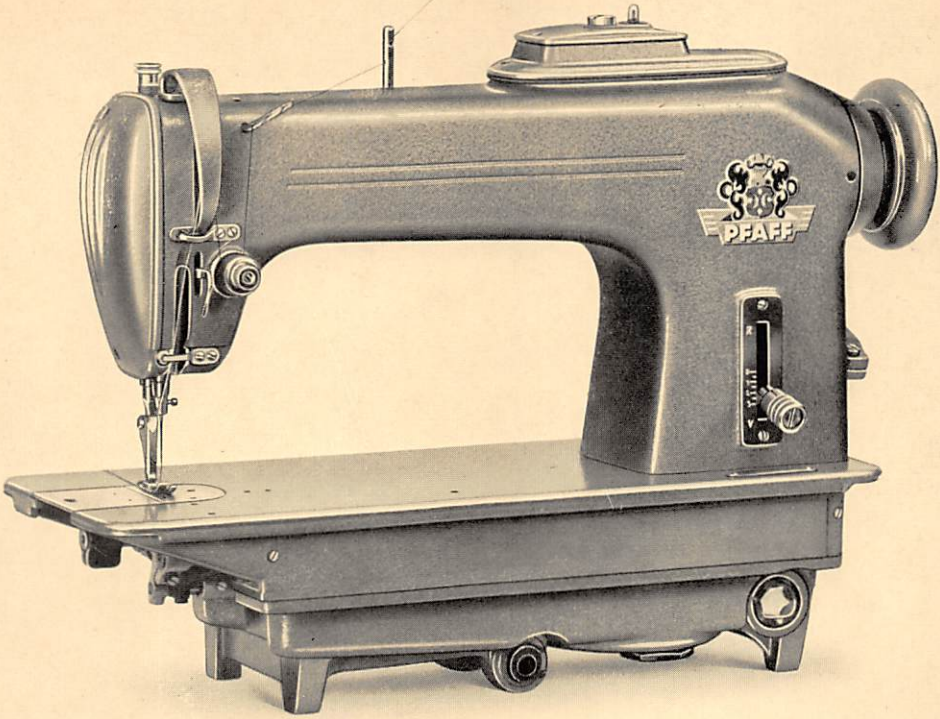

PFAFF 433

High Speed Sewer

INSTRUCTION BOOK

G. M. PFAFF AG, Sewing Machine Factory, KAISERSLAUTERN

Instruction Book

PFAFF 433

Single-Needle Flat-Bed Lockstitch Sewer
with Automatic Lubrication

PFAFF 433

Brief Description of Machine

The PFAFF 433 is a single needle, lockstitch, high speed sewing machine, organized with link take-up and horizontal rotary hook, which incorporates many important mechanical improvements while retaining all worthwhile features of the service-proven PFAFF 134. Depending on the material to be sewn, this machine is capable of operating at speeds up to 5,000 s.p.m. which has made the incorporation of a forced feed lubrication system and a separate hook oiling system an absolute necessity.

Since all manipulations for threading the machine, regulating the stitch length, backtacking and the like are the same as with previous models, no expensive retraining of operators is required.

With its modern and functional design, rugged construction and perfect performance, the PFAFF 433 satisfies the greatest demands in the sewing industry.

Varieties of the PFAFF 433

The PFAFF 433 is available in the following varieties:

Model	Class of Work	Maximum Length of Stitch (Stitches p. Inch)	Maximum Speed (s.p.m.)	Needle System	Presser Foot Clearance
A	Sheer, light-weight fabrics	7	5,000	133 R	$^{11}/_{64}$"
B	Medium-weight fabrics	6	4,700	134 R	$^{9}/_{32}$"
C	Medium-heavy fabrics	$5^{1}/_{2}$	4,400	134 R	$^{5}/_{16}$"

The above varieties differ in the needle bar rise, presser bar lift, maximum stitch length and take-up motion and are particularly well adapted to the class of work they are intended to perform.

1. Setting Up the Machine

In most instances the PFAFF 433 is fitted for individual power drive. Head and power table are packed separately. The machine is driven by a $^{1}/_{2}$ HP clutch motor. (Type of current and tension optional to suit local requirements.)

Power is transmitted from the motor to the sewing machine by means of a V-belt, $^{25}/_{64}$" wide (DIN 2215).

For 50-cycle current a 2,800 r.p.m. motor should be used, while a 3,400 r.p.m. motor is appropriate for 60-cycle current.

The motor pulley can be easily exchanged to alter the maximum sewing speed of the machine.

The below table should be consulted for all data regarding the maximum number of stitches which can be obtained with motor pulleys of different diameters.

Diameter of Balance Wheel		50 Cycles				60 Cycles			
		Diameter of Motor Pulley			Stitches per Minute	Diameter of Motor Pulley			Stitches per Minute
d_m	D	d_m	D	Order No.		d_m	D	Order No.	
$2\,^{51}/_{64}$"	3"	$3\,^{47}/_{64}$"	$3\,^{15}/_{16}$"	99089	3,800	$3\,^{5}/_{32}$"	$3\,^{11}/_{32}$"	99086	3,800
$2\,^{51}/_{64}$"	3"	$3\,^{15}/_{16}$"	$4\,^{9}/_{64}$"	99090	4,000	$3\,^{11}/_{32}$"	$3\,^{35}/_{64}$"	99087	4,000
$2\,^{51}/_{64}$"	3"	$4\,^{11}/_{64}$"	$4\,^{3}/_{8}$"	99091	4,200	$3\,^{35}/_{64}$"	$3\,^{47}/_{64}$"	99088	4,300
$2\,^{51}/_{64}$"	3"	$4\,^{13}/_{32}$"	$4\,^{39}/_{64}$"	99092	4,400	$3\,^{47}/_{64}$"	$3\,^{15}/_{16}$"	99089	4,600
$2\,^{51}/_{64}$"	3"	$4\,^{41}/_{64}$"	$4\,^{27}/_{32}$"	99093	4,700	$3\,^{15}/_{16}$"	$4\,^{9}/_{64}$"	99090	4,800
$2\,^{51}/_{64}$"	3"	$4\,^{59}/_{64}$"	$5\,^{1}/_{8}$"	99094	5,000	$4\,^{11}/_{64}$"	$4\,^{3}/_{8}$"	99091	5,000

d_m = effective diameter; D = total diameter

Unpack the head cautiously in order to avoid damage to the machine. After taking off the lid of the box, unscrew the wood screws which hold the cushioned wooden blocks that support the machine head in the box. Cautiously lift out the head, wipe off the dust and mount it on the rubber pads on the table. To facilitate the mounting of the V-belt, slip the belt on the machine pulley, slightly tilt back the machine and pull the belt onto the motor pulley. Adjusting the V-belt tension is instructed in Section 20.

The machine is dispatched without oil in the reservoirs and must not be run while in this condition.

2. Filling the Oil Reservoirs

The amount of oil which is needed for the first two fillings comes with the machine in a can. The oil used in the PFAFF 433 is a spindle oil with a viscosity of 110S/70°F (US) or 95R/70°F (Br.) which has proved very satisfactory for the lubrication of high speed sewing machines. To fill the main reservoir take out screw **d** (Photo 1), fill in about one pint (.5 l) of oil and wait a few minutes until it has drained down into the reservoir. Then check the oil level gauge to see if the amount of oil filled up is sufficient. The oil level should be between the "max." and "min." marks when the machine is inoperative. Never remove the top cover to fill up oil there.

Experience has shown that it is of advantage to lubricate the hook seperately. The reservoir which supplies oil to the rotary hook is located under top cover **b** on the machine arm. (Photo 1).

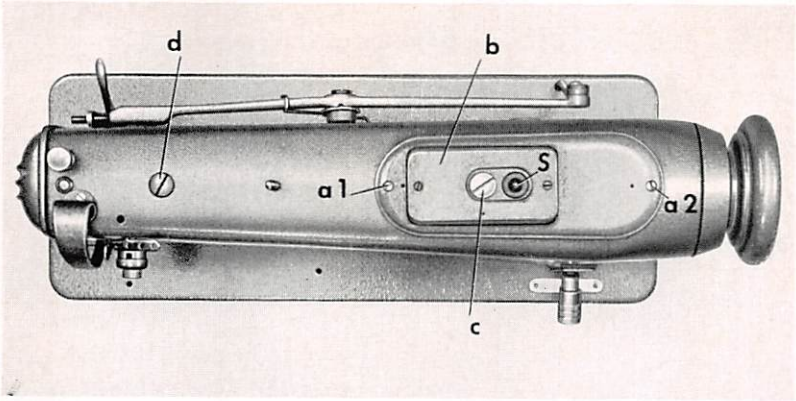

Photo 1

Take out screw c and fill about 5 cu. in. of oil into the hook oil reservoir (Photo 21).

As long as the red tip of the float spindle is visible in oil level tube S (Photo 21) **while the machine is in operation, there is enough oil in the reservoir. If, however, the red tip is flush with the top surface of the oil sealer nut, oil should be filled up.**

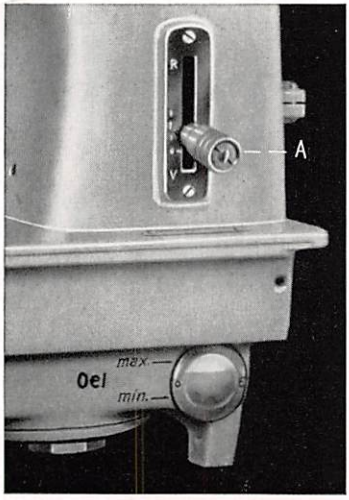

Photo 2

3. Testing the Machine

It is recommended to test-run the machine with needle thread and bobbin case removed. Before you plug the power lead into the electric circuit, make sure that the voltage of the circuit is the same as that indicated on the rating plate of your sewing machine, and ascertain that the machine pulley will turn toward you. Never must the pulley turn in the opposite direction as this is bound to cause trouble in the lubrication system.

