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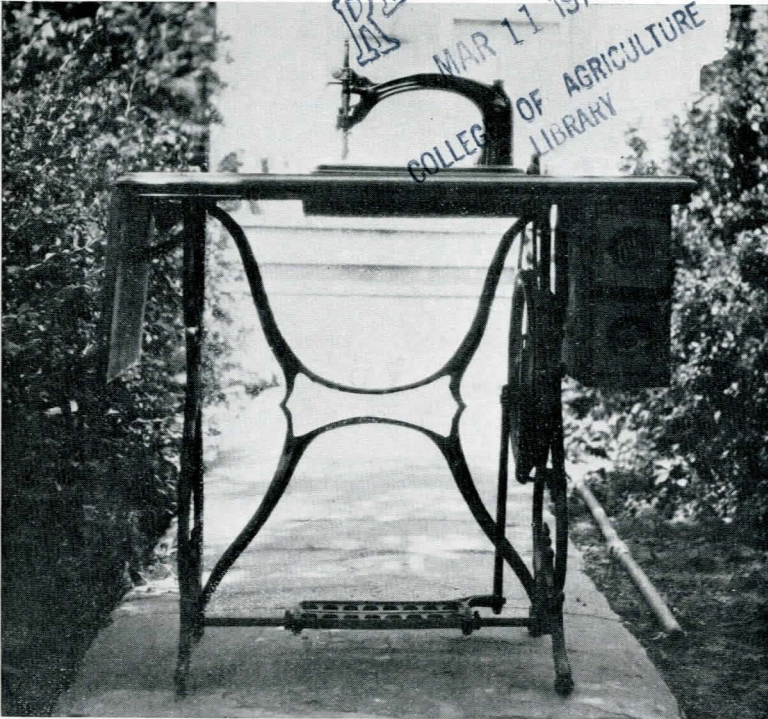
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Extension Circular 714 Revised⁻³²

July, 1932

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Know Your Sewing Machine



A MODERN SEWING MACHINE 80 YEARS AGO.

The University of Nebraska Agricultural College Extension Service
and United States Department of Agriculture Cooperating
W. H. Brokaw, Director, Lincoln

NEBRASKA WESLEYAN

Know Your Sewing Machine

BY PAUL R. HOFF

If properly cared for, a sewing machine as used in the average family should last for two generations. Machines or individual working parts do not wear beyond their usefulness nearly as rapidly as is commonly thought, but usually require what may be a very simple adjustment for wear. Since it is possible to operate a sewing machine and do work of questionable quality when the machine is very dirty and badly out of adjustment, many sewing machines are used far beyond the time when they should receive attention.

Regular and frequent cleaning is an important factor in keeping a machine operating easily and satisfactorily. Once in five years time a thorough cleaning such as is described later in this bulletin should be given the machine, as well as any other time that the machine is very dirty because of poor oil or because it has been used on material that leaves lint or dirt in the working mechanism. At intervals of several

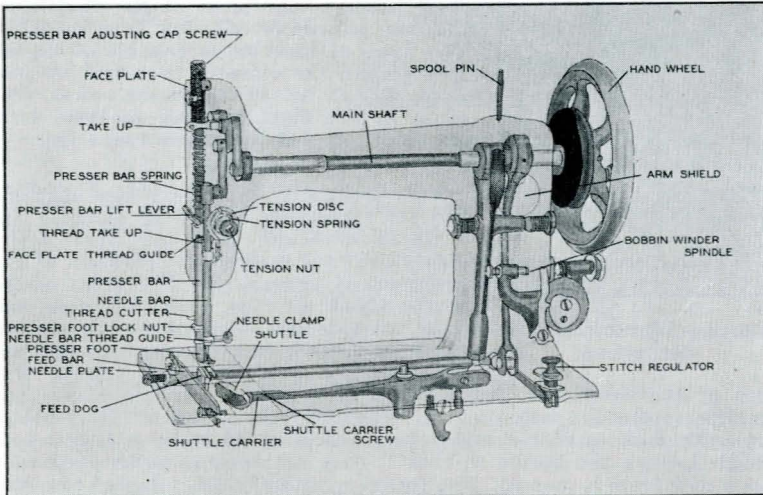


FIG. 1.—Phantom view of vibrator sewing machine head with working parts.

months, previous to being oiled the machine should have kerosene or gasoline run through the working parts to loosen any gummy oil that may have collected.

