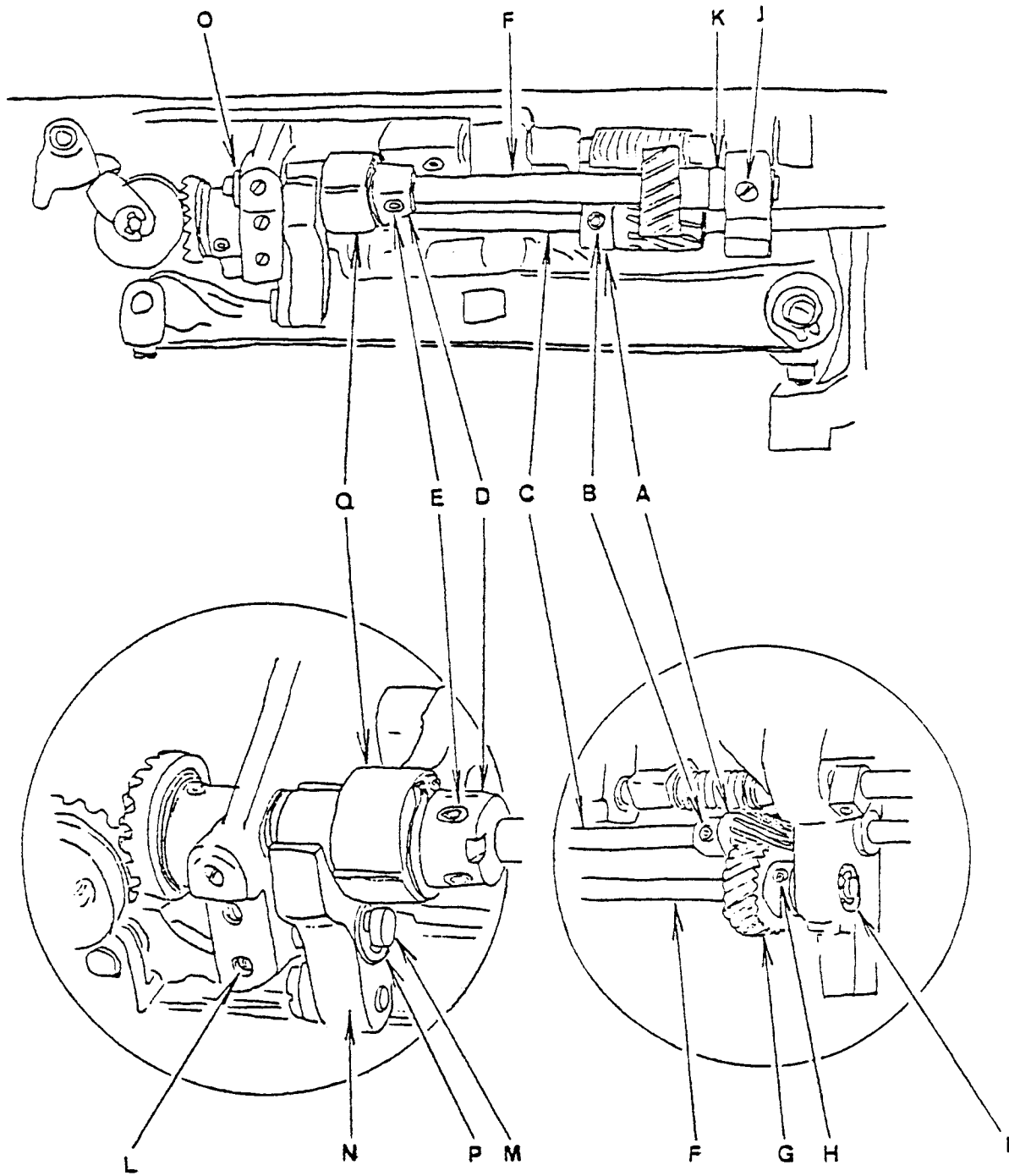


Fig. 28

25. FEED DRIVE SHAFT (Continued)

5. Replace retaining ring (I) on feed drive shaft (F).
6. Locate feed drive shaft gear set screw (H) (the set screw which appears first when gear is turned over toward front of machine) so that it will bear squarely on flat of feed drive shaft (F).
7. With retaining ring (I) against rear bushing (K), locate feed drive shaft gear (G) against bushing (K) and tighten set screws (H).
8. Insert feed lifting fork hinge stud (M) through feed lifting fork (N) and into hole in bed casting. Move feed lifting fork (N) to the right to attain proper alignment with feed timing eccentric (D), and with feed timing eccentric (D), and with hinge stud retaining ring (P) against feed lifting fork (N), tightens set screw (L).
9. For convenience in subsequent adjustments, locate feed drive shaft driving gear set screw (B) on flat of rotating hook drive shaft (F) and secure feed drive shaft driving gear (A) while holding feed drive shaft gear set screws (H) in view for easy access.
10. Adjust feed timing as described in Hook and Feed Timing adjustment procedures.
11. Loosen set screw (J). Move bushing (K) with feed drive shaft left or right to attain proper alignment between feed regulator slide block drive connection (Q) and feed timing eccentric (D) to prevent binding. Tighten set screw (J).
12. Replace bottom cover.

## 26. FEED REGULATOR AND SLIDE BLOCK

### REMOVAL:

1. Remove bottom cover.
2. Remove feed drive shaft.
3. Slide rotating hook drive shaft to the right until it is clear of feed bar connecting link. Refer to Rotating Hook Drive Shaft Removal and Replacement procedures.
4. Loosen feed lifting fork hinge stud set screw (A) and remove feed lifting fork hinge stud (B).
5. Remove feed regulator slide block (D) from feed regulator (C).
6. Loosen feed regulator set screw (E) and slide feed regulator (C) to the left and off the feed regulator shaft.

### REPLACEMENT:

1. Replace feed regulator (C). Locate feed regulator set screw (E) on flat of feed regulator shaft and tighten set screw (E).
2. Replace feed regulator slide block (D). Engage feed lifting fork with feed timing eccentric; then replace feed lifting fork hinge stud (B) and tighten set screw (A).
3. Replace rotating hook drive shaft. Refer to Rotating Hook Drive Shaft Removal and Replacement procedures.
4. Replace feed drive shaft. Refer to Feed Drive Shaft Removal and Replacement procedures.
5. Adjust as described in the following adjustment procedures.
  - a. Hook and Feed Timing.
  - b. Alpha Feed.
  - c. Cam Controlled (flexi) Feed System.
6. Replace bottom cover.



