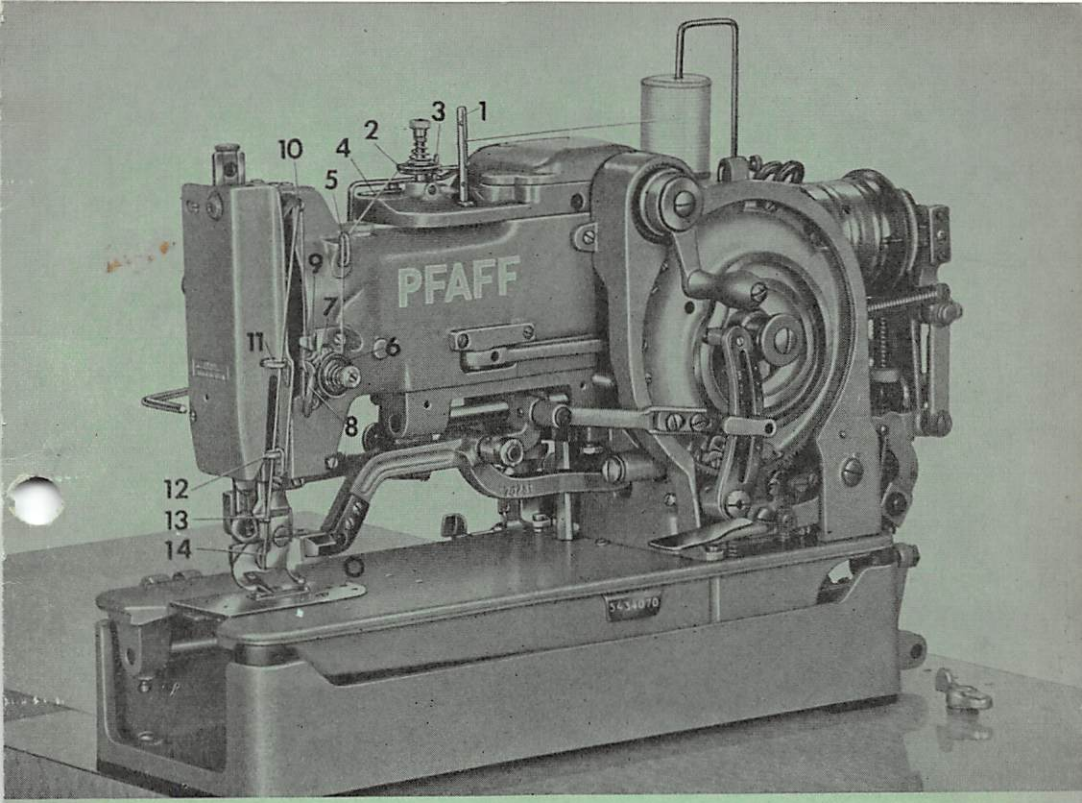

PFAFF 3114

Automatic Lockstitch Buttonhole Sewing Machine

INSTRUCTION BOOK

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

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Instruction Book

PFAFF 3114

Automatic Lockstitch Buttonhole Sewing Machine

This Instruction Book contains useful information for operators and mechanics alike and therefore should be made available to both rather than be put away in your files.

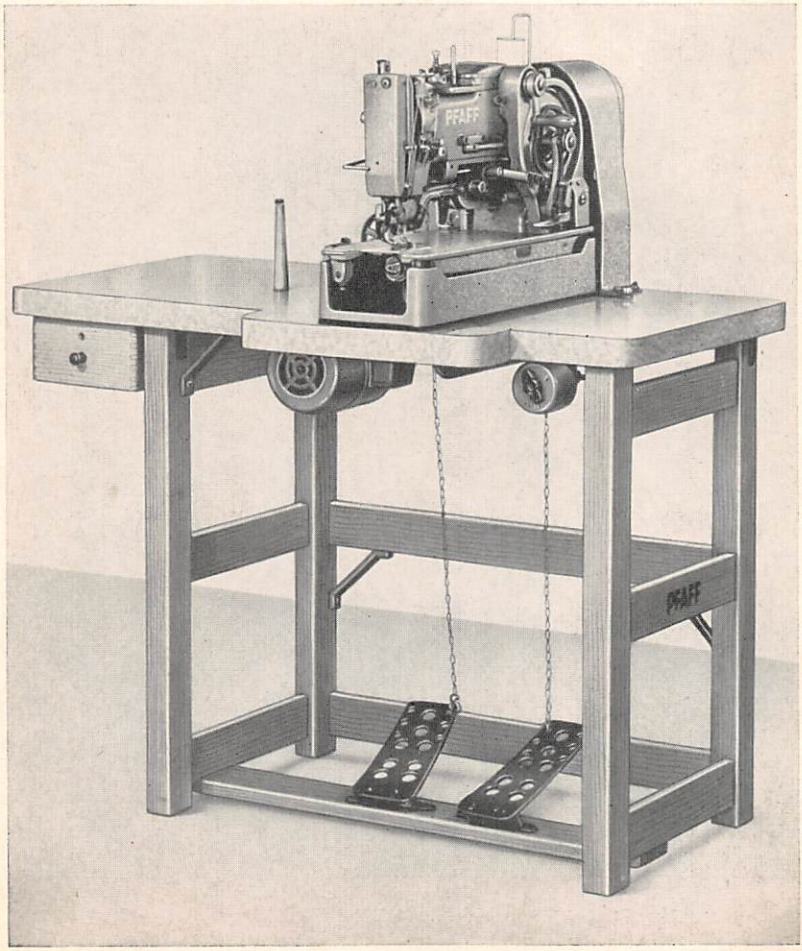


Photo 1

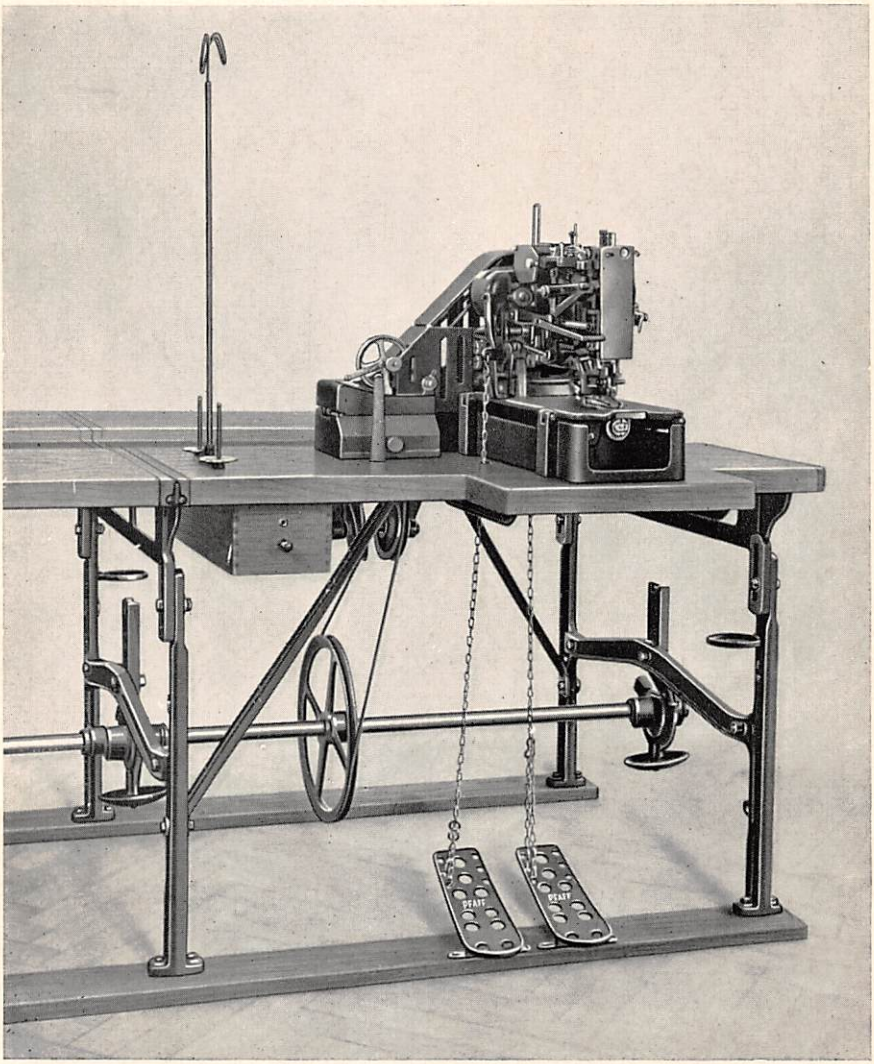


Photo 2

The PFAFF 3114 is a special purpose sewing machine which stitches both whipstitch and purlstitch buttonholes with two straight or taper bars, from $^{23}/_{64}$"—$1^{9}/_{16}$" long, completely automatically. With equal facility, the machine makes eyelet-end buttonholes with one taper bar. Its range of applications extends from lightweight to heavyweight fabrics and includes linen goods, tricot and knitwear, sports and workwear garments, aprons and similar articles; in short, this versatile machine is used in every case where straight or eyelet-end buttonholes are to be made.

An exclusive feature of the PFAFF 3114 is a bedplate which is free of any mechanism whatsoever. This large, clear area facilitates not only the handling of the work but also the mounting of attachments, such as edge guides, gauges and tape guides which are used for manipulating knitted fabrics.

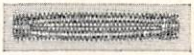
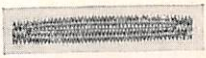
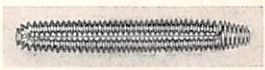
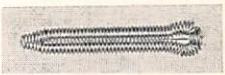
Subclasses

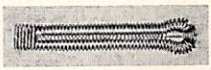
The various subclasses of the PFAFF 3114 differ mainly by their feed cams, work clamps and, in some instances, their bar tripping segments (see Table of Subclasses). When converting machines from one subclass into another, note that subclasses 1 and 2; 3 and 4; 5, 6 and 12; as well as 7, 8, 9 and 10 use the same feed cams. The various subclass machines use work clamps which differ according to the maximum length of the buttonhole the respective machine makes. For sewing buttonholes in tricot materials and knitted fabrics, we supply a tape guide which is to be mounted on the bedplate. Upon special request, the machines of this class will be equipped with collar and cuff guides.

In most instances, the size of the button is given in lignes, the length of the buttonhole slot in millimeters or inches.

40 lignes = 1 inch (1 inch = 25.4 millimeter)

The PFAFF 3114 is available in the following varieties:

Sub-Class	Lenght of Buttonhole	Model	Inside Dimensions of Work Feed Frame		Class of Work	Stitch Diagram
			Width	Length		
1	1/4"—3/4" 1/4"—1"	A B	11/64" 13/64"	13/32" 129/64"	Lingerie Blouses Corsetry	with 2 straight bars 
2	1/4"—1"	B C	13/64" 15/64"	129/64" 129/64"	Tricot Knit Goods	with 2 straight bars 
3	1/2"—1" 1/2"—11/4"	C C	15/64" 15/64"	129/64" 149/64"	Ladies' Wear Sport and Work Clothes	with 2 straight bars 
4	1/2"—11/4" 1/2"—19/16"	C C	15/64" 15/64"	149/64" 211/64"	Extra long button-holes, belt slots in aprons and work clothes	with 2 straight bars 
5	1/2"—1" 1/2"—11/4"	C C	15/64" 15/64"	129/64" 149/64"	Ornamental button-holes in lapels and sleeve slashes	with 1 taper bar 
6	1/2"—1" 1/2"—11/4"	C C	15/64" 15/64"	129/64" 149/64"	Buttonholes in trouser front flies and trouser pocket flaps	with 2 taper bars 
7	3/4" 7/8" 1"	C	15/64"	129/64"	Work Clothing Staple Goods	with 1 taper and 1 conceoled bar and pear-shaped eye 
8	3/4"—1"	C	15/64"	129/64"	Work Clothing Staple Goods	with 1 straight and 1 conceoled bar and pear-shaped eye 
9	3/4"—11/4"	C	15/64"	149/64"	Work Clothing Staple Goods	with 1 taper and 1 concealed bar and pear-shaped eye 

Sub-Class	Lenght of Buttonhole	Model	Inside Dimensions of Work Feed Frame		Class of Work	Stitch Diagram
			Width	Length		
10	$^{3}/_{4}$"—1$^{1}/_{4}$"	C	$^{15}/_{64}$"	1$^{49}/_{64}$"	Work Clothing Staple Goods	with 1 straight and 1 concealed bar and pear-shabed eye 
$\frac{30}{12}$	$^{1}/_{2}$"—1"	C	$^{18}/_{64}$"	1$^{29}/_{64}$" 1$^{49}/_{64}$"	Tricot Knitwear (with gimp guide)	with 1 taper bar 
$\frac{30}{14}$	$^{1}/_{2}$"—1"		$^{9}/_{32}$"- $^{23}/_{64}$"	1$^{29}/_{64}$" 1$^{49}/_{64}$"	Tricot, Knitwear (with gimp guide)	with 1 taper bar 

1. Setting Up the Machine

As shown in photo 1, the PFAFF 3114 is set up with its head facing the operator.

When supplied with individual power table, the head is packed separately and has to be mounted on the power table which comes from the factory ready-assembled. For this purpose, place the cast-iron machine base and the felt pads on the table so that the front edge of the base is flush with the front edge of the table projection and that the base is positioned exactly in the middle of this projection. Now the machine head is carefully mounted on the base and connected with its hinges.

Make sure that the machine rests properly on the rubber blocks.

Mount both driving belts, attach the belt guard and screw it down on its hinges.

Make particularly sure that the machine pulley always rotates in the right direction, as indicated by the arrow in photo 23.

The $^{1}/_{3}$ HP electric motor performs at a constant speed of 1,400 r.p.m. and is provided with a two-speed pulley No. 99056 which measures 3$^{5}/_{8}$" and 1$^{21}/_{32}$" in diameter and permits a sewing speed of 1,800 s.p.m. A second two-speed pulley No. 99057, with diameters of 3$^{55}/_{64}$" and 1$^{27}/_{32}$", comes with the machine and allows for a sewing speed of 2,000 s.p.m.

When in permanent operation, the PFAFF 3114 should be operated at 1,800 r.p.m. for the first six weeks. After this time the speed may be increased to 2,000 r.p.m. by exchanging the motor pulley.

