SERVICE MANUAL

PFAFF 230/332 Automatic

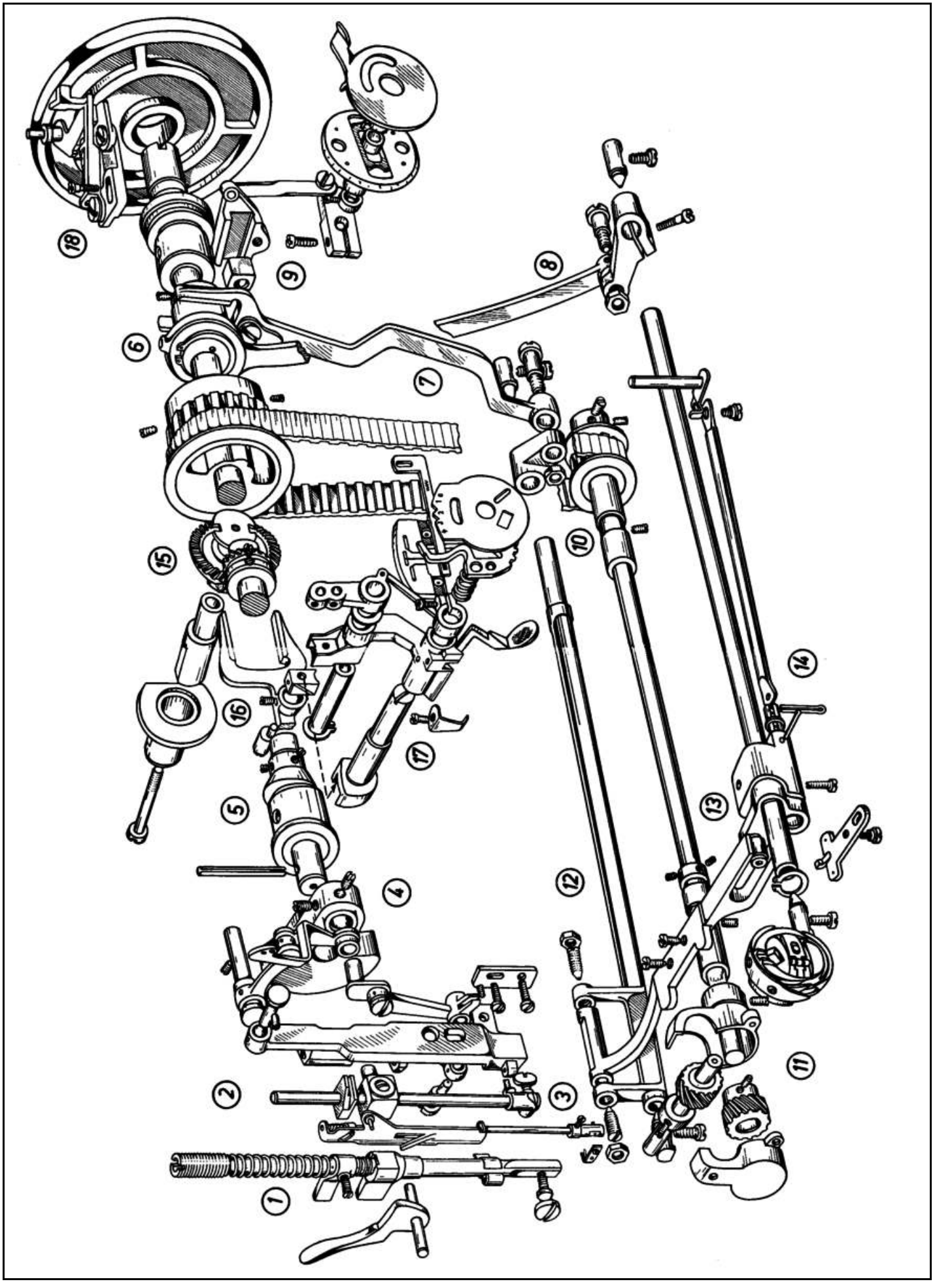
Functions of Assemblies

Care and Maintenance

Adjustment and Assembly Procedures

Practical Hints

G · M · PFAFF AG · Sewing Machine Factory · Kaiserslautern/Germany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① = Presser bar assembly

② = Needle bar assembly

③ = Needle threader

④ = Link take-up

⑤ = Arm shaft front bushing with Automatic Mechanism driving eccentric

⑥ = Feed driving and lifting eccentric

⑦ = Feed driving connection (Feed forked connection)

⑧ = Feed lifting connection with feed lifting shaft and rear crank

⑨ = Stitch regulator mechanism

⑩ = Hook drive shaft with Synchroflex belt sprocket wheel

⑪ = Sewing hook with driving mechanism

⑫ = Feed driving shaft (Feed rock shaft) with feed dog carrier

⑬ = Feed lifting shaft with front crank

⑭ = Drop feed mechanism

⑮ = Needle vibrating eccentric and bevel gear assembly

⑯ = Needle bar frame pitman

⑰ = Stitch width regulator mechanism

⑱ = Bobbin winder

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FOREWORD

This profusely illustrated Service Manual contains many important adjustment procedures for the PFAFF 230/332-260 Automatic and is primarily intended for Pfaff dealers and their mechnical staff. It should be used together with the instruction book and the spare parts catalogue. The fold-out drawings at the beginning and the end of the book will materially assist in understanding how the individual assemblies of the machine function.

Beginning with a general description of the machine and the workings of the Automatic Mechanism, this manual is a valuable source of information on all questions concerning the elimination of sewing troubles and the performance of adjustments and minor repairs. It must not be confused, however, with a guide book on performing major repairs; its contents are merely intended to deepen the mechanical knowledge on the PFAFF Automatic and to constitute a reliable basis for the job-proven PFAFF service.

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I. Operation and Maintenance

The Functions of the Parts

The PFAFF 230/332 Zigzag and the PFAFF 230/332-260 Automatic machines all make the conventional lockstitch. This type of stitch is formed by an upper (spool) and a lower (bobbin) thread which are interlocked inside the fabric at every stitch. Needle, sewing hook and take-up lever are essential in forming the stitch.

The parts discussed thereafter are instrumental in producing the seam.

The Needle

It takes the thread down through the material and, rising from the lowest point of its stroke, forms the needle thread loop which is entered by the poin of the hook.

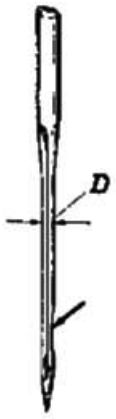


Fig. 1

Sewing machine needles are available in many different varieties and sizes and, hence, are classified into several groups (systems). PFAFF domestic sewing machines normally use System 130 R needles with a flat shank. System 130 B round-shank needles are used for cording and multi-needle decorative sewing. Make sure you use only genuine PFAFF needles!

Needle sizes are determined by the blade diameter (**D** in Fig. 1) and are given in one-hundredths of a millimeter. A No. 100 needle, for example, has a blade diameter of $^{100}/_{100}$, or one millimeter. Opposite the flattened side of the shank a long groove extends all the way down to the needle eye. On PFAFF zigzag and automatic sewing machines this groove must face toward the operator. The clearance cut or scarf in the blade of the needle, marked by an arrow in Fig. 1, must point toward the hook. The correct relation between needle size and thread weight may be established by referring to the Needle and Thread Chart which is contained in the instruction book furnished with each machine.

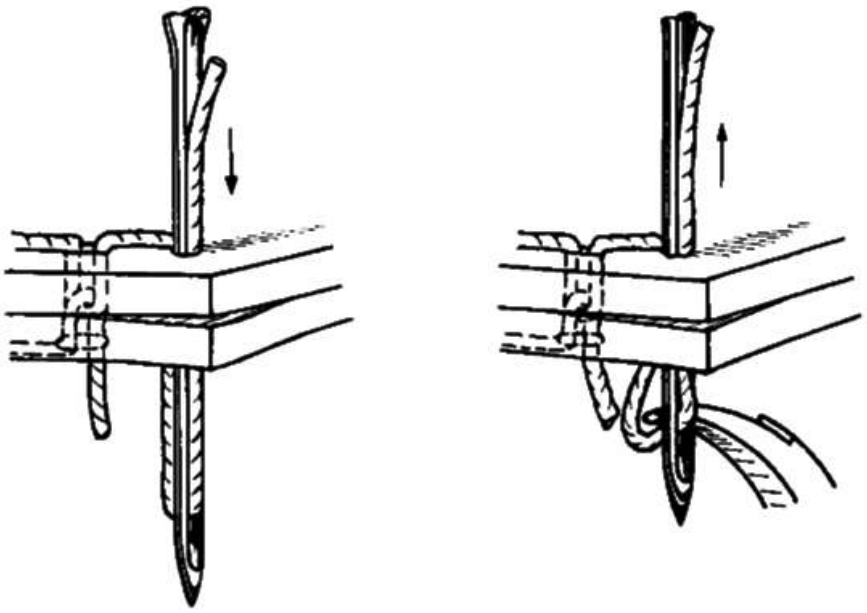


Fig. 2

The Sewing Hook

The function of the sewing hook is to enter, with its point, the needle thread loop which forms at the needle eye as the needle ascends (Fig. 2), and to enlarge this loop and pass it around the stationary bobbin case (Fig. 3).

The type of loop taker which is used in the PFAFF 230/332-260 is a constant-motion, transverse rotary hook whose shaft is geared to the top shaft on a 2:1 basis. Hence, a stitch is formed at every other revolution of the hook.

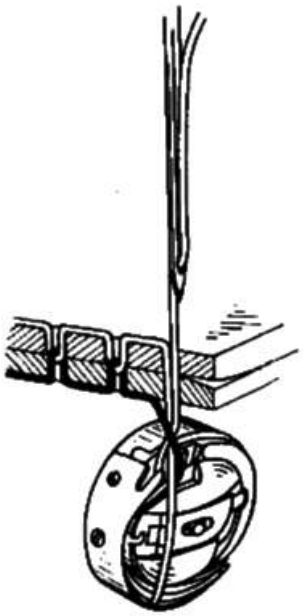


Fig. 3

The Take-Up Lever

It provides the correct amount of thread required to enlarge the loop, and draws back the excess thread after the loop has passed around the bobbin case. In the last part of its upward stroke, the take-up lever draws the stitch tight and is aided in performing this function by the forward movement of the feed dog. At the same time the take-up lever pulls through the upper tension the amount of thread which is required for the next stitch.

All PFAFF domestic sewing machines feature the link take-up.

The Feed Dog

The principal function of the feed dog is to move the material forward or backward in accordance with the stitch length set at the stitch length regulator. The feed dog should move the material only while the needle is out of the goods.

The Thread Tension

Upper and lower threads must be sufficiently tight to ensure a correct setting of stitches. The relation between upper and lower tensions should be such that the concatenation of both threads will lie exactly midway between the top and bottom surfaces of the material. This relation is determined by

the upper tension (tension discs) on the front of the machine, and

the lower tension (flat spring) on the bobbin case.

Fig. 4

The new type upper tension (Fig. 4) is so designed that all grades of tension, from loose to tight, can be covered with just one complete turn of the tension knob. A scale which is provided on the tension device greatly helps in setting any specific tension desired. For two-needle work the upper tension is fitted with a third tension disc.

To correctly regulate the tension on the threads, begin by setting the bobbin thread tension at a medium grade. For this purpose, turn the regulating screw (located in the middle of the tension spring on the bobbin case) to

the right until a noticeable resistance has to be overcome when pulling the thread. Then turn the tension knob of the upper tension until a tightly set stitch is obtained. To check whether the threads are locked in the center of the material, set the machine for a wide zigzag stitch and sew on a piece of medium-heavy fabric. If the tensions are correctly set, the threads should lock in the fabric exactly at the zigs and zags of the seam, and the seam should look alike on both sides of the fabric. For decorative sewing, slightly increase the tension on the bobbin thread so as to obtain a neat satin stitch on the surface of the material.

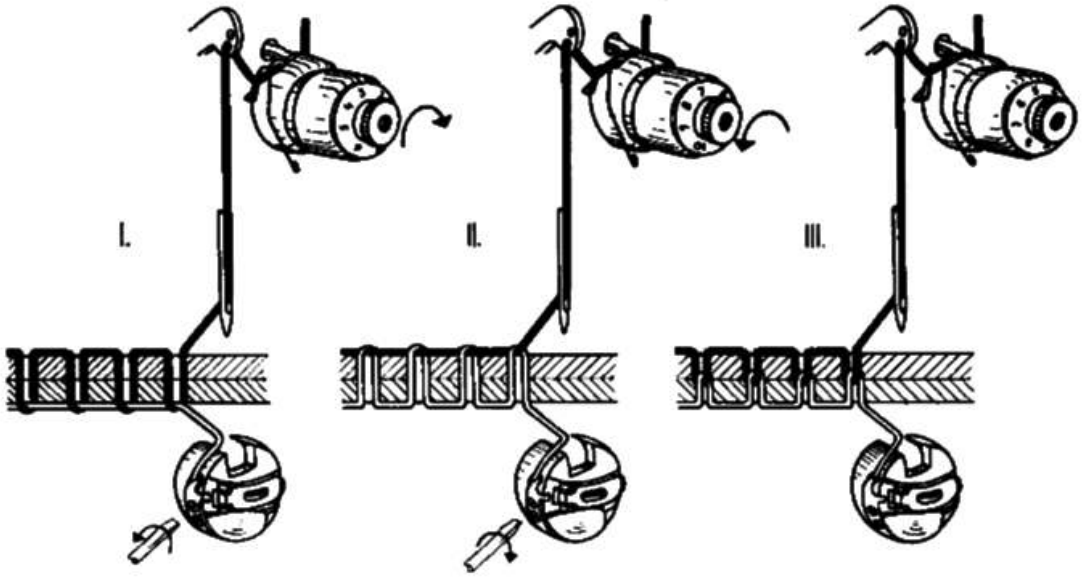


Fig. 5

Seam sketch III (Fig. 5) shows the perfect stitch. Both threads are interlaced in the center of the thickness of the material.

In seam sketch I the threads interlock on the underside of the fabric.

Cause: Upper tension too loose or lower tension too tight.

The interlacing of threads on the surface of the fabric is illustrated in seamsketch II.

Cause: Upper tension too tight or lower tension too loose.

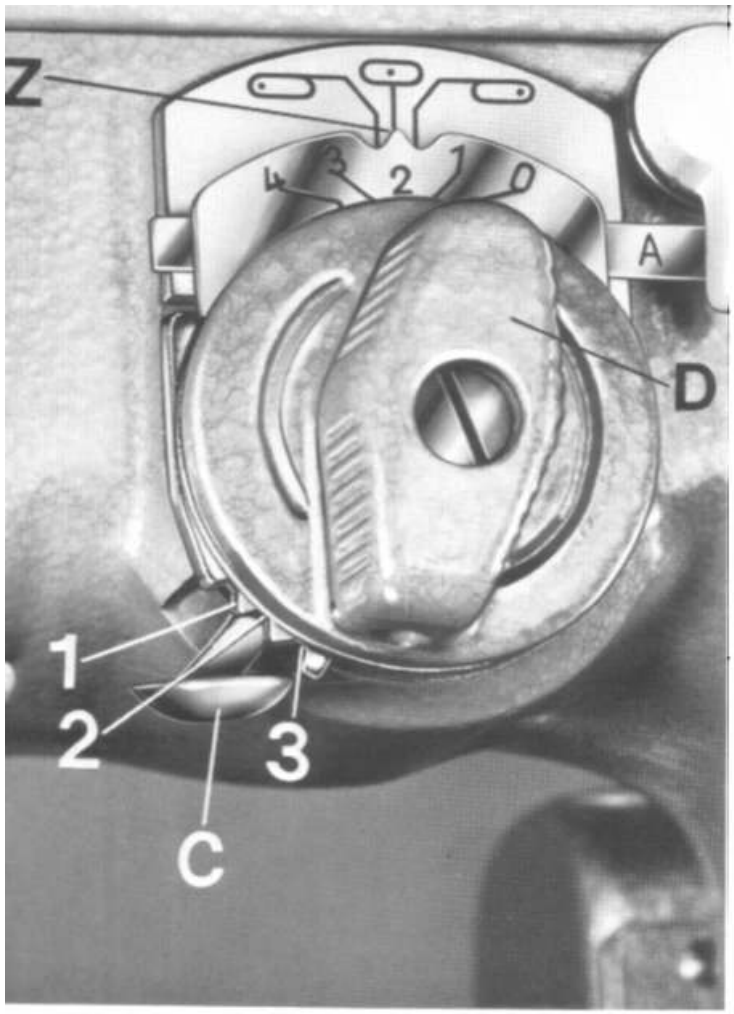
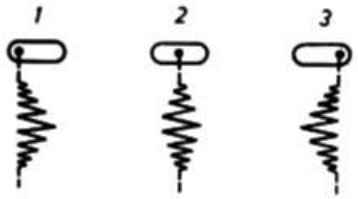


Fig. 6

The Zigzag Mechanism

To make the zigzag stitch and the many variants which are derived from it, the needle bar must swing crosswise to the direction of sewing. For this reason it is carried in a vibrating needle bar frame whose sideways motion is derived from the needle vibrating eccentric and transmitted to the frame by means of the needle bar frame pitman. The width of this sideways motion is determined by the stitch width set. The more button **D** (Fig. 6) is turned over to the left, the wider the needle bight will be. Its maximum width is about $^{3}/_{16}$". When button **D** is set on zero, the machine will sew straight. Besides changing the stitch width, the possibility exists to vary the needle position in relation to the needle slot. This adjustment will affect both the position of the straight seam and the starting position of the zigzag seam. To alter the needle position, press down needle position lever **C** (Fig. 6) and engage it in either notch 1, 2 or 3. Pointer **Z** (Fig. 6) on the top scale indicates the position of the needle in the needle slot.



Notch 1 – Needle in left position Notch 2 – Needle centered in needle slot
Notch 3 – Needle in right position

Important Hints for the Customer

1. Always turn the balance wheel of a PFAFF domestic sewing machine toward you.

2. Never turn the balance wheel in the opposite direction once the machine has been threaded.
   (Never run a theaded machine unless there is a piece of fabric under the presser foot!)

3. Before commencing to sew lay both threads under and toward the back of the presser foot.

4. When beginning or ending a seam, make sure the take-up lever is in its highest position.

5. Regulary put a drop of oil into the hook race.

6. Use only genuine PFAFF accessories and replacement parts.

Preparing the Machine for Delivery

Storing Heads and Cabinets

It goes without saying that store rooms have to be absolutely dry. If adverse local conditions make it impossible to comply with this rule, it is strongly recommended to procure a dehumidifier which will keep the degree of air moisture at the same level regardless of the season. Moisture, particularly when it rises from the floor, has a detrimental effect on the machines and cabinets stored. In all such cases the occurrance of a slight trace of rust is inevitable despite the precautions taken by the manufacturer. If cabinets with mounted machines are to be left in their cartons, make certain that the packing has not absorbed any humidity in transit. If it has, unpack the machine at once and store it thus. It is best to store the heads on shelves and the cabinets, whether packed or unpacked, on a lath grid.

Checking Cabinets and Stands

Before mounting the head, check and oil the cabinet or treadle stand which has been selected for the machine. To do this, put it on a level surface and check whether the door and the drawers open easily. If not, apply a little paraffin wax to all surfaces where there is friction. This will eliminate creaking.

Next, the following moving parts in the treadle mechanism are to be oiled:

a. Stand wheel bearing
b. Pitman bearing
c. Treadle bearing

Then make sure that there is no excessive play between the center pins of the treadle. If adjustment is required, take the stand screw wrench, loosen square-head srew (186) on one of the center pins, and push the pin over toward the treadle as far as it will go, without rotating it. Then tighten the screw, which engages the level surface of the center pin.

Fastening the Bed Plate Extension (PFAFF 230)

(German made cabinets only)

Tilt the machine up so that it rests on its needle bar end (put a felt pad under the face cover), and turn the bed plate toward you.

Slip the extension, with its connecting flap down, on the balance wheel end of the bed plate, insert screw and washer, bring the extension in line with the bed plate, and screw it down. Minor corrections may be made after the head has been mounted on the cabinet.

Mounting the Head

(German made cabinets only)

After removing the top cover of the cabinet, lift the head hinges all the way up, and turn set screws (297) on the machine so far out that they do not protrude into the holes which receive the hinge studs.

Now seize the machine by the head and the arm standard, slightly tilt it down and push it onto the hinge studs cautiously. In sliding the machine on the studs, make sure that both studs enter the boreholes simultaneously. Failure to observe this rule will cause bending of the hinges. The same applies to lifting the machine off the studs whereby care should be taken that both set screws are sufficiently turned out. Having ascertained that the studs have entered the holes as far as they can go, swing the machine into sewing position. Now check whether there is an even and adequate interspace between the front edge of the bed plate and the top flap of the cabinet. If the space should be too wide, slip as many spacers (28419) over the hinge studs as may be required to reduce it to normal. Then tilt the machine back and screw down the set screws well enough to prevent them from getting loose when the machine, dropped within the cabinet, is shipped to the customer. To ensure that the hinges will not be damaged in transit, lay the cabinet on the back in the delivery truck. In certain instances it may be advisable to mount the machine on the cabinet in the customer's home.

Cleaning the Mechanisms in the Machine

For some time already all PFAFF domestic sewing machines are being sprayed with a rust preventive fluid. This is done chiefly to curb the occurrence of a light trace of rust on metal surfaces under tropical conditions. In spraying the machine with a mixture of vaseline oil and gasoline it cannot be avoided that spatters of the fluid will enter the bearings and cause binding after the gasoline has evaporated. To prevent this, wash this substance out of the bearings with cleaning fluid (kerosene) while running the machine. Then apply normal PFAFF sewing machine oil to all oiling points to ensure easy running.

For the above operation, it is best to set up the machine on a stand. If proper caution is applied, the machine may be rinsed with cleaning fluid even after it has been mounted on the cabinet.

Here is the procedure which should be followed:
Tilt the machine back as instructed under "Care and Maintenance" in the instruction book, and put a few drops of cleaning fluid into all oiling points (marked by arrows in the pertinent illustrations) in the understructure of the machine (bed plate or cylinder arm mechanisms). For this purpose, fill the cleaning fluid into an oiler.

This done, swing the machine back to the sewing position and run it for 10–20 seconds at varying speeds.

After tilting the machine back once more, wipe off the fluid that has seeped out and put a few drops of PFAFF sewing machine oil into all marked oiling points. In addition, apply one or two drops of oil between the lower sprocket and the Synchroflex driving belt. (This does not apply to machines which are fitted with clip belts.)

Again return the machine to its upright position, remove the top cover, and apply cleaning fluid to all oiling points marked in the arm. Then run the machine for a few seconds.

Having rinsed the arm and head parts of the machine, oil all moving and rotating parts in these mechanisms with PFAFF sewing machine oil. Running the machine for just a few seconds will suffice to distribute the oil evenly.

Stitching Off the Machine

To make the machine ready for sewing, wind No. 50 thread on the bobbin and, while doing this, check the proper functioning of the bobbin winder. In order to save the housewife the trouble of regulating the bobbin thread tension, set this tension at a medium grade.