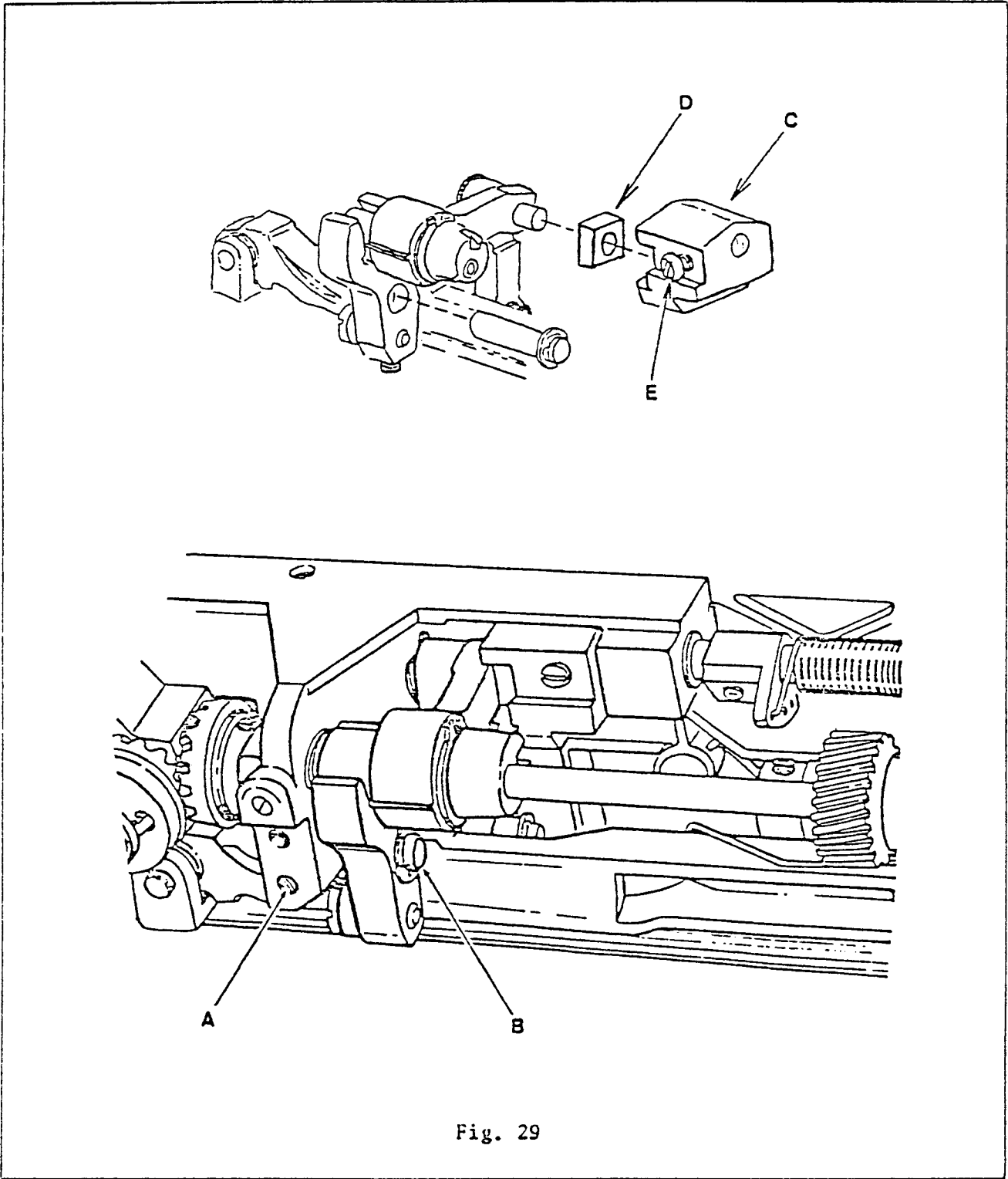


Fig. 29

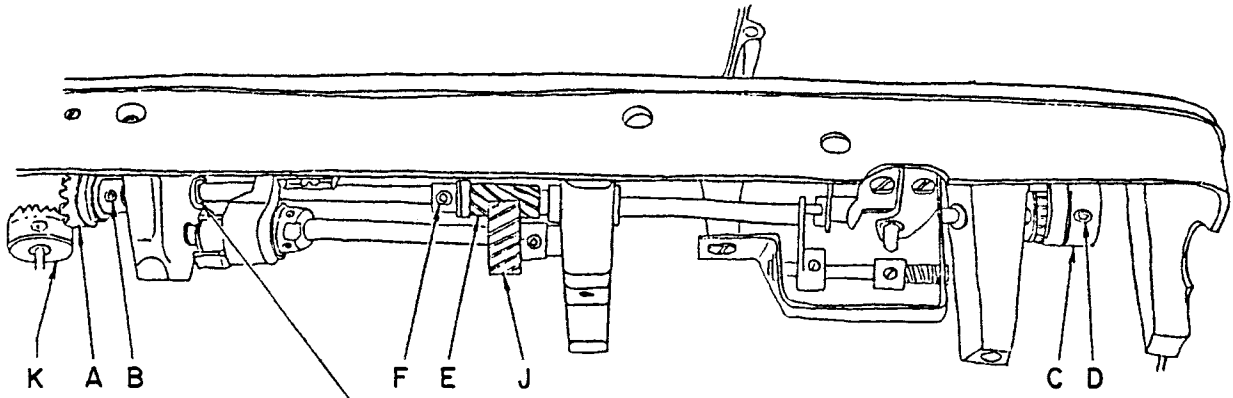


Fig. 30-2

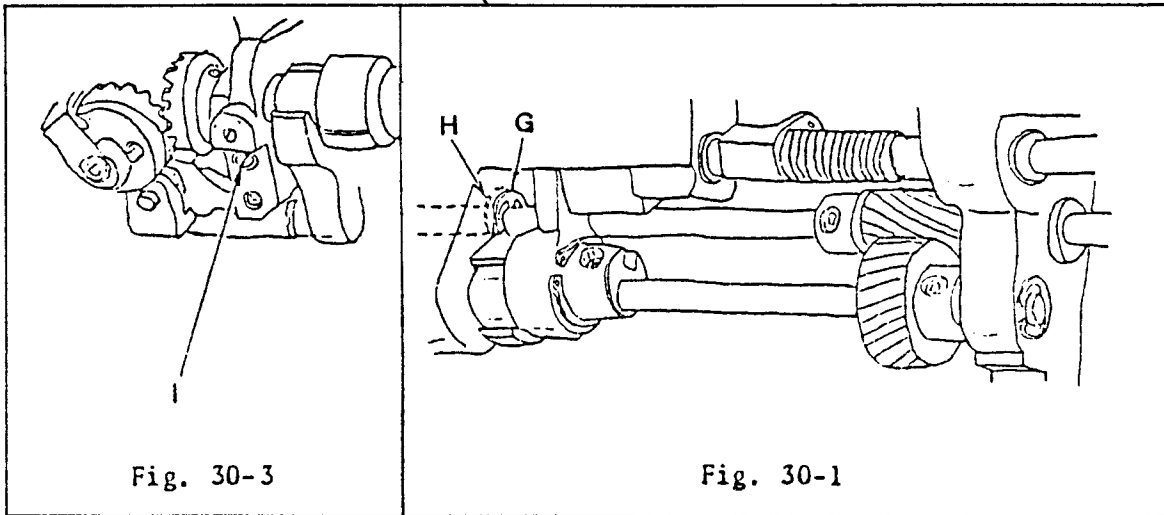


Fig. 30-3

Fig. 30-1

## 27. ROTATING HOOK DRIVE SHAFT

### REMOVAL:

1. Remove needle.
2. Remove bottom cover.
3. Loosen set screws (B) in hook drive gear (A). Be sure screw is clear of recess in shaft.
4. Loosen two set screws (D) in rotating hook drive shaft belt pulley (C).
5. Loosen set screw (F) in feed drive shaft driving gear (E) until it clears recess in shaft.
6. Slide rotating hook drive shaft to the right to remove rotating hook drive shaft retaining ring (G). (Fig. 30-1).
7. Remove rotating hook drive shaft.

