

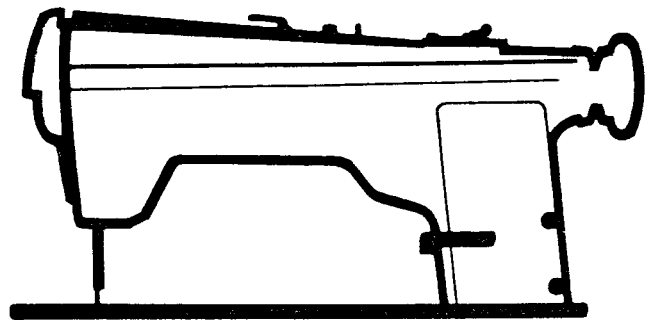
SINGER
457G UTT

SERVICE MANUAL

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FOR UNDERBED THREAD TRIMMER



SINGER Machine

457G

THE SINGER COMPANY

CONTENTS

	Page
Description of the Underbed Thread Trimmer with Thread Wiper . . .	4
Description of the Trimming Cycle	4
Illustration of the Thread Pulling and Trimming Cycle	5
Manual Actuation of the Mechanisms	7

Timing and Setting:

Control Cam	9
Pulling and Trimming Unit	11
Needle Thread Pulling Mechanism	15

Disassembly and Assembly:

Pulling and Trimming Unit	19
Thread Puller and Knife	19

Electrical Drive:

EFKA-VARIOSTOP-Motor	22
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Parts List	34
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Note:

This manual should be used in connection with the Service Manual for the appropriate variety. It informs especially regarding the operation and maintenance of the Underbed Thread Trimmer and its driving elements in 457 G-Machines.

Description of the Underbed Thread Trimmer with Thread Wiper

Electro-mechanical Underbed Thread Trimmer Mechanism permanently installed in the machine.

The machine is driven by a Stop Motor. Its control box relays the electrical impulses to solenoids installed in the machine.

The needle and bobbin threads are trimmed below the throat plate upon completion of the sewing operation.

The thread wiper "wipes" the needle thread to the proper position for starting the next sewing operation.

Description of the Thread Trimming Cycle

Upon completion of the sewing operation, the machine stops in needle-down position (P1). The trimming operation is initiated by heeling the foot treadle.

Solenoid 1 in the machine bed pulls the locking pawl for an instant, the action of which releases the follower arm. A torsion spring forces the follower arm against a cam mounted on the bed shaft, which now takes over the controlling function for the pulling and trimming cycle.

The machine hereby runs from the needle-down position P1 to the needle-up position P2. The bobbin and needle threads are pulled to the proper length and trimmed.

Simultaneously with solenoid 1 in the machine bed, solenoid 2 in the machine arm releases a lever, which with its catch is pulled into the circular path of a follower fastened to the take-up lever drive. As the machine continues its movement, the lever actuates the needle thread pulling mechanism which pulls the needle thread and advances it to the proper length. Simultaneously this lever, via a connecting rod, causes the needle thread wiper to swing out. Shortly upon completion of the trimming operation, spring action returns the wiper to its rest position. During this movement it pulls the needle thread out of the material and places it over the sole of the presser foot.

Upon trimming of the needle and bobbin threads, the machine stops in needle-up position P2.

The sequence of the trimming cycle in brief is as follows:
Stop Sewing – Heel Foot Treadle – Automatic Trim and Wipe – Start Sewing.

Manual Actuation of the Mechanisms

Trimming Mechanism (Figs. A, B and D)

To check the trimming mechanism, turn the handwheel until the mark on the rotating take-up is opposite the mark P1 on the face plate.

Depress the plunger of the solenoid ⑤ in the machine bed and turn the machine into the normal direction of rotation until the mark on the rotating take-up is opposite the mark ④ on the face plate. The trimming cycle should now be completed.

Needle Thread Pulling Mechanism and Thread Wiper (Figs. A, B and C)

To check this mechanism, turn the handwheel until the mark on the rotary take-up is opposite the mark P1 on the face plate.

Insert a pin or screwdriver in hole ③ and push back solenoid plunger. Remove pin or screwdriver and continue turning the handwheel until the mark on the rotating take-up is opposite the mark P2 on the face plate. The needle thread pulling and wiping cycle should now be completed.

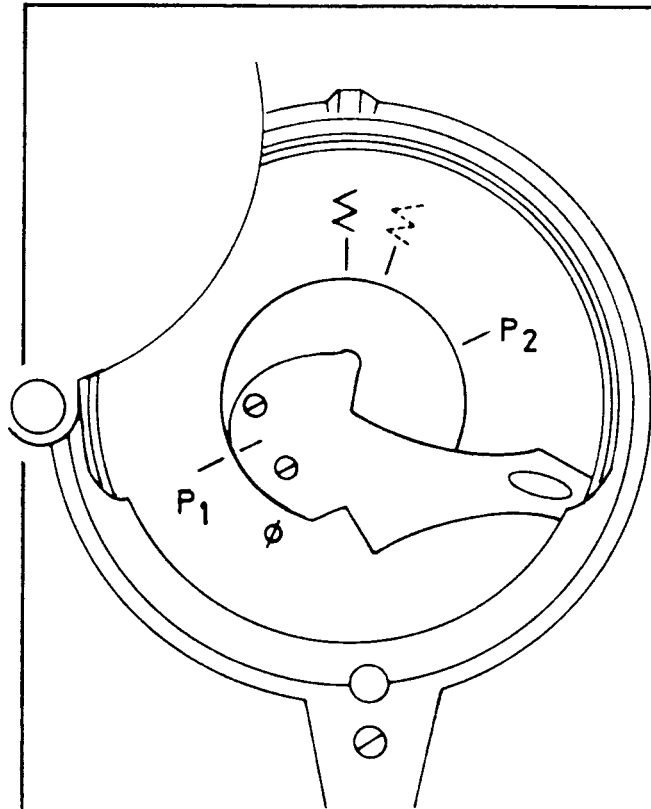


Fig. A

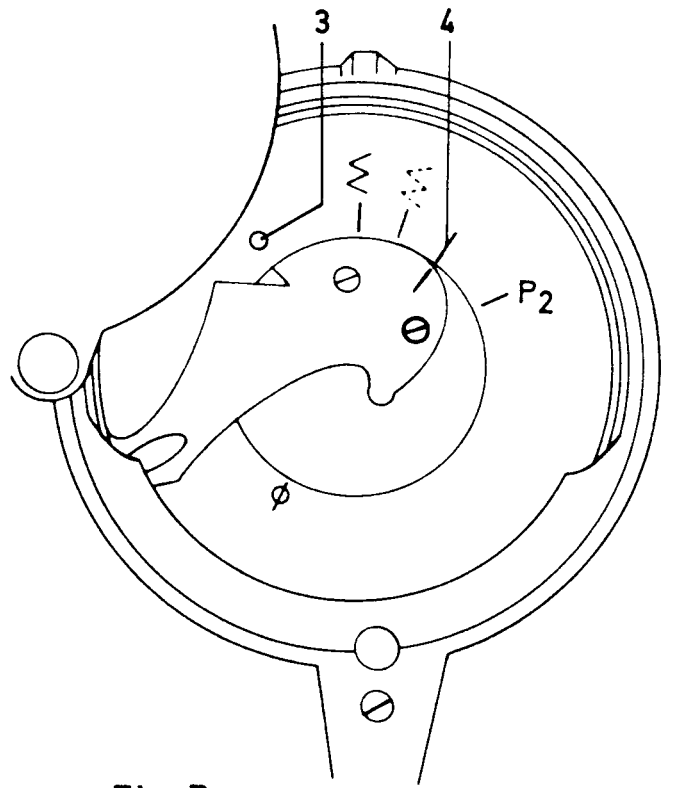


Fig. B

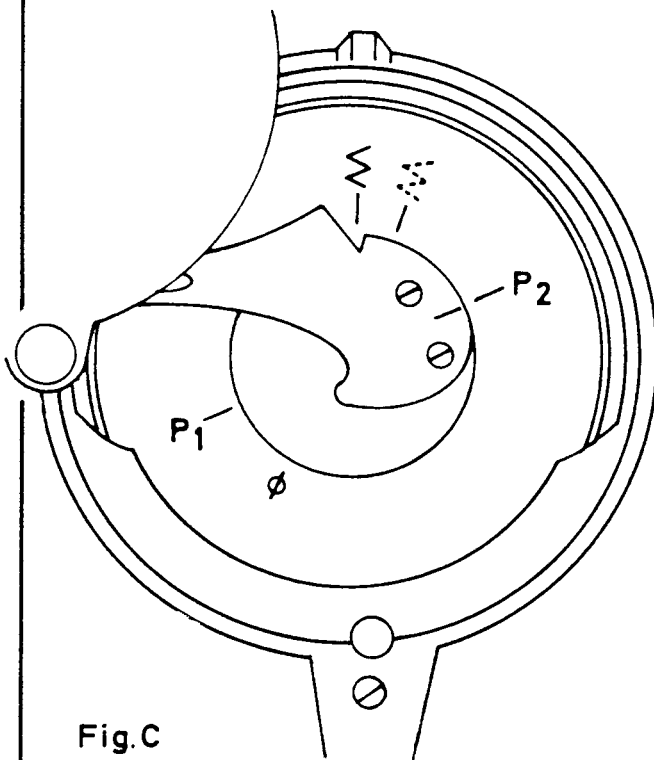


Fig. C

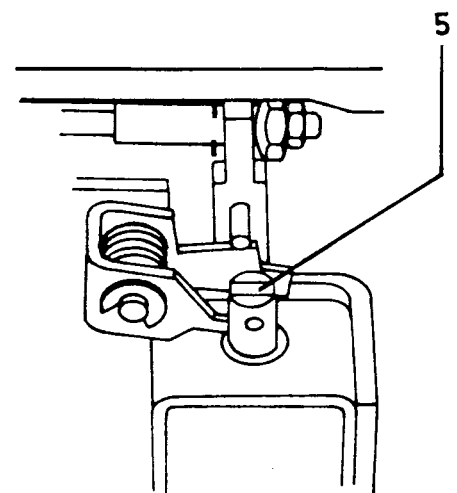


Fig. D

Timing and Setting

Control Cam (Figs. A, B, C, D and E)