TYPES OF SEWING MACHINES

The sewing machines used for household sewing use two threads and are known as lock stitch machines. There are three types of lock stitch machines, all of which produce about the same stitch. These three are the vibrator, the oscillator, and the rotary types.

VIBRATOR

This type is easily identified by the long pointed shuttle. Vibrator machines have the most simple mechanism of the three types but do not run as smoothly as either of the other two, especially after they have

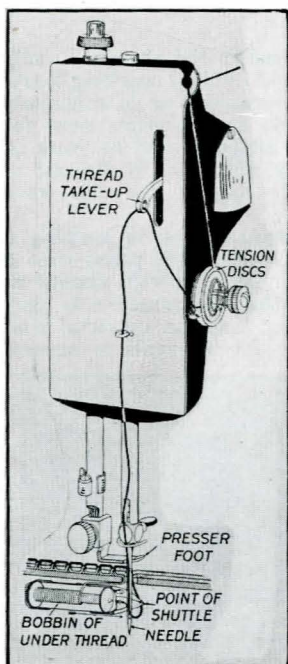


FIG. 2.—Vibrator shuttle mechanism.

point of the shuttle or shuttle hook of a rotary machine makes one complete revolution each time the machine locks a stitch. It is necessary with both oscillator and rotary machines to leave a long upper thread through the needle so that it does not become unthreaded each time a new seam is started. The rotary machine is also adapted to motor as well as treadle operation.

NEEDLES

It is common practice of the majority of manufacturers of sewing machines to sell their machines to merchants, wholesale and mail order firms under any name the buyer may designate. At the present time machines under about 8,000 different names are in use, but the total number of manufacturers is very small compared to the number of names of machines.

been used enough to become somewhat loose. They are slower operating machines, and therefore are not as well adapted to motor operation. Of the older machines in use, the majority of them are the vibrator type.

OSCILLATOR

More properly this type is known as the oscillating hook machine. The bobbin and bobbin-holder remain stationary while the circular shuttle race carrying the shuttle hook moves through approximately a half circle and return, during the locking of one stitch. The point of the shuttle hook, which picks up the upper thread at the beginning of the stitch locking operation corresponds to the point of the shuttle on the long shuttle or vibrator type machine. This type of machine is capable of higher speeds than the vibrator type and is commonly driven by electric motor power. Because it is a light running machine it is also well adapted to treadle operation.

ROTARY

Very frequently the rotary type machine and the oscillating hook type machine are confused, although they are very easily identified if the manner of operation of the two types is understood. The point of the shuttle hook of the oscillator does *not* make a complete revolution each time a stitch is locked, but travels through approximately a half circle and return. The

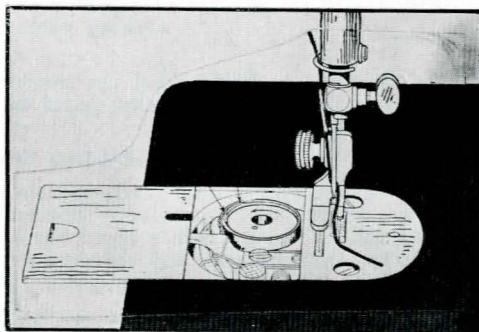
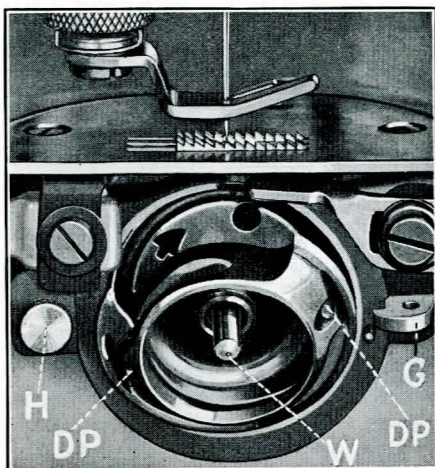


FIG. 3.—Oscillator shuttle mechanism.