- NOTE:
- a. If the hook drive shaft is being removed to provide access to other components, it is recommended that the shaft only be withdrawn enough to provide the required access.
  - b. If the hook drive shaft is being removed from machine to be replaced by a new one, be careful not to lose hook drive shaft thrust washer (H). (Fig. 30-1).

### REPLACEMENT:

1. Check that needle is removed from needle clamp.
2. Insert hook drive gear end of shaft through hook drive shaft belt pulley (C) and right hook drive shaft bushing. Be sure belt pulley (C) is properly located on the hook drive shaft with the cogs of the pulley toward the casting. Also, be sure timing belt is properly located on belt pulley (C). (Fig. 30-2).
3. Push the hook drive shaft through center bushing and feed drive shaft driving gear (E).
4. Be sure thrust washer (H) is in place, and push the shaft through left bushing and hook drive gear (A).
5. Replace retaining ring (G).

27. ROTATING HOOK DRIVE SHAFT (Continued)

6. Locate hook drive gear set screw (B) on flat of hook drive shaft.
7. With retaining ring (G) against left hook drive shaft bushing, locate hook drive gear (A) against left bushing and tighten set screw (B).
8. Loosen bushing set screw (I) and move hook drive gear (A) lightly against rotating hook gear (K) to obtain proper mesh. (Fig. 30-3).
9. Locate feed drive shaft driving gear set screw (F) on flat of hook drive shaft.
10. Position feed drive shaft driving gear (E) so that feed drive shaft gear (J) is located midway on the feed drive shaft driving gear (E) and tightens set screw (F). (Fig. 30-2).
11. Temporarily tighten set screws (D) in belt pulley (C). Run machine to check for proper mesh of hook drive gear (A) and rotating hook gear (K). Reset if necessary. See step 8.
12. Replace needle and re-time the hook and feed as instructed in Hook and Feed Timing adjustment procedures.
13. Check alpha feed and adjust if necessary.
14. Check cam controlled (flexi) feed system and adjust if necessary.
15. Replace bottom cover.