> As a general rule, observe that the tension screw on the bobbin case should be turned in just sufficiently to keep the bobbin case from being pulled down by its own weight when hanging down on the thread, even when slightly swung to and fro. On the other hand, the tension must not be set so tight as would be appropriate for a straight-stitch machine.

For detailed instructions concerning the regulation of tensions, please refer to "The Thread Tension" on page 8.

Use a No. 50 thread in the needle.

Insert a new No. 80 needle before you thread the machine and, on this occasion, check whether the needle threader works correctly.

After these steps have been completed, the machine is sewed off on a piece of medium-heavy fabric.

While making straight and plain zigzag stitches, adjust the upper tension.

The complete range of sewing tests includes sewing forward and backward with the machine set for straight stitches of varying length, sewing across tucks and multiple thicknesses to try out whether the machine will process materials of maximum thickness. Then check whether the machine will make a neat seam on lightweight material, without puckering. All of the above tests, of course, should also be made with narrow and wide zigzag stitches, and the machine be tried out on overcasting an edge. In this latter operation, check the correct stitch formation as the needle clears the edge of the fabric. After switching back to straight stitching, try out the performance of the machine with different needle positions.

If the respective machine is fitted with the Automatic Mechanism, several embroidery designs should be sewed automatically. For best results, use the following settings: A 5, B 4, C 3, and E 1 or E 7. If, after the machine has been set as instructed above, the Automatic Mechanism causes zigzag button **D** to move evenly from "0" to "4" and back when the machine is operated at a low speed, one may rightly assume that the Automatic Unit works perfectly.

Before an Automatic is delivered to the customer, apply one or two drops of oil to each of the oil pads on the spring assembly, between zigzag button and stitch width scale, and also between this and the needle position scale.

Various Settings of the Machine

Regulating the Pressure on the Material

For most sewing operations the medium amount of pressure for which the presser foot has been set at the factory will be found entirely sufficient. If mostly sheer and delicate fabrics should be sewed, ease the pressure, which is exerted by the presser bar spring, by turning regulating screw **V** (Fig. 7) outwardly. To increase the pressure for dense and thick fabrics, turn screw **V** inwardly.

Observe the following hints:

Normal pressure: Regulating screw is flush with top of casting

Light pressure: Regulating screw is about 1/8" above top of casting. Do not turn out screw **V** too far as it would bind against the top cover.

Heavy pressure: Regulating screw is about 3/16" below top of casting.

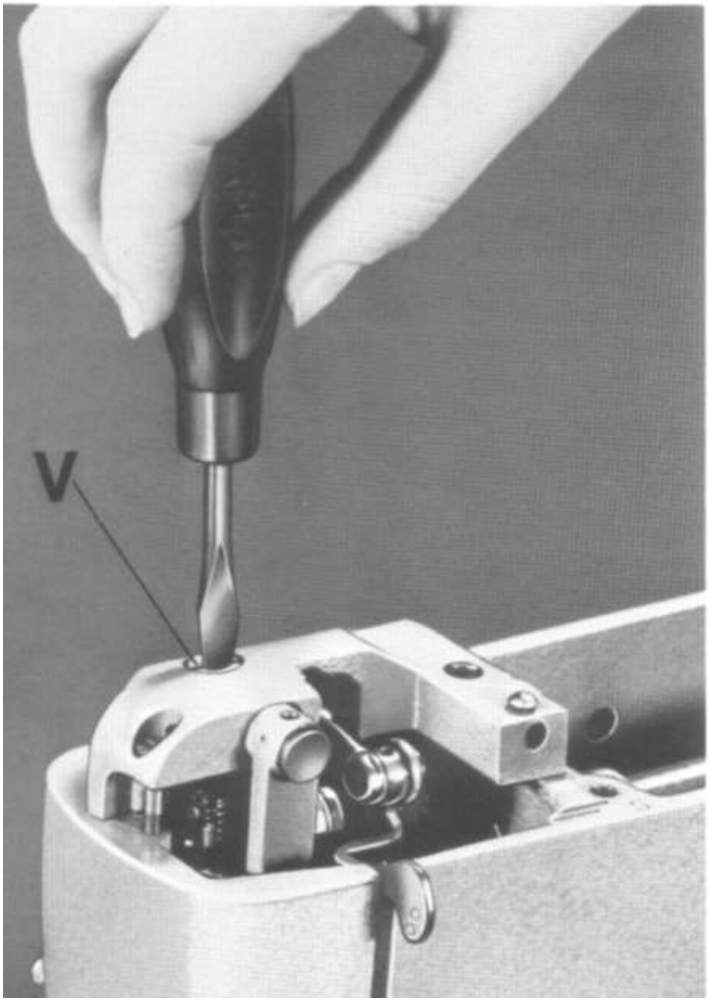


Fig. 7

Threading the Machine for Two-Needle Work

The new type upper tension has a third tension disc so that each needle thread will be guided between two discs. For the same reason, the take-up lever features two thread eyelets. Threading of the machine is illustrated in Fig. 8.

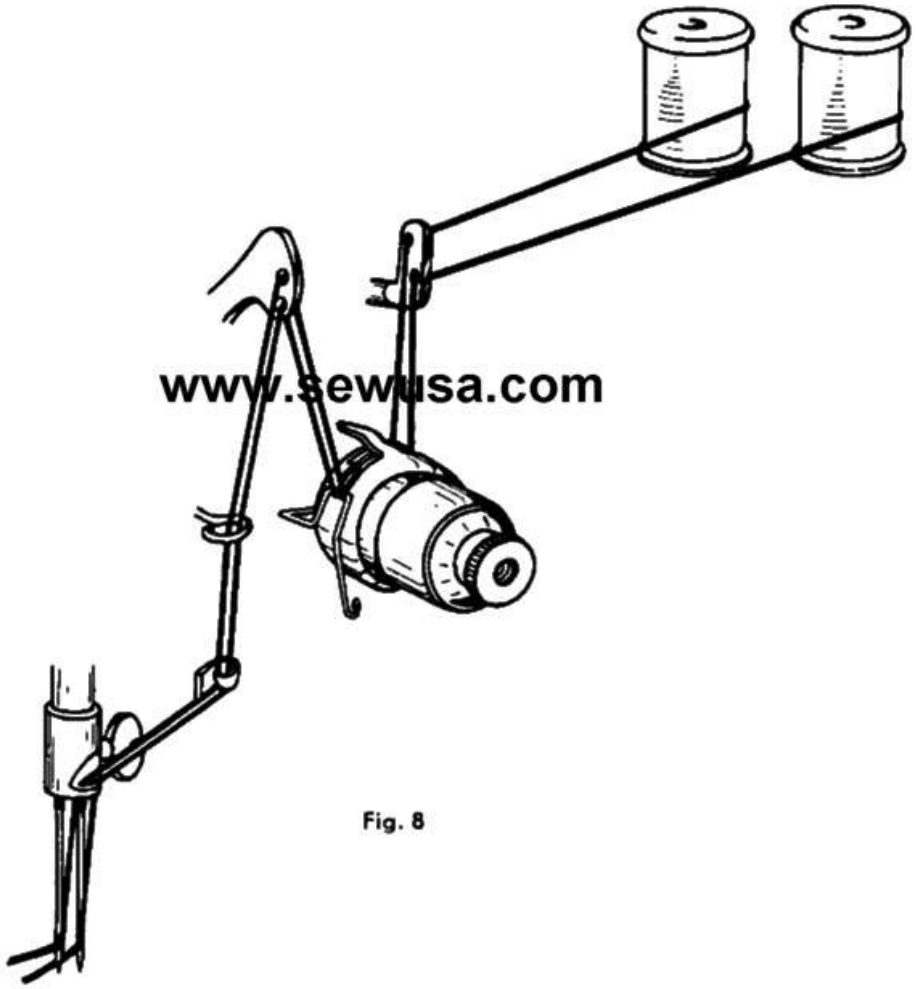


Fig. 8

Preparing the Machine for Two-Needle Decorative Sewing

To fit the machine for two-needle decorative sewing, exchange feed dog, needle plate and presser foot for an identical set of parts adapted for a stitch width of $^{15}/_{64}$" which is available at extra cost. Converting the machine for two-needle work is exceedingly simple. First loosen the two needle plate set screws (173) and remove the needle plate. Set the machine for the maximum length of stitch and turn the balance wheel back and forth until first

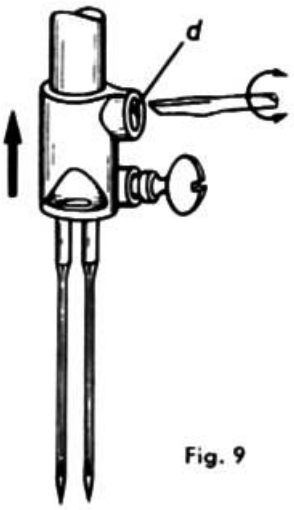


Fig. 9

the front and then the rear set screws (82) in the feed dog can be reached with a screw driver and taken out. Replace the ordinary feed dog with feed dog (26889) which permits of a stitch width of $^{15}/_{64}$". Before tightening the screws firmly, slip on needle plate (26888) and check whether the feed dog moves freely in the feed slot. After mounting the new needle plate, screw on matching presser foot (51051).

To make two-needle ornamentations, the machine has to be fitted with a twin-needle clamp (105381 x 2.0), part of the extra accessories, for a needle gauge of $^{5}/_{64}$". It is secured on the needle bar by means of set screw **d** (Fig. 9).

Fig. 10

Removing the Top Cover

After removing the top cover, all oiling points in the arm of the machine can be reached and the assemblies in the arm be adjusted.

Two studs hold the top cover in position on the arm casting. To remove the cover, proceed as follows:

Engage the bobbin winder, tilt the cover back, then forward, and pull it up simultaneously (Fig. 10). Do not try to lift the cover off perpendicularly. On page 76 is explained how to remove the top cover from the PFAFF Automatics.

Removing and Replacing the Face Cover

It will not normally be required to unscrew the face cover. The only time this may become necessary is when the needle and presser bars need adjustment or the head parts have to be cleaned. For this purpose, loosen set screw **k** (Fig. 11) by turning it to the left, and let the cover slide downward.

When replacing the cover, make sure that stud **F** is correctly inserted into lug **H** at the bottom of the arm casting. Also take care that pin **S** enters the slot in threader engaging lever **K** and projection **L** fits in groove **N**. Then push the cover upward into position and tighten screw **k**. To facilitate replacement of the cover, bring lever **K** into a horizontal position.

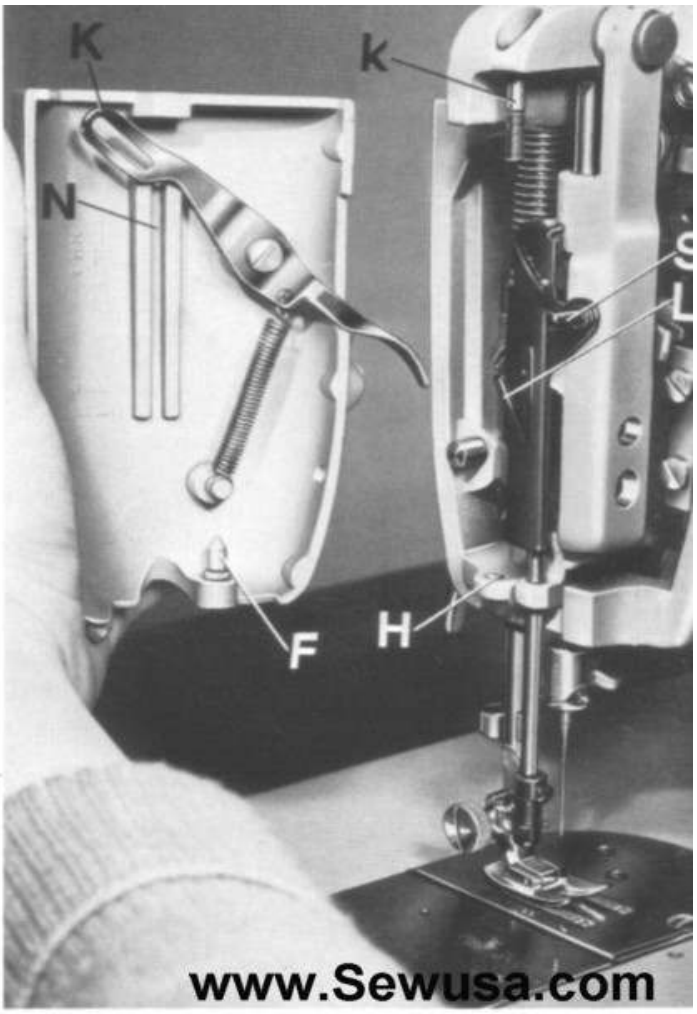


Fig. 11

Cleaning and Oiling the Machine

No PFAFF dealer should fail to impress upon his customers the paramount importance of regular machine care. A long service life, smooth running, and proper performance of the machine will greatly depend on it.

Lint is likely to accumulate on the underside of the needle plate and in the vicinity of the sewing hook. To correct this condition, it will be necessary, from time to time, to remove the needle plate and clean the surfaces of these parts with a brush. Also remove the packed lint from between the tooth rows on the feed dog and around the hook.

At longer intervals the face cover should be removed in order to clean the parts in the head of the machine. (For instructions refer to "Removing and Replacing the Face Cover" above.)

The only lubricant which should be used in these machines is PFAFF sewing machine oil. Never must resinous and acidiferous lubricants or oil of animal and vegetable origin be applied.

In general it may be said that the bearing surfaces of all moving and rotating parts require regular lubrication. The principal oiling points are marked by arrows in the instruction book. Since excessive oiling will result in soiling of the work, gumming of the oil residues, and binding of the mechanism, the machine should be oiled very sparingly. In most instances, one or two drops of oil at each oiling point will suffice to reduce friction between parts in moving contact. In lubricating the machine it is best to follow a plan and begin underneath the bed plate.

From time to time, about once every six month, it is advisable to rinse all moving parts in pure kerosene. This will help maintain the easy running of the machine. Proceed by squirting ample kerosene into all oil holes of the machine, raise the presser foot and run the unthreaded machine at high speed. After oil residues and dirt particles have been washed out, oil the machine and wipe it off. This procedure should be followed regardless whether the machine is used little or not at all. Cleaning and lubricating the sewing hook is instructed on page 64.

Trouble Shooting

1. The Machine Skips Stitches

Cause	Remedy
Needle inserted incorrectly.	Push needle up as far as it will go and make sure the long groove faces toward you.
Wrong needle used.	The correct needle system is stamped on the bed plate slide.
Needle bent.	Insert a new needle.
Machine improperly threaded.	Check and correct threading as instructed in the instruction book.
Needle either too thin or too thick for the thread being used.	Select correct needle from Needle and Thread Chart in the instruction book.

2. The Needle Thread Breaks

Cause	Remedy
Thread breaking may occur for any of the reasons enumerated in par. 1 above.	See par. 1 above.
Thread tension too tight.	Regulate upper and lower tensions as instructed in the instruction book.
Poor or knotty thread used.	Use only first-rate thread or a good quality of silk.
Lack of oil, or thread jamming in hook race.	Clean and oil hook race as instructed on page 64.
Needle hole in needle plate has sharp or burred edge.	Smooth needle hole with fine emery cloth.

3. The Needle Breaks

Cause	Remedy
Needle bent and struck by point of hook.	Replace needle at once to prevent more damage.
Needle too thin or thread too thick.	Study Needle and Thread Chart in the instruction book.
Needle bent and strikes needle plate because material is pulled to or away from operator.	Don't force the feeding, just guide the material lightly.
Bobbin case inserted incorrectly.	When inserting the bobbin case, push it in until it clicks in position audibly.

4. The Machine Makes a Faulty Seam

Cause	Remedy
Tension regulated improperly.	Regulate upper and lower tension as instructed in the instruction book.
Thread too heavy, knotty or stiff.	Use only first-rate thread.
Bobbin wound unevenly.	Don't run the thread over your finger when winding the bobbin but, instead, pass it around the tension stud on the top cover.
Pieces of thread caught between tension discs.	Release tension and remove thread.

5. The Machine Feeds Improperly

Cause	Remedy
Feed dog set too low so that it fails to rise sufficiently above needle plate level.	Adjust position of feed dog so that it will show a full tooth above the needle plate.
Accumulations of packed lint between tooth rows.	Take off needle plate and remove lint with a stiletto.

6. The Mechanism Binds

Cause	Remedy
Driving belt is either too long and slips off, or too short and causes excessive pressure on the bearings.	Either shorten belt, or lengthen it by inserting a piece of belting. Cut the belt on the straight and abut ends. Punch holes from smooth side of belt.
Lack of oil, or pieces of thread in hook race.	Clean and oil hook race.
Gummed oil in mechanism.	Use only PFAFF sewing machine oil, never salad oil or glycerine.
Bobbin winder is engaged while sewing.	Disengage bobbin winder.
Thread snarled up between balance wheel and bushing.	Remove thread with a thin needle If necessary, take off balance wheel.
Clip belt on PFAFF 332 has shrunk due to being soaked with oil, and exerts excessive pressure on bearings.	Slacken belt by adjusting idler bracket.

The Electric Equipment

The electric equipment of PFAFF 230 and 332 machines (with or without Automatic Mechanism) complies with international safety regulations, and neutral test laboratories in Germany, Denmark, Norway, Canada and the U. S. have testified to its faultless installation.

1. The Sewlight

Its components (**A** in Fig. 12) are:

a. The Push Button

It is located on the front of the machine and will withstand being pressed about 100,000 times.

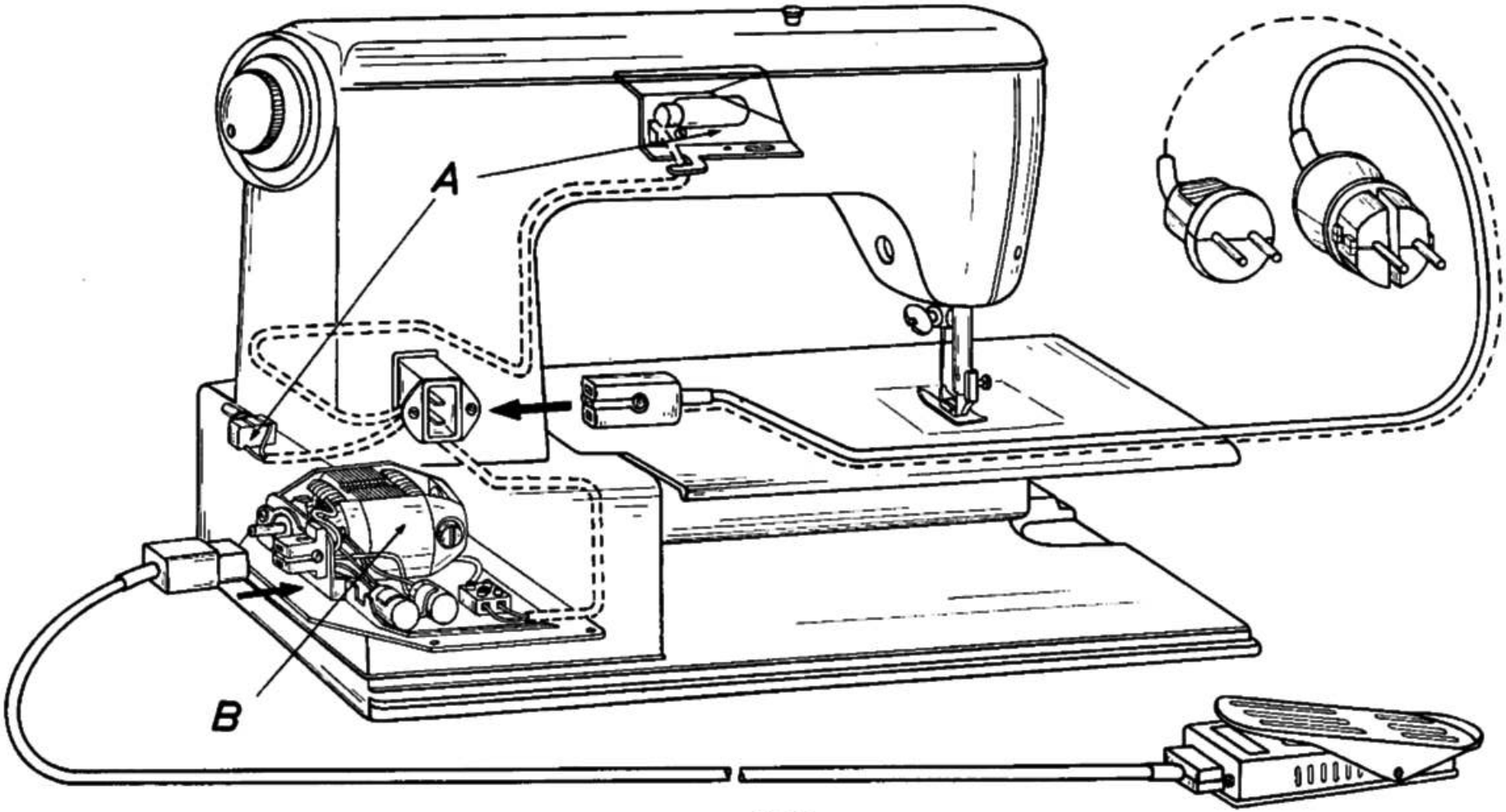


Fig. 12

A = Light connection B = Motor ——> Plug in here

b. The 25 Watt Bulb

It is tubular in shape and has a bayonet socket (BA 15d). (Fig. 13.)

Preference was given to this type of socket because it is prevalent in all countries of the world.

Fig. 13

Other advantages of this bulb are that it can be easily exchanged and that it will not be loosened by the vibrations of the machine. In order to make it withstand the great stress to which every sewlight bulb is subjected, the filaments have been suspended in a special manner and, as a result, the life of the bulb extended to 1,000 hours of service. These, of course, will be reached only if the voltage of the circuit is the same as that stamped on the bulb. How much the burning life of a bulb is dependent on the line voltage may be seen from the fact that an increase in tension of just 5 per cent will bring its burning life down to 50 per cent. As this experience applies to all kinds of light bulbs, make sure the actual and rated voltages agree. The voltage will also determine the candle power emitted by the bulb. Its optimum candle power can be obtained only if the line voltage corresponds to the voltage of the bulb.

