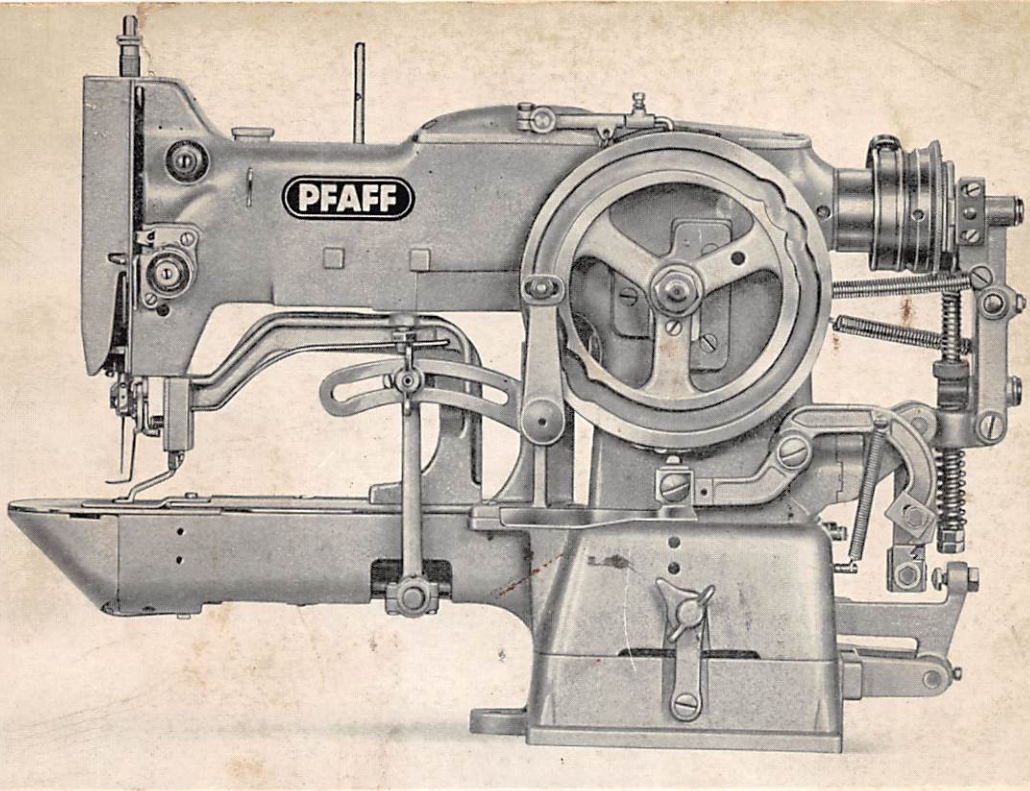


PFAFF® 3334

Automatic Lockstitch Bartacker

SERVICE MANUAL

Foreword

Pfaff sewing machines are quality products. Constant checks are being made throughout the production process to ensure that a high quality standard is maintained. But even the best sewing machine has to be operated and serviced skillfully if satisfactory results are to be obtained.

This book has been compiled as a source of information for all Pfaff mechanics servicing Pfaff 3334 automatic bartackers and will serve as a valuable guide in performing minor repairs and adjustments.

We have made every effort to render the presentation of these instructions as simple as possible and have included numerous illustrations in order to afford a better understanding.

G. M. PFAFF AG
Kaiserslautern Branch

SERVICE MANUAL

PFAFF 3334

Automatic Lockstitch Bartacker

Contents

A. Description and Operation

1. General Information

Stitch Type:	Lock stitch
Loop Taker System:	Oscillating (central bobbin) shuttle
Bobbin Capacity:	66 yds No. 40/3 cotton
Needle System:	Model A and B machines use System 34 R needles for ordinary sewing operations, and System 34 Lr or 34 D needles for leather work (needle size up to 110). Model C machines use System 332 R needles for ordinary sewing operations, and System 332 Lr or 332 D needles for leather work. (Additional needle systems that may be used are listed on page 60).
Foot Lift:	$^{19}/_{32}$" to $^{5}/_{8}$", or 15 to 16 mm (on earlier machines the foot lift ranges from $^{11}/_{32}$" to $^{13}/_{32}$", or 9 to 10 mm).
Maximum Length of Tack:	$1^{7}/_{16}$", or 36 mm
Maximum Width of Tack:	$^{7}/_{8}$", or 22 mm
Classes of Work:	Models A and B are used for light- to medium-weight materials. Model C is used for heavyweight materials (machine features higher needle bar rise and larger take-up motion).

a. Purpose of Employment

The Pfaff 3334 is specially designed for automatic bartacking and short seaming operations of every description. While both the shape of the tack and the number of stitches per tack are predetermined for each subclass, the size of most tacks can be varied within certain limits.

The machine's field of application embraces all branches of the sewing industry. Thus, apart from bartacking, it may be employed for stitching staying seams, attaching belts and straps, and stitching ornamental tacks, to name just a few additional applications. (See ill. on page 7).

The Pfaff 3334 is of the cylinder-bed construction. Its slender cylinder arm greatly facilitates the handling of the work, particularly when tubular articles are being stitched.

If desired, the Pfaff 3334 automatic bartacker can be fitted with electromagnetic control, this version being known as Pfaff 3334 X 35 in Models A and B, or Pfaff 3334 X 45 in Model C. On this machine, the functions of raising the work clamp and starting the machine are performed by solenoids, and the two treadles of the standard model are replaced by a foot switch (Fig. 4).

Feed Motion

The work is held between, and guided by, the work clamp and the feed plate. To produce the desired tack, the material is moved up and across the machine bed while the needle moves up and down. The feed motion is derived from the feed cam.

The Pfaff 3334 attains a speed of up to 1,200 s.p.m., depending on the thickness of the material as well as the size and shape of the tack. To convert the machine from one subclass to another, it will be sufficient normally to exchange the feed plate and the clamp feet rather than the complete work clamp.

If, however, the shape and size of the tack or the number of stitches in the design are to be changed, the feed cam, knife cam, worm and worm wheel have to be exchanged.

b. Application Possibilities

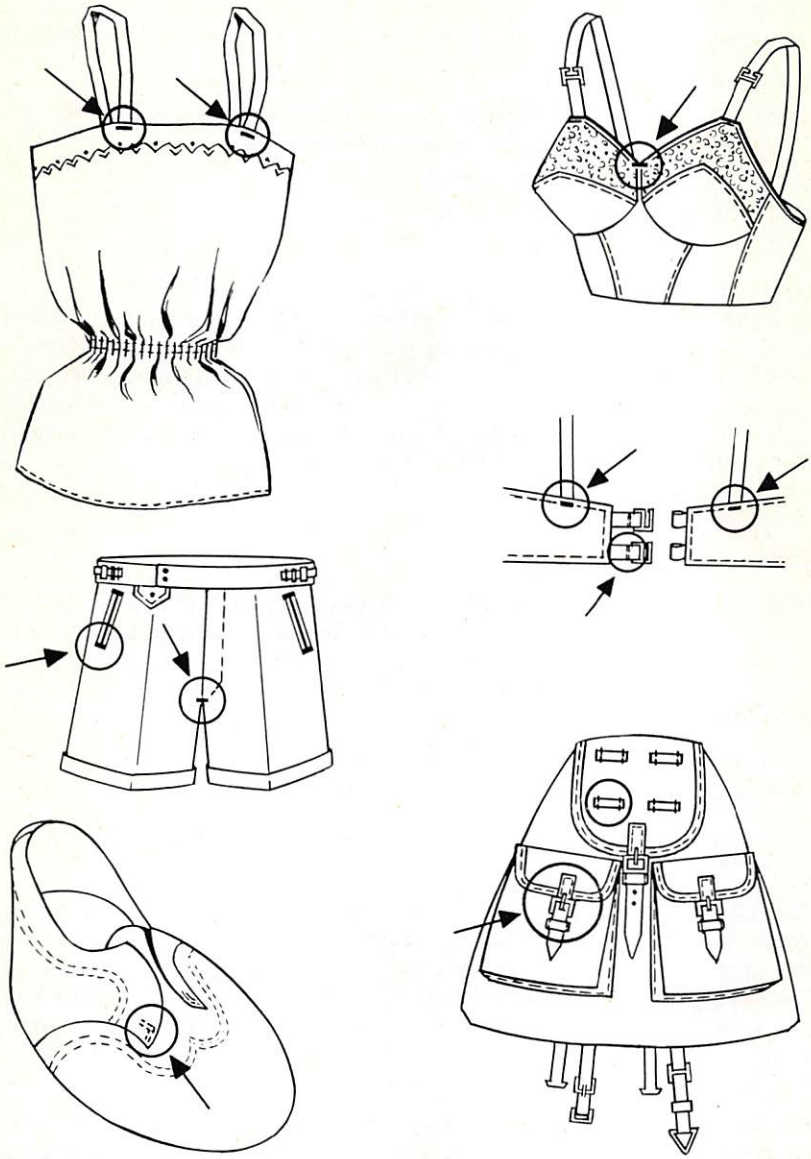


Fig. 1

2. Operation

a. Efficiency Rating

The output of an automatic bartacker is determined by the following factors:

(1) the number of stitches per tack,
(2) the handling times involved in a given operation (which, in turn, are determined by the size and bulkineess of the workpiece),
(3) the quality of material and thread,
(4) the handy arrangement of the work, and
(5) the speed of the machine.

The Pfaff 3334 automatic bartacker can be fitted to make 7, 9, 14, 16, 18, 21, 24, 28, 32, 36, 42, 48, 56, and 72 stitches per tack. The tack design diagrams contained in the Subclass Catalogue (Form No. 10080) illustrate the versatility of this efficient machine. In special cases, it may be advisable to submit a sample of the material to be sewn as well as a specimen of the finished work either to the Kaiserslautern Branch of G.M. Pfaff AG or the nearest Pfaff industrial sewing machine representative.

b. Mode of Operation

While both the length and width of a bartack can be varied within certain limits by simply adjusting a lever, its shape as well as the number of stitches it comprises can be varied only by exchanging the feed cam. In many instances, the worm gear assembly and the knife cam must be exchanged in addition.

The entire sewing action, including the stopping of the machine, is controlled automatically.

The machine is equipped with two cams which are carried on a joint transverse shaft on either side of the machine arm.

The right, or feed, cam has two pattern-forming grooves, one on each side. While the groove on its outside face controls the crosswise feed motion, the lengthwise feed motion emanates from the groove on its inside face. The feed cam, in addition, carries one or several stop tripping segments as well as one or several thread nipper tripping segments. Whereas the former serve to stop the machine at the completion of a sewing cycle, the latter actuate the thread nipper.

The number of stop tripping segments and thread nipper tripping segments provided on the rim of the feed cam depends on the number of tacks produced per cam revolution.

The left, or knife, cam operates the needle and bobbin thread knives.

As the knives swing forward from the inoperative to the stand-by position, a sufficient amount of thread is pulled from the spool and the bobbin with which to start the next tack.

As the machine makes the last stitch of the tack, the groove in the knife cam causes the lower, or main, tension to be released so that the last stitch knot is pulled ino the material.

The main tension will not by reactivated until the machine, depending on the subclass, has completed three to four stitches after starting a new tack. In this way, puckering of the fabric is successfully eliminated. This is particularly important for stitching delicate fabrics or sewing with long stitches.

The machine is started by depressing the right treadle. This action causes the stop motion lever to swing back and the tripping and locking levers to be interlocked.

The locking lever prevents the operator from inadvertently raising the work clamp while the machine is in operation since this action would cause the knives to trim the threads.

By the same token, the machine cannot be started while the work clamp is raised.

When the machine is started, the driving belt is shifted from the idler to the driving pulley and, conversely, when the machine stops, it is returned from the driving to the idler pulley.

All the operator has to do to start the sewing cycle is to press down the right treadle. After the machine has stopped automatically, she raises the work clamp by depressing the left treadle.

c. Sewing Cycle

The work is held between the work clamp and the feed plate and is advanced after each stitch to form the predetermined tack design. This design is produced by moving the material up and across the machine bed as the needle moves up and down. Fig. 3 illustrates the sewing cycle of a rectangular tack.

When the machine has been started by depressing the right treadle, the needle enters the fabric for the first stitch. After the first stitch has been completed and the needle has risen clear of the fabric again, the work is moved across the machine bed the predetermined distance between stitches. This cycle is repeated until the tack is completed.

1 = Needle bar frame
2 = Needle bar
3 = Work clamp
4 = Clamp foot lifting lever
5 = Thread wiper wire
6 = Feed plate
7 = Work clamp feet
8 = Presser bar
9 = Presser bar lifting bracket

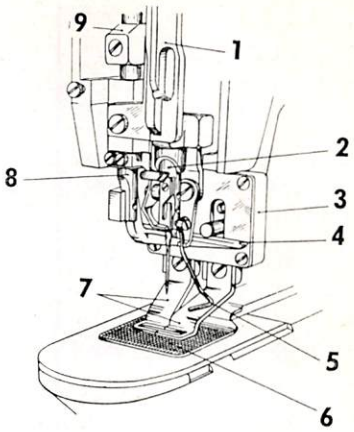


Fig. 2 Feed plate and work clamp

While the last stitch is being formed, the stop motion is released so that the machine stops exactly in the predetermined position after completing the last stitch.

When the left treadle is depressed, the needle and bobbin threads are trimmed and the work clamp raised for easy removal of the work.

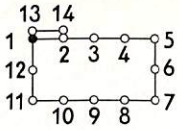
Electromagnetic Control

On machines fitted with electromagnetic control, various operations that used to be performed by hand or foot previously, such as raising the work clamp and starting the machine, are controlled by solenoids. On the Pfaff 3334, the solenoids are activated by depressing push-button switch **FS** (Fig. 4) on the foot rest.

When this button is pressed down to the first switch position, the work clamp is lowered onto the goods. At this stage, the work clamp may be raised or lowered indefinitely by depressing or releasing the push button, as may be required to adjust the position of the work under the clamp. Depressing the button to the first switch position will not start the machine.

Only when the button is depressed to the second switch position will the machine be started by a second solenoid (Fig. 4).

Schematic Seam Construction Diagram



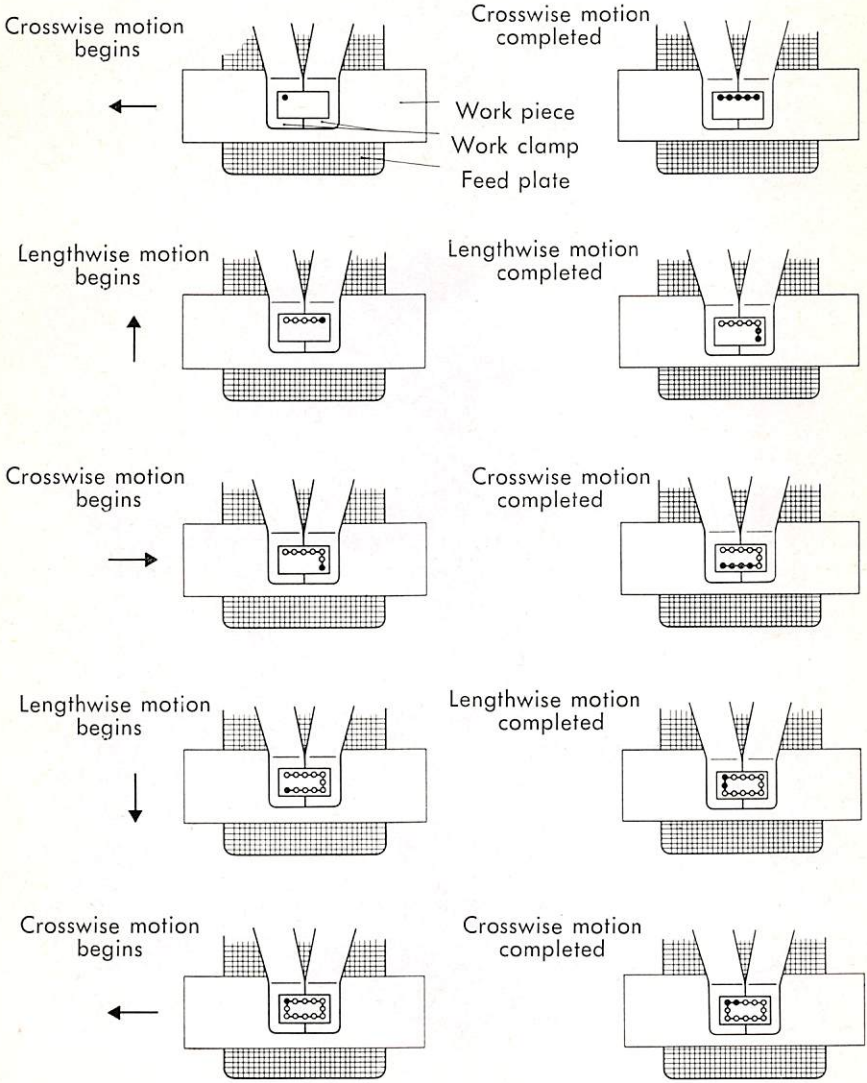


Fig. 3 The individual phases of sewing a four-sided tack

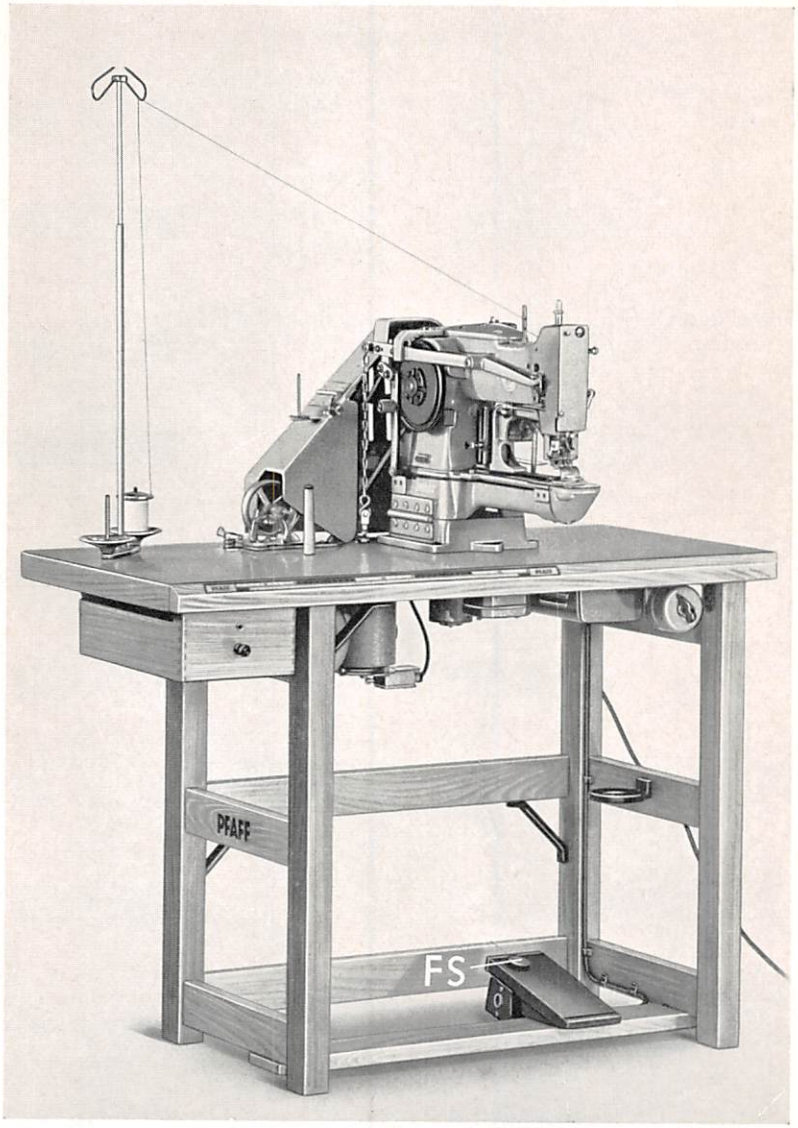


Fig. 4 Pfaff 3334 X 35 or X 45 fitted with electromagnetic control

3. Mechanical Setup

From the foregoing description of the sewing action of a bartacker it is evident that this machine must incorporate the following essential mechanisms, in addition to the shuttle and needle bar drive mechanisms found in any ordinary sewing machine:

(1) a special feed mechanism which advances the workpiece in the predetermined direction after each stitch,

(2) an automatic stop control which stops the machine as soon as the predetermined number of stitches have been made and the take-up lever has almost reached the highest point of its stroke, and

(3) a trimming mechanism which severs the needle and bobbin threads.

a. Shuttle and Needle Bar Drive

The shuttle driving motion is derived from the cranked arm shaft and transmitted to the shuttle via a connecting rod, an oscillating rock shaft, a crank with slide block, and the shuttle driver shaft. This mechanical setup produces the oscillating motion required for this type of shuttle.

The needle bar is moved up and down by means of the needle bar crank and the needle bar connecting link.

b. Feed Motion

The feed motion lengthwise and across the machine bed is controlled by two pattern-forming grooves, one on either face of the feed cam.

Whenever the material is to be moved in a straight line lengthwise or across the machine bed, this motion is controlled by only one of these grooves. The feed motions emanating from both grooves are combined to produce circular, triangular or other tacks whose sides extend at an angle to the true lengthwise or crosswise direction of feed.

The groove on the outside face of the feed cam controls the feed motion crosswise of the machine bed. As the feed cam revolves, a roller located at the top end of the feed across regulator (Figs. 6 & 7) rides in this groove and transforms the throws emanating from its curvature into a reciprocating motion which is transmitted to both the feed plate carrier bar and the work clamp by means of a ball joint connection. The amount of motion across the machine bed can be adjusted by changing the position of the ball joint connection in the slot of the feed across regulator.

1 = Idler pulley
2 = Driving pulley
3 = Hinge pin
4 = Hinge screw
5 = Oscillating rock shaft
6 = Shuttle driver shaft crank
7 = Slide block
8 = Shuttle driver shaft
9 = Shuttle driver
10 = Shuttle race
11 = Shuttle
12 = Bobbin case
13 = Take-up crank
14 = Arm shaft
15 = Shuttle drive connecting rod
16 = Needle bar
17 = Needle bar connecting stud
18 = Needle bar connecting link
19 = Hinge pin
20 = Take-up lever link
21 = Take-up lever
22 = Needle bar crank

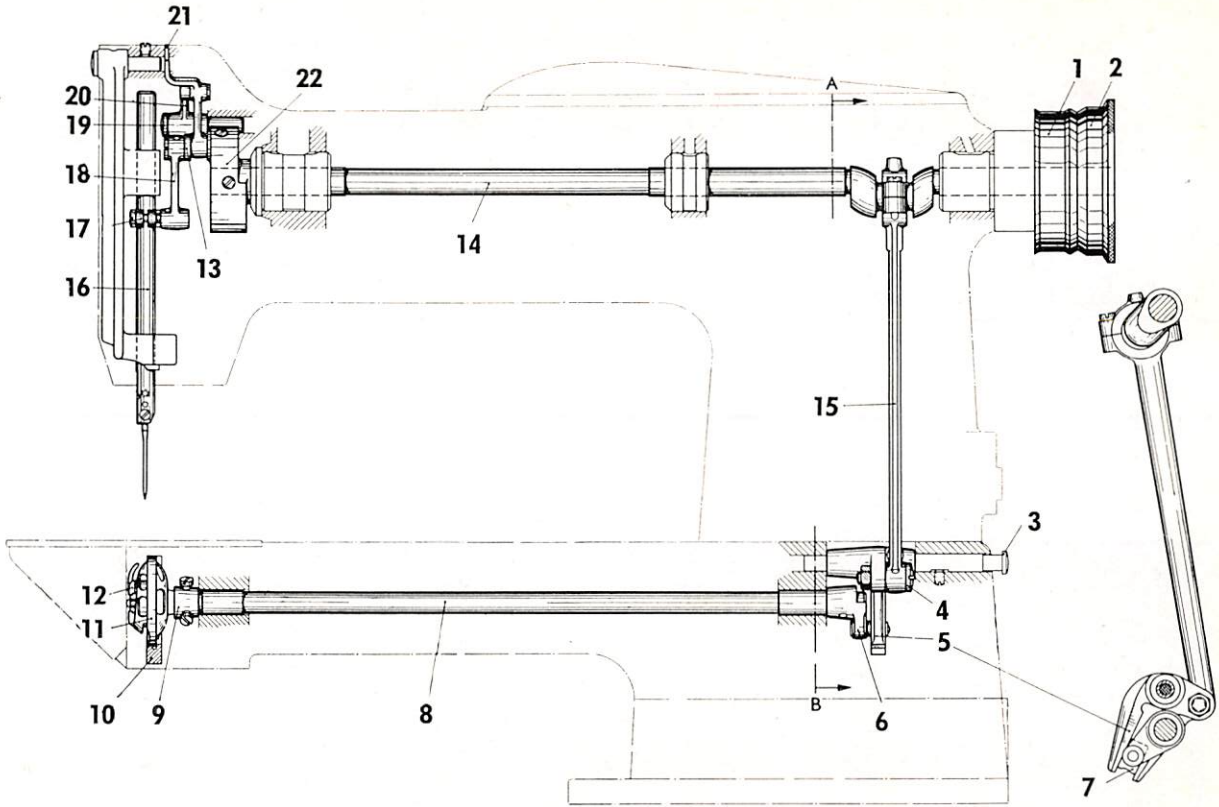


Fig. 5 Shuttle and needle bar drive

1 = Arm shaft
2 = Feed cam driving worm
3 = Idler pulley
4 = Driving pulley
5 = Feed cam
6 = Worm wheel
7 = Bearing bracket
8 = Guide plate
9 = Slide block
10 = Hinge screw
11 = Feed across shaft
12 = Feed across shaft crank, front
13 = Hinge stud
14 = Guide plate
15 = Feed across driving block
16 = Feed plate
17 = Feed plate carrier bar
18 = Ball joint connection
19 = Feed across regulator

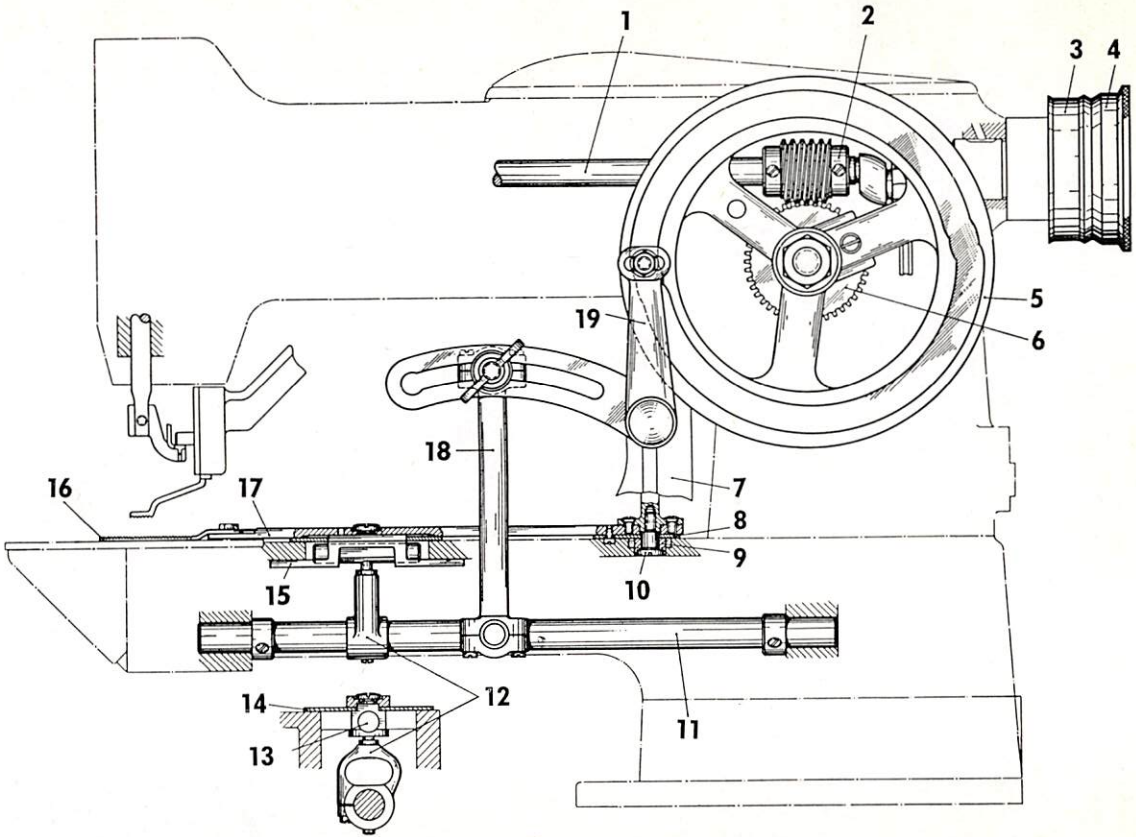


Fig. 6 Feed across motion (longitudinal section)

1 = Roller
2 = Roller stud
3 = Feed across regulator
4 = Ball screw stud, upper
5 = Hinge stud
6 = Ball joint connection
7 = Ball stud, lower
8 = Feed across shaft
9 = Feed across shaft crank, rear

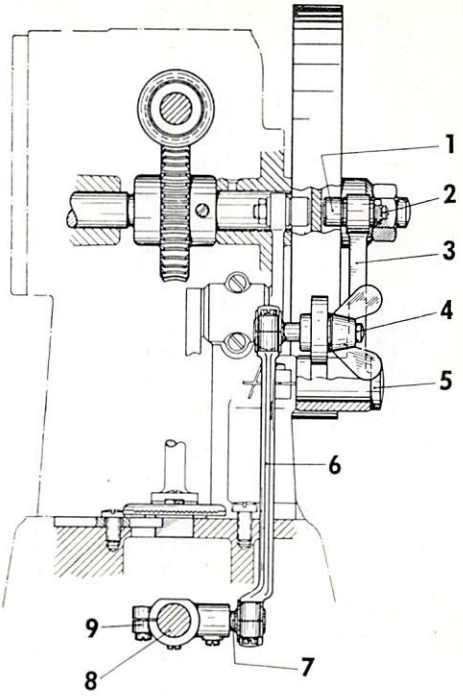


Fig. 7 Feed across motion (cross section)

The groove on the inside face of the feed cam controls the feed motion lengthwise of the machine bed. A roller which rides in this groove imparts a reciprocating motion to the two-armed feed regulator (Figs. 8 & 9). The feed regulator has a slot milled into its back side which accommodates the feed regulator post. Both the feed regulator and the feed regulator post are connected by a swivel (Fig. 8) which is held in place by a clamp and a regulating screw. The more this swivel is moved downward, the larger will be the effective arm of the feed regulator. And, conversely, the more the swivel is moved upward, the smaller will be its effective arm. This device makes it possible to adjust the amount of lengthwise travel of the feed plate carrier bar.