Axial Adjustment (Figs. A and B)

As soon as the follower arm ① has been locked by the retaining pawl ②, the control cam ⑫ on the bed shaft is adjusted so that the gap between the highest point ④ of the control cam ⑫ and the cam follower ③ is 0.008 inch.—0.2 mm. This adjustment is accomplished after the set screws ⑪ in the control cam ⑫ have been loosened. The control cam ⑫ is then shifted to the proper position and the set screws ⑪ are tightened again. The collar ⑤ serves as an axial seating means for the control cam ⑫ and is fastened on the bed shaft flush against the control cam ⑫.

Radial Adjustment (Figs. C, D and E)

Loosen the set screws ⑪ in the control cam ⑫. Align the mark on the rotary take-up with a similar mark ⑩ on the face plate by turning the handwheel. At the same time release the retaining pawl ② by depressing the solenoid plunger ⑥. Now adjust the control cam ⑫ radially in such a manner, that the follower arm ⑦ is at the beginning of the highest point ⑧. Then push the control cam ⑫ against the collar ⑨ and fasten it in this position on the bed shaft by tightening the set screws ⑪. This adjustment ensures a synchronous trimming cycle and should be conducted with the greatest care.

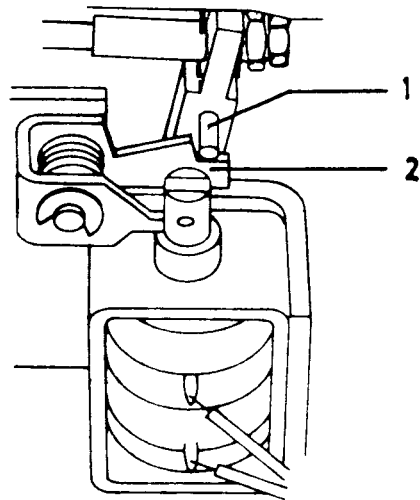


Fig. A

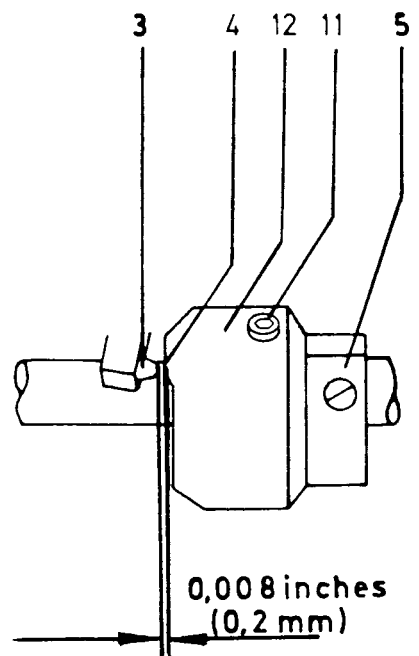


Fig. B

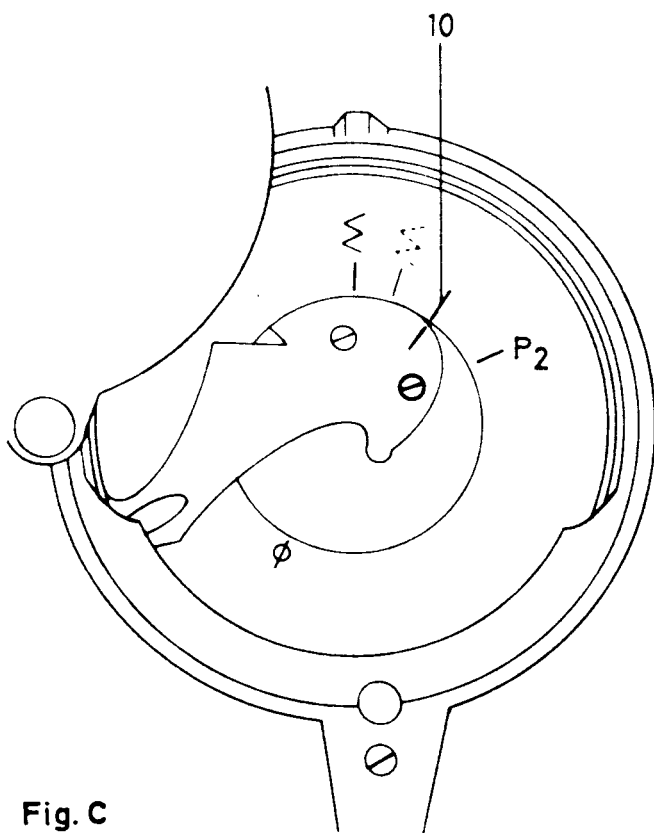


Fig. C

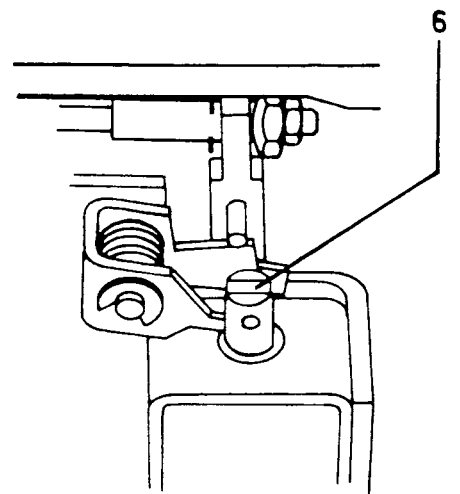


Fig. D

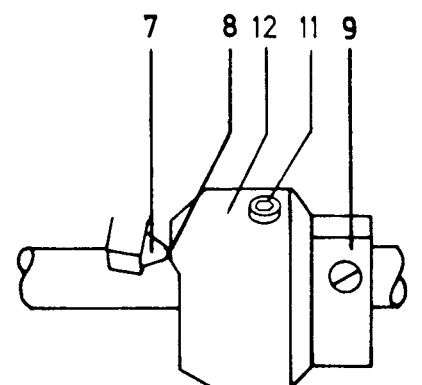


Fig. E

Timing and Setting

Pulling and Trimming Unit (Figs. A, B and C)

Upon disassembly of the Pulling and Trimming Unit (See page 19 for disassembly instructions) the adjustments described on this page can be conducted.

Knife Tension (Fig. C)

To increase the knife tension, tighten screw ⑤ . To decrease the knife tension, loosen screw ⑤

Thread Guiding Wire (Figs. A and B)

The function of the thread guiding wire ⑥ is to ensure proper trimming of the threads in that it positions the threads properly in relation to the knife.

The thread guiding wire ⑥ should be adjusted to make contact with the side of the knife ⑦ . This can be accomplished by loosening the nut ⑧ and sliding the guiding wire into place. Then retighten the nut. The tip of the thread guiding wire should project 0,05 inch.–1.2 mm below the underedge of the knife and should not interfere with the threads prior to their trimming.

Thread Puller Finger (Fig. C)

The thread puller finger ⑪ must be adjusted so that the point moves into the thread triangle and swings out properly to catch the two rear threads. This is the case when the minimum distance between the thread puller finger back and the knife mounting plate ⑫ is 0.008 inch.–0.2 mm. To make this adjustment, loosen screw ⑨ and shift the thread puller finger stop ⑩ until the above adjustment is achieved. Then retighten screw ⑨ again.

The thread puller should execute its movement as close as possible above the highest point of the hook, this being the most favorable position for entering the thread triangle. Minor adjustments can be conducted by forming the end of the thread puller finger ⑪ with a pair of flat pliers.