Only one of these sewing machine companies makes needles, and there are two other needle manufacturers, a total of three firms which make most of the needles that are used. Sewing machine needles have been standardized so that there are eight different styles. Regardless of the name of the machine in question, it can be properly fitted by one of these eight styles of needles. These needles are designated by a number rather than by the name of the machine in which they are to be used. This number refers to the style of the shank and the length of the needle from the end of the shank to the eye. The total length of the needle is immaterial, the important measurement of needle length being the distance from the upper end of the shank to the eye.



Courtesy of White Sewing Machine Co.

FIG. 4.—Rotary shuttle mechanism.

The entire assortment of eight styles of needles is made by each needle manufacturer. Each separate style of needle is designated by a number but each needle firm uses a different numbering system. When obtaining a needle for any particular machine, the following steps must be taken to assure selection of the proper needle.

1. Determine the brand of needle carried by the merchant.
2. Determine the number of needle made especially for the machine in question, either by trial or by comparison with a needle known to work properly.
3. Keep the needle number in mind for future reference.

Sewing machine needles should be purchased by the number of the needle, not by the name of the sewing machine.

Length of Needle. When the proper length of needle is in the machine, the point of the shuttle or shuttle hook is one-eighth to one-sixteenth inch above the eye of the needle at the time the point is nearest the needle. Any variation from this dimension will result in the machine either missing stitches or entirely refusing to make the stitch.

Setting in the Needle. The needle should be pushed up as far as it will go on all modern machines. Also, the flat side of the shank is put to the right. If these instructions do not apply, the machine in question is an older model. The instruction book with the machine should be referred to and if that is not available the following will usually apply.

1. The long groove in the needle should be placed on the same side as the lowest thread guide on the needle bar.
2. Machines in which the needle must be set at a certain point have a mark usually on the needle bar for reference. If no mark is found, set the needle according to above instructions.

TENSION ADJUSTMENT

The proper adjustment of the upper and lower tension is the factor that determines the condition of the stitch. A perfect stitch is exactly alike on both sides, and this stitch is stronger because both threads are under the same stress. See illustration "A", Fig. 5. In addition to looking the same on both sides of the material the stitch must be loose enough that it does not pucker the material, but not too loose to look smooth.

Any stitch will fall into one of the three classes shown, although it may not be so extreme that one thread will lie entirely straight on one side of the material. However, if the stitch is not a perfect one, with both threads under exactly the same tension and both sides of the stitch looking exactly alike, it falls into one of the two imperfect classes, even though it is not as extreme as the "B" or "C" illustrations, Figure 5.

The condition of the stitch is determined by the adjustment of the upper and lower tensions. The upper tension adjustment is the large thumb-screw on the two small discs through which the upper thread passes, or on the long bar on top of the head of the machine through which the upper thread passes. On a long shuttle or vibrator type machine, the lower tension adjustment is the small screw holding the flat spring (lower tension spring) on the side of the shuttle. On the oscillator or rotary type machines, the lower tension spring is a flat, curved spring on the side of the bobbin holder. This spring is usually held in place by two small screws, and the screw nearest to the place where the thread passes out from under the tension spring is the lower tension adjusting screw. On many machines having this type of lower tension, the adjusting screw has a larger head than the second screw and is easily identified.

INSTRUCTIONS FOR ADJUSTING TENSIONS

Several methods of adjusting tensions are commonly used but the one described here is accurate under a greater variety of conditions. Proceed as follows:

1. Make sure that the machine is threaded with the thread you expect to use.
2. Double a piece of the material with which you expect to work so that you have a square or rectangular piece of material of double thickness.
3. Sew diagonally across this piece of material, two or three inches.
4. Catch the stitch with the fingers and thumb of one hand about one-half inch from the fingers and thumb of the other hand and pull evenly on both threads until you hear a snap. Stop pulling immediately.