Since both the work clamp and the feed plate are mounted on the feed plate carrier bar and the workpiece is held in place between these parts, it is moved positively from one stitch position to the next.

1 = Feed plate
2 = Feed across driving block
3 = Slide block
4 = Feed plate carrier bar
5 = Feed regulator post
6 = Work clamp
7 = Feed regulator swivel
8 = Swivel clamp
9 = Feed cam
10 = Worm wheel shaft
11 = Worm wheel
12 = Driving pulley
13 = Idler pulley
14 = Feed cam driving worm
15 = Arm shaft
16 = Feed regulator

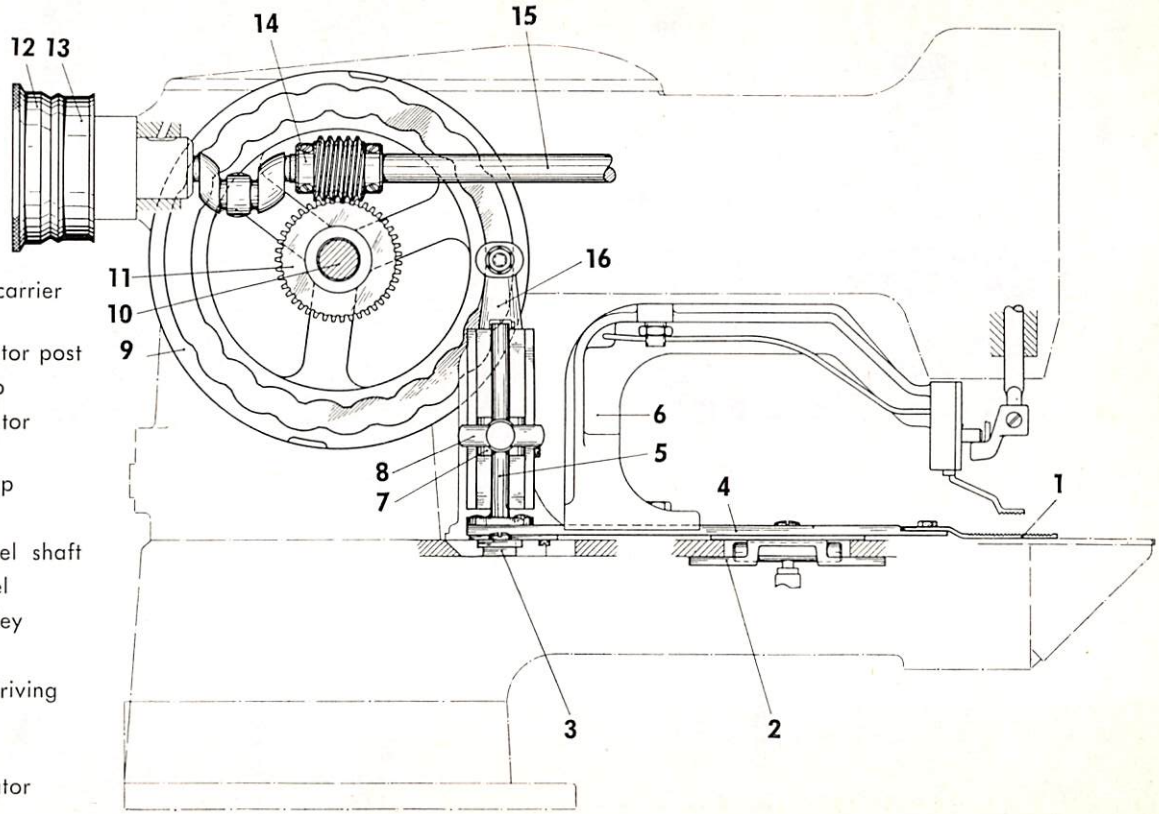


Fig. 8 Feed lengthwise motion (longitudinal section)

1 = Feed cam
2 = Roller stud
3 = Roller
4 = Feed regulator
5 = Bearing bracket
6 = Slide block
7 = Guide plate
8 = Feed plate
9 = Swivel clamp
10 = Thumb screw
11 = Feed regulator swivel
12 = Feed regulator post
13 = Worm wheel shaft
14 = Worm wheel
15 = Feed cam driving worm
16 = Arm shaft

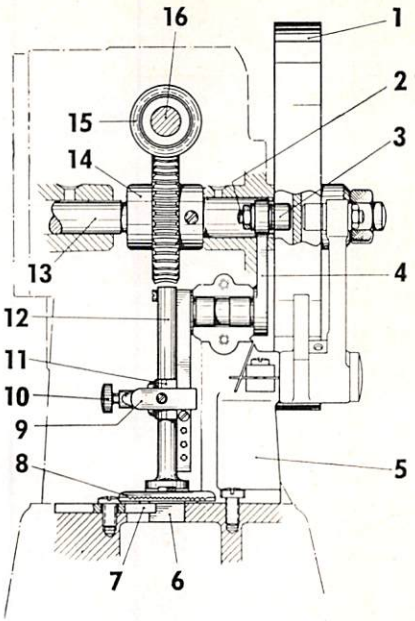


Fig. 9 Feed lengthwise motion (cross section)

The adjustment possibilities inherent in the feed regulator and feed across regulator are not sufficient to produce larger tacks. Such tacks, however, can be made with the aid of special organizational parts which provide for a larger amount of work clamp travel lengthwise and across the machine bed.

c. Automatic Stop Motion

The machine is stopped automatically in order to ensure that all tacks will be sewn with exatly the same number of stitches and that the machine will always be in the same position when a new needle cycle begins. The shape of the pattern-forming groove and the gear ratio of the worm gear assembly are determined by the number of stitches per tack.

The automatic stop motion is operated by the stop tripping segment on the rim of the feed cam (Fig. 10). When this tripping segment depresses the tripping lever, the latch at the lower end of the stop motion lever slips out of the catch on the tripping lever so that the stop motion lever can be pulled against the stop cam by a tension spring. Shortly before the stop cam has completed its last revolution, the stop link hits its surface and snaps into its groove, thereby causing the machine to stop. To absorb the momentum of the machine at this sudden stop, the Pfaff 3334 is equipped with double buffer springs.

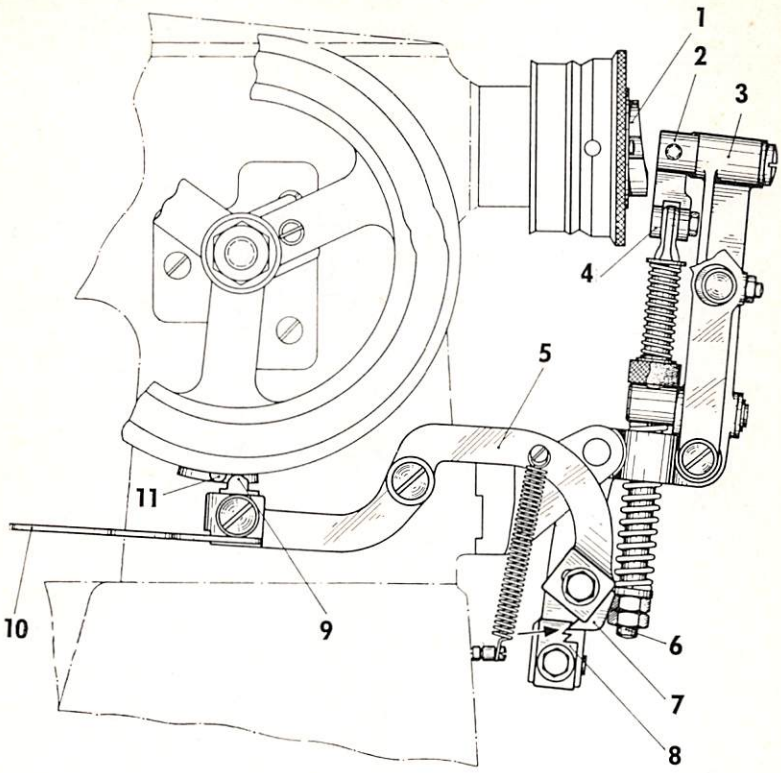


Fig. 10 Automatic stop motion mechanism

1 = Stop cam
2 = Hinge stud
3 = Stop motion lever
4 = Stop link
5 = Tripping lever
6 = Stop link rod
7 = Latch
8 = Catch
9 = Tripping dog
10 = Hand stop lever plate
11 = Stop tripping segment

As the stop cam makes its last half revolution, the brake block at the top end of the brake lever engages the face of the driving pulley, thus annihilating part of the machine's momentum before it is stopped.

At the same time, the belt shifter moves the driving belt from the driving to the idler pulley (Fig. 11).

If trouble should occur while the machine is in operation, it can be stopped instantly by depressing the hand stop lever (Fig. 10). This is important in case of needle or thread breakage.

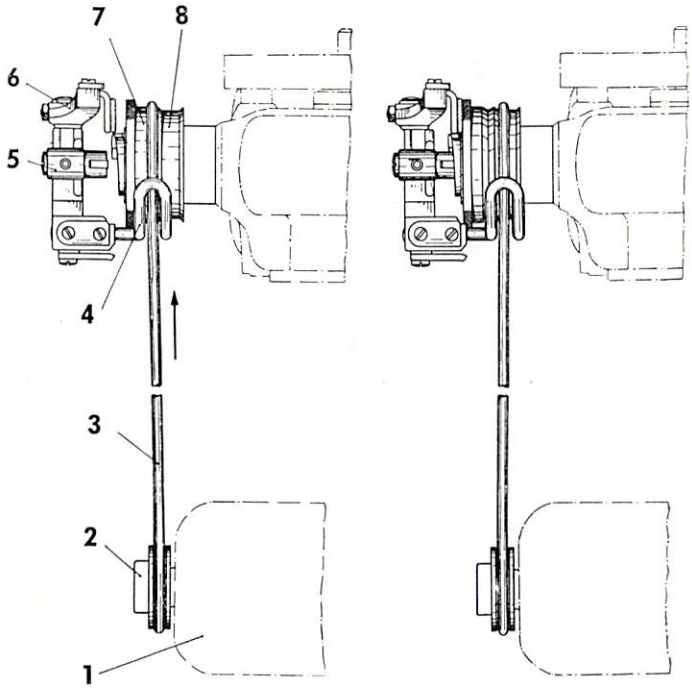


Fig. 11 Machine drive

1 = Motor
2 = Motor pulley
3 = Driving belt
4 = Belt shifter
5 = Stop motion lever
6 = Brake lever
7 = Driving pulley
8 = Idler pulley

d. Thread Trimming Action

On completion of the sewing action, both threads are trimmed by the needle and bobbin thread knives which are located under the needle plate.

The motion which causes the knives to swing forward and catch the threads emanates from the knife cam and is transmitted to the knives by the knife bar tripping lever and the knife bar (Fig. 12).

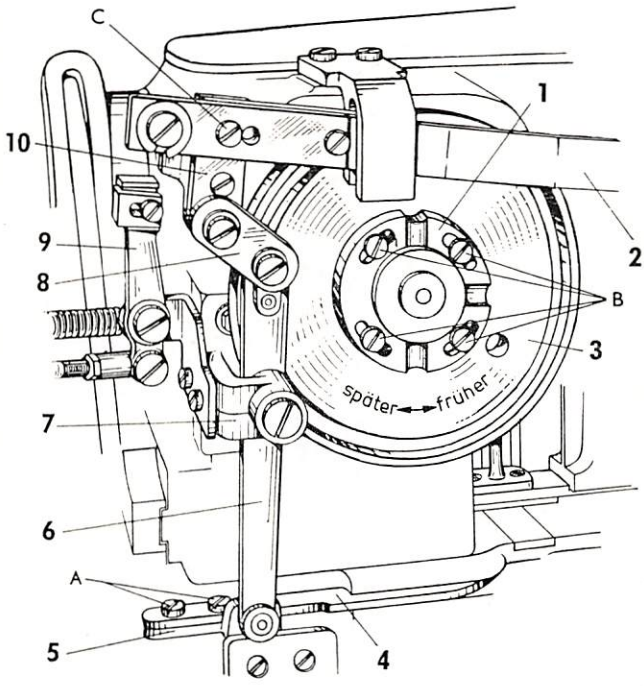


Fig. 12 Thread trimming mechanism

1 = Knife cam positioning flange
2 = Lifting lever
3 = Knife cam
4 = Knife bar
5 = Knife bar tripping fork
6 = Knife bar tripping lever
7 = Bearing bracket
8 = Ball joint connection
9 = Locking lever
10 = Bracket

The needle and bobbin threads are cut when the left treadle is depressed. A detailed description of the thread trimming action is given below:

While the last stitch is being made, the knife cam causes both knives to swing forward from the inoperative to the stand-by position. During this motion the tip of the needle thread knife catches the needle thread and pulls it onto the back edge of its blade (Figs. 13 & 14). The bobbin thread is caught by the bobbin thread knife in the same manner.

When the left treadle is pressed down, both knives continue to swing forward, and the needle thread loop and the bobbin thread are pulled onto the tapering back edge of the respective knife and are cut.

When the treadle is released, the knives return to the stand-by position where they remain during the first four stitches of the next tack. At the completion of these stitches they are automatically returned to the inoperative position by the knife cam.

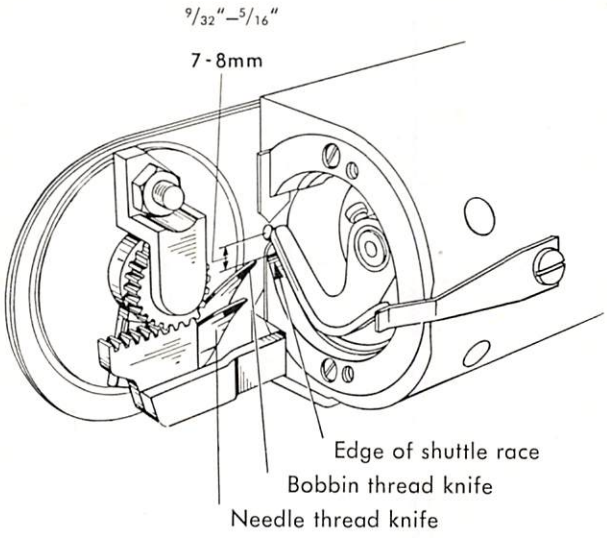


Fig. 13 Inoperative position of knives

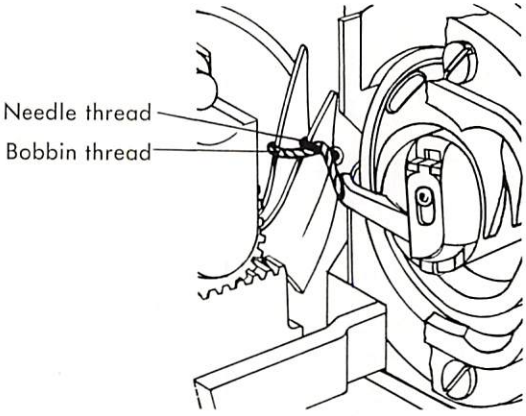


Fig. 14 Stand-by position of knives

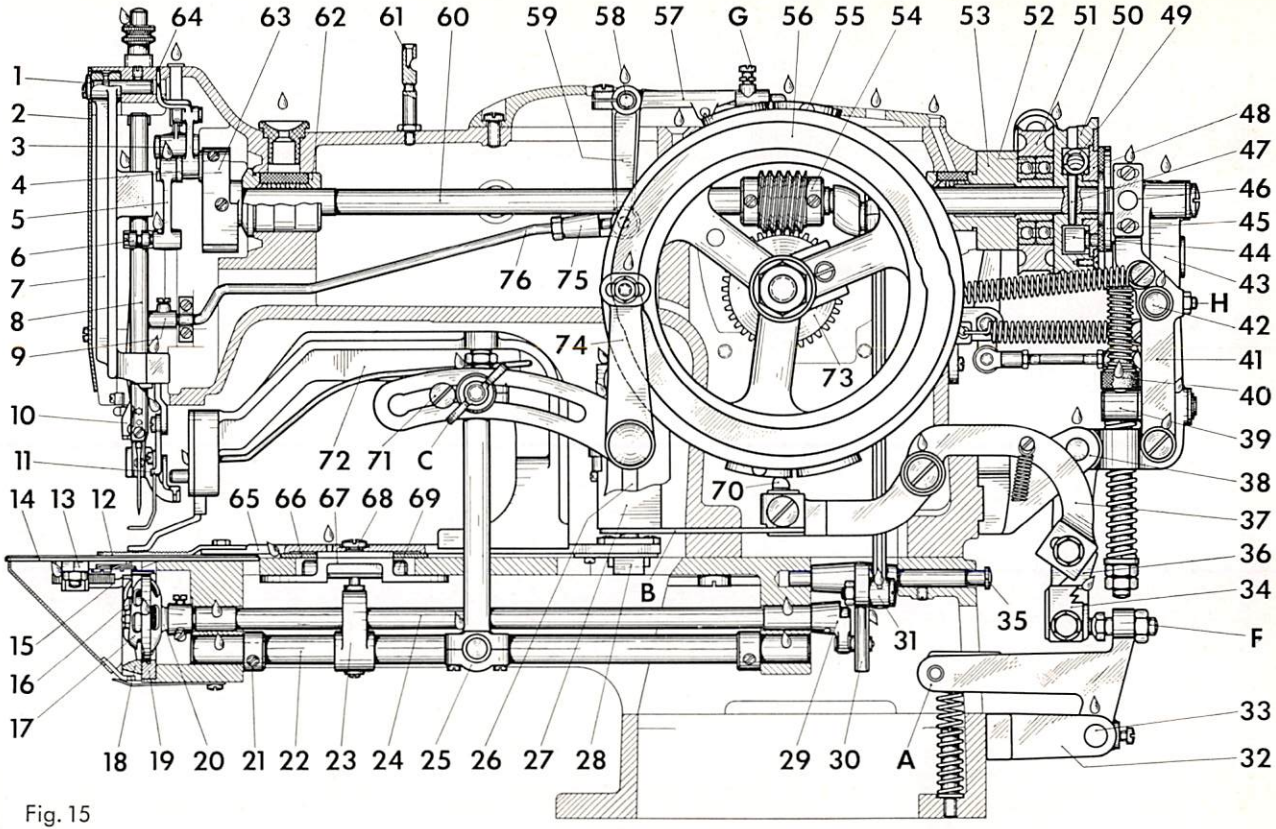


Fig. 15

A = Starting lever
B = Hand stop lever
C = Feed across motion regulating nut
F = Starting lever regulating nut
G = Thread nipper regulating screw
H = Brake lever regulating screw

(Drops indicate oiling points)

1 = Hinge stud
2 = Face plate
3 = Take-up lever link
4 = Take-up crank
5 = Needle bar connecting link
6 = Needle bar connecting stud
7 = Needle bar frame
8 = Needle bar
9 = Thread nipper rod extension
10 = Thread nipper lever
11 = Thread wiper wire
12 = Feed plate
13 = Thread trimming mechanism
14 = Needle plate
15 = Knife bar
16 = Bobbin case
17 = Shuttle
18 = Shuttle race ring
19 = Shuttle race
20 = Shuttle driver
21 = Set collar
22 = Feed across shaft
23 = Feed across shaft crank, front
24 = Shuttle driver shaft
25 = Ball joint connection
26 = Bearing bracket
27 = Feed regulator
28 = Slide block
29 = Shuttle driver shaft crank
30 = Oscillating rock shaft
31 = Shuttle drive connecting rod
32 = Bearing bracket
33 = Hinge stud
34 = Stop motion lever catch
35 = Oscillating rock shaft hinge pin
36 = Tripping lever latch
37 = Tripping lever
38 = Bearing bracket
39 = Hinge stud
40 = Felt washer
41 = Brake lever
42 = Hinge stud
43 = Stop motion lever
44 = Check block
45 = Brake block
46 = Brake regulating bracket
47 = Positioning pin
48 = Stop cam
49 = Stop cam spring
50 = Driving pulley
51 = Idler pulley
52 = Ball bearing
53 = Arm shaft bushing, rear
54 = Feed cam driving worm
55 = Tripping segment
56 = Feed cam
57 = Thread nipper tripping lever
58 = Thread nipper hinge stud
59 = Thread nipper crank
60 = Arm shaft
61 = Thread guide
62 = Arm shaft bushing, front
63 = Needle bar crank
64 = Take-up lever
65 = Feed plate carrier bar, w/ position pin
66 = Guide plate
67 = Feed across driving block
68 = Driving block set screw
69 = Hinge stud
70 = Tripping dog
71 = Stop screw
72 = Work clamp
73 = Worm wheel
74 = Feed across regulator
75 = Thread nipper rod joint
76 = Thread nipper rod

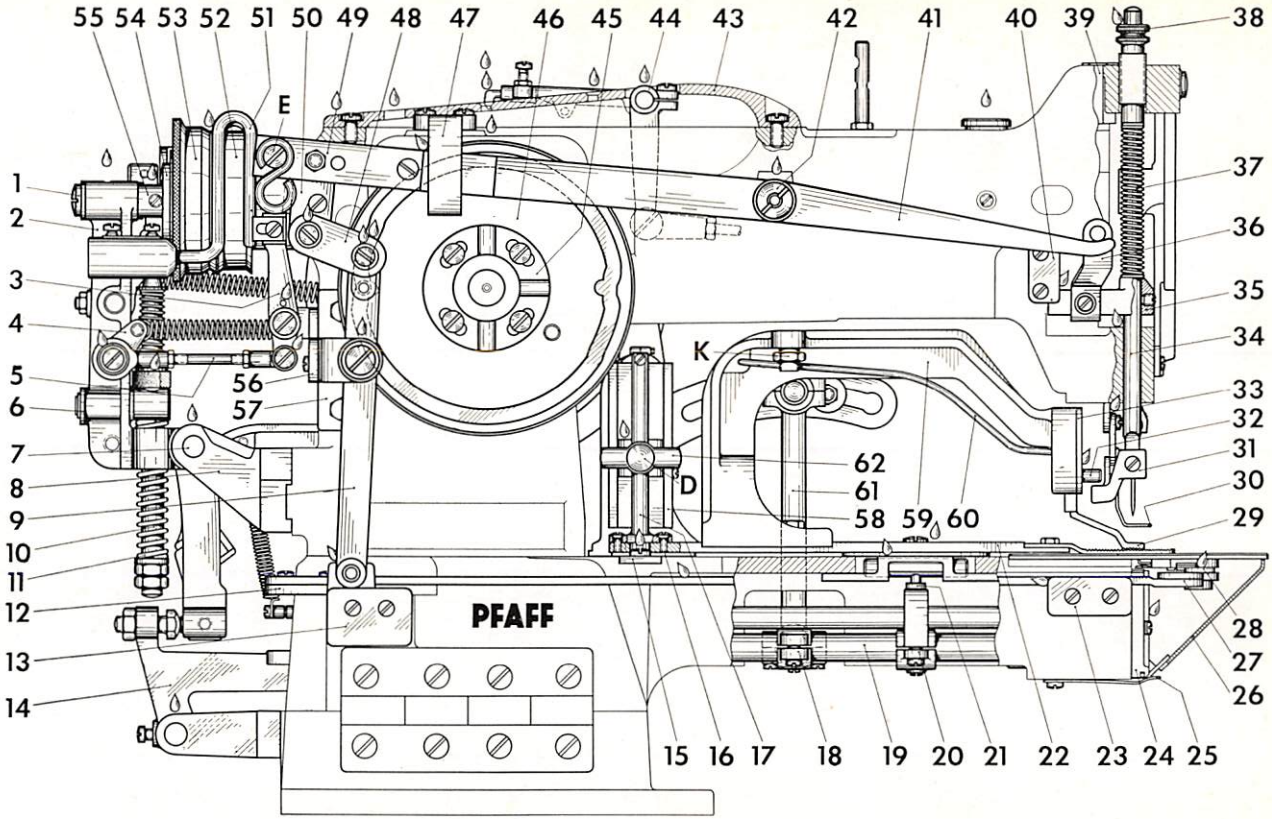


Fig. 16

D = Feed lengthwise motion regulating screw
E = Chain suspension hook
K = Work clamp foot pressure regulating nut

(Drops indicate oiling points)

1 = End screw
2 = Stop motion lever
3 = Locking lever
4 = Spring suspension bracket
5 = Ball joint connection
6 = Washer, w/circlip
7 = Hinge stud
8 = Bearing bracket
9 = Knife bar tripping lever
10 = Stop link rod
11 = Pressure spring
12 = Knife bar tripping fork
13 = Position bracket
14 = Starting lever
15 = Guide plate
16 = Guide plate
17 = Feed regulator post
18 = Feed across shaft crank, rear
19 = Feed across shaft
20 = Feed across shaft crank, front
21 = Driving stud
22 = Feed plate carrier bar, w/position pin
23 = Position bracket, front
24 = Shuttle race ring
25 = Cylinder arm cap spring
26 = Cylinder arm cap
27 = Knife bar
28 = Thread trimming mechanism
29 = Work clamp foot
30 = Thread wiper wire
31 = Clamp foot lifting lever
32 = Work clamp foot lifting stud
33 = Work clamp face plate
34 = Presser bar
35 = Presser bar lifting bracket
36 = Lifting bracket link
37 = Presser bar spring
38 = Pressure regulating screw
39 = Oil tube
40 = Lifting bracket guide
41 = Lifting lever
42 = Hinge stud
43 = Top cover
44 = Thread nipper hinge stud
45 = Knife cam positioning flange, adjustable
46 = Knife cam
47 = Lifting lever guide
48 = Ball joint connection
49 = Lifting lever extension
50 = Bracket
51 = Belt shifter
52 = Idler pulley
53 = Driving pulley
54 = Stop cam
55 = Hinge stud
56 = Bracket
57 = Bearing bracket
58 = Feed regulator
59 = Work clamp
60 = Pressure spring
61 = Ball joint connection
62 = Swivel clamp