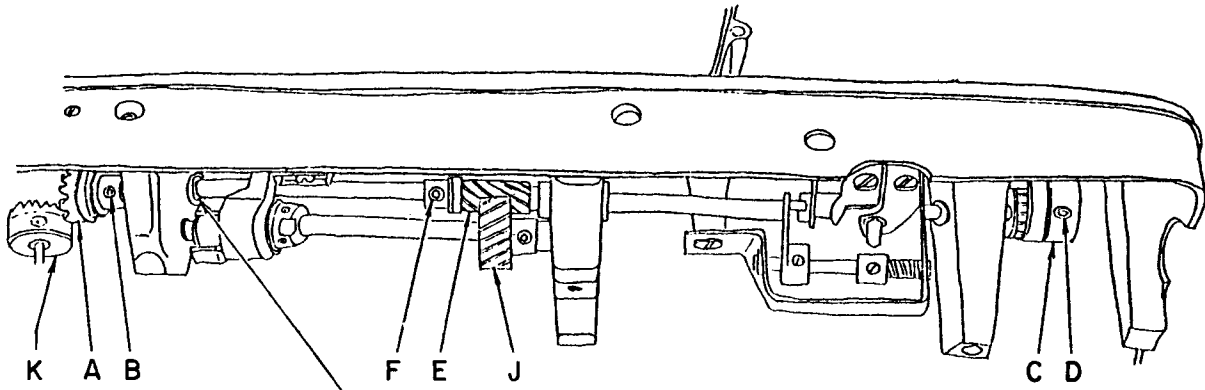


Fig. 30-2

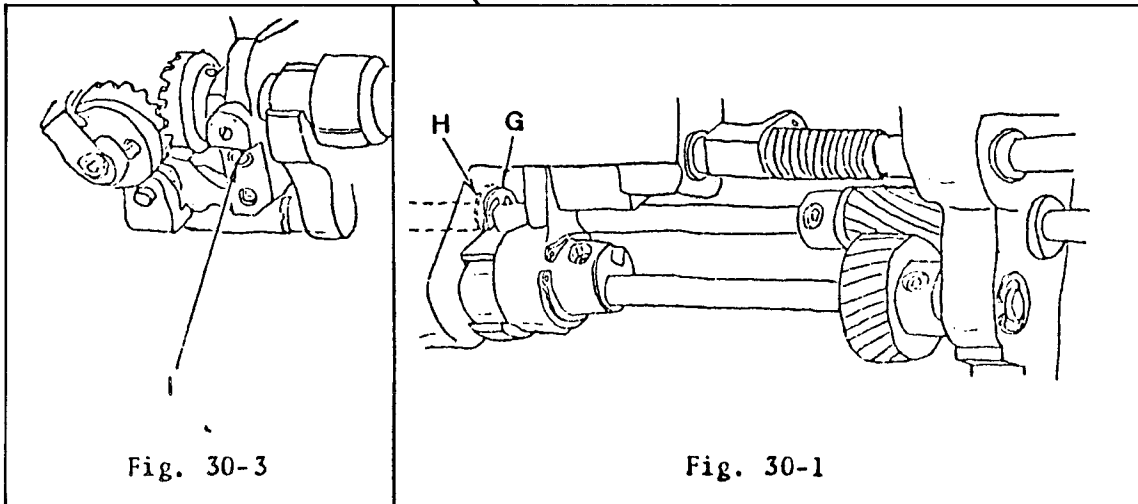


Fig. 30-3

Fig. 30-1

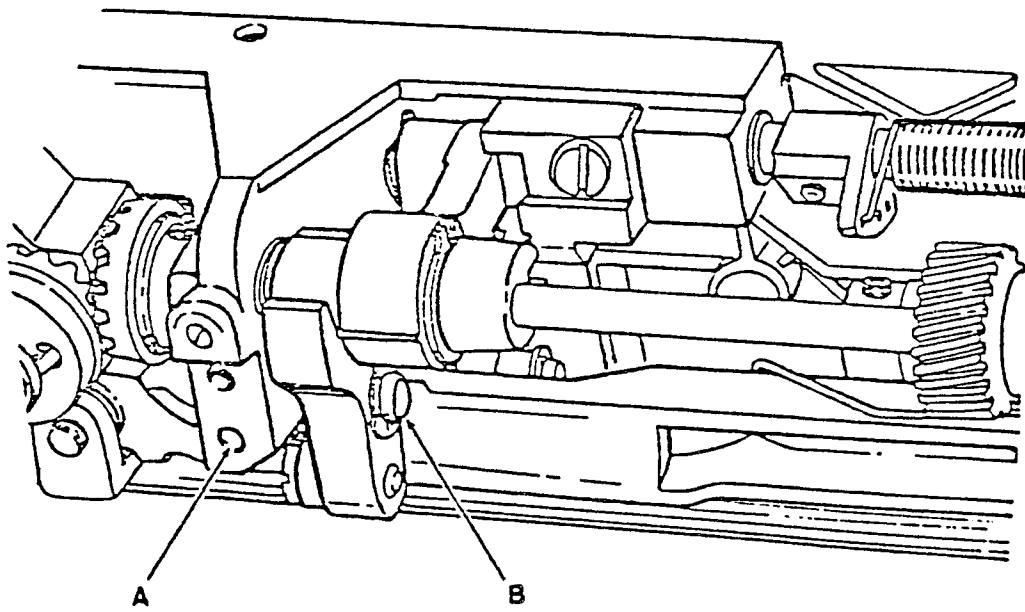
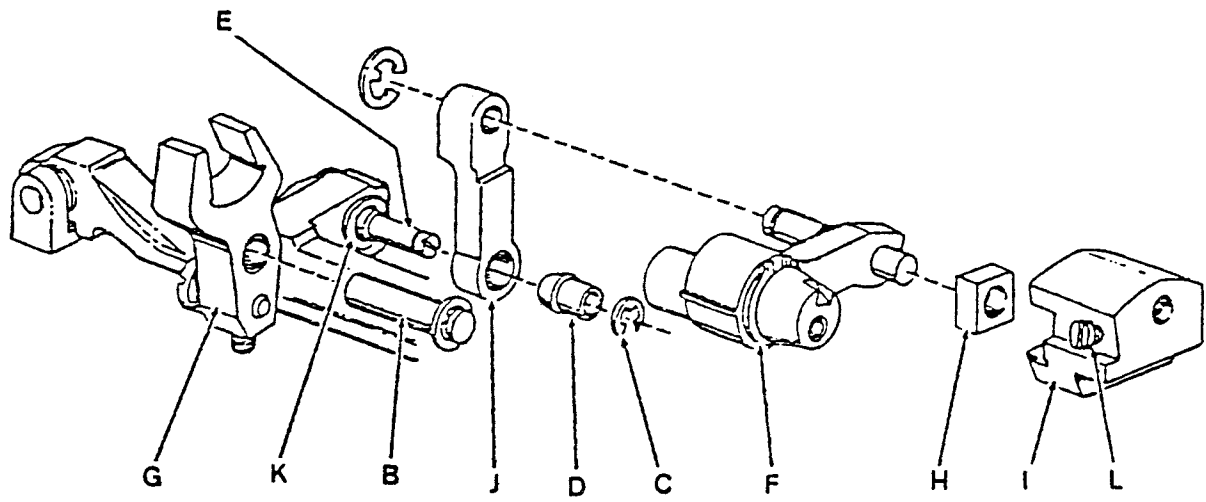


Fig. 31

28. FEED BAR CONNECTING LINK

REMOVAL:

1. Remove bottom cover.
2. Remove feed drive shaft.
3. Remove rotating hook drive shaft.
4. Loosen set screw (A) and remove feed lifting fork hinge stud (B).
5. Remove retaining ring (C).
6. Slide ball bushing (D) off eccentric hinge stud (E).
7. Lift drive connection assembly (F) out of feed lifting fork (G).
8. Tilt lower end of drive connection assembly (F) to the right to remove it from eccentric hinge stud (E). Tilt upper end to the left to remove slide block (H) from feed regulator (I).
9. Lift drive connection assembly (F) up and to the left to remove it and feed bar connecting link (J) from machine. Be careful not to lose wave washer (K).

NOTE: If necessary, feed regulator (I) may now be removed by loosening set screw (L) and sliding feed regulator off regulator shaft.

REPLACEMENT:

1. If feed regulator (I) has been removed, replace it on feed regulator shaft. Do not tighten set screw (L) at this time.
2. Be sure wave washer (K) is in place. Insert drive connection assembly (F) at a 45 degree angle to bring lower end of feed bar connecting link (J) over eccentric hinge stud (E).
3. Insert slide block (H) onto upper end of drive connection assembly, and then into slide of feed regulator (I).
4. Replace ball bushing (D) and retaining ring (C).

28. FEED BAR CONNECTING LINK (Continued)

5. Locate feed regulator set screw (L) on flat of feed regulator shaft.
6. Locate feed regulator (I) so there is no binding or excessive play between it and slide block (H). Tighten feed regulator set screw (L).
7. Replace feed lifting fork hinge stud (B) and tighten set screw (A).
8. Position drive connection assembly (F) into feed lifting fork (G).
9. Replace rotating hook drive shaft.
10. Replace feed drive shaft.
11. Re-time hook and feed as described in Hook and Feed Timing adjustment procedures.
12. Check alpha feed and adjust if necessary.
13. Check cam controlled (flexi) feed system and adjust if necessary.
14. Replace bottom cover.



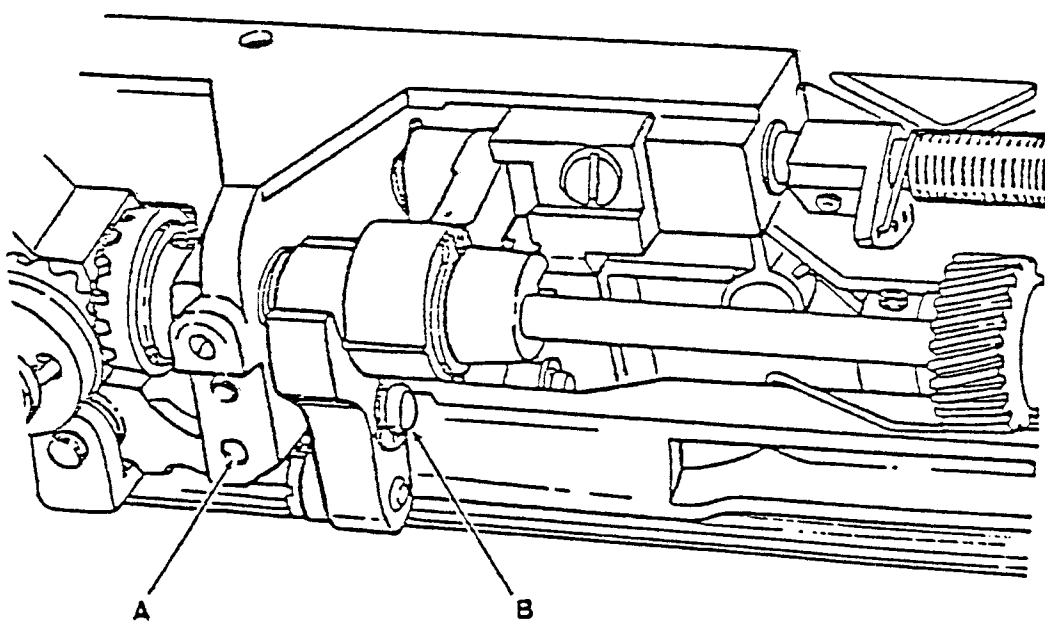
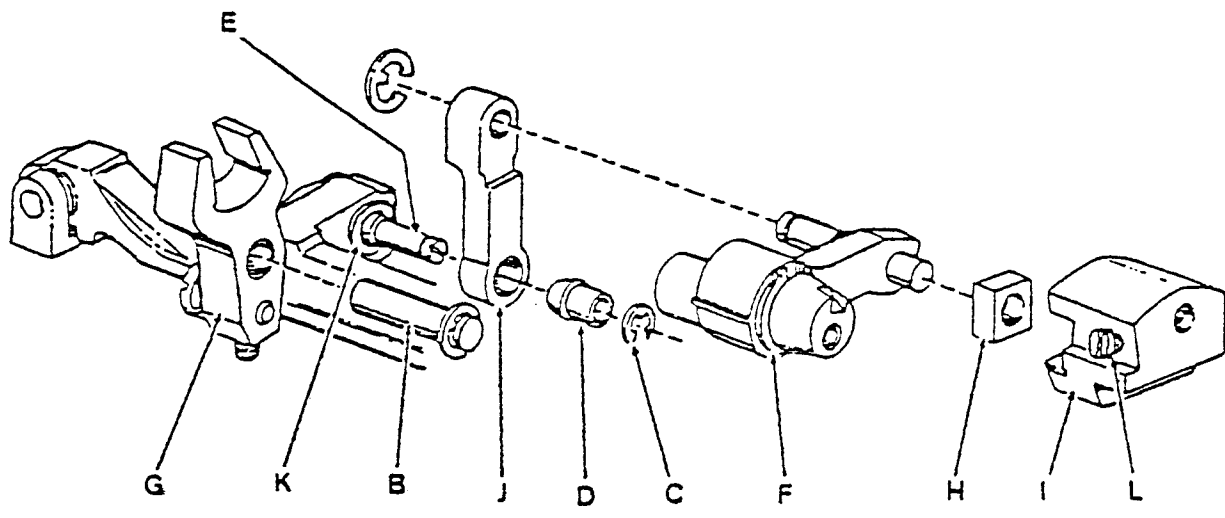