The direction of rotation of the motor can best be checked before mounting the belt. If the belt has been mounted, hold the balance wheel, switch on the motor and tip on the treadle. From the jerk of the balance wheel you can tell in which direction it will rotate. If it rotates in the wrong direction, simply exchange the two wires on the motor terminals.

Start the machine by pressing down the treadle.

Never run the machine unless you have placed a piece of fabric under the presser foot or raised the presser bar.

For the regulation of the oil flow to the hook see Section 23.

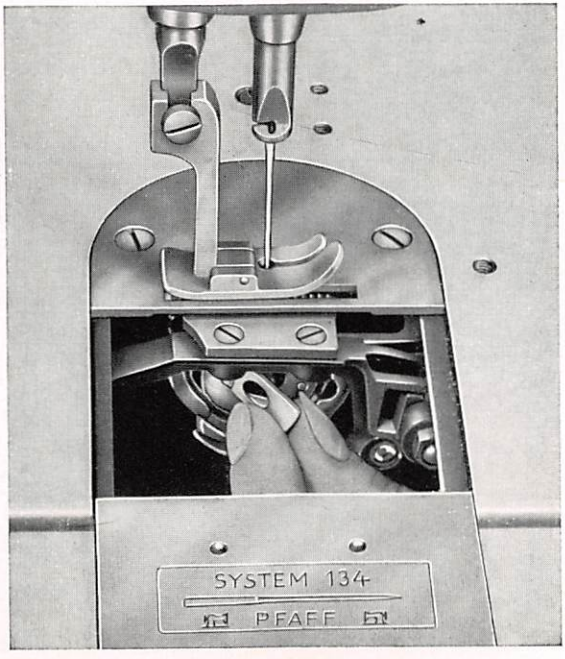

Photo 3

4. Taking Out the Bobbin Case

Raise the take-up lever to its highest position, lift the latch of the bobbin case with thumb and forefinger of your left hand and pull the bobbin case out of the machine as shown in photo 3.

As long as you hold the latch open, the bobbin cannot fall out.

5. Winding the Bobbin

For this operation the power-driven bobbin winder is used which features a number of improvements. (Photo 4).

The bobbin winder spindle runs in a sintered steel bushing which makes lubrication of the winder completely superfluous.

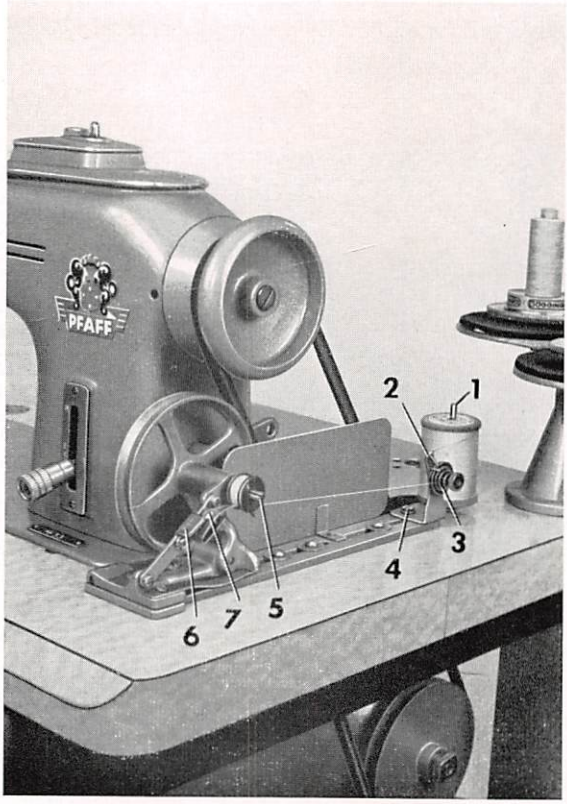

Photo 4

In order to reduce somewhat the high speed of the machine, the diameter of the bobbin winder pulley has been increased to $3^{15}/_{16}$".

The V-groove in the rim of the pulley has been designed with an obtuse-angled profile so that the V-belt will fit into it perfectly and, if necessary, even a round belt may be used.

The bobbin winder is quietly stopped by means of an adjustable leather pad.

A windshield which is mounted on the winder base prevents the thread from being dragged over toward the belt by air suction.

Fasten the bobbin winder to the table with its driving pulley far enough from the machine belt so that it will not touch the belt when the winder is disengaged.

Pass the thread from spool 1 through thread guide 2, clockwise around and between tension discs 3, and to the bobbin. Pull the thread through the slot in the bobbin, from the inside. Place the bobbin on spindle 5 and hold the end of the thread until the winder has made a few revolutions. Start the winder by pressing down engaging lever 6. When sufficient thread has been wound on the bobbin, the winder will stop automatically. The amount of thread to be wound on the bobbin is regulated by screw 7.

Turn it to the right for more thread;
and to the left for less thread.

6. Threading the Bobbin Case

Insert a full bobbin into the bobbin case so that the thread draws on the top from the left toward the right, as shown in photo 5.

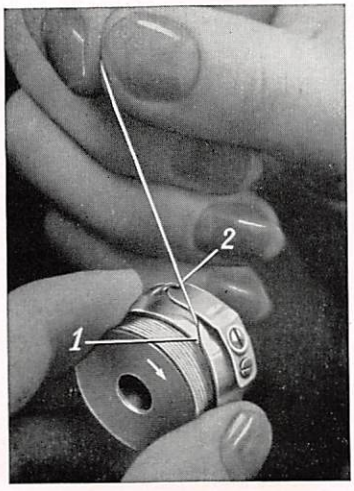

Photo 5

Pull the thread into slot 1 and draw it under the tension spring into delivery eye 2. Place the bobbin case with the bobbin on the center stud in the bobbin case base and make sure that the end of the latch points toward you. Press the bobbin case all the way in until it clicks into position audibly. This is very important as, otherwise, needle or bobbin case breakage may result.

7. Threading the Needle

To thread the PFAFF 433 is not difficult at all since the thread passes in clear view of the operator, similar to the PFAFF 133 and 134. (Photo 6).

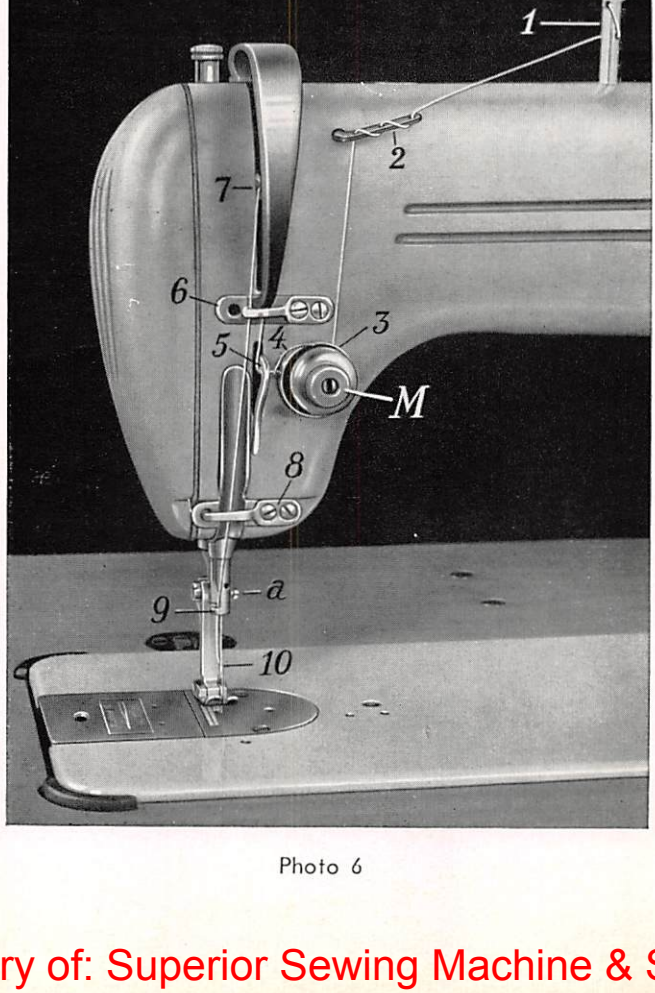

Photo 6

Pass the thread from the thread unwinder to thread guide pin 1 and through both holes in order to keep the thread from whipping at high speed. By the same token, pass it through all three holes in thread retainer 2 as shown in photo 6, then between tension discs 3, through thread check spring 4, under thread regulator 5, through guide 6, up and from right to left through eyelet 7 in the take-up lever, down and through thread guides 8 and 9, and from left to right through needle eye 10.

8. Drawing Up the Bobbin Thread

Hold the end of the needle thread and turn the balance wheel toward you until the needle moves down and up again, thus catching the bobbin thread which will come up through the needle hole in a loop. (Photo 7). Lay both threads back under the presser foot.

Make sure that the take-up lever is in its highest position always when beginning or ending a seam.

Failure to observe this precaution may cause thread jamming or unthreading of the needle. In this case, it is not necessary to hold the threads when beginning to sew.

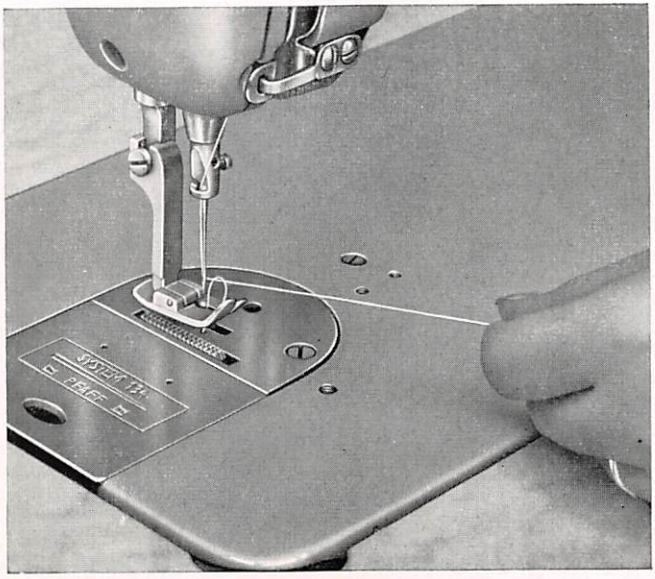

Photo 7

9. Regulating the Thread Tensions

To obtain a perfect seam, observe the following hints:

The needle and bobbin threads should be locked in the center of the material as shown in Fig. 8.

