MAINTENANCE, ADJUSTMENT AND REPAIR OF INDUSTRIAL SEWING MACHINES

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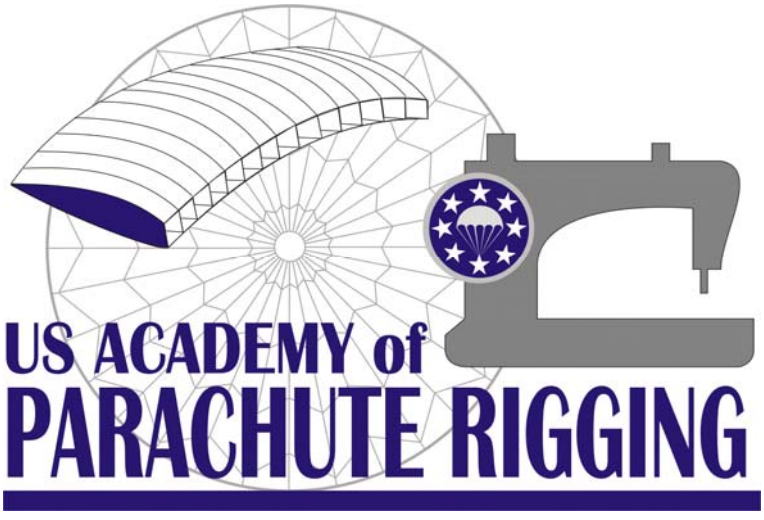


MAINTENANCE, ADJUSTMENT AND REPAIR OF INDUSTRIAL SEWING MACHINES

PREMISE:

You know how to sew and you are working with an “E” thread lock stitch sewing machine and it was sewing and now it’s gone bad.

You probably just changed something – 98% of the time just go back and inspect and correct what you just did and you will be back in business.

COMMON CASE SCENARIOS:

A. Bobbin change

B. Top thread change

C. Jam

D. Broken needle and/or changed needle

Before we get into these specific areas, let’s go back and remember the basic way the machines work.
All lock stitch machines make the same stitch.
301, 304, or 308: these are just lock stitch machines.

“THE FLOW ACTION”

- The needle does down
- The needle goes **below** path of hook (Figure 1)
- Needle bottoms out (B.D.C.)
- Needle comes up (3/32 inch - common measurement), loop forms on hook side of needle (non-long groove side of the needle) (Figure 2)
- Hook picks up top thread loop and carries it around bobbin case. (Figure 3)
- Hook drops top thread off (Figure 4)
- Thread take-up arm takes out slack and sets stitch in goods. (Figure 5)
- Think of the bobbin thread as a long straight rod with the top thread spiraled around it. Sew a piece of paper with two different color threads – rip paper to remove it and there is your example. (Figure 6)

REMEMBER

Everywhere the top thread goes must be very smooth and there must be clearance for the thread to pass.

e.g.
guides
springs
needle
tension disks
passages in hook
bobbin case indexer
throat plate
If not – top thread will be snagged and/or cut.

A: BOBBIN CHANGE

PROPER PROCEDURE

- Insert 85-90% full bobbin into bobbin case and pull thread through slot and under tension spring. (Figure 7)

- Pull end to test even-smooth tension. The weight of one small hemostat will not un-spool thread but 2 small hemostats will un-spool thread. (Figure 8&9)
- Place bobbin case in machine and latch in place. Pin top thread against bed (don't pull) hand wheel machine forward, and bobbin thread should come up as the thread take-up arm goes to the top. (Figure 10)
- Pull bobbin thread with fingers and check for smooth tensioned feed out.

PROBLEMS

1. Bobbin overfull: outer wraps of bobbin thread dragging on bobbin case – remove excess thread to 85-90% capacity.
2. No tension – bobbin thread not under bobbin tension spring or tension has not set ahead of time. (2 hemostat rule)
3. Bobbin thread does not feed out at all – bobbin thread under bobbin case latch or caught in lower mechanism – clear.
4. No feed or uneven feed – bent or wrong bobbin or snarl – use good bobbin with fresh fill NOTE: use same amount of tension on our bobbin winder as bobbin case feeds out.