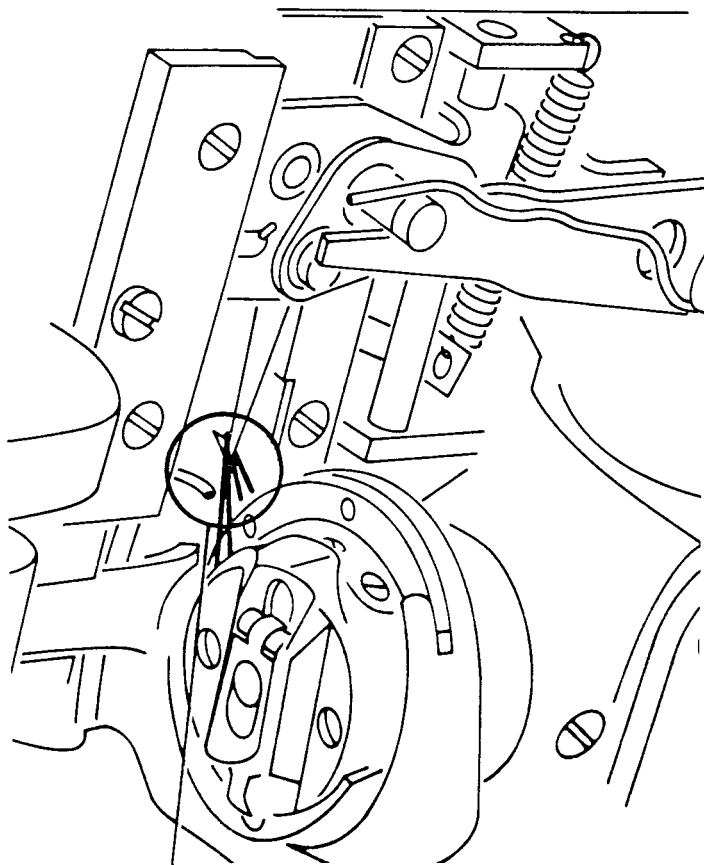


Fig. A

The thread guiding wire must not interfere with the threads

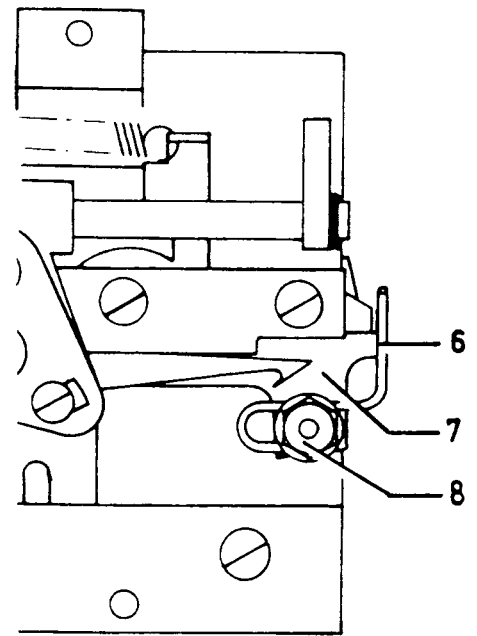


Fig. B

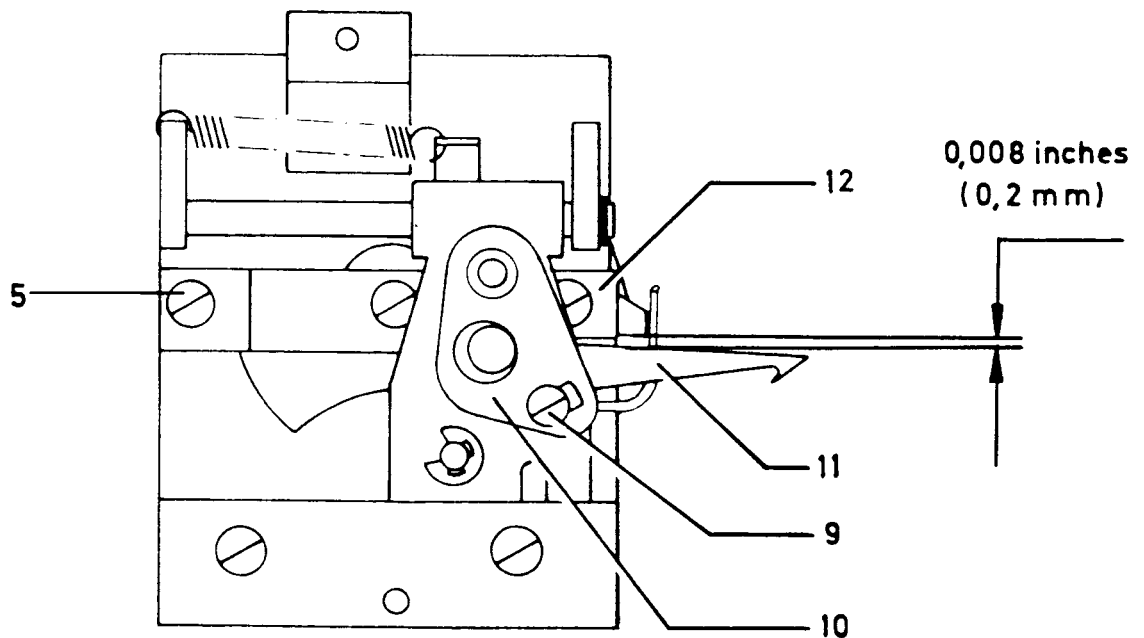


Fig. C

Timing and Setting

Movement of the Thread Puller Finger (Figs. A, B and C)

The movement of the thread puller finger can be adjusted by changing the length of the connecting rod. The length of the connecting rod ③ can be adjusted by loosening the lock nut ① and turning the screw socket ② clockwise to decrease the length or counter-clockwise to increase the length.

At the needle-down position P1 and with the solenoid plunger pushed in, the thread puller carriage ④ should easily move in towards the hook until it hits the stop ⑤ on the bed slide. If the thread puller finger cannot be moved far enough, lengthen the connecting rod as described above.

With the thread puller finger returned to its rest position, check the space between the carriage ⑥ and the block ⑦. The thread puller finger carriage should never be forced against the block ⑦ by the return lever ⑧. The carriage should be held approximately 0.06 inch.–1.5 mm away from the block ⑦ by spring ⑨. If this distance is too small, the connecting rod should be lengthened, if too large, the connecting rod should be shortened.

After setting the connecting rod to the proper length, be sure to tighten lock nut ①.