Turn tension nut **M** (Photo 6) clockwise for a tighter **upper tension,** and counter-clockwise for a looser tension.

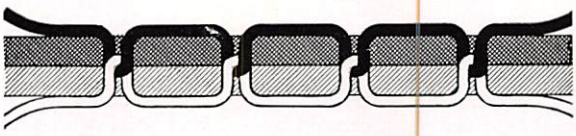

Fig. 8

The **lower tension** is regulated by means of tension screw **z** (Fig. 9). Take the small screw driver and turn this screw either clockwise for a tighter tension, or counter-clockwise for a weaker tension.

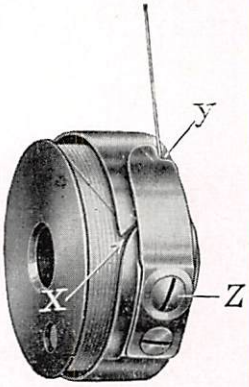

Fig. 9

The tension should be regulated in accordance with the material to be sewn and should be such that the stitches will be tightly set, yet without causing seam pucker, and that they will lie in a straight line on the surface of the goods.

The grade of thread used plays an important part in obtaining a perfect seam on any material.

Sheer fabrics require a thin and soft thread. Stiff and resistant threads are unsuitable for almost any fabric because of their low resilience.

In regulating the thread tensions you have to have a little experience before you can tell which tension needs adjustment. In Fig. 10 either the upper tension may be too tight or the lower tension too loose.

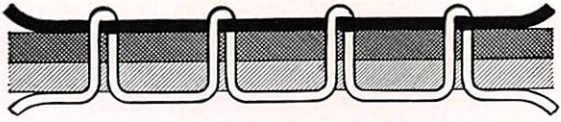

Fig. 10

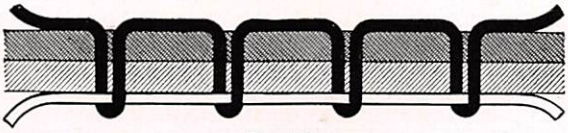

Fig. 11

In Fig. 11 the tension on the needle thread may be too weak or the lower tension too tight.

The operator will have to decide in every individual case if either the upper or lower tension requires adjustment, particularly when the thread forms small knots or kinks on top and bottom of the fabric.

The upper tension can be adjusted only when the presser bar is lowered because it will automatically release the tension when raised.

10. Regulating the Pressure on the Material

It greatly depends on the amount of pressure which is exerted by the presser foot whether the work will feed smoothly and evenly or if there will be staggering stitches in the seam and feed markings on the underside of the fabric.

Turning pressure regulating screw **V** (Photo 20) inwardly will increase the pressure for heavier materials; turning it outwardly will ease the pressure for lightweight fabrics.

When stitching delicate and flimsy fabrics, it is recommended to place a piece of tissue paper under the material which will protect its underside and prevent puckering and can be readily pulled away after the sewing.

11. Choosing the Proper Needle

The PFAFF 433 uses standard round-shank needles with a round point and a shank diameter of $^{5}/_{64}$". Model A machines which are intended for sheer fabrics use short System 133 R needles while Model B and C machines require System 134 R needles which are $^{5}/_{32}$" longer. The standard shank diameter of $^{5}/_{64}$" is imprinted on the needle wrapper.

The needle is of eminent importance for obtaining a perfect seam and therefore should be chosen in proper relation to the thread and fabric weights used.

For lightweight fabrics, a thin needle should be employed in order to avoid ugly needle holes in the fabric.

When using a thin needle with a thick thread, the thread is likely to break and, conversely, when using thin thread in a thick needle, skipping of stitches may occur as a result.

Select the correct needle from the chart below:

Needle and Thread Chart

Needle Size	Thread Weight		Needle Size	Thread Weight	
70 75	Cotton Silk	100-80 100 (0)	100	Cotton Silk Linen	40-30 60 (D) 90-80
80 85	Cotton Silk	80-60 80 (B)	110	Cotton Silk Linen	30 50 (E) 80-50
90	Cotton Silk	60-40 70 (C)	120	Cotton Silk Linen	30 40 60-40

We warn you against using needles of unknown origin even if the needle wrapper should bear the inscription "Needles for Pfaff Sewing Machines" plus the needle system.

Never use rusty needles!

Only the exceptional quality of the needle finish will ensure trouble-free sewing and prevent thread breaking. Due to the high speed of the PFAFF 433, a needle with a rough surface will quickly get hot and scorch the thread. This is particularly true of nylon thread which is highly sensitive to heat and fuses easily.

If the ordinary needle should get too hot when stitching dense and resistant materials or long panels of fabric, it is recommended to exchange it for a superfinished, chromium-coated System 133 or 134 needle which may be procured from us.

If even a superfinished needle should get too hot, the PFAFF 433 may be fitted with a "Schmetz needle cooling device". This efficient device is ideally suited to solve the problem since it requires no attachments to the machine and does not disturb the operator. The draft of air which is caused by the needle motion is not noticeable at all. When fitted with this device, the machine will stitch also resistant fabrics with appreciable speed.

12. Changing the Needle

1. Raise the needle bar to its highest position.
2. Take the small screw driver and loosen needle set screw **a** (Photo 6).
3. Pull out the needle.

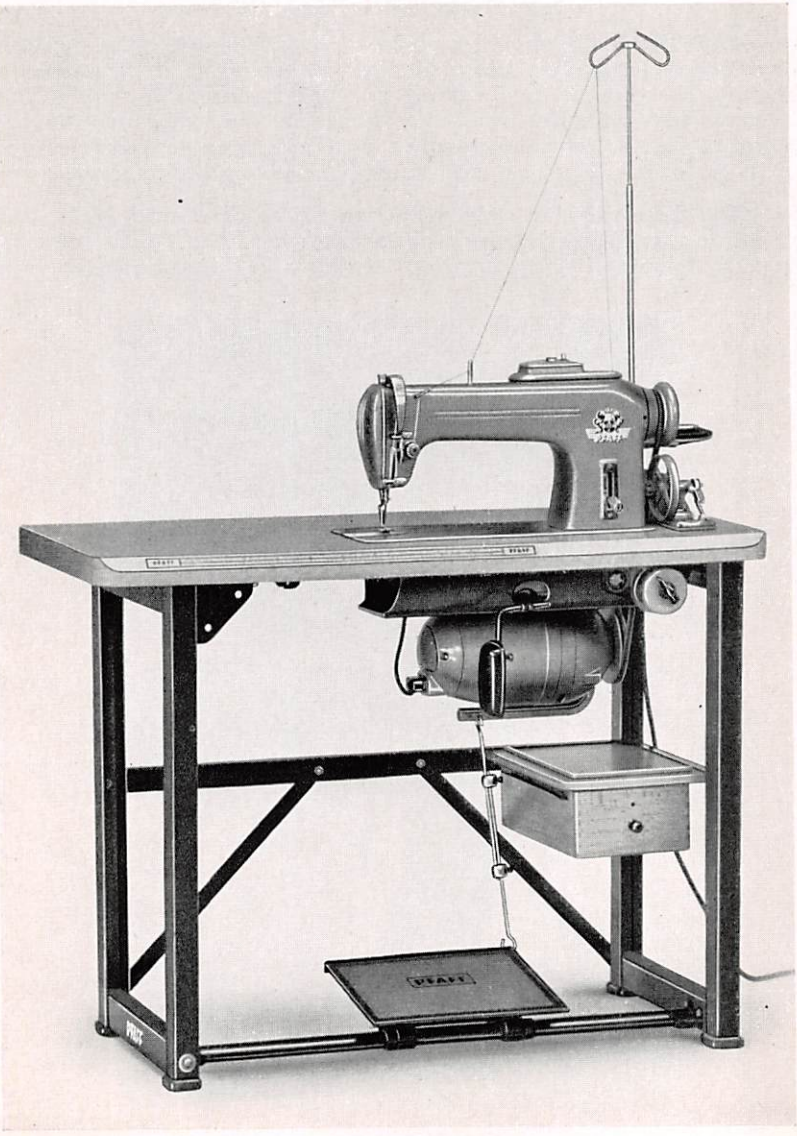

Photo 12

4. Insert a System 133 R or 134 R needle into the opening of the needle bar and push it up as far as it will go. Make sure that the short groove faces to the right.

5. Tighten needle set screw **a** securely.

13. Regulating the Length of Stitch

The PFAFF 433 is fitted with a job-proven, spring-loaded stitch regulator which can be set for the length of stitch desired by turning thumb nut **A** (Photo 2). Once set, a special device will lock the length of stitch so that it cannot inadvertently be changed while sewing. The numbers on the scale indicate the stitch length in millimeters. By pushing the stitch regulator lever up as far as it will go, the machine can be set for feeding reverse.

Switching the machine to reverse stitching can be done either by hand or by foot control. When letting go of the stitch regulator lever it will automatically return to its initial position. In order to relieve the right leg which

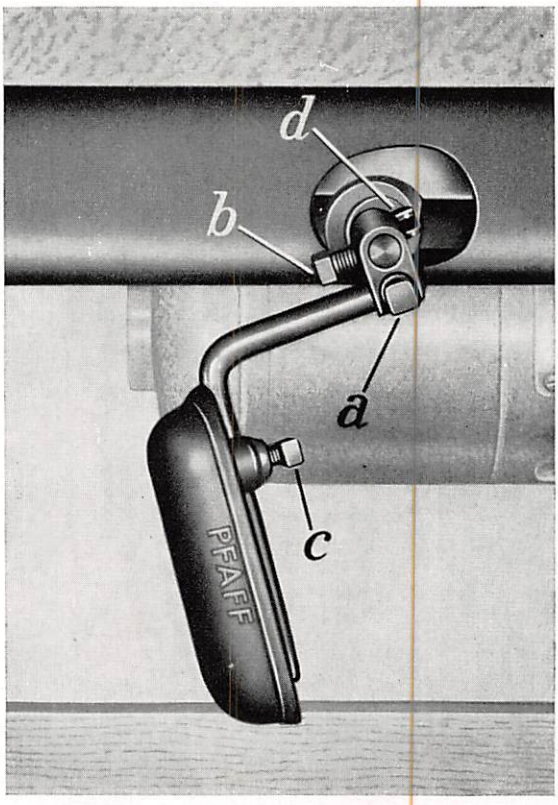

Photo 13

actuates the knee lifter, the treadle for actuating the stitch regulator is arranged on the left. The foot-controlled reverse feed mechanism leaves both hands free to manipulate the work.