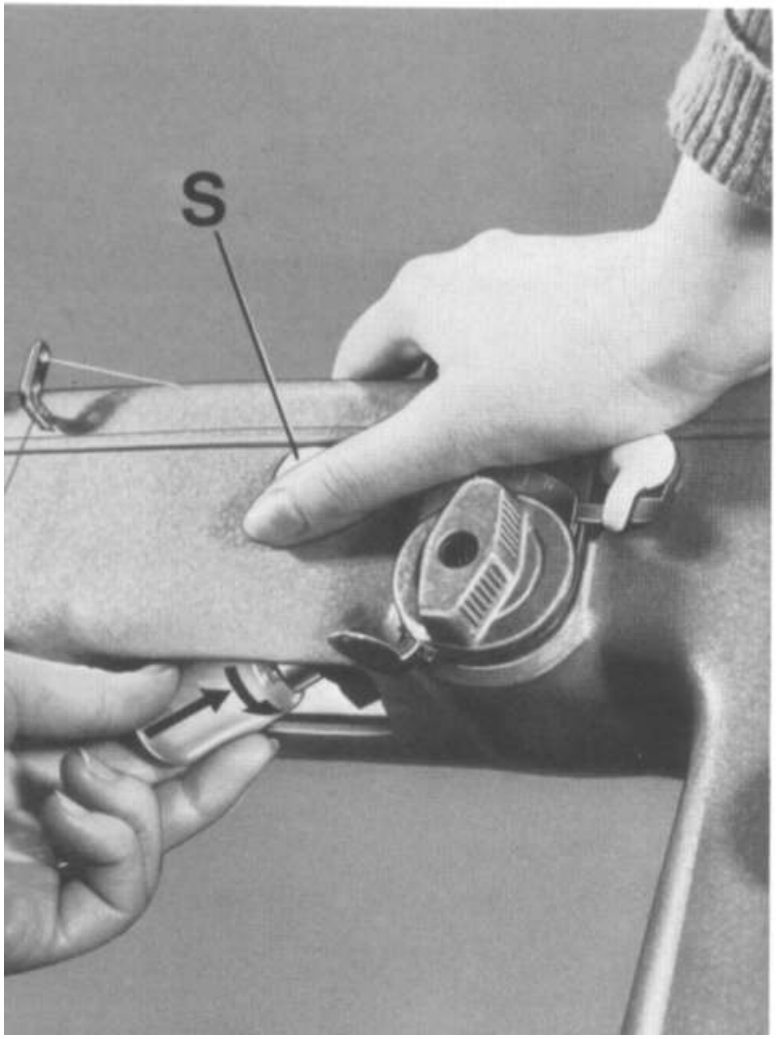


Fig. 14

c. The Lamp Socket

To swing out the socket, flick the small lever **S** (Fig. 14) over to the left. When inserting a bulb, ensure that its two pins **F** (Fig. 13) slide in the slots of the socket. Then push it all the way up and turn it to the right. To remove the bulb from the socket, simply reverse this procedure.

2. The Electric Drive

a. General

The salient feature of series motors, such as used on PFAFF 230 and 332 machines, is that they adapt their speed to the respective load. This characteristic is particularly important for the drive of sewing machines. Their capacity is in line with the power required to drive the machines. Inasmuch as a correlation exists between output and speed of a series motor, an excessive power reserve would disturb the electric balance of the motor. In addition, motors whose output capacity exceeds the power requirement of the sewing machine may cause excessive wear or actual damage to the machine.

b. The Power Cord

Every PFAFF domestic sewing machine will be supplied with normal or safety plugs, whichever is desired.

c. The Rheostat

The speed of the motor is affected not only by the torque required to drive the machine but also by the voltage which is supplied to the motor. This fact is utilized in regulating the speed of the motor.

A rheostat, which is available as either a foot or knee control (optional), is placed in the circuit ahead of the motor.

All PFAFF speed controls are based on the carbon pile principle and permit of an infinitely variable speed regulation. In this connection it is important to know that the energy which is annihilated in the rheostat is, of necessity, converted to heat and that the number of calories released in this process is the same regardless whether a carbon pile or wire rheostat is involved. This is a physical fact which, unfortunately, is not enough known.

d. The PU 332 Built-In Motor

This is the motor which is used in the free-arm PFAFF 332 Portable.

It is made up of the following components:

1. Stator Frame
2. Armature with collector
3. Pulley-end shield with sinter bearing and threaded screwholes (for mounting the motor on the base plate)
4. Collector-end shield with sinter bearing and brush holder
5. Brushes

When operating at 4,700 r.p.m., the output of the motor is 25 W. This output corresponds to the power required to drive a portable sewing machine and guarantees a minimum sewing speed of 1,200 s.p.m.

Motor **B** (Fig. 12), radio noise filter condensers, power lead terminals, and foot control socket are all mounted on the base plate. The technical data of the motor are recorded on the rating plate which is screwed onto the bottom of the base plate. The wiring of the motor is illustrated in Fig. 15.

e. The KU 52 Attached Motor
(Does not apply to the U.S.A)

This is the motor with which the PFAFF 230 is equipped. It is supplied in either black or beige finish. Its principal components are:

1. Stator Frame
2. Armature with collector
3. Pulley-end shield with sinter bearing and threaded screwholes (for mounting the motor on the motor bracket)
4. Collector-end shield with sinter bearing and brush holder
5. Brushes

This motor has an output of 40 W when operating at 5,500 r.p.m. and ensures a minimum sewing speed of 1,500 s.p.m.

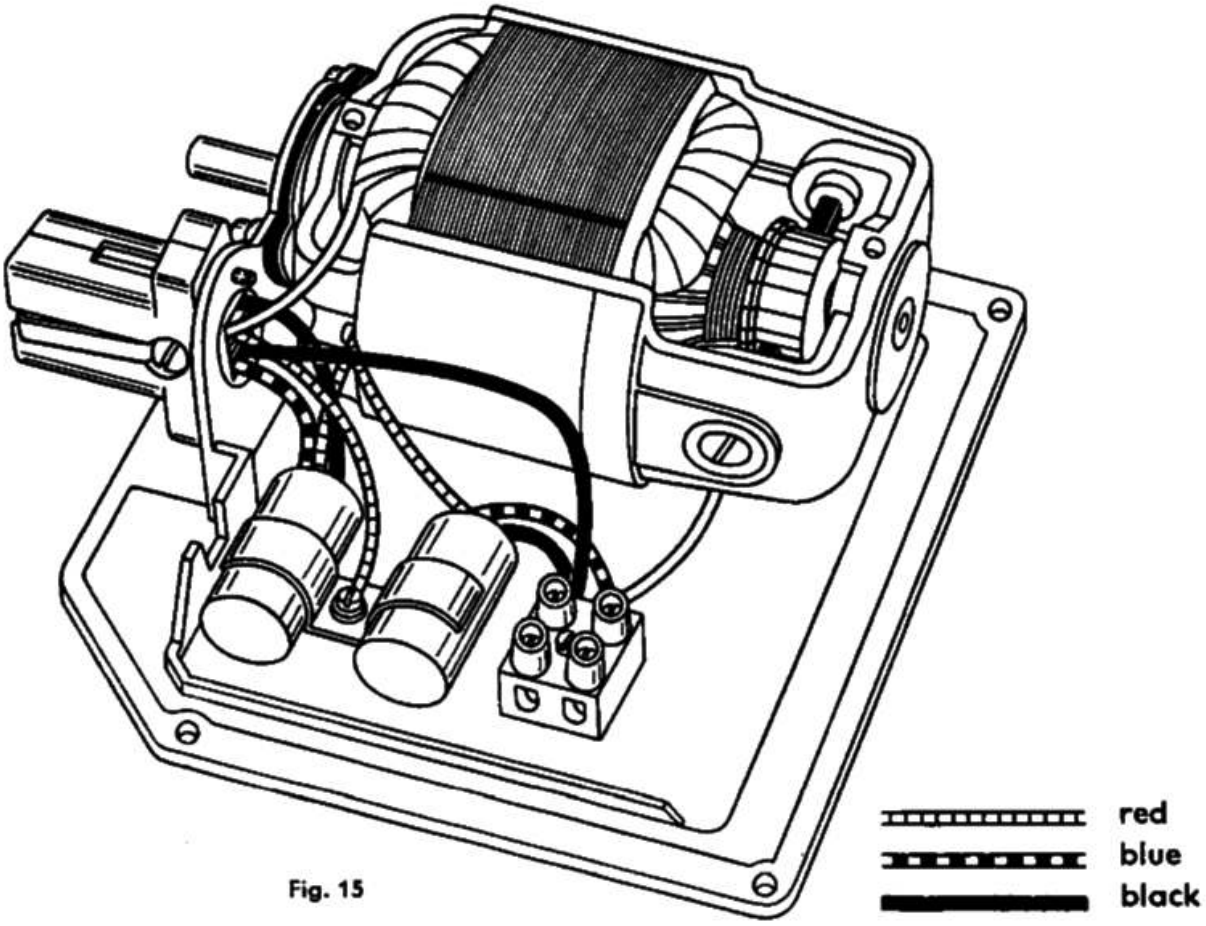
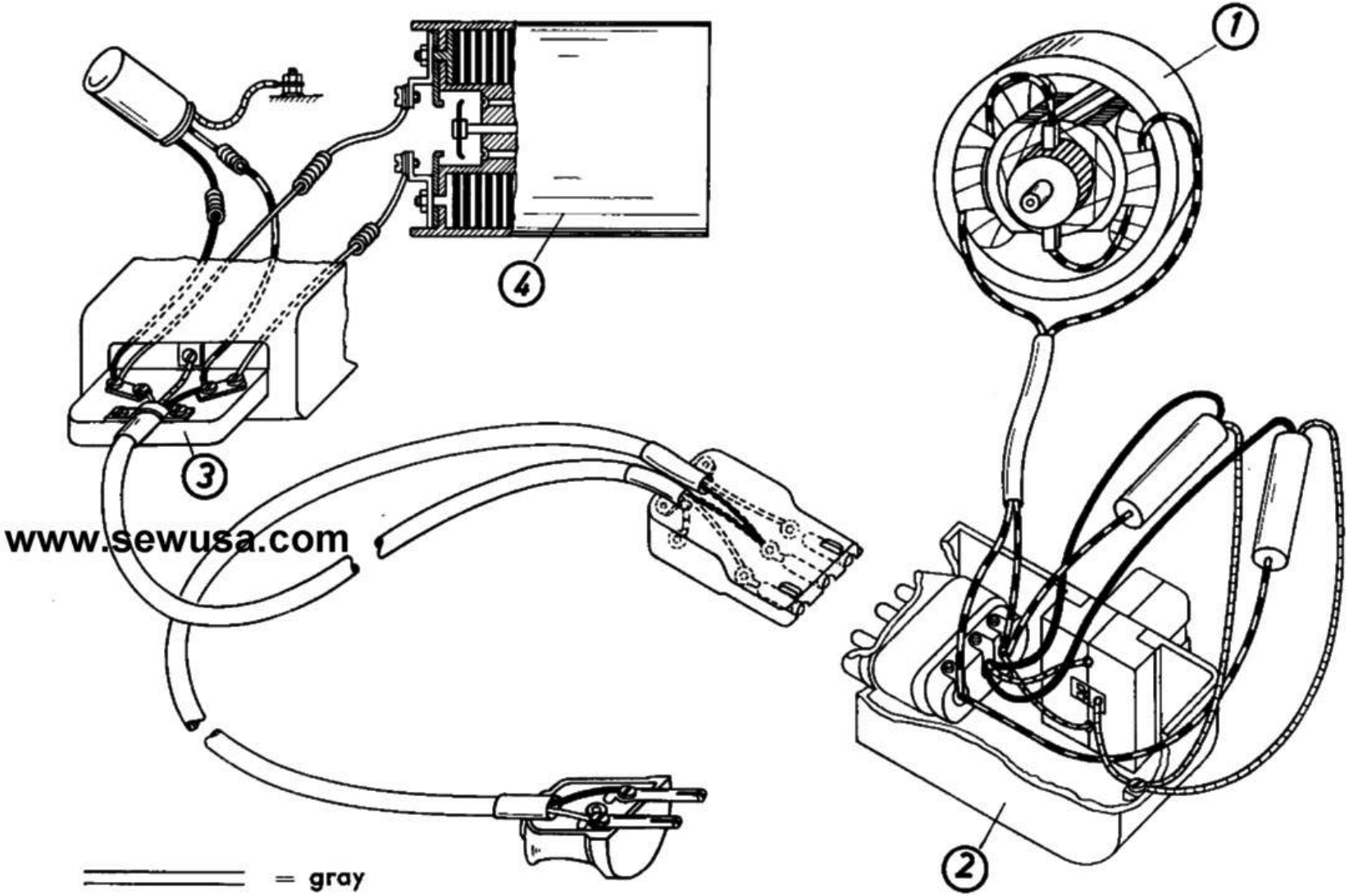


Fig. 15

Both halves of the housing are held together by two long screws. On the underside of the motor is disposed the radio noise filter case which houses the radio noise filters, the sewlight socket, and the three-pin socket which receives power and foot control cords. The wiring of the motor is illustrated in Fig. 16.

f. The Radio Noise Filter

The two motors referred to above are fitted with two radio noise filter condensers which will eliminate radio interference in the long, medium and short-wave bands. Presently there are no regulations in effect which require noise suppression in the FM and TV bands. The data of these filters are specially adapted to the two motors for which they are intended. In case the filters have been exchanged when repairing the



= gray
= blue
= red
= black
= yellow

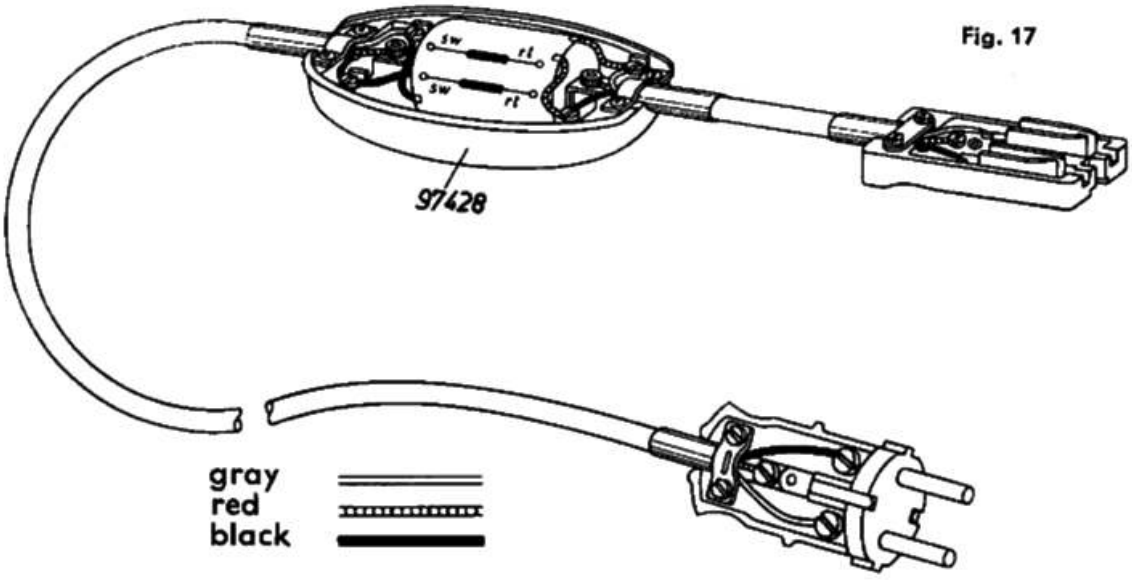
Color of Wires

Fig. 16

① = Motor
② = Motor terminal box
③ = Speed control connection
④ = Speed control

machine, the proper elimination of radio interference will not be ensured. In replacing condensers, care should be taken that they are connected correctly and in accordance with the instructions given by the supplier. (See Figs. 15 and 16).

Fig. 17



Color of Wires

A prerequisite to the effective elimination of radio interference is that radio sets are equipped with elevated, or even screened, aerials which function correctly. In case the degree of noise suppression is found to be inadequate, an additional filtering device is available which is to be placed in the power line as shown in the wiring diagram (Fig. 17). This device may be ordered under No. 97428.

g. Taking Care of the Motor

The motors which are used on PFAFF household sewing machines need no special care. The self-lubricating sinter bearings make any additional lubrication superfluous.

The type of carbon brush was carefully selected so as to ensure about 400 hours of satisfactory service after which time it should be replaced.

To exchange the carbon brushes, proceed as follows:

Pull the plug out of the wall outlet. Then unscrew the cups which cover the brush housings and take the old brushes out. When pushing the new

brushes into the housings, take care that they will slide all the way in until they touch the collector. Slip the cups over the springs, push them in and screw them on. They should be neither too tight nor too loose.

On KU 52 motors the brush housings extend vertically and on PU 332 motors horizontally. (See Figs. 18 and 19.)

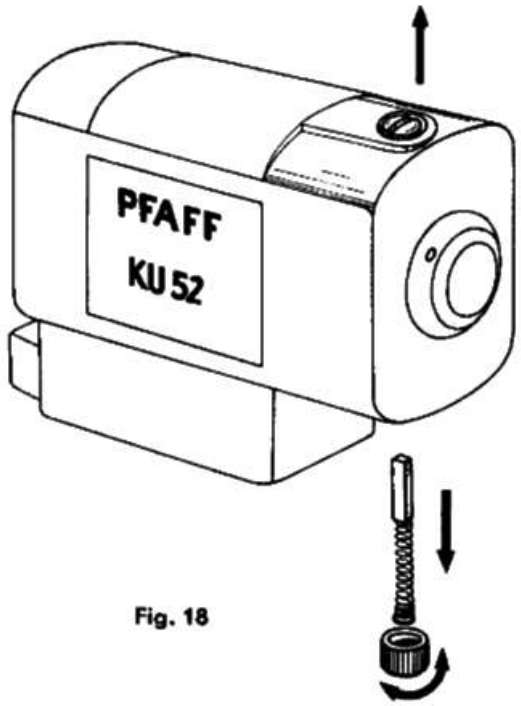


Fig. 18

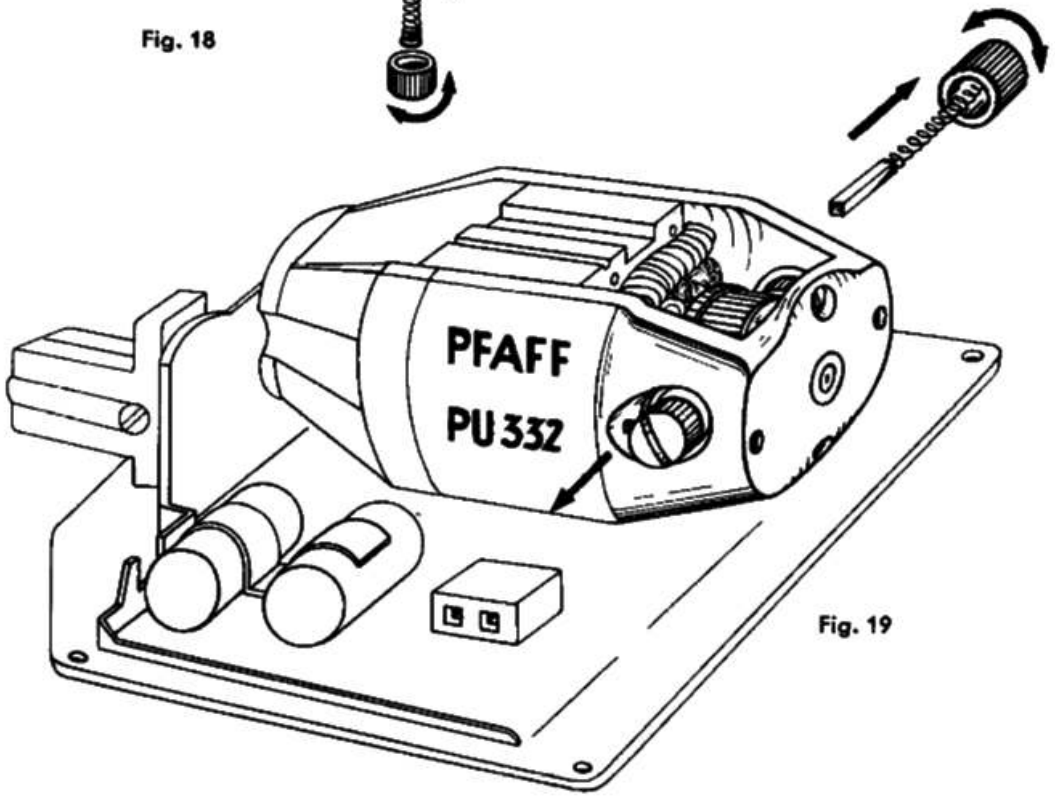


Fig. 19

II. Adjustment Procedures

The following instructions apply to both the PFAFF 230 and PFAFF 332. Wherever the parts used and the adjustments required differ, each procedure will be treated separately. To check the correct performance of a machine and readjust it, if required, apply the following procedure:

The Arm Parts

The Feed Eccentric

Ascertain that the timing marks on the feed eccentric (8703 on the PFAFF 230; 60254 on the PFAFF 332) from which the feed driving and feed lifting motions are derived are in alignment with those on the top shaft. Then push the eccentric over toward the top shaft rear bearing (on the right) until there is a

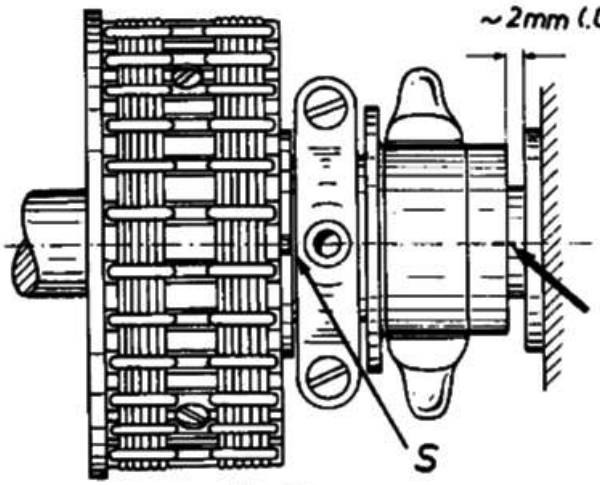


Fig. 20 a

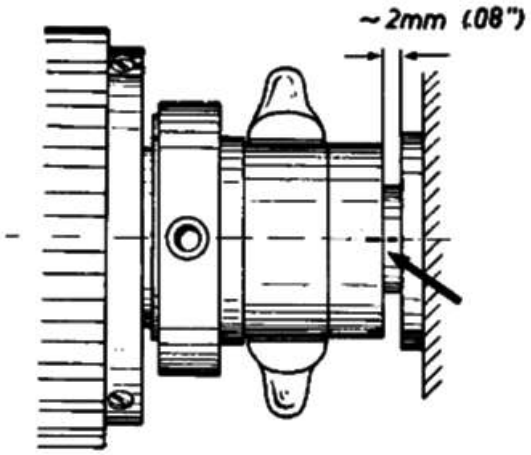


Fig. 20 b

clearance of $^{5}/_{64}$" between bearing bushing (105003) and the eccentric. Tighten the eccentric set screws.

The Top Shaft Belt Sprocket (Synchroflex or Clip Belt)

The correct positioning of the belt sprocket on the top shaft is of eminent importance for preserving the correct balancing of the top shaft. This conditions that the feed eccentric has been meticulously set. To position the sprocket, push it exceedingly close to the eccentric, turn it so that its pin (which should point toward the balance wheel) will enter the borehole in the feed eccentric (Fig. 21), and securely tighten both set screws in the sprocket.