If the lower thread is broken and the upper one not, the lower tension is tighter, the stitch corresponding to "C", Figure 5. Should the upper

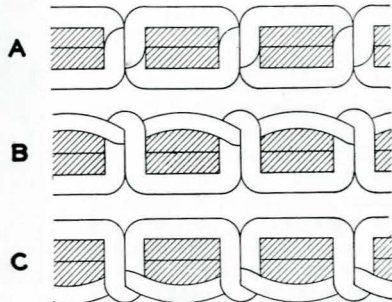


FIG. 5.—Threads showing tension adjustment.

thread be broken and the lower one not, the upper tension is tighter and the stitch corresponds to "B", Figure 5. Both are examples of imperfect stitch. If both threads break at exactly the same time, that is an indication of a perfect stitch.

The operation of adjusting the tension to secure a perfect stitch is known as balancing the stitch. It should *always* be done with the upper tension. When the lower thread breaks upon test, the lower tension is tighter and the upper tension should be tightened until it corresponds to the lower. If the upper thread breaks upon test, the upper tension should be loosened until it corresponds to the lower.

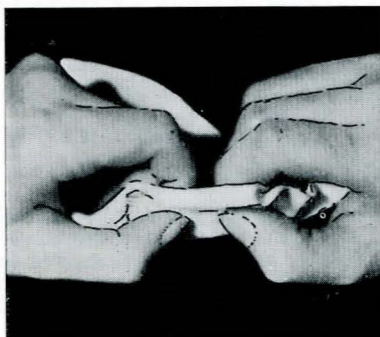


FIG. 6.—Pull the threads very evenly.

AUTOMATIC TENSIONS

A number of sewing machines are equipped with so-called automatic tensions. These tensions are the familiar double disc and spring upper tension, entirely enclosed. While some types of upper tensions will carry a much wider range of thread and work with a much wider range of weight of materials than others, there is no tension, either upper or lower, that does not need adjustment at some time for different materials or to balance the stitch. The adjustment of the so-called automatic upper tension is accomplished by turning the piece on the outer end of the screw or pin which holds the upper tension in place.

ADJUSTMENTS FOR DIFFERENT WEIGHTS OF MATERIAL

Thin Material. Difficulty in handling thin material due to puckering is usually traced to improper tension adjustment. Both tensions may be too tight, or the tensions may not be balanced, or both. If the machine is causing thin material to pucker, both tensions should be loosened, then re-balanced to make the same stitch on both sides of the material. When the tensions are loosened for thin material, it is necessary, of course, to *loosen the lower tension as well as the upper*, then balance the stitch.

It is never necessary to sew any kind of material on newspaper if the machine is adjusted for that particular weight of material.

Heavy Material. Because heavy material requires a strong stitch to hold firmly, it is necessary to **tighten** both tensions, then balance the stitch.

Both tensions must be loosened or tightened to equal the weight of the material being handled, then balanced.

NOTE: In addition to adjusting the tensions according to the weight of material being handled, the compressor foot pressure adjusting screw should be tightened for heavy material and loosened for thin material. Occasionally thin material will pucker because of too heavy pressure, also trouble may be experienced because of poor feeding when handling heavy material if the compressor foot pressure is not heavy enough.

CLEANING AND OILING THE MACHINE**MATERIAL AND SUPPLIES**

Large oil squirt can filled with gasoline.
Pie tin containing about one-half inch of gasoline.
Large screw driver.
Small screw driver.
Pliers
Small paint brush.
Several old cloths.

THE CLEANING OPERATION

1. Remove the thread, needle, bobbin and shuttle. Then take off the shuttle slide plates, presser foot, the large vertical plate on the left end of the machine and the small plate (throat plate) through which the needle passes. If the machine has a plate on the back, near the hand wheel, remove it also.
2. From the large oil can, squirt a generous amount of gasoline into each oil hole, raise the head back and bathe the moving parts under the head and also the stand parts well with gasoline.
3. Return the head to running position and run the machine hard for a few minutes to work the bearings free from the old oil.
4. Slide the pie pan of gasoline under the needle and presser foot bars. With the brush thoroughly wash out the mechanism in the left end of the machine. Do the same to the hand wheel and bobbin winder. If the machine has a plate on the back of the head near the hand wheel, wash the mechanism under the plate in the same manner. Next remove the pan from this position, tilt back the head of the machine and wash out around the shuttle driving mechanism and the feeding assembly. Be sure no lint is left around the feed dog. The treadle and large belt wheel on the stand should next be cleaned with the brush and gasoline. If any thread is wound around the wheel shaft or rod connecting wheel and treadle, it may be necessary to use a large pin or knife to remove it.