14. The Knee Lifter

The PFAFF 433 is equipped with a knee lifter mechanism which is harmoniously connected with the head of the machine.

The presser foot is lifted either by raising the presser bar lifter by hand or by actuating the knee lifter with the right knee. The knee lifter pad can be adjusted horizontally as well as vertically. For horizontal adjustment, loosen screw **b** and adjust at screw **a**; for vertical adjustment, loosen screw **c** (Photo 13). To permit the machine to be tilted back, pull out pin **d**, which can be easily reached through an opening in the dress guard (Photo 18), and strip the knee lifter shaft with the knee lifter lever.

15. The Hook

The PFAFF 433 is organized with the trade-tested PFAFF 134 double-revolution rotary hook. The only difference between previous models and this one is that the PFAFF 433 hook is provided with centrifugal lubrication.

The hub of the hook carries an oil retainer which is meticulously balanced and ensures an absolutely vibrationless running of the hook. Emerging from a jet in the hook shaft bushing the oil is atomized by centrifugal force and, through a second borehole, enters the hook race where it effects a dependable and permanent lubrication.

After removing the needle plate, the amount of oil, which is set for ordinary sewing requirements at the factory, can be regulated as instructed in Section 23. If this adjustment should become necessary, it should be performed only by a mechanic.

16. The Bobbin Case Opener

All varieties of the PFAFF 433 are fitted with a positive mechanical opener. Since the advantages of this mechanism are not generally known, a few explanations will be given here.

The interlocking of the needle and bobbin threads which is necessary to form a lockstitch seam is accomplished in two different ways, depending on the class of machine. In long or vibrating shuttle machines the threads are locked by passing the shuttle with the bobbin thread through the needle thread loop which is formed as the needle rises after having passed the lowest point of its stroke. Another method consists in passing the needle thread loop around the bobbin case while the latter is in a stationary position.

In machines with oscillating loop takers, such as central bobbin or beak shuttle machines, the loop forming part, in moving back and forth, passes the needle thread loop around the bobbin case which is carried either in a center or off-center position.

With the double-revolution horizontal rotary hook, the type of loop taker which is generally used in high speed sewing machines and also in the PFAFF 433, the needle thread loop is passed around the stationary bobbin case at every other revolution of the hook.

In rotary hook machines which have no mechanical opener, the needle thread, having passed around the bobbin case, has to turn the bobbin case slightly in order to make an opening through which it can pass.

The friction between hook race and bobbin case increases in proportion to the sewing speed. By the same token, the pressure of the position finger against the position slot increases as the sewing speed goes up. As a result, the needle thread has to overcome a stronger resistance when passing between position finger and edge of slot and may break. The only remedy to this condition is to ease the thread tension.

The drawback of this remedy lies in the fact that the needle thread tension, in most cases, has to be eased to an extent which will make the proper setting of stitches impossible when the machine is operated at a reduced speed. To eliminate these disadvantages, PFAFF high speed sewing machines are organized with a mechanical bobbin case opener whose finger, which is carried on the opener shaft, assumes the function of slightly rotating the bobbin case at the right time and contrary to the direction of rotation of the sewing hook. In this case the needle thread can pass freely between the position finger and the position slot. The advantages of this device for high speed sewers are manifold.

First of all, as the needle thread is not subjected to additional or fluctuant strain, the upper tension need not be changed, regardless of the sewing speed. For this reason, the thread tensions may be so set as to ensure an even setting of stitches and prevent puckering of the material at any speed and also in sheer fabrics. Secondly, since the danger of thread breaking has been greatly eliminated, it is possible to use threads of a low tensile strength even for high speed operations. Thirdly, the machine will sew flimsy fabrics at top speed even when the bearing surfaces of the hook are not completely smooth yet.

All of the above advantages which are inherent in the mechanical bobbin case opener have lead to its incorporation not only in the light but also in the heavy styles of the PFAFF 433.

Timing of the mechanical opener should be performed only by a mechanic as instructed in Section 29.

17. Tilting the Machine Back

To facilitate the removal of packed lint between sewing hook and feed dog, strip the knee lifter and tilt the machine back.

To do this, reach through the hole in the middle of the dress guard under the table and pull out pin **d** (Photo 18). Now pull the knee lifter with its shaft forward out of its bearings. This done, tilt the machine back and rest it on the wooden machine rest pin or on the base of the swung-away sew-light bracket.

18. Dismantling the Hook

Skilled operators who make it a routine always to begin or finish a seam with the take-up lever in its highest position or to lay the threads back under the presser foot when commencing to sew will hardly ever encounter thread jamming in the hook race.

If thread should happen to jam in the hook race, try to get a hold of the end of the thread and to pull it out while turning the balance wheel back and forth slightly. If this action fails to free the jammed thread, dismantle the hook as instructed below:

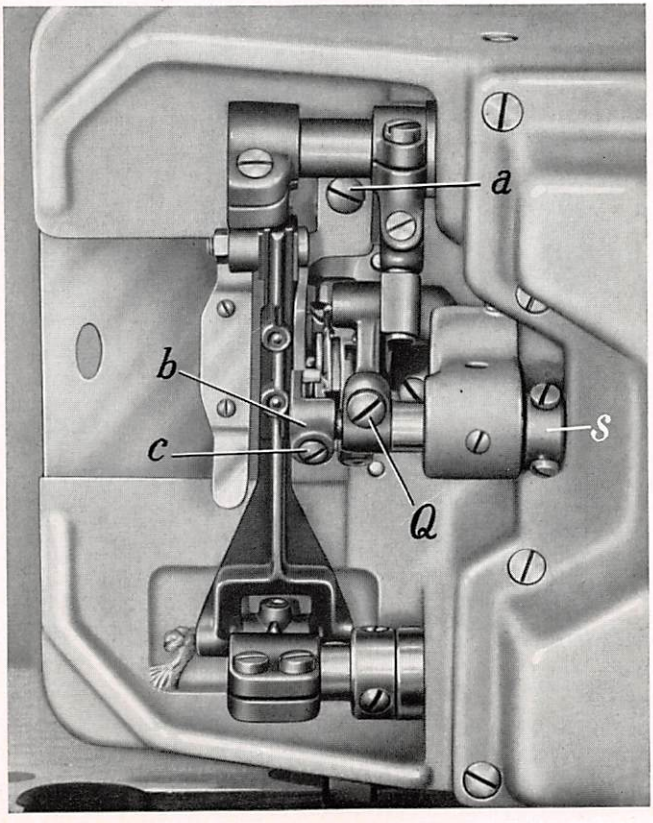

Photo 14

1. Tilt the machine back as described in Section 17.
2. Raise needle bar and take-up lever, provided the balance wheel can still be turned. If not, remove position finger bracket **a** first. (Photo 14).
3. Loosen set screw **c** and pull off opener finger **b**. When reassembling the parts, the correct position of the finger on the shaft can easily be found since the shaft is marked with a groove.
4. Pull out the bobbin case with the bobbin, seizing it by the latch with thumb and forefinger.
5. Return the machine to its upright position and remove needle plate and feed dog.
6. Take out screws e_1, e_2 and e_3 (Photo 15) and remove hook gib **d**. Be sure that you do not confuse it with thread pull-off flange **f**.

Photo 15

7. Turn the balance wheel until the first screw f_1 in thread pull-off flange **f** is opposite slot **i** in the bobbin case. When in this position, the bobbin case base can be taken out of the hook. Photo 17 shows the hook components in the same position. Note that tip 1 of the bobbin case base should be positioned between hook point **g** and tip **f** of the flange.

8. Seize the bobbin case base with thumb and forefinger, pull it to the left and down, and take it out of the machine.
9. Clean hook and bobbin case base thoroughly and remove lint with a pointed wooden instrument, never with a screw driver.
10. It is recommended to screw on position finger bracket **a** before replacing the bobbin case base. When inserting the bobbin case base, make sure that position finger **h** engages in slot **i** in its rim and that there is a clearance of about $^1/_{64}$" between the tip of position finger **h** and the bottom of slot **i**.
11. Replace hook gib **d** and tighten screws $\mathbf{e}_1$, $\mathbf{e}_2$ and $\mathbf{e}_3$.
12. Push the opener finger onto its shaft. Take care that screw **c** rides in the lengthwise groove of the shaft and that the opener finger covers about $^1/_3$ of the projection on the rim of the bobbin case base. Tighten screw **c** securely. (Photo 14).

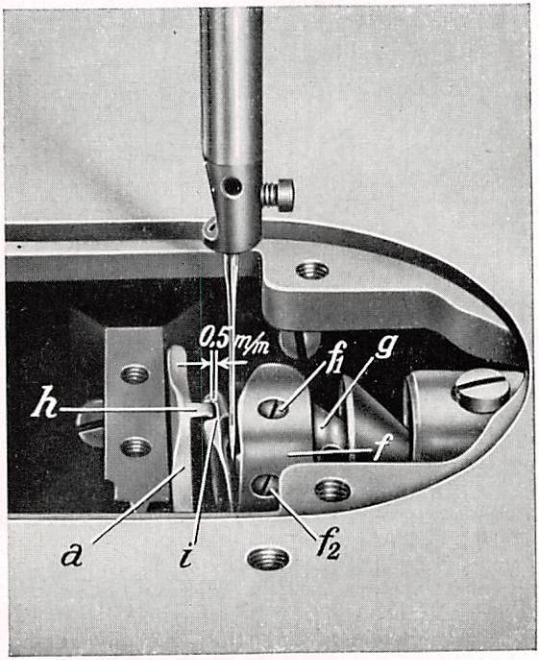

Photo 16

19. Care and Maintenance

Since the PFAFF 433 is provided with automatic lubrication there will hardly any maintenance be required while the machine is in operation. Merely check the automatic lubrication system regularly and clean the machine thoroughly. From time to time the oil in the hook lubrication system should be replenished.