When using first-rate thread, the sewing speed may even be increased to 2,200 r.p.m. For this purpose, motor pulley No. 99058, with diameters of $4^{7}/_{32}$" and $2^{3}/_{64}$", is available at extra cost.

When ordering motor pulleys, please specify the diameter of the motor shaft.

In those cases where a motor with a higher speed is already on hand and has to be used, a speed reducer will be furnished for the PFAFF 3114 when set up on individual power table. The type of speed reducer required should be specified on the order. High-speed motors are not recommended because the small pulleys they require have very unfavorable transmission ratios.

To facilitate mounting the PFAFF 3114 on an existing power benching system, it is advisable to procure from us a table top in the proper length and with the necessary cutouts and holes. From the line shaft pulley, power is conveyed to the machine by means of two jockey pulleys and one two-speed pulley.

With a line shaft speed of 300 r.p.m., a line shaft pulley of $9^{27}/_{32}$" diameter is required to obtain a sewing speed of 1,800 s.p.m.

When using thread of a superior quality, a line shaft pulley of $11^{13}/_{16}$" diameter may be used after the breaking-in period so as to obtain a sewing speed of 2,200 s.p.m.

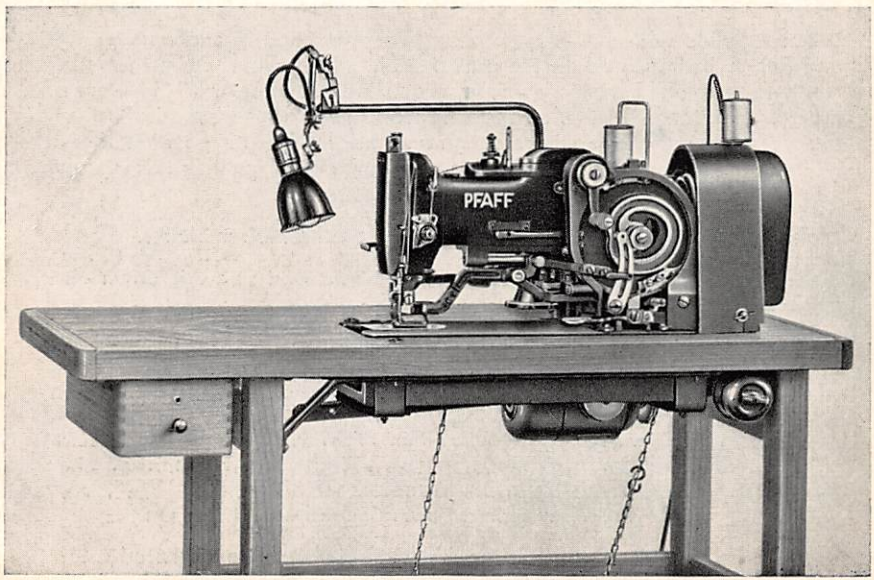


Photo 3

Photo 2 depicts the disposition of the two-speed and jockey pulleys and the belt guard. The treadles for operating the machine should be screwed on within easy reach of the operator.

The long chain which serves to lift the work clamp is suspended from the lifting lever L on the left side of the machine, passed through the hole in the table top, and connected to the second or third hole in the left treadle, depending on the angle of inclination desired.

The short chain is suspended from the starting lever inside of the machine base and is connected to the right treadle.

Whereas the PFAFF 3114 is exclusively set up crosswise of the table, as shown in photos 1 and 2, when used in garment manufacture, it is often mounted lengthwise of the table (Photo 3) when used in the manufacture of linen and tricot goods. Since the buttonholes in these articles, e.g. men's shirts, extend lengthwise of the buttonhole facing, this way of setting up the machine greatly facilitates its operation.

2. Cleaning and Lubricating

When delivered, all polished parts of the machine are coated with a rust-preventive lubricant which, together with the dust accumulated in transit, should be removed, and the machine thoroughly rinsed with kerosene at

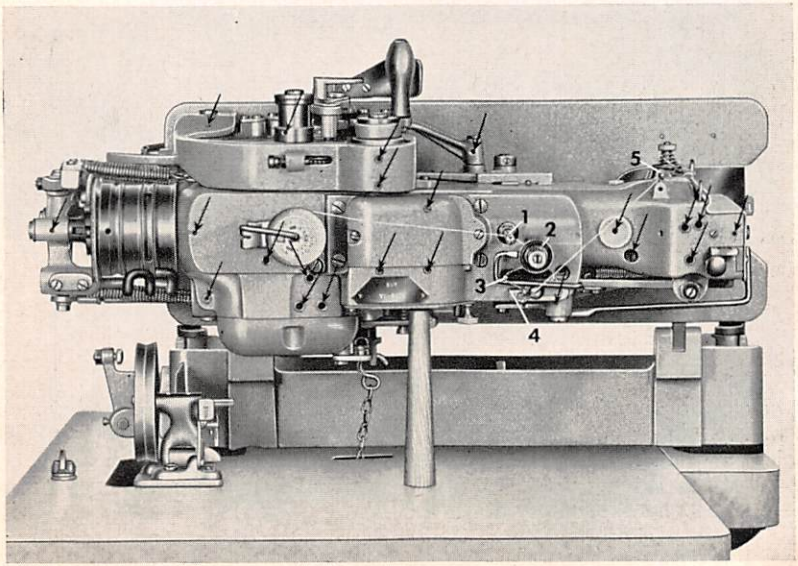


Photo 4

all oiling points. Then place a piece of fabric under the work clamp, preferably remove the bobbin case cap, and run the machine a short while without being threaded. This done, apply sewing machine oil at all oiling points (see Section 12).

In order to reach the oiling points in the machine bed, open the catch of the belt guard, tip the belt guard back, tilt over the head of the machine to the left and rest it carefully on the wooden machine rest pin.

The oiling points are marked by arrows in the illustrations and, as far as feasible, are marked with red paint and the work "OEL" on the machine.

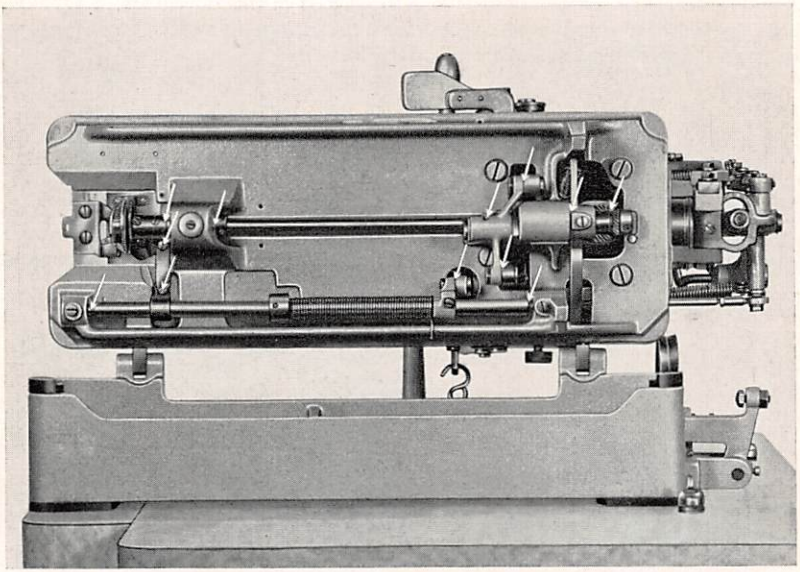


Photo 5

Special care should be taken that the PFAFF 3114 be oiled properly. With a mechanism as complex as this, it is impossible, of course, to mark all points of friction which should be oiled. Excessive oiling should be avoided so as not to soil the work. To ensure uniform stitches, the hook race must be cleaned and oiled every day.

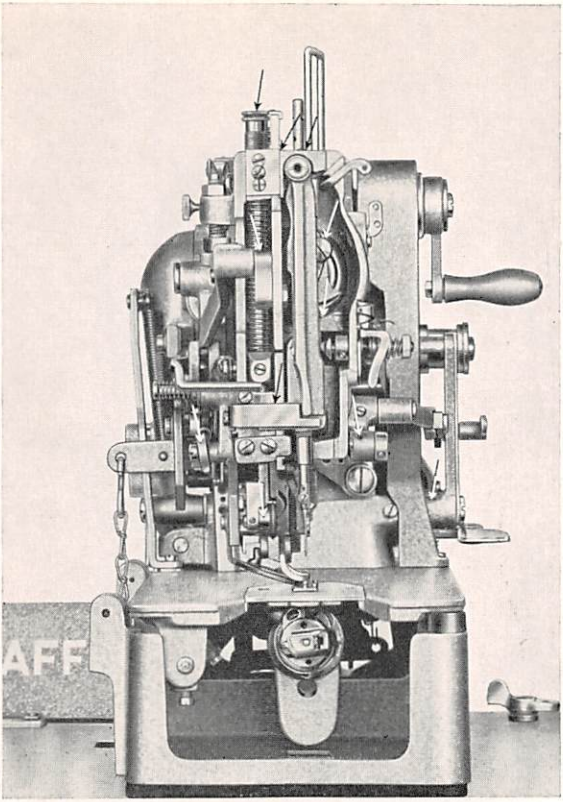


Photo 6

After oiling the hook, sew a few buttonholes on a rag until there are no traces of oil left on the material.

Special attention should be paid to oiling the slide collar x_1 on tripping rod **w** so as to ensure reliable engaging and disengaging of the buttonhole knife.

It cannot be emphasized enough that it is very important to remove the accumulations of lint with a brush several times a day and thus to ensure proper operation of the hook and the bobbin thread trimmer. This daily cleaning and oiling will increase the service life and the dependability of the hook considerably.

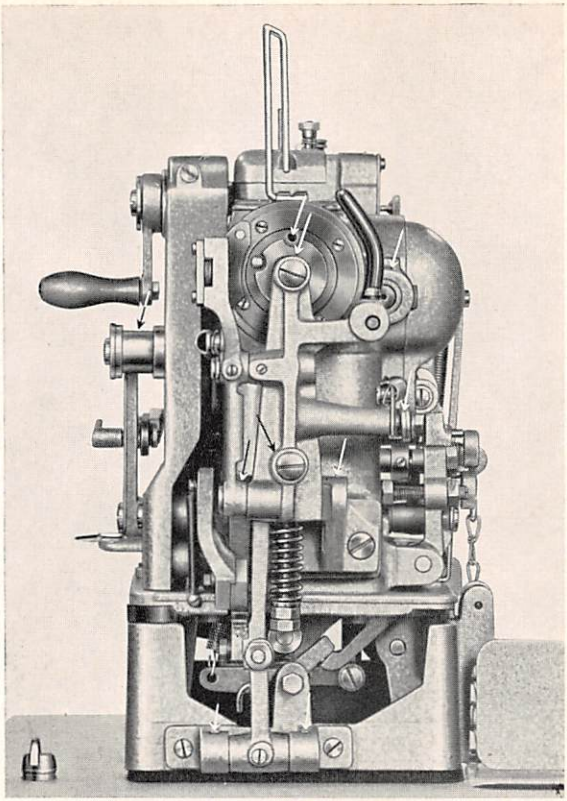


Photo 7

3. Needle and Thread

The PFAFF 3114 uses System 134 R needles in sizes 70—110.

The needle should be selected as thin as possible. The appropriate needle size depends on the thickness of the thread which should permit the thread to pass through the needle eye freely. For dense and resistant materials, the needle must not be chosen too thin to avoid needle and thread breaking.

For purlstitch buttonholes it is recommended to use a smooth No. 36-50/4-6-cord, thread of an even twist in the needle, and a soft No. 60-120/3-cord thread in the bobbin.

Whipstitch buttonholes call for the same weight of needle and bobbin thread. For best results, a soft thread of an even and moderate twist should be used in the needle.

We should like to stress at this point that only the very best threads in the weights recommended above should be used for sewing buttonholes. Besides the quality of the thread it is its condition at the time of use which should be given due consideration because even threads of superior quality may turn brittle and loose their tensile strength when stored in dry rooms for too long. Inferior quality threads are completely unsuitable for this type of work.

The PFAFF 3114 is carefully stitched off with threads of the grades and weights most suitable for the purpose the machine is intended for.

No guarantee will be assumed for the proper working of the machine and the neat appearance as well as the durability of the buttonhole if thread of a poor quality is used.

If there is any doubt about the cause of thread breaking and you want to find out whether the thread or the machine is at fault, press the right treadle halfway down and sew the buttonhole at half the normal speed.

4. Inserting the Needle

The needle, System 134 R, is inserted into the needle bar with the long groove facing the arm standard, and is pushed up as far as it will go.

5. Threading the Needle

As shown in photos 4 and 8, the PFAFF 3114 is threaded as follows: Pass the thread from the thread unwinder through the hole in spool pin 1, between the discs of top tension 2, at the back of thread pull-off pin 3, through thread guide 4 and the upper hole of thread guide 5, between the discs of main tension 6, through thread check spring 7, under thread regulator 8, through thread guide 9 and take-up lever 10, through thread guides 11, 12 and 13 on top and bottom of the face plate and on the needle bar, and back-front through the needle eye 14.

After threading the needle and before commencing to sew the first buttonhole, lay the needle thread toward you under the work clamp and hold the bobbin thread with your hand under the needle plate.