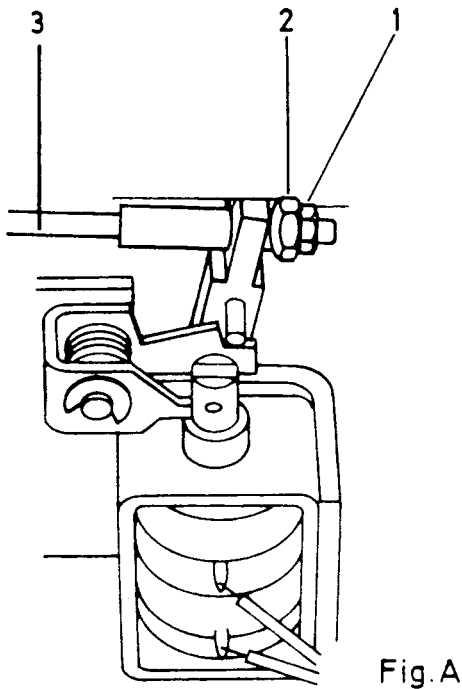


Fig. A

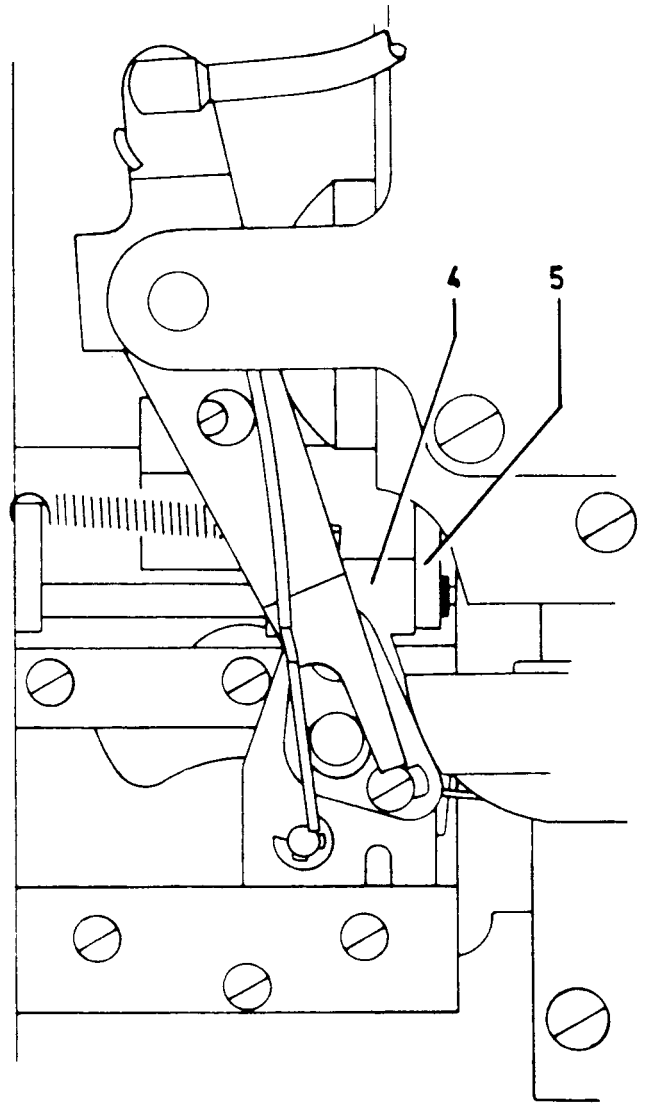


Fig. B

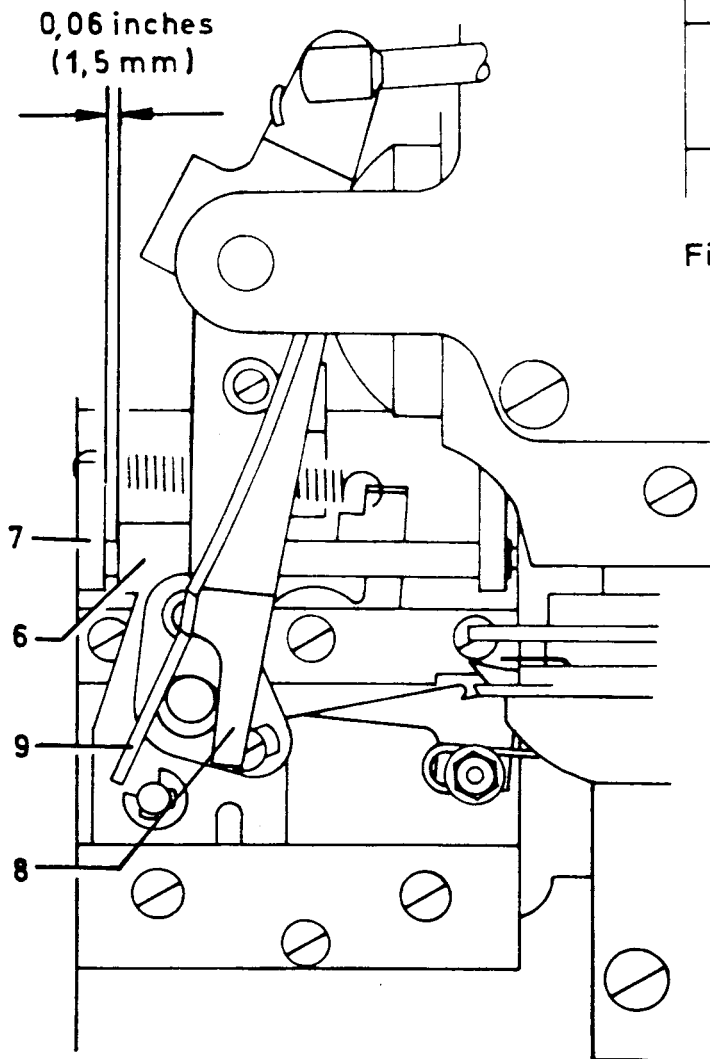


Fig. C

Timing and Setting

Needle Thread Puller Mechanism (Figs. A, B and C)

General Adjustment (Figs. A, B and C)

The stroke of the crank ① is determined by the adjustment of pawl ③ . The stroke required is $23/32$ inch.–18 mm.

To increase the stroke, shift pawl ③ in direction of the arrow. (Downward = Higher Stroke; Upward = Shorter Stroke).

Crank ① contacts the eccentric disc ② in its lowermost position. By turning this eccentric disc ② , the stroke can be equally divided by the horizontal centerline through the crank pivot.

Timing (Figs. A and B)

The thread puller mechanism can be timed by shifting pawl ③ in normal direction of rotation or contrary to the normal direction of rotation. (See illustration). The movement of the thread puller mechanism and the movement of the wiper to the left must be completed when the trimming cycle is finished.

The wiper must not start its return movement prior to the trimming cycle being completed.

Needle Thread Wiper (Fig. C)

The height of the needle thread wiper should be set so that it just passes under the needle without touching it. To adjust the height of the needle thread wiper, turn the machine in the normal direction of rotation until the timing mark on the take-up is 0.07 inch.–2mm beyond the timing mark ④ on the face plate. The height of the needle thread wiper in relation to the needle point can be checked only by releasing the needle thread wiper and puller mechanism as described on page 7.

The needle thread wiper block ⑤ should be approximately $15/64$ inch.–6 mm below the underside of the machine head so that the motion of crank ⑥ is symmetrically divided by the horizontal centerline through its pivot.

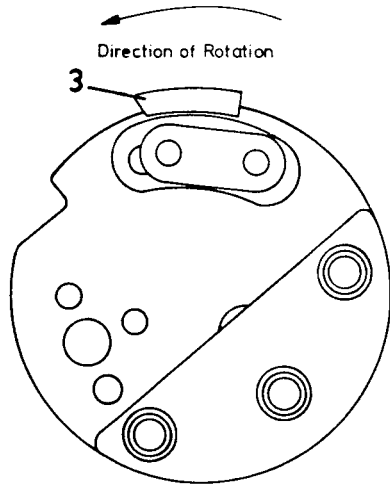


Fig. A

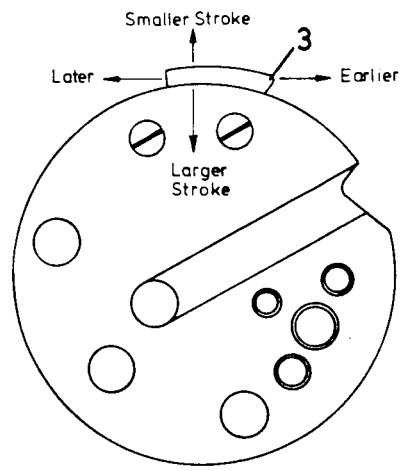


Fig. B

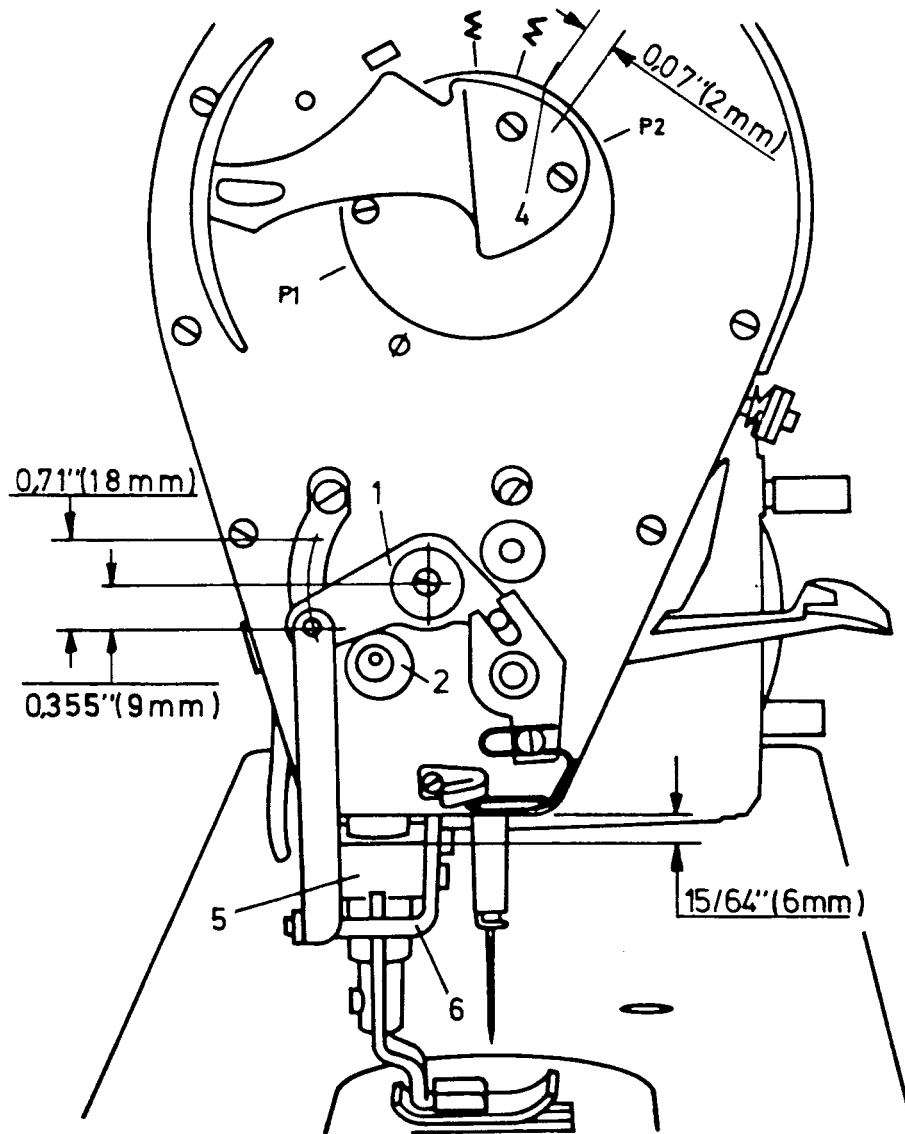


Fig. C

Timing and Setting

Needle Thread Puller (Fig. A)

The needle thread puller ①, in its rest position, is just below the thread guide ② and should in this position not interfere with the needle thread in any way.

In order to pull off more needle thread to increase the starting length or to pull off less needle thread to decrease the starting length, the needle thread puller ① should either be shifted to the rear or to the front, as shown in Fig. A.

The length of the starting end should strictly be varied by means of the respective adjustment of the needle thread puller.

However, the following adjustments could influence the length of the starting end, thus necessitating readjustment of the needle thread puller.

- a) Adjustment of the Thread Control Spring.
- b) Adjustment or timing of the Needle Thread Puller Mechanism.
- c) Adjustment of the Control Cam.