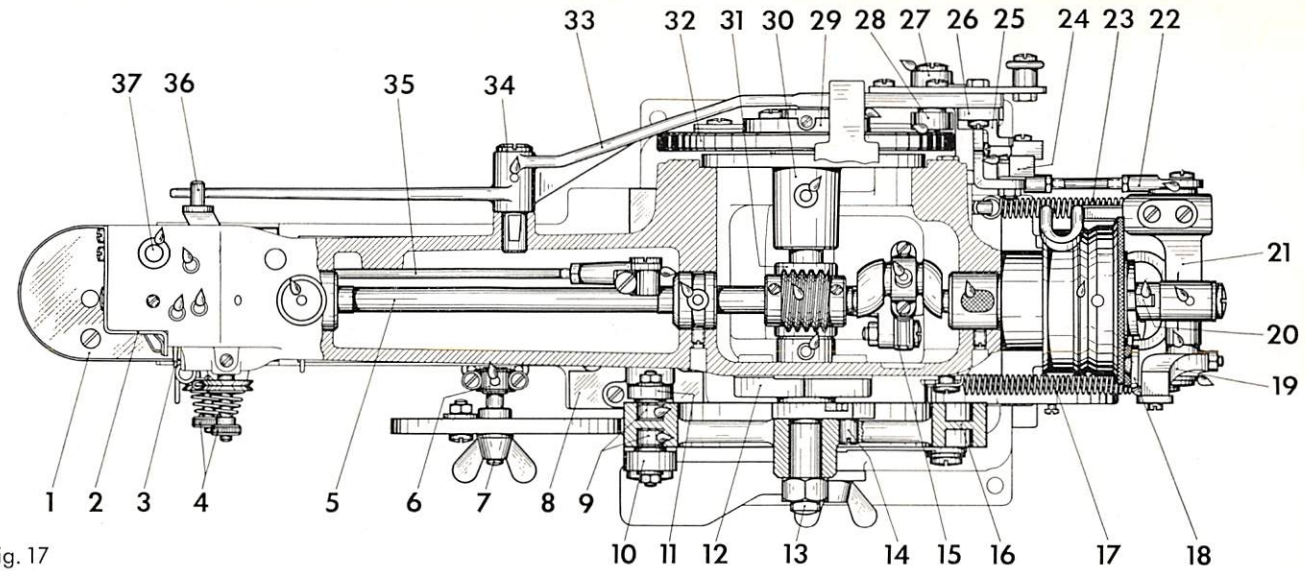


Fig. 17

1 = Needle plate
2 = Face plate
3 = Take-up lever
4 = Thread tensions
5 = Arm shaft
6 = Ball joint connection
7 = Ball screw stud, upper
8 = Bearing bracket
9 = Rollers
10 = Feed across regulator
11 = Feed regulator
12 = Worm wheel shaft bearing bracket, front
13 = Worm wheel shaft
14 = Feed cam position stud
15 = Shuttle drive connecting rod
16 = Feed cam
17 = Tension spring
18 = Brake block
19 = Brake lever
20 = Stop link
21 = Stop motion lever
22 = Ball joint connection
23 = Tension spring
24 = Locking lever
25 = Lifting lever stop
26 = Bracket
27 = Bearing bracket
28 = Knife bar tripping lever
29 = Knife cam positioning flange, adjustable
30 = Worm wheel shaft bearing bracket, rear
31 = Worm wheel
32 = Knife cam
33 = Lifting lever
34 = Hinge stud
35 = Thread nipper rod
36 = Lifting bracket link
37 = Presser bar

(Drops indicate oiling points)

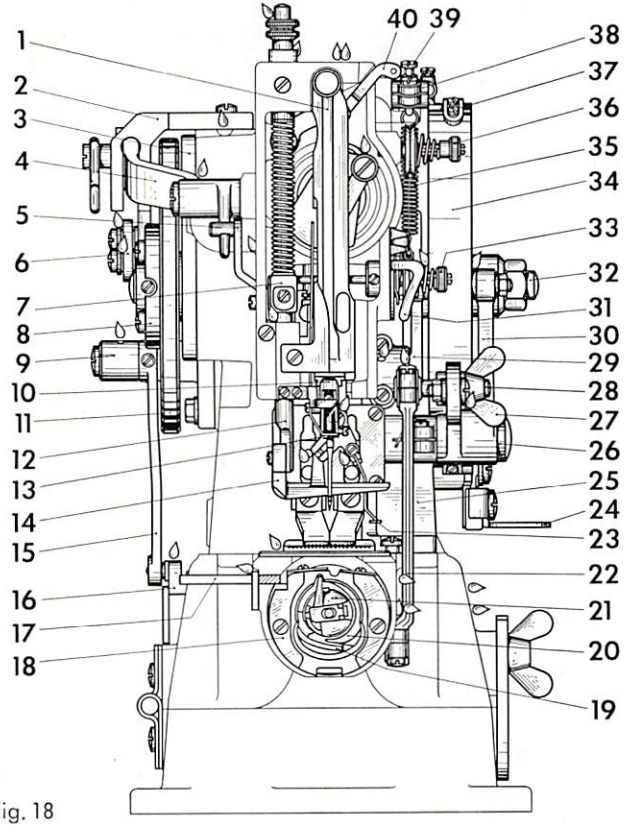


Fig. 18

(Drops indicate oiling points)

1 = Needle bar frame
2 = Lifting lever guide
3 = Worm wheel shaft bearing bracket
4 = Lifting lever
5 = Lifting bracket link
6 = Ball joint connection
7 = Presser bar lifting bracket
8 = Knife cam positioning flange, adjustable
9 = Bearing bracket
10 = Needle bar
11 = Knife cam
12 = Presser bar
13 = Thread nipper
14 = Clamp foot lifting lever
15 = Knife bar tripping lever
16 = Knife bar tripping fork
17 = Knife bar
18 = Shuttle race ring
19 = Shuttle driver
20 = Shuttle
21 = Bobbin case
22 = Ball joint connnection
23 = Thread wiper wire
24 = Hand stop lever
25 = Bearing bracket
26 = Hinge stud
27 = Feed across regulator wing nut
28 = Ball screw stud, upper
29 = Feed regulator
30 = Feed across regulator
31 = Tension bracket
32 = Worm wheel shaft
33 = Thread tension, complete
34 = Feed cam
35 = Tension spring
36 = Thread tension, upper, complete
37 = Thread nipper tripping segment
38 = Thread nipper tripping lever
39 = Regulating screw
40 = Take-up lever

B. Instructions for Repair

1. Disassembly

Strip the machine only as far as is absolutely necessary for the repair job intended. This rule applies particularly to dismantling the worm gear assembly. All major repair and conversion jobs should be performed at the Pfaff plant.

It is advisable to strip complete assemblies which can be easily disassembled and reassembled as a unit. In order to avoid that screws will be misplaced or get lost, replace them in the screwholes immediately after the respective part has been removed. If not marked previously, spot the position of cranks on shafts and the meshing teeth on both the worm and the worm wheel. These position marks greatly facilitate the assembly and adjustment of the machine later.

To dismantle the machine completely, strip the parts in the following sequence (see illustrations on pages 24 through 29):

Needle, Work Clamp and Face Plate

Remove these parts first.

Stop Motion

Unscrew brake lever tension spring (9624) and ball joint connection (22772). Loosen screw on stop motion lever hinge stud (11126), and push out this stud. Strip both the stop motion and brake levers, and dismantle locking lever (22530).

Front Parts

Turn out needle bar frame set screw (700073), and loosen set screw (700152) on needle bar frame hinge stud. Pull needle bar frame and hinge stud out of the machine cautiously. Dismantle presser bar (6523) with presser bar spring, pressure regulating screw (392), presser bar lifting bracket (22037), and clamp foot lifting lever (22861). Unscrew thread wiper wire (22104), and strip take-up lever.

Feed Cam

Unscrew wing nut (701578) on ball screw stud of ball joint connection (22394), loosen binding screw (700297) on bearing bracket (21060), and pull out feed across regulator (22017). Unscrew hexagon nut (701638) on worm wheel shaft (22009), and pull the feed cam off this shaft.

Knife cam

Strip knife bar tripping lever (22239) and lifting lever guide (22004). Dismantle lifting lever and knife cam (cautiously drive taper pin out of knife cam positioning flange).

Top Cover and Worm Wheel Shaft Bearing Bracket

Pull out thread nipper hinge stud (22332), and unscrew top cover (22333) as well as worm wheel shaft rear bearing bracket (22016).

Feed Regulator Bearing Bracket

Take both set screws (700252) out of feed regulator bearing bracket (21060), loosen thumb screw (700293), and move swivel clamp (22467) downward. Pull bearing bracket to the right and up, and strip feed plate carrier bar and feed regulator post.

Cylinder Bed Parts

Unscrew needle plate and shuttle race ring. Take out shuttle, and strip shuttle race. Cautiously drive pin out of shuttle driver shaft crank (6568), and pull out shuttle driver shaft. Dismantle feed across shaft (22020).

Arm Parts

Strip shuttle drive connecting rod (22059). Loosen set screws in needle bar crank and worm, slacken set screws (700150) in arm shaft rear bushing (21195), and cautiously drive out arm shaft, making sure its cranked portion points downward.

Worm Wheel Shaft

Loosen set screws im worm wheel, and attach worm wheel shaft rear bearing bracket (22016) so that the worm wheel shaft will not be bent when you drive out taper pin (1848). Now pull worm wheel shaft out of machine.

2. Assembly

Examine all parts for wear before you assemble them. If necessary, rework or replace damaged parts. Make sure to remove burrs and dents on shafts so as to ensure that gears, eccentrics, set collars and other parts can be moved on them easily. All shafts must be perfectly straight because bent shafts are likely to cause binding and noisy running of the machine. To facilitate subsequent adjustment, it is recommended to replace all parts in close proximity to their previous positions.

Worm Wheel Shaft

Replace both the worm wheel and the worm wheel shaft. Again screw on worm wheel shaft rear bearing bracket (22016) so that the shaft will not be bent when you drive home taper pin (1848).

Arm Parts

Replace arm shaft with driving pulley (20658), arm shaft rear bushing (21195) and worm. Push needle bar crank onto arm shaft, and screw down. Rotate arm shaft to make sure it revolves freely. Mesh worm and worm wheel

in accordance with position marks. Both the arm and worm wheel shafts must revolve freely, without having any end play. The only gears that may have a scarcely perceptible amount of play are the worm and worm wheel.

Place machine on stand and test-run it. If the worm gear assembly should be too noisy, correct this condition by setting the worm as close to the worm wheel as possible and relapping both parts. If the arm shaft should have any end play, drive taper pin (2056) out of the driving pulley, set pulley as close to arm shaft rear bearing as possible, and tighten set screws securely. Re-ream pin hole with a taper reamer, and take a thicker taper pin to pin driving pulley on arm shaft. Make sure the taper pin does not protrude from the hub of the pulley, as this would interfere with the proper functioning of the stop cam spring.

If a new arm shaft must be installed in the machine, drill the taper pin hole in the driving pulley only after the latter has been mounted on the shaft. The driving pulley is screwed onto the arm shaft only until the front parts have been installed. Rotate the driving pulley on the arm shaft until the groove in the stop cam extends vertically. Check to see that the machine stops when the ascending take-up lever has reached a position about $^{5}/_{84}$", or 2.0 mm, below the highest point of its stroke. To make whatever adjustment may be necessary, insert stop cam spring, Novotex segment (20275), and stop cam (20062) into the driving pulley.

Insert shuttle drive connecting rod (22059) and oscillating rock shaft (6674), and check to see that both parts move freely without having any end play.

Mount thread nipper components in machine arm.

Front Parts

Screw on needle plate, and add take-up lever. Insert needle bar frame with needle bar, and align so that needle is correctly centered in the needle hole. Mount presser bar with guide, spring and pressure regulating screw.

Cylinder Bed Parts

Insert feed plate carrier bar and bearing bracket. Set guide plate as close to the feed plate carrier bar as possible so that the latter moves freely without having any lateral play. Screw feed across driving block and guide plate (22391) to feed plate carrier bar, making sure the attached parts move freely. Install feed across shaft with set collars as well as front and rear cranks. Adjust the front crank so that driving stud (22025) is centered in the cutout of the feed across driving block when both feed motions are set on zero. Add shuttle driver shaft with crank (6568).

Feed Cam

Attach feed cam, and tighten hexagon nut on worm wheel shaft. Make sure the machine runs smoothly and the roller does not chafe against the bottom

of the pattern-forming groove. Add feed across regulator, and screw feed plate onto feed plate carrier bar.

To prevent the rollers from becoming wedged in the grooves, again loosen the set screws in the bearing bracket, and turn the driving pulley by hand. This action will cause the rollers to adopt the best position in the grooves automatically.

Knife Cam

Attach bearing bracket for knife bar tripping lever (22239). Push knife cam with positioning flange onto worm wheel shaft, pin down, and tighten set screws securely. Install knife bar (22088), making sure that spotted teeth of rack and pinion mesh. Mount lifting lever (22003) and connect with knife bar tripping lever by means of ball joint connection (22512).

Stop Motion

Attach stop motion lever, brake lever, tripping lever, and locking lever.

Other Parts

Attach remaining parts while you adjust the machine, or after adjustment has been completed.

3. Adjustment and Check-Up

To facilitate the use of this manual, all adjustments discussed in the following chapter, wherever feasible, have been grouped by assemblies. Thus, for instance, all adjustments pertaining to the shuttle will be found under the heading "Timing the Shuttle and Setting the Needle Bar at Correct Height". For best results, it is recommended to perform the adjustment and check-up of a machine in the sequence given below.

Important

Always insert a new needle before you adjust a machine. Select the needle size in accordance with the material to be sewn. Unless specified otherwise, the adjustments discussed below apply to all subclasses. Certain materials, however, necessitate minor deviations from the standard settings given here.

a. Timing the Shuttle and Setting the Needle Bar at Correct Height

Insert a new needle, and screw on the needle plate. Loosen the set screw in the needle bar frame, and adjust the latter so that the needle is centered in the needle hole. (Needle plate inserts are available in various needle hole sizes).

(1) Needle Bar Rise

The amount of needle bar rise required to form the loop is 3/32", or 2.4 mm. This means that the point of the shuttle should be opposite the center line of the needle when the latter has passed the lowest point of its stroke and risen 3/32". Make sure you turn the driving pulley counter-clockwise, as viewed from the back of the machine. The correct amount of needle bar rise can be set easily with the aid of gauge No. Z 70.67-2 (Fig. 19).

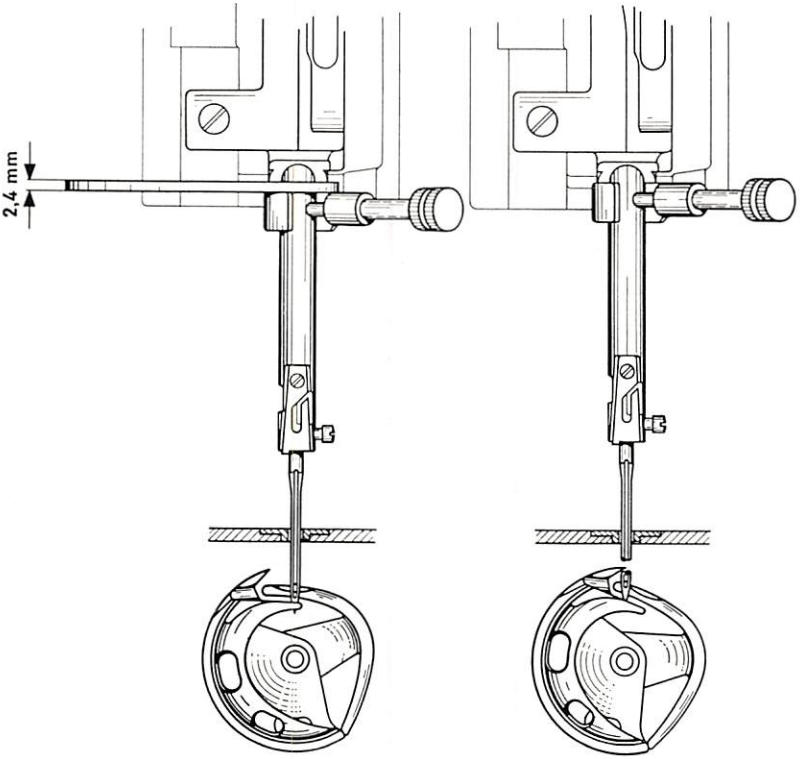


Fig. 19 Setting the amount of needle bar rise

To make this adjustment, turn driving pulley to bring needle bar to its lowest position. When the needle has reached the lowest point of its stroke, the shuttle should be at its left point of reversal. Slip both the clamp and the gauge onto the needle bar, positioning the latter between the clamp and the bottom of the needle bar frame. Push the clamp up against the gauge, and tighten the clamp screw. To make sure the needle bar is at the

lowest point of its stroke, try to rotate the driving pulley, and check to see that the needle bar does not move up and down. This done, pull out the gauge, and cautiously turn the driving pulley until the clamp bears against the needle bar frame. When in this position, the needle bar has risen 3/32", or 2.4 mm, from the lowest point of its stroke, and the point of the shuttle should be opposite the center line of the needle. If adjustment is required, loosen screws **a** (Fig. 20) in the shuttle driver, and rotate the shuttle driver on its shaft, as may be required. When you retighten the shuttle driver set screws, make sure the shuttle driver shaft has no end play.

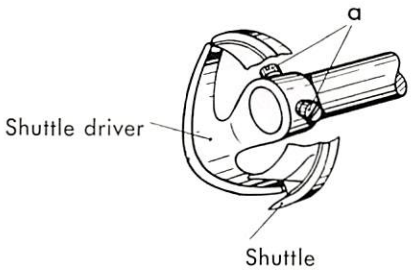


Fig. 20 Shuttle driver mounting

(2) Needle Bar Height

When the needle bar has risen 3/32" from the lowest point of its stroke, the point of the shuttle should be 1/16", or 1.5 mm, above the top of the needle eye (Fig. 21). Make sure the needle eye is not positioned below the beveled edge of the shuttle driver when the needle is at its lowest position because this may result in skipping of stitches and thread breaking (Fig. 22)

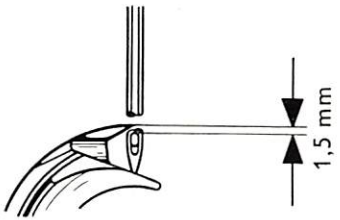


Fig. 21 Setting needle bar at correct height

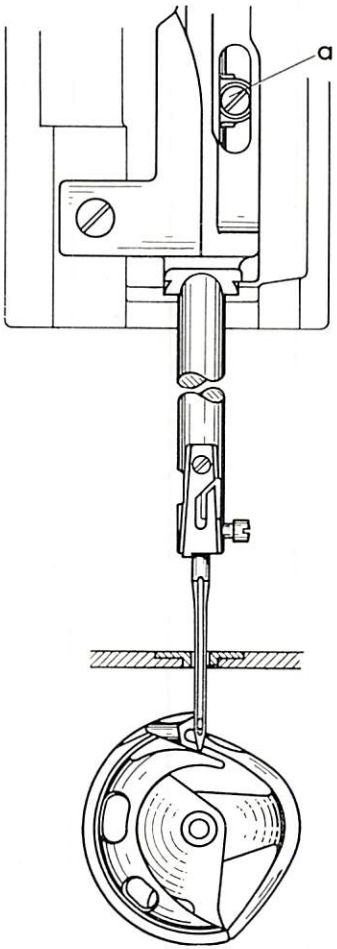


Fig. 22 Setting the needle bar at correct height

To adjust, loosen screw **a** on needle bar connecting stud, and set needle bar higher or lower, as may be required (Fig. 22).

(3) Setting Needle to Shuttle

When the needle has risen $^{3}/_{32}$" from the lowest point of its stroke, there should be a clearance of about .004", or 0.1 mm, between the needle and the point of the shuttle. This setting is predetermined by the position of the shuttle race and cannot be changed (Fig. 23).

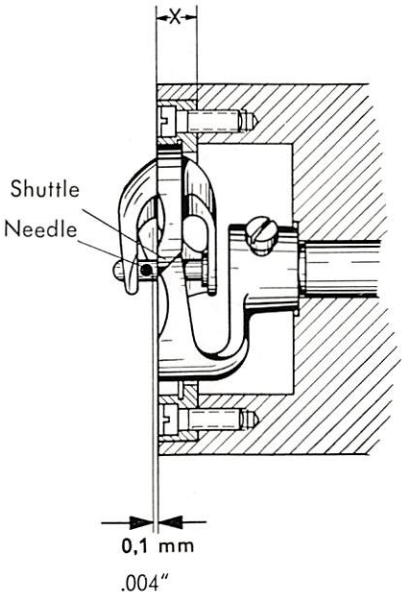


Fig. 23 Setting needle to shuttle

The only way adjustment can be made is by exchanging the shuttle race. Shuttle races are available for this purpose which are .004", .008" and .012", or 0.1, 0.2 and 0.3 mm, thicker than the standard shuttle race. On recent machines, this adjustment can be made by adding spacers of varying thickness.

(4) Setting Needle to Shuttle Driver

In order to avoid that the point of the shuttle hits the needle if the latter is deflected by hard spots in the material, the shuttle driver has been designed as a needle guide. The needle should bear lightly against the shuttle driver when the point of the shuttle passes it. If adjustment is required, bend the shuttle driver cautiously (Fig. 24).

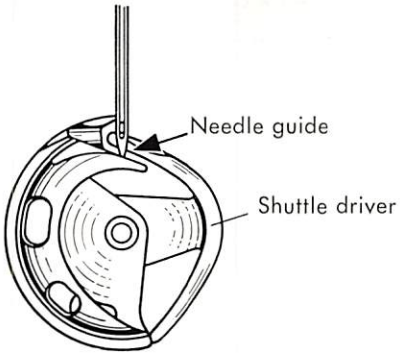


Fig. 24 Setting needle to shuttle driver

(5) Clearance Between Shuttle and Shuttle Driver

The clearance gap between shuttle and shuttle driver should be wide enough to permit the heaviest grade of thread used on this particular machine to pass through it freely. A clearance of about 1/64", or 0.4 to 0.5 mm, normally will be sufficient for this purpose. To allow heavier threads to be used on this machine, it may be necessary to make this gap about 1/32", or 0.6 to 0.7 mm, wide.

If adjustment is required, bend the driver fingers cautiously, making sure, however, that the bottom finger does not contact the shuttle race and the top finger is positioned exactly opposite the center of the shuttle neck (Fig. 25).

1 = Clearance gap 1/64", or 0.4 to 0.5 mm

2 = Shuttle driver top finger opposite center of neck

3 = Shuttle driver

4 = Shuttle driver bottom finger lines up with heel of shuttle (must not contact shuttle race)

5 = Shuttle

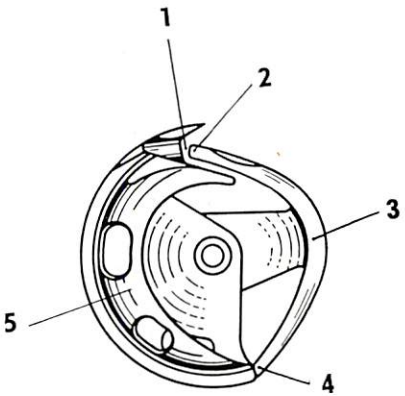


Fig. 25 Clearance gap between shuttle and shuttle driver

b. Timing the Feed Motion

Timing the feed motion is explained with the aid of a subclass -2 machine because the adjustment procedures can best be demonstrated here. These procedures apply to other subclasses accordingly.

(1) Synchronizing the Feed Motion with the Needle Motion

The feed motion normally must not begin until the needle has risen clear of the fabric, and must be completed when the needle enters the material again. When extra-thick materials are being sewn, the observation of this rule may prove impossible because the needle does not remain outside the fabric long enough. In such cases, set the machine so that it starts feeding shortly before the ascending needle has risen clear of the material completely. Make sure, however, the feed motion is completed when the needle point reaches the goods again. If the feed motion continues after the needle has entered the material again, needle breakage is likely to occur.

To double-check this setting, turn the driving pulley by hand so that the feed cam makes one complete revolution (on machines making three bartacks per cam revolution, for instance, the needle cycle will thus be repeated twice). This is the only way to ascertain that the setting is correct for all motions involved. If the settings should differ, use an intermediate setting. To adjust, loosen hexagon nut **b** (Fig. 26) and feed cam position stud **a**, and rotate the feed cam on its shaft, as appropriate. After this adjustment, tighten both the nut and the stud securely.

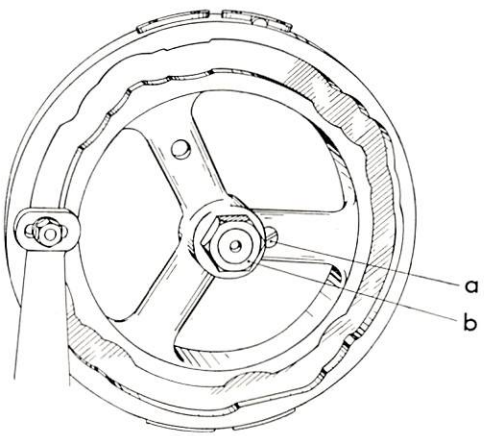
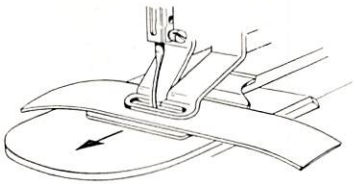
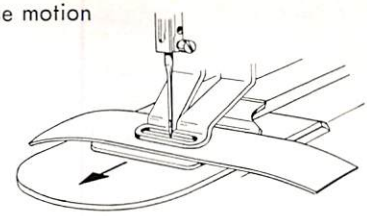


Fig. 26

Feed lengthwise motion

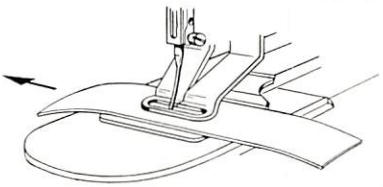


Wrong
The feed motion is not completed when the needle enters the material. Hence, the needle is deflected and breaks.

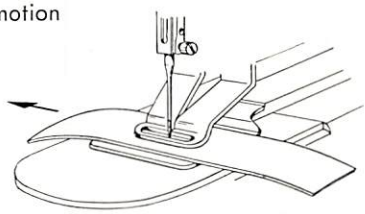


Right
The feed motion is completed when the needle enters the material.

Feed across motion



Wrong
The feed across motion is not completed when the needle enters the material. Hence, the needle is deflected and breaks.

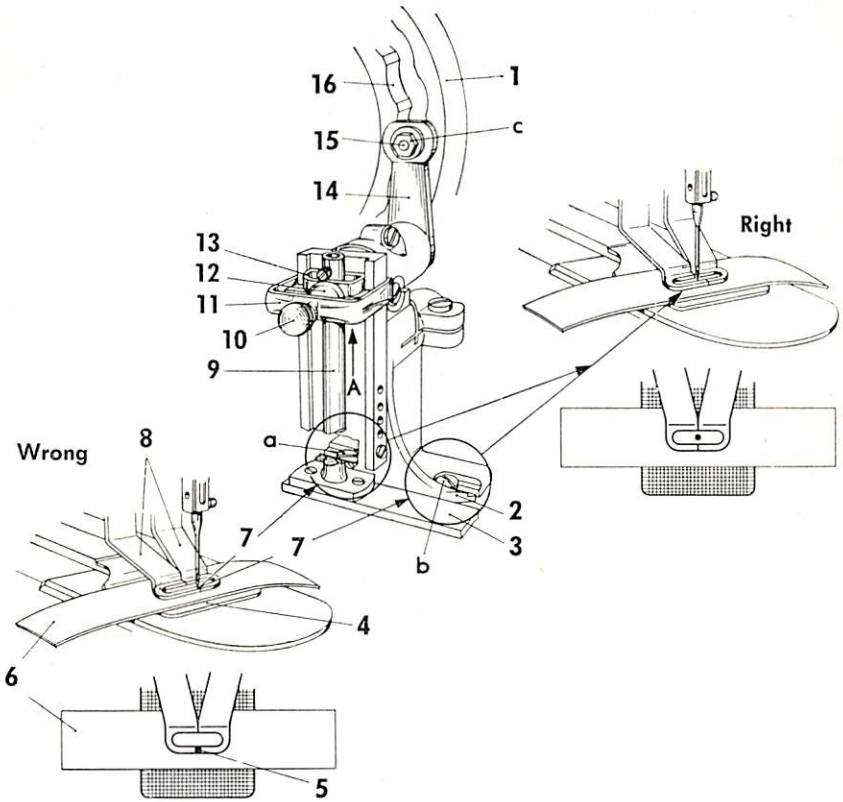


Right
The feed motion is completed when the needle enters the material.

Fig. 27 Synchronizing the feed motion with the needle motion

(2) Timing the Feed Lengthwise Motion

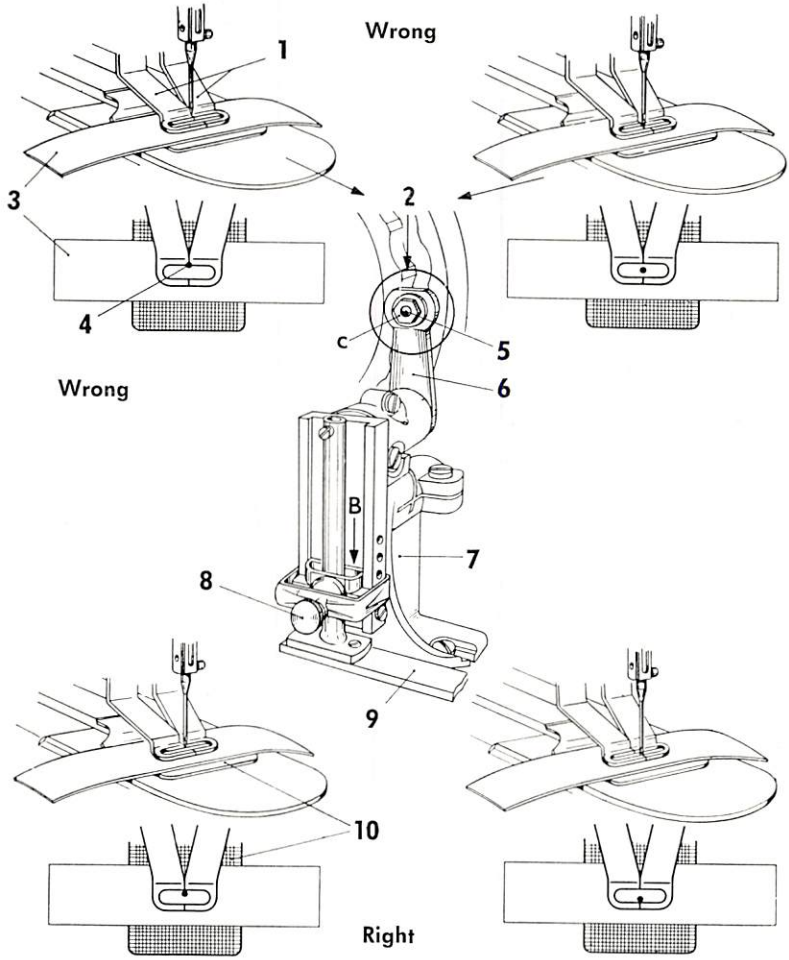
When the roller stud is positioned in the middle of the elongated hole in the feed regulator and the swivel clamp is at its highest position (marked A in Fig. 28), the needle must be centered in the feed plate cutout or the elongated hole in the work clamp feet. If adjustment is needed, loosen screws **a** and **b** (Fig. 28), and move the bearing bracket forward or backward, as appropriate.