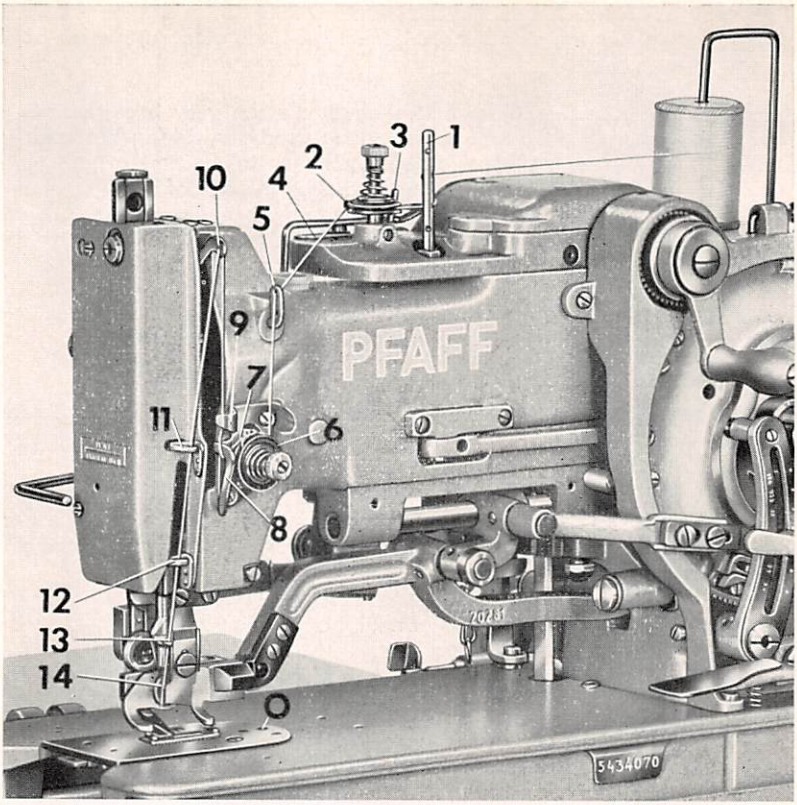


Photo 8

6. Winding the Bobbin

(Photo 9)

When set up for individual power drive, the bobbin winder is mounted on the table top; when set up on power benching, it is disposed on a cast-iron base. After loosening the set screws, the winder thread tension which is secured on the belt guard can be moved sideways as may be required to align the tension discs and the bobbin.

The thread is passed from spool 1 through thread guide 2, around and between tension discs 3, to bobbin 4.

Depressing lever 5 will engage the bobbin winder.

When the bobbin is full, the bobbin winder will throw off automatically. The amount of thread which is to be wound on the bobbin is regulated by screw 6:

Turning it right—More thread
Turning it left —Less thread

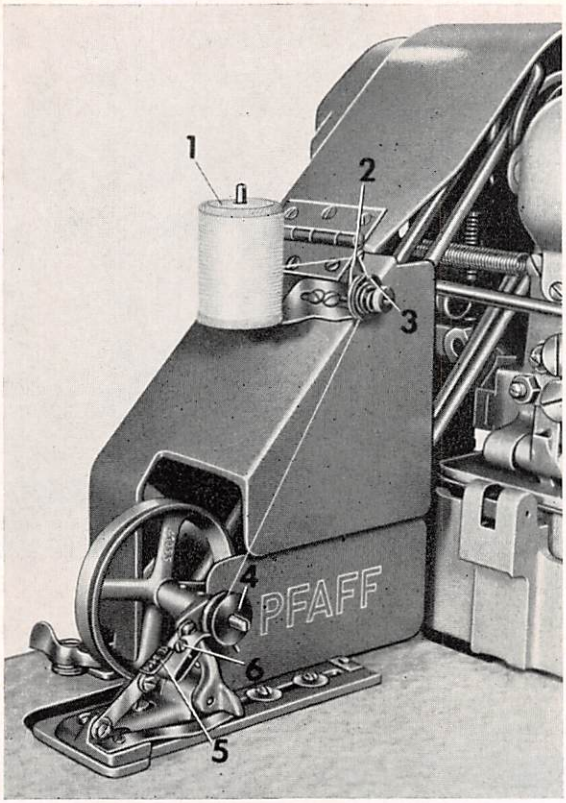


Photo 9

7. Changing the Bobbin

With thumb and forefinger of your left hand seize the bobbin case cap by the latch and pull it out of the hook (Photo 10). As long as the latch is held open, the bobbin cannot fall out.

8. Threading the Bobbin Case

Insert the full bobbin into the bobbin case cap so that it will rotate counter-clockwise when the thread is pulled off (Photo 11).

Hold the bobbin and pull the thread into slot 1 and toward you under the tension spring.

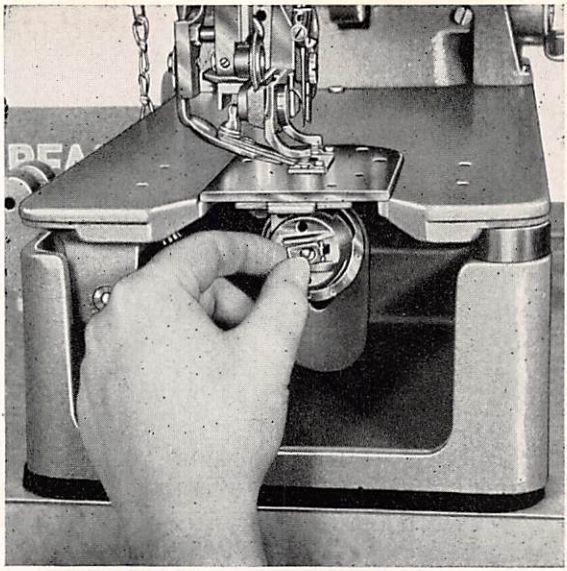


Photo 10

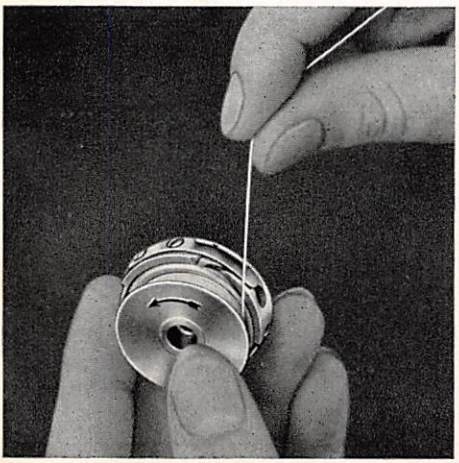


Photo 11

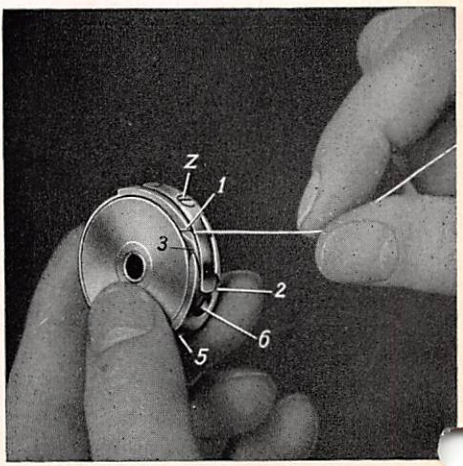


Photo 12

Then retain the thread in front of the tip of the tension spring with the forefinger of your left hand until the thread is pulled back into slot 3, through the gap between the bobbin case and the bobbin, and through slot 4 into the delivery eye 5.

When letting go of the thread and pulling it through the delivery eye, it will properly snap under the tension spring and be visible through aperture 6 (Photo 4).

While holding the latch open, the bobbin case cap and the bobbin are pushed onto the center stud in the bobbin case base and the latch is closed.

A slight pressure exerted with the thumb will make the cap snap into position audibly. This is very important since an improperly inserted bobbin case may cause damage to the hook, the bobbin case or the needle.

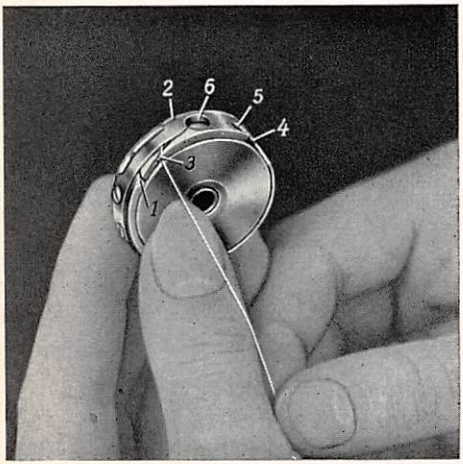


Photo 13

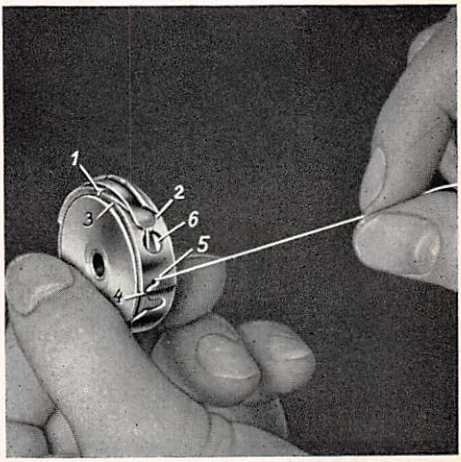


Photo 14

9. Regulating the Bobbin Thread Tension

The bobbin thread tension is regulated by means of screw **z** (Photo 15). Tightening this screw will increase the tension; and loosening it will decrease it.

Purlstitch buttonholes of any description require a very weak bobbin thread tension.

The tension is properly regulated if the bobbin case will slowly slide down by its own weight when letting it hang on the thread. (Photo 16). On no account should the bobbin thread tension be increased in excess of the

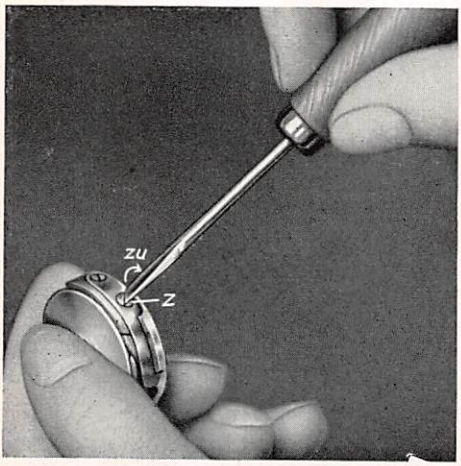


Photo 15

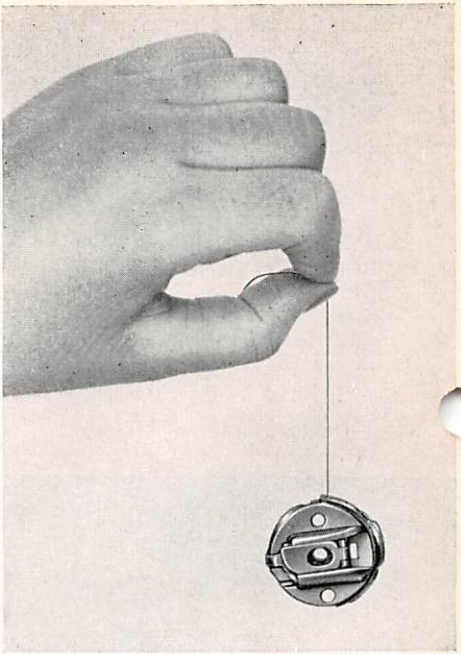


Photo 16

amount given above since this would necessitate increasing the needle thread tension and might result in thread breaking.

10. Regulating the Needle Thread Tension

The PFAFF 3114 has two needle thread tensions which are both released when the machine is inoperative.

When starting the machine, the top tension Sp 1 (Photo 17) is engaged first. It is set for a normal amount of tension and causes the knotting stitches to be locked inside of the material.

After some stitches, the lateral tension Sp 2 is engaged and increases the needle thread tension so that the bobbin thread will be pulled up and both threads will interlace on the top surface of the fabric and form a straight purl-line along either parallel of the buttonhole.

To prevent breaking of the needle threaa, the tension Sp 2 should not be set tighter than is absolutely necessary for obtaining a raised seam construction without risking thread breaking.

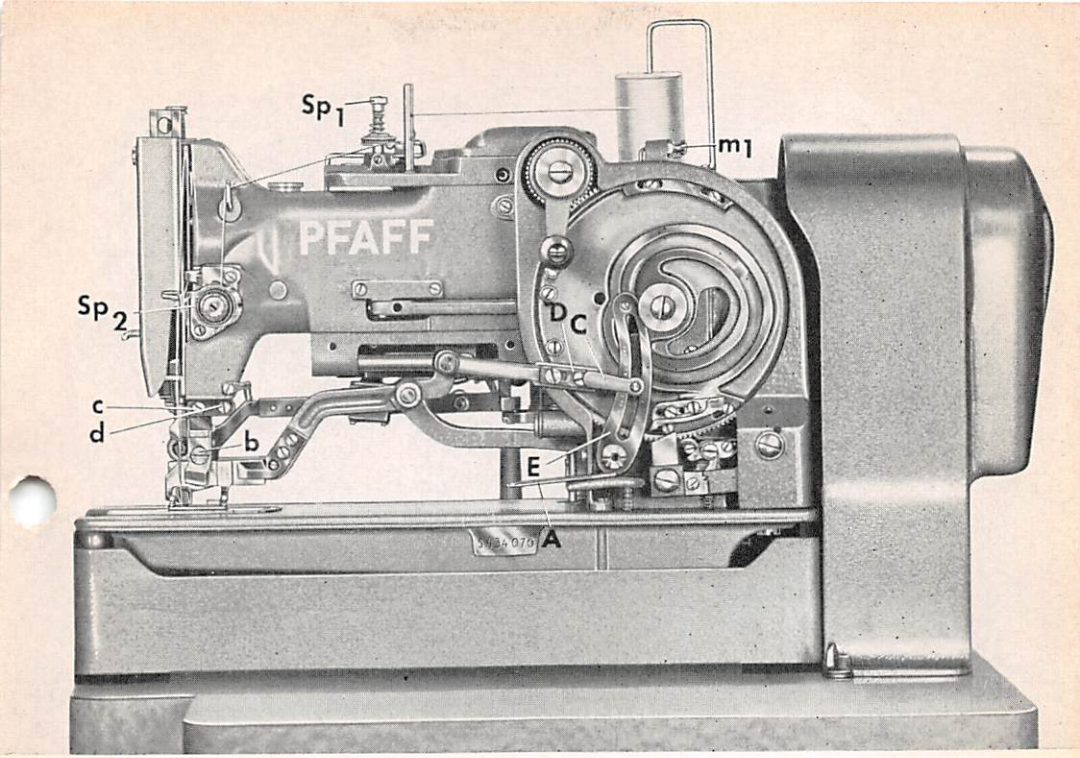


Photo 17

For best results, cotton No. 36-50/4 or 6-cord is used as needle thread. It cannot be emphasized enough that only first-class thread should be used so that the high sewing speed of the PFAFF 3114 can fully be utilized.

To prevent ravelling of the buttonhole, tension Sp 2 is automatically released when making the last two or three stitches and tension Sp 1 will cause the threads to form a durable concatenation inside of the fabric. Tension Sp 1 is released when the machine has stopped.