NOTE: Under the front shuttle slide in the heel of the machine is usually found a small hole filled with wool waste. From this little well runs a very small hole, to the shuttle race, of the long shuttle or vibrator machines. The wool should be saturated with oil, for just enough comes through to oil the shuttle. When cleaning the machine, the wool should be taken out, washed in gasoline and replaced, or renewed. Run a pin through the small hole leading to the shuttle race to clean it out. Most oscillator machines have a split piece of red felt that rubs on the moving shuttle race. This felt should be saturated with oil and cleaned occasionally. Make sure that it always rubs both sides of the shuttle race. A number of rotary machines have an oil hole in the shuttle race and the shuttle should have a small drop of oil frequently.

5. With a clean cloth wipe dry all the parts possible and let the machine stand for an hour or more before re-assembling, that the gasoline may all evaporate.
6. Oil the machine by placing a few drops of oil in each oil hole and on every place where two pieces of metal rub. Turn the hand wheel slowly and with the head raised back, observe where metal surfaces rub, and give those places a supply of oil. Oil all bearing surfaces of the stand parts also.
Care should be taken to use high grade sewing machine oil and one drop should be applied to each bearing and each point where there

is any friction. It is poor economy to use oil of doubtful quality, as it may gum on the working parts and make necessary a complete overhauling of the machine. Oil designed for cream separator, washing machine or vacuum sweeper use is not suitable for a sewing machine and should *not* be used.

7. Replace all parts that you have removed, taking care not to force any piece into place. Forcing may mean breaking a part.

CLEANING A VERY DIRTY MACHINE

If the head of the machine is very dirty or badly gummed with heavy oil, the head should be removed from the stand and placed in a wash boiler. Enough gasoline should be poured over the head to cover it and the parts which should have been removed previously. Head and parts should remain in the gasoline at least an hour, longer if the machine is badly gummed. As soon as all dirt and gummy oil is loosened, the head and parts can be removed and cleaned as previously described.

CAUTION!

GASOLINE IS INFLAMMABLE AND EXPLOSIVE.
CLEANING SHOULD NOT BE DONE IN A ROOM WITHOUT AMPLE VENTILATION AND NEVER NEAR AN OPEN FIRE. KEROSENE MAY ALSO BE USED TO CLEAN A MACHINE. IT IS USED IN THE SAME MANNER AS GASOLINE, EXCEPT THAT AT LEAST TWENTY-FOUR HOURS MUST ELAPSE BETWEEN CLEANING AND OILING. THE CLEANING PROCESS MAY BE A LITTLE SLOWER THAN GASOLINE, BUT THERE IS NO REASON WHY IT CANNOT BE AS WELL DONE.

SEWING MACHINE MOTORS

The motors used on electric sewing machines require very little attention other than the periodic oiling recommended in the instruction book that comes with the machine. Care should be taken that the proper lubricant is used, some motors requiring oil, others a special grease. The instruction book specifies the proper lubricant, and it can be purchased from the sewing machine agency. The screws holding all electrical connections should be kept tight, and all wires should be given a periodic inspection, making sure that no connections are loose, or any wires have insulation worn off in any spots. It is usually not practical to attempt to repair any part of the motor or control mechanism. These parts should be taken to an electrician or sewing machine agency.

SEWING MACHINE TROUBLES AND CORRECTIONS

The remaining portion of this bulletin contains a list of the more common sewing machine troubles and the adjustments that will usually correct them. The following instructions may help in the use of this trouble table.