1 = Feed cam
2 = Bearing bracket
3 = Feed plate carrier bar
4 = Feed plate
5 = Needle
6 = Workpiece
7 = Adjust
8 = Work clamp feet
9 = Feed regulator post
10 = Thumb screw
11 = Swivel clamp
12 = Thrust washer
13 = Feed regulator swivel
14 = Feed regulator
15 = Roller stud
16 = Pattern-forming groove

Fig. 28 Timing the feed lengthwise motion

When the swivel clamp is moved down to position B, the feed plate should move the same distance from the middle both ways so that the needle will hit neither the work clamp feet nor the feed plate. Adjustment can be made by loosening nut **c** (Fig. 29) and moving the roller stud in the elongated hole of the feed regulator, as may be appropriate.



1 = Work clamp feet
2 = Adjust
3 = Workpiece
4 = Needle
5 = Roller stud
6 = Feed regulator
7 = Bearing bracket
8 = Thumb screw for adjusting the feed lengthwise motion
9 = Feed plate carrier bar
10 = Feed plate

Fig. 29 Timing the feed lengthwise motion

(3) Timing the Feed Across Motion

The amount of crosswise clamp travel varies with each subclass machine, and is determined by the type of tack the machine is supposed to make. For certain tack designs, the normal adjustment possibilities are not sufficient so that the work clamp feet and the feed plate must be replaced by a set of parts having a larger cutout. To adjust the feed across motion, loosen the wing nut on ball screw stud **2** (Fig. 30), and move the stud in the slot of the feed across regulator, as follows:

> Move it toward you to increase the feed across motion,
> or over from you, to decrease this motion.

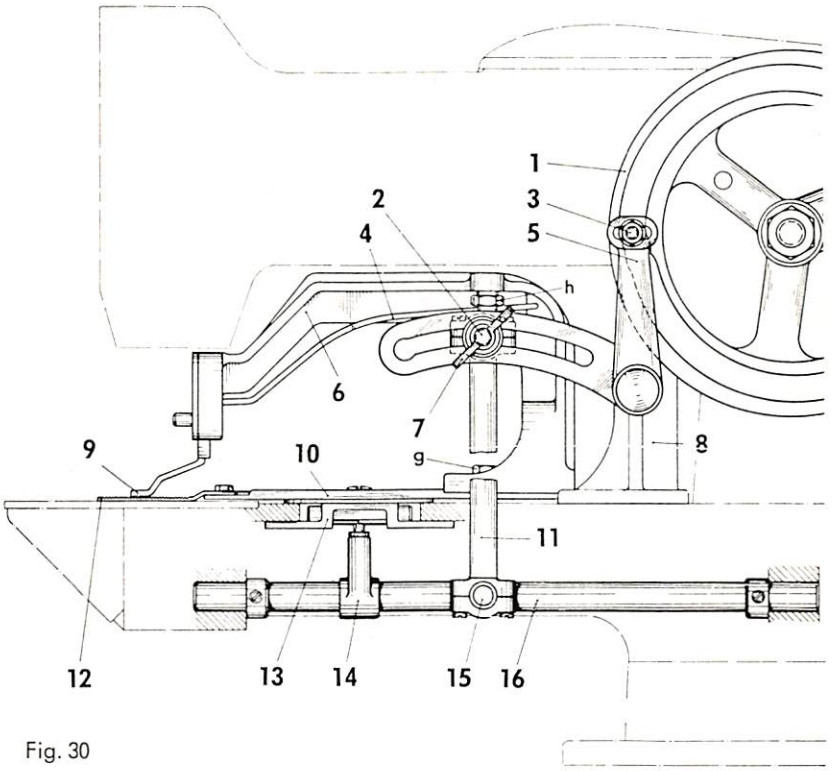
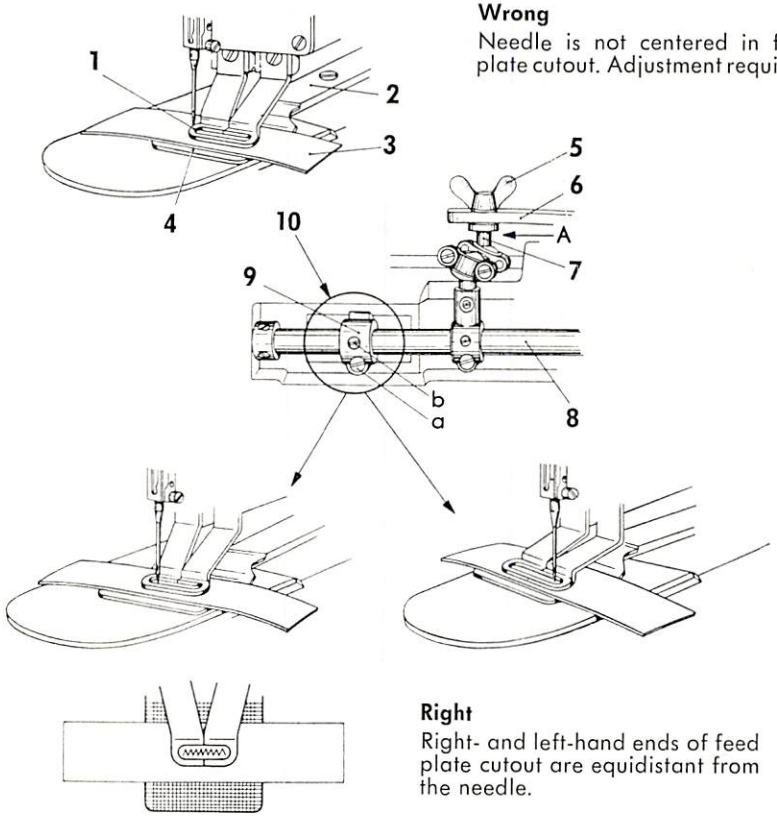


Fig. 30

1 = Feed cam
2 = Ball screw stud
3 = Roller stud
4 = Pressure spring
5 = Feed across regulator
6 = Work clamp frame
7 = Wing nut
8 = Bearing bracket
9 = Work clamp foot
10 = Feed plate carrier bar
11 = Ball joint connection
12 = Feed plate
13 = Feed across driving block
14 = Feed across shaft crank, front
15 = Ball stud
16 = Feed across shaft

As a result of this adjustment, the stitches are spaced farther apart or packed more closely together, while the total number of stitches per tack remains unchanged. If the stitches are spaced too far apart, the tack looks ugly. And, conversely, if they are packed too closely together – – particularly in leather or plastic material – –, the thread is likely to cut through the material. To facilitate establishing the correct amount of crosswise clamp travel, the adjustability of ball screw stud **2** has been limited to suit the type of work being performed by a given subclass machine.



Wrong
Needle is not centered in feed plate cutout. Adjustment required.

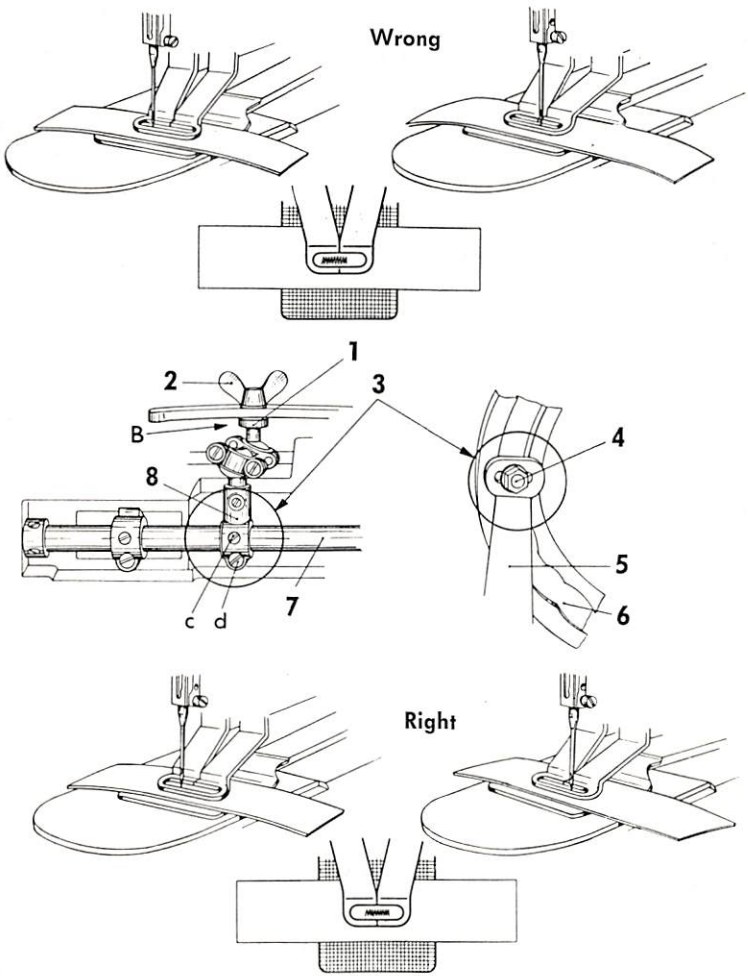
Right
Right- and left-hand ends of feed plate cutout are equidistant from the needle.

1 = Work clamp feet
2 = Feed plate carrier bar
3 = Workpiece
4 = Feed plate
5 = Wing nut
6 = Feed across regulator
7 = Ball screw stud
8 = Feed across shaft
9 = Feed across shaft front crank
10 = Adjust

Fig. 31 Timing the feed across motion

Important

The right and left ends of the feed plate cutout must be equidistant from the needle hole when the feed plate is at the extreme right or left of its throw. Check this setting for the largest and smallest amount of crosswise clamp travel.



1 = Ball screw stud
2 = Wing nut
3 = Adjust
4 = Roller stud
5 = Feed across regulator
6 = Feed cam
7 = Feed across shaft
8 = Feed across shaft rear crank

Fig. 32 Timing the feed across motion

To adjust, set the roller stud in the middle of the elongated hole in the feed across regulator (Fig. 32). Loosen wing nut **5** (Fig. 31), and move ball screw stud **7** to its extreme left position in the slot of the feed across regulator (marked A in Fig. 31). The machine is now set for the largest amount of crosswise clamp travel. Turn the driving pulley, and check whether the right- and left-hand ends of the feed plate cutout are equidistant from the needle hole when the feed plate is at the extreme right or left of its throw. To adjust, loosen screws **a** and **b** on the feed across shaft front crank and adjust the position of the feed plate, as appropriate.

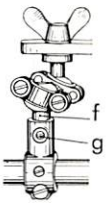
Move ball screw stud **7** to the right in the slot of the feed across regulator as far as it will go, thus setting the machine for the smallest amount of crosswise clamp travel. This position is marked B in Fig. 32. As you turn the driving pulley, check to see that the short tack side is centered within the long tack side produced with the previous setting. If adjustment is required, loosen screws **c** and **d** on the feed across shaft rear crank, and move the crank slightly to the right or left on the shaft until the correct setting is obtained (Fig. 32).

Again set the machine for the largest amount of crosswise clamp travel, and check whether the left- and right-hand ends of the feed plate cutout are equidistant from the needle when the feed plate is at the extreme right or left of its throw. If necessary, adjust as instructed above.

Provided the adjustment has been made conscientiously, tacks of all sizes will be correctly centered in the feed plate cutout.

If the small tack is positioned to the left of the center line of the large tack, move the feed across shaft rear crank slightly to the left. And, conversely, if it is positioned too far to the right, move the crank slightly to the right.

Fig. 33

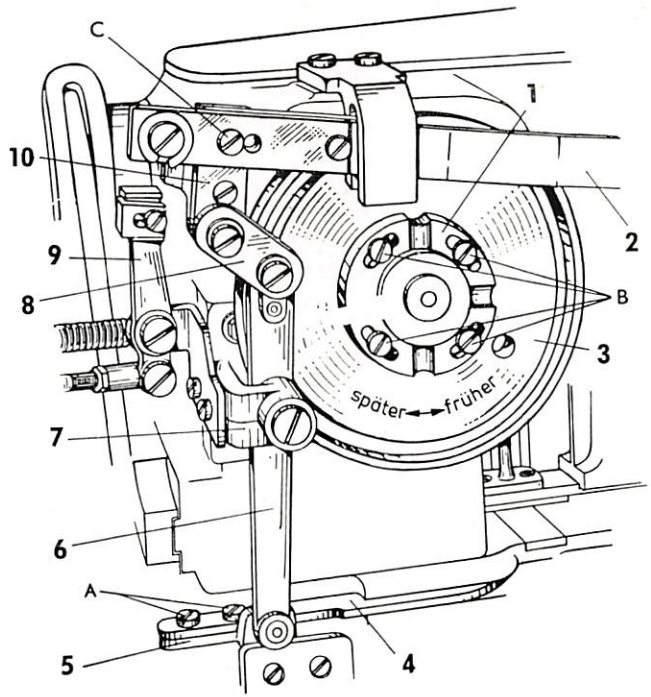


The width of the tack can be adjusted within certain limits by moving ball stud **f** lengthwise of the feed across shaft.

c. Timing the Thread Trimming Action

(1) Adjusting the Knife Bar

The knife bar carries an adjustable fork at its rear end which is secured in position by two screws **A** (Fig. 34) and, hence, can be adjusted as may be required. The knife bar is positioned correctly if there is a clearance of $^{9}/_{32}$" to



1 = Knife cam positioning flange
2 = Lifting lever
3 = Knife cam
4 = Knife bar
5 = Knife bar tripping fork
6 = Knife bar tripping lever
7 = Bearing bracket
8 = Ball joint connection
9 = Locking lever
10 = Bracket

Fig. 34 Knife tripping mechanism

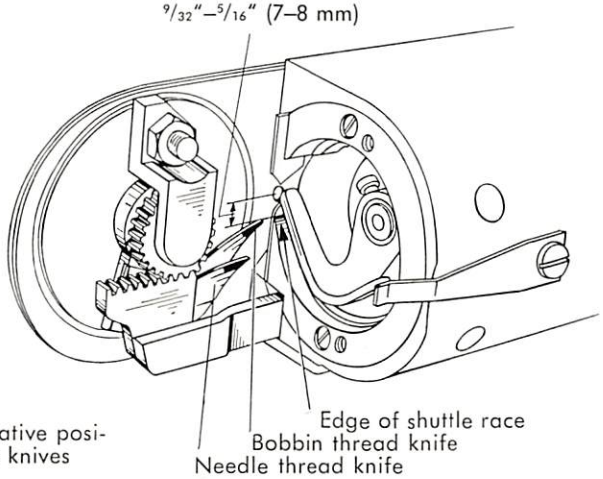


Fig. 35 Inoperative position of knives

5/16", or 7 to 8 mm, between the tip of the bobbin thread knife and the needle hole when the knife is inoperative (Fig. 35). Except when the machine makes the last stitch of a tack and the first four stitches of the next tack the knives remain at their inoperative position throughout the sewing cycle.

(2) Knife Cam

Shortly before the machine stops, the knife cam causes the knives to swing forward from the inoperative to the stand-by position. At the same time, the needle thread loop formed during the last stitch is pulled over the back edge of the needle thread knife. The bobbin thread is caught simultaneously by the tip of the bobbin thread knife and pulled sideways so that it is positioned in front of its cutting edge. The threads, however, are not cut until the left treadle is depressed to raise the work clamp after the machine has stopped.

The knife cam is screwed to a positioning flange and, hence, can be easily rotated on the worm wheel shaft. By turning the knife cam on its shaft, the trimming action can be precisely synchronized with the needle motion. The trimming action normally should start when the needle begins to descend for its last stitch. (The gear ratio between worm and worm wheel is 1:42).

Make particularly sure that the needle is not deflected by one of the knives or even strikes them. Also check to see that the shuttle grips the needle thread loop securely as the needle ascends after the last stitch has been made. Take care that the needle does not come into contact with the knives when the machine makes the first four stitches of the next tack. If the knife cam is designed to make more than one tack per revolution (there are 2-, 3-, 4-, and 6-cycle cams), the trimming action must be checked for each needle cycle. If the settings should differ, use an intermediate setting.

To make sure that the play which might be present in the trimming mechanism does not cause the needle to hit the knives occasionally, turn the driving pulley clockwise (as viewed from the rear), and see whether the needle contacts the knives. If adjustment is needed, correct the setting of the knife bar.

After the knives have been set correctly, depress the treadle to see whether the lifting lever turns easily. As the treadle is depressed, the roller at the top end of the knife bar tripping lever must snap into the depression in the channel track of the knife cam.

With machines having different gear ratios, such as 1:21, 1:28, and 1:36, minor deviations from the above setting may be necessary. On machines having a 1:28 gear ratio, for instance, the knives must be set to swing forward to the stand-by position somewhat later.

d. Adjusting the Work Clamp

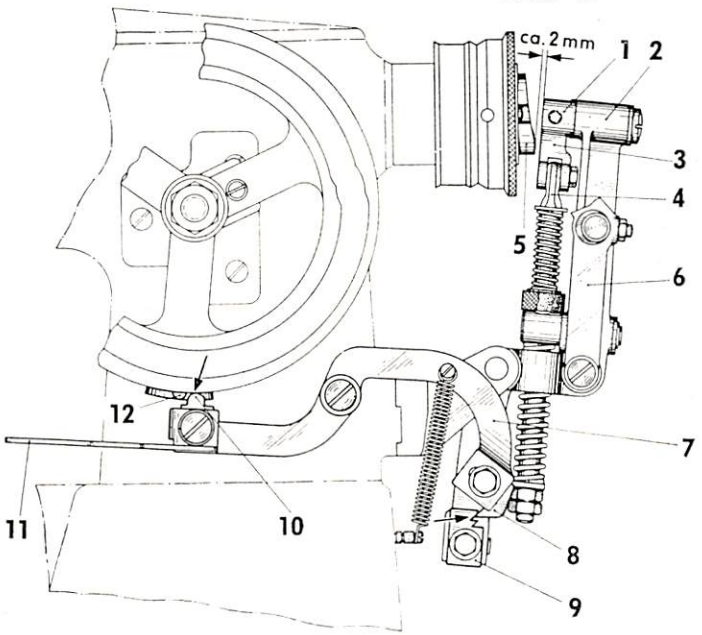
Adjust the work clamp frame on the feed plate carrier bar so that the needle will neither be deflected by, nor strike against, the work clamp feet, regardless how large the tack may be. The work clamp spring pressure can be regulated by nut **h** (Fig. 30).

The clamp foot lifting lever (Fig. 2) must not contact the lifting studs protruding from the work clamp face plate as, otherwise, the work clamp feet will not press the material against the feed plate firmly. After the machine has completed the last stitch and stopped, adjust the presser bar and the clamp foot lifting lever so that the top edge of the latter is positioned just below the work clamp foot lifting studs.

e. Timing the Stop Motion

(1) Stop Motion Lever

Adjust both the tripping lever latch and the stop motion lever catch (Fig.36) so that the latch will leap about halfway into the upper notch of the catch about $^{5}/_{64}$"



1 = Hinge stud
2 = Stop motion lever
3 = Stop link
4 = Stop link rod
5 = Stop cam
6 = Brake lever
7 = Tripping lever
8 = Latch
9 = Catch
10 = Tripping dog
11 = Hand stop lever plate
12 = Stop tripping segment

Fig. 36 Stop motion

when the right treadle is depressed to start the machine. Also see that there is a clearance gap about 5/64", or 2.0 mm, wide between the front edge of the stop link and the lobe on the face of the stop cam (Fig. 36) when the machine is in operation.

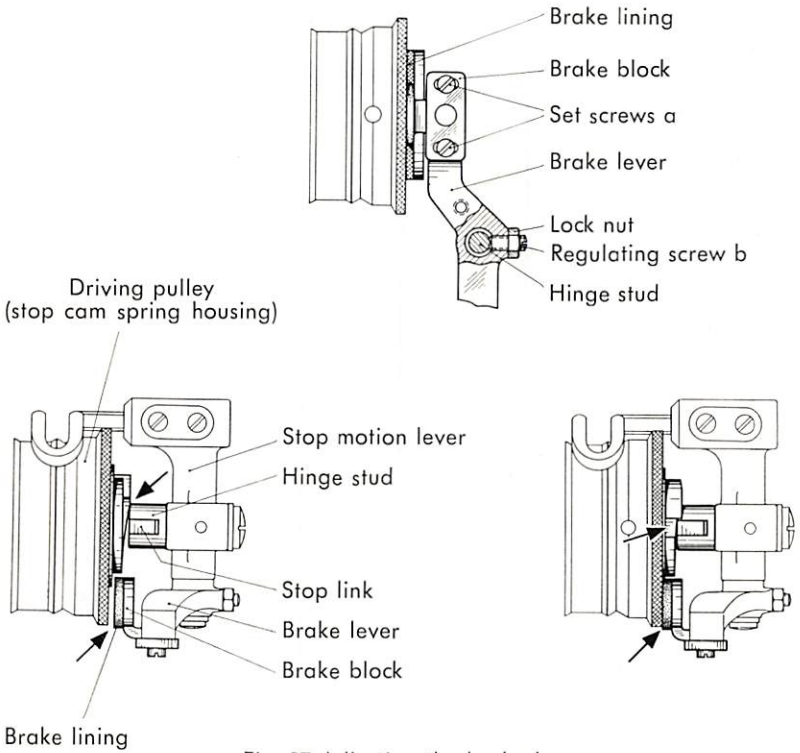
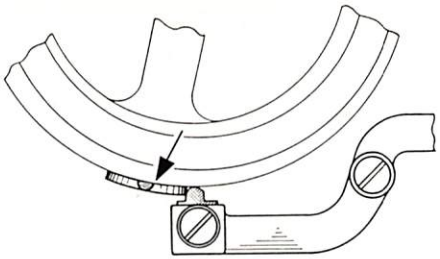


Fig. 37 Adjusting the brake lever

Make particularly sure that the stop link snaps into the groove of the stop cam freely. The tension springs must be strong enough to pull the stop motion and brake lever assembly securely against the stop cam when the machine stops. The stop link should be allowed only a small amount of play in the stop cam groove. If the edges of the stop link or the stop cam are worn, these parts must be replaced instantly.

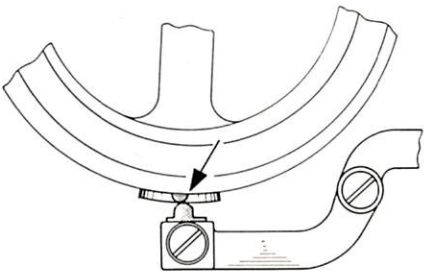
(2) Tripping Lever

Adjust the height of the tripping dog at the front end of the tripping lever so that the stop tripping segment on the rim of the feed cam will depress it far enough to ensure secure stopping of the machine.



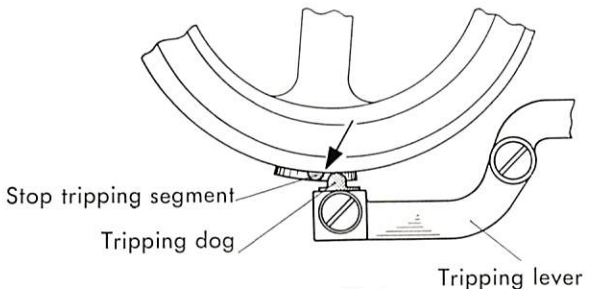
Wrong

Fig. 38 Stop tripping segment set too far ahead so that stop motion is tripped too early



Wrong

Fig. 39 Stop tripping segment set too far back so that stop motion is tripped too late



Right

Fig. 40 Stop tripping segment set correctly

(3) Brake Lever

The brake mechanism serves to slightly reduce the sewing speed shortly before the machine stops.

Adjust so that the brake block is pressed against the driving pulley when the latter has only half a revolution to go before the machine stops. When it has stopped, check whether the brake lever can be pulled away from the pulley by about 5/64", or 2.0 mm. To adjust, loosen brake block set screws **a** (Fig. 37) and the lock nut on stop screw **b** and turn the latter in or out, as appropriate.

1 = Lifting lever
2 = Knife bar tripping lever
3 = Bearing bracket
4 = Bracket
5 = Ball joint connection
6 = Locking lever
7 = Catch
8 = Lifting lever stop

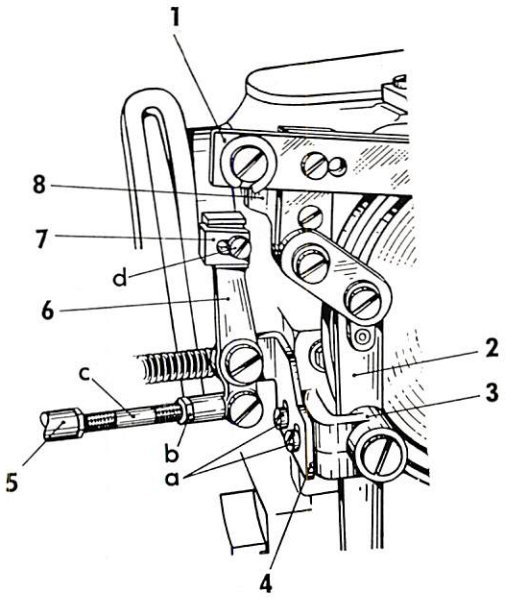


Fig. 41 Adjusting the locking lever

(4) Stop Tripping Segments

Adjust the stop tripping segments on the rim of the feed cam so that the tripping dog at the front end of the tripping lever will hit the rim of the feed cam right behind the stop tripping segment when the machine is started (Fig. 40).

(5) Locking Lever

The locking lever serves to lock the lifting lever in position and prevent the work clamp from being raised inadvertently before the stitching cycle is completed. In addition, it prevents starting of the machine before the work clamp has been lowered onto the goods. To adjust, loosen screw **d** (Fig. 41) and move the catch at its top end to the right or left, as may be required.

(6) Belt Shifter

After you have loosened the set screws, adjust the belt shifter so that the belt runs in the groove of the driving pulley (without chafing against the belt shifter) when the machine is started, and is securely shifted to the idler pulley when the machine is about to stop (Fig. 11).

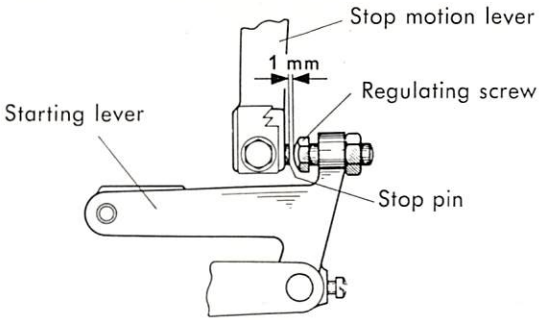


Fig. 42 Adjusting the starting lever

(7) Starting Lever

There should be a clearance of about .04", or 1.0 mm, between the stop pin of the stop motion lever and the regulating screw (Fig. 42) when the machine has stopped. If adjustment is required, turn the regulating screw in or out, as appropriate. A wider clearance gap would result in a greater delay when depressing the treadle to start the machine.

f. Timing the Thread Nipper and Adjusting the Thread Tension

(1) Thread Nipper

The thread nipper should become operative when the machine has stopped after having completed the last stitch. To adjust, loosen screw **b** (Fig. 44) and set finger (22335) so that it is positioned as close to the near end of the depression in the rim of the feed cam as possible when the machine stops. When engaged, the thread nipper should exert just enough pressure to permit the thread to be pulled through it smoothly. To adjust, loosen the lock nut and turn screw **a** in or out, as appropriate (Fig. 44).