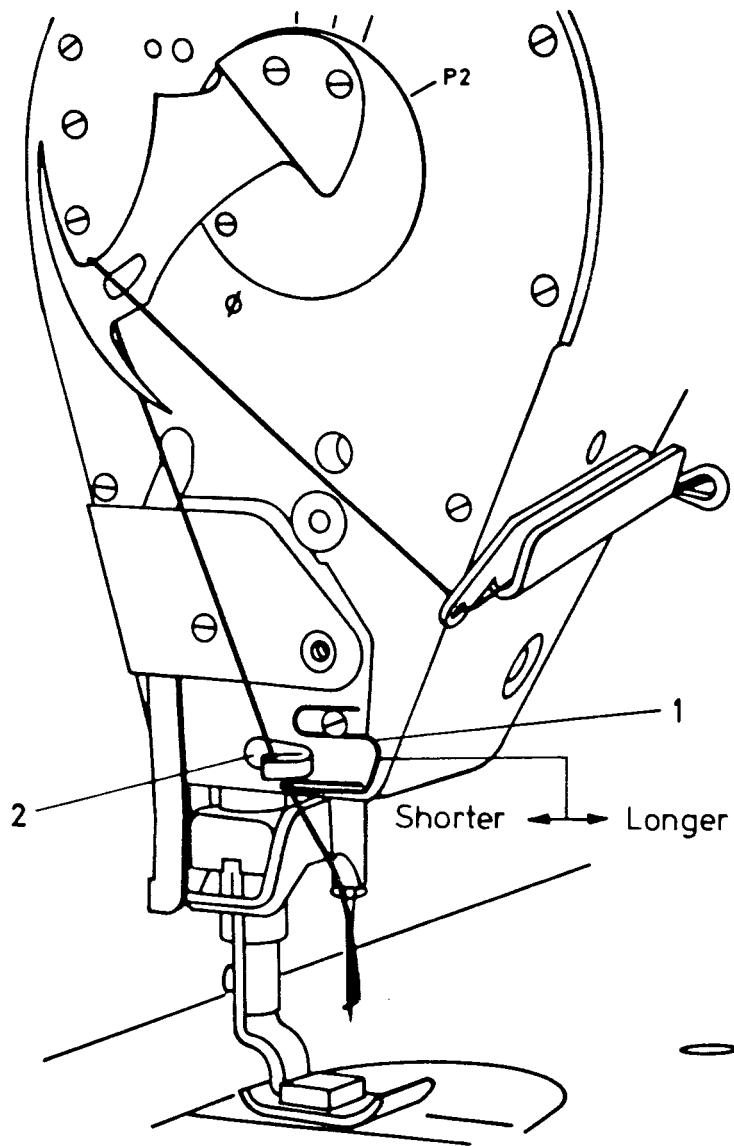


Fig. A

Disassembly and Assembly

Pulling and Trimming Unit (Figs. A and B)

Disassembly

To enable the disassembly of the Pulling and Trimming Unit, push in solenoid plunger ⑤ so that the thread puller ⑧ moves out and allows access to screw ① . Loosen screws ① and ② and lift the shank ③ of the torsion spring over the thread puller stud ④ . Now the Pulling and Trimming Unit can be removed from the machine.

Assembly

The Pulling and Trimming Unit is assembled to the machine by sliding it in and up to the stop of the bed slide and securing it with screws ① and ② . Then lift the shank ③ of the torsion spring over the thread puller stud ④ so that it rests on this part.

Thread Puller and Knife (Fig. C)

Disassembly

To disassemble the thread puller carriage ① , remove retaining ring ② and the screws ③ and ④ . Then lift plate ⑤ away from the bed slide ⑥ and pull shaft ⑦ out of its mount in the direction shown. The carriage ① is now loose and can be lifted away from the bed slide ⑥ . The thread puller finger ⑧ can now be removed from the carriage ① for reworking or replacement.

If it is necessary to replace the pawl ⑬ that actuates the knife ⑪ , remove retaining ring ⑨ and slide the pawl ⑬ out of the carriage ① . For replacing the knives ⑩ and ⑪ , the removal of the three screws ⑫ and unlocking of spring ⑭ are required.

Assembly

Assemble the parts in the reverse sequence, making sure that the movable knife ⑪ , together with a washer, is on the bottom.