On machines which are fitted with a clip belt, the position pin of the sprocket should engage in the small recess **S** (Fig. 20a) in the flange of the feed ec-

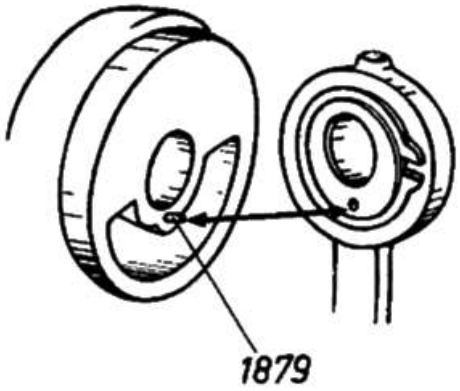


Fig. 21

centric. This recess should be exactly in line with the position mark on the top shaft for the feed eccentric.

On recent machines, power is transmitted to the hook shaft by means of a toothed Synchroflex belt. Position pin (1879) on the top shaft sprocket is disposed exactly opposite the timing mark on the shaft and enters the borehole which is suitably arranged below the top shaft on the eccentric. The correct fitting of sprocket and eccentric is illustrated in Fig. 21.

Just recently a new feed lifting connection (Fig. 20b) has been introduced which supersedes the former two-part connection. This new connecting rod has a closed lug which fits over the lifting eccentric and is held in position on the eccentric by a snap ring. This is the reason why also a new type feed eccentric is required for this assembly.

The different parts which make up the old and new feed lifting rod assemblies are as follows:

Part Name	Machine	Old No.	New No.
Feed eccentric	PFAFF 230	8 703	105 064
Feed eccentric	PFAFF 332	60 254	60 434
Lifting connection	PFAFF 230	7 130	105 063
Lifting connection	PFAFF 332	60 053	105 063

Hence, the same feed lifting connection will be used on both machine models in the future. The components of every feed lifting rod assembly are prefitted and will be supplied only as a unit.

The Large Bevel Gear and the Needle Vibrating Eccentric

This assembly is carried on a transverse stud (105183) which can be moved lengthwise of its flanged bushing and secured with a grub screw. The position mark on the bushing should point upward. To ensure that the sideways motion of the needle bar will be completed when the point of the needle has reached a position about $^{5}/_{16}$" above the needle plate, check the following:

(See Fig. 22)

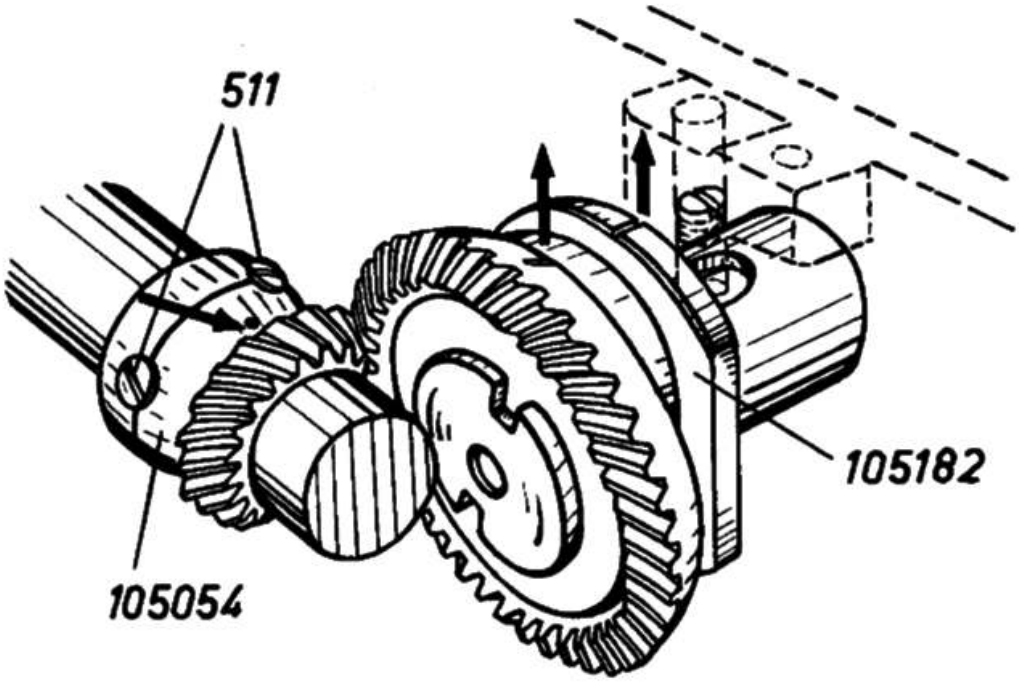


Fig. 22

The meshing teeth on both the small and large bevel gears are marked by a depression (see arrow) on the pinion and a notch on the large bevel gear. Both should be opposite each other when meshed.

Turn the top shaft until the position mark for the feed eccentric points upward. Loosen set screws (511) on bevel pinion (105054) on the top shaft and, while keeping it in mesh with the large bevel gear, turn the pinion until the mark on the gear rim of the large bevel gear is at the top.

In case there is no marking on the large bevel gear, hold the top shaft with its position mark pointing upward and turn the bevel pinion until the swell of the eccentric is in top position. Then set the pinion on the shaft so that its

teeth will meet the teeth on the large bevel gear in one point. To comply with this requirement, it may become necessary to adjust the flanged bushing in such a manner that the needle bar frame pitman is correctly guided sideways, yet without binding. Securely tighten both set screws on the bevel pinion, hold the large bevel gear in the adjusted position and secure the transverse stud by tightening the grub screw.

It is important that a light and smooth running of the gears is obtained with a minimum of play.

Check the above adjustment in the following manner:

The needle vibrating eccentric is correctly set if zigzag button **D** can be turned from "0" to"4", and back, without the needle bar making a perceptible sideways motion when in its highest position. For this check, set the needle position lever in the center notch.

The Driving Eccentric for the Automatic Mechanism

This eccentric (105061) performs a dual function. One is that it serves as a set collar at the top shaft front bushing. To eliminate any end play on the top shaft, the eccentric should be set as close as possible to top shaft bushing (105002), leaving just enough play to permit oil to enter the gap between these parts, and to prevent binding. Before this adjustment is made, the needle bar crank should be set close to the top shaft front bushing.

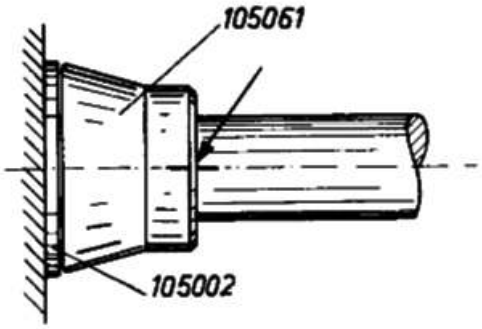


Fig. 23

Never try to make the top shaft run easily by tapping on the balance wheel. This action might force the top shaft bushing forward out of the bearing and cause binding of the head parts. When adjusting the end play of the top shaft, preserve a clearance of about .007" between the balance wheel and the top shaft rear bushing.

The second function performed by the eccentric is to drive the stack of pattern cams in the Automatic Mechanism. To ensure that the cams will be turned only when the needle is out of the material, take care that it is secured on the top shaft in the predetermined position. This position is identified by two marks, one on the top shaft near its front bearing and the other on the bottom of the eccentric. Align both marks before tightening the set screws. (Fig. 23).

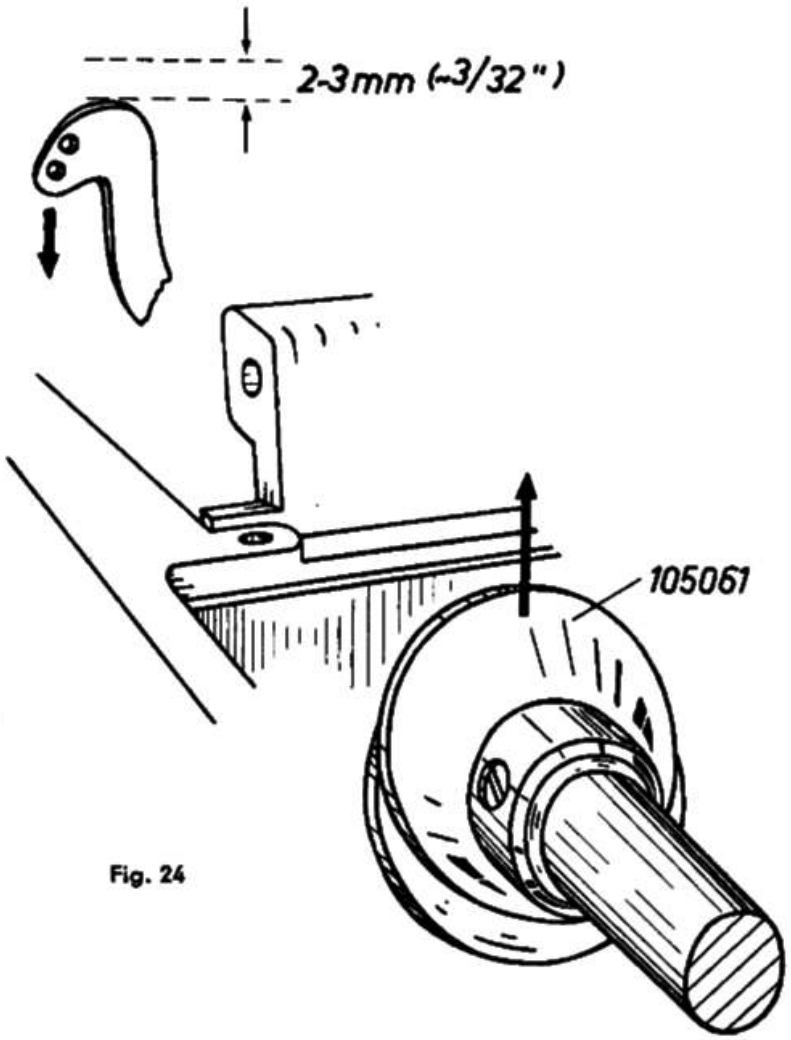


Fig. 24

Unmarked eccentrics are set as follows: Turn the balance wheel in sewing direction until the take-up lever has passed the highest point of its stroke and descended $^{3}/_{32}$"–$^{1}/_{8}$". When the top shaft is in this position, the swell of the eccentric should point upward. Securely tighten both set screws (Fig. 24).

The Zigzag Mechanism

Zeroing the Needle for Straight Stitching

This adjustment is performed with utmost precision by appropriate meters at the factory. Wherever such dial gauges are not available, use the following procedure:

If the machine should fail to make perfectly straight stitches despite the fact that the zigzag button has been set at "0", zigzag regulator spindle (105101) may be out of adjustment. Before readjusting, make sure that needle position lever (105088) will be engaged in the center notch. Then insert a thin needle, attach the button sewing foot, drop the feed dog and place a piece of white cardboard between needle plate and presser foot.

The needle is correctly zeroed if it stitches twice into the same hole when turning the balance wheel forward, then backward. (Let it stitch into the cardboard just lightly!) If there is a discrepancy, loosen set screw (687) of the zigzag button, which can be reached from below. Hold the button on zero and press it against the arm. Then take a large screw driver and slightly turn regulator spindle (105101) to the right or left until any sideways motion of the needle bar has ceased (Fig. 25) Move the cardboard under the presser foot after every check so that needle punctures may be clearly distinguished.

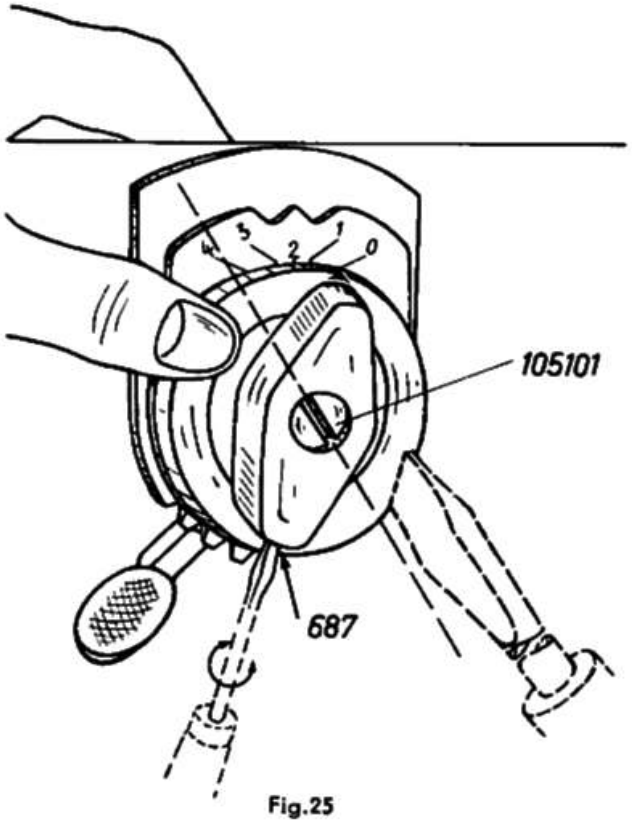


Fig.25

As a clue to a rough adjustment of the zigzag regulator spindle, it should be observed that a line extending in the direction of the slot in its face should clear the "4" mark on the zigzag scale about $^5/_{64}$" to the left. After the needle has been zeroed in, firmly tighten the set screw in the zigzag button. Take care, though, that the regulator spindle has no eccessive amount of play. In case this adjustment should fail to produce a satisfactory result, the needle may be too thin for the fabric to be sewn and is deflected by the texture yarns. This causes staggering stitches. To remedy this undesirable condition, simply insert a thicker needle.

Centering the Needle in the Needle Hole for Straight Stitching

When the zigzag button is set on "0" and the needle position lever in the center notch, the needle should pass exactly through the center of the elongated needle hole. To provide a possibility for adjustment, needle bar frame (105351) and needle bar frame pitman (105189) are connected by means of an eccentric stud (**A** in Fig. 26). Normally the eccentric part of this stud (8723)

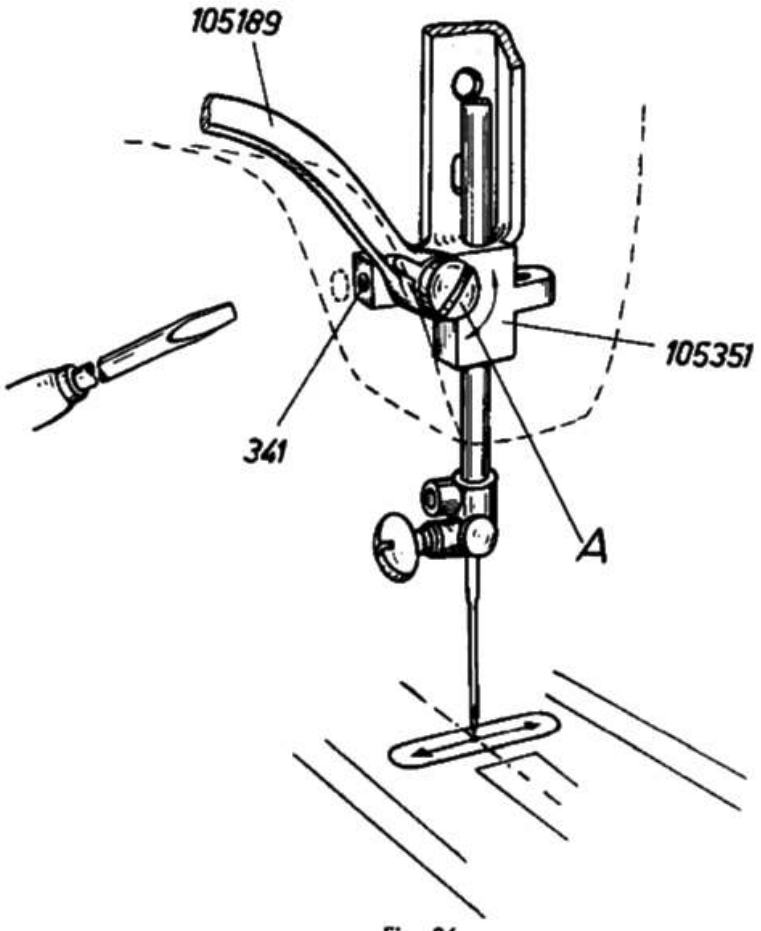


Fig. 26

should point downward. To center the needle in the needle hole, loosen set screw (341) which can be reached through an aperture in the bend of the arm, and cautiously turn the eccentric stud to the right or left. To get at the stud, pass the screw driver through the large aperture at the back of the arm. Never turn the stud so that its eccentric part points upward. This adjustment completed, tighten the set screw securely.

Adjusting the Needle for Zigzag Stitching

In order to obtain a symmetrical stitch pattern when changing from straight to zigzag stitching and vice versa and, particularly, when making decorative stitches, the punctures which are made by the needle on the right and left of its throw should be equidistant from the needle puncture in the middle. Proceed as instructed in the preceding Chapter. Set the needle position lever in the center notch, place a piece of cardboard under the needle, and let the needle stitch into it just lightly. Flick the zigzag button to *"4"*, turn the balance wheel back and forth, and let the needle on its right and left throws stitch lightly into the cardboard again.

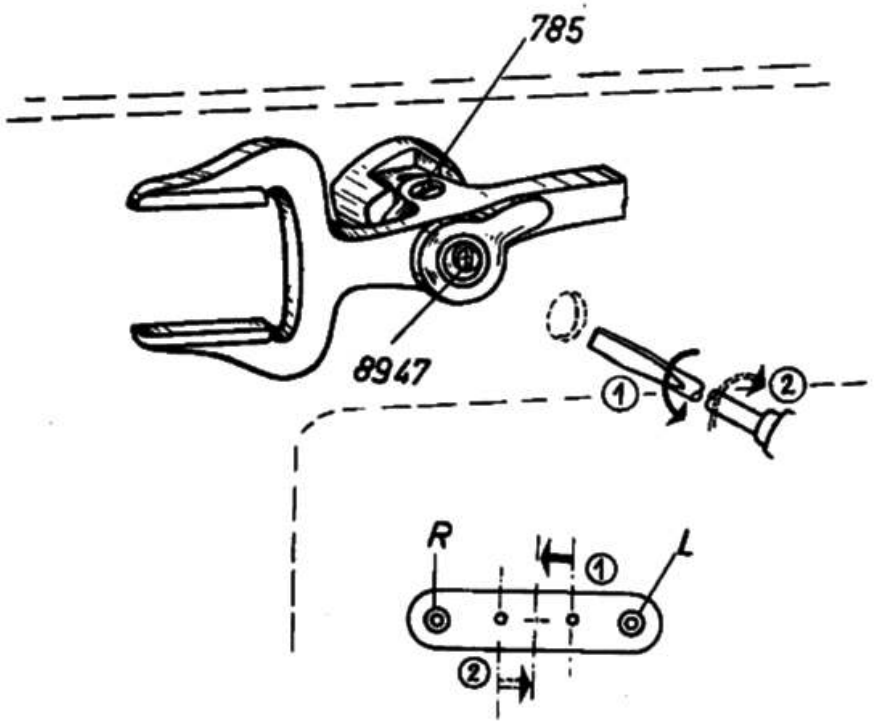


Fig. 27

In case the interspaces between the needle punctures should differ, adjust at eccentric stud (8947) near the fork of the needle bar frame pitman (Fig. 27). To turn the stud as may be required, loosen set screw (785) which can be reached from above, and insert the screw driver through the hole at the back of the arm. The direction in which the stud has to be turned is determined by the position of the center puncture in relation to the outer punctures.

Observe the following rule:

> Always turn the eccentric stud in the direction in which the center puncture has to be moved in order to center it between the two outer punctures **R** and **L** (Fig. 27). The needle hole is shown in the illustration as seen from the back of the machine. Tighten the set screw lightly, not tight.

Next, check whether the needle punctures are positioned at equal distances from the ends of the elongated needle hole. If not, the needle has to be re-centered in the needle hole by adjusting eccentric **A** (Fig. 26). Then again adjust the zigzag stitch as instructed above. This procedure has to be repeated until the zigzag throw of the needle bar is exactly halved by the center puncture, and the needle clears the ends of the needle slot at equal distances. This latter adjustment should be checked with the needle set for its maximum width of bight and in all three needle positions. Securely tighten the set screws on both eccentric studs.

The Bed Plate and Cylinder Arm Parts

Timing the Hook

As the needle rises from the lowest point of its stroke, the needle thread forms a loop at its backside (short groove) which is entered by the point of the hook and then enlarged. The formation of this loop is the first step in producing a stitch. With the PFAFF 230 (332), the thread has sufficiently bulged away from the needle to be taken by the point of the hook when the needle bar has risen about 5/64". This distance is termed "needle rise". Of course, it is possible to set the amount of needle rise by trial and error methods. As a prerequisite to perfect stitch formation, however, it is absolutely necessary that all available adjustment devices be used in order to ensure that the hook will be set with utmost precision.

To facilitate the adjustment of the hook, use the four-part needle rise gauge (Z 70.67-1) and the matching clamp (Z 70.68-1). By the same token, it is advisable to use a special gauge needle (Z 70.101-4) which will permit setting the hook and the needle at a median distance regardless of the size tolerances of sewing machine needles. Another advantage inherent in this needle (which corresponds in size to a No. 130 needle) is that it will normally not be bent.

PFAFF 230

Preparatory to timing the hook, insert the above mentioned false needle or a regular No. 90 needle, unscrew the needle plate, engage needle position lever (105088) in the center notch and set the needle for straight stitching. Loosen the hook set screws just sufficiently to permit the hook to be turned on its shaft.

Needle Rise

Turn the balance wheel until the needle has descended to its lowest position. Attach the clamp to the needle bar and slip the 5/64" gauge over the needle bar between the bottom of the casting and the clamp. Push the clamp up against the gauge and tighten the binding screw (Fig. 28a). This done, pull out the gauge and cautiously turn the balance wheel in sewing direction until the clamp strikes the casting. When in this pisition, the needle bar has risen 5/64" from the lowest point of its stroke. (Fig. 28b.) Hold it in this position at the balance wheel and turn the hook on its shaft until its point is opposite the center line of the needle. At the same time, set the hook to the needle so that its point will be as close to the needle as possible, without

touching it. Slightly tighten the hook set screw which can be reached most easily, make certain that the setting is correct, and remove the clamp. Now tighten both set screws firmly.

PFAFF 332

Basically the same principles are applied for setting the hook of the PFAFF 332. The only difference is that the PFAFF 332 hook is permanently mounted on the short transverse shaft and, hence, cannot be turned to set it for the correct amount of needle rise. For this adjustment, it is necessary to loosen clip belt sprocket (60152) or Synchroflex belt sprocket (60329), whichever is applicable, on the hook driving shaft and to turn hook driving shaft (60149) accordingly. Never must the position of the clip (or Synchroflex) belt sprocket on the top shaft be changed to make this adjustment. Although this procedure would be much simpler, it would disturb the correct balancing of the top shaft. (See also "Arm Parts – Top Shaft Belt Sprocket", on page 33.) To get at the lower clip (Synchroflex) belt sprocket, unscrew grille (60176) below the balance wheel, move the idler bracket over from the belt (Fig. 46), loosen set screw (1143) on the rim of motor pulley (60262) and remove the pulley (pull it out with the clip belt mounted on it). Now cautiously tilt the machine back and unscrew motor base plate (60163). (Make sure you don't lose the rubber washers!) The plate with the motor mounted on it can now be pulled over to the left and taken off (Fig. 29). Next, disconnect the motor lead from terminal (60279) and strip cord clip **K** inside the machine base.