The thread must remain trapped until the needle enters the material again, at which time the tripping segment should release the thread nipper. As the machine makes the next stitch, the thread must be trapped when the take-up

Fig. 43

1 = Thread nipper tripping lever
2 = Thread nipper tripping segment
3 = Finger
4 = Thread nipper closed
5 = Thread nipper open
6 = Thread nipper closed
7 = Thread nipper rod joint
8 = Thread nipper crank
9 = Thread nipper hinge stud
10 = Thread nipper rod extension
11 = Thread nipper lever
12 = Thread nipper rod
13 = Needle bar
14 = Thread nipper lever
15 = Thread nipper spring

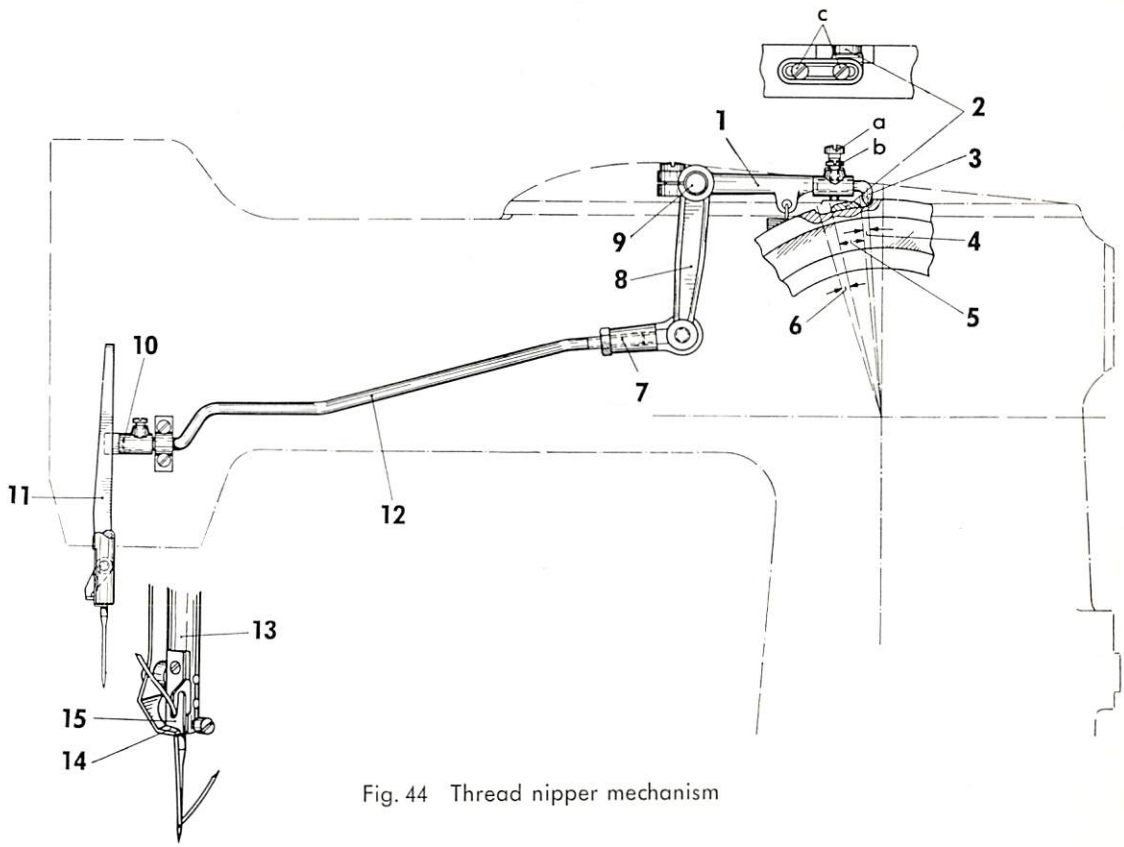


Fig. 44 Thread nipper mechanism

lever has almost reached its top position. The thread nipper should release the thread again after the needle has entered the goods.

To adjust, move the thread nipper tripping segment to or fro on the rim of the feed cam, as appropriate. Thread nipper tripping segments are available in different lengths to suit machines having different gear ratios (see Spare Parts Catalogue). The order numbers are as follows:

1:21 1:24	No. 22 504	1:28 1:32	No. 22 504	1:36 1:42	No. 22 454	1:48 1:56	No. 22 858

If several thread nipper tripping segments should be arranged on the rim of the feed cam, repeat this adjustment for each segment.

The above setting applies to normal operating conditions. If materials and threads of different weights are used on this machine, minor deviations from this basic setting may become necessary.

Make sure the thread nipper lever does not jam and the thread nipper spring releases the thread completely when the former is at its inoperative position. The thread nipper spring should extend parallel to the flat spot on the needle bar so that the thread tension will not change while sewing (Fig. 43).

The small prong of the thread nipper spring must project into the recess in the needle bar so that the thread cannot slip out of the thread nipper during sewing.

(2) Needle Thread Tensions

The Pfaff 3334 has two needle thread tensions (Fig.53).

The upper tension holds the needle thread taut while the threads are being cut. Set this tension device so that it exerts just a light tension on the thread, and the thread can be cut easily. If the tension is too light, the knives will pull an excessive amount of thread through the tension and the thread will not be caught properly. If the tension is too tight, the thread will be cut too early, leaving too short a thread end.

The lower, or main, tension holds the thread taut while the stitch is being set in the material. Begin by setting the upper tension. Then set the main tension so that the stitch will be pulled into the fabric properly.

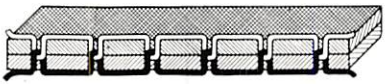
The main tension remains inactive during the first four stitches of the tack in order to prevent the fabric from being contracted while the first long stitches are being sewn. (This applies only to bartacks made with exceptionally long starting stitches and on very thin fabric). The main tension remains inactive also during the last stitches of the needle cycle so that an adequate amount of thread can be pulled through the tension for the trimming action.

(3) Bobbin Thread Tension

Set the bobbin thread tension so that the bobbin thread will be pulled into the fabric correctly. Make sure, however, that the tension is not too light as otherwise the bobbin thread will not be cut.

Correct Tension Regulation

Fig. 45



The neat appearance of the finished seam and its durability greatly depend on the correct regulation of tensions. The tensions are correctly balanced if the needle and bobbin threads interlock in the center of the material, as illustrated.

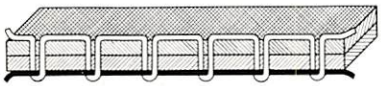


Fig. 46

This seam looks ugly and is not durable. The bobbin thread pulls the needle thread to the underside of the fabric as the stitch is being formed.

Cause: Needle thread tension too weak, or bobbin thread tension too tight.

Remedy: Increase needle thread tension or decrease bobbin thread tension.

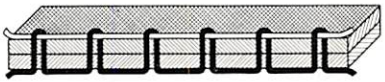


Fig. 47

This seam looks ugly and is not durable. The needle thread pulls the bobbin thread to the surface of the fabric as the stitch is being formed.

Cause: Needle thread tension too tight, or bobbin thread tension too weak.

Remedy: Decrease needle thread tension or increase bobbin thread tension.

(4) Lifting Lever

After the machine has stopped, the left treadle is depressed to pull down the lifting lever and raise the clamp feet. At the same time, the knife bar is actuated and causes the knives to swing forward from the stand-by to the cutting position. This action causes the needle thread loop to be pulled over the cutting edge of the needle thread knife and be trimmed. Simultaneously, the bobbin thread which passes in front of the cutting edge of the bobbing thread knife is pulled taut and cut.

To adjust the throw of the knives, loosen screw **C** (Fig. 34) and move the bracket on the lifting lever forward or backward. The setting is correct if the tip of the bobbin thread knife is flush with the edge of the needle plate when the lifting lever has been depressed completely.

(5) Knives

There are two types of knives with which the Pfaff 3334 can be fitted:

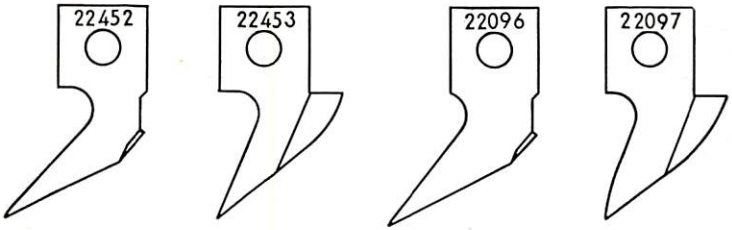


Fig. 48 Knife styles

The narrower the knives, the smaller will be the amount of thread that is pulled from the spool while the last stitch is being made, and the shorter will be the thread end with which to start the next tack. The shorter the amount of thread with which to start the tack, the shorter will be the thread ends which are left on the underside of the fabric when the first stitch is made. The amount of thread with which to start the next tack must be long enough to prevent the needle from becoming unthreaded when the first stitch is made. Furthermore, it must be adequate to ensure that the first stitch will be formed securely. Knives Nos. 22096 and 22097 normally will be quite adequate for this purpose.

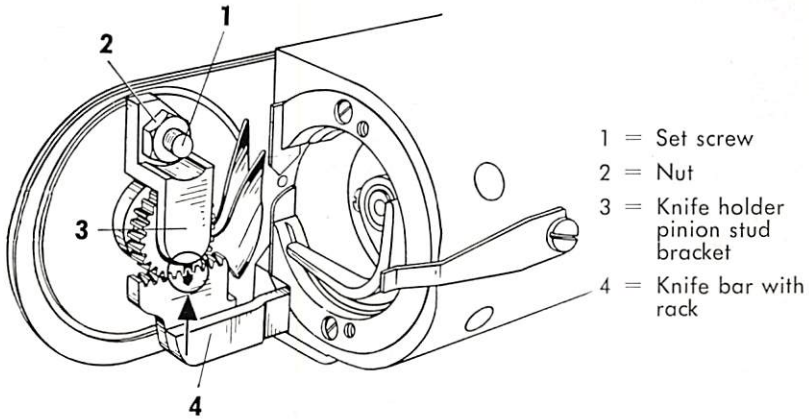


Fig. 49 Marking meshing teeth on knife pinion and rack

Changing the Knives

The knives should be sharpened from time to time, particularly when the machine is in operation costantly. To strip the knives, tilt the machine over to the left, resting it on the wooden peg. Open the cylinder bed cap,

loosen the nut on the knife pinion stud bracket set screw (Fig. 49), and take out this screw. Next, remove the knife pinion stud bracket and the knife assembly.

There is a possibility of getting at the knives without removing the knife holder pinion stud bracket. To do this, loosen the small hexagon screw **b** (Fig. 50) on the feed plate, and pull the feed plate up out of its mount. After removing the four needle plate set screws, both the needle plate and the trimming mechanism can be pulled forward out of the machine.

The knives are secured to the knife carrier only by screw **a** (Fig. 50). Take out this screw and sharpen the knives with a knife grinder, or replace them by new ones.

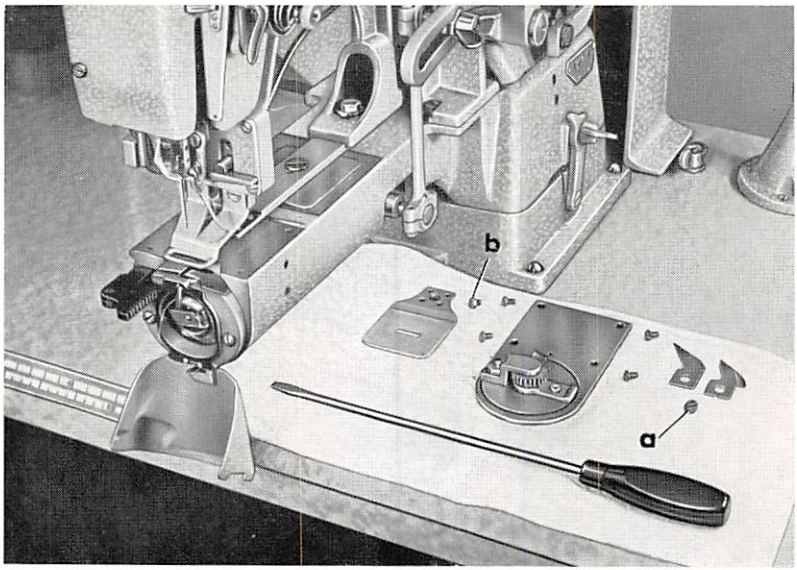


Fig. 50 Changing the knives

When you sharpen the knives, take care that the cutting edge is not simply polished, but really sharpened, and that the tips are well polished and free from jags (Fig. 51).

In replacing the knives, make sure they fit in the knife carrier groove correctly. Then tighten screw **a** securely. The meshing teeth of both the rack and the pinion are spotted (Fig. 49) so that the knife bar need not be readjusted after the knife assembly has been replaced. To replace the knife assembly in the machine, simply reverse the above procedure.

To ensure that the trimming mechanism will function correctly, coordinate the functions of both needle thread tensions properly. The upper needle thread tension normally must be lighter, while the lower needle thread tension should be tighter.

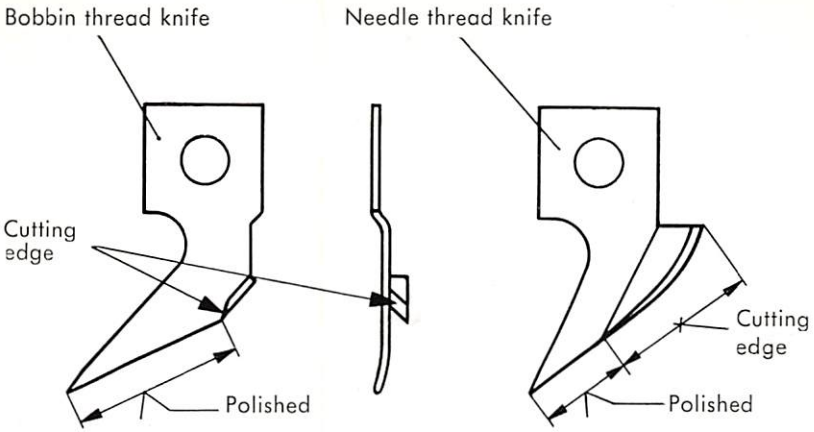


Fig. 51 How to sharpen the knives

(6) Adjusting the Stroke of the Thread Check Spring

The thread check spring performs the function of thread control, i.e. it retains the excess thread which is created as the take-up lever descends (but is not yet needed), and holds it back until the needle enters the goods.

The stroke of the thread check spring is checked by a stop and can be adjusted by rotating this stop, as may be required. To do this, loosen the set screw and turn the stop to the right or left, as appropriate.

The check spring is set correctly if it has completed taking up the balance of the thread when the needle stitches into the fabric.

Needle and Thread Chart

Needle Size	Thread Weight		Needle Size	Thread Weight	
70	Cotton	100/4	100	Cotton	40/4
	Silk	A		Silk	C & D
	Nylon	00		Linen	80–90
				Nylon	D
80	Cotton	60/4	110	Cotton	36/3
	Silk	A & B		Silk	D
	Nylon	0		Linen	60–80
				Nylon	D
90	Cotton	50/4	120	Cotton	30/3
	Silk	B & C		Silk	D
	Nylon	C		Linen	60/3
				Nylon	F

4. Stitching-Off

After the machine has been adjusted, stitch it off carefully. In order to be able to stitch off the machine correctly, ask your customer to submit a sufficient amount of thread and fabric as well as a specimen of the finished work.

a. Sewing Thread

The Pfaff 3334 handles all customary branded threads of silk, cotton, linen, nylon, etc., without any difficulty.

Select the proper needle and thread from the Table on page 59.

b. Needle

Insert the needle into the opening of the needle clamp so that its long groove faces toward you.

The Pfaff 3334 normally uses the following needle systems:

System 34 R (or LR) for Model B machines, and
System 332R (or LR, D, etc.) for Model C machines.

System 34 needles can be used only for needle sizes up to No. 110 because all needles of a larger size (No. 120 and up) have a thicker shank. Take care that the needle does not enter the fabric up to the shank as this might shear off the thread. If System 34 needles should prove too short, use system 31x1 or 68x13 needles. Needles of this System fit the needle bar also in sizes 120 and 130, and require only a slight vertical adjustment of the needle bar. If your customer wants to use needles thicker than No. 110, System 34 R needles can be replaced by System 287 needles. All Model C machines feature a needle bar which is fitted to receive System 332 (29x1) needles.

Earlier machines (manufactured up to April, 1954) were fitted with a needle bar for System 134 and 134-35 needles.

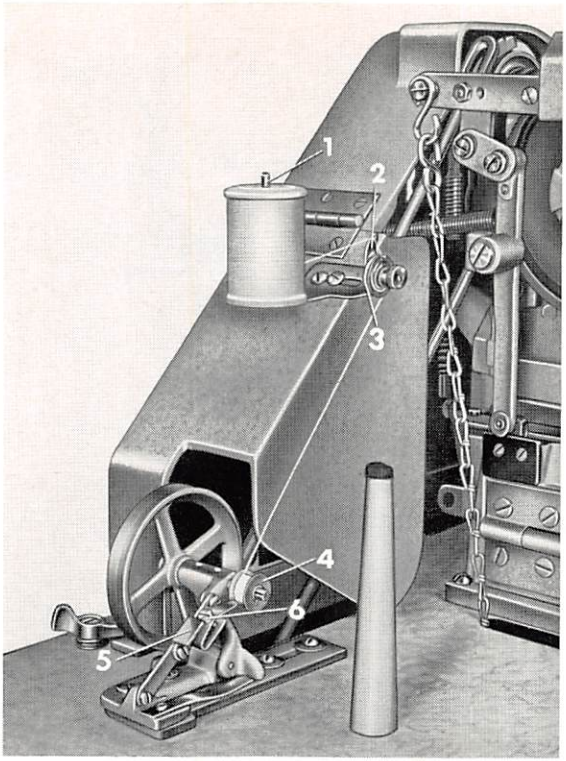


Fig. 52

c. Bobbin Winding

Place the bobbin winder on the table so that its pulley will not contact the machine belt when the winder is disengaged, and screw it down (Fig. 52). The bobbin winder tension is arranged on the belt guard and can be adjusted sideways to bring bobbin and tension in line. To do this, loosen the two screws on the tension bracket.

Place a spool of thread on spool pin 1 and an empty bobbin on the bobbin winder spindle. Lead the thread from the spool through thread guide 2 (from back to front), around and between tension discs 3, and down to bobbin 4. Pull the thread through the slot in the bobbin, from the inside, and press in lever 5. Hold the end of the thread and start the machine. Having wound a few turns, break off the thread end and continue winding.

The amount of thread to be wound on the bobbin is regulated by screw 6, as follows:

Turn screw right for more thread,
or left for less thread.

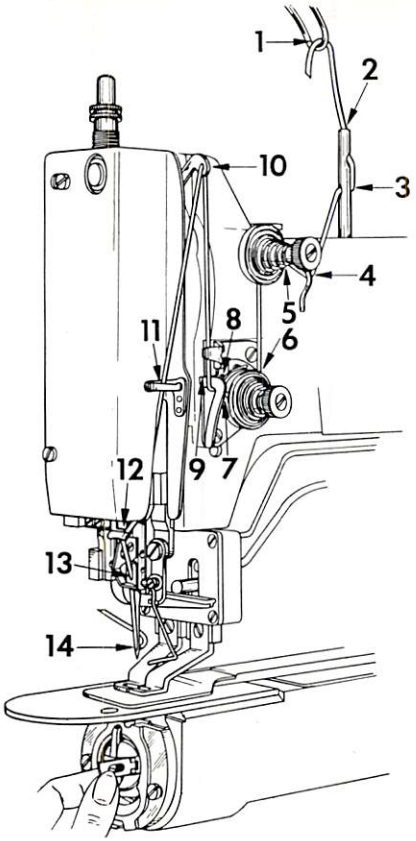
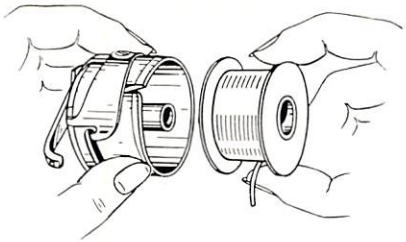


Fig. 53

d. Needle Threading

Pass the thread from the spool on the thread stand up and through thread guide 1, through holes 2 and 3 of the spool pin, below thread guide 4, over and from right to left around and between the tension discs of upper tension 5 and lower tension 6, as illustrated in Fig. 53. Pull the thread through the thread check spring, below thread guide 8, through hole 9, to take-up lever 10, from right to left through the hole of the take-up lever, down and through thread guides 11 and 12, between thread nipper spring and needle bar, and from front to back through the needle eye.



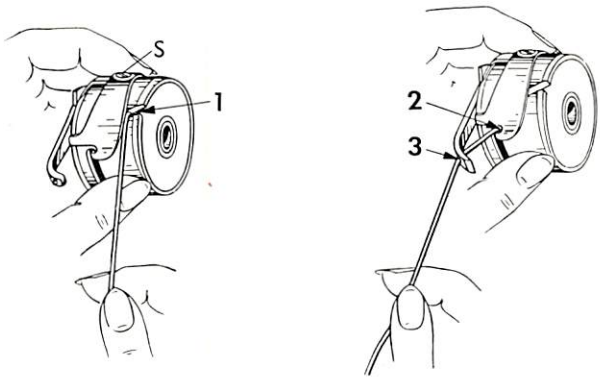


Fig. 54

e. Threading the Bobbin Case

Place bobbin into the bobbin case so that it revolves clockwise when you pull the thread. Then draw the thread into slot 1, and pull it under the tension spring into delivery eye 2. Make sure the thread is drawn behind the prong of the tension spring so that it will not slip out of the delivery eye. Lead the thread through the hole of position finger 3 (Fig. 54).

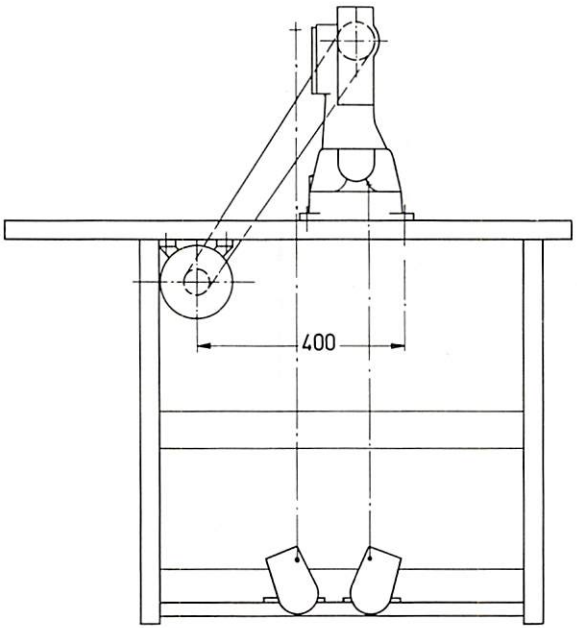
f. Inserting the Bobbin Case

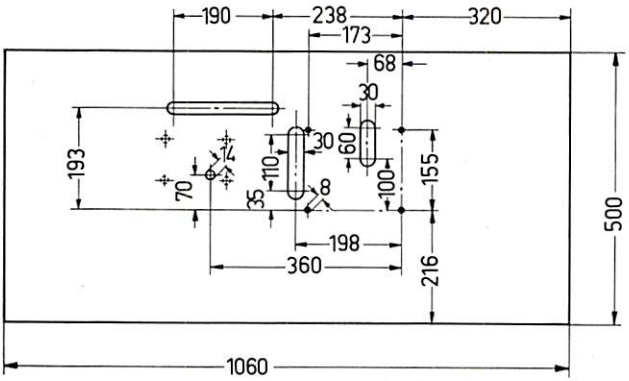
In inserting the bobbin case, make sure the position finger enters the slot in the shuttle race ring, and the loose end of thread does not get jammed between position finger and edge of slot. Press against the bobbin case until you hear it snap into place.

5. Setting-Up

a. Individual Power Drive

If the machine is set up for individual power drive, power is transmitted from the motor pulley to the driving and idler pulleys of the machine by means of a $^{9}/_{32}$"-dia. round belt (Fig. 55).





Figs. 55 & 56 Pfaff 3334 set up for individual power drive

The electric motor driving the machine should have a power input of 1/3 HP (0.25 kw) and operate at 1,400 r.p.m. It should be fitted with a single-groove pulley having a diameter of 1 31/32", or 50 mm (Order No. 99032). This pulley develops a sewing speed of about 1,000 s.p.m.

If, in exceptional cases, a high-speed motor operating at a speed of 2,800 r.p.m. is used, place a two-speed pulley, No. 31326, between motor and machine pulleys.

Electrical Information

Make sure the motor is properly connected to the power supply. When connecting a motor to a 220/380-volt, three-phase A.C. line having a working voltage of 380 volts (see electric meter), use the star connection. The delta connection is used for lines having a working voltage of 220 volts. To change from one connection to the other, simply rearrange the bridges on the motor terminal board, as illustrated in Figs. 57 & 58. Before you connect a motor to another three-phase A.C. line (e.g. 127/220 volts), make sure its working voltage is the same as the line voltage. The motor pulley should turn counter-clockwise so that the belt rotates the machine pulley at the top from the belt shifter toward the left, i.e. counter-clockwise. To reverse the direction of rotation, simply interchange wires R and T.

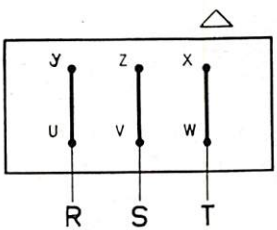


Fig. 57 Delta connection

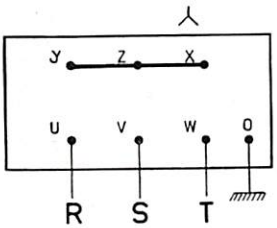


Fig. 58 Star connection

Connecting the Treadle Chain

The longer chain serves to raise the work clamp. Attach the chain to hook **A** on lifting lever **B** (Fig. 59), pass it through the hole in the tabletop, and connect it to the left treadle. The short chain is hooked into the hole at the front end of starting lever **C** (Fig. 60) and attached to the right treadle. To do this, tilt the machine back.

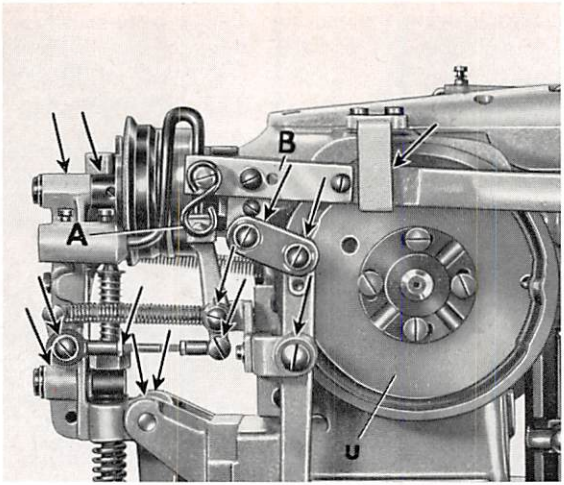


Fig. 59 Attaching the long chain

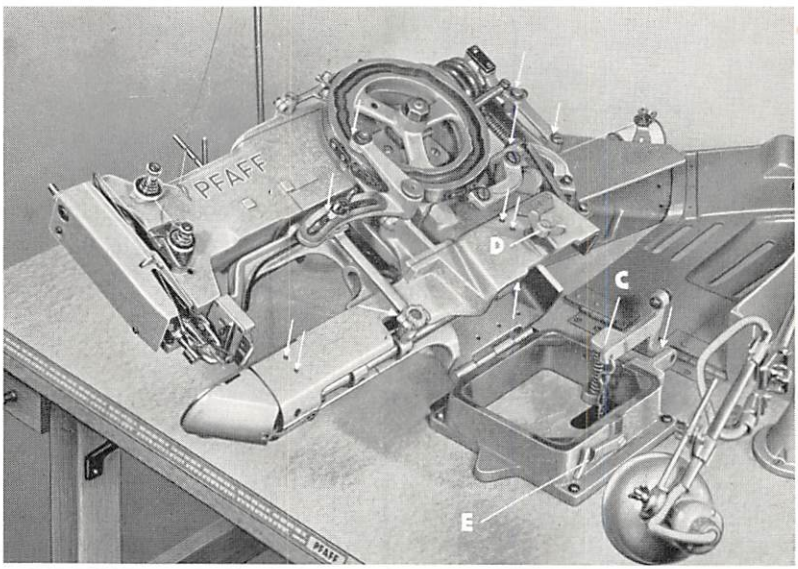


Fig. 60 Attaching the short chain

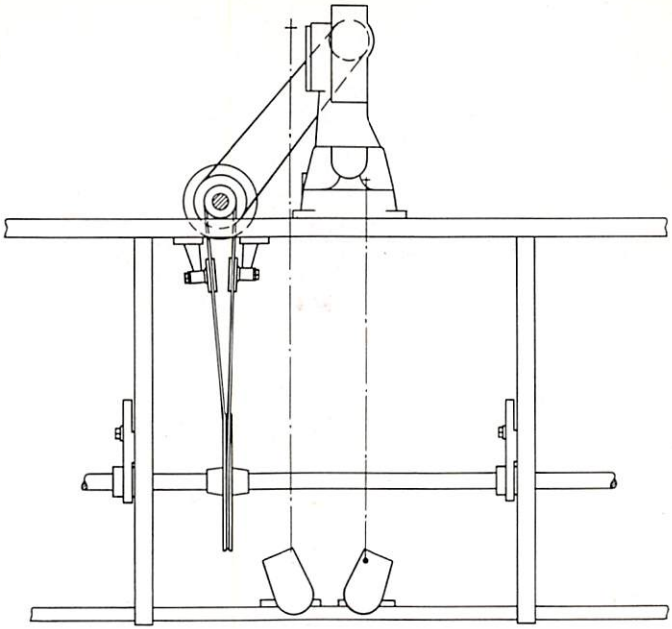


Fig. 61 Pfaff 3334 set up on power benching

b. Bench Power Drive

Power is transmitted from a pulley on the line shaft (Fig. 61) to two jockey pulleys No. 31321 and No. 31323 and thence to the large-diameter pulley of two-speed pulley assembly No. 31326. Mount the driving belt on the small-diameter pulley of the two-speed pulley assembly.