To ensure that the needle thread will be pulled into the material securely, tension Sp 1 is released by means of lever A (Photo 18) while the buttonhole is cut open.

In case inferior quality thread is used, only whipstitch buttonholes can be sewn on the PFAFF 3114. For this purpose, loosen the thumb nut of tension Sp 2 so that only tension Sp 1 will remain active.

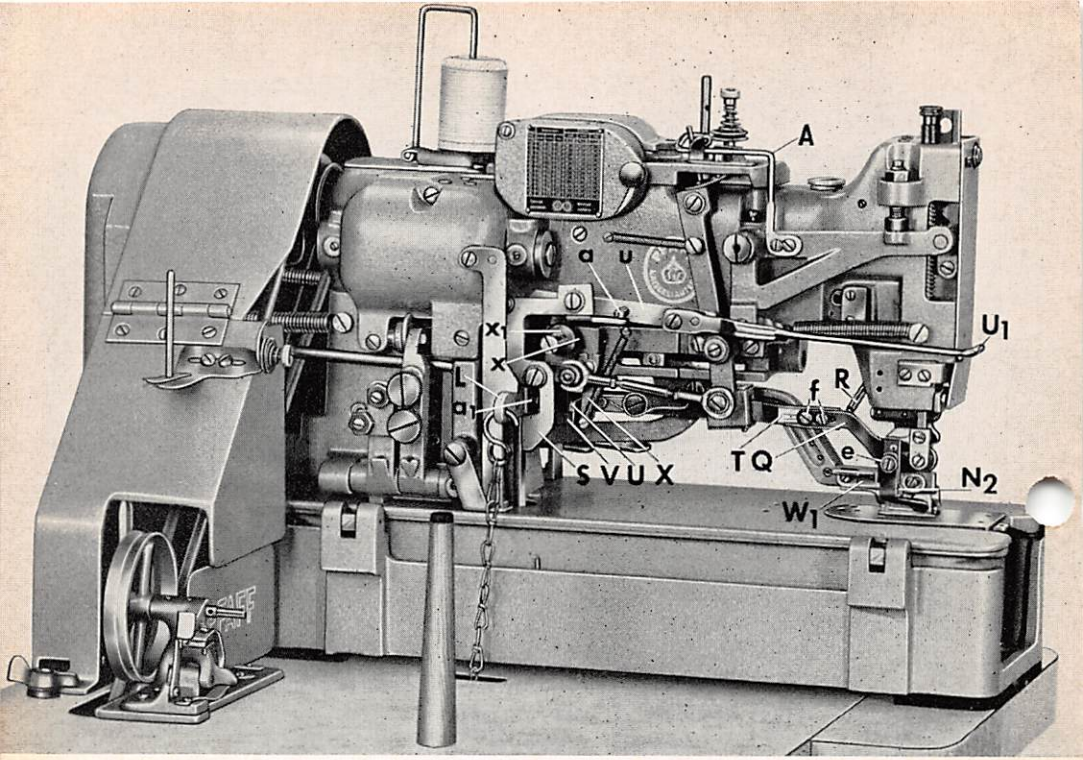


Photo 18

11. Placement of the Work

When depressing the left treadle, the work clamp is raised. Then the work is placed into the machine with the front end of the marked buttonhole under the needle. In order to avoid crooked buttonholes, the buttonhole marking should be placed exactly in the middle under the work clamp. When the left treadle is released, the work clamp is again lowered onto the work.

Upon lifting the work clamp, lifting lever L is pulled between the vertical guide and the lower end of locking lever S so that the machine cannot be started accidentally while the work clamp is raised (Photo 18).

12. Starting the Machine

Don't run the machine unless you have thoroughly familiarized yourself with its operation. Make particularly sure that you know how to stop the machine during a sewing cycle and practise actuating the knife interlocking mechanism (see Section 14). Only when the operator is fully acquainted with

these manipulations can she commence sewing. The best way to get to know the machine is to turn the machine pulley by hand and to study all phases of the performance of the machine. Then, preferably without threading the machine and with the bobbin case removed, switch on the motor and run the machine, but don't let the knife cut.

By pressing down the right treadle, the brake is released and the front driving belt (low speed) is shifted from the front loose pulley to the front driving pulley, thus driving the machine at half speed. When pressing the right treadle all the way down (and then taking the foot off the treadle), the rear driving belt (high speed) is shifted from the rear loose pulley to the rear driving pulley, thus bringing the machine to full speed. At this stage, the front driving belt is shifted to the rear loose pulley, and locking lever S arrests lifting lever L so that the work clamp cannot be raised accidentally while sewing (Photo 18).

The two-belt drive ensures that the machine is accelerated to top speed not only faster but also at a lesser power consumption and that belt slippage and excessive wear are greatly eliminated.

13. Stopping the Machine

After completion of the buttonhole the machine stops automatically. Shortly before making the bartacking stitches, the machine is automatically slowed down to half speed in order to effect a soft impact of the buttonhole knife. Another advantage of this reduction in speed is the fact that the momentum of the machine is much less and can be easily absorbed by the double buffer springs when the machine stops instantaneously. This will greatly eliminate the breakage of parts and trouble in the machine.

14. Stopping the Machine While Sewing

Instant stopping of the machine during the sewing cycle is particularly important when thread jams in the hook race or the needle breaks as, otherwise, the fabric or the hook would be damaged by fragments of the needle or its stump. This is especially essential with delicate fabrics which would be easily damaged by punctures of the needle stub.

The machine is stopped by quickly pressing down hand stop lever 15 twice (Photo 19).

In case the bobbin runs out of thread or the thread breaks while sewing the buttonhole, it is possible to let the machine complete the needle cycle until it is in starting position again. However, the cutting of the knife at the close of the needle cycle must be prevented in any case.

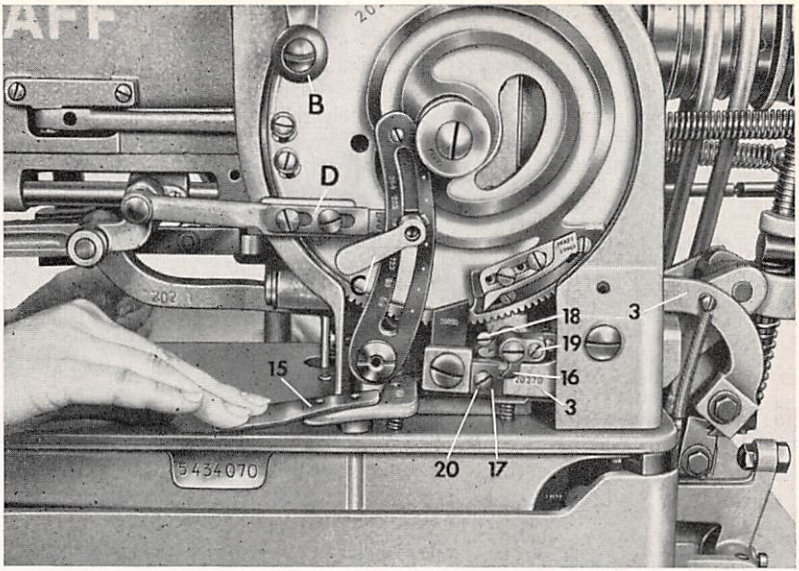


Photo 19

Although it is possible to resume sewing at the point the thread has broken, or a short distance before this point, we recommend to unravel the first seam and to start all over again. In this manner you avoid ugly bunching of stitches and faulty seams which are accepted only with extremely cheap quality articles.

The hand crank must be turned only when the machine has stopped by itself, i.e. not in those cases where it has stopped as a result of a torn belt or a breakdown of the power supply.

If, in case of needle breakage, etc., the machine was stopped by actuating hand stop lever 15 and was cranked to its starting position (crank B), the knife must be prevented from cutting by pressing down extension v_1 of the knife drive connecting rod v.

When restarting the machine, or after the machine has been idle for some time, it is advisable to hold extension v_1 down for a few stitches.

Before starting to work on the machine, make it a rule to check whether the crank has been turned and the machine blocked in the meantime.

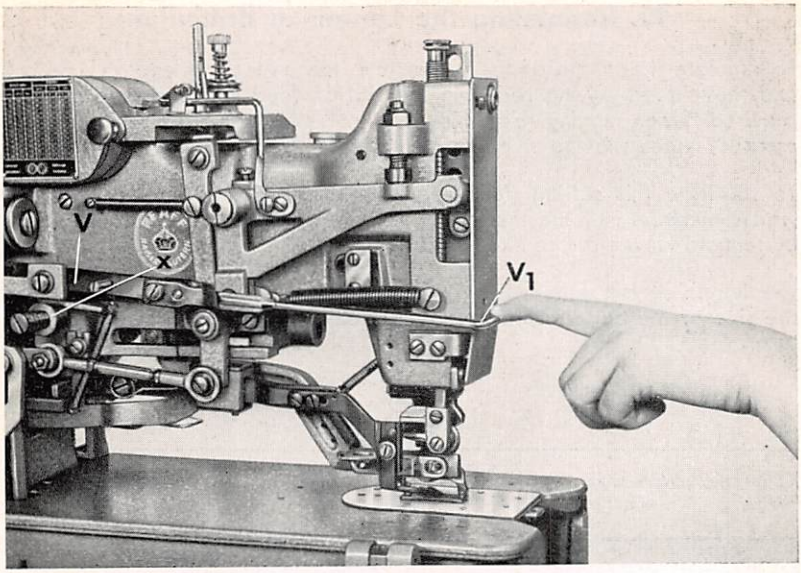


Photo 20

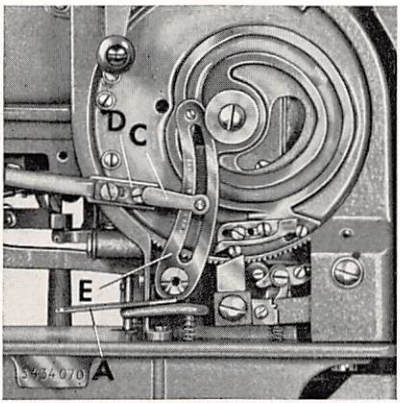


Photo 21

Blocking of the machine may occur when it did not stop automatically and the crank was turned which caused the knife to cut prematurely. As a result of connecting rod v not being locked, it is pressed against knife driving lever H_2 by set collar x (Photo 28).

15. Regulating the Length of Buttonhole

To regulate the length of the buttonhole, loosen locking lever C (Photo 21) and move feed driving rod D in the slot of feed regulator E as may be required. When moving rod D up, lengthwise travel of the work clamp increases; when moving it down, the length of buttonhole decreases.

To facilitate this setting, feed regulator E is provided with a graduation whose numbers indicate the length of the cut in inches and millimeters. The buttonhole knives are marked accordingly.

The length of buttonhole (length of buttonhole knife blade) in relation to the size of the button used is shown in the table below:

Sub-class	Work Clamp No.	Size of Button (Ligne)	Knife No. 20241 (x cutting space) mm	inch	Feed Cam No.
1	No. 20401 x 28 x 4,5	10	6,4	1/4	No. 20226 x 40
		15	9,6	3/8	
		20	12,7	1/2	
		25	16,0	5/8	
		30	19,0	3/4	
	No. 20035 x 37 x 5	35	22,2	7/8	
		40	25,4	1	
2	No. 20035 x 37 x 5	10	6,4	1/4	No. 20226 x 40
		15	9,6	3/8	
		20	12,7	1/2	
		25	16,0	5/8	
	No. 20035 x 37 x 6	30	19,0	3/4	
		35	22,2	7/8	
		40	25,4	1	
3	No. 20035 x 37 x 6	20	12,7	1/2	No. 20226 x 53
		25	16,0	5/8	
		30	19,0	3/4	
		35	22,2	7/8	
	No. 20035 x 45 x 6	40	25,4	1	
		45	28,6	1 1/8	
		50	31,7	1 1/4	
4	No. 20035 x 45 x 6	35	22,2	7/8	No. 20226 x 53
		40	25,4	1	
		45	28,6	1 1/8	
		50	31,7	1 1/4	
	No. 20035 x 55 x 6	55	35,0	1 3/8	
		60	38,1	1 1/2	
		62	39,7	1 9/16	

Sub-class	Work Clamp No.	Size of Button (Ligne)	Knife No. 20241 (x cutting space) mm	inch	Feed Cam No.
5	No. 20035 x 37 x 6 No. 20035 x 45 x 6	20 25 30 35 40 45 50	12,7 16,0 19,0 22,2 25,4 28,6 31,7	1/2 5/8 3/4 7/8 1 1 1/8 1 1/4	No. 20457 x 45
6	No. 20035 x 37 x 6 No. 20035 x 37 x 6	20 25 30 35 40 45 50	12,7 16,0 19,0 22,2 25,4 28,6 31,7	1/2 5/8 3/4 7/8 1 1 1/8 1 1/4	No. 20457 x 45
7	No. 20494 x 37	30 35 40	19 22,2 25,4	3/4 7/8 1	No. 20491 x 45
8	No. 20494 x 37	30 35 40	19 22,2 25,4	3/4 7/8 1	No. 20491 x 45
9	No. 20494 x 45	30 35 40 45 50	19 22,2 25,4 28,6 31,7	3/4 7/8 1 1 1/8 1 1/4	No. 20491 x 45
10	No. 20494 x 45	30 35 40 45 50	19 22,2 25,4 28,6 31,7	3/4 7/8 1 1 1/8 1 1/4	No. 20491 x 45
30/12	No. 20557 x 7 x 37 No. 20557 x 9 x 37 No. 20557 x 7 x 45 No. 20557 x 9 x 45	20 25 30 20 25 30 40	12,7 16,0 19,0 12,7 16,0 19,0 25,4	1/2 5/8 3/4 1/2 5/8 3/4 1	No. 20457 x 45
30/14	No. 20557 x 7 x 37 No. 20557 x 9 x 37 No. 20557 x 7 x 45 No. 20557 x 9 x 45	20 25 30 20 25 30 40	12,7 16,0 19,0 12,7 16,0 19,0 25,4	1/2 5/8 3/4 1/2 5/8 3/4 1	No. 20566

16. Changing the Number of Stitches per Buttonhole

The neat appearance and durability of a buttonhole greatly depend on the stitch density, i.e. the proper relation of the length of buttonhole to the number of stitches.