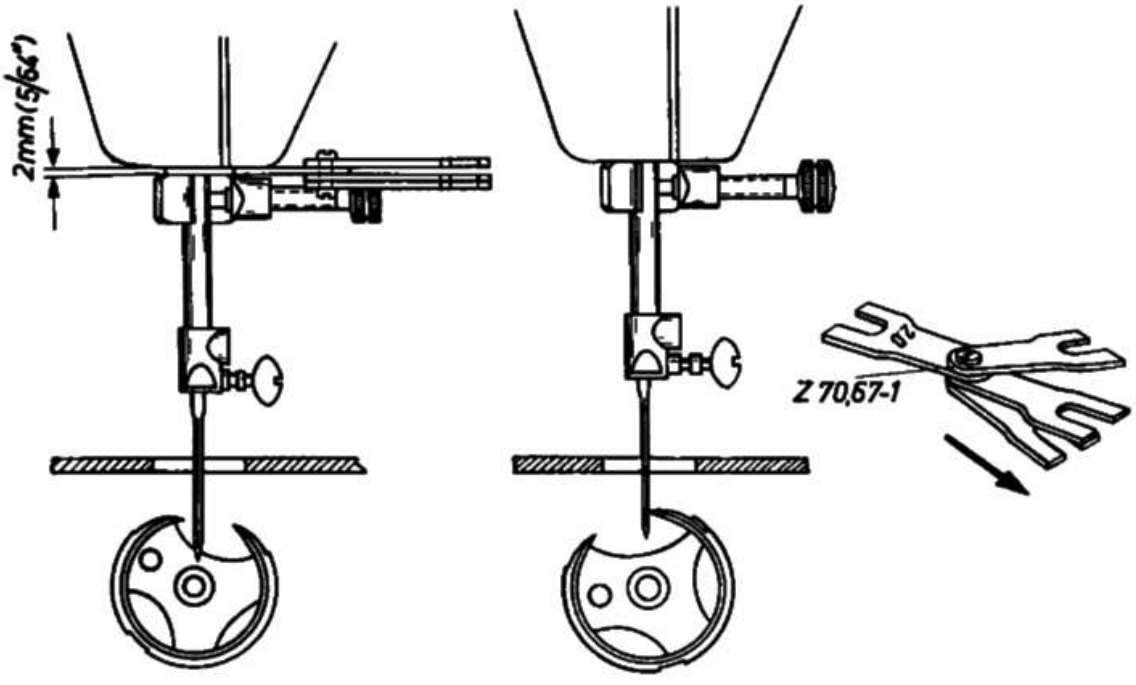


Fig. 28 a

Fig. 28 b

Then take out the four screws and remove bottom plate (60162) after which all parts in the machine base, including the lower belt sprocket, are accessible. Turn out the sprocket set screws only so far as to permit the hook driving shaft to be turned independently of the sprocket.

Needle Rise

In adjusting the needle rise with the aid of the appropriate gauge follow the procedure given for the PFAFF 230. In this case, however, no heed need be given to the lateral distance between hook and needle. Take care that in making this adjustment the lower clip (Synchroflex) belt sprocket will not be moved lengthwise of the hook driving shaft. To reinstal the dismantled parts, simply reverse the above dismantling procedure, and connect the motor. Replacing the rubber washers on the motor base plate is facilitated by turning the machine upside down. To protect it against scratches, place it on a felt pad.

Any forcible disturbance of the hook setting will rarely throw the lower clip (Synchroflex) belt sprocket out of timing since both helical gears (60171 and 16628) on the hook and hook driving shafts are secured against being thrown out of adjustment either by pins or a flattened surface on the shaft. (Fig. 30).

Fig. 29

In view of this, it is recommended, in case the hook setting should have been disturbed, first to check the position of the upper clip (Synchroflex) belt sprocket and of the feed eccentric in relation to the top shaft. Both markings should be in line.

If the hook has been exchanged, it may be necessary to retime it in relation to the needle rise, adopting the procedure outlined above. Following this, the hook is set to the needle as follows:

Unscrew the needle plate and insert either a gauge needle or a normal No. 90 needle. If a check reveals that the distance between the point of the hook and the needle has to be adjusted, hold the balance wheel and take out the hook set screw (1019) which is located on the back of the cylinder arm. (Fig. 31). This screw has a left-hand thread and, hence, has to be turned clockwise. Then remove the position finger bracket (60192) and pull out the hook and its short shaft. Note the position of the hook before stripping it. Depend-

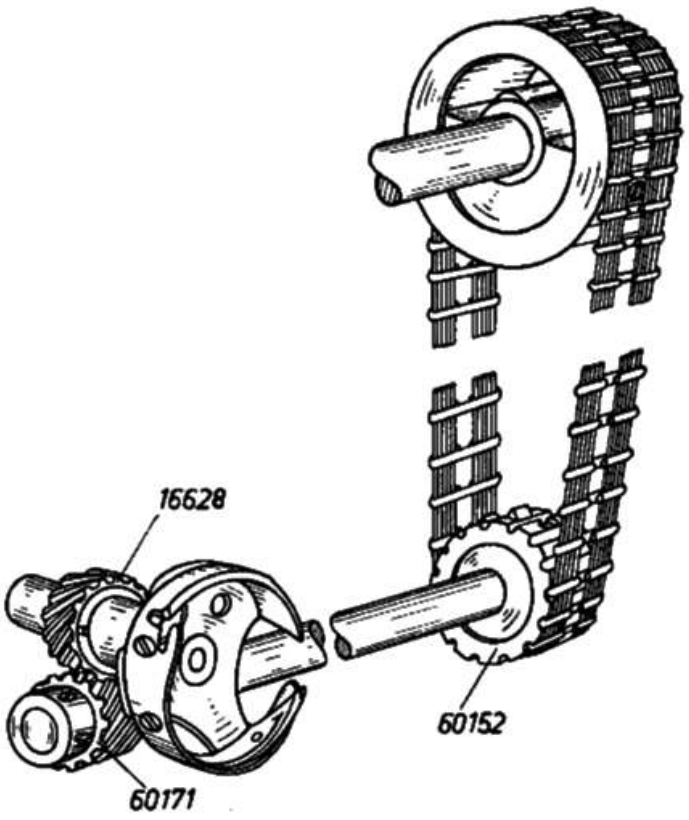


Fig. 30

ing on whether the clearance between point of hook and needle is too wide or too narrow, add or remove spacers (60156) until the point of the hook is as close as possible to the needle, without touching it. Replace the hook in the same position in which it was removed. Having ascertained that the clearance between both parts is correct, insert and tighten the hook set screw by turning it counter-clockwise. Then replace the position finger bracket.

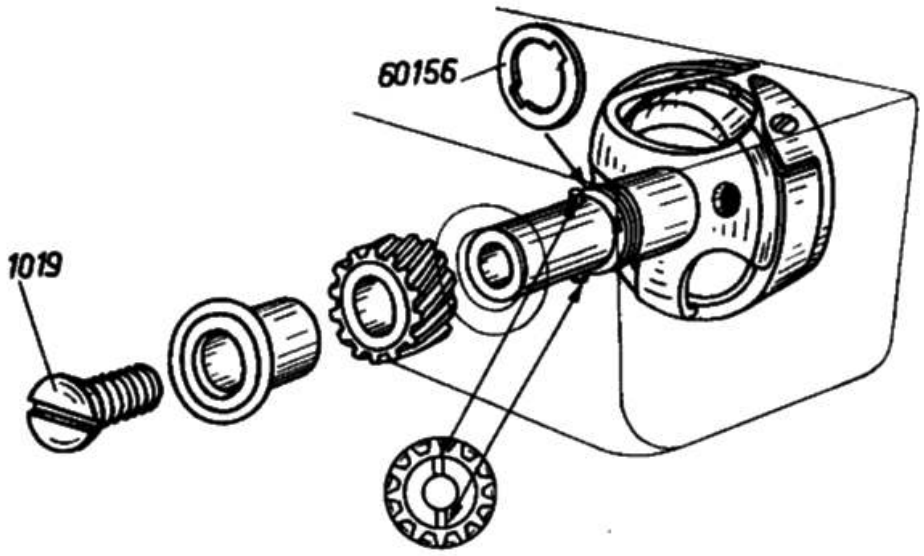


Fig. 31

The Position Finger Bracket

After adjusting the clearance between hook and needle on the PFAFF 332 it will automatically become necessary to recheck the position of the position finger bracket. Unhindered passage of the thread loop through the clearance gap greatly depends on the correct position of bracket (60192) in relation to the bobbin case base. Both are correctly positioned if there is a clearance gap about $^{1}/_{32}$" wide between the tip of the position finger (60194) and the bottom of the position slot. (Fig. 32).

Faulty adjustment may result either in the bobbin case base jamming in the hook (if finger fails to enter slot sufficiently) or in the thread getting caught in the gap and breaking (if gap is too narrow). (The same setting applies to position finger bracket (8951) on the PFAFF 230.) For accurate adjustment use gauge (8951–100). After slackening set screw (73) in the position finger bracket (use an elbowed screw driver for the PFAFF 332), insert the narrow finger of the gauge into the gap between the position finger and the bottom of the position slot. Push the position finger bracket forward until the gauge is pressed against the bottom of the slot, then tighten set screw (73). For a correct adjustment of the clearance gap, the gauge must neither be jammed nor have too much play in the slot.

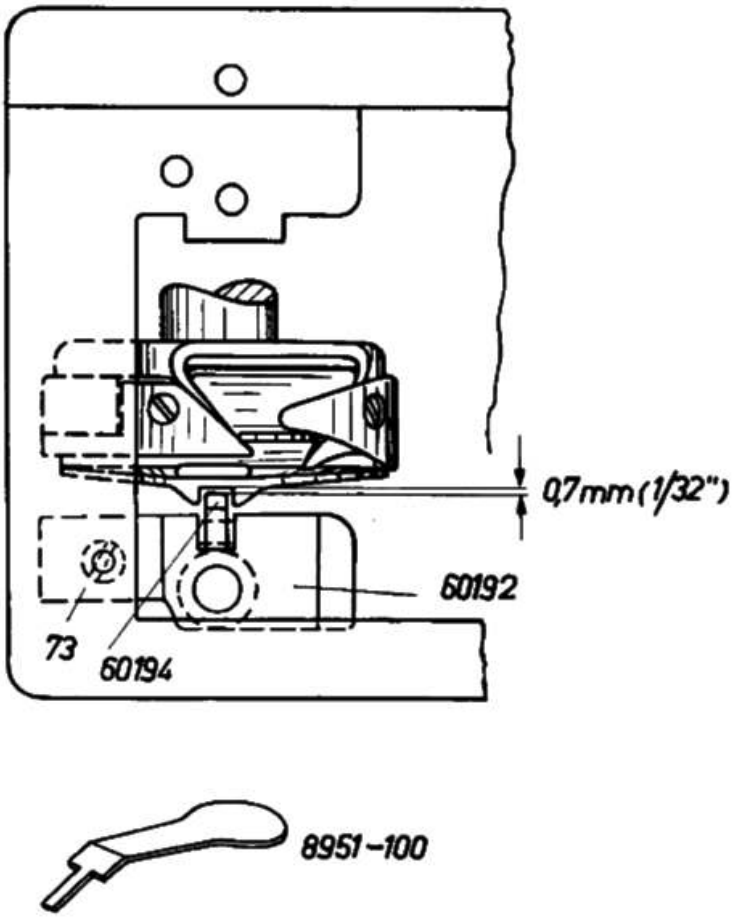


Fig. 32

Setting the Needle Bar at Correct Height

It is not advisable to make this adjustment before zigzag mechanism and hook have been correctly set since any previous adjustment errors cannot be traced and eliminated if the step sequence is changed.

For this adjustment insert a No. 90 needle, unscrew needle plate and face cover (105300) and retain threader bar frame (105353) in its top position with a piece of folded wrapping paper. Set zigzag button **D** for the widest zigzag stitch and engage the needle position lever in the center notch. Then turn the balance wheel in sewing direction until the point of the hook is exactly opposite the center line of the needle when the latter descends on its left throw. (Fig. 33). The needle bar height is correct if the top of the needle eye is .02" below the point of the hook. To adjust, pass the screw driver through the lower hole in needle bar frame (105351), loosen needle bar set screw **A** (Fig. 33) and move the needle bar up or down as required.

In correcting the height setting of the needle bar, take care that the bar will not be turned axially and that needle clamp screw (1129) will be exactly at right angles to the direction of feeding. After this adjustment, tighten set screw **A** securely. For replacing the face cover see the instructions given on page 19.

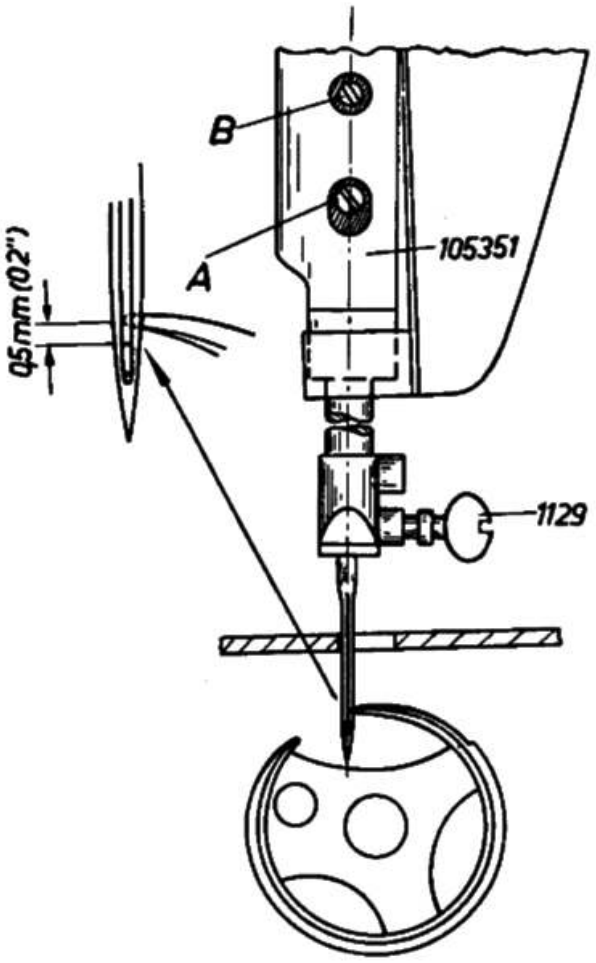


Fig. 33

The Forward-Reverse Stitch Regulator

Adjustment at the factory is made to ensure that the feed dog will be at a complete standstill when the stitch length lever (105251) is set on zero. Since the reverse stitch is chiefly used to tie off the end of a seam, a ratio of 9:10 between forward and reverse stitches was found most practicable. If the machine would be set to make stitches of the same length in either direction, the needle would most probably injure the seam when backtacking. In those instances where it is important that forward and backward stitches be made of the same length, e. g. in stitching leather, the appropriate adjustment may be made at any time. In this case, however, it is not possible to preserve the zero position of the feed dog and to set the length of the forward stitch by the scale.

Before you make this adjustment, set both the stitch length lever (105251) and the stitch length limiting lever (105264) on zero (thereby locking the stitch length lever). Then remove the top cover and drop the feed dog. With a long screw driver loosen screw **K** (Fig. 34) in member (105260) which

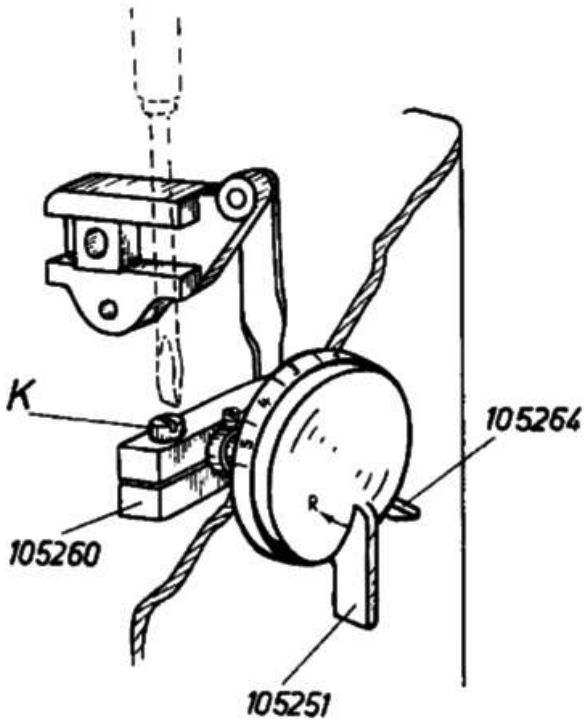


Fig. 34

is located in the vertical portion of the machine arm. Run the machine slowly and watch the feed dog. If adjustment is required, turn the member on the stitch regulator spindle until the feed dog moves neither forward nor backward. When this requirement is met, securely tighten screw **K.**

The following procedure should be applied to achieve forward and backward stitches of the same length:

Set the stitch regulator lever for the stitch length most frequently used, turn the stitch length limiting lever over toward the stitch regulator lever as far as it will go. Then loosen screw **K** and adjust member (105260) until the machine makes forward and reverse stitches of the same length. Do not drop the feed dog for this adjustment. To check the stitch length, place a piece of thin cardboard (which should not be too smooth, however) under the presser foot, let the machine make ten forward stitches, flick the stitch regulator lever over to the left, and sew ten stitches backward. The difference in length between forward and reverse stitches indicates which way the member must be turned in order to obtain stitches of equal length.

Adjusting the Feed Dog in the Feed Slot

Sideways Adjustment:

The feed dog must neither strike nor bind against the edges of the feed slots but should move freely.

If it is set oblique in the feed slots ① (Fig. 35), correct this condition after loosening both set screws (82) in the feed dog.

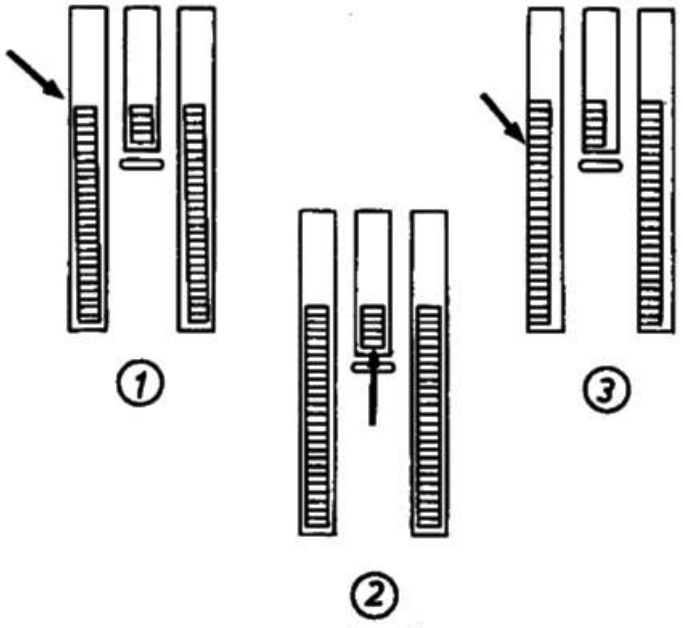


Fig. 35

In case the feed dog is not correctly centered and chafes against one side of the feed slots ③ (Fig. 35), adjust as follows:

On the PFAFF 230, loosen the set screws which hold the center pins (3102) in the feed driving shaft (8766), tap on the shaft (with the handle of the screw driver) until the feed dog is correctly centered in the slots. Before tightening the set screws, make sure that the flattened surfaces of the center pins point toward the screws and that the shaft has a sufficient amount of end play to

ensure proper lubrication. If the feed driving shaft has been much displaced, reset its rear crank (2249) and bring it in line with the feed driving connection (105226) so as to eliminate binding and noise.

To correct the above mentioned condition on the PFAFF 332, the feed dog carrier (60221) rather than the feed driving shaft has to be moved lengthwise. For this adjustment, remove the swing-out workplate, slacken both jam nuts (701664), and adjust the lateral position of the feed dog by turning both center screws (700139) as appropriate. (Fig. 36). When retightening the jam nuts after the adjustment, take care that the center screws will not turn likewise and jam the feed dog. To avoid this, retain the screws in the position adjusted with the aid of a screw driver while tightening the jam nuts. Make sure the feed dog is permitted sufficient play to ensure proper lubrication.

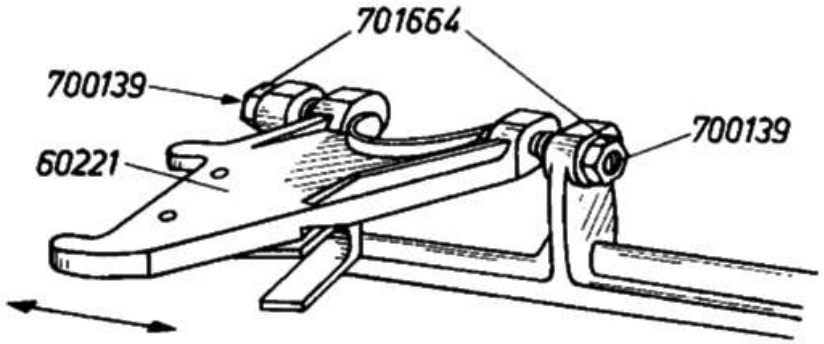


Fig. 36

Lengthwise Adjustment:

Set the machine for the longest forward stitch. Loosen binding screw (67 or 68) in feed driving shaft crank (2249 or 60132) and turn the crank so on the shaft that the feed dog will rise for its forward motion as close to the near edge of the feed slots as possible. Also make sure that the feed dog will strike neither the near nor far ends of its slots when set for the longest forward or backward stitch ② (Fig. 35).

To perform this adjustment on the PFAFF 332, remove the bottom plate. (See "Timing the Hook" on page 42.)

Adjusting the Presser Bar and Setting the Feed Dog at Correct Height

Gauge (8760–104) should be used to set both the presser bar and the feed dog at the correct height. This gauge is about $^{9}/_{32}$" high and has a $^{1}/_{32}$" recess on its underside. The depth of this recess corresponds to the correct height

of the feed dog when it has risen to its highest position above the needle plate. The height of the gauge is identical with the correct clearance between needle plate and presser foot when the latter is in its raised position.

To orient the presser bar in relation to the needle, use gauge foot (44088-103) which has just been developed for this purpose. It ensures that all sewing feet and attachments will be correctly set in relation to the centered needle. It should be employed in conjunction with gauge needle (Z 70.101-4) mentioned in Chapter "Timing the Hook". Since the height of the gauge foot is the same as that of all other sewing feet, it may also be used for setting the presser bar (with gauge foot screwed on) at the correct height.

The adjustment is made as follows: Unscrew face cover (105300), secure threader bar frame (105362) in top position with a piece of cardboard, insert false needle (Z 70.101-4), set the needle position lever in the center notch and the zigzag button at "0". Then raise the presser bar and attach the gauge foot.