To obtain the rated sewing speed of 1,000 s.p.m., select the correct size of the line shaft pulley from the following table:

Line Shaft Speed RPM	Line Shaft Pulley Dia. Inches	Millimeters	Pulley No.
300	$15^{3}/_{4}$	400	30637
350	$13^{25}/_{32}$	350	30627
400	$7^{7}/_{8}$	200	30553

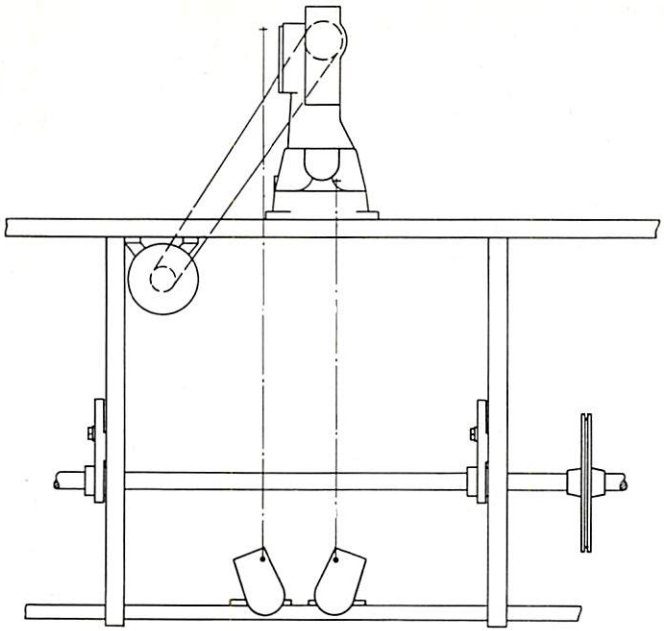


Fig. 62 Individually powered machine on power benching

c. Individually Powered Machine on Power Benching

The Pfaff 3334 can be set up on existing power benching while being driven by an individual motor. This arrangement (Fig. 62) is much more favorable than driving the machine from the line shaft. The special advantage of this setup is that the machine can be put out of operation, as may be required.

All that is required to drive a machine of this type is a short belt. Compared with line shaft drive, this belt can be mounted more easily and will hardly slip.

A tabletop provided with the necessary cutouts and boreholes can be obtained from Pfaff at extra charge.

6. Subclass Conversion

Parts which differ with each subclass are compiled in the Annex. (See also Form No. 10080, Subclass Organizations of the Pfaff 3334).* Such parts are essentially the feed cam, the clamp feet, and the feed plate. If the worm gear assembly has to be exchanged in order to convert one subclass machine into another, it is advisable to ship the machine to your nearest Pfaff distributor.

a. Changing the Feed Cam

Unscrew wing nut **6** (Fig 63), loosen binding screw **9,** and strip feed across regulator **5.** Unscrew nut **4,** and pull the feed cam off its shaft. In placing the new feed cam on its shaft, make sure the rollers ride in the pattern-forming grooves without having any play. Tighten nut **4,** and check to see that the rollers do not chafe against the bottom of the grooves (see clearance marked "x" in Fig. 63). If the roller in the rear groove should chafe against the bottom of this groove, place a spacer between the hub of the cam and the positioning flange on the worm wheel shaft. If the roller in the front groove should chafe against the bottom of this groove, place a spacer between the feed across regulator and its bearing bracket.

1 = Feed cam
2 = Roller
3 = Roller stud
4 = Nut
5 = Feed across regulator
6 = Wing nut
7 = Ball screw stud, upper
8 = Hinge stud
9 = Binding screw
10 = Ball joint connection
11 = Ball stud, lower
12 = Feed across shaft
13 = Feed across shaft crank, rear

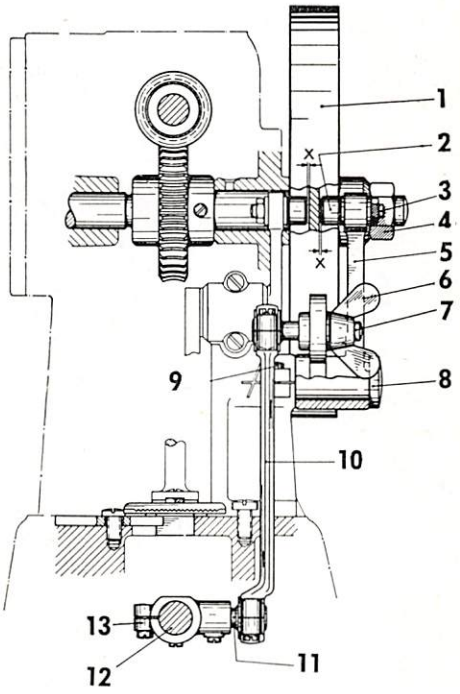


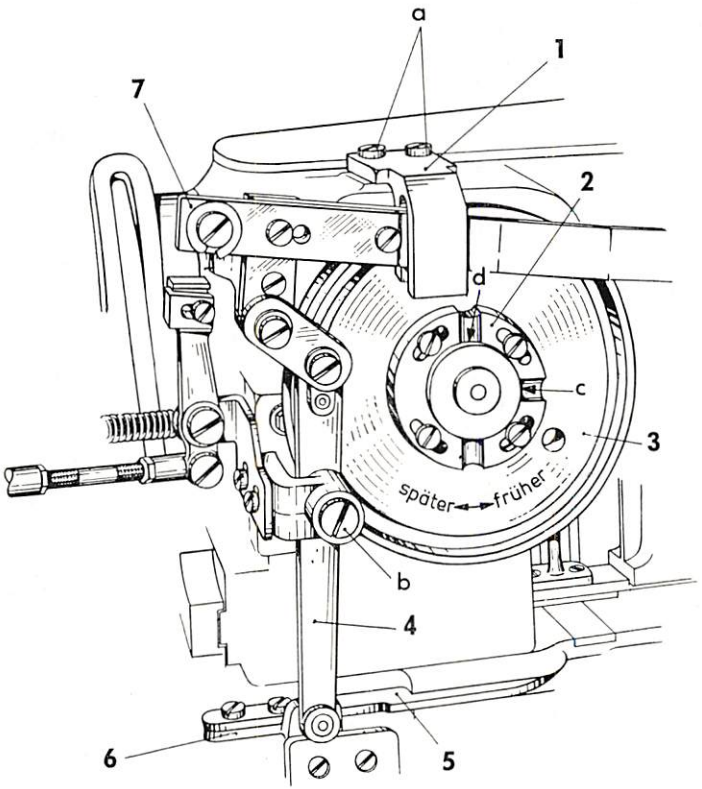
Fig. 63 Exchanging the feed cam

* Available in German only

Since minor deviations cannot be entirely eliminated in machining the feed cams, double-check the feed motion setting (see adjustment procedure on page 39). The same applies to the adjustment of the thread nipper and the stop tripping segments (see adjustment procedures on pages 53 and 52, respectively).

b. Changing the Knife Cam

Take out screws **a** on the lifting lever guide and remove the guide. Then take out screw **b** in the knife bar tripping lever bracket, and swing the lifting lever away. Loosen screw **c** and drive out taper pin **d.** Remove the knife cam with its positioning flange, and mount the new knife cam in reverse order (Fig. 64).



1 = Lifting lever guide
2 = Knife cam positioning flange
3 = Knife cam
4 = Knife bar tripping lever
5 = Knife bar
6 = Knife bar tripping fork
7 = Lifting lever

Fig. 64 Exchanging the knife cam

c. Changing the Work Clamp Feet

To exchange the work clamp feet, take out set screws and pull the feet out of their mount. Having attached the new feet, check to see that the needle does not strike them. If it does, adjust the position of the work clamp.

d. Changing the Feed Plate

The feed plate can be stripped after taking out the hexagon screw. When attaching the new feed plate, check to see that its holes fit over the position pins exactly. If necessary, rework the holes with a reamer. Also make sure that the feed plate bears against the needle plate lightly, but does not press against it as this would retard the feeding motion. If adjustment is required, bend the feed plate slightly.

All other parts which may have to be exchanged are listed in Section D of this book.

7. Trouble Shooting

a. Skipped Stitches

(1) Needle bent.
(2) Needle incorrectly inserted.
(3) Needle too fine for the thread.
(4) Needle rise timed inaccurately, or needle set either too high or too low.
(5) Shuttle set too far away from needle.

b. Thread Breaking

(1) For any of the causes enumerated above.
(2) Needle point blunt or worn, or burrs and sharp edges on needle plate.
(3) Thread caught between tension discs or under bobbin case tension spring.
(4) Poor or knotty thread used.
(5) Thread tensions too loose or too tight.

c. Needle Breaking

(1) Needle bent.
(2) Needle too fine for the fabric, or deflected by hard spots in the material and struck by the point of the shuttle.
(3) Stop cam spring broken, causing irregular stopping of machine.
(4) Knives timed improperly, causing needle to strike knives.
(5) Machine feeds while needle is down in material.
(6) Needle not centered correctly in clamp feet cutout.

d. Heavy Working

(1) Lack of oil.

(2) Mechanism clogged by inferior lubricants.

(3) Pieces of thread jammed in shuttle race.

(4) Belt too long or tensioned improperly.

e. Irregular Stopping

(1) The brake mechanism does not work properly.

To adjust the brake mechanism, proceed as instructed on page 51. Take care that the brake lever tension spring is not too strong, as this might cause the machine to stop too early, particularly when the driving belt is a little slack. If, on the other hand, the tension spring is too weak, this may cause the machine to make one extra stitch, particularly when the driving belt is rather tight.

(2) The stop motion mechanism is timed improperly.

To adjust the stop motion mechanism, proceed as instructed on page 49. Make particularly sure that the stop motion lever snaps into the groove on the stop cam freely. (Check to see that the ball joint connection (22772) which connects to the lower end of the locking lever (22530) does not jam. If it does, straighten the connection).

(3) Stop cam spring is broken or has lost its resilience.

A powerful spring is housed in the hollow driving pulley and serves to absorb the momentum of the machine when it stops. Since this spring is subjected to excessive stress, it may lose its resilience or break by fair wear and tear after prolonged use. If the stop cam spring has become unserviceable, this is indicated by the irregular stopping of the machine, i.e. the needle bar is not always at the same position when the machine stops.

To replace a broken stop cam spring, remove tension springs **N** and **O** (Fig. 65), take out the hinge screw connecting the locking lever with the ball joint connection, loosen screw **K** (Fig. 66), pull out hinge stud **Q** (Fig. 65), and strip stop motion lever **p** and brake lever **R**.

Next, take out the four screws **b,** strip cap ring **A,** and remove stop cam **S** and the broken stop cam spring (Fig. 65). Clean the spring housing and all component parts.

Insertion of a new stop cam spring is greatly facilitated by the use of a special wrench which is available under No. 20057-1. To insert the new spring, proceed as follows:

a. Place one check block (Fig. 67) on the stud in the stop cam spring housing.

b. Insert new stop cam spring.

c. Insert punch **D** into hole 1 of the driving pulley, as shown in Fig. 67. Then rotate the pulley until the punch bears against the left bearing bracket.

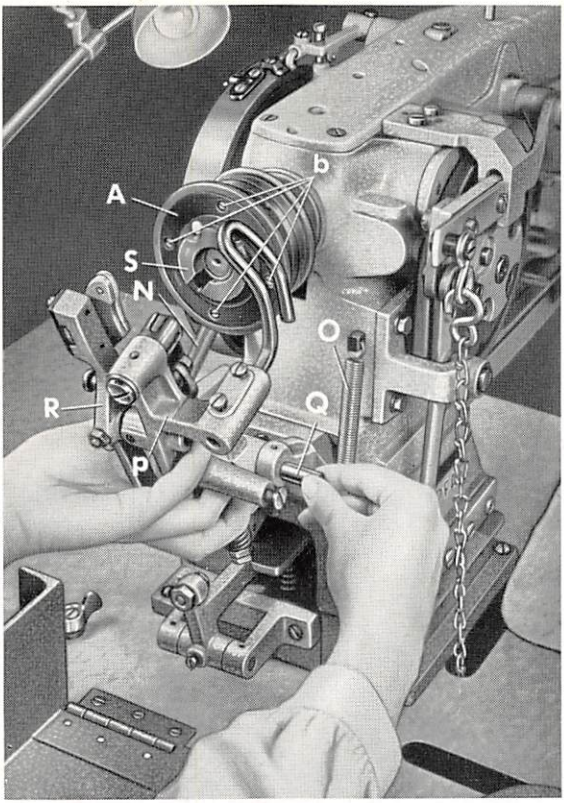


Fig. 65 Stripping the stop motion and brake levers

d. Place check block **U** on the stud of the wrench, and push the wrench onto the end of the arm shaft, as shown in Fig. 67, so that the hub of the wrench bears against the hub of the driving pulley. Now depress the wrench until the Novotex segment can be placed between both check blocks.

While holding the segment in place with your right hand, press against the wrench with the palm of your left hand so that it will not slip. Make sure the flat (long) sides of the check blocks face toward the segment and the spring. Grease the stop cam spring lavishly before you replace the stop cam.

Having replaced both the stop cam and the cap ring, check the resilience of the stop cam and see that it does not jam. (Insert a sturdy screwdriver in the groove of the driving pulley and turn it counter-clockwise). Then mount the stop motion and brake levers.

Make sure the brake lining on the brake block engages the braking surface of the driving pulley with sufficient pressure as the machine stops.

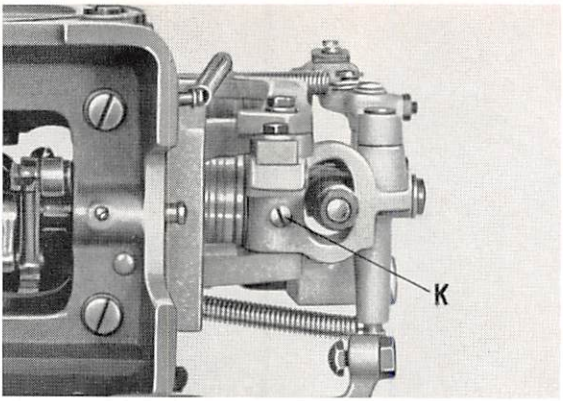


Fig. 66

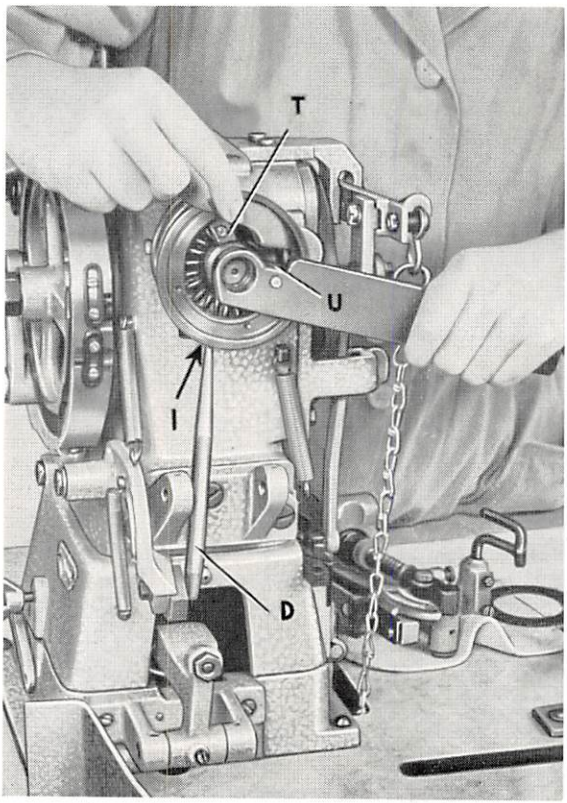


Fig. 67 Inserting a new stop cam spring

8. Machine Care

a. Cleaning and Oiling

Careful cleaning and regular oiling increase the service life of the machine and ensure smooth running.

When the machine is delivered to the customer, all polished parts are covered with a rust-preventative grease. Remove this grease, together with the dust which has accumulated in transit, before you put the machine in operation. Also, squirt an ample amount of oil into all marked oiling points, unthread the needle, take out the bobbin case, and run the machine to work the oil into all the bearings. All important oiling points are marked by arrows in Figs. 68 through 70, and by drops in Figs. 15 through 18. Wherever feasible, these oiling points are marked with red paint on the machine.

To get at the oiling points in the cylinder arm and the machine base, tip the belt guard back, loosen wing nut **D** (Fig. 60), swing away catch **E**, tilt the machine over to the left, and rest it on the wooden peg.

When the machine is in operation continuously, form the habit of removing the lint which has accumulated in the vicinity of the shuttle, and putting a drop of oil into the shuttle race. Repeat this procedure several times a day. Run the machine with a scrap of material under the work clamp to absorb all excess oil.

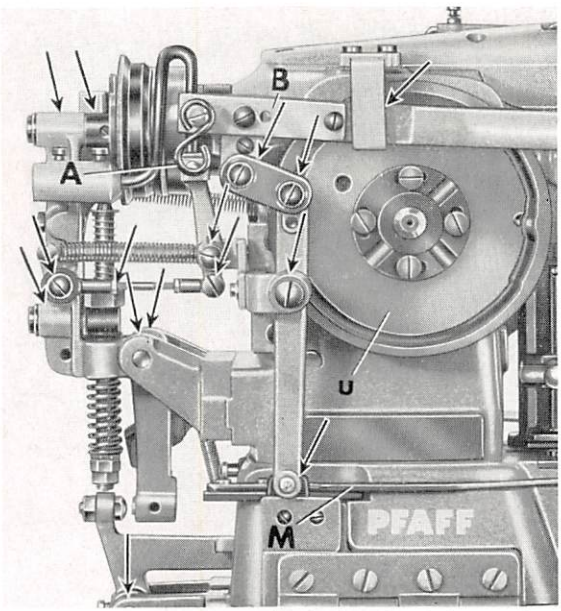


Fig. 68 Oiling points on the back side of the machine

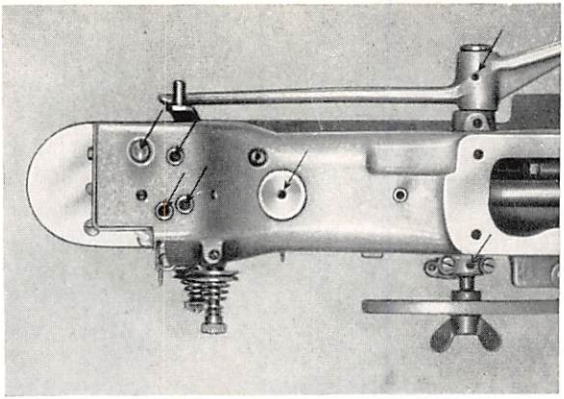


Fig. 69 Oiling points on the machine arm

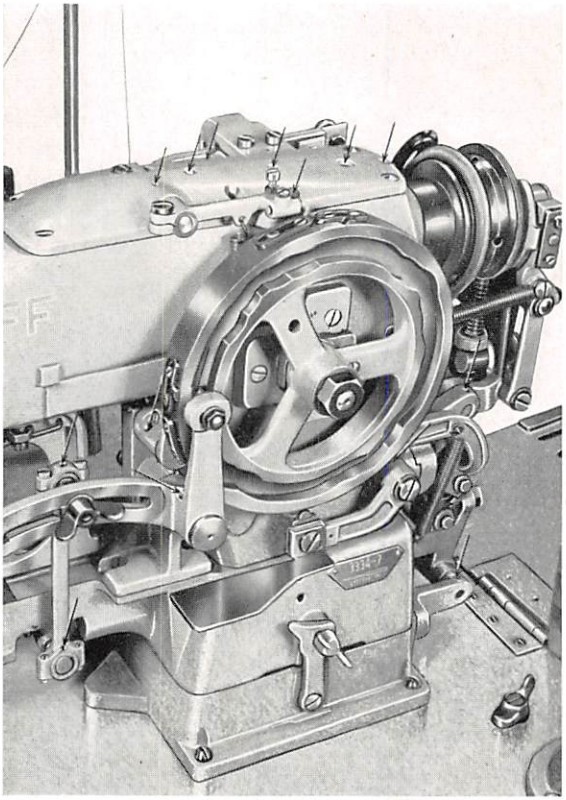


Fig. 70 Oiling points on the top cover and front of the machine

Certain sewing troubles, such as skipping of stitches or thread breaking, cannot be remedied by lavish oiling. Excessive quantities of oil are liable to soil the work or mix with the dirt and lint in the machine and cause hard running. Therefore, oil sparingly, but regularly!

Pfaff sewing machine oil is non-resinous and has the right lubricating properties for this machine. For this reason, use no other oil in this machine.

b. Dismantling the Shuttle Race

If the machine is in operation continuously, clean the shuttle race from time to time.

To dismantle the shuttle race, see that the machine is in the regular stopping position. Then tilt it over to the left, resting it on the wooden peg. Open the cylinder bed cap, press down and pull it out of the machine. Remove the bobbin case and the bobbin. Take out screws **h** and **i** (Fig. 71), strip shuttle race ring **d,** and take the shuttle out of the shuttle race. Take care that the springs on screws **h** and **i** do not get lost.

The shuttle race proper need not be stripped for cleaning. Take a pair of tweezers and remove pieces of thread that have accumulated in the area behind the shuttle race. Then, with a toothpick or similar wooden object, clean the shuttle race. Never use a metal tool for this purpose.

To assemble the shuttle mechanism, reverse the above procedure.

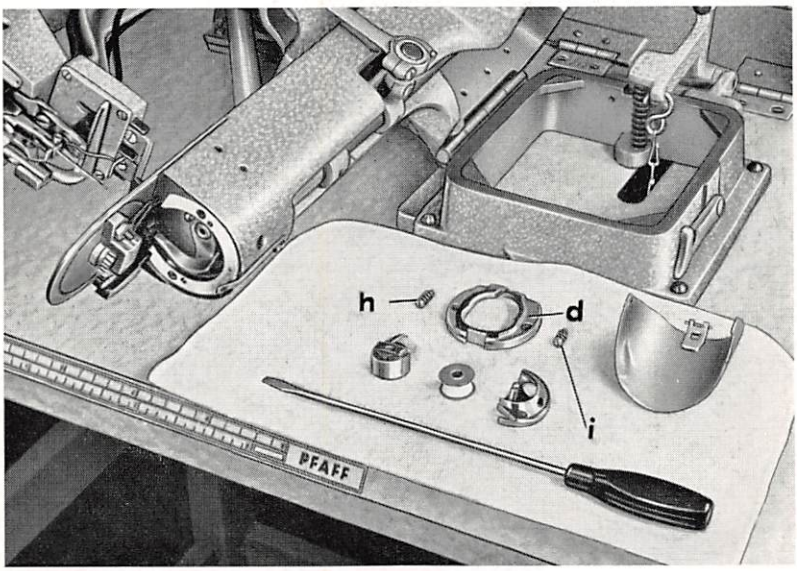


Fig. 71 Dismantling the shuttle race

C. Electromagnetic Control

1. General Information

a. Brief Description

Lifting the work clamp or starting the machine previously required a considerable amount of energy on the part of the operator in an average working day. To reduce the physical strain and, at the same time, increase the output, electromagnetic control has now been introduced. On a Pfaff 3334 fitted with an X 35 or X 45 device, all the operator has to do to start the machine is to tip on a push button (FS in Fig. 4), which is provided with two switch positions. Actual work is then performed by solenoids **HM** and **EM.** While the former serves to raise and lower the work clamp, the latter starts the machine. Since both solenoids operate on D. C., but the current locally available is either single or three-phase A. C., a rectifier (**GL** in Fig. 72) has been placed in the circuit. When motor **M** is switched on, current is simultaneously supplied to the rectifier which instantly raises the work clamp.

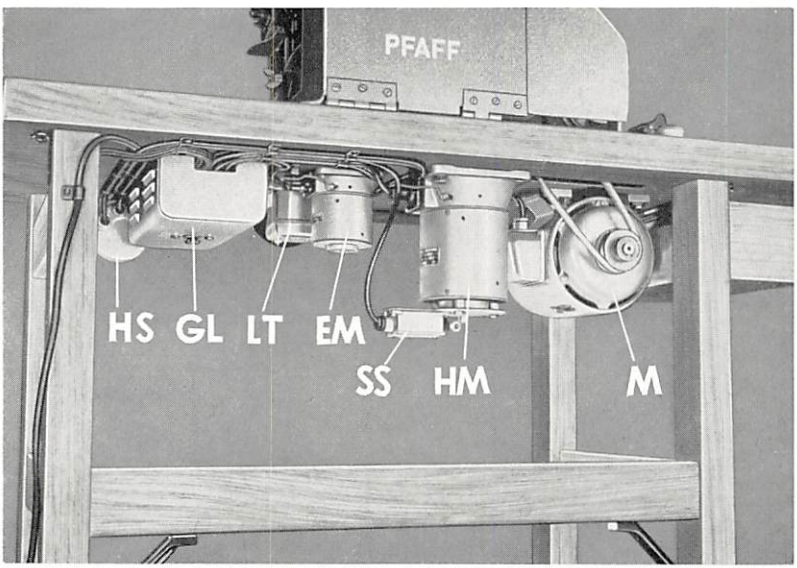


Fig. 72

b. Key to Symbols Used

Symbol	Nomenclature	Order No.
HS	Master switch (triple-pole switch)	97 064
GL	Rectifier	97 080
M	Electric motor; permanent duty; 1,400 r.p.m.	*)
EM	Starting magnet, TGB 9; 25% ED; 180 =	98 211
HM	Clamp lifting magnet, TGB 12; 100% ED; 180 V =	97 260
FS	Foot control switch D 6 U 1 P	97 263
ES	Switch U 1 R	97 162
FL	Spark suppressor	97 160
SS	Switch, Gusspilot G A 1 R	98 214
Si	Fuse; 0,5 A; FNK 3	97 104
LT	Sewlight transformer, 220/12 V, type A 1/15 VA	98 076

*) Please state voltage on your orders

2. Operating Instructions for X 35 and X 45 Devices

a. Turning on Master Switch HS

Motor **M** starts running. Since both switches, **FS** and **ES,** are closed, current flows to clamp lifting magnet **HM** (Circuit I). As a result, the plunger is attracted and the work clamp raised.

b. Inserting the Work and Operating Foot Switch FS (1st Switch Position)

Insert fabric and depress foot control **FS** to the first switch position. By this action, circuit I is opened and clamp lifting magnet **HM** de-energized. As a result, the work clamp is lowered onto the work by spring action.

If it should become necessary to reposition the work in the machine, simply remove your foot from the control. As foot control **FS** returns to its normal position, it again closes circuit I. As a result, clamp lifting magnet **HM** is energized and the work clamp raised.

c. Starting the Machine by Operating Foot Switch FS (2nd Switch Position)

Press foot control **FS** all the way down to the second switch position. This action closes circuit II in that current flows through switches **FS** and **SS.** Electromagnet **EM** is energized and starts the machine only after the plunger in clamp lifting magnet **HM** has dropped back and thereby has closed switch **SS.**

d. Sewing Cycle and Automatic Stopping of Machine

Release foot control **FS.**

Immediately on starting the machine, lever **B** presses against switch **T** and opens it. As a result, the flow of current to clamp lifting magnet **HM** is interrupted at a second point in the circuit and the work clamp kept from being raised inadvertently while the machine is in operation.

On completion of the sewing cycle, the machine stops automatically. At the same time, switch **ES** is closed so that current flows through switch **FS** to clamp lifting magnet **HM**

As a result, the work clamp is raised and upper and lower threads trimmed. The work can be removed.