1. Find your trouble in the list.
2. Make each adjustment singly. If the first correction tried does not correct the difficulty, return to the original position before attempting further adjustment. Never make more than one adjustment at one time.
3. Do not turn any adjustment very far without trying the machine. You may pass the point of proper set and bring up other difficulties.
4. The trouble may be from a combination of causes. In that case it will be necessary to analyze each cause separately. Occasionally adjustment will not correct the trouble, and one or more new parts may be necessary.
5. This section should be used in connection with your sewing machine instruction book. If you have none, one may be secured from the manufacturer or agency.

MACHINE RUNS HARD

1. Cause—Lack of oil.
Remedy—Clean out all oil holes and oil with good sewing machine oil. Tilt head back and oil all wearing surfaces on mechanism, also all bearings on treadle and large belt wheel.
2. Cause—Gummed oil in bearings or between moving parts. Dirty.
Remedy—Follow cleaning instructions.
3. Cause—Belt too tight or too loose.
Remedy—Adjust belt length by either taking out or inserting a small piece.
4. Cause—Bobbin winder running on belt or wheel when not in use.
Remedy—Make sure that bobbin winder is clear when not in use.

MACHINE MAKES AN IMPERFECT STITCH. (Threads do not lock in the center of the material).

1. Cause—Tensions not balanced.
Remedy—Follow instructions for balancing tensions.
2. Cause—Tension plates or springs badly worn or weak.
Remedy—**UPPER TENSION.** Take upper tension apart, clean and polish inner surface of the tension plates, removing all dirt, lint, and rusty spots. If the thread has worn grooves in the plates, they should be removed with emery paper or a fine whet stone.
LOWER TENSION. Take off lower tension spring and remove any thread, dirt, or lint that has collected, also any rust.

MACHINE MISSES STITCHES

1. Cause—Bent or broken needle.
Remedy—The vertical needle passage under the throat plate may be filled with dirt, pushing the needle to one side.

2. Cause—Needle too small for thread being used.
Remedy—Change needles.
3. Cause—Incorrect needle for machine.
Remedy—Follow instructions for obtaining correct needle.
4. Cause—Needle set too high or too low.
Remedy—The needle must be set so that the eye of the needle is one-sixteenth to one-eighth inch below the point of the shuttle when the point is nearest the needle. On all modern machines the needle is to be pushed up as far as it will go.

5. Cause—Point of shuttle blunt or broken (usually on vibrator machines).
Remedy—Sharpen the point of the shuttle with a piece of fine emery paper or a fine whet stone. The shuttle should be sharpened on the round side, *never on the flat side.*

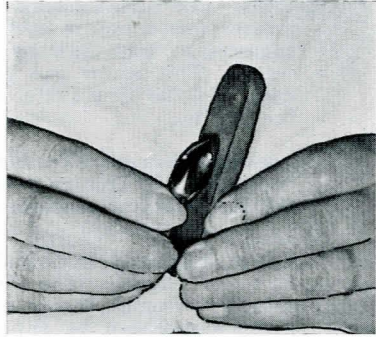


FIG. 7.—Sharpening point of long shuttle.

6. Cause—Worn shuttle.
Remedy—Replace shuttle.

BREAKING THREAD—(Upper thread)

1. Cause—Needle set in machine wrong side out.
Remedy—On modern machines needle is set with flat side of shank to the right. For older machines, or those in which the needle is set otherwise, follow instructions under “Needles”.
2. Cause—Machine threaded incorrectly.
Remedy—Follow your instruction book. (See Figure 10.)
3. Cause—Needle rubs against feed plate or shuttle.
Remedy—(a) Replace needle if bent.



Courtesy of White Sewing Machine Co.
FIG. 8.—Loosen these screws to adjust needle centering or take-off end housing.

(b) A number of machines have adjustable needle bar housing. (See Figure 8.) The screws holding the housing in place are loosened, *slightly*, allowing move-

ment from front to back. This allows adjustment of the needle to the needle plate (throat plate) hole, from front to back.