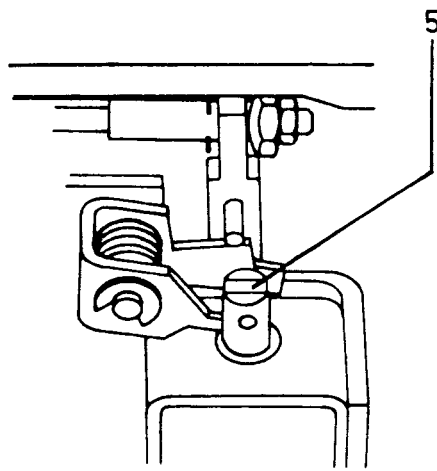


Fig. A

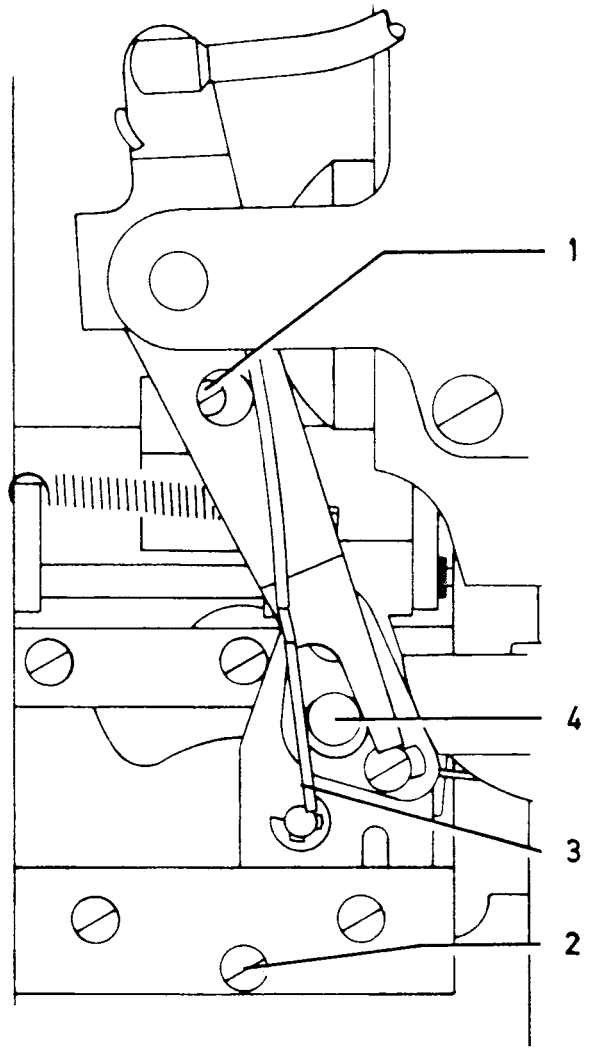


Fig. B

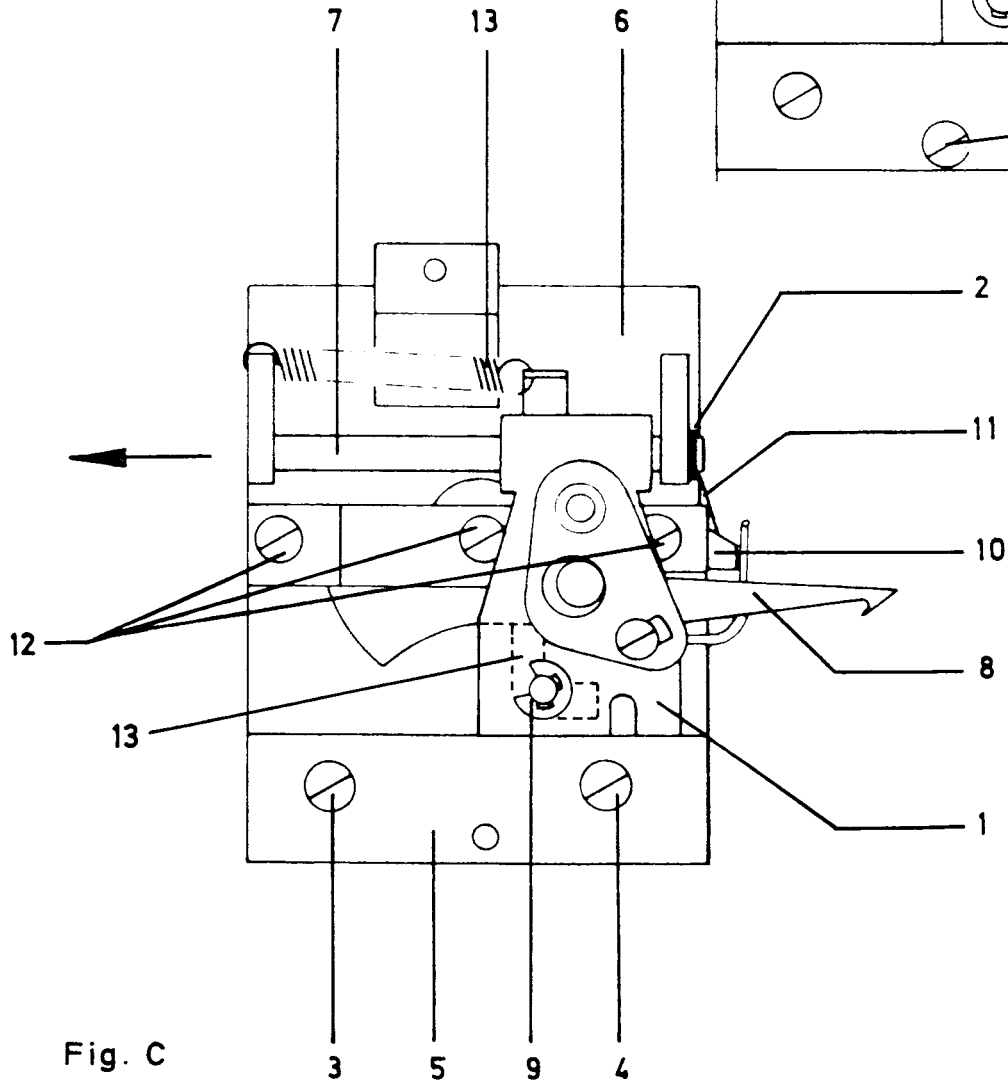


Fig. C

Electrical Drive for Singer 457 G Machines

with Underbed Thread Trimmer

EFKA-VARIOSTOP-Motor	Page
Assembly	23
Electric Circuitry	25
Operating Speeds	26
Adjusting the Commutator Sensor (Synchronizer)	31

EFKA-VARIOSTOP-Motor

Assembly

The EFKA-VARIOSTOP-Motor complete with control box should be mounted to the underside of the sewing table just like any conventional clutch motor. Then the distributor box (as illustrated) is also mounted beneath the table and the electric connections made. Finally the commutator sensor (synchronizer) is mounted to the handwheel hub of the machine and adjusted as instructed on page 29.

The speed ranges 1–3 should be checked as instructed on page 26. The number of stitches within Range 2 are important as they determine the proper start of the seam. They can be set with the respective selector button of the control box.

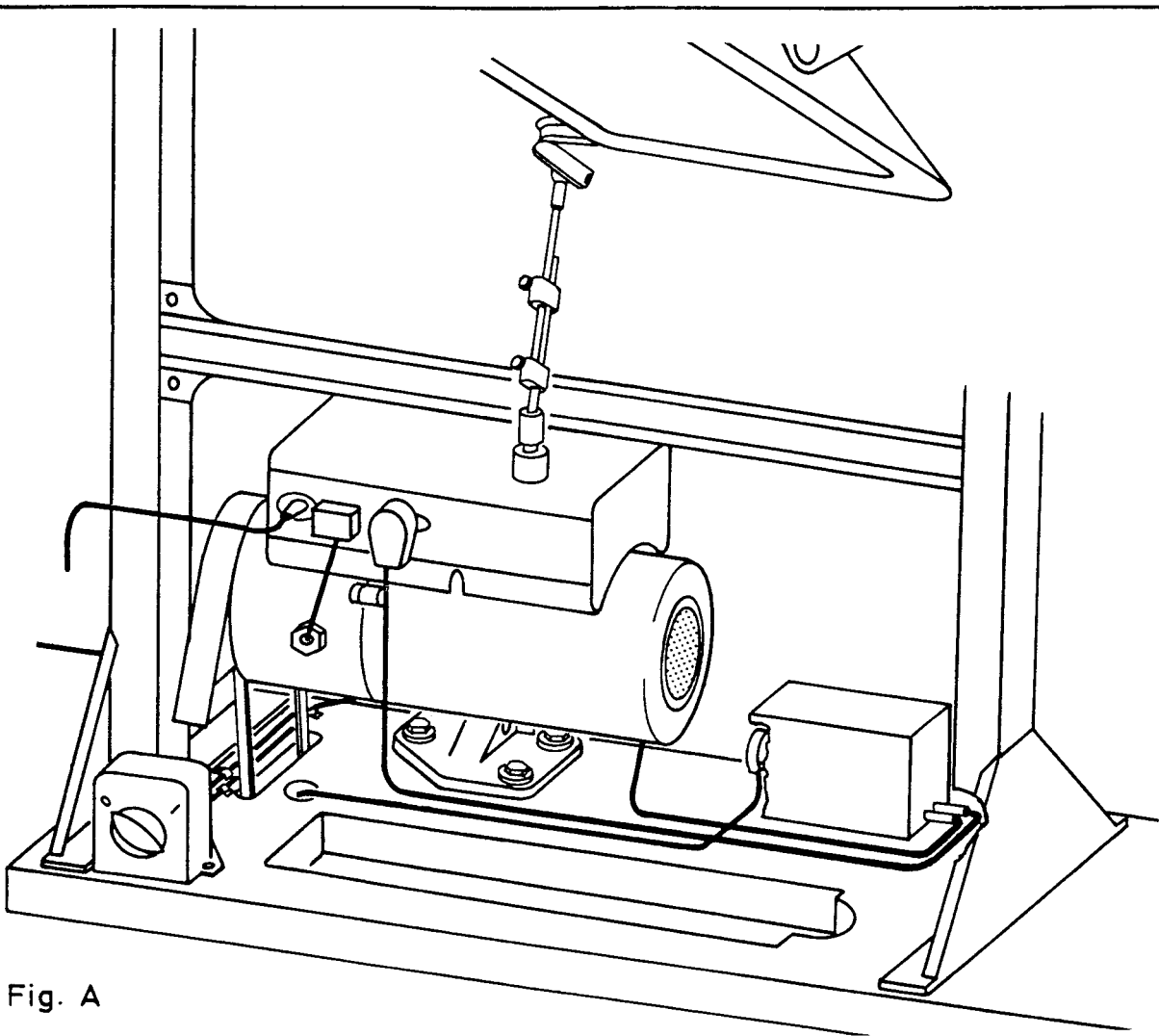


Fig. A

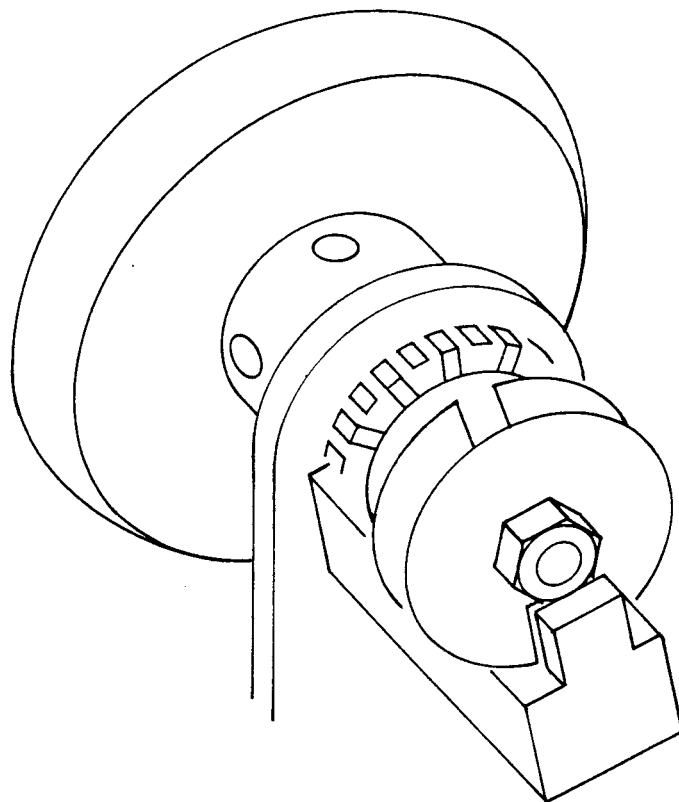


Fig. B

EFKA-VARIOSTOP-Motor

Electric Circuitry (Fig. A)

The solenoids in this underbed thread trimmer are supplied with current from the control box via the distributor box, type FKVZ 8A. The distributor box should be connected in accordance with Fig. A. The permanently fixed cable of the distributor box with the 10-pole plug must be connected to the appropriate socket of the control box, and the permanently fixed 3-pole cable of the control box must be connected with the terminal block in the distributor box. Thereby it is essential that the green-yellow wire is connected to the terminal indicated by the grounding symbol. Access to the terminal block can be made after removing the two screws securing the cover of the distributor box.