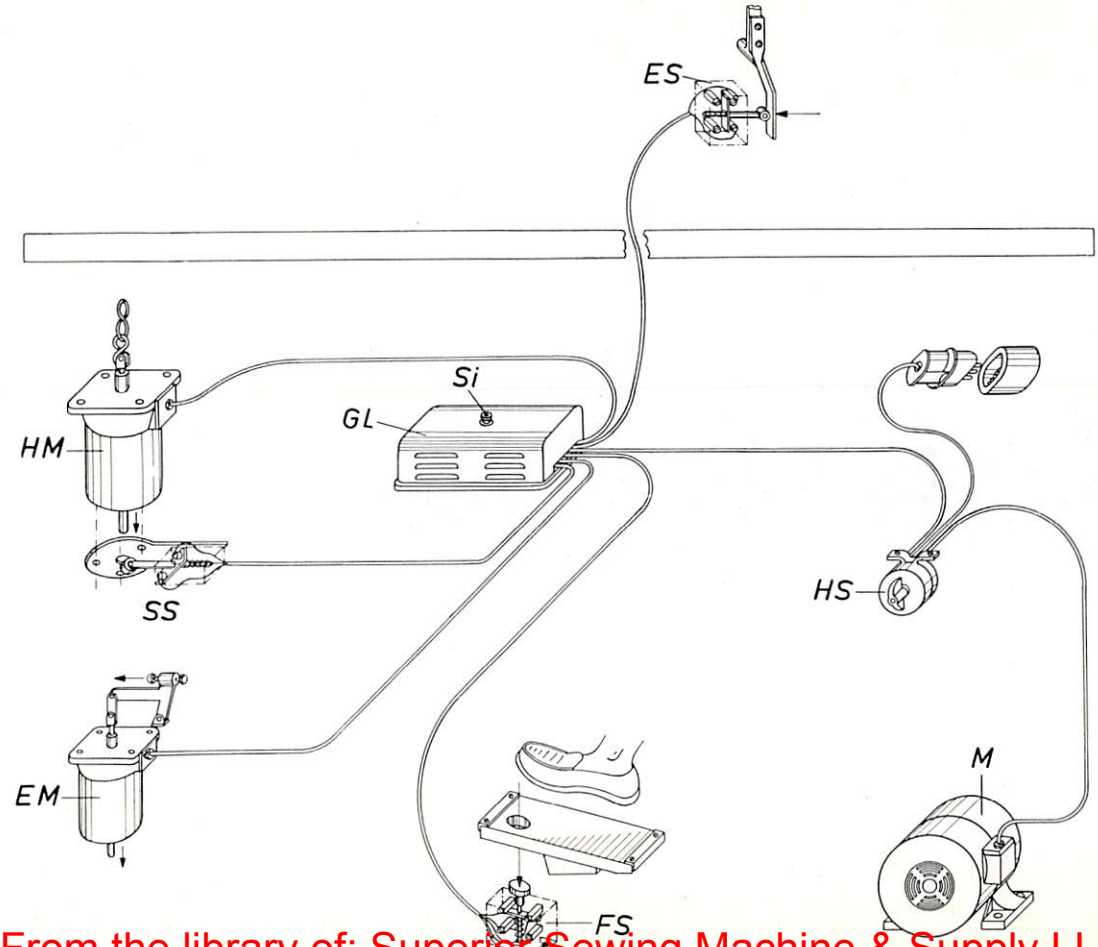


Fig. 73 Wiring Diagram

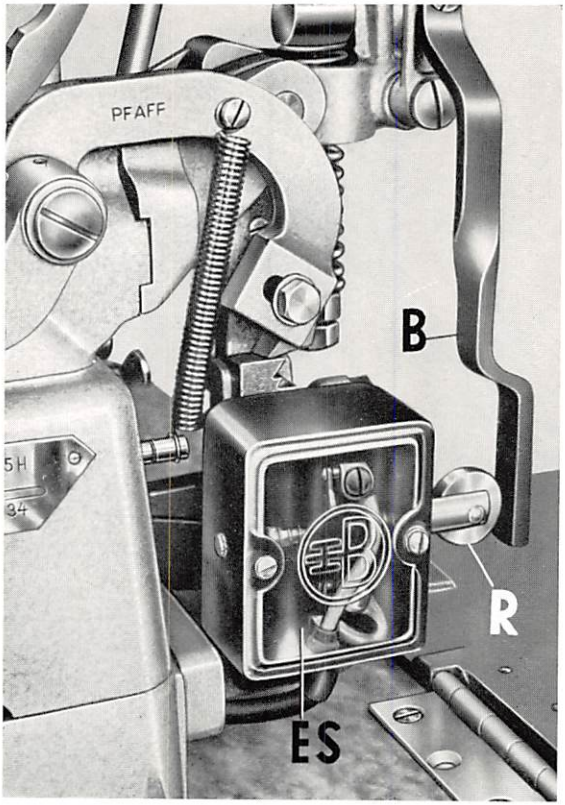


Fig. 74 As the machine is started, lever **B** presses against roller **R** and thereby opens switch **ES** and interrupts the flow of current to clamp lifting magnet **HM.** Switch **ES** remains open throughout the sewing action.

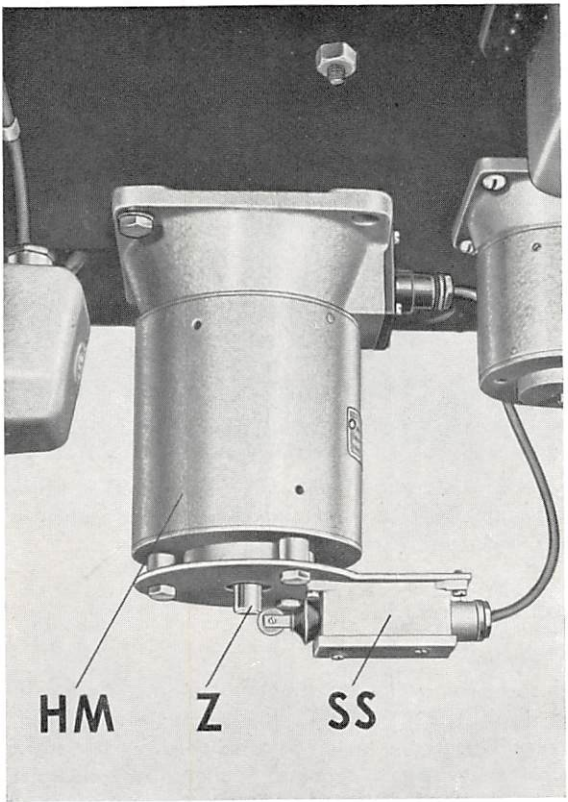


Fig. 75 Plunger **Z** of solenoid **HM** is connected to the clamp lifting lever of the machine by means of a chain.

Switch **SS,** which is actuated by plunger **Z** of electromagnet **HM,** permits starting of the machine only after the work clamp has been lowered onto the goods completely.

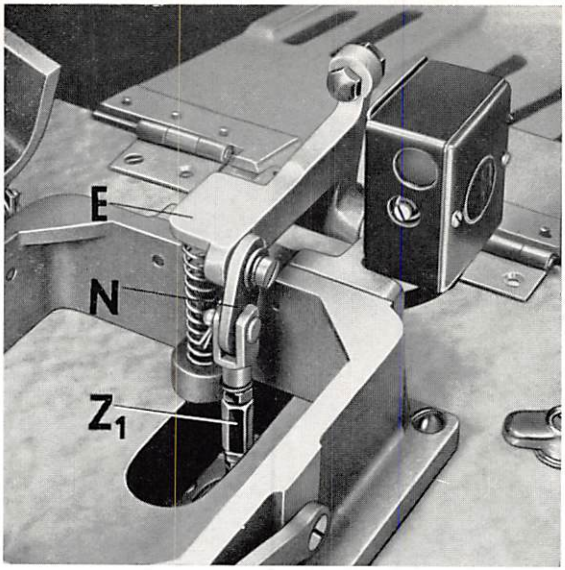


Fig. 76 Plunger **Z,** or starting magnet **EM** is connected to starting lever **E** by means of link **N.** When solenoid **EM** is energized, plunger **Z** pulls down lever **E** and thereby starts the machine.

3. Working of Device

a. Master Switch HS

Upon turning on master switch **HS,** the motor is connected to the supply and starts running. At the same time A. C. flows through terminals 5 and 6, and 1 and 2 to the reectifier. As the rectifier starts operating, it closes a D. C. circuit from its positive pole through terminal 9, the coil of clamp lifting magnet **HM,** terminals 12 and 14, switch **FS,** terminals 3 and 4, switch **ES,** and terminals 7 and 8 to the negative pole. The work clamp is raised.

b. Foot Switch FS

By depressing foot control **FS** to the first switch position, the circuit discussed under a) above is interrupted. Clamp lifting magnet **HM** is de-energized, switch **SS** closed and the work clamp lowered.

c. Solenoid EM

By depressing foot control **FS** all the way down, the machine is started. Simultaneously a circuit is closed from the negative pole of the rectifier through switch **FS,** terminal 13, switch **SS,** terminal 11, the coil of starting magnet **EM,** terminals 9 and 10 to the positive pole. As a result, the starting magnet is energized and starts the machine.

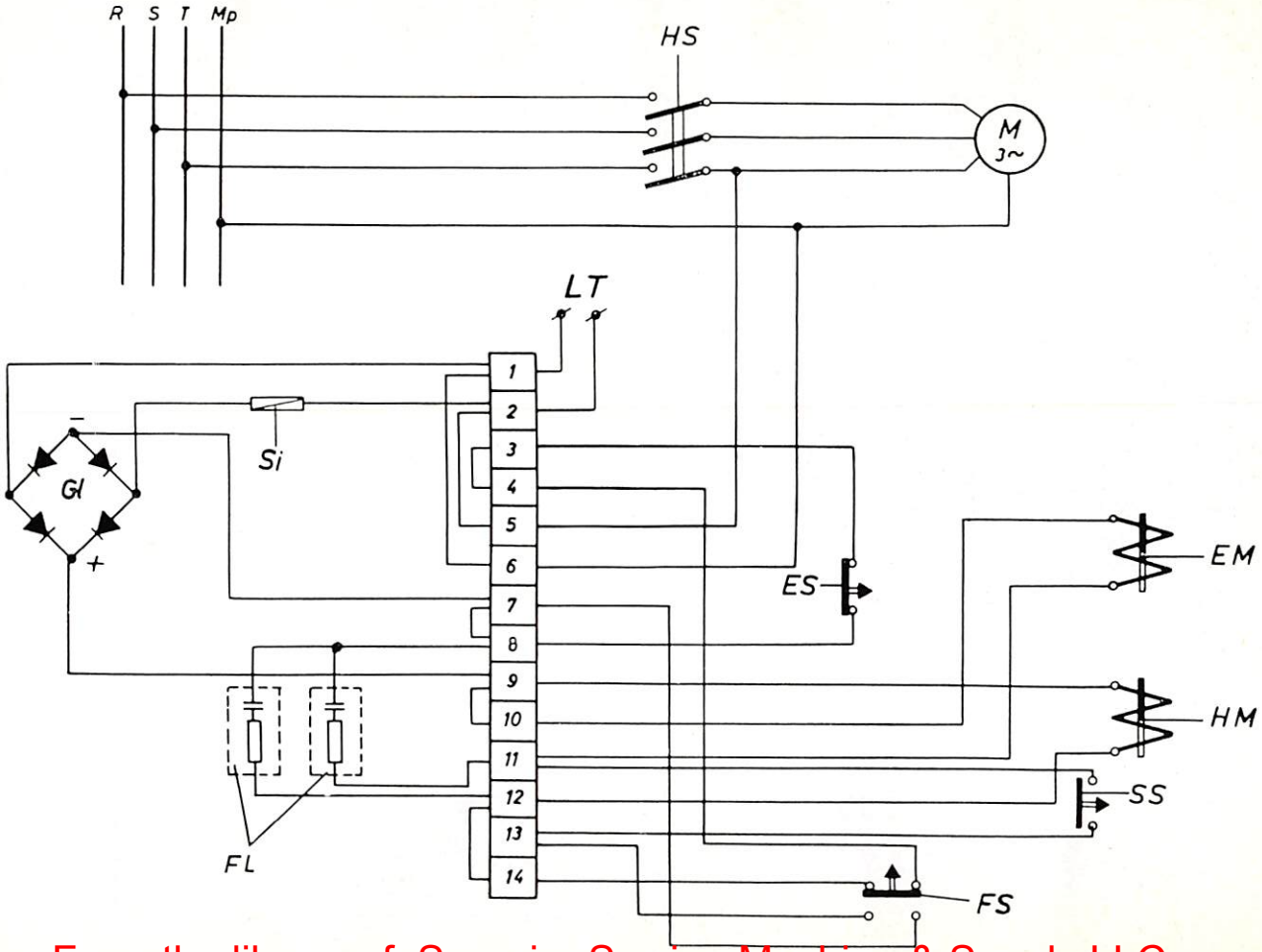


Fig. 77 Wiring Diagram

d. Solenoid HM and Switch ES

Foot control **FS** is released. To ensure that clamp lifting magnet **HM** will remain inoperative while sewing, the circuit discussed under a) above is interrupted by switch **ES** as long as the machine is in operation.

The two spark suppressors **FL,** which are connected between terminals 8, 11 and 12, protect the contact points against excessive voltages. If, on special request, the machine is equipped with sewlight transformer **LT,** the spark suppressors are connected to terminals 1 and 2.

e. Switch SS

The function of switch **SS** is to interrupt the flow of current to machine starting magnet **EM** for the short period of time it takes to lower the work clamp onto the work. This prevents the machine from being started by quickly depressing foot control **FS** before the clamp has been lowered completely. Switch **SS** closes the circuit to starting magnet **EM** only after the plunger in clamp lifting magnet **HM** has dropped back (that is, when the clamp has been lowered completely).

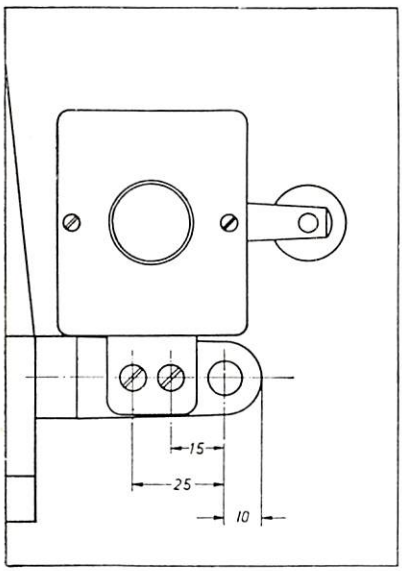


Fig. 78 10 mm = $^{13}/_{32}$"
15 mm = $^{19}/_{32}$"
25 mm = $^{31}/_{32}$"

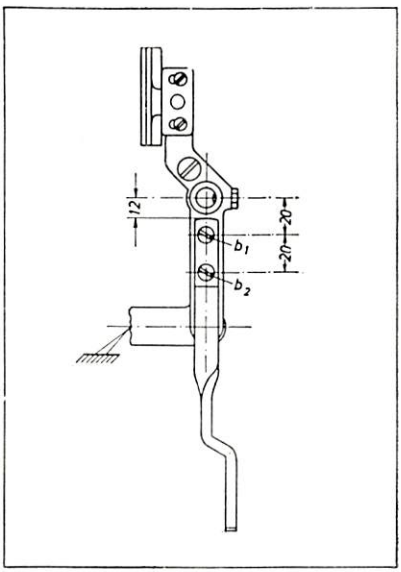


Fig. 79 12 mm = $^{15}/_{32}$"
20 mm = $^{25}/_{32}$"

4. Mounting and Adjustment Procedures

a. Switch ES

Attach switch **ES** to bearing bracket of starting lever. On machines supplied previously, drill screwholes in the positions indicated in Fig. 78. Recent machines are provided with appropriate holes.

b. Lever B

On previous machines, lever **B** should be mounted as shown in Fig. 79. Recent machines are so designed that the lever can be easily screwed on with two fillister head screws.

c. Solenoid EM

Connect starting magnet **EM** to link **N** on starting lever **E** by means of a bolt. Press starting lever **E** all the way down and adjust magnet until its plunger is in a vertical line with link **N**. Mark position of magnet on underside of tabletop and secure it in position with four wood screws.

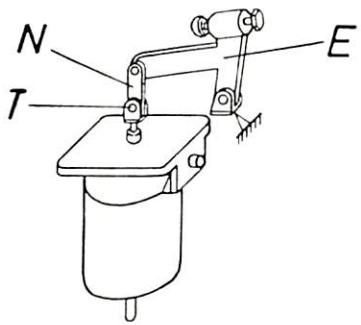


Fig. 80

d. Switch SS

Switch **SS** which is attached to clamp lifting magnet **HM** can be mounted without any difficulty. Check whether it is closed when the plunger has dropped back, and open when the plunger is attracted.

e. Solenoid HM

Switch **SS** which is attached to clamp lifting magnet **HM** can be mounted without any difficulty. Check whether it is closed when the plunger has dropped back, and open when the plunger is attracted.

No special instructions are required for mounting the remaining parts of the electromagnetic control mechanism. Merely take care that the mechanism is convenient to operate and that the wiring is clearly arranged. (See below diagram).

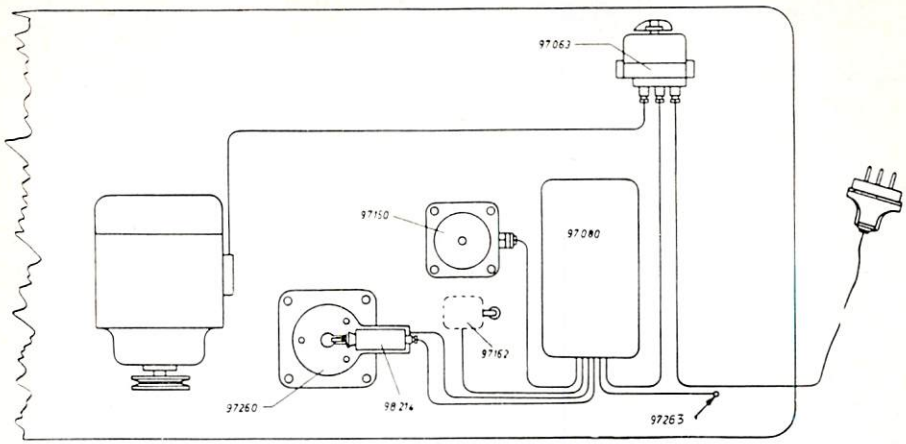


Fig. 81

After all the components have been secured in place, make the following adjustments:

a) and b) above

There should be a clearance of about $^{1}/_{16}$" – $^{5}/_{64}$" between roller **R** and lever **B** when the machine has stopped. If adjustment is required, either loosen the two screws of lever **B** and adjust lever, or turn screw **d** and thereby adjust roller. (See Fig. 82.)

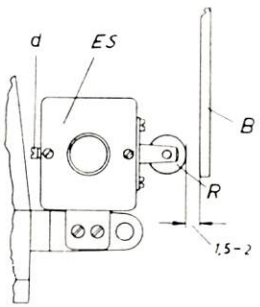


Fig. 82

c) above

When the machine is inoperative, there should be a clearance of about 1/64" between starting lever **E** and brake lever **H.** To adjust, turn screw **G** in or out, or reset fork **J.** (See Fig. 83).

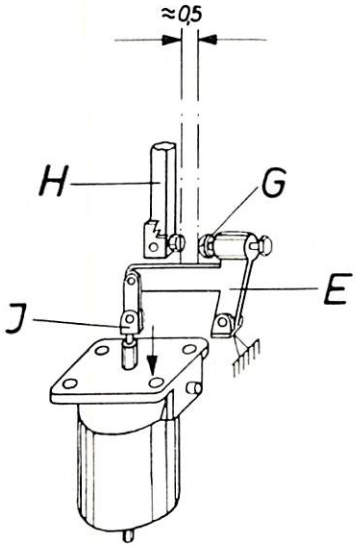


Fig. 83

d) and e) above

The chain should be slack throughout the sewing action. To check this, proceed as follows:

Turn the machine by hand a full cycle and see whether the chain is slack at all times. The chain must not be too loose, however, as otherwise the upward travel of the magnet plunger would be shortened.

If adjustment is required, set fork **J** either higher or lower.

Apart from the X 35 and X 45 electrical devices discussed above, the Pfaff 3334 can be fitted with an X 38 or X 39 device (foot-operated and knee-operated presser foot lifter, respectively). Machines equipped with the latter two devices are set up in pairs in "V" tandem arrangement on a twin power table.

D. Subclass Information

The standard Pfaff 3334 has been adapted to produce a vastly diversified range of tack designs differing both in shape and in the number of stitches per tack. There is a special subclass machine available for any tack design desired.

The various subclass machines differ in the design of the feed cam, the knife cam, the clamp feet, and the feed plate. In addition, each subclass machine uses a different gear ratio in the worm gear assembly.

All requests of our customers for the development of additional subclasses capable of performing special non-standard operations will be given our careful consideration.

Instructions for converting one subclass into another are given on page 69.

Listed in the following Tables are:

1. Subclasses having the same gear ratio
2. Subclasses having the same knife cam
3. Subclasses requiring additional parts
   (marked with an asterisk in Tables 1. and 2.)
4. Principal parts varying from one subclass to another
5. Special organizational parts
6. Tack designs arranged by shapes. This table offers a survey of the variations available for each basic tack design, and indicates the total number of stitches and the dimensions of each tack.

Conversion of one subclass machine into another takes very little time if both machines have the same gear ratio. If both machines have the same knife cam and require no additional conversion parts, all that has to be exchanged is the feed cam, work clamp feet, and feed plate.

Conversion of one subclass machine into another takes more time if both machines have different gear ratios because in this case both the worm and worm wheel have to be exchanged. (It is best to have your nearest Pfaff representative perform this conversion job for you.).

If the machine is to be fitted to make a different size bartack (within the dimensions given in the tack design diagrams), a matching feed plate and work clamp feet have to be fabricated.

1. Subclasses Having the Same Gear Ratio

Subclass	Gear Ratio	Worm	Worm Wheel	Thread Nipper Tripping Segment
-9, -14*, -23*, -51, -71/2, -129, -158, -168, -200, -205	1:21	22 143	22 142	22 505
-5/2*, -130, -146, -160, -176, -177, -178*, -214	1:24	24 016	24 017	22 505
-5/3*, -22, -24/1, -25, -27, -32, -41, -75*, -82*, -91, -93, -94, -95/2, -98, -103*, -112, -113, - 126, -128, -134, -141, -166, -173, -180, -196, -210, -216, -232	1:28	21 268	21 269	22 504
-28/5, -58, -68, -69, -73, -77, -81, -101, -110, -127, -131, -153, -165, -172, -181, -182, -185, -208, -213, -218, -234	1:32	21 232	21 233	22 504
-7, -8, -28/1, -62*, -71/1, -95/1, -196, -121*, -123, -138, -154, -155, -157, 167, -174, -179, -199, -209/1, -209/2, 209/3, -217, -233	1:36	22 212	22 213	22 454
-1, -2, -3, -4, -5/1*, -6, -10*, -11, -12, -13*, -15, -16, -17, -18*, 19*, -20, -21, -26, -28/2*, 28/3, -28/4, -29, -30*, -31, -33*, -34*, -35*, -36, -37*, -38/1, -38/2, -39, -40, -42, -43, -45, -46*, -49, -50, -52, -53, -54, -55, -57, -59/1, -59/2, -59/3, -61, -63, -64, -65, -66, -67, -70, -72, -74, -76, -78, -79*, -80, -83, -85, -86, -87, -88*, -89*, -90, -92, -97, -99, -100*, -102, -107, -108, -114, -116, -117, -119, -124, -125, -132, -135, -136, -139, -142, -147, -149, -150, -151, -152, -156, -159, -162, -163, -164, -169, -175, -183, -184, -186, -187, -191, -193, -201, -202, -203, -206, -207, -219, -220/1-10, -236	1:42	21 023	21 024	22 454
-188	1:48	24 842	24 843	—
-24/2, -48*, -56*, -84*, -96*, -104*, -111*, -115*, -118*, -122, -137, -140, -148, -161, -189, -190, -192, -194, -195, -198, -212, -215, -231	1:56	22 574	22 575	22 858
-44*, -47*, -60*, -105*, -109*, -120*, -133, -143, -144, -145, -170, -171, -197, -204, -211, -235	1:72	22 694	22 695	—

Note: Machines which have a gear ratio of 1:21, 1:24, 1:28, 1:32, 1:36, 1:42 and 1:48 and are to be converted to 1:56 and 1:72 must be shipped to the nearest Pfaff agency.

* These subclasses require additional parts (see Table 3).

2. Subclasses Having the Same Knife Cam

Gear Ratio	Knife Cam				
	One-Cycle	Two-Cycle	Three-Cycle	Four-Cycle	Six-Cycle
1:21	-9, -14*, -23*, -51, -71/2,-158, -168, -200, -205		-129		
1:24	-5/2*, -130, -160, -176, -177, -178*, -214	-146			
1:28	-5/3*, -22, -24, -25, -27, -32, -41, -82*, -91, -93, -94, -95/2, -98, -103, -113, -126, -128, -134, -141, -166, -173, -180, -196, -216, -232	-75*, -112, -210			
1:32	-28/5, -68, -69, -77, -81, -101, -110, -131, -153, -165, -181, -182, -185, -208, -213, -218, -234	-58, -73, -127, -172			
1:36	-8, -71/1, 95/1*, -106, -121*, -123, -138, -154, -155, -157, -174, -179, -209/1,-209/2,-209/3, -217, -233	-62*, -167 -199		-7 -28/1	
1:42	-2, -3, -15, -16, -17, -20, -30*, -33*, -34*, -37*, -43, -46, -55, -59/1, -59/2, -59/3, -66, -67, -70, -72, -76, -79*, -83, -85, -87, -88*, -89*, -90, -92, -99, -100*, -107, -114, -116, -117, -125, -132, -136, -139, -149, -150, -151, -152, -156, -159, -162, -164, -169, -183, -187, -191, -201, -202, -203, -205, -207, -220/1-10, -235	-1, -4, -5/1*, -6, -11, -12, -13*, -18*, -26, -28/4, -31, -35*, -36, -39, -40, -49, -50, -52, -53, -54, -57, -61, -63, -64, -65, -74, -80, -85, -102, -108, -119, -124, -135, -142, -147, -175, -184, -193, -219	-10*, -19*, -28/2, -28/3, -29, -38/1, -38/2, -42, -45, -97, -163, -186		-21
1:48	-188				

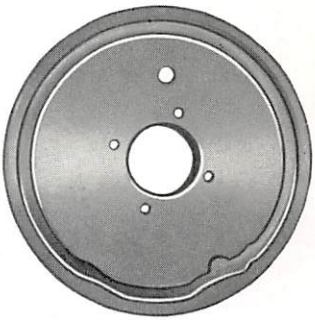
Gear Ratio	Knife Cam				
	One-Cycle	Two-Cycle	Three-Cycle	Four-Cycle	Six-Cycle
1:56	-48*, -56*, -84*, -96*, -104*, -111*, -115*, -118*, -148, -161, -189, -190, -192, -194, -195, -212, -231	-24/2, -122, -137, -140, -198, -215			
1:72	-47*, -60*, -109*, -133, -144, -145, -170, -171, -197, -204, -211, -235	-44*, -105, -120*, -143			

3. Subclasses Requiring Additional Parts

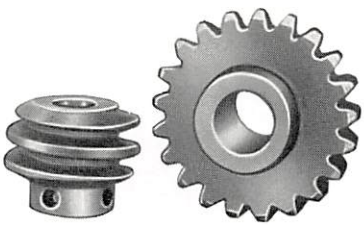
Subclass	Additional Parts
-5	Work clamp, complete
-10, -13, -14, -18, -19, -33, -37, -95/1, -95/2, 121	One work clamp, complete, each; clamp foot lifting lever No. 22289; and work clamp stop No. 21146
-18, -23, -30, -34, -44, -47, -48, -56, -60, -79, -82, -84, -88, -89, -96, -104, -105, -109, -111, -115, -118, -120	Bearing bracket No. 22413 and feed regulator No. 22460
-30, -34, -35, -60, -84, -88, -96	Clamp foot lifting lever No. 22859, adjustable, replacing Nos. 22410 and 22314
-44, -120	Clamp foot lifting lever No. 22790, work clamp foot bracket No. 22785
-62, -75, -103	Clamp foot lifting lever No. 22604, work clamp foot bracket No. 22599
-46	Clamp foot lifting lever No. 22859, work clamp foot bracket No. 22570, complete
-60, -84, -100, -179	Tripping lever No. 22700, complete Feed plate carrier bar No. 22720, complete Slide block No. 22722, for feed plate carrier bar