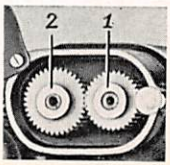
With the PFAFF 3114 feeding of the work is accomplished by means of the gear-driven feed cam.

To obtain the proper rate of speed of the work clamp motion and, consequently, the proper number of stitches in relation to the length of buttonhole chosen, the pinions marked 1 and 2 in photo 23 are either interchanged or exchanged for pinions which produce the number of stitches desired. The pinions required may be selected from the table below which is also reproduced on the back cover of the feed gear housing.

Number of Stitches

Length of Buttonhole Slot		Number of Stitches			Gears					
					Wide		Medium		Narrow	
Inch.	mm	Wide	Medium	Narrow	1	2	1	2	1	2
1/4"	6,4	90	100	120	48	22	47	23	44	26
3/8"	9,6	90	105	150	48	22	46	24	40	30
1/2"	12,7	100	125	180	47	23	43	27	37	33
5/8"	16,0	105	150	210	46	24	40	30	34	36
3/4"	19,0	105	170	240	46	24	38	32	32	38
7/8"	22,2	105	190	270	46	24	36	34	30	40
1"	25,4	110	210	300	44	26	34	36	28	42
1 1/8"	28,6	130	220	330	42	28	32	38	26	44
1 1/4"	31,7	140	250	360	41	29	31	39	25	45
1 5/16"	33,3	160	270	390	39	31	30	40	24	46
1 7/16"	36,5	170	300	410	38	32	28	42	23	47
1 9/16"	39,7	180	310	440	37	33	27	43	22	48

Driven pinion



Driving pinion

The number of teeth given in any two of the adjoining columns must add up to 70. The driving pinion No. 1 should be mounted on the stud close to the operator (Photo 23).

After swinging up the cover, the pinions can be easily pulled off the studs and interchangeable feed gears mounted without tools. The cover which holds the feed gears in position on their studs should be kept closed while sewing so that the pinions cannot fall out.

17. Changing the Width of Bar and Parallel

The stitch width for the bartacking and buttonhole stitches (parallels) is regulated at lever H (Photo 22). The upper thumb screw J serves to regulate the width of bight for the buttonhole parallel, and the lower thumb screw K for the bar.

Turn them inwardly for wider stitch width

Turn them outwardly for narrower stitch width

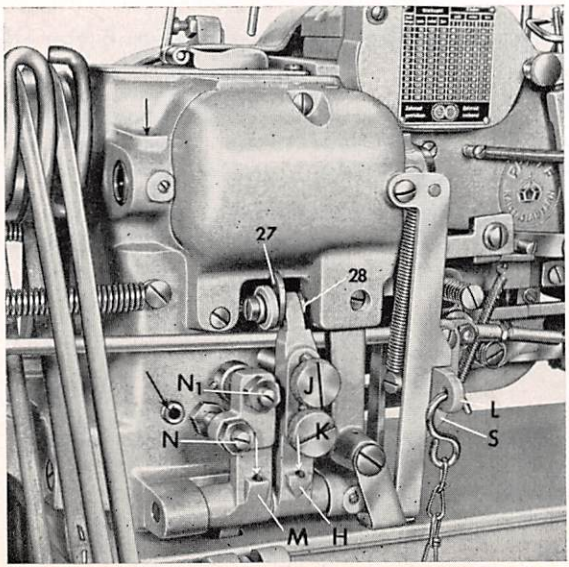


Photo 22

18. Adjusting the Position of the Buttonhole in Relation to the Cutting Space

The position of the buttonhole in relation to the cutting space is adjusted as follows:

The zero line of the needle bar vibration lies on the right, i.e. the needle vibrates from right to left always.

When the amount of needle vibration is reduced to zero by turning screw J out, i.e. when the needle does not vibrate at all, the needle penetrates either parallel of the buttonhole on its right.

The knife must cut the slash exactly in the middle of the buttonhole.

In case the cut is somewhat off center, first check whether the needle or the knife is bent. If not, the position of the parallels must be corrected. This is done by means of screw N and N_1 on lever M (Photo 22). By turning the lower screw N inwardly, the right parallel is moved to the left; by turning it outwardly, to the right. Turning inwardly the upper screw N_1 will move the left parallel to the left; turning it outwardly, to the right.

19. Regulating the Distance Between Parallels

(Photo 22)

As follows from the preceding section, the distance between the parallels of the buttonhole can be regulated by means of screws N and N_1. After the regulation tighten the nuts of both screws x securely.

The distance between the parallels must not be too wide as this would result in an ugly appearance of the buttonhole after cutting open.

20. Exchanging the Buttonhole Knife

When inserting a new buttonhole knife, loosen screw b (Photo 17) and push the knife up in the knife holder as far as it will go.

When cutting the fabric, the knife should descend far enough so that its lowest point (front edge) is .04" below the needle plate. If the knife is worn by grinding, it must be set lower accordingly.

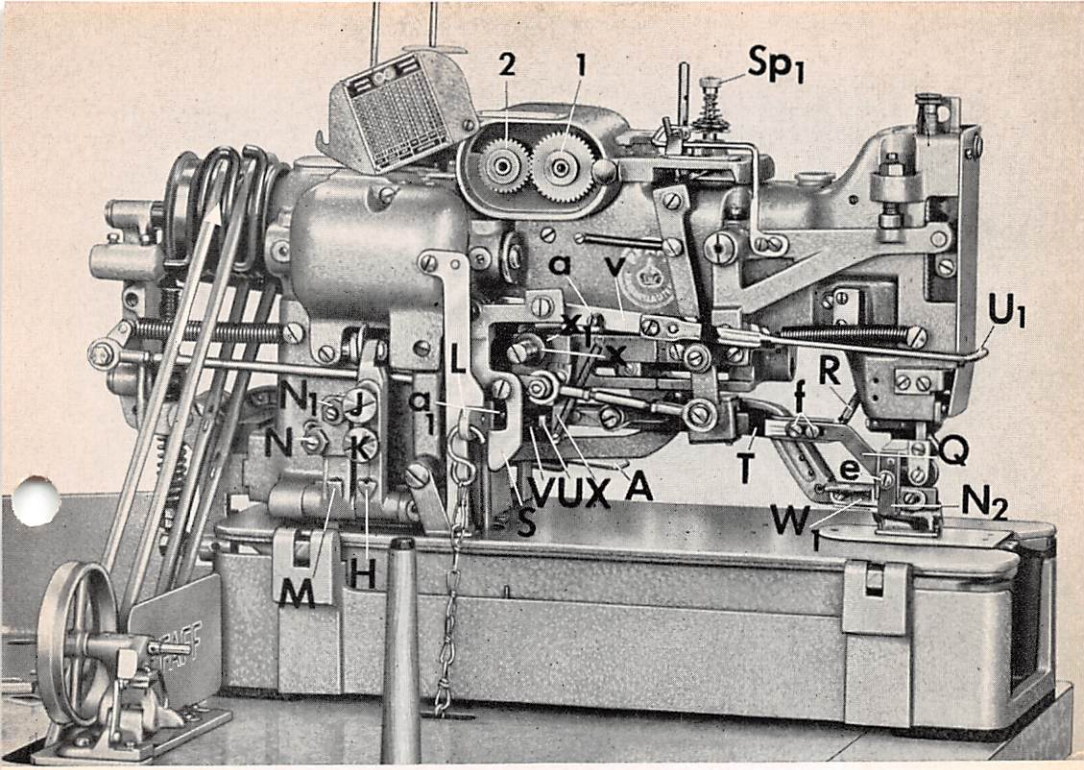


Photo 23

21. Proper Position of Knife Holder

The knife holder is set in such a manner that there will be a clearance of $^{9}/_{64}$" between the knife and the needle irregardless of the length of buttonhole, and that the buttonhole will be cut open all the way to the bars.

If, in spite of the above, the knife should injure a bar, the knife holder must be adjusted after loosening set screws c and d (Photo 17).

22. The Needle Thread Trimmer

When depressing the left treadle after finishing the buttonhole, the needle thread is automatically trapped by the trapper spring, which is mounted on the needle thread trimmer, and is cut on the top surface of the buttonhole before the work clamp is raised.

When re-starting the machine for the next buttonhole, the needle thread trimmer first is moved back and then to the left so that the needle can stitch across the loose end of thread.

After tacking the end, both the trimmer and the trapper spring open and release the thread so that it may be completely covered by the first parallel of the next buttonhole.

The needle thread trimmer is secured on bracket Q (Photo 23) by screw e. After loosening this screw, the trimmer can be removed for grinding.

When replacing the trimmer, it should be positioned in such a manner that there is a clearance of approx. $^1/_{64}$"—$^1/_{32}$" between its bottom surface and the top of the work clamp.

In case the trimmer should fail to trap the thread securely, loosen both screws f and adjust the longitudinal position of bracket Q. After the adjustment, tighten the screws securely.

The sideways motion of the needle thread trimmer toward the thread is effected by tension spring R. When depressing the left treadle, the spring-loaded sprung latch U, which is carried on swing-sideways trimmer bracket arm T, is released by the retainer V which is mounted on lifting lever L so that tension spring R can become active and make bracket Q

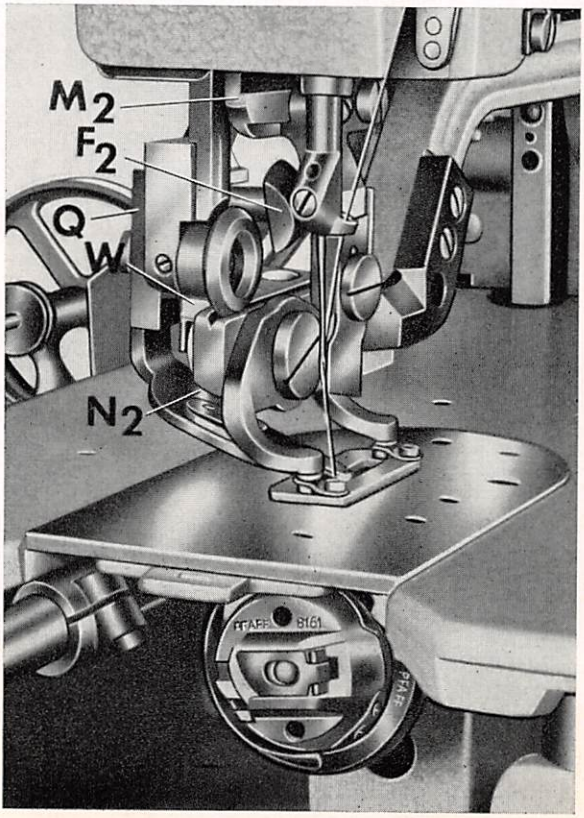


Photo 24

and the trimmer snap forward toward the needle thread. Thereby the vertical cam N_2 (Photo 24) on the movable blade of the needle thread trimmer strikes the back side W of cam guide W_1 (Photo 23). As a result, the trimmer closes and the thread is trapped and cut.

When re-starting the machine, the trimmer bracket Q is pulled back and pushed sufficiently far over to the left by the slanted side of the cam guide W_1 so that the sprung latch U will again be caught by retainer V. Sprung latch U which yields downwardly should be held in position about $^1/_8$" below the top surface of the retainer by angle X (Photo 23).

Retainer V must be set in such a way that there will be a clearance of .04" between sprung latch U and retainer V when the trimmer is retracted. If adjustment is required, loosen set screw a_1 and move the retainer V as may be required.

To avoid damage to the needle thread trimmer in case the knife cuts too early, guide screw F_2 (Photo 24) of bracket Q is provided with a taper head and is disposed in such a way that the slanted edge of the descending knife bar M_2 will force the trimmer bracket Q back so as to keep the knife from striking the trimmer.

23. The Bobbin Thread Trimmer

As may be seen from photo 25, the bobbin thread trimmer consists of the thread pull-off i and blades k and l. The thread pull-off i and blade k are both carried on bracket m.

Photo 25a depicts the bobbin thread trimmer in inoperative position. When pressing down the left treadle upon completion of the buttonhole, first the needle thread trimmer is actuated, then the bobbin thread cut, and finally the work clamp lifted.

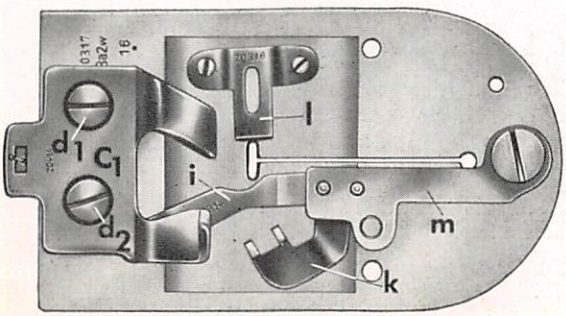


Photo 25a

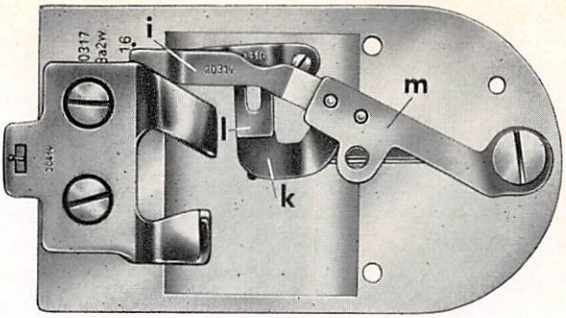


Photo 25b

This arrangement causes the short end of needle thread to be pulled down which is left after cutting.

When actuating the bobbin thread trimmer, bobbin thread pull-off i pulls the thread over blade 1 and pulls off the exact amount of thread which is required for the first stitch of the succeeding buttonhole. Then the trimmer cuts the thread as the two blades meet.

Photo 25b shows the final position after cutting the thread.