Fig. 31

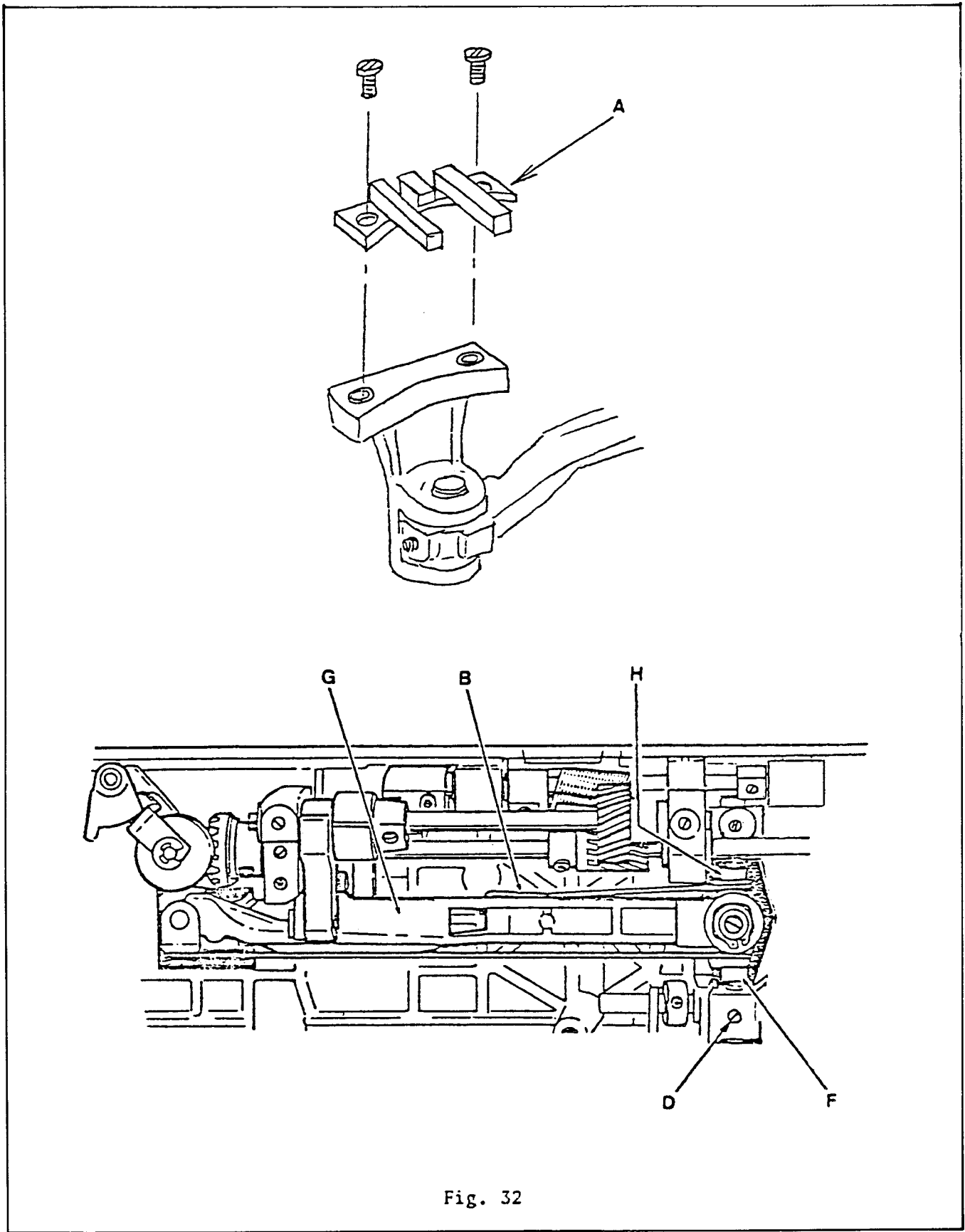


Fig. 32

## 29. FEED BAR ASSEMBLY

### REMOVAL:

1. Remove feed dog (A).
2. Remove bottom cover.
3. Remove motor.
4. Remove feed drive shaft.
5. Remove rotating hook drive shaft.
6. Remove spring (B) from feed bar.
7. Loosen set screws (D) and slide out cone point bearings (F).
8. Remove feed bar assembly (G).

### REPLACEMENT:

1. Position feed bar assembly (G) with upper end of feed bar pivot stud (H) seated on upper cone point bearing (H). Be sure spring (B) is properly located over pivot stud (H) and that its short leg is engaged with the rib of the casting.
2. Replace lower cone point bearing (F). Make sure it is properly seated into the lower end of feed bar pivot stud (H).
3. Applying finger pressure to the lower cone point bearing (F) tighten set screw (D).
4. Engage spring (B) over top of feed bar (G).
5. Check for any binding or looseness of the feed bar between the cone point bearings. There must be a "perfect fit". If necessary, reset by adjusting the upper cone point bearing (E).
6. Replace feed drive shaft.
7. Replace rotating hook drive shaft.
8. Replace motor.
9. Replace feed dog.
10. Adjust feed mechanism as described in Alpha Feed adjustment procedures.
11. Replace bottom cover.

### 30. FEED CONTROL CAM

#### REMOVAL:

1. Remove bottom cover.
2. Remove motor.
3. Remove feed control mounting bracket.
4. Remove rotating hook drive shaft.
5. Remove retaining ring (A).
6. Remove flat washer (B) and wave washer (C).
7. Remove feed control cam (D).

#### REPLACEMENT:

1. Apply a small amount of grease to track on feed control cam (D) and replace cam on bushing (E).
2. Replace wave washer (C), flat washer (B), and retaining ring (A). Be sure retaining ring (A) is properly seated in its groove in bushing (E).
3. Replace rotating hook drive shaft.
4. Replace feed control mounting bracket.
5. Re-time hook and feed as instructed in Hook and Feed Timing adjustment procedures.
6. Adjust cam controlled (flexi) feed system.
7. Replace motor.
8. Replace bottom cover.