It is urgently recommended to make it a daily routine to brush off lint and fluff which have accumulated between needle plate and feed dog and on

the hook when the machine is in permanent use. As the fluff contains a high percentage of dressing which has an abrasive effect on the sewing mechanism, in time excessive wear would develop. The whole machine, including the bottom, should be cleaned with a soft rag.

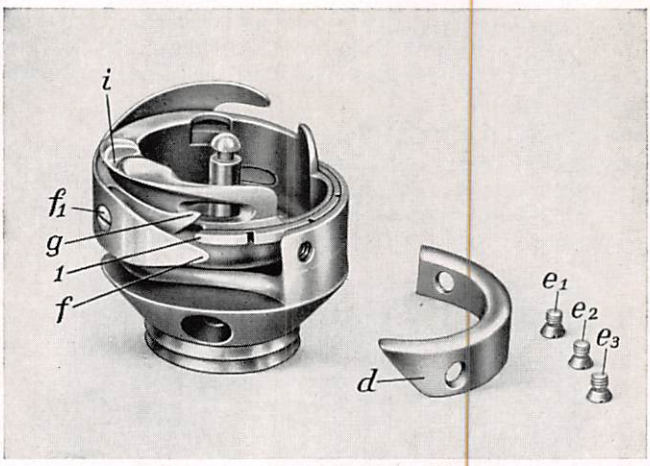

Photo 17

Great emphasis has been placed on making the oil reservoirs in the PFAFF 433 as leak-proof as possible. But everybody who is familiar with the problem knows that the capillary attraction of the oil cannot be completely overcome with machines which contain large quantities of oil—and sewing machines are no exception. Capillary attraction denotes the property of thin-bodied oil to spread in every direction and seap even through the tightest packings, covering the outer surface of the machine with a thin oil film. The functional arrangement of vent holes on the PFAFF 433 has greatly contributed to eliminating excess pressure and attendant expansion of the oil. But even so, for the reasons given above, the possibility exists that a minor leakage may occur when the machine has been idle for several days or the temperature rises above normal. In this case it is important that you do not throttle the flow of oil drastically as this might result in insufficient lubrication once the temperature has dropped to normal. This temporary nuisance can best be remedied and soiling of the work prevented by wiping off, with a clean rag, the oil film that covers the outside of the machine and, particularly, the needle and presser bars and the underside of the head.

There are many people who prefer, for sewing machines, a clear, colorless oil in order to avoid yellowish spots on the work. In this connection we should like to point out that yellowish oil is as pure and free of color particles as any other brand and that its yellowish color is nothing but the result of optical refraction which makes also the cut edges of glass appear yellow, green or blue.

The flow of oil to all lubricating points should be regulated only by a mechanic.

Instructions for Mechanics

20. The V-Belt Drive

When mounting the V-belt for the first time, remember that a crookedly mounted belt will wear more quickly. Hence, do not force the belt on the pulley.

The various motors which are used to drive the PFAFF 433 are standard motors which meet German DIN 42691 requirements. They are hinged on the motor bracket by means of a hinge stud and, after loosening a set screw or a nut, can be readily swung to any desired position in order to tension the belt. (See PKA motor pictured in photo 18).

It takes some experience to set the tension on the belt correctly so as to avoid excessive pressure on the top shaft bearings and attendant overheating and seizing of the machine.

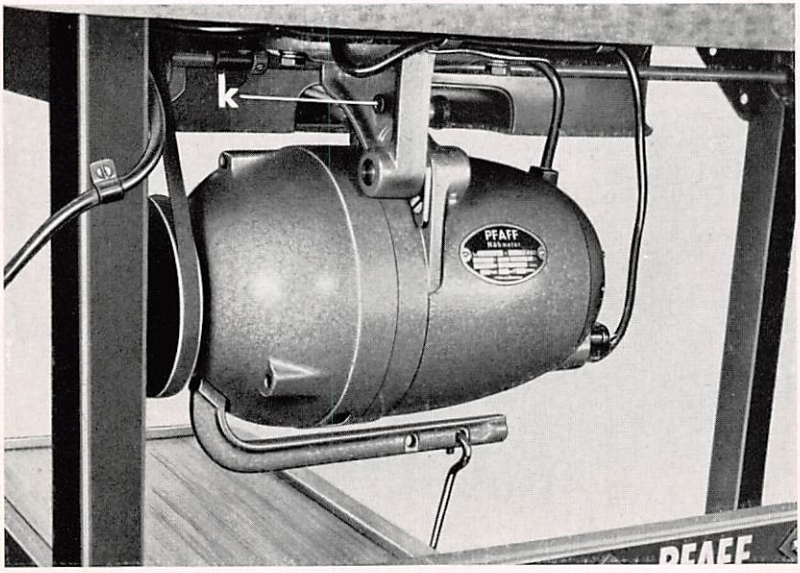

Photo 18

The belt is correctly tensioned if you can readily compress it aubout $^{3}/_{4}$ of an inch midway between the pulleys.

Securely tighten either the hinge stud nut or set screw **k** (on PKA motors) so that it will not get loose while sewing.

If you fail to tighten this screw securely, the motor will be held only by the V-belt and exert a one-sided pressure on the top shaft bearings which, in turn, will lead to overheating and seizing of the machine.

21. Regulating the Flow of Oil

The flow of oil to the sewing hook, the top shaft bearings and the head parts can be regulated separately and is set for normal requirements when the machine leaves the factory. If it should become necessary to adapt the oil flow to specific operating requirements, a mechanic has to be called in to do the job. When used for permanent operation in seaming whole bales of fabric, a more liberal supply of oil is required than for short runs. Sudden changes, particularly abrupt rises, in temperature may necessitate a temporary adjustment of the oil flow.

Arm and head parts are supplied with oil by means of line 1 (Photo 19). Through a hole in this tube a jet of oil squirts up against the top cover, reverberates and sprays the bevel gears, connecting rods and eccentrics,

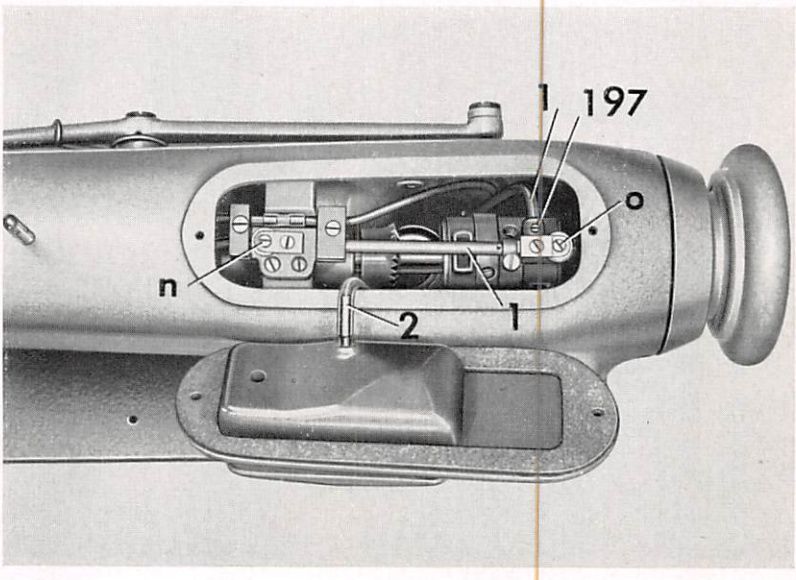

Photo 19

maintaining a constant film of oil between all parts in moving contact. Of the two valves in line 1, one regulates the flow of oil to the head parts and the top shaft front and center bearings while the other controls the oil supply for the top shaft rear bearing.

When slots **n** and **o** (Photo 19) point lengthwise of the arm, the valves are open. By turning them either way, the oil flow can be regulated as desired or shut off completely. It is recommended, however, normally to leave valve **n** open and thus to ensure proper lubrication of the head parts and both top shaft bearings.

22. Regulating the Flow of Oil to the Head Parts

As may be seen from photo 20, the hollow top shaft is closed at its one end with regulating stud **o** which is held in position by set screw **p**. This stud serves to regulate the amount of oil which is pressure-fed from the hollow top shaft to the take-up crank. To adjust, loosen set screw **p** by turning it **clockwise.** When the + symbol is opposite the red mark on the needle bar crank, an unrestricted oil flow passes to the take-up crank. When turning the stud either to the right or left until the — symbol is opposite the red mark, the flow of oil is restricted accordingly. (Fig. 20a).