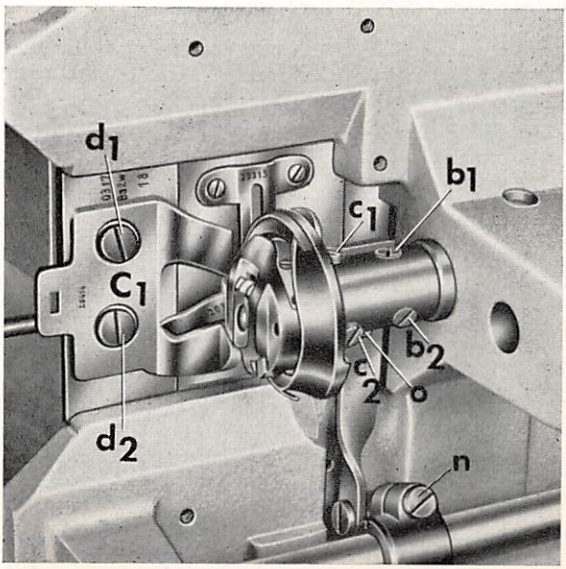


Photo 26

For properly setting the bobbin thread trimmer it should be noted that both blades should overlap about .04" in their final position. To adjust, loosen screw n (Photo 26) and turn the crank as may be appropriate.

When exchanging blade 1, make sure that the cutting edge of the new blade is approx. $^{3}/_{64}$"—$^{1}/_{16}$" away from the needle hole in order to prevent injury to the needle thread.

The compact disposition of the trimmer mechanism on the underside of the needle plate facilitates removal in case the knives need grinding. Simply loosen screw o (Photo 26) and the needle plate set screw. When replacing the mechanism, make sure that the bobbin case position lug properly enters the slot of the bobbin case position bracket.

24. Pulling Off the Needle Thread and Releasing the Top Tension

To avoid unthreading of the needle, the amount of thread needed for the first stitch of the next buttonhole must be pulled off by the top tension Sp_1 prior to cutting the needle thread. This action is performed by pull-off pin p which is mounted on lug q_1 and carried on tension release lever q (Photo 27).

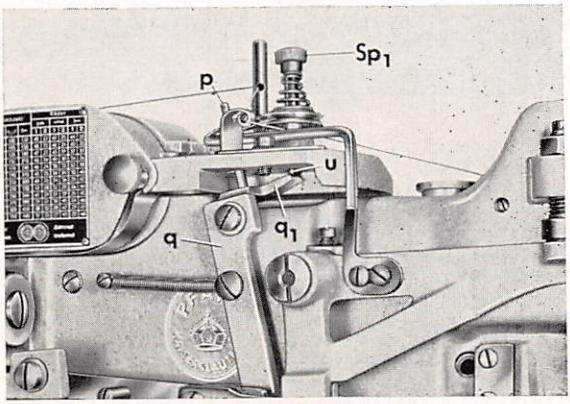


Photo 27

Upon starting the machine by pressing down the right treadle, the hinged stop motion lever 1 (Photo 28) actuates connecting rod s and tension release lever q whose upper end moves forward to release the pulled-off thread. Simultaneously, the top tension Sp_1 is engaged.

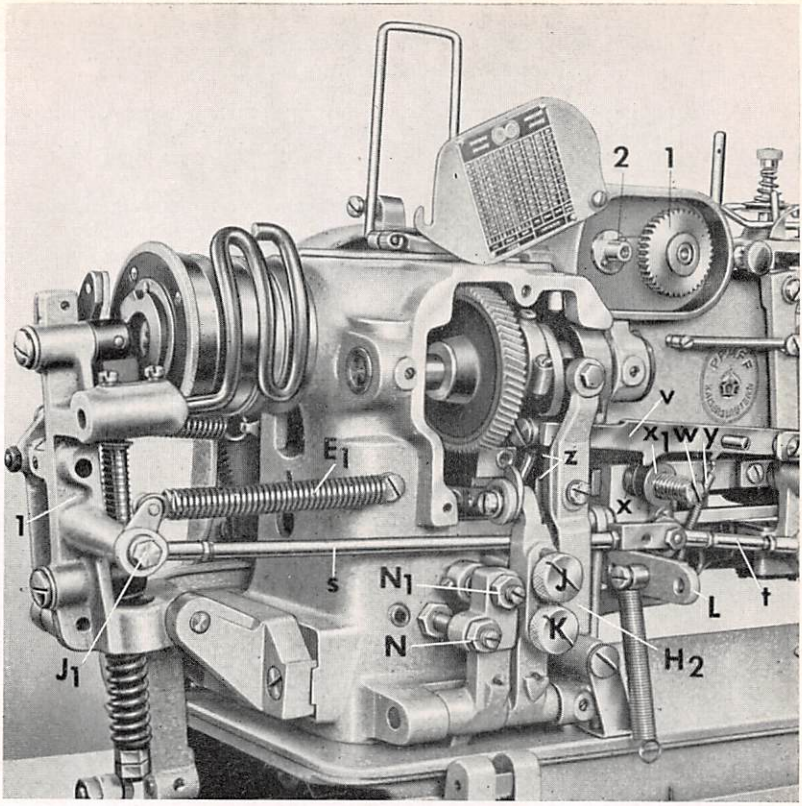


Photo 28

Shortly before the machine stops, tension release lever q is automatically returned to its initial position so that pin p can pull off the amount of thread required from top tension q_1. At the same time the lug on top of tension release lever q moves under the tension release pin and releases the top tension.

25. The Knife Action

(Photo 28)

While the machine is inoperative, knife drive connecting rod v is held in raised position by locking lever S (Photo 23) and angle X. Thereby the knife drive lever assembly cannot be blocked when the feed cam is turned by means of crank B, and tripping rod w with set collar x can move freely. There should be a clearance of .02"—.04" between knife drive connecting rod v and slide collar x_1.

When starting the machine, locking lever S releases knife drive connecting rod v which falls and rests on slide collar x_1. Shortly before completing the buttonhole, tripping rod w is tripped by the feed cam and with set collar x pushes slide collar x_1 away from the machine until connecting rod v can be pulled onto the somewhat smaller set collar x by spring y. When tripping rod w and set collar x return, driving block z can engage knife driving lever H_2 and actuate the knife.

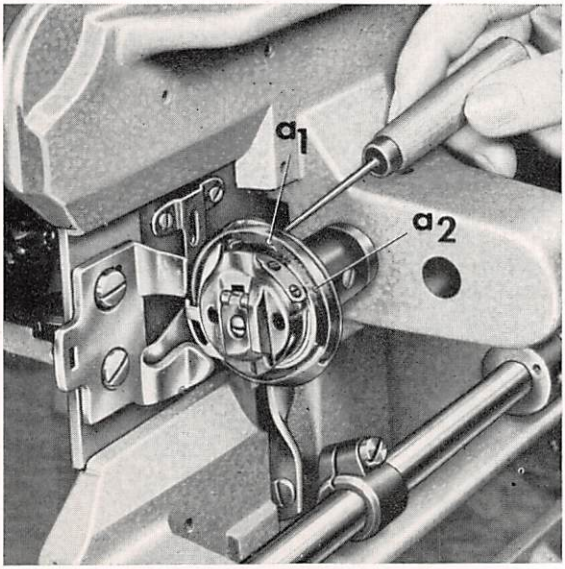


Photo 29

26. Dismantling the Hook

The PFAFF 3114 hook has a divided bobbin case.

To dismantle the hook for cleaning or removing of thread, proceed as follows: Tilt the machine over to the left and rest it on the wooden machine rest pin. Remove the bobbin case cap and turn the driving pulley until the two hook gib screws a_1 and a_2 on the back of the hook can be reached with the screw driver (Photo 29). After removing both screws, the hook gib can be swung out. Seize the bobbin case base by its center stud A_1 (Photo 30) and turn the driving pulley until point S of the bobbin case base is in line with point G of the hook.

in this position (Photo 30), the bobbin case base can be easily tilted and removed from the hook.

When replacing the bobbin case base, make sure that the bobbin case position lug B_1 properly enters the slot of the bobbin case position bracket C_1. After thorough cleaning, reassemble the hook in reverse order.

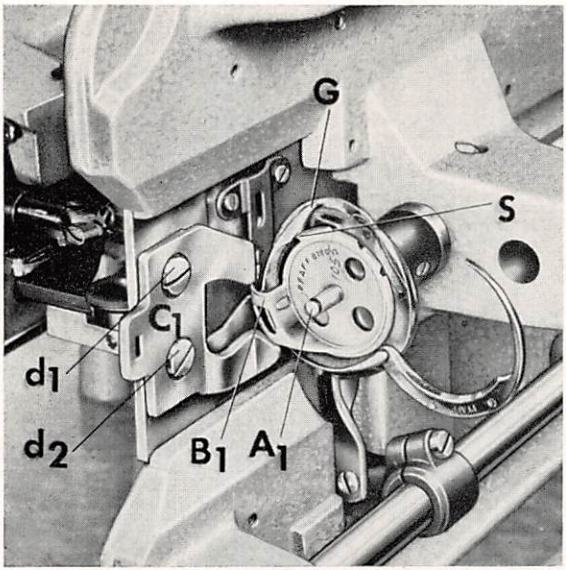


Photo 30

27. Timing the Hook

With the PFAFF 3114 the amount of needle bar rise required to form the loop is $^3/_{32}$" (2.4 mm), i.e. when the needle has passed the lowest point of its stroke and risen $^3/_{32}$", the point of the hook should be just opposite the center line of the needle and about $^5/_{64}$" (2.0 mm) above the top of the needle eye. This distance is checked when the needle ascends on its right hand stroke while sewing the left parallel of the buttonhole.

The needle bar rise can be easily adjusted with the aid of the gauge which may be obtained from us.

Begin by lowering the needle bar to the lowest point of its stroke, push the $^3/_{32}$" gauge **a** (Photo 31) on the needle bar immediately below the needle bar frame, push the clamp on the needle bar immediately below the gauge and screw it on.

Remove the gauge and turn the driving pulley slowly until the clamp strikes the needle bar frame.

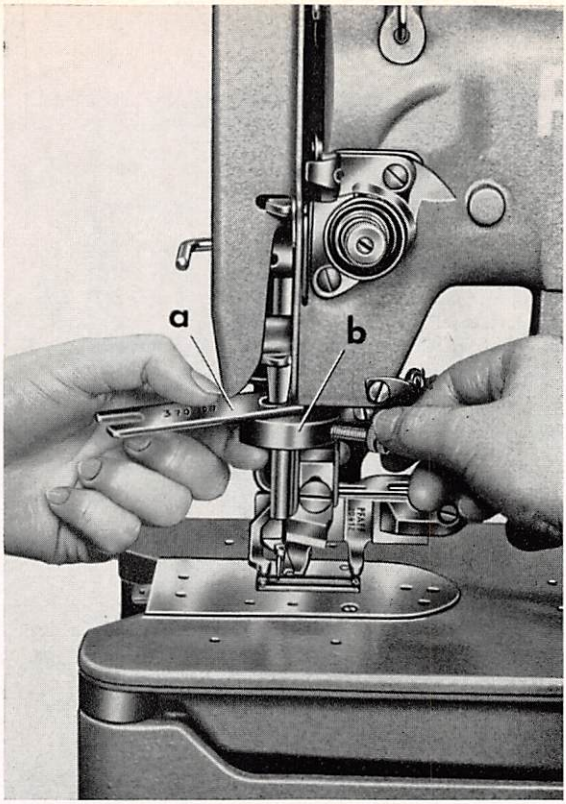


Photo 31

To turn the hook on the hook shaft until it is in the position described above (point of hook about $^{5}/_{64}$" above top of needle eye), loosen both set screws b_1 and b_2 (Photo 26).

The needle bar is set at the correct height when the bottom of the needle eye is flush with the top edge of the needle guard while the needle bar is at the lowest point of its stroke.

The sideways adjustment should be made with particular care so as to ensure that there is a clearance of about .004" (0.1 mm) between the point of the hook and the needle.

In order to exchange the hook, loosen both set screws c_1 and c_2 on the hook shaft collar (Photo 26), remove bobbin case position bracker C_1 and pull the hook forward out of its mount on the shaft. To save lengthwise readjustment of the position bracket, it is advisable to remove same together with its base by loosening screws d_1 and d_2.

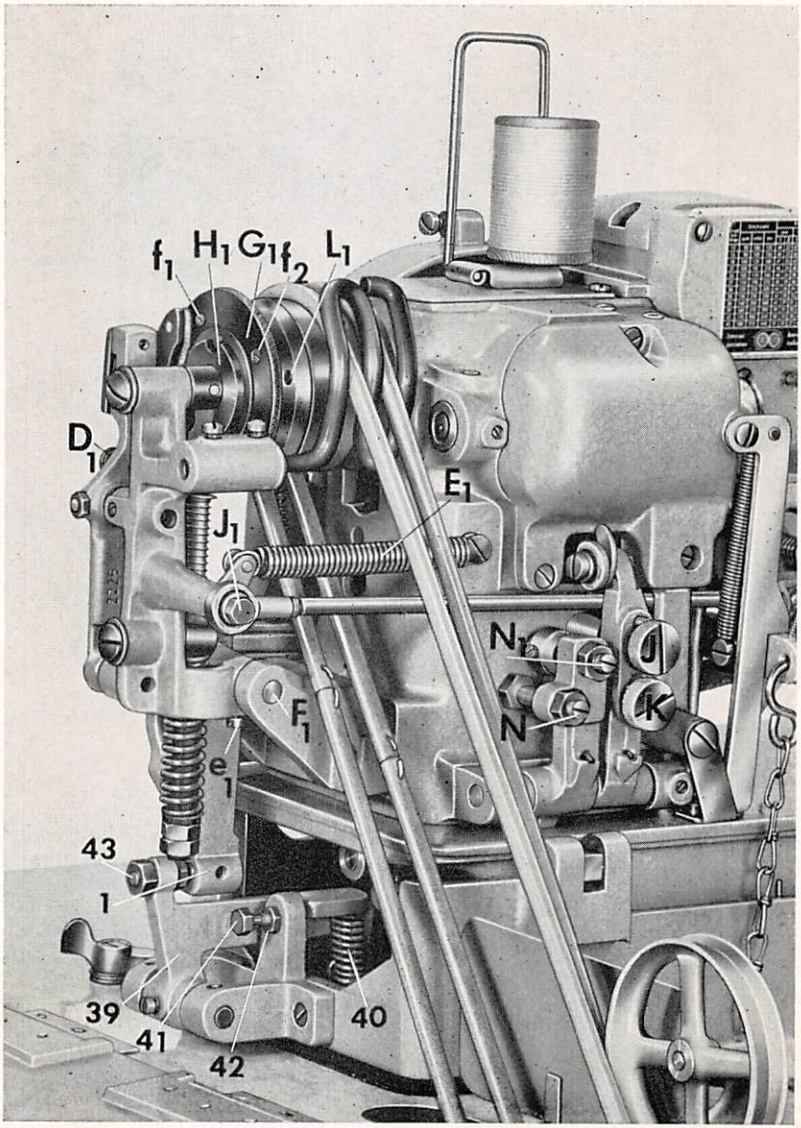


Photo 32

28. Regulating the Pressure on the Material

The amount of pressure to be exerted by the work clamp should be set in accordance with the material to be sewn. By tightening the presser bar thumb screw on top of the machine arm, the pressure can be regulated in such a manner as to ensure perfect feeding of the material and to prevent fabric pucker as well as poor buttonhole seams.