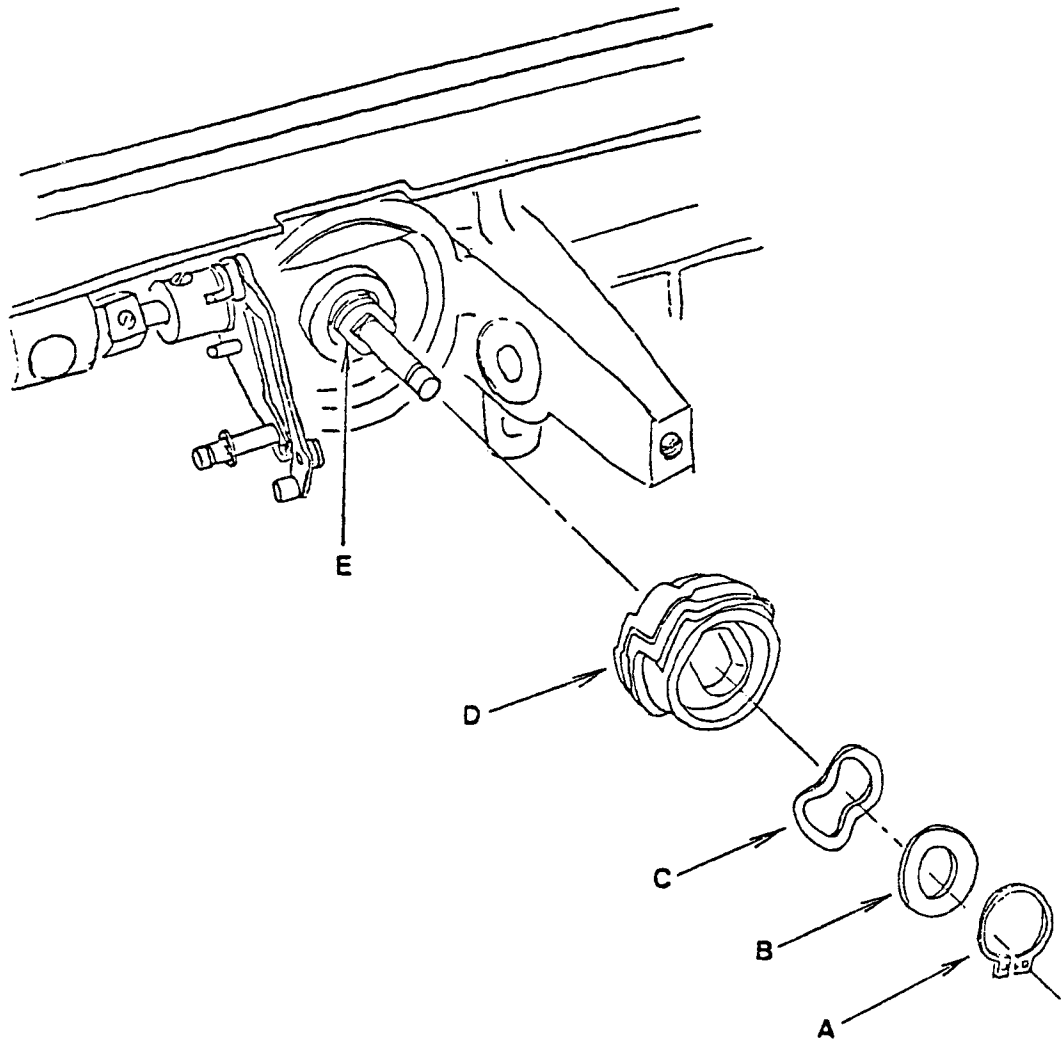


Fig. 33

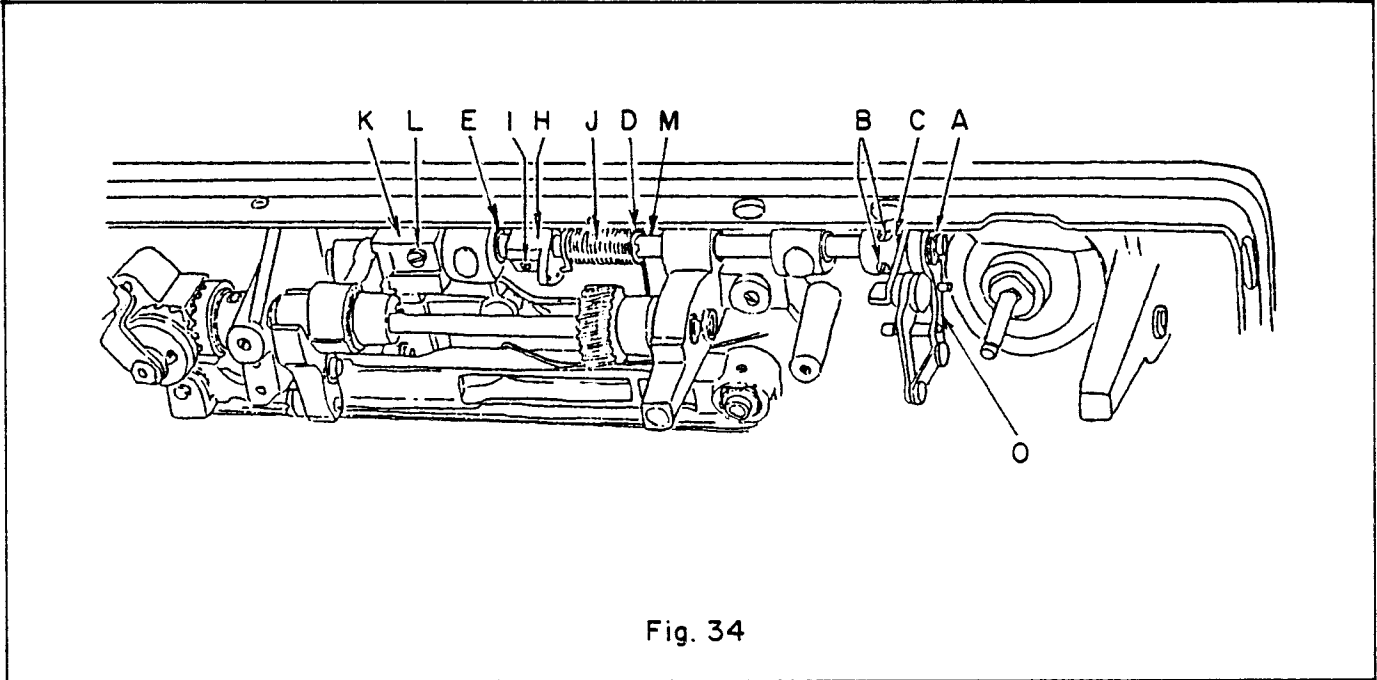


Fig. 34

### 31. FEED REGULATOR SHAFT

#### REMOVAL:

1. Remove bottom cover.
2. Remove motor.
3. Remove feed control mounting bracket.
4. Remove rotating hook drive shaft.
5. Remove feed control cam.
6. Remove retaining ring (A).
7. Loosen two set screws (B) in feed regulator shaft crank (C), and remove feed regulator shaft crank from shaft.
8. Remove retaining ring (D).
9. Loosen set screw (I) in feed regulator tension adjusting collar (H) until it clears recess in feed regulator shaft (M).
10. Disengage spring (J) from tension adjusting collar (H).
11. Loosen set screw (L) in feed regulator (K) until it clears recess in feed regulator shaft (M).
12. Slide feed regulator to the right and remove retaining ring (E).
13. Remove feed regulator shaft (M) by sliding it out to the right through access hole located at right end of casting.