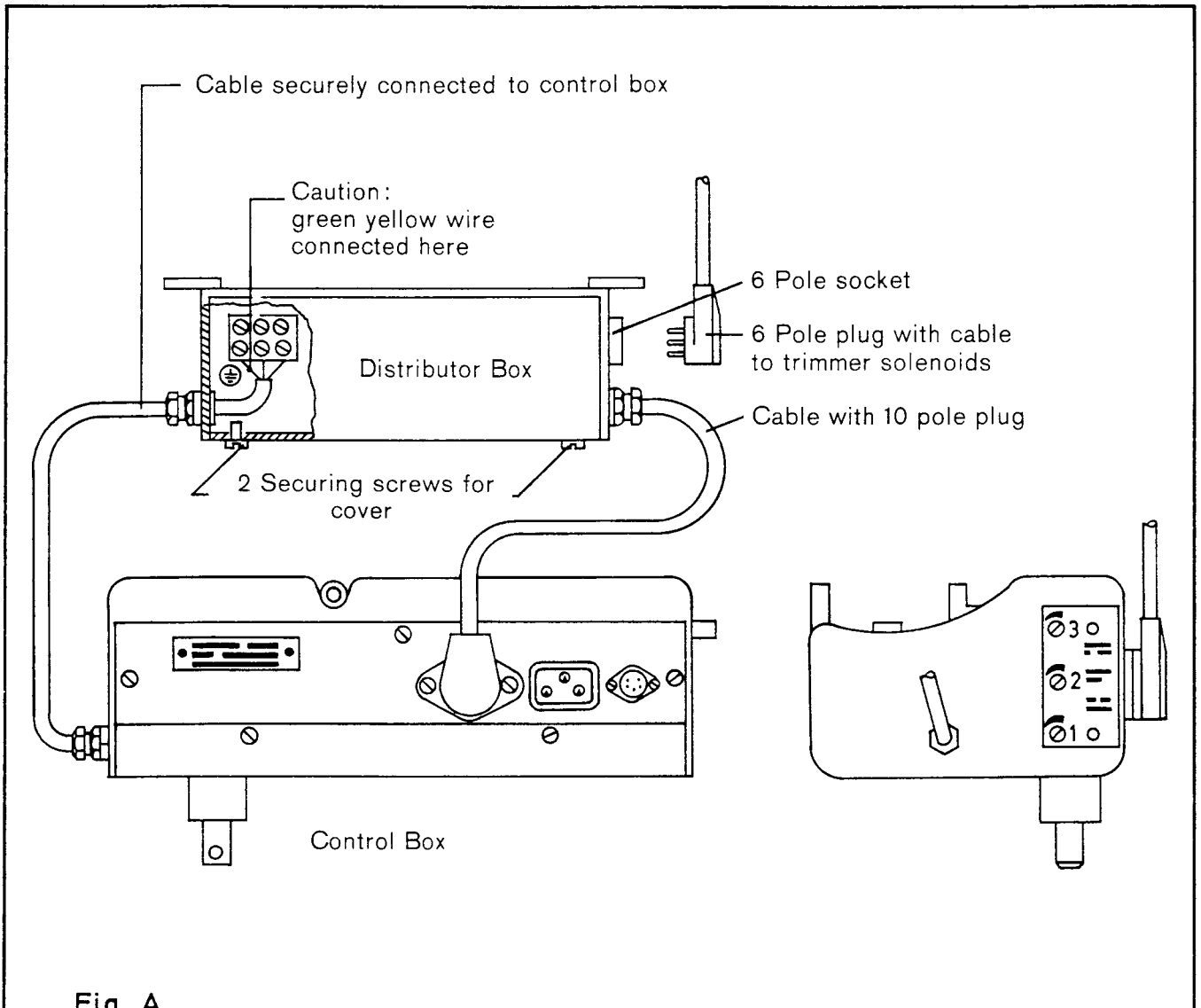


Fig. A

EFKA-VARIOSTOP-Motor

Operating Speeds (Fig. A)

The VARIOSTOP Drives with control box FKVSH6CX3 are designed to operate at 4 speeds, the first three of which are infinitely adjustable while the fourth is the direct ratio between the motor pulley and the machine pulley.

The operating speeds 1, 2 and 3 can be regulated by turning the potentiometer screw 1, 2 or 3 as indicated by symbols on the side of the control box. (See Fig. A)

Range 1: (Positioning Speed) It is set at the factory so that the machine positions with a speed of 160 RPM. Variation of the speed in Range 1 is possible by turning the appropriate potentiometer screw. (Counter-clockwise for less speed; clockwise for more speed). The positioning speed in Range 1 should not be set higher than 180 RPM or lower than 130 RPM.

Range 2: It is set at the factory so that the machine operates at the following speeds:

- a) motor 1400 RPM (1700 RPM) = 625 SPM
- b) motor 2800 RPM (3400 RPM) = 800 SPM

By turning the potentiometer 2 in the clockwise direction, the speed will be increased and by turning it in the counter-clockwise direction the speed can be reduced to the same speed as Range 1.

The selector on the side of the control box is used to regulate the number of stitches (0 to 4) that the machine will sew in Range 2 when the actuating shaft is moved rapidly in direction "A".

Range 3: It is set at the factory so that the machine operates at the following speeds:

- a) motor 1400 RPM (1700 RPM) = 1250 SPM
- b) motor 2800 RPM (3400 RPM) = 2100 SPM

By turning the potentiometer 3 in the clockwise direction the speed will be increased and by turning it in the counter-clockwise direction the speed can be reduced to the same speed as Range 2.

The operating speeds as set with the potentiometers 1, 2 and 3 are respective speeds as measured on the synchronizer and, therefore, the actual speed of the sewing machine. These speeds are completely independent of the motor pulley's ratio to the machine pulley and remain the same although the torque requirements of the machine may change.

When changing the operating speed in one of the lower ranges, the operating speed in the upper ranges will also change, for example, if Range 1 is readjusted, the operating speeds of the Range 2 and 3 will also change and if Range 2 is readjusted, Range 3 will also change. When necessary the upper ranges should also be readjusted after adjusting a lower range. The lower ranges, however, do not change when adjusting one of the upper ranges. making readjustment of the lower ranges unnecessary.

EFKA-VARIOSTOP-Motor

Operating Speeds continued

For this reason the adjustment of ranges should always be made in the sequence 1, 2, 3.

Range 1, Positioning Speed, is always required. Ranges 2 and 3 can be rendered inactive when the potentiometers 2 and 3 are turned counter-clockwise as far as they will go.

As already mentioned, Range 4 is the direct ratio of the motor pulley. Any changes in the Ranges 1, 2, or 3 will have no effect on Range 4. Any change in Range 4 (through exchanging the motor pulley) will also have no effect on the Ranges 1, 2 and 3.

Measuring the Operating Speeds: After removing the cover on the synchronizer, the operating speeds can be measured with a tachometer directly on the shaft of the synchronizer.

Attention: When exchanging sewing machines with preassembled synchronizers, the operating speeds in Ranges 1, 2 and 3 should be checked.

Functional Sequence:

When the actuating shaft is moved slowly in direction "A" (via foot treadle and related linkage) until it reaches the end stop, the operating speed of the machine will follow the sequence of Ranges 1, 2, 3 and 4.

On the other hand, when the actuating shaft is moved rapidly in direction "A" until it reaches the end stop, the machine will sew 0 to 4 stitches at the speed of Range 2 and immediately shift to the operating speed of Range 4. In the case that, as previously mentioned, the speed of Range 2 has been reduced to that of Range 1, the first 0 to 4 stitches will be sewn with the speed of this range.

When the actuating shaft is slowly returned to its starting position, the operating speed will follow the sequence of Ranges 4, 3, 2, 1 and the machine will stop in needle-down position.

When the actuating shaft is rapidly returned to its starting position the machine will stop immediately.

Functional Positions:

Position 1 (needle bar down) is reached when the actuating shaft is returned to its starting position.

Position 2 (needle bar raised) is reached after moving the actuating shaft in direction "B" by heeling the foot treadle. The solenoids are energized for 70 ms and as soon as they are deenergized, the machine moves to the upper needle position. During this period the trimming and wiping mechanisms are mechanically actuated.

EFKA-VARIOSTOP-Motor

Attention: If the operator accidentally starts the trimming operation and immediately resumes sewing, the trimming operation will always be carried out to completion before the machine starts to sew. A built-in safety device in the control box prevents the machine from sewing when the trimming mechanism is in operation, thereby averting any damage to the trimming mechanism.

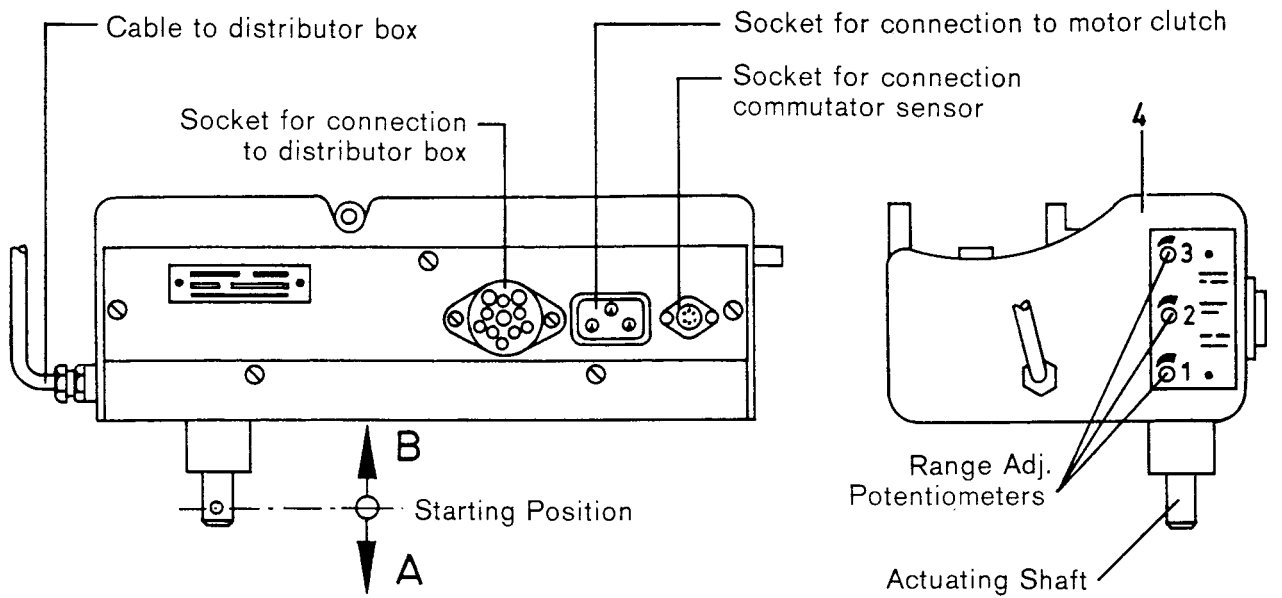
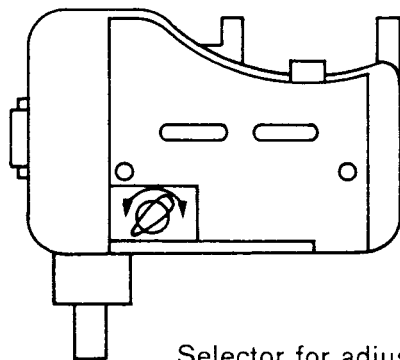


Fig. A



Selector for adjusting the number of starting stitches (0 to 4) (Infinitely variable).