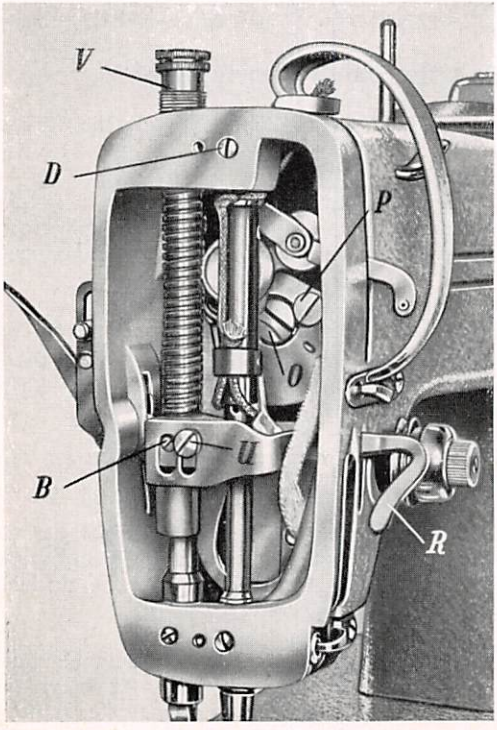

Photo 20

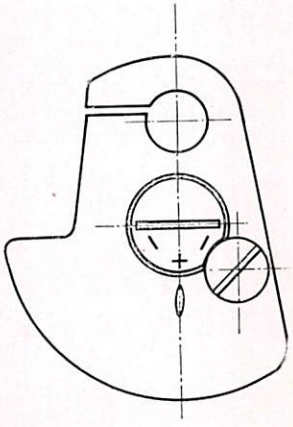

Fig. 20a

There is no hard and fast rule for properly regulating the flow of oil so as to ensure that the head parts will be adequately lubricated. The correct amount of oil, however, can be easily established by the following test: Hold a piece of cardboard between the presser bar and the rear wall of the machine and run the machine at top speed. Turn regulating stud **o** as may be required to obtain two thin lines of spray oil on the cardboard which should be the case after 10 seconds.

To ensure adequate lubrication of the needle bar which is constantly under heavy strain, an oil wick has been passed through the take-up link stud, wound around the needle bar upper bushing, taken down to the lower bushing, wound around the needle bar and secured by a clip. (Photo 20).

A second oil wick connects the take-up link stud with a small oil pad which is secured inside the machine head with a screw and delivers oil to the takeup link whenever it brushes past.

23. Regulating the Hook Lubrication

The rotary hook of the PFAFF 433 is oiled indepedently of the forced feed lubrication system of the machine.

This feature has proved very advantageous because it permits to supply the sewing hook as the most sensitive part in a sewing machine with fresh and clean oil of excellent lubricity. This is particularly important in handling delicate fabrics.

Because of the fine grit which mixes with the lubricant, the oil in the forced feed lubrication system will soon assume a darker color which, although it does not impair its lubricity in the least, might soil the thread if used for the lubrication of the hook.

For instructions about filling the hook oil reservoir in the top cover see Section 2.

Oil is conducted to the rotary hook by means of the transparent plastic tubes 2 and 3. When the machine runs, valve **v** is opened by oil pressure which is generated in pump **p** and conveyed through tube 1. As the machine stops, the valve is closed by spring action. (Photo 22).

Tube 3 conducts the oil from valve **v** to regulating screw **q** in the hook shaft bearing which regulates the oil flow to the sewing hook. As shown in photo 23, this screw can be reached with a small screw driver after removing the needle plate. Turn the screw to the left for more oil and to the right for less oil.

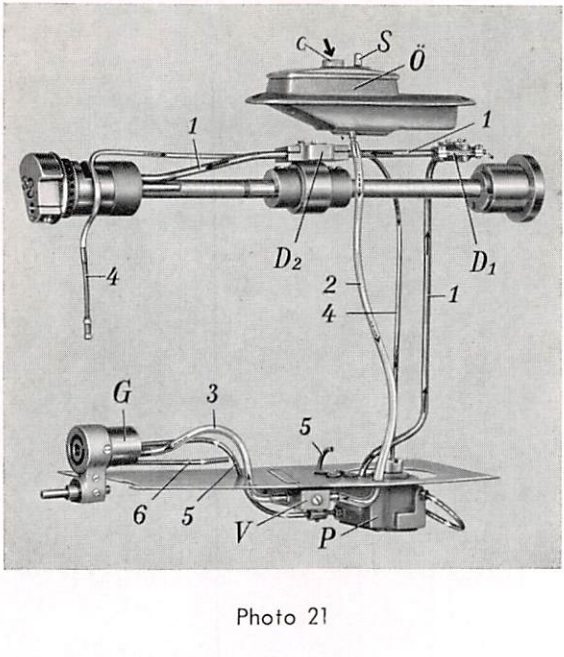

Photo 21

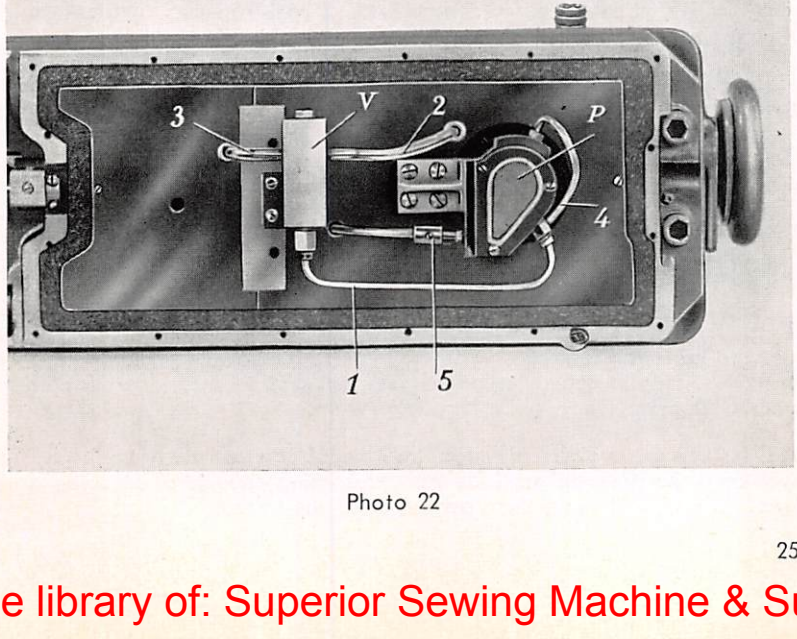

Photo 22

Tube 5 which connects the oil pump with hook shaft front bearing G supplies oil only to this bearing.

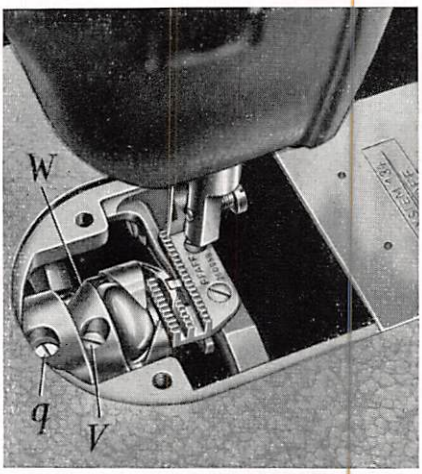

Photo 23

Having passed regulating screw **q**, the oil drips into the groove of the oil retainer, is flung away by centrifugal force, drains down through an oblique hole and enters the annular groove in the hook.

The oil flow must be adapted to specific operating requirements. The correct amount of oil required under ordinary operating conditions is found as follows:

Place a piece of stiff paper over the needle plate opening and, after about ten seconds, check whether two thin lines of spray oil, about 1/4 of an inch apart, are perceptible on the paper. These lines are made by oil particles which are flung away from the race and the front edge of the hook. After sewing for about fifteen minutes, repeat the above check and slacken regulating screw **q** in case the oil marks should fail to appear.

The amount of oil which is to be fed to the sewing hook greatly depends on the material to be sewn.

Since the particles of the dressing mix with the oil and thicken it, heavily dressed materials require a lavish oil flow to the sewing hook. This mixture tends not only to choke the oil conduits but also to wear the hook unduly and to "blacken" the sewing thread.

All this can be avoided by permitting the oil to flow more profusely. This will keep the dressing particles from absorbing enough oil to settle down and, instead, will wash them away out of the hook.

The operator will not encounter any difficulties in regulating the oil flow correctly when she remembers that more oil is required for stitching heavily dressed materials or for long runs at high speed (bed sheets or bath towels) and that the normal oil flow, or even a little less, will suffice for sewing flimsy and delicate materials which, without an exception, are all undressed.

For short runs and speeds below 4,000 s.p.m. in the garment manufacture, the oil flow to the hook may be shut off completely in favor of manual oiling.

If the hook should either blacken the thread, or become so hot that you cannot touch it with your hand, this is a sure indication of inadequate oiling. On the other hand, if oil spots appear on the bobbin case this indicates that there is an excessive flow of oil passing to the sewing hook and that soiling of the material may result.

These signs greatly help in keeping the oil flow to the hook at the correct level and in adapting it to specific operating requirements.

24. Changing the Oil

As with any other high speed sewing machine with automatic lubrication, regular changing of the oil will do much to increase the service life of the machine. Particularly during the break-in period, the oil should be changed more frequently. This is necessary in order to remove the grit which occurs particularly while a new machine is being broken in. As the overheating Of the oil does not affect its lubricity, it is not necessary to change the oil in order to correct this condition.

To comply with the above requirement, follow the schedule given below:

First change	after one week's operation
Second change	after four week's operation
Third change	after three months' operation
and thereafter	every three months

Of course, this schedule applies only to the automatic lubrication system. The oil which is used up in the separate hook lubrication system has to be replenished at shorter intervals.

To drain the oil from the bed oil reservoir, take out the large drain screw **while the machine is idle.** Take care that no used oil, mud or grit remains in the reservoir.

The drained oil may be reused for other lubricating purposes after it has been filtered through several lays of linen.

New oil is filled in as instructed in Section 2.

25. Regulating the Check Spring Action

The check spring assists the take-up lever in taking up the balance of the needle thread after the loop has passed around the bobbin, and further in setting the stitch to the desired tightness and in controlling the slack of the needle thread from the time the descending take-up lever has drawn the thread from the spool until the needle reaches the goods.

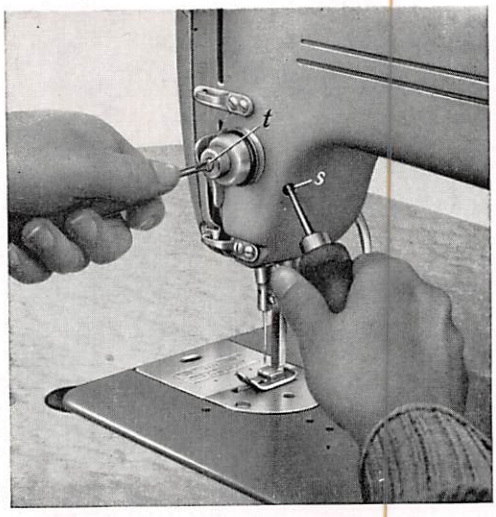

Photo 24

The check spring is checked in its downward motion by a stop on its bushing which can be adjusted as required. To do this, loosen set screw **s** (Photo 24), insert a screw driver into the slot of tension stud **t** and turn the stud.