If the needle needs to be adjusted from left to right, loosen the lower screw holding the needle housing in place, then turn screw "C", Figure 9, to adjust needle to hole. The point of the needle should be a little closer to the right side of the needle hole plate, as the operator faces the machine.

4. Cause—Needle rubs against presser foot.

Remedy—On some machines, the presser foot clamp is held on the compressor foot bar by a set screw. This screw can be loosened and the foot centered with the needle.

5. Cause—Insufficient clearance between shuttle and race of long shuttle (vibrator machines).

Remedy—Loosen shuttle cradle screw sufficiently that cradle can be moved slightly. The clearance should be enough that a piece of heavy paper can be slipped between the shuttle and race.



Courtesy of White Sewing Machine Co.
FIG. 9.—Screw "C" also adjusts needle centering.

BREAKING THREAD—(Lower thread)

1. Cause—Improper threading of shuttle or bobbin case.

Remedy—See instruction book for proper threading.

2. Cause—Thread wound unevenly on bobbin.

Remedy—Thread guide on bobbin winder is carrying thread too far to one side of the bobbin. Bend thread guide in the direction of least winding on bobbin, using a small pair of pliers. (Figure 13.)

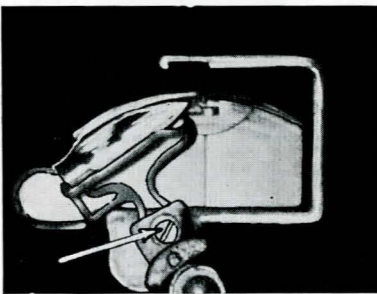


FIG. 10.—Loosen clamp screw and move shuttle carrier.

3. Cause—Burr or rough needle hole in throat plate.

Remedy—Smooth edges of needle hole with small reamer.

4. Cause—Dirt collected in end of long shuttle.

Remedy—Remove dirt or lint.

LOOPED STITCHES—(On top of material)

1. Cause—Lower tension either too loose or dirt lodged under lower tension spring.
Remedy—Adjust or clean tension.
2. Cause—Lower tension spring badly worn or weak.
Remedy—Replace lower tension spring.

LOOPED STITCHES—(On lower side of material)

1. Cause—Upper tension either too loose or dirt lodged between upper tension plates.
Remedy—Adjust tension or clean plates.
2. Cause—Upper tension plates badly worn or rusty.
Remedy—Replace upper tension plates.
3. Cause—Shuttle cradle holds shuttle too tight (long shuttle).
Remedy—Adjust cradle for more clearance (Figure 10).
4. Cause—Upper thread catches on rough place on shuttle.
Remedy—Polish off rough place.

PUCKERED MATERIAL

Follow instructions under "Tension Adjustments".

1. Cause—Dull needle.
Remedy—Replace needle.

STAGGERED STITCHES

1. Cause—Not enough pressure on presser foot.
Remedy—See directions under "Goods Do Not Feed Properly".
2. Cause—Lost, broken or weak take-up spring.
Remedy—Replace take-up spring, the small spring with the wire loop on the end, close to the upper tension.

MACHINE DOES NOT FEED PROPERLY

1. Cause—Too much or too little pressure on presser foot.
Remedy—Tighten or loosen the thumb screw on the top of the compressor foot bar until the material feeds through the machine easily, and you are able to turn the material as you sew without lifting the foot and without wrinkling the material.
2. Cause—Feed dog set too high or too low.
Remedy—Set feed dog at proper height by loosening the clamp screw just under the throat plate, and moving the feed dog up or down by hand, whichever is necessary. To make this adjustment *turn the hand wheel until the feed dog is at its highest point. The needle is at its highest point at the same time. At this point the bottom of the grooves of the feed dog should be exactly level with the top of the throat plate (Fig. 11).*

3. Cause—Stitch regulator may be turned so far back that the feed is entirely out of action.

Remedy—Lengthen the stitch.

HAND WHEEL DOES NOT RELEASE TO FILL BOBBIN

1. Cause—Clutch dirty or stuck with gummy oil.

Remedy—Remove hand screw on wheel, clean, oil, and replace. Under this hand screw is a large washer that can be replaced in four different ways. Only one way will allow the clutch to operate properly. There is no way to designate the proper position. It can be determined only by trial. (Fig. 12.)