4. Principal Parts Varying from One Subclass to Another

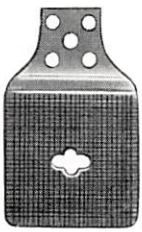
Feed cam



Knife cam



Worm Worm wheel



Feed plate

Work clamp foot, left

Work clamp foot, right

5. Special Organizational Parts

Subclasses **-10; -13; -14; -18; -19; -33; -38**


22 146


700 252


21 153


21 148

22 289


437


28 200


701 578


22 294


701 046

Subclass **-4**

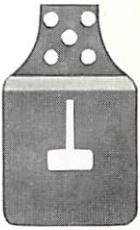

22 263 22 264


22 266


22 267


1 042

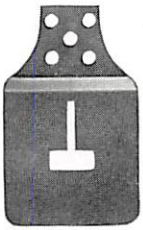

324


22 197 x 14

Subclass **-5**

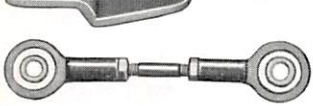

21 302


22 685


22 197 × 14


22 193/94

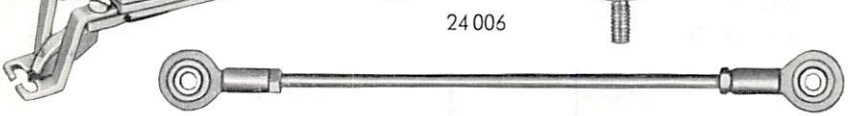

22 683



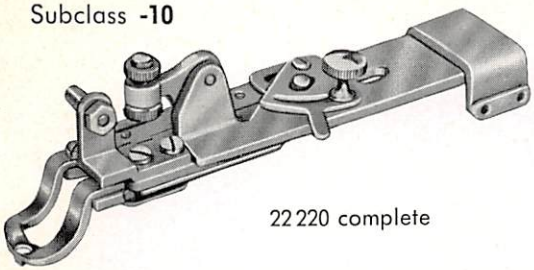
22 200 complete


22 682


22 681

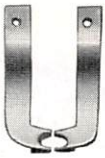

24 006

Subclass **-10**



22 220 complete

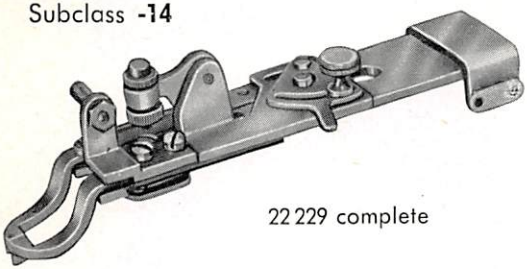
22 221 22 222



22 302

22 224

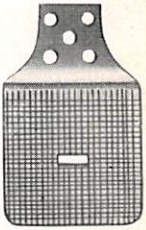
Subclass **-14**



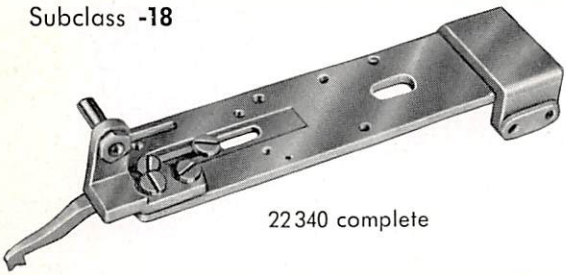
22 229 complete

22 300 22 301

22 224



Subclass **-18**

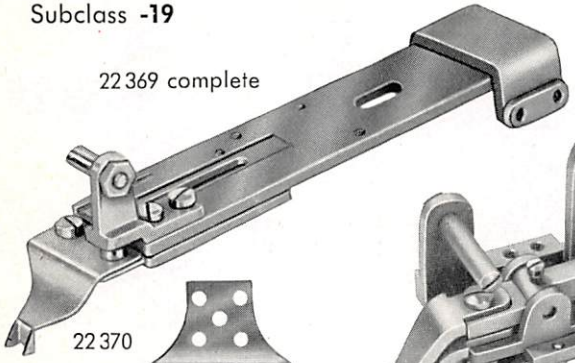


22 340 complete

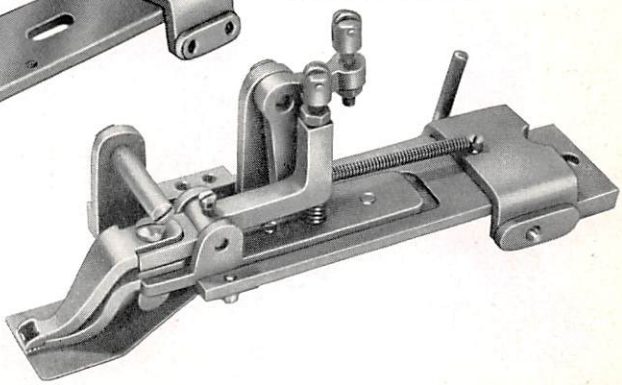
22 342

Subclass **-19**

22 369 complete



481 350 complete

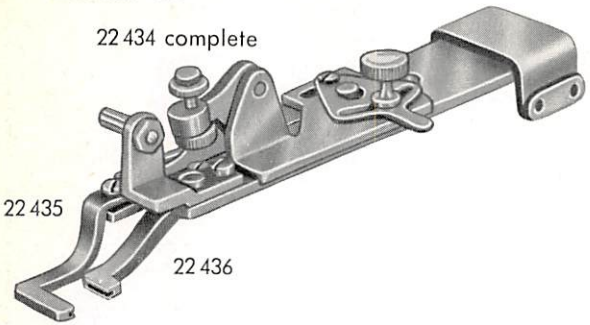


22 370

481 360
complete

Subclass **-33**

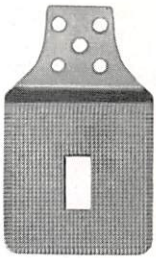
22 434 complete



22 435

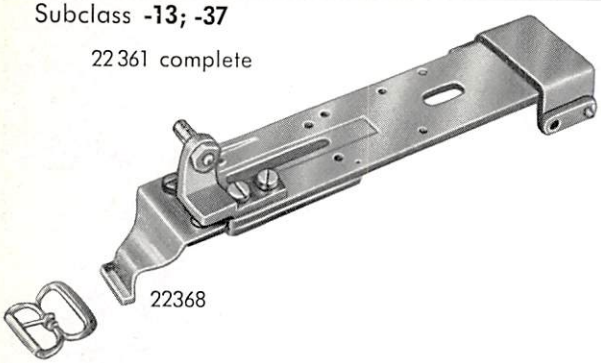
22 436

22437



Subclass **-13; -37**

22 361 complete

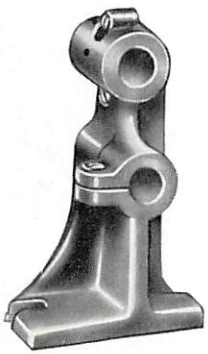


22368

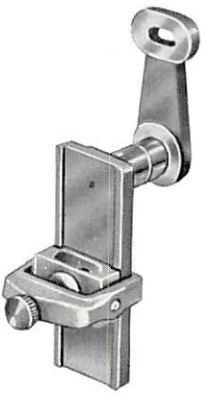
22 297 x 32

Subclasses **-18; -23; -30; -34; -44; -47; -48; -56; -60; -79; -82; -84; -88; -89; -96; -104; -105; -109; -111; -115; -118; -120**

22 413 complete



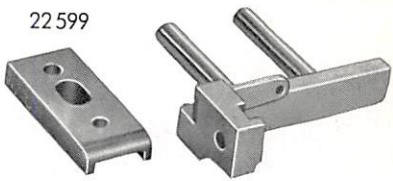
22 460 complete



Subclasses **-46; -62; -75; -103**

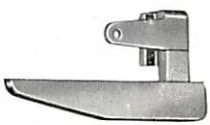
22 604 complete

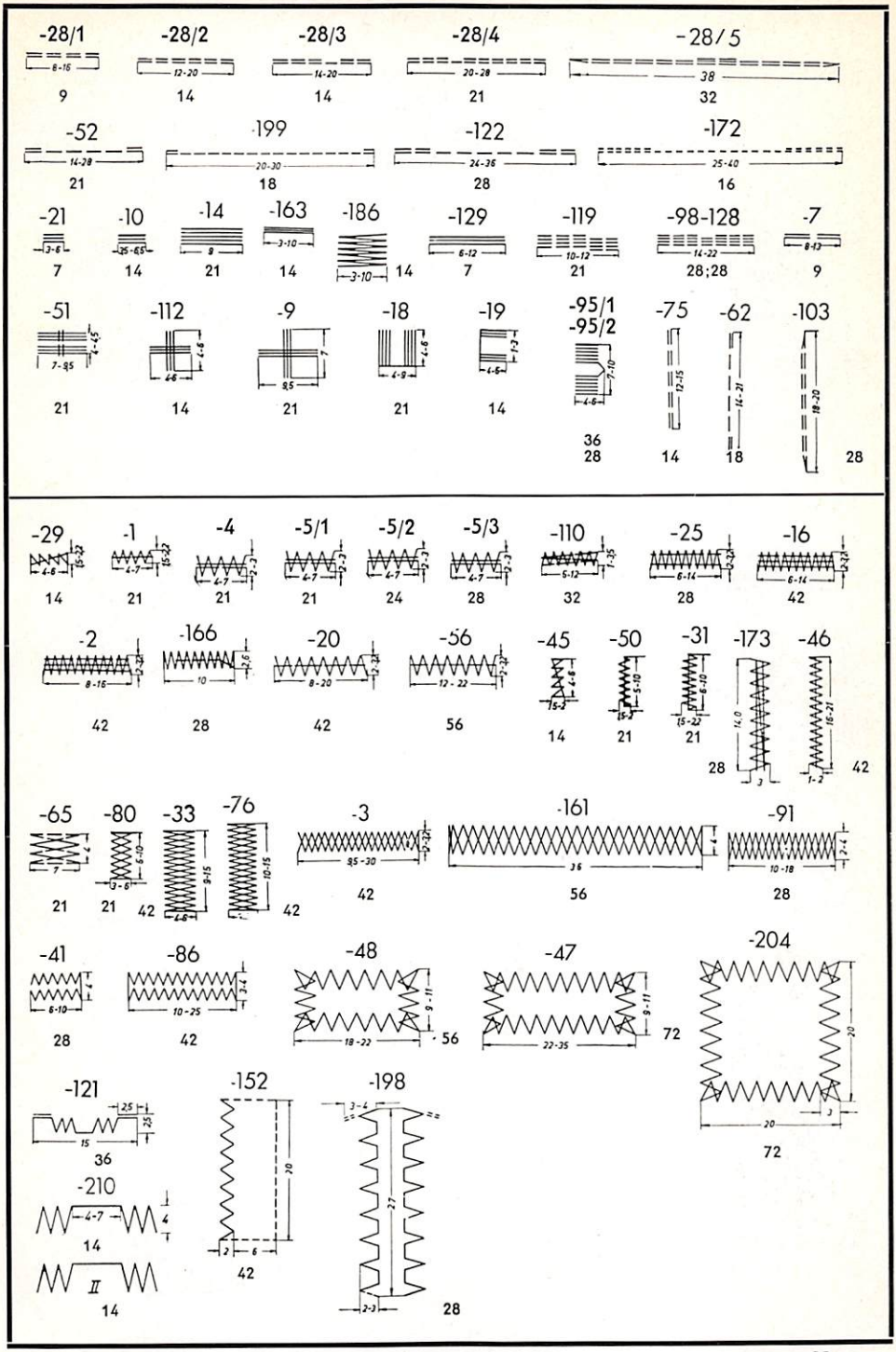
22 599



Subclasses **-30; -34; -35; -48; -60; -84; -88; -96**

22 410





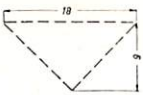
-73

16

-124

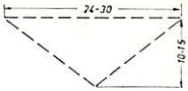
21

-68



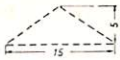
32

-67



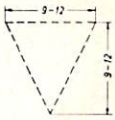
42

-35



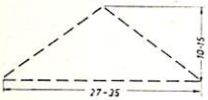
21

-134



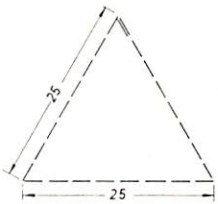
28

-116



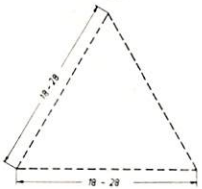
42

-232



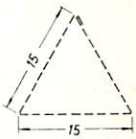
28

-150



42

-234



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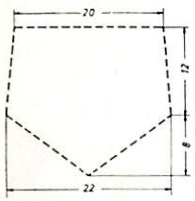

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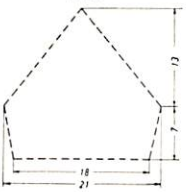

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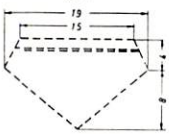

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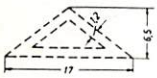

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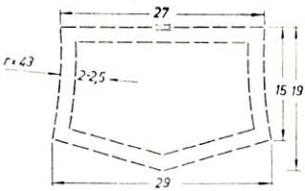

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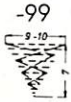

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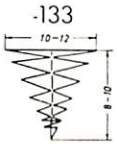

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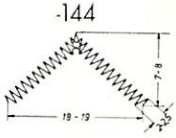

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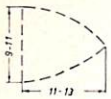

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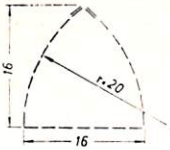

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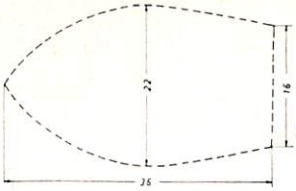

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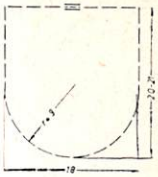

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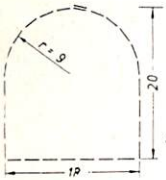

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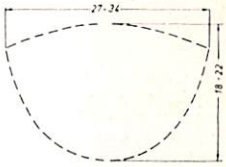

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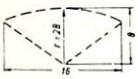

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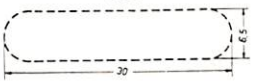

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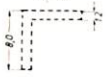

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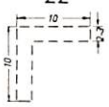

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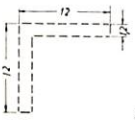

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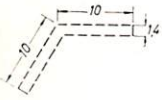

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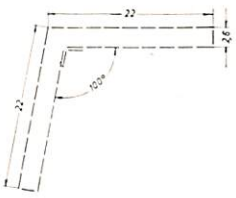

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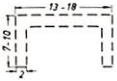

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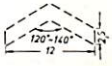

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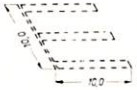

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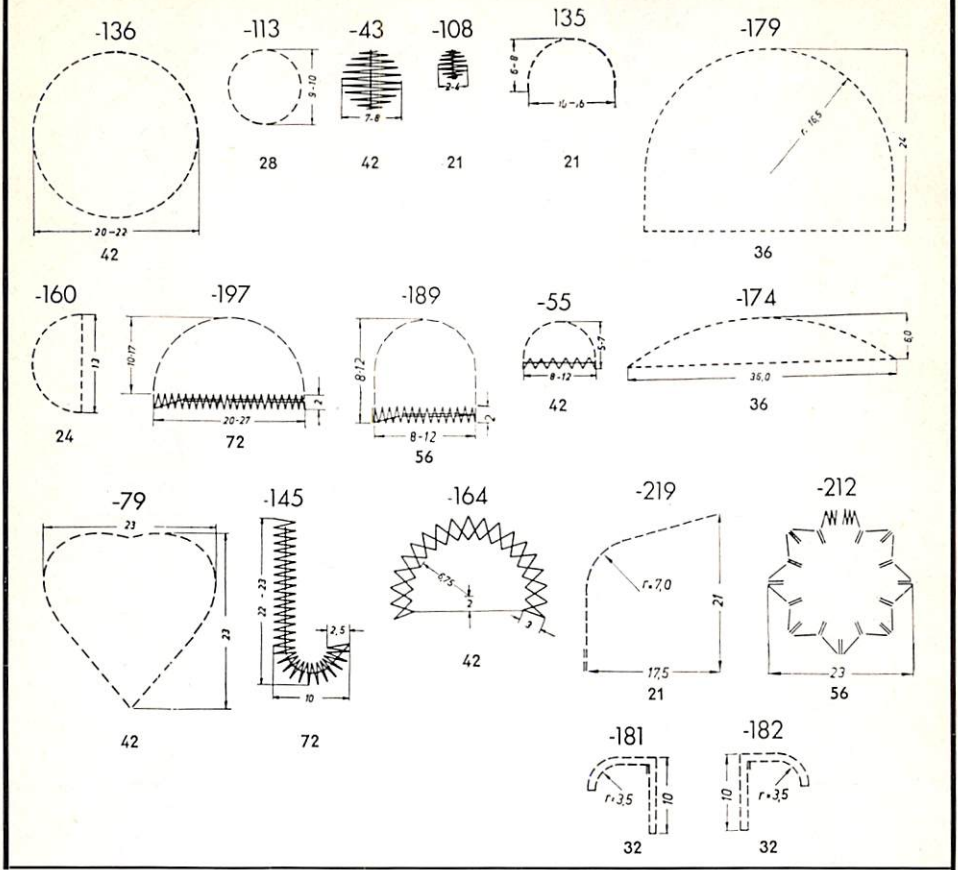

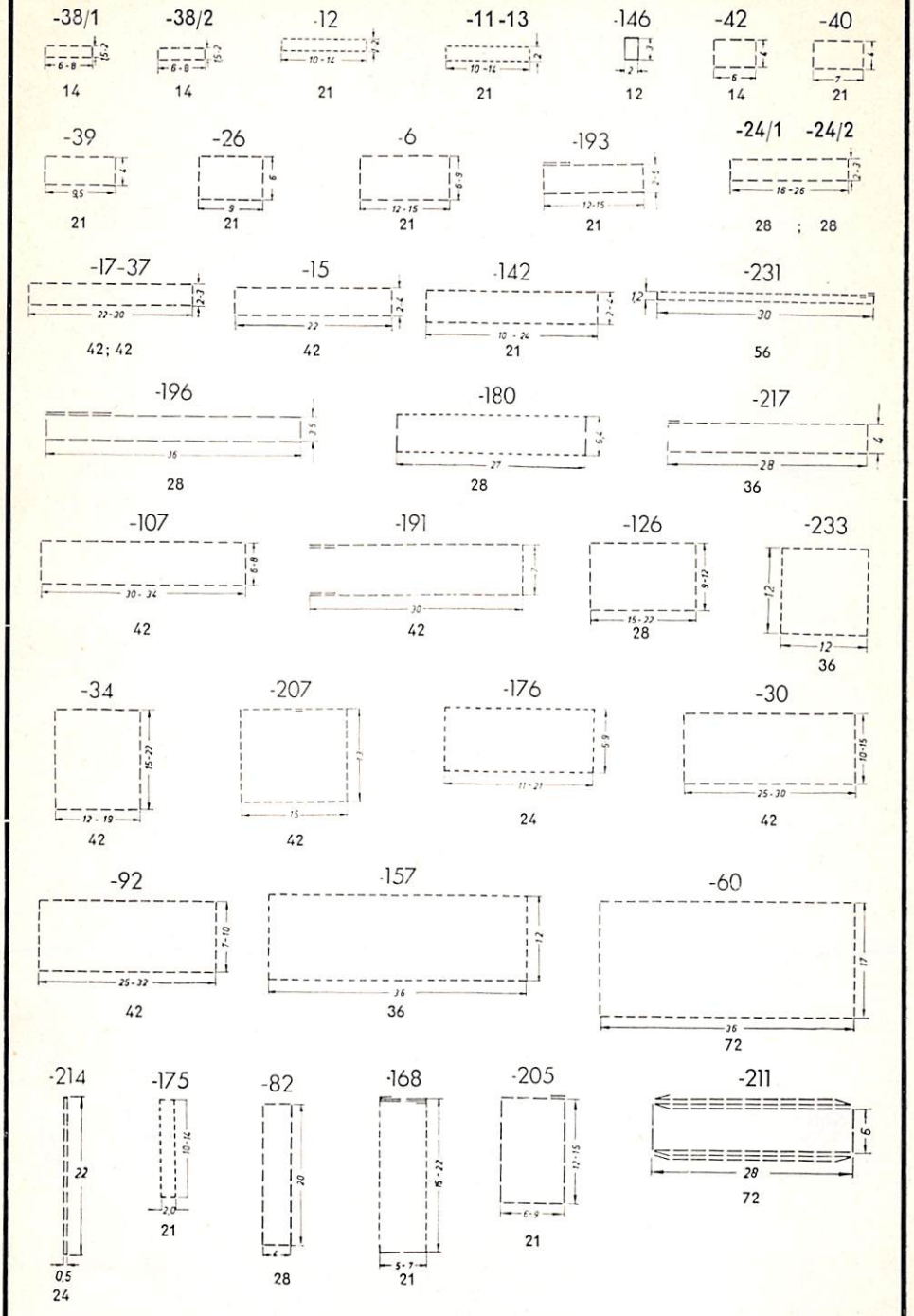

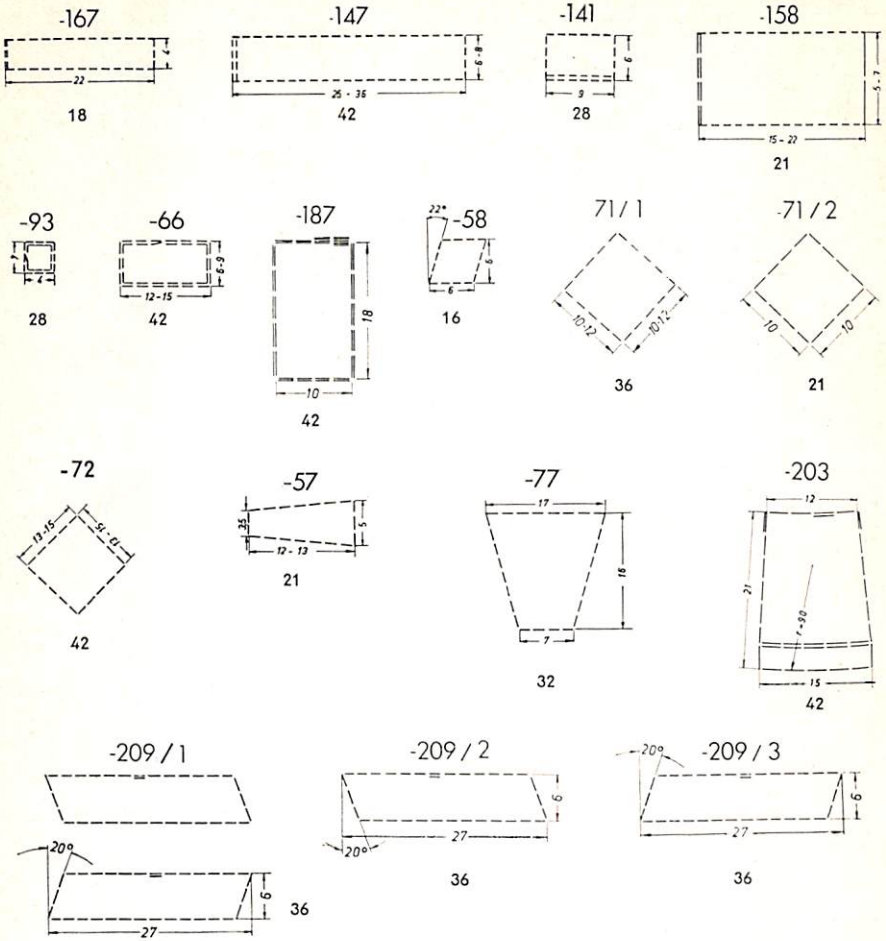

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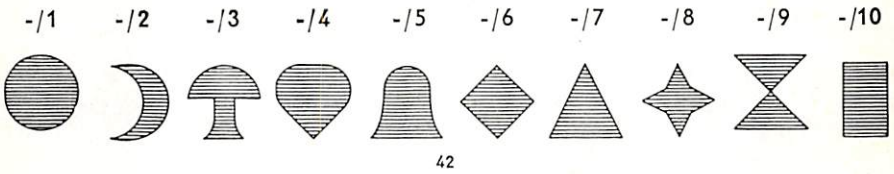

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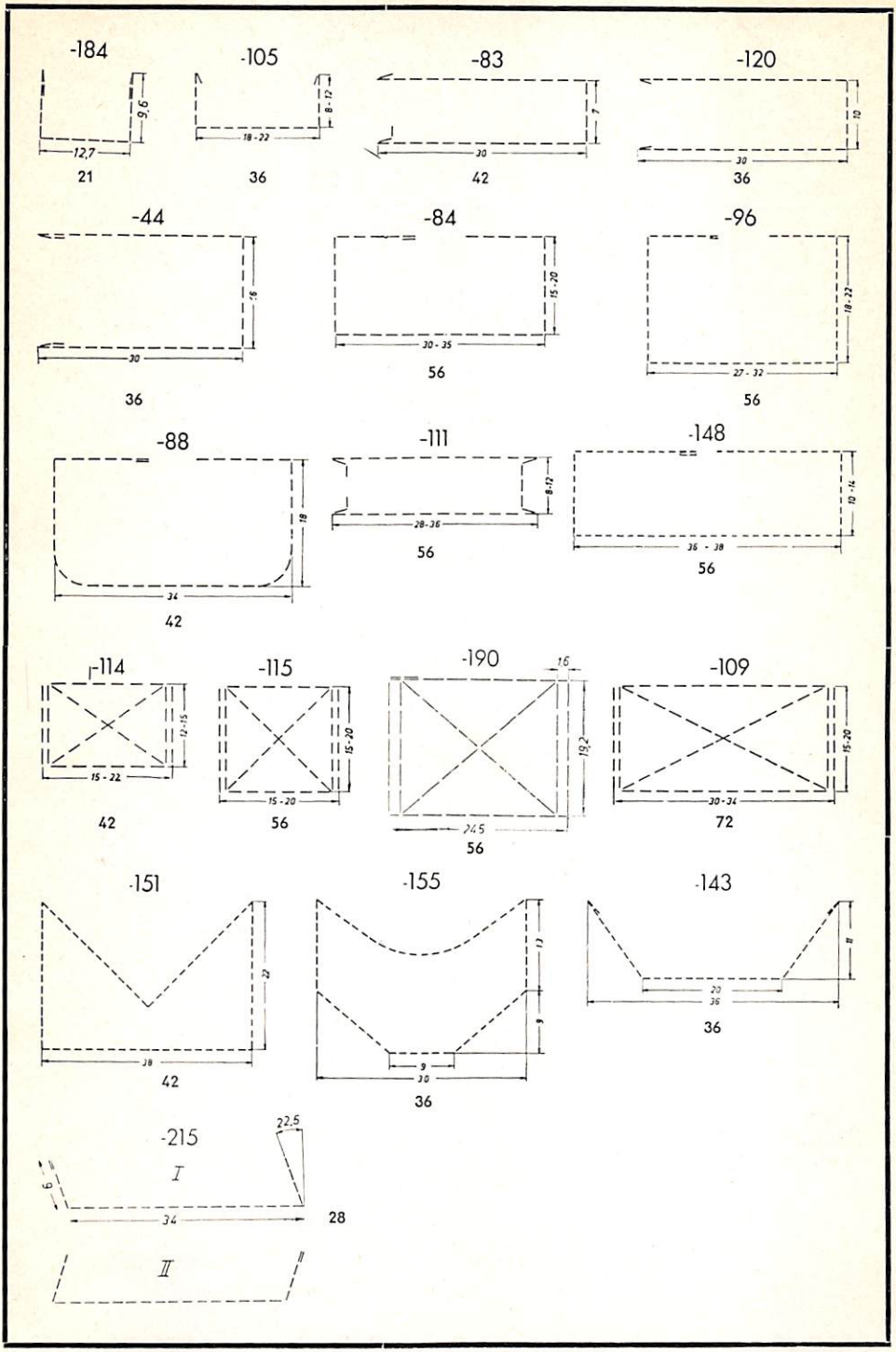

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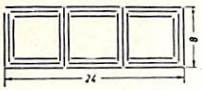

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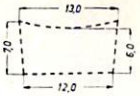

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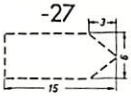

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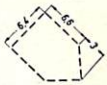

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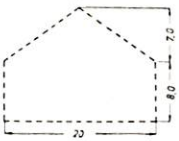

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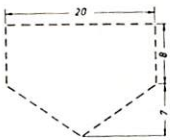

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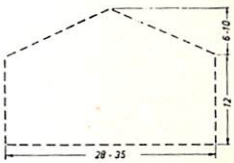

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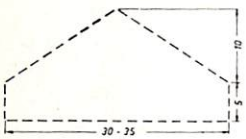

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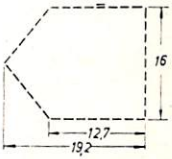

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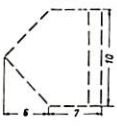

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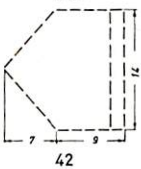

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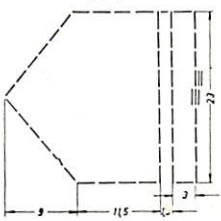

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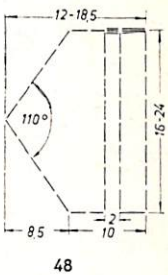

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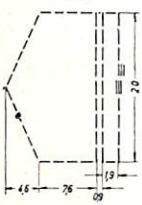

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