Since thread regulator **R** (Photo 20) is mounted on the presser bar lifting bracket, it moves up and down with the presser bar as the sewing foot passes over irregularities in thickness. With this motion it regulates the amount of thread which varies with the inequalities in thickness of the material and complements the action of the check spring so that it does not have to take up excess slack thread.

Vertical adjustment of the thread regulator is made possible after loosening screw **u** (Photo 20). It has the same effect on the thread control as turning the check spring bushing. For best results, it is recommended to coordinate both adjustments so that the check spring will not only take up the correct balance of the thread but also draw up the thread perpendicularly.

Once you are familiar with the functions of both the check spring and the thread regulator, you will be in a position to perform proper adjustment right away, without first having to try out different settings.

The check spring is correctly set if it has completed taking up the balance of the thread when the needle stitches into the material. Since the amount of travel of the take-up lever is somewhat larger with the PFAFF 433 than is normal, it may be necessary to allow the check spring a larger amount of play than is usual so that it will exert still a slight pull on the thread at the time the needle reaches the goods.

26. Setting the Needle Bar at Correct Height

To facilitate setting the needle bar at the correct height, a small depression about $^{5}/_{64}$" wide has been milled into the bar. (Photo 25). When the needle bar has reached the lowest point of its stroke, the top of this mark should be flush with the bottom edge of the lower needle bar bushing. The width of this mark coincides with the amount of needle rise which is required to form the loop. In other words, when the needle bar has risen about $^{5}/_{64}$"

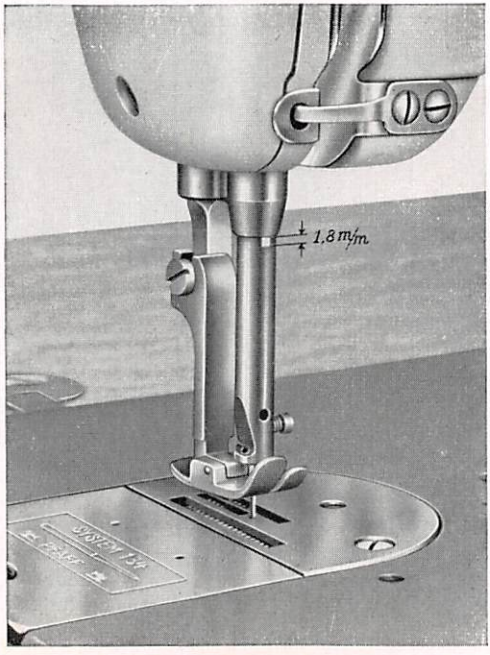

Photo 25

from the lowest point of its stroke, the point of the hook should be opposite the center line of the needle and about .04" above the top of the needle eye. This is the position in which the point of the hook is about to enter the loop after it has been sufficiently enlarged.

To correctly set the amount of needle rise, it is recommended to use the special gauge which will be supplied by us upon request.

Begin by lowering the needle bar to its lowest position, slip the gauge onto the bar so that it touches the bottom surface of the lower bushing. Slip the clamp onto the needle bar immediately beneath the gauge and screw it on. (Photo 26). Now remove the gauge and turn the balance wheel slowly until the clamp contacts the needle bar bushing. With the needle bar in this position, proceed to time the sewing hook.

Photo 26

27. Timing the Sewing Hook

Remove the needle plate and slacken hook set screws **v** and **w** (Photo 21), then turn the hook on the hook shaft to the position described in the preceding section (point of hook opposite center line of needle and about .04" above top of needle eye).

Use great care in setting the hook to the needle so that there will be a clearance of about .004" between both.

When making the above adjustment or inserting a new hook, make sure that the hook shaft front bushing is moved well enough forward to ensure a clearance of .012"-.016" between its face and the hook. This distance can be easily measured between the point of the hook and the needle.

The clearance of .008"-.012" which will exist between the hub of the hook and the hook shaft bushing after setting the hook to the needle is absolutely necessary in order to ensure proper lubrication of the hook.

28. Exchanging the Sewing Hook

1. Remove needle, needle plate and position finger bracket.
2. Loosen set screw **c** and pull off mechanical opener **b**.
3. Slacken hook set screws **v** and **w**. (Photo 21).
4. Turn the balance wheel until the feed dog is in its highest position.
5. Pull the hook off its shaft.
6. With the feed dog in its highest position, push the new hook onto the hook shaft and replace the position finger bracket.
7. Time the hook as instructed in Section 27 and tighten set screws **v** and **w** securely.
8. Replace and screw on the mechanical opener as instructed in par. 12, Section 18.
9. Screw on feed dog and needle plate.

29. Timing the Bobbin Case Opener

Despite the fact that many mechanics find it rather difficult to time the mechanical opener correctly, it is of great importance to perform this adjustment meticulously in order to ensure that the advantages afforded by the bobbin case opener may take full effect.

There are two different adjustments required:

1. The adjustment of the mechanical opener drive, and

2. the timing of the mechanical opener finger.

The oscillating motion of the feed lifting shaft is transmitted to the mechanical opener shaft by means of a link.

To adjust the motion of this link, loosen the binding screw and turn the clamp crank on the feed lifting shaft until the throw of its joint is exactly halved by the center line. (Photo 27).

The point of the opener finger set screw should engage in the lengthwise groove in the opener shaft. This groove marks the correct position of the opener finger on the shaft so that no adjustment will be required when replacing the opener finger after having removed the hook. If adjustment should become necessary, loosen binding screw **Q** on the bottom of the link (Photo 14) and turn the opener shaft as may be required.

To set the opener finger so that it will rotate the bobbin case at the correct time, turn the opener shaft so that the finger will reach the projection on the bobbin case and begin to open the clearance gap for the thread when the hook point is about one-eight of a revolution short of its top position, i.e. at northeast.

Since the motion of the opener finger is very slow and hardly perceptible, we recommend to push the bobbin case over the right at the bottom and

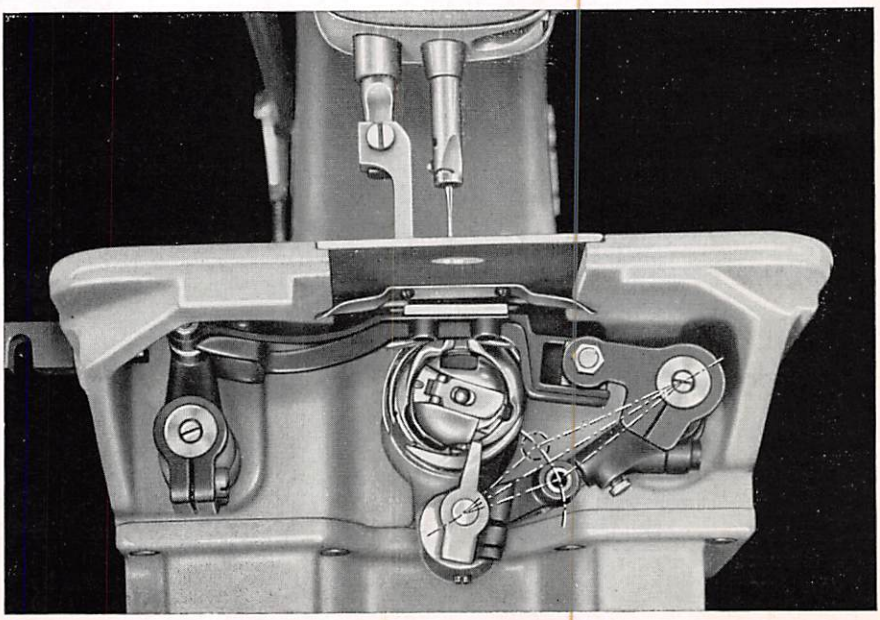

Photo 27

to place a piece of thin paper between the finger and the projection on the bobbin case. When the finger begins to hold the paper in position, it has reached the position where it will begin to rotate the bobbin case.

When timing the mechanical opener, care should be taken that the upper and lower jaws of the link will not be moved sideways on the shaft, and further, that the mechanical opener shaft will not be allowed any end play. If existent, it should be corrected by adjusting either the opener link jaw or the set collar. (Photo 14).

30. Disassembling the Link Take-Up

1. Remove face cover, presser foot and needle.
2. Take out the pressure regulating screw and the presser bar spring, slacken set screw **B** (Photo 30) in presser bar lifting bracket and pull the presser bar out of the machine.
3. Loosen set screw **C** (Photo 30) in needle bar connecting stud and set screw **D** (Photo 20) in the needle bar upper bushing, remove oil wick clip and oil wick and pull the needle bar out of its bearings.

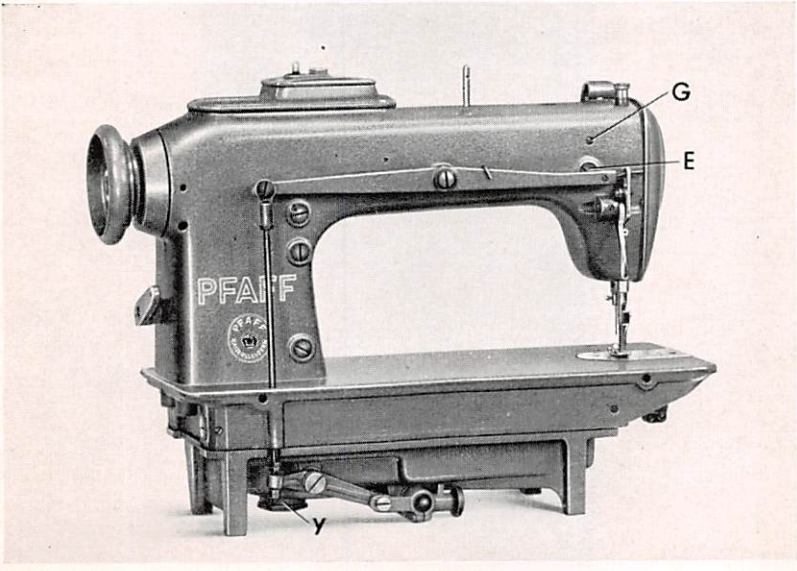

Photo 28

4. Take out screw **E** (Photo 28) at the back of the machine.
5. Turn the balance wheel until the set screw for the take-up crank, which is positioned in the needle bar crank, can be reached through hole **G**. (Photo 28).
6. Loosen the take-up crank set screw.
7. Loosen the set screw for the take-up link stud.
8. Unscrew the top cover and pull the packing out of the hollow hinge stud of the take-up link.
9. Place the bar (Photo 29) across the head of the machine, insert a $^{3}/_{16}$"$\times$28 screw through its hole and screw it into the hollow, threaded hinge stud of the take-up link and, in this manner, pull out the hinge stud.
10. Carefully pull out the take-up lever with its link, the take-up crank and the needle bar connecting link, all in one.