29. Changing the Buffer Spring

To absorb the momentum of the machine and reduce the impact on the stop motion, a powerful buffer spring is provided in the rear driving pulley of the machine.

The machine is blocked when the take-up has almost reached its highest position and the needle bar has descended about .118" (3.0 mm) from the highest point of its stroke.

The buffer spring is exposed to excessive stress and may slacken or break after some time as a result of fair wear and tear. A broken or worn spring causes irregular stopping of the machine, leaving the needle bar and the take-up in varying positions. Thus it may occur that the needle bar is so low when the machine stops that the needle is damaged or broken by the needle thread trimmer.

In order to replace the broken buffer spring, loosen both tension springs D_1 and E_1 (Photo 32), remove screws J_1 and e_1, pull out hinge pin F_1, and take off the hinged stop motion and brake lever assembly.

After removing the four set screws f_1, f_2, f_3 and f_4 (Photo 32), take off cap ring G_1 and stop cam H_1 and remove the broken buffer spring.

The new spring is inserted between the two spring rests K_1 (Photo 33) and compressed sufficiently to permit inserting the Novotex segment J_2.

To facilitate exchanging the buffer spring, it is recommended to use a special wrench which we will furnish on order, together with the new buffer spring. As shown in photo 33, insert a punch into hole L_1 located on the rim of the rear driving pulley and turn the pulley until punch M_1 rests against the bearing bracket O_1. Then slide the loose spring rest on the stud of the wrench and push the wrench on the top shaft hub. Take the wrench in your left hand and press it straight down, thus compressing the buffer spring, until the Novotex segment J_2 can be inserted. Make sure that the straight side of the spring rest faces the Novotex segment. Replace and screw on stop cam and cap ring and mount the hinged stop motion and brake lever assembly.

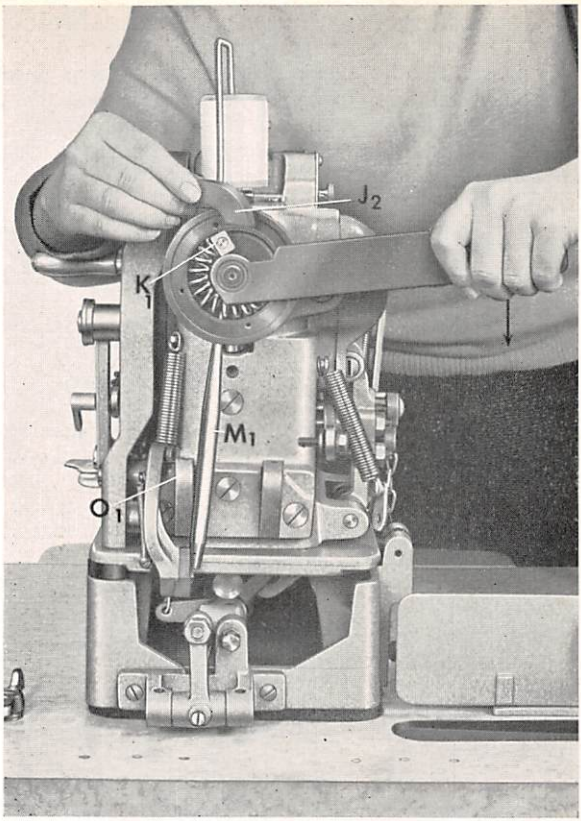


Photo 33

30. Adjusting the Stop Motion Lever

Catch 2 (Photo 35) is mounted on the lower end of stop motion lever 1 and can be adjusted vertically. Latch 4 is carried on the rear end of the tripping lever 3 and can be adjusted lengthwise of the lever.

Catch 2 and latch 4 must be adjusted in such a way that latch 4 on tripping lever 3 will fall into the top notch of catch 2 when the right treadle is depressed to start the machine at low speed.

Loosen set screw 5 (Photo 35) in the elongated hole of tripping lever 3 and move latch 4 in such a manner that there will be a clearance of $^{5}/_{64}$" (2.0 mm) between the front surface of the stop link 7 (Photo 34) and the highest point of stop cam 6 when the machine runs at low speed. To measure this clearance, use the same gauge as is used for setting the needle bar at correct height.

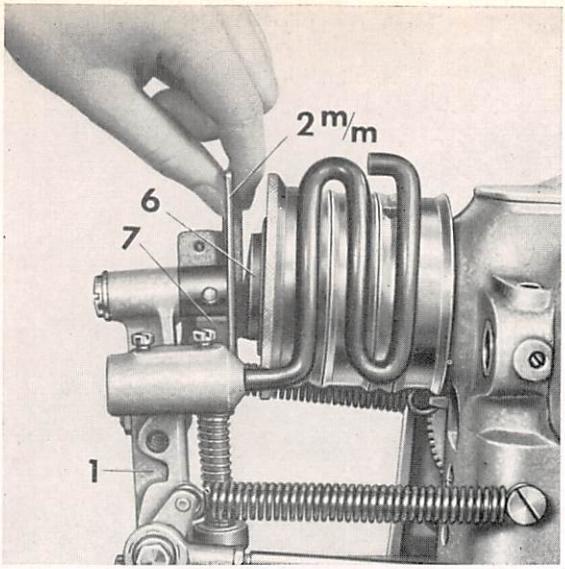


Photo 34

In case the stop link is set too close to the stop cam, the former cannot yield sufficiently when falling into the stop cam and may break.

31. Adjusting the Brake Lever

Brake lever 8 (Photo 35) must be adjusted in such a manner that the surfaces of brake shoe 9 and the driving pulley are about .275" (7.0 mm) apart when the machine runs at low speed. To set this distance, loosen nut 10 and regulate set screw 11 in the middle of brake lever 8.

Brake lever 8 is in the proper position if it can be pulled away from the driving pulley another $^{5}/_{64}$" (2.0 mm) when the machine is inoperative.

32. Adjusting the Tripping Lever

Tripping lever 3 (Photo 35) should be adjusted only after stop motion lever 1 has been properly set as instructed in Section 30.

Tripping dog 12 is carried on the front end of tripping lever 3. After loosening screw 13, this tripping dog should be adjusted in height so that there will be a clearance of .04" (1.0 mm) between its tip and that of tripping segment 14 when the machine has stopped In this position, latch 4 of tripping lever 3 should rest on catch 2

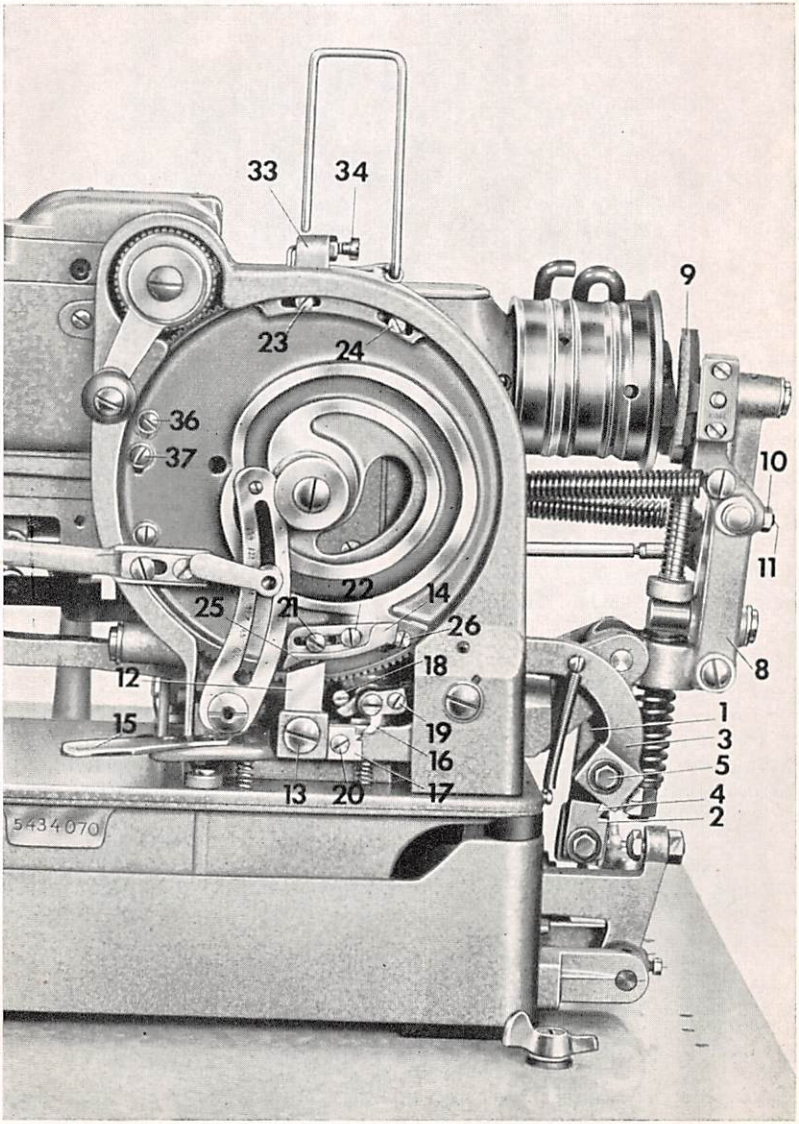


Photo 35

When running the machine at low speed, latch 4 must enter the top notch of catch 2; at high speed, it must fall into the lower notch.

To adjust the distance between the tripping dog and the tripping segment, switch off the machine and turn the crank until the feed cam is in the position shown in photo 40.

33. Adjusting the Hand Stop Lever

Hand stop lever 15 (Photo 35) carries a spring-loaded latch 16 which must engage the vertically adjustable catch 17 mounted on the tripping lever 3. Stud 18 is disposed on the left of latch 16 which serves to limit the sideways motion of the latch.

For adjustment, loosen set screw 19 in the elongated slot and move latch 16 sideways as may be required to ensure that it will engage catch 17 precisely on time.

After loosening screw 20, catch 17 can be adjusted in height so that latch 16 will engage in the lower notch of catch 17 and the speed of the machine will be reduced to half upon pressing down hand stop lever 15 once (while machine is switched on). When in this position, latch 4 of tripping lever 3 is engaged in the top notch of catch 2 (Photo 35). Upon depressing hand

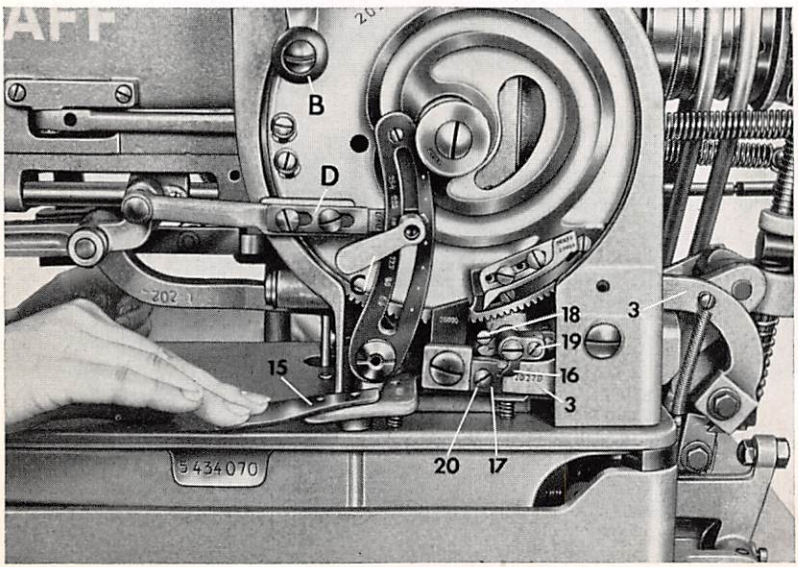


Photo 36

stop lever 15 the second time, latch 16 falls into the top notch of catch 17, tripping lever 3 is tripped and the stop motion and brake lever assembly 1/8 stops the machine.

34. Adjusting the Stop Tripping Segment

The function of the stop tripping segment may be seen from photos 37, 38, 39 and 40.

In photo 37, the front edge of stop tripping segment 14 on the feed cam, which moves counter-clockwise, has reached tripping dog 12.

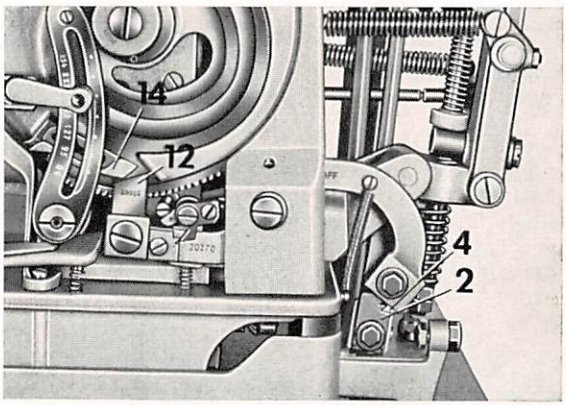


Photo 37

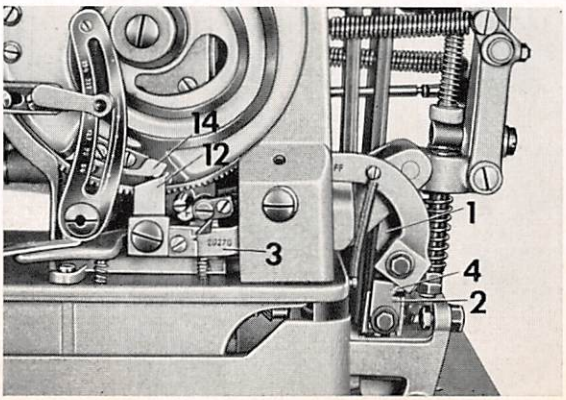


Photo 38

In photo 38, tripping dog on tripping lever 3 was depressed far enough to make latch 4 engage in the top notch of catch 2 and cause stop motion lever 1 to reduce the speed to half.