Snarls come from winding bobbin without tension or when a backlash occurs – sudden machine stoppage and bobbin still spins (inertia) in bobbin case – use anti-backlash bobbin case.

NOTE: All machines have a device that prevents bobbin holders from spinning. (Figure 11; Figure 12; Figure 13; Figure 14)

B: TOP THREAD CHANGED

You changed the top thread and now there's a problem.
Trace with finger and eyes from thread stand on through machine with following chart.

ALL MACHINES TOP THREAD THE SAME

TOP THREADING CHART

1. Spool (with cups or foam underneath) (Fig 15)
2. Up to thread stand guides (Fig 16)
3. Thread guide(s) on machine: NOTE too many wraps add too much tension
4. Top thread tension DISKS – make sure thread is between disks
5. Thread take-up spring (check spring) (Fig 17)
6. Something that makes thread take-up SPRING work (Fig 17)
7. Thread take-up ARM (Fig 17)
8. Guide(s)
9. Needle Long grove side to non-long groove side (Hook side) (Fig 18)

COMMON PROBLEMS OF TOP THREAD

1. Wrapped around bottom/top of thread stand (Fig 19)
2. Wrapped around guide (half hitched) (Fig20)
3. Not between tension disks (Fig 21)
    a. Behind both disks
    b. Caught in spring
    c. Missing altogether
4. Not in thread take-up spring and/or wrapped around it. (Fig 22)
5. Not through part that make thread take-up spring work (Fig 23)
6. Not through thread take-up arm (Fig 24)
7. Wrapped around needle or wrong way through. (Fig 25)

We are going to take a look at and talk about certain parts and their function

1. Thread take-up arm (Lever)
    Allows slack in top thread so hook can take it around bobbin case, after top thread is dropped off by the hook, thread take-up arm takes up previous slack and sets stitch in the goods. (Fig 26)
2. Thread take-up (Check) spring – takes up slack in top thread when needle is out of goods so top thread does not loop around needle (or other parts) nor is it pierced by needle.

a. Set tension by 2 hemostats rule: one hemostat weight will start deflecting spring and two hemostats will fully deflect spring to stop.
b. Throw limits of spring.
    i. Spring goes to full-on stop while thread take up arm is setting stitch and stripping off more top thread for next stitch
    ii. All spring tension is gone off top thread after needle pierces goods and must be off before needle is at bottom of stroke (B.D.C.)

C: JAMS

Jams are when the machine, or a part of the machine, does not turn over freely.

We will look at:

1. Oscillating hook
2. Safety clutch
3. Vertical shaft hook
4. Horizontal shaft

CLEARING JAM IN OSCILLATING HOOK

Rarely occurs – mostly when you forgot to put in the bobbin and bobbin case, in a bartack and tried to sew – take out bobbin and bobbin case – cut threads and remove. If you need more access, remove hook and race assembly, clear, clean lube and reassemble.

SAFETY CLUTCH

Where top and bottom shafts no longer move together – bottom shaft stopped.

Safety clutch (usually on vertical shaft hooks) has disengaged top shaft from bottom shaft. Thread probably jammed in the hook assembly (Fig 27)

Remove needle and bobbin. Clear the thread. To re-engage press button shown, hold button down hand wheel BACKWARDS – keep hand wheeling backwards and you will hear and feel a click when clutch re-engages.
(Fig 28 & Fig 29)

Put proper needle in correctly. Hand wheel machine over and eye ball timing – thread up and test sew. If necessary, re-time the machine.

CLEARING JAM IN VERTICAL SHAFT HOOK

The bobbin holder cannot rotate freely in hook.