#### REPLACEMENT:

1. Insert feed regulator end of feed regulator shaft (M) through access hole at right end of casting.
2. Place spring (J) on feed regulator shaft with long leg of spring to the right and engage leg with notch in casting.
3. Place tension adjusting collar (H) on feed regulator shaft with tension adjusting holes next to spring (J).
4. Replace retaining ring (E).
5. Push feed regulator shaft through bushing.

31. FEED REGULATOR SHAFT (Continued)

6. Check that slide block is in place, and replace feed regulator (K) on left end of feed regulator shaft.
7. Place feed regulator shaft crank (C) on right end of feed regulator shaft.
8. Replace retaining rings (A) and (D).
9. Replace feed control cam. Refer to Feed Control Cam Removal and Replacement procedures.
10. While holding shaft (M) to the left, locate regulator (K) so there is minimal end play with no binding of shaft (M) and tighten screw (L). Position and hold feed regulator shaft so there is 1.0 - 1.3 mm (0.039 - 0.051) clearance between feed regulator shaft crank actuating lever (O) and feed control cam, and tighten screws (B).
11. Position tension adjusting collar (H) so that its set screw (I) will bear on the recessed portion of feed regulator shaft, and insert short leg of spring (J) into bottom hole of collar (H). Set feed control knob to maximum stitch length, rotate collar (H) down (counterclockwise) until access to set screw (I) can only be achieved with screwdriver inserted between feed drive shaft and hook drive shaft, and then tighten set screw (I).
12. Replace rotating hook drive shaft.
13. Replace feed control mounting bracket.
14. Adjust as instructed in the following adjustment procedures.
  - a. Hook and Feed Timing.
  - b. Alpha Feed.
  - c. Cam Controlled (flexi) Feed System.
15. Replace motor.
16. Replace bottom cover.