Do not apply force when removing the take-up assembly because all parts are precision-engineered and meticulously fitted, and do not tap on the parts as this would dislocate the press-fitted bearing rings.

Honed needle bearings are provided in the rear end of the take up lever and the top end of the needle bar connecting link.

To loosen end screw **L,** turn it to the **right.** (Photo 29).

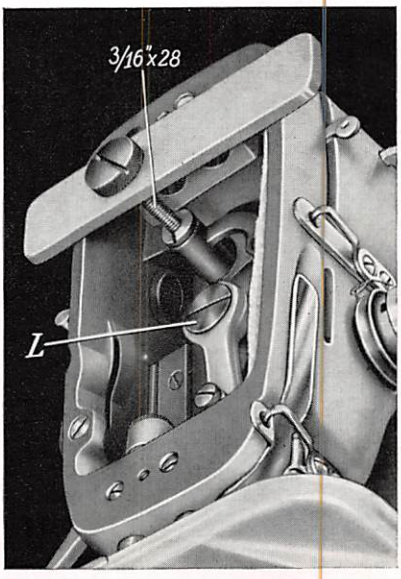

Photo 29

When stripping the link take-up and needle bar assembly, take care that none of the tiny bearing needles gets lost. Each bearing contains 18 needles. To facilitate insertion of the needles, the bearings are grease-packed so that the needles will be held in position by the grease. Use a pair of tweezers to insert the needles into the bearings.

Reverse the above procedure and use proper caution when replacing the take-up and needle bar assembly in the head of the machine. It is advisable to take a thin wire whose one end is bent into a hook to lace the packing through the hollow hinge stud of the take-up link. When fastening this packing to the needle bar top bushing (Photos 20 and 30), make sure that it clears the presser bar spring as, otherwise, the excess oil which would accumulate on the spring would seep through the presser bar bearing and soil the work.

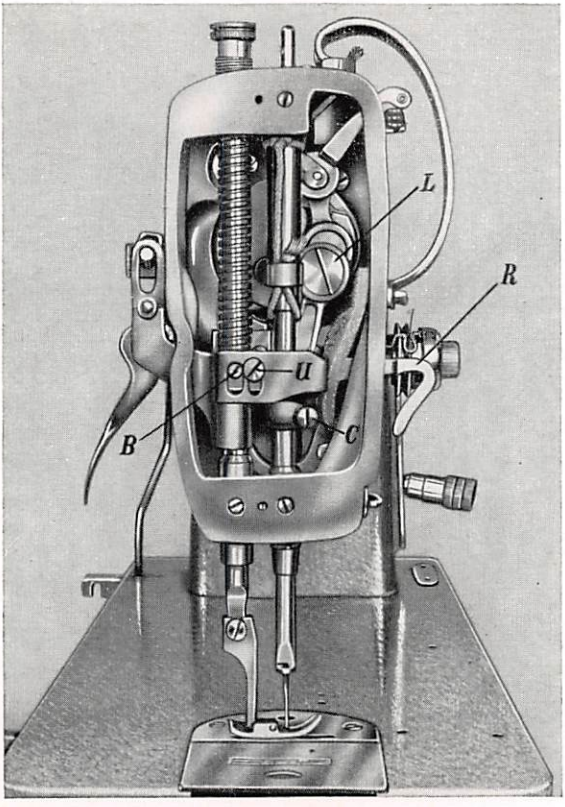

Photo 30

31. Adjusting the Stitch Length for Forward and Reverse Sewing

PFAFF 433 A and B machines can be so set as to make stitches of exactly the same length when sewing forward or backward. This means that the needle will stitch through the same hole twice, once when sewing forward and again when sewing reverse which is much desired for backtacking.

With Model C machines, the reverse stitch becomes proportionally shorter as the stitch length for forward sewing increases. When set for a maximum forward stitch of about $^{13}/_{64}$", the corresponding reverse stitch will be about $^{9}/_{64}$" long.

To adjust the stitch length for both forward and backward sewing, loosen binding screw **N,** which is visible in the stitch regulator slot (Photo 31), and turn the clamp crank on the stitch regulator spindle.

Hold lever A (Photo 31) in its position and adjust by turning lever **O** on the stitch regulator spindle. To increase the length of the forward stitch, turn it downward.

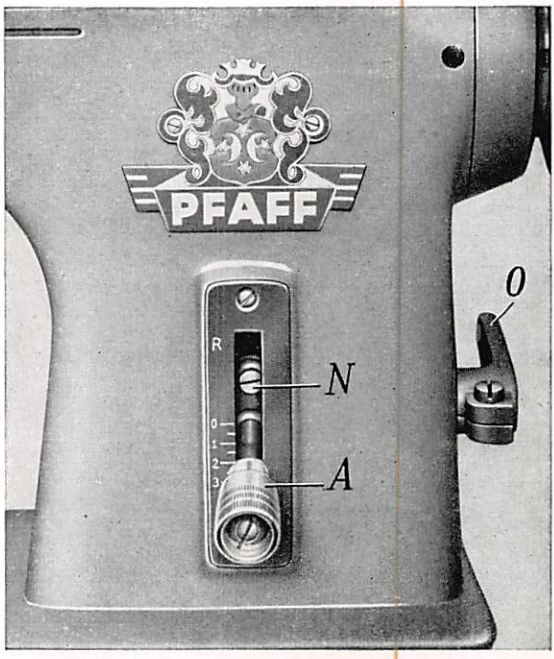

Photo 31

Having adjusted the forward in relation to the backward stitch length, tighten screw **N** securely.

The longer the maximum forward stitch is set, the shorter will be the corresponding stitch length for reverse sewing.

32. Dismantling Oil Reservoir and Oil Pump

As all settings of the feeding mechanism, the mechanical opener and the hook can be performed on the outside of the machine, there is normally no need to strip the oil reservoir. If the oil pump should cause trouble and has to be removed, proceed as follows:

1. Drain the oil completely.
2. Unscrew pinch nuts **y** (Photo 28) and strip the knee lifter mechanism on the bottom of the oil reservoir.
3. Tilt the machine back and take out all screws in the oil reservoir bottom trough, except for two screws at the corners which need only be loosened.
4. Remove the bottom trough and rinse it thoroughly with kerosene until all grit is removed.
5. Disconnect all oil tubes from the pump.
6. Take out both screws No. 855 and strip the cover plates. (Photo 27).
7. Unscrew the four set screws and dismantle the oil pump.
8. Rinse the pump with gasoline and replace it.
9. Clean the packing surfaces along the rim of the bottom trough and mount it on the machine. Make sure the packings are correctly positioned.
10. Insert all position screws and tighten them crosswise.

As the machine is provided with a special type gasket which is located between the bed plate and the oil reservoir, be cautious that this gasket will not be damaged when removing or replacing the bottom trough. A damaged gasket is completely useless.

33. Trouble Shooting

Skipping of stitches

1. Incorrect threading
2. Wrong needle used
3. Needle inserted incorrectly
4. Needle too thin for thread used
5. Needle too thick for thread used
6. Needle bent
7. Needle at incorrect height
8. Too wide a clearance between needle and point of hook (.004")
9. Needle rise insufficient
10. Processing adhesive or heavily dressed materials
11. Thread twisted too much

Thread Breaking

1. For any of the above reasons
2. Thread tensions too tight
3. Knotty thread
4. Thread has become unserviceable because of extensive and dry storage
5. Inferior quality thread
6. Thread jamming in the hook race
7. Rough edges of needle hole
8. Thread has slipped from spool and snarled up around spool pin
9. Incorrect setting of check spring
10. Point of needle blunt as a result of hitting the hook, etc.

Needle Breakage

1. Needle bent and struck by point of hook
2. Thread too thick for needle used
3. Timing of hook disturbed after thread jamming
4. Needle thread tension too tight
5. Needle deflected by hard spots in material
6. Needle bent because material is pushed or pulled
7. Machine feeds while needle is down in material
8. Hook set too close to needle
9. Needle too thin for material sewn
10. Thread snarled up on spool pin

Improper Feeding

1. Feed dog set too low
2. Tooth pattern on feed dog too fine for material sewn
3. Type of feed dog unfit for work to be performed
4. Insufficient amount of pressure exerted by presser foot
5. Lint accumulated between teeth of feed dog
6. Blunt feed points

Overheating

1. Oil hole in hook choked up causing overheating of hook
2. Oil regulating screw **q** (Photo 21) too tight
3. Oil flow for head parts (stud **o** in Photo 20) insufficient
4. V-belt too tense, causes excessive pressure on arm shaft bearings
5. Full weight of motor presses on V-belt because belt take-up hanger has become loose
6. Improper oil used. (Viscous oil cannot penetrate the narrow conduits when the machine is cold).

Index

SEWING MACHINE FACTORY
G. M. PFAFF AG, KAISERSLAUTERN

Founded 1862

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For every **PFAFF Sewing Machine** bearing this

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the factory assumes full guarantee for first-class quality, efficiency and durability.

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