Loosen set screw (153) on presser bar lifting collar (60022), slightly push up the presser bar to make room for gauge (8760–104) which is to be placed, recess down, between gauge foot and needle plate. Now lower the presser bar until the gauge foot touches the surface of the gauge just lightly (Fig. 37). This done, retighten the set screw in the presser bar lifting collar and lower presser bar lifter (60024), thus clamping the gauge in this position. Tilt the machine back and turn the balance wheel to bring the feed dog to its highest position. When in this position, check whether its teeth touch the underside of the recessed portion of the gauge. If adjustment should be necessary, loosen binding screw (67) and slightly raise or lower feed lifting shaft crank (6094). Return the machine to its upright position, raise the presser bar, and remove the gauge.

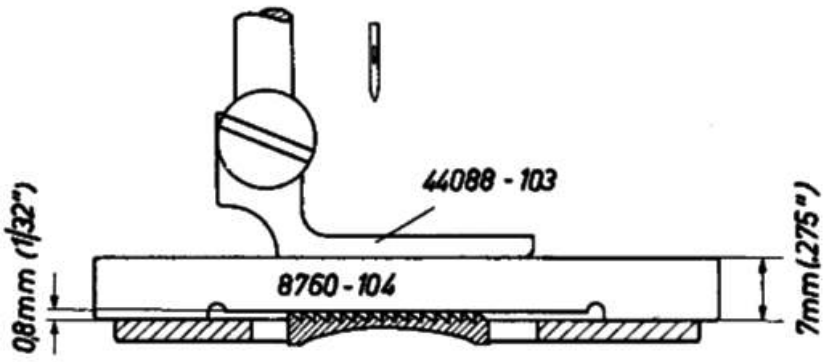


Fig. 37

On the PFAFF 332 this adjustment is made at the feed lifting shaft rear crank (60138) rather than front crank (60137) since set screw (367) on the latter engages in a flat depression on the shaft. To get at the rear crank, remove the bottom plate and proceed as instructed in "Timing the Hook" on page 42.

To adjust the position of the presser foot sideways, slightly loosen set screw (153) in the presser bar lifting collar and cautiously lower the needle bar. While doing this, the thicker portion of the gauge needle blade should pass exactly through the needle hole in the gauge foot, without being deflected. This is the most important requirement which is to be met by this adjustment. In addition, however, it is desirable so to set the gauge foot that the left edge of its shoe will be parallel to the edge of the feed slot. Then tighten the set screw in the presser bar lifting collar for good.

The Drop Feed Mechanism

Set collar (8888) presses the hinged feed lifting shaft front crank (6049) firmly against the fixed crank (6094). There must be no more play between them than is necessary to ensure that the hinged crank will move easily. The set collar should be so positioned on the shaft that its flattened side will face toward the feed dog carrier, and the carrier will not strike the collar when the feed dog is either lowered or set for maximum forward or reverse feeding. Furthermore, the sliding surface in the forked end of feed dog carrier (8839) should rest fully on crank roller (1758) across its entire width. It is also necessary to check whether set screw (534) in the feed lowering lever correctly presses against the flat spot on stud (105452). When switching the lowering lever from one stop to the other, the connecting rod must neither bind nor be hampered in its movement. If adjustment is required, the condition can be remedied by moving the hinged and fixed cranks plus the set collar lengthwise of shaft (8767), yet without turning them. The foregoing part numbers apply only to the PFAFF 230.

The above adjustment analogously applies to the PFAFF 332. Note, however, that the feed dog must not be lowered and that button (60142) must be turned over to the left until it is checked by pin (25168) before feed lowering crank (60143) can be screwed down on the spindle.

Miscellaneous Parts

Setting the Needle Threader

First etablish the correct height of the threader cam (105361) on the needle bar. To do this, take off the face cover and bring the needle bar to its highest position. Then move the threader bar frame (105353) all the way down and see if pin (1897) rides in the oblique slot from one end to the other, and also if there is a clearance of .02" between the bottom of the threader bar frame and the lower bearing of threader bar (105352) when the frame is at the correct height (Fig. 38). Adjustment can be made by setting the needle bar at 5/64" above the bottom of its stroke, loosening screw **B** (Fig. 33) which can be reached through the upper hole in needle bar frame (105351), and correcting the position of the threader cam as required.

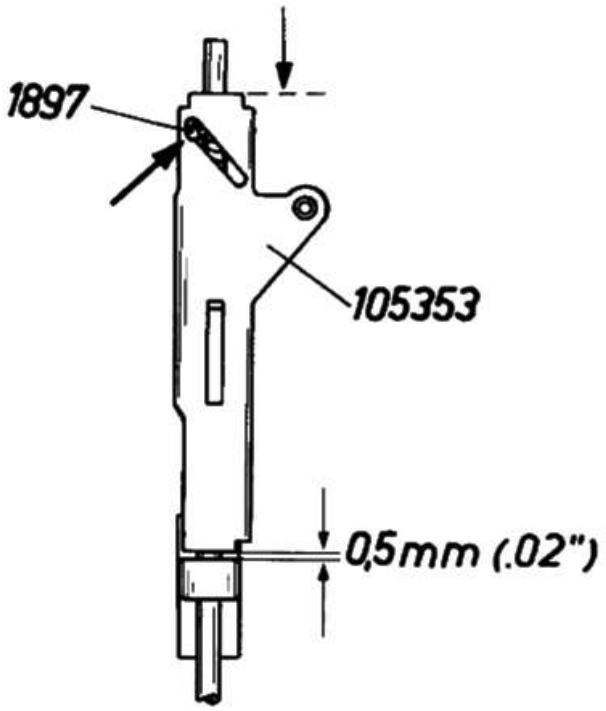


Fig. 38

When replacing the face cover, follow the instructions given on page 19 (Fig. 11).

Now bring the needle bar to its highest position, insert a No. 70 needle and proceed to adjust threader head (105355).

Accurate performance of this setting necessitates the application of gauge (60399–202). Figs. 39a and 39b illustrate how the gauge is to be inserted.

Lower threader engaging lever (105303) and thereby bring the threader bar to its lowest position. Hold it in this position with the gauge. Then push on threader head (105355) and turn it so toward the needle that its prong

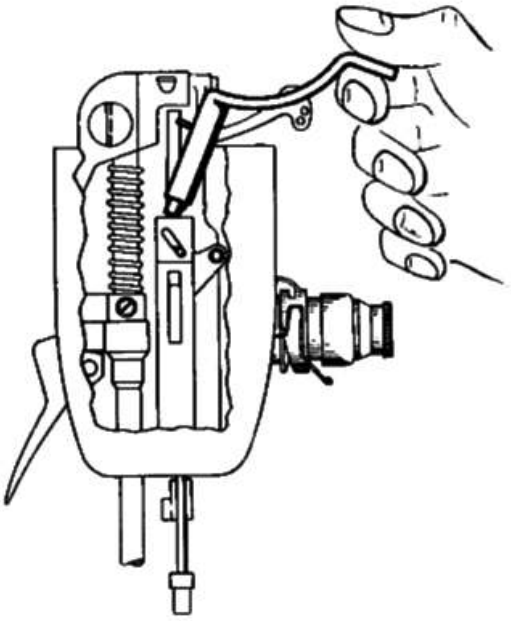


Fig. 39 a

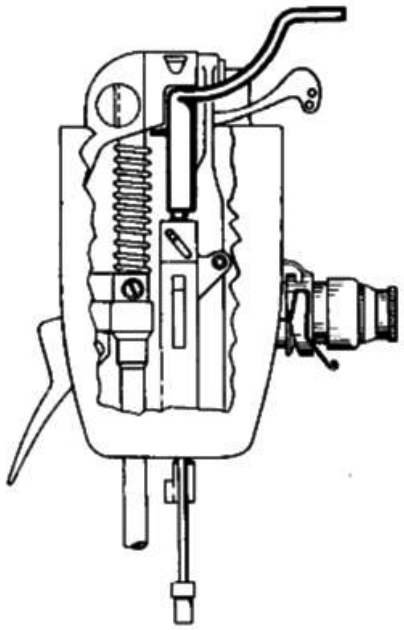


Fig. 39 b

(105363) will pass freely through, and protrude sufficiently from, the needle eye. This latter requirement has to be met in order to facilitate placing the thread into its lap (Fig. 40).

If the prong should not fit correctly, loosen the screw (1149) with which the prong is secured to the threader head and turn it to the right or left until its tip passes through the eye without bending the needle. Then tighten the set screws securely.

Another important adjustment is that of the height of the prong in relation to the needle. The prong should pass through the needle eye as close to its bottom as possible. This is important since the bottom of the needle eye will recede toward the point of the needle as the needle size increases while the top of the needle eye will always remain at the same distance from the top of the needle shank, regardless of the needle size.

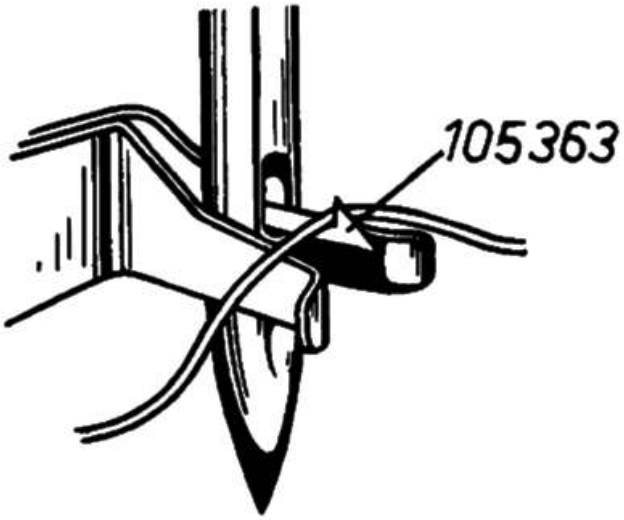


Fig. 40

Adjusting the Bobbin Winder

Every bobbin winder has been meticulously set at the factory and checked for even winding. If, in spite of this, the thread should wind unevenly, this is to be attributed to the fact that force has been applied in removing or replacing the top cover. As a result, link (105477) may have been bent and bobbin winder spindle (105485) forced out of a true vertical position.

This condition is evidenced by:

Thread accumulating on upper portion of bobbin if spindle extends oblique to the left;

Thread accumulating on lower portion of bobbin if spindle extends oblique to the right.

To eliminate this defect, straighten the bobbin winder link. On recent machines this link has been reinforced.

The last step in this adjustment procedure pertains to setting the bobbin winder at the correct distance from the balance wheel. Begin by loosening the set screw in bobbin winder base (105476), then move the base over toward the balance wheel until the rubber ring on the winder puiley just contacts and is securely driven by the balance wheel when the winder is engaged. Excessive pressure on the balance wheel which is exerted by the winder pulley will result in binding and premature wear of the rubber ring.

Exchanging and Timing the Thread Check Spring

Old Type:

To exchange a broken thread check spring, remove the top cover and loosen set screw (150) which holds the thread tension in the machine and can be

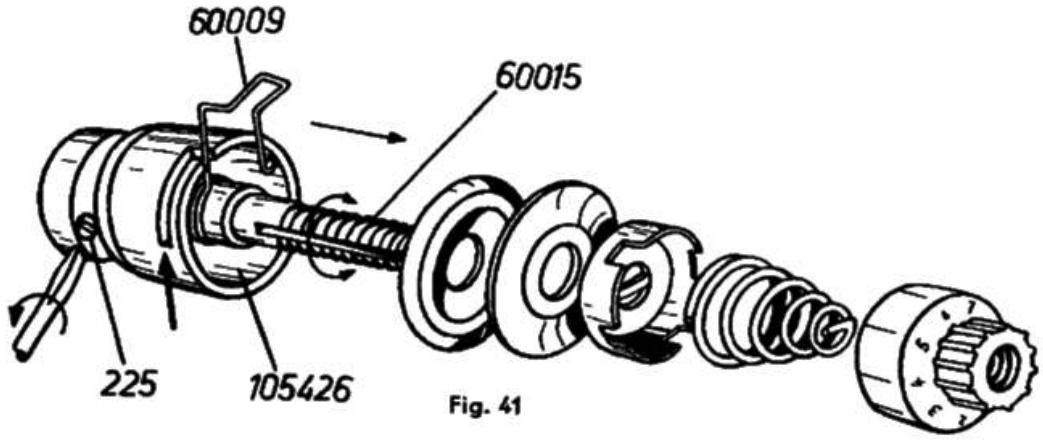


Fig. 41

reached from above. Then the complete tension can be pulled forward out of the machine. (Make certain that you do not lose the tension release plunger and pin; it is best to lower the presser bar lifter beforehand.) Now loosen set screw (225) in the tension bushing (105426) and turn tension stud (60015) so that the radial part of check spring (60009) is opposite the slot in the tension bushing. When in this position, tension stud, check spring and tension discs can be withdrawn (Fig. 41). Now remove the broken check spring from the assembly and insert a new one with its bent loop pointing toward the tension discs. Its short elbowed end is inserted into the hole which is provided for this purpose in the tension stud. From this point on assemble the tension in the reverse sequence. However, before tightening the set screw in the tension bushing, turn the tension stud over to the left until the check spring will rest just lightly against the end of its slot (see arrow). After inserting the tension release pin into the hollow tension stud the assembled tension is replaced in the machine.

New Type:

With this improved tension (105434) it should be noted that the guide finger on cup (105436), which fits over the tension discs, has to enter the hole provided on the front of the machine (Fig. 42).

To insert the tension mechanism, lower the presser bar lifter, push the tension in as far as it will go, and turn it so that the radial part of the check spring will extend horizontally to the left. Tighten the set screw just lightly.

Final adjustment is made while sewing. The check spring should be through acting and should have reached the end of its slot when the needle point reaches the goods. This requirement can be met by turning the complete tension. After the adjustment, tighten set screw (150) for good.

The New Upper Tension

The new type tension features a number of improvements over the old version.

With just one complete turn of the tension regulating nut you can cover all grades of tension from loose to tight, i. e. from "0" to "10" on the scale. The marks greatly facilitate the setting of any specific grade of tension and, if thread of the same weight is used, permit setting the

tension device for the same amount of tension at any later date. In addition, the tension device is organized for two-needle work and the thread cannot slip out of the tension when the tension discs are open.

The new upper thread tension (105434) is composed as follows:

(See Fig. 42)

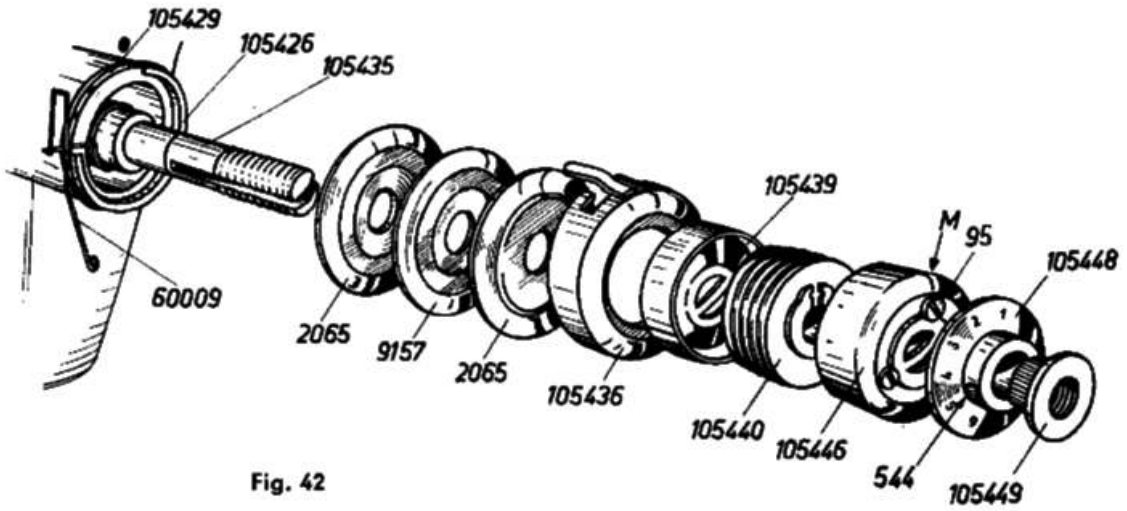


Fig. 42

Tension bushing (105426) receives tension stud (105435) plus thread check spring (60009). The stud is held in position by screw (225). Recently a spring retainer ring (105429) has been added which is slipped over the front edge of the bushing and held in position by a groove. This ring has to be removed and screw (225) to be slackened before tension stud and check spring can be taken off (e. g. for replacing a broken spring). Slipped on the tension stud are three tension discs, the contact surfaces of the outer discs (2065) facing disc (9157) in the middle. All three tension discs are enclosed in cup (105436) whose finger should point upward and engage in the hole on the front of the machine when the tension is mounted. Then tension release disc (105439) and spring stack (105440) are slipped on the stud with the open side of the disc and the snap ring side of the stack out. Next on the stud is sleeve (105446) with marking **M** up. To facilitate positioning the sleeve on the stud so that its mark will be exactly at the top, a disc with a center partition is secured to its face with three screws. While this partition enters the slit in the

tension stud and holds the disc in position on the stud, the sleeve can be turned after loosening the three set screws. The high-headed screw (95) below the marking serves as a stop for the small pin in dial ring (105448). Last on the tension stud is tension nut (105449) on whose collar the dial ring is slipped and secured by screw (544).

Here is the procedure to follow for adjusting the tension mechanism.

As explained above, mark **M** (Fig. 42) on the tension sleeve should be in top position. This is a prerequisite to an exact adjustment of the tension mechanism. Since the sleeve can be correctly set only after the working of the check spring has been checked in accordance with the instructions given in the preceding Chapter on page 57, it is recommended to set the tension for a medium grade when checking the proper functioning of this spring.

Another requirement which has to be met before the tension mechanism can be adjusted is the correct tension of the thread check spring. Its resilience should be sufficient to return the spring to the end of the slot. As you know, the grade of resilience can be altered by turning tension stud (105435) in tension bushing (105426).

Turn it to the left for more tension,
and to the right for less.

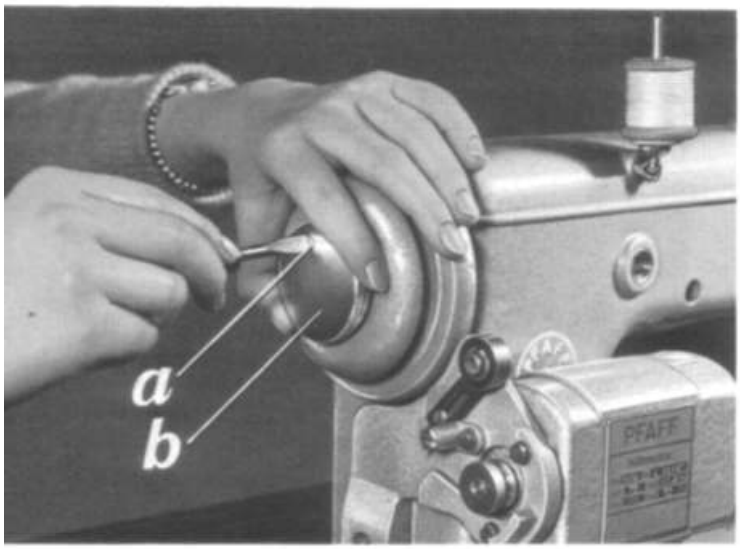
This adjustment not only requires dismantling the complete tension mechanism but also changes the position of the tension sleeve marking in relation to the tension stud.

If, after the above adjustments have been taken care of, this mark should be noticeably out of adjustment, loosen the set screw in the dial ring, unscrew the tension nut and take the dial off. Next, slacken the three screws in the tension sleeve and turn the sleeve so that its mark is at the top. Before you tighten the screws firmly, make certain that the sleeve will be correctly centered on the stud. After this adjustment, slip the dial on the collar of the tension nut and replace both on the stud.

The last adjustment which has to be made is to set the tension mechanism for the correct amount of tension. Begin by lowering the presser bar lifter. Set the tension dial (105448) at "1", hold it in this position and turn tension nut (105449) until a slight resistance has to be overcome when pulling a

No. 40–50 thread through the tension discs. Lightly fasten set screw (544) in the dial, turn dial and tension nut to "0", and check whether the thread can be pulled through the tension without any resistance. To meet both requirements it may become necessary to repeat this adjustment several times. Then press the dial against the flange of the tension nut and tighten set screw (544) in the dial securely. By following this procedure the turn of the dial will be limited exactly at "0" and "10".

Fig. 43



Removing the Balance Wheel

If it should become necessary to remove the balance wheel, loosen stop screw **a** (Fig. 43) just a few turns and turn out clutch screw **b.** Then remove clutch washer **a** (Fig. 44) and pull balance wheel (105275) off its bushing (105055).

With the PFAFF 332 the balance wheel can be taken off only after the following steps have been completed: Unscrew grille **A** (Fig. 46), loosen screw **P** and push idler **D** over to the side, slacken set screw (1143) on motor pulley (60262) and pull the pulley (plus the clip belt) off its shaft. When assembling the parts in reverse order, take care that screw (1143) presses against the flat depression on the motor shaft and that the face of the motor pulley is flush with the butt of the shaft.

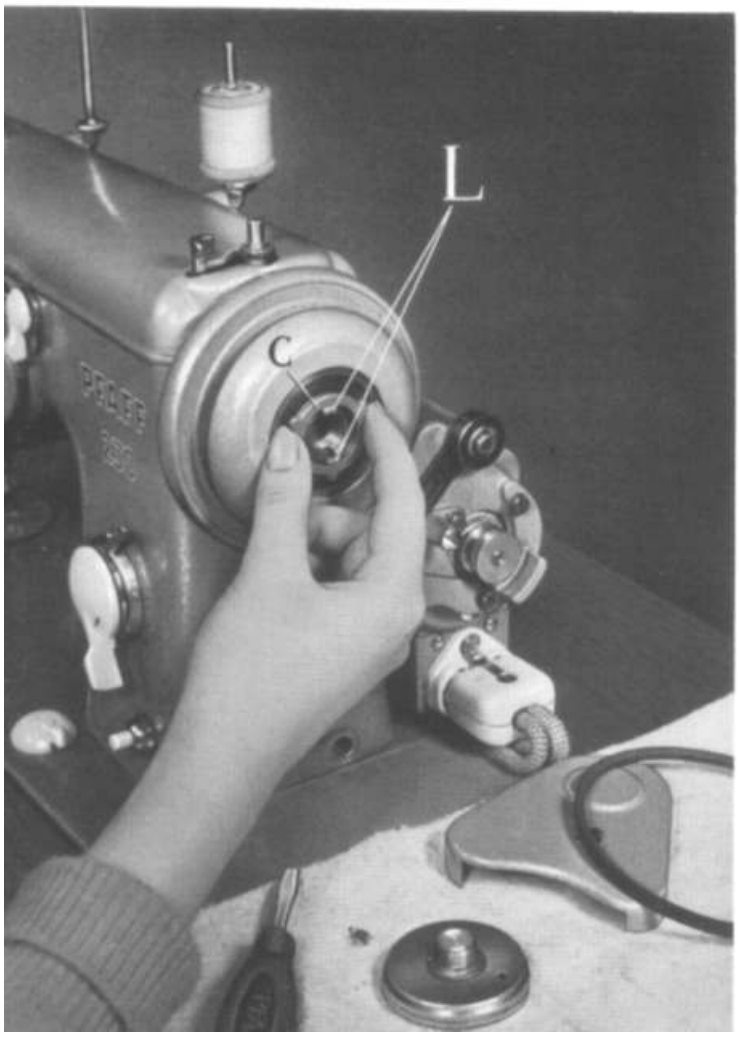


Fig. 44

When replacing clutch washer **c** (Fig. 44), make sure that its bent-up lips **L** face outside and are in line with the corresponding recesses in the balance wheel bushing. Then insert and tighten thumb screw **b** (Fig. 43) and stop screw **a.** The washer is correctly positioned if for disengaging the sewing mechanism the thumb screw can be turned about 1/8 of a complete revolution. If the screw should be locked instantaneously, rotate the clutch washer one-half turn. In any case it should be ensured that the sewing mechanism will be completely disengaged for winding the bobbin, and will be securely connected with the balance wheel when sewing.