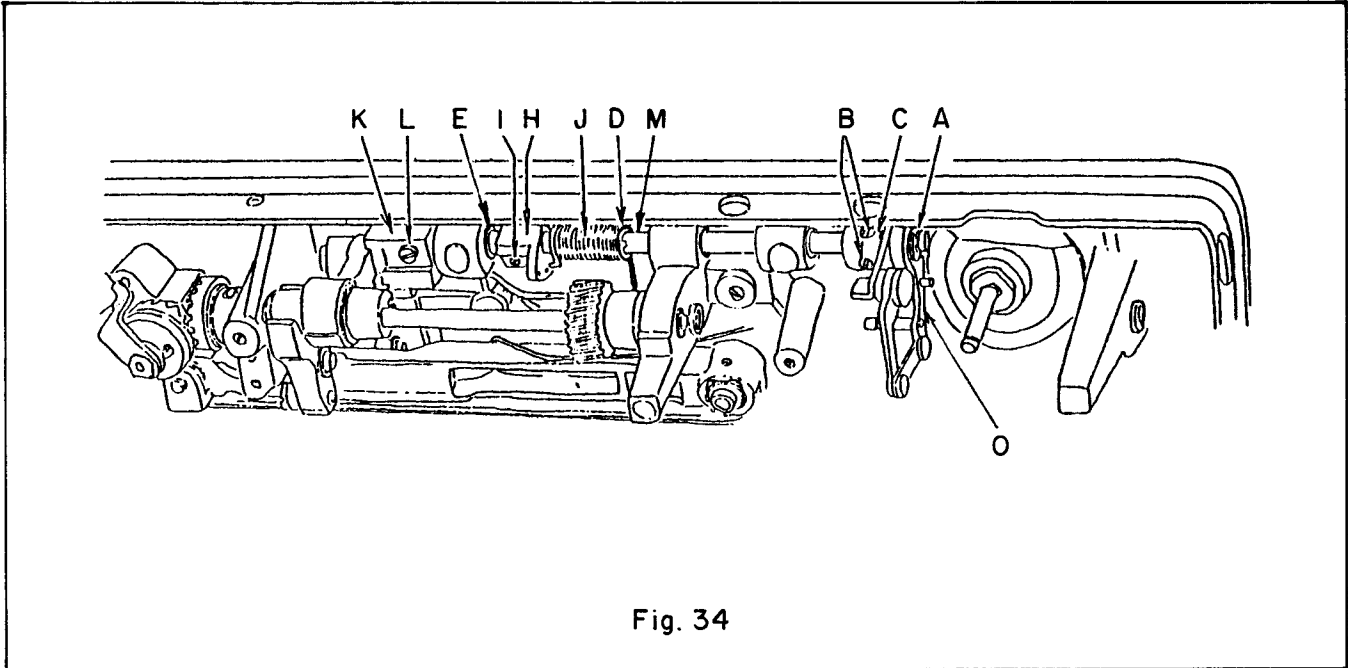


Fig. 34

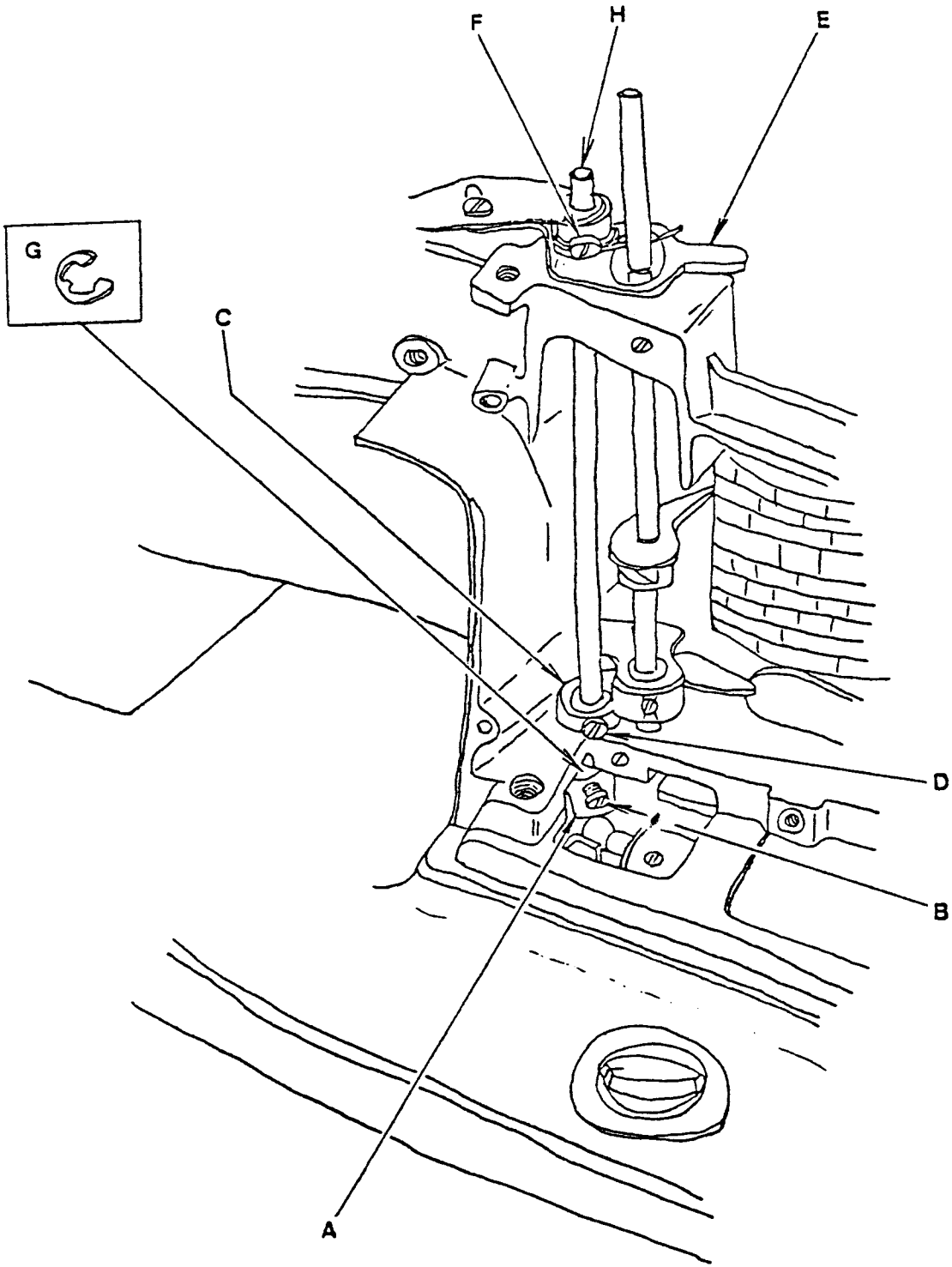


Fig. 35

### 32. CAM FOLLOWER RELEASE CRANK SHAFT

#### REMOVAL:

1. Remove all covers.
2. Remove pattern selector assembly.
3. Remove motor.
4. Loosen set screw (B) in crank (A) until it clears recess in crank shaft (H).
5. Remove crank (A).
6. Loosen set screw (D) holding pattern selector dial lock lever disengaging lever (C).
7. Loosen set screw (F) in crank shaft lever (E) until it clears recess in shaft.
8. Remove retaining ring (G).
9. Pull crank shaft (H) up and out of machine.

#### REPLACEMENT:

1. Insert crank end of crank shaft (H) through crank shaft lever (E).
2. Push crank shaft (H) down through its upper hole in arm casting.
3. Insert pattern selector dial lock lever disengaging lever (C) onto lower end of crank shaft (H) and push shaft down through its lower hole in casting.
4. Replace retaining ring (G).
5. Push crank shaft (H) up until retaining ring (G) is against underside of casting. Locate crank shaft lever set screw (F) on flat of crank shaft (H), and then tighten set screw (F). Be sure that crank shaft operates without any binding and/or excess up and down play.
6. Insert crank (A) onto crank shaft (H) so that its set screw (B) will bear on the flat of shaft, and tighten set screw (B). There should be a slight clearance between the crank and the feed lever bracket.
7. Replace pattern selector assembly. Correctly position pattern selector dial lock lever disengaging lever (C) as described in Pattern Selector Dial Lock Lever Setting Under Cam Release System adjustment procedures. Replace motor. Replace all covers.

### 33. HINGED BED PLATE

#### REMOVAL:

1. Remove bottom cover.
2. Loosen two screws (A) and (B) holding bed plate hinge bracket to bed casting.
3. Remove hinged bed plate assembly by pulling it away from the machine bed.

#### REPLACEMENT:

1. Slide hinge bracket screws (A) and (B) into their corresponding groove in the bed of machine.
2. Adjust bed plate so that its outer edges are flush with bed edges and with clearances (C) and (D) as shown in Fig. 36, and then tighten screws (A) and (B).
3. Test hinged bed plate for proper latching.

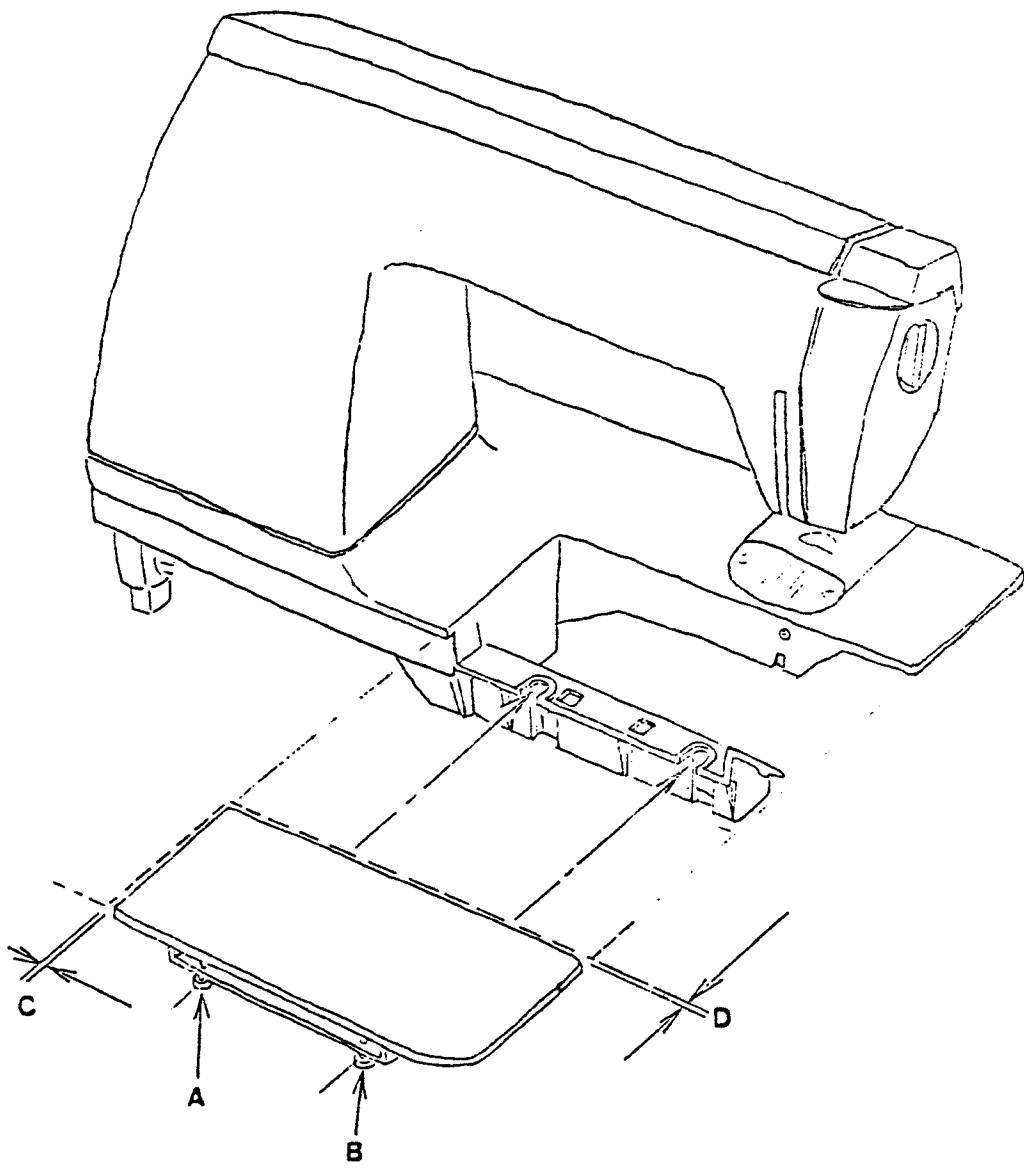


Fig. 36