In photo 39, stop tripping segment 14 has pressed tripping dog 12 farther down so that latch 4 disengages the top notch.

In photo 40, latch 4 has released stop motion lever 1 which, in turn, has stopped the machine.

After slackening both set screws 21 and 22 and moving the stop tripping segment to and fro, it can be set as required to stop the machine at the predetermined moment.

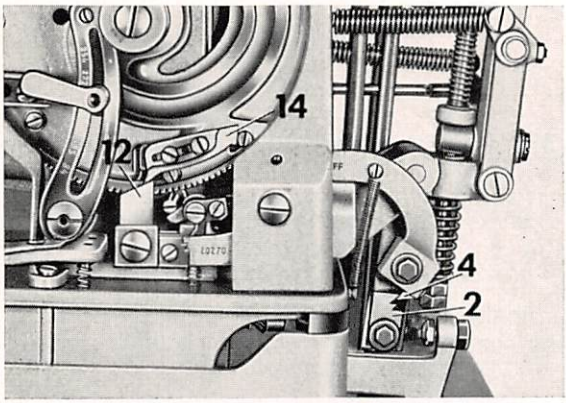


Photo 39

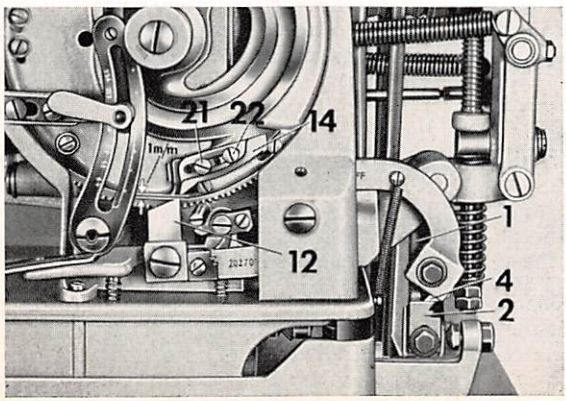


Photo 40

The final stitch of the second bartack must be made in the middle of the bar always (see Section 36). If the last stitch lies too far to the right, the machine has stopped too early and tripping segment 14 must be moved to the left accordingly. Conversely, if the last stitch lies too far to the left, the tripping segment must be moved to the right in order to make the machine stop earlier.

Note that stop tripping segment 14 must be adjusted only within certain narrow limits as, otherwise, retiming of all other motions controlled by the feed cam may become necessary. For this reason, we recommend that you check first whether raising or lowering the position of tripping dog 12 will suffice to make the machine stop sooner or later.

This adjustment calls for great care since setting tripping dog 12 too high would cause the rear end of tripping lever 3 to be swung up too far and the machine to be stopped abruptly rather than being shifted to low speed first.

35. Adjusting the Bar Tripping Segment

The tripping segments which are mounted on the back of the feed cam and control the width of the bartacking stitches have elongated slots and can be adjusted as required. The tripping segment for the first bar is secured by screws 23 and 24, that for the end bar by screws 25 and 26 (Photo 35).

After slackening these screws, both bar tripping segments can be adjusted so that the sewing of the bars will commence at the proper time and in conformity with the feeding motion.

The tripping segment for the first bar should be adjusted in such a manner that the first bar will not be sewn until after the first parallel is finished in order to avoid displacing the first bartacking stitches to the left.

The tripping segment for the second bar should trip the machine early enough to ensure that the first stitches of the first parallel will be completely covered and that a neat appearance of the buttonhole will be obtained.

36. Adjusting the Needle Bar Zero Lug

Lug 27 (Photo 22) on the top of lever H permits to adjust the sideways motion of the needle bar in relation to the center line of the buttonhole for making the tying stitches in the end bartack.

In order to enhance the appearance of the buttonhole, the last tying stitches must be made in the center of the end bartack. When making these stitches there must be absolutely no sideways motion of the needle bar. The sideways motion of the guide roller for the needle bar vibration is thus checked by lug 27 when it has reached a position conforming to the zero (center) line of the buttonhole.

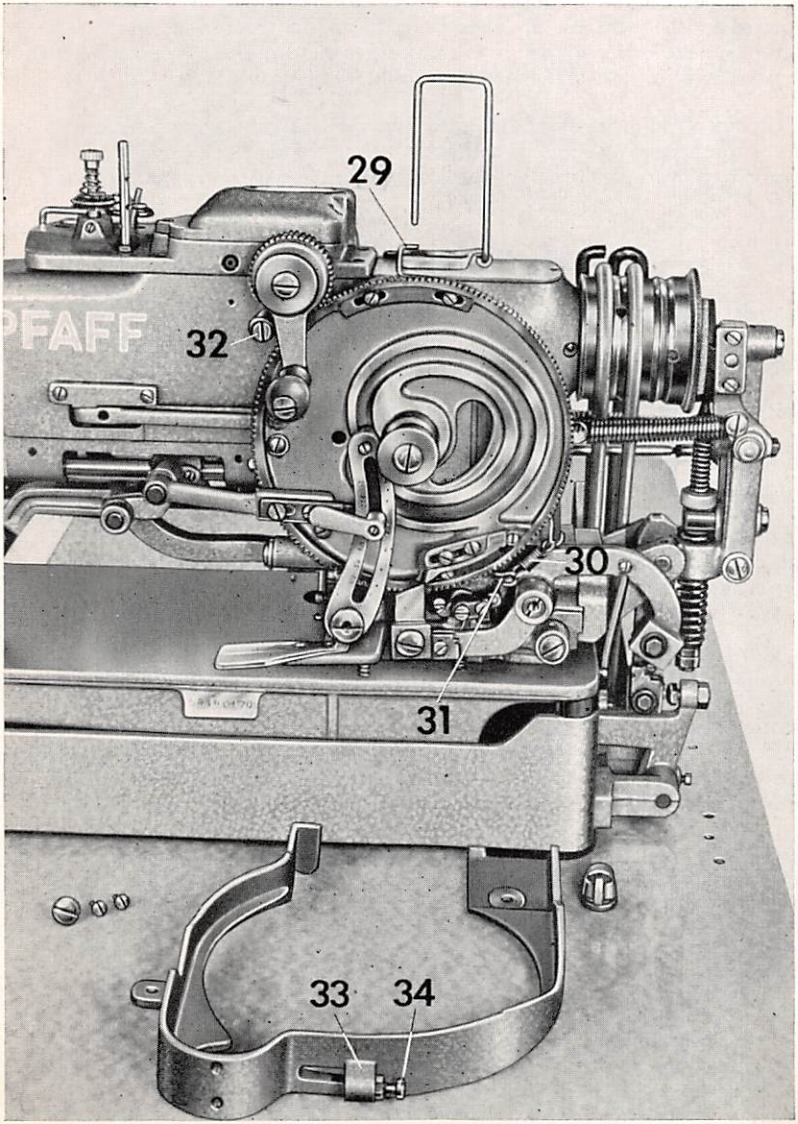


Photo 41

To adjust the position of lug 27, proceed as follows:

With the machine switched off, turn the driving pulley back and forth by hand, let the needle stitch into a piece of stiff paper and check the position of the needle marks. Loosen nut 28 and move lug 27 back so that it does not affect the position of lever H. With nut 28 slackened, tap on the lug until the needle bar vibration is reduced to zero and the needle penetrates the material in one and the same point. Tighten nut 28 securely.

The careful adjustment of the zero lug, the bartack tripping segments and the stop tripping segment and their proper timing relationships are very important prerequisites for obtaining durable and neat buttonholes.

37. The Feed Cam Brake

In order to retain the feed cam against any reverse movement which may be caused by the buffer spring when stopping the machine abruptly, an adjustable brake is provided on the feed cam.

This brake is made of two wire hooks 29 and 31 (Photo 41) which are connected by tension spring 30. This spring is contained in a groove in the toothed rim of the feed cam and is fastened to stud 32 with one end and retainer 33 with the other.

To regulate the tension of the spring, turn set screw 34 of retainer 33 on the cam guard inwardly so that the cam will still turn easily without applying excessive force.

38. Adjusting the Tension Release Tripping Point

Tension Sp_2 must be automatically released when the machine makes the first tying stitch after completing the end bartack. This will leave only the top tension Sp_1 engaged which is set for a normal thread tension and will cause the threads to lock within the material.

To time the release of the tension, loosen screws 36 and 37 and move tripping point 35 as may be appropriate. The tripping point 35 is adjusted correctly if its tip is opposite the center of the straight vertical side of tension release lever 38 when the machine stops.

39. Adjusting the Starting Lever

After starting the machine by depressing the right treadle, starting lever 39 is returned to its initial position by pressure spring 40. Its return motion is checked by stop screw 41 which, after loosening nut 42, should be set in such a manner that there will be a clearance of .04" (1.0 mm) between the adjustable stud 43 of starting lever 39 and stop motion lever 1 when the machine has stopped, provided the latter has been adjusted correctly.

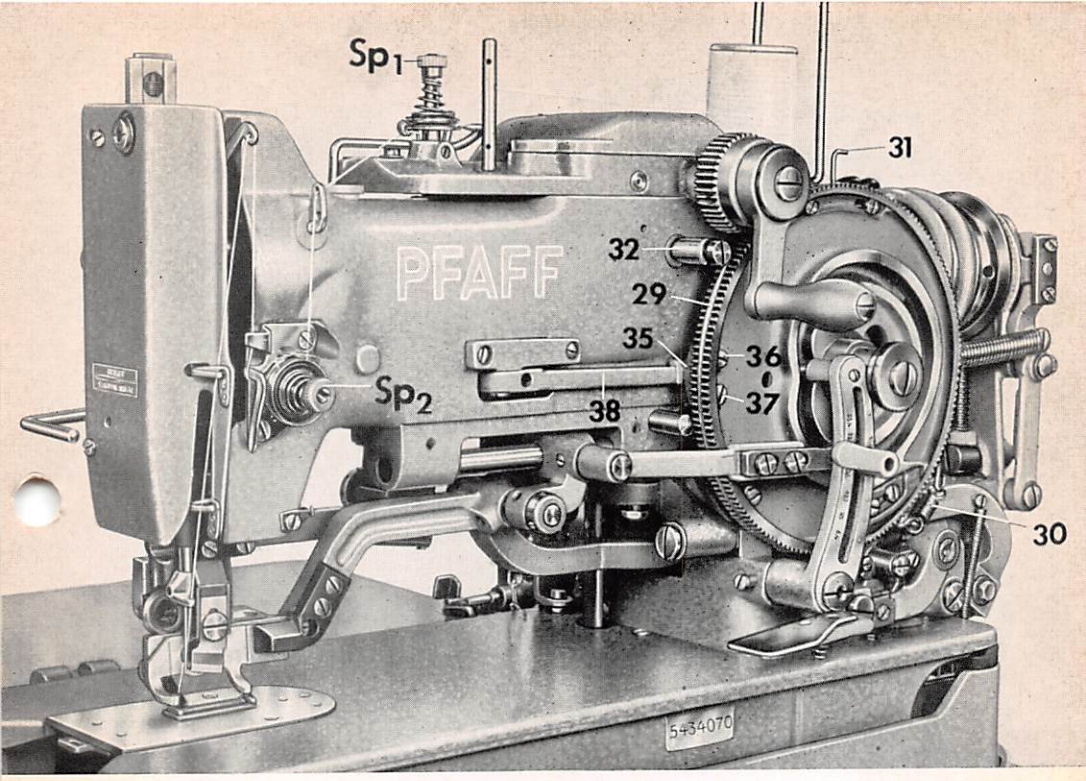


Photo 42

40. Trouble Shooting

Following is a list of some of the more common machine troubles and the probable causes of these troubles:

Thread Breaking

1. Needle rusty
2. Needle poorly polished
3. Needle too fine for thread
4. Needle point damaged
5. Needle plate damaged by needle
6. Thread snarled up
7. Poor quality thread used
8. Thread rotten as a result of excessive storage
9. Thread too light for buttonhole
10. Needle thread tension too tight
11. Bobbin thread tension not weak enough
12. Fixed blade of bobbin thread trimmer set too close to needle hole
13. Machine threaded incorrectly
14. Point of hook damaged
15. Needle guard damaged by needle

Skipping of Stitches

1. Needle bent
2. Needle set too high
3. Needle set to low
4. Needle inserted incorrectly
5. Needle too thick for thread
6. Needle too fine for thread
7. Amount of needle bar rise insufficient for proper loop formation
8. Point of hook set too far away from needle
9. Point of hook broken
10. Hook needle guard bent

Faulty Stitch Formation

1. Needle thread tension too weak
2. Bobbin thread tension too tight
3. Thread accumulated between tension discs
4. Needle thread gets caught at rim of spool (Use spool discs)
5. Thread spun unevenly
6. Thread knotty

Needle Breakage

1. Needle bent
2. Needle too fine for material
3. Needle worn
4. Needle blunt
5. Hook set too close to the needle
6. Needle thread not threaded through needle bar thread guide so that needle is pulled over
7. Improper needle system used

Insufficient Top Speed

(Full speed reached too late or not at all)

1. Machine driving belts too long
2. Line shaft belts too long
3. Machine poorly oiled
4. Mechanism gummed by wrong oil (Never use glycerine or castor oil)
5. Feed cam brake set too tight
6. Thread snarled up between loose and driving pulleys

Untidy Buttonhole Cut

1. Buttonhole knife blunt
2. Buttonhole knife set too high
3. Blade ground at wrong angle
4. Distance between buttonhole parallels set too wide
5. Buttonhole knife jagged
6. Buttonhole knife ground excessively
7. Distance between buttonhole parallels set too narrow
8. Insufficient amount of pressure on material
9. Knife slot in needle plate damaged

Needle Thread Trimmer Fails

1. Pieces of thread jammed between blades or trapper
2. Trimmer blades blunt
3. Trapper spring damaged by needle
4. Trapper spring slackens due to fair wear and tear

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