Taking Off the Motor Belt

In those cases where the PFAFF 230 has been fitted with an attachable motor the motor belt has to be removed before the balance wheel can be pulled off. To do this, loosen set screw **T** (Fig. 45) and take off V-belt guard (105577). Now slacken the belt by loosening screw **S** and moving idler **F** up away from the belt. Then seize the lower part of the belt close to the pulley (60519) and, with a jerk of your hand, throw it off as you pull it toward the pulley. Finally the balance wheel is taken off.

The above mentioned idler **F** serves to tension the belt after it has been remounted. Note, however, that the idler should be moved toward the belt and fastened by screw **S** in such a position that belt slippage will be definitely eliminated, yet without stretching the belt excessively. Conclude the adjustment by screwing on the belt guard.

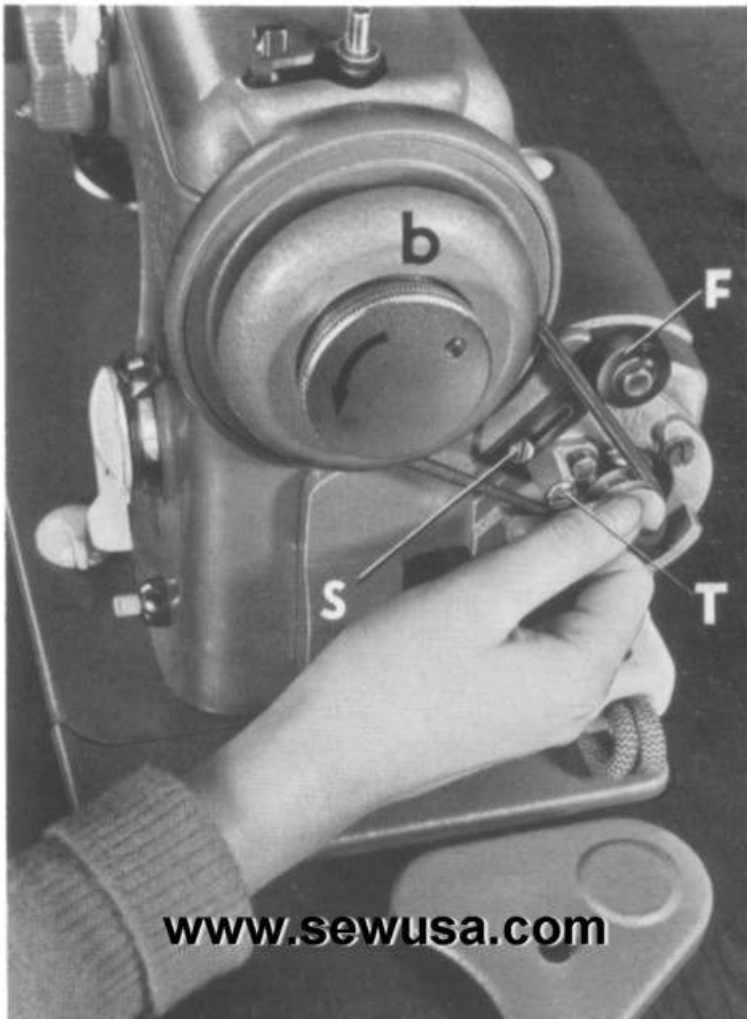


Fig. 45

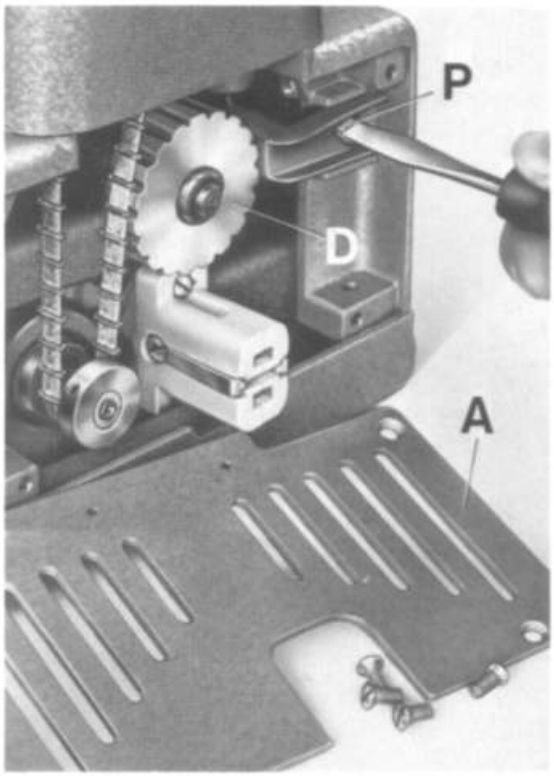


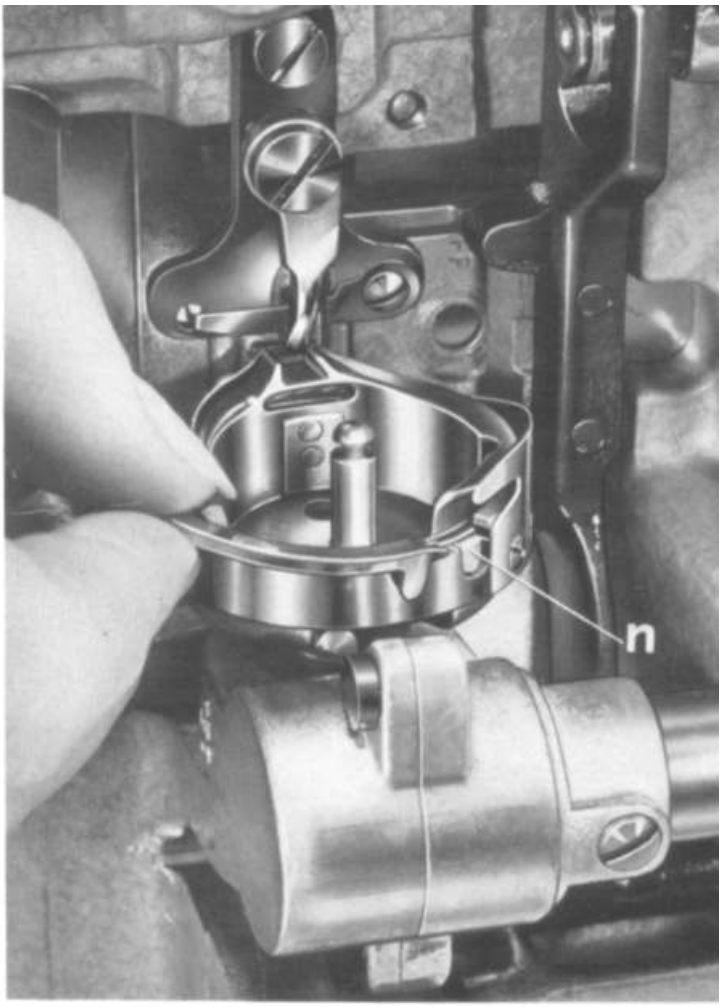
Fig. 46

Adjusting the Motor Belt Idler (PFAFF 332)

In the Chapter "Removing the Balance Wheel" reference was made to idler **D** (Fig. 46) which is incorporated in the PFAFF 332. The function of this idler is not to tension the clip belt (as this would merely impede its smooth running and increase the noise) but rather to keep the belt from fluttering excessively and its clips from brushing against, or even hitting, the walls of the machine (as this would cause undesirable noise).

To reset idler **D,** loosen screw **P** and move idler bracket (60267) over to the left until the clips on the belt are in permanent mesh with the idler and the latter revolves evenly as the belt rotates. When securing the idler bracket in position, make sure that rubber block (60288) is correctly placed. If, after adjusting the idler, the motor belt should have become too taut due to being soaked with oil and this condition should impair the sewing speed, retighten the four screws which hold motor base plate (60163). (See Fig. 29.) Thereby the rubber washers (60179) will be more tightly compressed and the axial distance between motor and top shaft reduced.

Fig. 47



Removing the Hook Gib

With machines which are equipped with the new type hook featuring but one gib screw, it will hardly ever become necessary to remove the hook gib. If thread should jam in the hook race, it will suffice, in most instances, to loosen hook gib screw (678) – provided it can be readily reached – and to turn the balance wheel back, or back and forth. This action should free the jammed thread. It is understood, of course, that the removal of the thread will be facilitated by taking out the gib.

After taking out the tiny gib screw (678) – be careful that you don't lose it –, hook gib (105493) can be swung out and pulled away.

When replacing the gib, take care that its heel enters the small groove which is located immediately beneath the prong of the thread pull-off flange and that its bent-down round lug fits in recess **n** in the body of the hook (Fig. 47). Then push its front end into position and screw it down. When inserting the gib screw it is advisable to cup your hand under the hook until the screw has taken hold.

Cleaning and Dismantling the Hook

Even if the machine is seldom used, the hook, which is its most sensitive part, should be cleaned frequently. The dust which has accumulated in the vicinity of the hook is removed with a small brush.

Take out bobbin case cap (9076) with the bobbin and unthread the machine. Squirt ample cleaning fluid into the annular groove of the hook or the flange of bobbin case base (8844), raise the presser foot, and run the machine for some time at varying speeds. Repeat this procedure until all lint and dust have been washed out of the hook. This completed, reoil the flange of the bobbin case base and sew off the excess oil on a piece of fabric.

Dismantle the hook only if it is absolutely necessary.

It is stripped as follows:

> Take out needle, bobbin case cap (plus bobbin) and needle plate; remove the hook gib as instructed in the preceding Chapter; then rotate the hook until the first set screw (678) in the thread pull-off flange (in sewing direction) is exactly above the position slot in the rim of bobbin case base (8844) which is entered by the position finger.

When in this position, seize the center stud with thumb and forefinger and tilt the base out at the bottom. To remove pieces of thread or any other foreign matter from the race, take a pointed tooth-pick or the like, never a metal tool.

The bobbin case base is replaced with the hook in the position as described above. Hold the base so that the position slot points upward, tilt it lightly, slip it in from below, and push it into position (Fig. 48). Don't apply force, though! If the bobbin case base should not readily slide in place, slightly turn the balance wheel back and forth.

Then screw on the hook gib in accordance with the instructions contained in the preceding Chapter. Before you tighten the gib screw securely, check, by cautiously turning the balance wheel whether the hook rotates easily and does not jam. Having completed this adjustment, replace all remaining parts.

Fig. 48

III. The Automatic Mechanism

Functions

Both the PFAFF 230 Zigzag and the PFAFF 332 Free-Arm Portable are so designed that the PFAFF Automatic Unit can be installed at any time.

The Automatic Mechanism (50350) as a compact unit is housed in the upper portion of the machine arm and enclosed with a suitably designed top cover.

In contrast to automatic devices which control the needle bar motion directly and, for this very reason, have to put up with a number of disadvantages, the PFAFF Automatic controls the needle motion indirectly through needle position and stitch width regulator assemblies. Hence, the PFAFF embroidery mechanism automatically performs all the manipulations which had to be done by hand in making ornamentations on an ordinary zigzag machine. At the same time, the mechanical principle of positively controlling the needle motion has been retained in this machine. Automatic machines which incorporate these features offer the additional advantage of permitting to vary the needle position and the stitch width either singly or jointly, and to sew all patterns in different lengths without altering the stitch density.

The drive of the Automatic Unit originates with the driving eccentric (105061) which is already provided in all standard machines and, at the same time, serves as a front set collar on the top shaft (Fig. 24). Pressed against this eccentric by spring action is a roller (50490) which is connected with driving lever (50366). As the top shaft rotates, the eccentric pushes roller and driving lever a certain distance over to the side. The amount of this sideways motion is decisive for the rotating speed of the cam stack. In order to provide a possibility of changing this speed and of thus altering the number of stitches

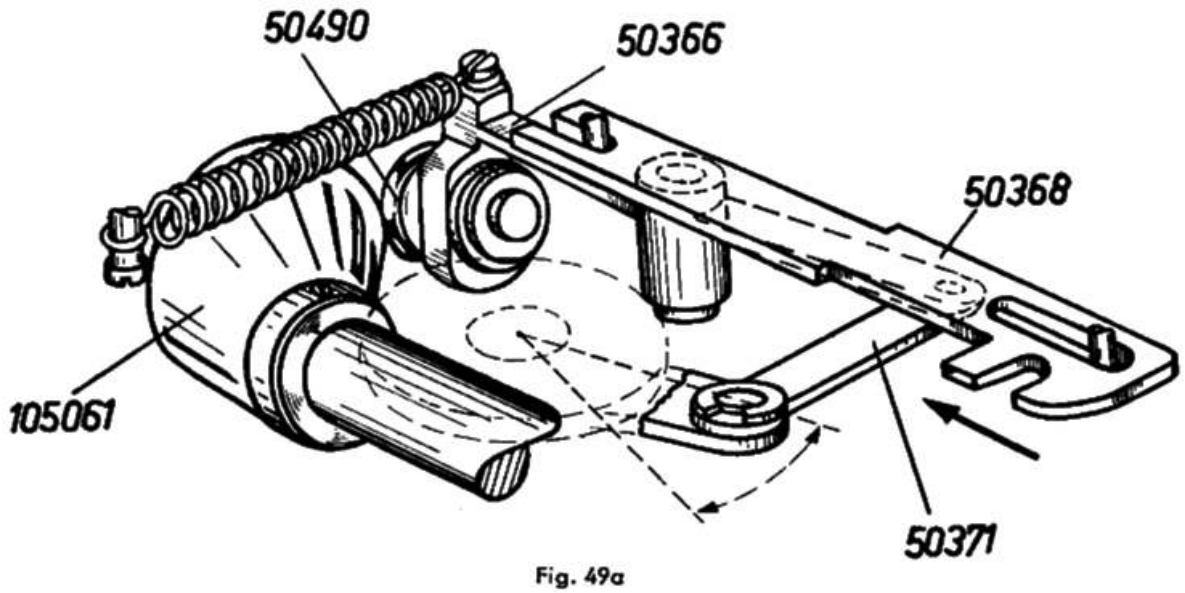


Fig. 49a

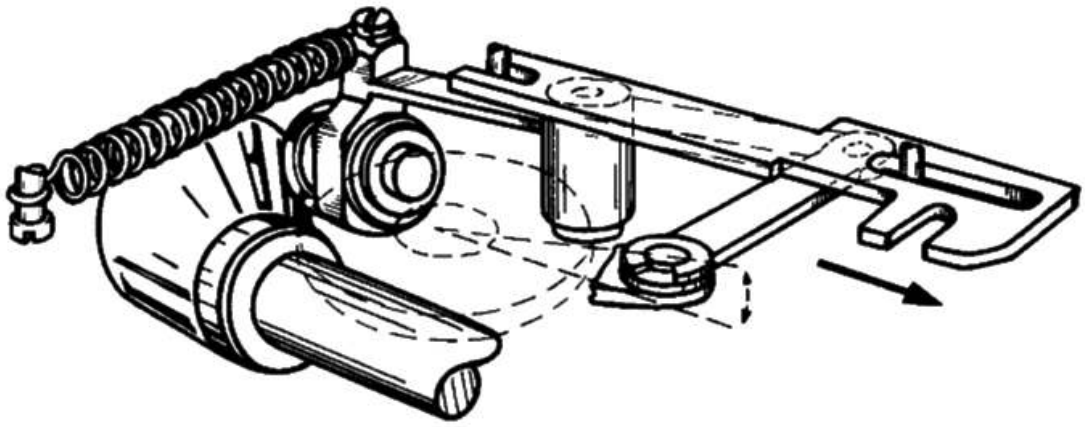


Fig. 49 b

per cam revolution, the leverage of the driving lever can be varied by moving it lengthwise of the machine arm on regulating slide (50368). For the same reason, the diameter of the eccentric has been reduced to the right. (Fig. 49).

When the regulating slide is moved to its extreme right position and, as a result, the roller is almost opposite the concentric collar of the eccentric, the driving eccentric will idle since the return stroke of the driving lever toward the top shaft is limited. As a result, driving lever and roller will remain in the initial position and so will the cam assembly. In other words, the Automatic Mechanism is disengaged. The farther the slide is moved to the left and the more the roller rides up on the conical part of the eccentric, the larger will be the sideways travel of the driving lever and the higher the rotating speed of the cam assembly. Its speed determines the length of the design to be sewn (without altering the stitch density).

Large sideways travel – quick rotation – few stitches – short pattern (Fig. 49a)

Small sideways travel – slow rotation – many stitches – long pattern (Fig. 49b)

The various speeds ranging from 25 up to 100 stitches per cam revolution can be controlled by lever (50556) which is disposed on the top cover. As this lever is flicked from one notch to the next (there are a total of eight notches), a pin, which is arranged in an eccentric position on crank (50561) and engages in the fork of slide (50368), moves this slide lengthwise of the mounting plate.

To ensure that the cam assembly will rotate only when the needle is out of the material, the driving eccentric must be turned on the top shaft until it occupies a position in proper relation to needle bar crank (105052). At every revolution of the top shaft the driving lever (50365) makes one sideways motion and, through connection (50371), turns the cam assembly for a certain fraction of one revolution at a time. (Intermittent feed.)

Of course, the cam assembly must be turned only in one and the same direction and should be retained in its position when the driving lever returns for its next stroke. This requirement has made it necessary to incorporate a feed clutch which features spring-loaded rollers and is made up of two assemblies, clutch (50473) and driving and braking flange (50483). The exchangeable stack of pattern cams is secured, in a predetermined position, on the collar of flange (50483) and is held in position on the center stud by a beehive spring and a thumb nut.

Eight contact fingers, arranged on a stud in ascending order and each offset at a 45° angle, make up feeler assembly (50391) and alternately ride on the rims of the cams opposite as these cams rotate. By setting the contact finger dial (50395) at any of its eight marked positions in succession, the fingers can be alternately engaged. With one complete turn of this dial all possible settings can be covered. The impulses originating with each throw of the cam are conveyed to feeler assembly carrier (50386) which is pivoted at its one end and kept in constant engagement with the cam assembly by a spring which acts upon its other end. From this carrier the impulse is transmitted to an adjustable connection and to stud carrier (50383). Rotably mounted on this carrier are three studs whose slots receive three spring-loaded clutch bars.

Two of these bars are connected with stitch width regulator connection (105089) and one with stitch width regulator arm (105085). The first two clutch bars serve to control the stitch width and are secured in the two holes of connection (105089) by means of eccentric studs. Since both of these holes are arranged at different distances from the fulcrum of the connection, the clutch bar closest to this fulcrum will turn the stitch width regulator stud farther than will the bar secured in the top hole. In addition, the length of travel of the studs diminishes from front to rear due to the fact that the stud carrier is pivoted at its one end.

All motions are so timed that the front clutch bar will control the entire width of bight, and the one in the middle half the stitch width. The needle position is varied by the bar at the back. It performs the shortest travel of them all and acts on the stitch width regulator arm. Which of the clutch bars, singly or jointly, are to be applied in conveying the impulses of the cam to the zigzag mechanism is determined by the position of dial (50422) and cam stud (50409) which is arranged at its back. The dial can be set at six different positions. When set on zero, all three bars are raised against the pressure of the spring assembly which is arranged above them.

With the clutch bars thus disengaged, the machine can be set by hand as any ordinary zigzag sewing machine. At all other positions of the dial either one or two bars are engaged and transmit the motion of the stud carrier to the zigzag mechanism of the machine. When engaged, the clutch bar slips down in the slot of the stud so that the small transverse pin in the slot enters its notch.

When set at "1" through "5", the clutch bar dial effects the following automatic settings in the embroidery mechanism:

Position 1

Center bar is engaged and automatically controls the needle motion for half the width of bight. The needle position has to be set by hand.

Position 2

Both the center and rear bars are engaged and, in addition to the above, also the needle position is controlled automatically.

Position 3

Only the rear bar is engaged and automatically controls the needle position. The stitch width desired has to be set by hand.

Position 4

Front bar is engaged and automatically controls the needle motion for the entire width of bight. The needle position has to be set by hand.

Position 5

Front and rear bars are engaged and automatically control the needle motion for the entire width of bight, and the needle position.

Important Hints

In order to eliminate, right from the beginning, all sewing troubles which may be caused by errors in assembling and adjusting the machine, it is imperative that all points of the instructions for installing the Automatic Mechanism be strictly adhered to.

A fold-out drawing which shows the individual assemblies of the Automatic Embroidery Unit is included at the end of this manual and will be instrumental in further illustrating the text. All essential parts have been designated with letters to facilitate spotting them in the drawing.

Adjustments which were covered in great detail in the various adjustment procedures in the first two parts on this book will be covered but briefly in the following.

Preparing the Machine for Installing the Automatic Mechanism

Proceed by loosening screw **d**, and removing zigzag button **D** and scale **a**. Then pull off pressure spring **c** which is located behind the scale. This spring is omitted when reassembling the parts later. Turn out screw **b** in notched member **w**. Tension spring (21123) inside the machine arm at the back of the scale should now be in a position lightly to pull the upper end of the notched member over to the left, pivoting it on its upper hinge screw (1164). Now check whether needle position lever **C**, in every one of its positions, will clear the member and also whether the lever, after having been engaged, will be readily released when the member snaps back to its basic position. On older machines it will be inevitable to slightly rework the notched member or to readjust the hinge screw.

Another check which has to be made serves to establish whether stitch width regulator arm (105085) will turn on fulcrum stud (105087) so easily that its own weight will suffice to return it to its lower position after having been lifted by lever **C** as far up as it will go. If it does not, find the cause responsible for this condition.

With older machines the fault will mostly lie with spacer **h** (105094) which may bind and has to be straightened. To eliminate this fault in the future, this spacer is now being made in two parts. If it should be fulcrum stud (105087) which causes binding, dismantle and refit it. For this purpose, first remove buttonhole regulating slide (105158) and its small lever (but make sure you pull it forward and don't bend the small leaf spring which has been provided in recent machines to retard the motion of the slide). Then, with a snap ring plier, remove the retainer ring from the end of the fulcrum stud.

After loosening set screw (225) take a copper punch and cautiously drive the stud forward out of its socket until you can grip and pull it out completely. If the machine is equipped with a two-part spacer **h**, hold part (105095), which is pushed onto the stud, while you pull the stud out.