Fig. B

EFKA-VARIOSTOP-Motor

Adjusting the Commutator Sensor (Synchronizer) (Figs. A, B, C and D)

After the commutator sensor has been mounted on the handwheel hub, adjustments for the needle-down and needle-up positions are made.

The first adjustment, using the inside disc ①, should be made for the needle-down position P1. Turn the handwheel until this position is reached on the face plate. Next loosen the hex nut ② and set the disc so that the notch ③ is between the electronic pick-ups ④ and ⑤. Check the adjustment by running the machine after the nut has been retightened. When this setting is found to be incorrect, the disc should be readjusted using the following as a guide:

- a) If the machine stops too late, turn disc ① in direction of the normal handwheel rotation.
- b) If the machine stops too soon, turn disc ① in the opposite direction of the normal handwheel rotation.

For adjusting the needle-up position the outer disc ⑥ should be used. Turn the handwheel until the position P2 on the face plate is reached. Next loosen hex nut ⑦ and turn the disc until the notch ⑧ is behind the electronic pick-up ⑨. The outer disc ⑥ can be readjusted in the same manner as the inner disc.

Before replacing the cover, make sure that the discs (the nuts) are properly tightened.

In case the commutator sensor is not equipped with the nuts ② and ⑦ the discs are held in place by springs. Disc 1 should still be adjusted in the manner described above.

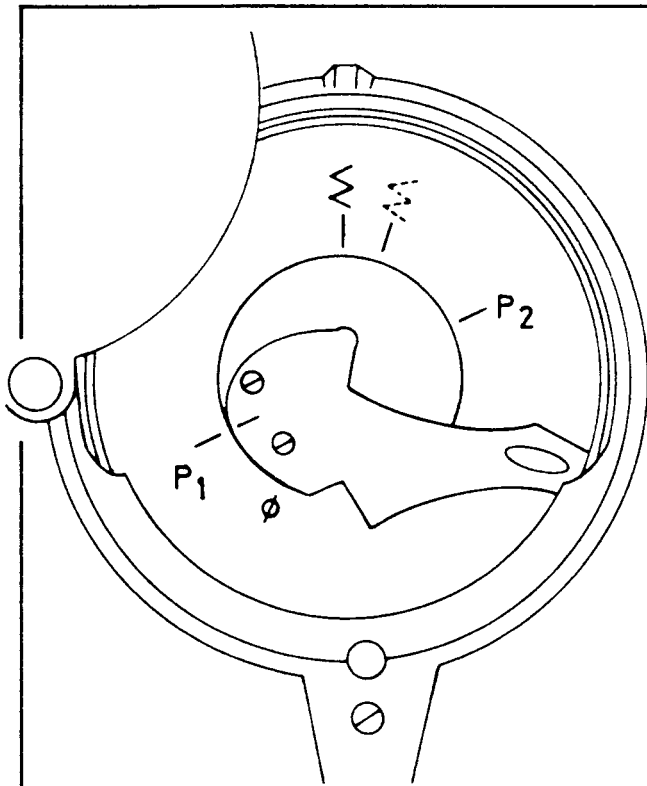


Fig. A

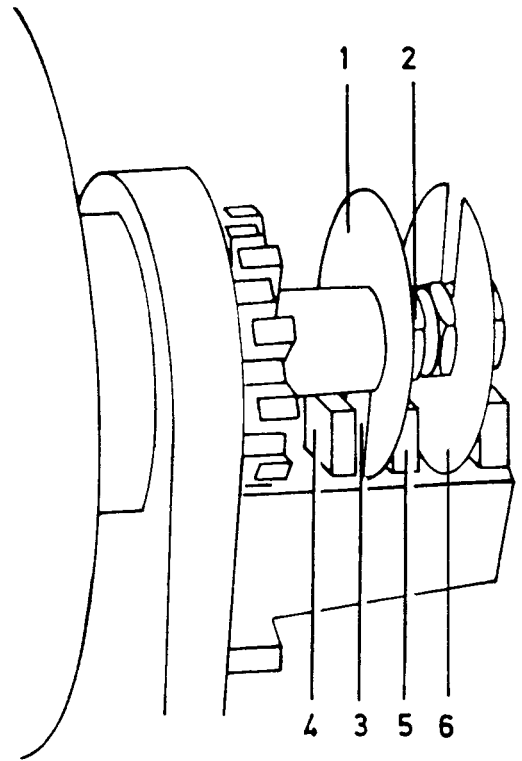


Fig. B

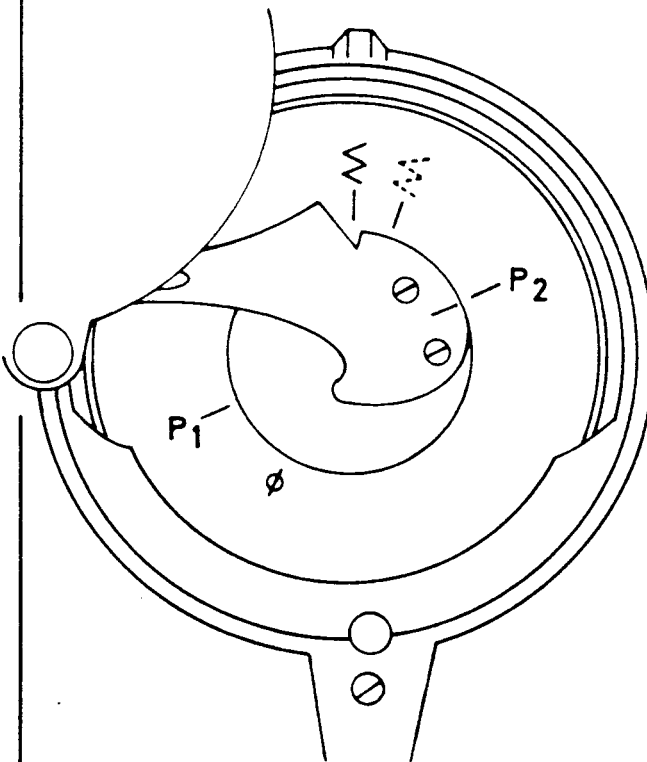


Fig. C

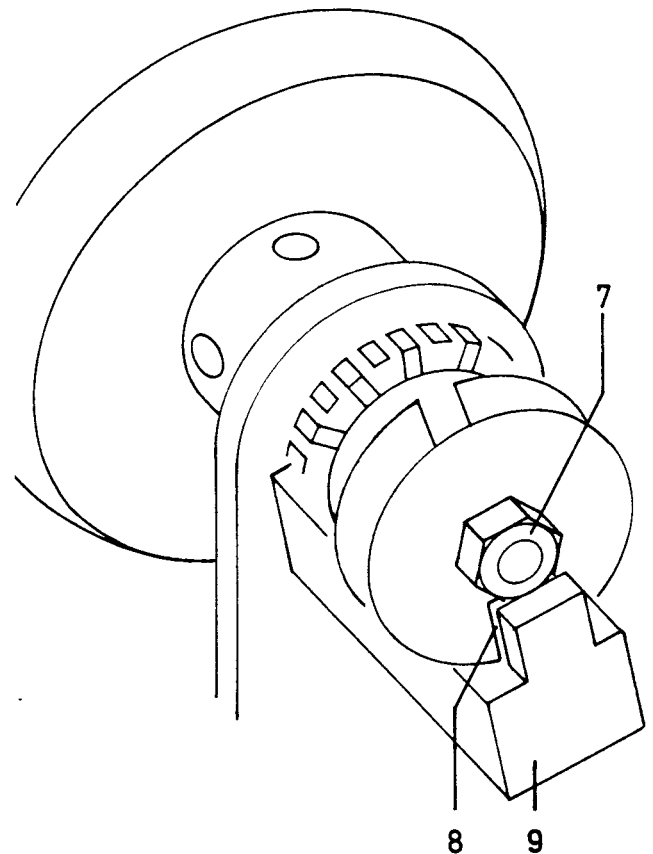


Fig. D