NOTE: Wheel clutches on all machines are not exactly the same as the illustration, and may not be as easily disassembled. If not, they may be remedied, usually by running gasoline or kerosene through them to loosen any dirt or gummy oil.

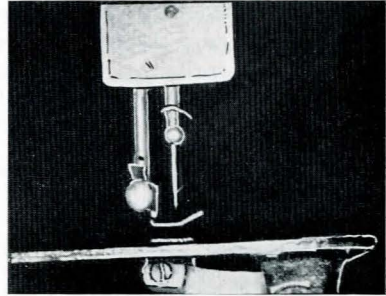
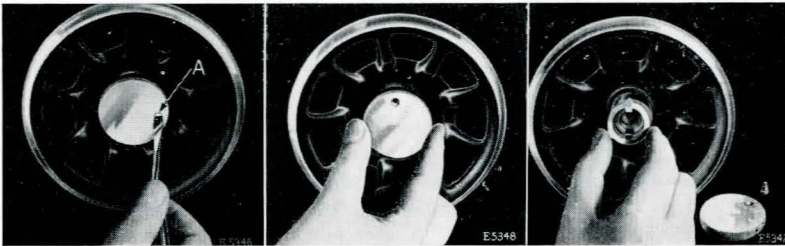


FIG. 11.—Clamp screw holding feed dog in place.



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Courtesy of Singer Mfg. Co.

FIG. 12.—Clutch mechanism.

BOBBIN WINDER DOES NOT WIND PROPERLY

1. Cause—Winds too far to one end of bobbin.

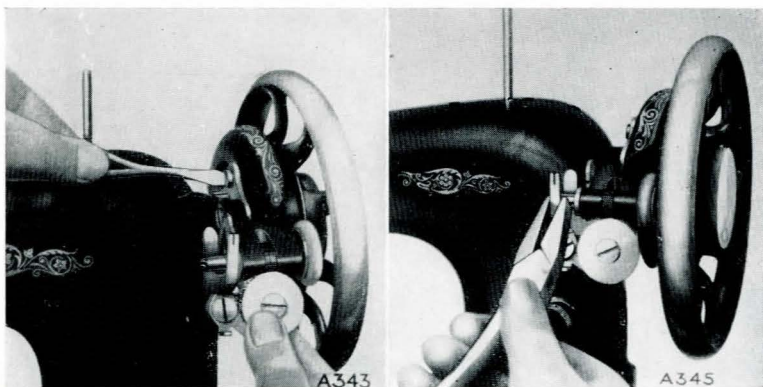
Remedy—Follow instructions under “Thread Breaks—Lower”, No.

2. See Figure 13.

2. Cause—Thread guide cam wheel refuses to turn.

Remedy—Loosen nut on end of screw holding cam wheel in place. This nut is on rear of bobbin winder. Remove screw and cam wheel, clean, and replace. The screw should be replaced and held in position so that the cam wheel turns easily. Finally, the nut should be replaced, making sure that the wheel will turn when the nut is tightened.

3. Cause—Bobbin winder drive wheel not bearing on hand wheel or on belt heavy enough.



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FIG. 13.—Bobbin winder adjustment.

Remedy—(a) If bobbin winder is operated from the belt, tighten the belt.

(b) If bobbin winder is operated from the rim of the hand wheel, make adjustment to allow it to bear heavier on rim of wheel Fig. 13.

NOISY TREADLE AND LARGE WHEEL BEARINGS

1. Cause—Pivot screws of treadle or large belt wheel loose or worn.

Remedy—Release screw by backing off the large nut one or two turns, place a screw driver in the slot of the screw and advance the screw towards the treadle or wheel just enough to take up the wear. Tighten the lock nut and test by shaking the piece being adjusted. If still noisy, repeat the operation.

2. Cause—Connecting rod bearings loose.

Remedy—See your instruction book for means of tightening bearings at either end of the rod, at the treadle, and at the belt wheel.