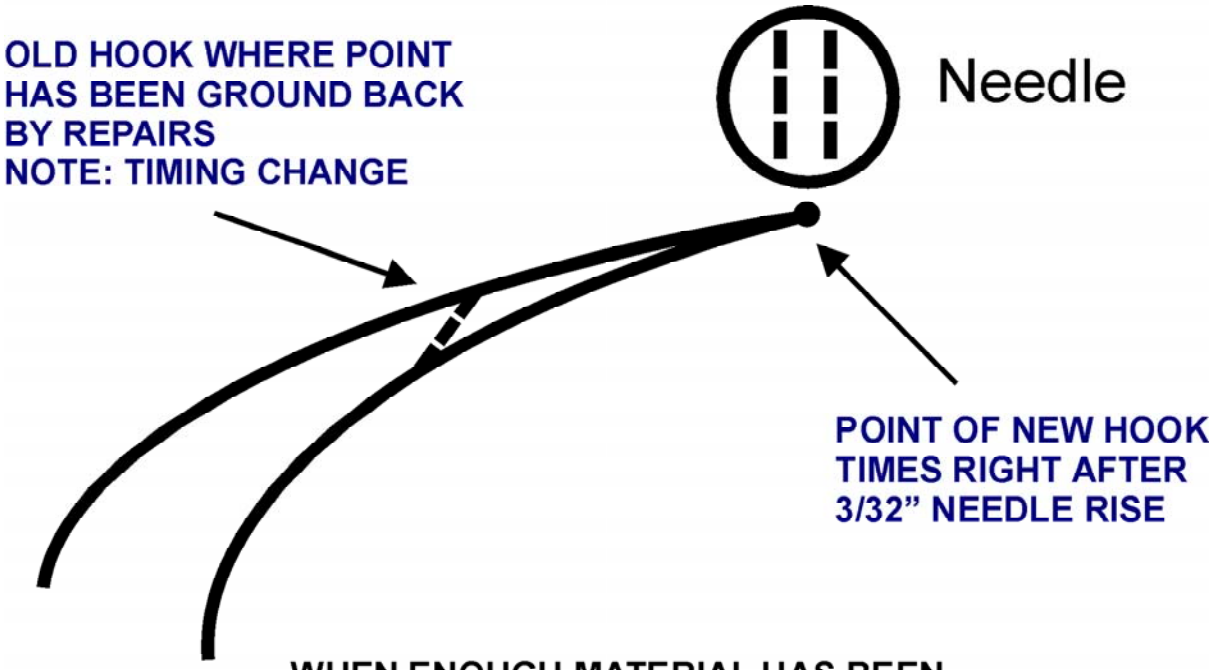
a. Remove bobbin, presser foot, and throat plate. (Fig 30)
b. Pull out thread if possible – wiggle hook and cut and pull. If you clear it, put back together and test.
c. OK: HOOK STILL JAMMED. Remove gib screws and gib. The bobbin holder will only come out at one orientation (you may have to force it) (fig) Clean, lube and replace bobbin holder in hook with gib and gib screws. Inspect point of hook (dress if necessary. NOTE: When installing throat plate indexing projection on bobbin holder must be in notch of throat plate. (Fig 32&32)

HOOK DRESSING

DO NOT REMOVE MATERIAL ON NEEDLE SIDE – UNLESS TIP IS PEENED OVER.

Clean up with diamond hone or ceramic stone. Polish with dremel tool and emery pads.
As you remove more and more metal from the tip of the hook – the new shorter point moves back.
Eventually shortened hook will not pick up loop and you will need a new hook.

TOP DOWN VIEW OF ROTARY HOOK AND NEEDLE



WHEN ENOUGH MATERIAL HAS BEEN REMOVED, HOOK WILL NOT PICK-UP LOOP. REPLACE WITH NEW HOOK.

CLEARING JAM IN HORIZONTAL SHAFT HOOK

The bobbin holder cannot rotate freely in hook and you will have to remove hook assembly. (Fig 33)

1. Remove indexing finger (Fig 34&35)
2. Loosen set screw on shaft (2 or 3)
3. Rotate assembly to clear feed dog mechanism and pull off shaft to the left.
4. Disassemble hook
    a. Remove screws, thread guide and bobbin race clip. (Fig 36)
    b. Rotate center (only comes out in one orientation) and remove.
    c. Sand and polish thread guide.
    d. Clean center.
    e. Dress hook if necessary
    f. Reassemble center into hook assembly with thread guide bobbin race clip and screws.
    g. Lube
5. Reinstall and time machine.