Now, with a piece of fine emery cloth, smooth the surface of the fulcrum stud so that the stitch width regulator arm will turn freely on the stud, yet without having any play. The parts are then reassembled in reverse order.

Another part that should turn freely in the stitch width regulator arm is stitch width regulator stud (105101). Although all parts in the zigzag mechanism have been scrupulously fitted at the factory, it may become neces-

sary to refit certain parts when installing the Automatic Mechanism in some of the first machines adapted for this purpose.

To dismantle the stitch width regulator arm with the regulator stud follow this procedure:

a) Strip buttonhole regulating slide plus lever (105158) as instructed above.

b) Loosen set screw (624) on crank (105093).

c) Unscrew notched member (105163) and needle position scale (105115).

d) On machines which have a one-piece spacer this part has to be removed; otherwise, merely part (105096) has to be loosened and swung away.

e) Remove the retainer ring from fulcrum stud (105087) as instructed above.

f) Take hinge screw (995) out of crank (105093) and pull the crank off the stitch width regulator stud.

g) Slightly tilt the stud, thereby pulling it away from slide block (6601) of needle bar frame pitman (105189), and pull stitch width regulator arm and stud forward out of the machine.

The bearing in the stitch width regulator arm must be cautiously smoothed until the regulator stud turns completely freely without play. For this, only a fitting adjustable reamer must be used. If no reamer is available, it will suffice to smooth the bearing surface of the regulator stud, all around its circumference, first with coarse and then with fine emery cloth. Before replacing the stud in the arm, clean both parts carefully.

When reassembling the parts in reverse order, make certain that the regulator stud will be pushed onto the slide block with its flattened side up. If inserted with the wrong side up, it will strike the top shaft. The oil hole in the slide block should be at the top also.

If all of the above requirements are met, replace scale **a.** When doing this take care that the small position pin on the needle position scale does not

jam in the slot of the stitch width scale. Then push on zigzag button **D**, slightly tighten its set screw, and turn the button all the way to the right.

Now follow the instructions given under "Zeroing the Needle for Straight Stitching" on page 38 in order to correctly position button **D** on its stud. Note, however, that in this case needle position lever **C** is not set in the center notch, as stated in the Chapter quoted above, but instead has to be moved to the right until it contacts its stop. In other words, the needle is zeroed for straight stitching in its right position.

Before set screw **d** is tightened for good, ascertain that button **B** does not press scale **a** against the needle position scale too much. The stitch width regulator should move easily when button **D** is turned all the way from "0" to "4". On the other hand, the button must not be too far away from the scale to keep spring-loaded pin (105156) from obtaining a firm hold in the notches of the buttonhole slide.

After zeroing the needle, the position of connection **i** (105089) should be checked with gauge 105999–108. This gauge is 6–$^{1}/_{16}$" to 6–$^{5}/_{64}$" long and is to be inserted in hole **x** on the left and in the upper hole of connection **i** on the right.

To adjust this distance to the gauge, hold button **D** in its position, loosen screw **y** (624), with which crank (105093) is secured on the regulator stud, and move connection **i** to the position determined by the gauge. When tightening screw **y**, take care that the crank will not be moved axially and spacer **h** will not be jammed.

Before the Automatic Mechanism is mounted, check whether driving eccentric **f** (105061) is correctly timed as instructed on page 37.

Also check at the unit whether

a) the top contact finger of assembly (50391) is beneath the red mark when dial **A** is set at "1". If not, loosen set screws (1166) and adjust. Then tighten set screws securely.

b) both set screws (1166) on cam stud (105409) point upward and the straight edge of the center cam is horizontal when dial **B** is either on "0" (older version) or on "3" (newer version). Observe this rule when exchanging button **B** or dial disc (50427).

Installing the Automatic Mechanism

Installing the Base Assembly

To facilitate mounting the unit on the machine, set dial **A** at "4" and dial **B** at "2" and move regulating slide (50368) all the way to the right.

Tighten screws (72) in the sequence $e_1 - e_3 - e_2 - e_4$, i. e. crosswise.

In case the machine is fitted with a two-part spacer **h**, part (105096) should just sufficiently enter the recess of part (105095) which is carried on the hinge stud to keep the spacer from turning, yet without impeding the motion of the zigzag button.

Assembling the Clutch Bars

Front Bar (50429): Insert eccentric stud k_1 through the hole in the bar and into the lower hole of connection **i**, mounting the bar on the front of the connection. Lightly tighten screw q_1.

Center Bar (50430): Insert eccentric stud k_2 through the hole in the bar and into the upper hole of connection **i**, mounting the bar on the back of the connection, and lightly tighten screw q_2.

Rear Bar (50431): Insert bearing bracket **l**, which is connected to the bar by means of eccentric stud k_3, into the recess in stitch width regulator arm **m** (105085) and secure it in position with screw **n** (486).

Adjusting the Clutch Bars

Before adjusting the clutch bars, make certain that the eccentric portions of studs (k_1–k_3) point upward. Only then are the studs turned to the right or left as may be required to ensure that each bar, with its square notch, will freely drop over the pin in driving studs (o_1, o_2 or o_3).

If, on turning the cam assembly by hand, it is found that the throw of the needle in the needle hole is less than $^5/_{32}$", or that the bar is not completely disengaged when lifted by the cam on stud (50409), and moves up and down as its notch rides up and drops back over the pin in the driving stud, turn the eccentric stud so that its eccentric portion points downward. When making this adjustment, care should be taken that, due to the shorter power arm of levers **m** or **i**, the lenghtwise travel of the clutch bar will not cause either the zigzag button or the needle position lever prematurely to strike their stops as this is bound to result in binding of the bar.

Note the following rule:

When swell of eccentric stud is up, the lever arm will become longer and the stitch width smaller.

When swell of eccentric stud is down, the lever arm will become shorter and the stitch width wider.

a) Clutch Bar (50429), controlling the needle motion for the entire stitch width:

Set dials **A** and **B** at "4" and zigzag button **D** at "0". By hand turn the cam assembly to the right until the engaged contact finger snaps into the depression (lowest point) on the rim of the cam. Turn eccentric stud k_1 to the right or left and thereby adjust the fulcrum of the clutch bar so that its notch will readily fit over the pin in driving stud o_1.

Tighten set screw q_1 firmly but make sure the bar has enough end play on the stud.

b) Clutch Bar (50430), controlling the needle motion for half the stitch width:

Leave dial **A** on "4", flick dial **B** to "1" and button **D** to "0". Also leave the cam assembly in the position as in par. a) above, and apply the foregoing adjustment to the center bar (eccentric stud k_2 and set screw q_2).

c) Clutch Bar (50431), controlling the needle position:
Leave dial **A** on "4" and button **D** on "0", but set dial **B** at "3".

Then move needle position lever **C** over to the left and retain it there. Adjust eccentric stud k_3 until the bar will readily fit over the pin in clutch bar driving stud o_3.

Tighten set screw q_3 securely but make sure that the bar has enough end play on the stud.

With clutch bar (50431) engaged, turn the cam assembly by hand until the contact finger rides up on the highest point of the cam. Check whether the bar can be easily lifted from the pin in the stud.

If this requirement cannot be met, adjustment has to be based on the medium throw of the cam. In other words, eccentric stud k_3 should be so turned that the contact finger will pass the maximum throw of the cam without exerting eccessive pressure.

Now, while leaving the contact finger at the maximum throw of the cam, set dial **B** and button **D** both on "4" and check whether front bar (50429) still falls readily over the pin in stud o_1. If it does not, readjust as instructed in par. a) above.

If, in exceptional cases, the clutch bars cannot be brought to fit readily over the pins in their driving studs merely by adjusting their fulcrums at the eccentric studs, loosen screws u_1 and u_2 (407) and slightly lengthen or shorten the two-part connection **v** (50401/50402). Note that the center-to-center distance between the hinge screws (1151) at either end should not exceed approx. $1-{}^{15}/_{16}$".

Mounting the Spring Assembly

First the spring assembly with its bracket (50455) is mounted on the base plate by means of two set screws which are inserted in holes s_1 and s_2. Then, at screws t_1–t_3, regulate the amount of pressure to be exerted on the bars by springs r_1–r_3. The pressure should be just sufficient to cause the bars to fall securely over the pins in studs o_1–o_3. Each spring has a small leather pad at its tip with which it rests on the bar underneath.

Spring r_4 fits over part (50434) on front bar (50429). On recent machines the top edge of this part has small crosswise grooves. The spring will act only when dial **B** is set on "3" and then ensures that button **D** will be retained in the position which has been set by hand. To adjust, use the following settings:

Dial **A** on "4", Dial **B** on "3", Button **D** on "2".

Then engage the Automatic Mechanism and run the machine. Tighten regulating screw t_4 until button **D** will remain at mark "2".

Since, during the above adjustment, the top cover is still removed and, hence, lever **E** cannot be used to shove regulating slide (50368) over to the left to permit the cams to rotate, insert a strong screw driver down through the oval aperture in the mounting plate of the unit and move the slide over.

The springs should be parallel to the bars and in engagement across their entire width. If spring carrier blocks **r** should have too much end play on bracket (50456) and, as a result, the springs rest on the bars in an oblique position, reduce the amount of play by cautiously tapping on retainer ring (64021) on the front end of the bracket stud. Take care, however, not to eliminate the play completely and thus to jam the blocks on the stud.

Testing the Performance of the Automatic Mechanism

Having mounted the Automatic Unit, set the machine in motion and check the performance of the individual cams, one by one, at all possible settings of dial **B**. Check in particular whether all controls will automatically return

to their initial positions. This is especially important when trying out the setting A 6, B 5. Then again make sure that the bars will properly engage in the driving studs and can be readily lifted out of the slits of these studs when the contact finger has reached the maximum throw of the respective cam. Furthermore, when dial **B** is set at "1", button **D** should move from "0" to "2"; and when set at "4", from "0" to "4". When dial **B** is set on "3", needle position lever **C** should move all the way from the top to the bottom notch as the machine is in operation.

Checking the Needle Position in Relation to the Needle Slot

Having completed checking the performance of the Mechanism, disengage it by moving, with a screw driver, the regulating slide to the right. Now flick dial **B** and button **D** back to "0" and engage lever **C** in the center notch. By turning the balance wheel check whether the needle is still correctly centered in the needle slot and will clear both ends when set for its widest throw. This repeated check is necessary because notched member **w** (105163) is no longer held in position by screw **b**, its position being determined only by the front cam on stud (50409). Hence, minor discrepancies in adjustment may occur after having mounted the Automatic Mechanism.

If the needle has to be recentered in the needle hole, follow the instructions given in Chapter "Centering the Needle in the Needle Hole for Straight Stitching" on page 39.

Fig. 50

The possibility exists that the foregoing adjustment may change the interspaces between the outer and center punctures of the needle and cause asymmetric stitch patterns, such as the one shown in Fig. 50 which was made with dial **B** at "4" and lever **C** at "2".

To remedy this, adjust as instructed under "Adjusting the Needle for Zigzag Stitching" on page 40. If all settings are correct, lavishly oil the Mechanism at all marked oil holes. Don't forget to apply oil to the leather pads at the tips of the springs and also to put a drop of oil between the needle position and stitch width scales and between the latter and the zigzag button (Fig. 51).

Recent embroidery units feature an oil pad carrier (50492) which serves to lubricate the pattern cams. This carrier is so to be screwed to the mounting plate with nut (1547) that the pad will clear the cams with a springing distance. (Fig. 51.) Make sure it is well soaked with oil.

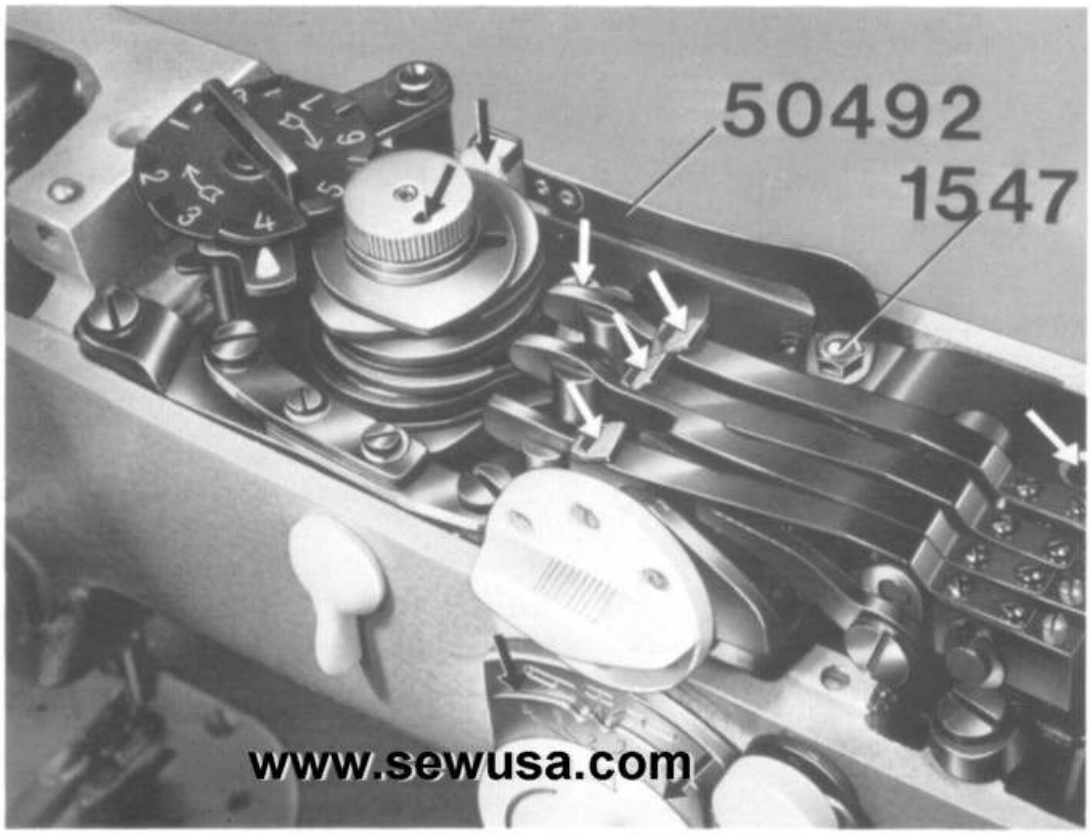


Fig. 51

Replacing the Top Cover

The top covers with which both the PFAFF 230 and the PFAFF 332 are regularly fitted have to be exchanged for the special top cover which is furnished with the unit. Take care that the cover is removed and replaced perpendicularly from above and that pattern length lever **E** (50556) is set between "5" and "7" (or "1" and "2" on older machines).

Also note:

Once lever (50556) is on "0", the Automatic Mechanism must be completely disengaged. Also it must be possible to move the lever from "0" to the last number on its scale.

If the lever should get stuck, chances are that the setting of crank (50558) beneath the top cover has been disturbed. To readjust, proceed as follows:

Set lever **E** (50556) at the mark between "5" and "7", hold it in this position and turn the top cover upside down.

Loosen set screw (687) and rotate crank (50558) until the fork of crank (50561) points toward the balance wheel and extends lengthwise of the arm.

Then tighten set screw (687) as far as possible (it is hard to get at the screw in this position), turn lever to "7", and tighten the screw completely.

Elimination of Faults

Fault

When sewing patterns with dial **B** at "3", the hand-set stitch width changes.

Remedy

Set dial **A** on "4" and **B** on "3".

Take off the top cover and, by tightening regulating screw t_4, increase the pressure of spring r_4 until the stitch width set will remain unchanged.

Fault

Patterns which, for example, are sewed with the settings **A** 5, **A** 6, **B** 4 or **B** 5 turn out irregular because lever **C** and button **D** move irregularly or hesitatingly.

Remedy

This fault may be attributed to a number of causes.

First, the possibility exists that springs r_1–r_3 are excessively tensioned and, hence, retard the return of these controls; or the small oil pads on the tips of the springs lack oil.

The correct spring pressure can be set at regulating screws t_1–t_3, in accordance with the procedure outlined in "Mounting the Spring Assembly" on page 74. Put a drop of oil on each leather pad and also between needle position scale, stitch width scale and zigzag button **D** respectively.

Secondly, the fault may lie with the fact that button **D** has been set too close to the scale and, hence, moves exceedingly heavily. In this case, permit the button a little more play. For this purpose, slightly loosen set screw **d** (687) and, with a copper punch, lightly tap on the stitch width regulator stud to force it slightly back in its bearing. If the play is sufficient, retighten the set screw securely. Of course, the two scales must not gape.

On machines which still have a one-piece spacer, binding may be caused by the fact that the spacer has been dislodged on tightening screw e_3 and jams. In this case, it will suffice to loosen the screw and set the spacer at right angles.

Also the possibility exists that due to the inexact adherence to the above installation procedure for the Automatic Mechanism the stitch width regulator binds in the bearing of its arm, or this arm binds on its fulcrum stud. In this case follow the instructions contained in "Preparing the Machine for Installing the Automatic Mechanism" on page 69.

Fault

The patterns sewed with settings B_4 and C_2 turn out asymmetric.

Remedy

This condition may be due to erroneous adjustment, improper handling or other reasons whereby the setting of the correct stitch width has been disturbed. To remedy, apply the instructions given in "Adjusting the Needle for Zigzag Stitching" on page 40.

Fault

The patterns turn out incomplete or irregular.

Remedy

Presumably the clutch bars have not enough play or springs r_1–r_3 fail to press on the bars sufficiently to make them snap into the driving studs.

Another cause may be that the springs are in an oblique position and, hence, slip off the bars.

To correct this condition, either increase the spring pressure at screws t_1–r_3 or reduce the end play of carrier blocks **r** by setting the retainer ring on stud (50456) closer to the blocks. Also check the adjustment of the bars, following the instructions on page 72.

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III. The Automatic Mechanism

A = Cam selector dial

B = Clutch bar dial

C = Needle position lever

D = Zigzag button (Dial-A-Stitch control)

E = Pattern length lever (not illustrated)

a = Stitch width scale (105162)

b = Lower set screw (175) of notched member (105163)

c = Pressure spring (105167) for zigzag button

d = Set screws (687) for zigzag button

e_1-e_4 = Set screws (72) for base plate

f = Driving eccentric (105061) for Automatic Mechanism

h = Spacer (obsolete 105094); (two-part 105095/96)

i = Connection (105089)

k_1-k_3 = Eccentric studs (50432)

l = Clutch bar bearing bracket (50436)

m = Stitch width regulator arm

n = Set screw (486) for clutch bar bearing bracket

o_1-o_3 = Clutch bar driving studs (50384)

p = Stack of pattern cams with nut

q_1-q_3 = Set screws (543) for eccentric studs k_1-k_3

r = Spring carrier blocks (50457)

r_1-r_3 = Leaf springs (50433) for clutch bars

r_1 = Reinforcing spring (50435) for front clutch bar

s_1-s_3 = Screwholes for spring assembly bracket (50455)

t_1-t_4 = Regulating screws (701034)

u_1-u_3 = Screws (407) for connections (50401/50402)

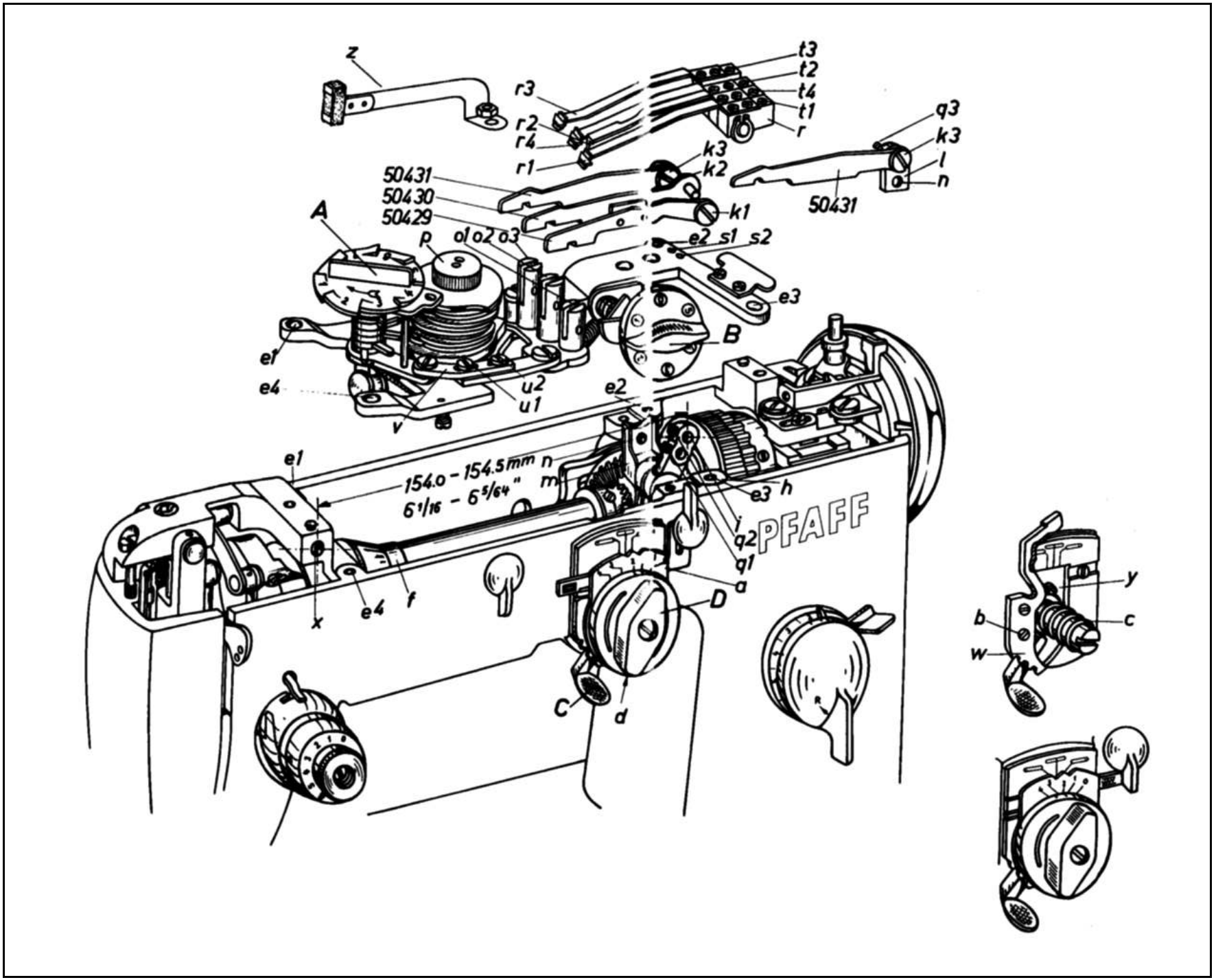
v = Two-part connection (50400)

w = Notched member (105163)

x = Hole for gauge (105999-108)

y = Set screw (624) for crank (105093)

z = Oil pad carrier spring (50492)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t3
t2
t4
t1
r
r3
r2
r4
r1
k3
k2
k1
50431
50430
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P
o1 o2 o3
e2 s1 s2
e3
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