D: BROKEN/BENT NEEDLE

O.K. – you broke/bent a needle

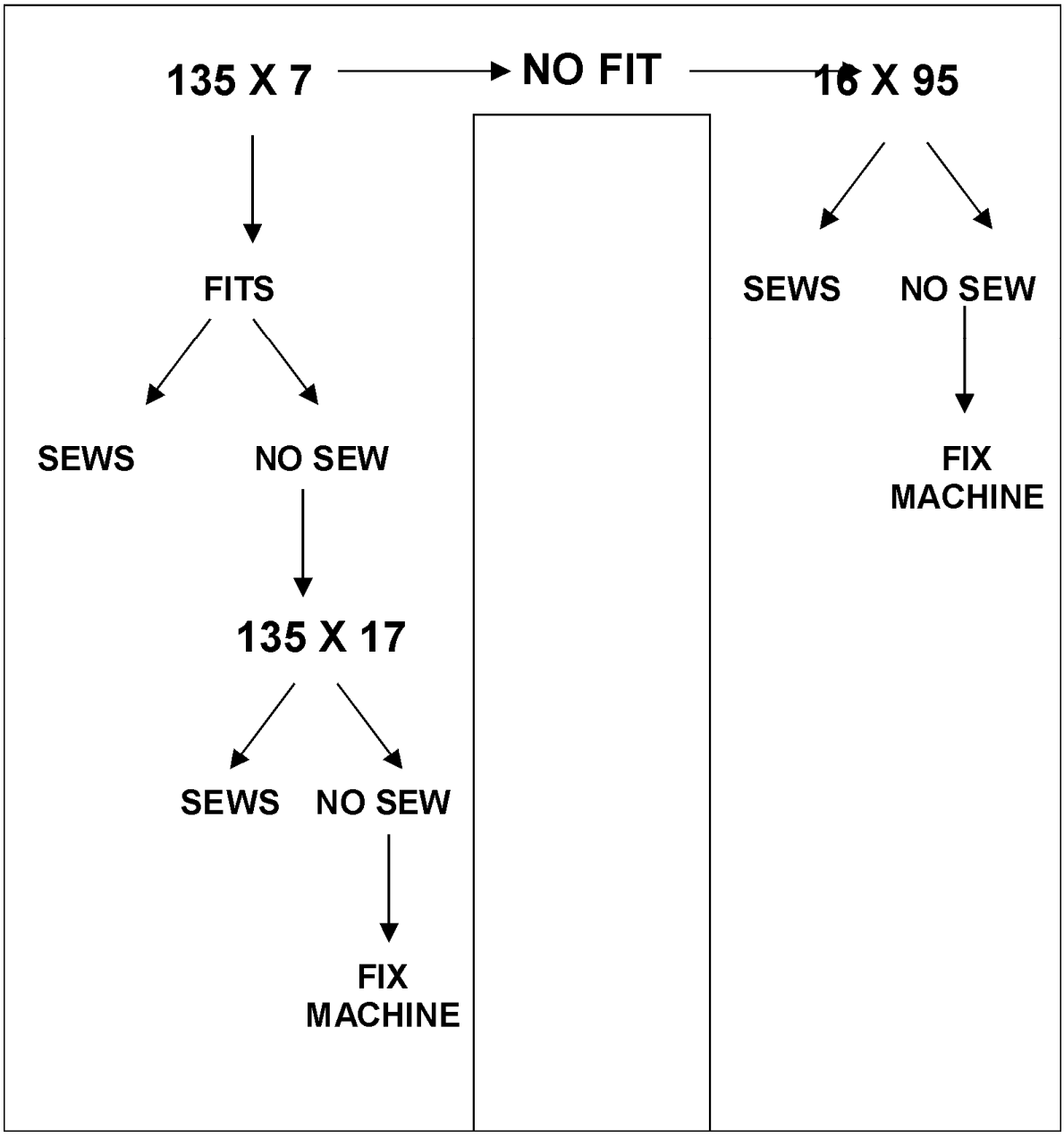
Let's to over needle terminology

SHANK – sized to fit needle bar
SHAFT – sized to job, thread used, material sewn, and thickness of goods
LONG GROOVE – very important that thread move freely in groove otherwise there will be problems in the loop formation and stitching
EYE – thread passes through from long groove to hook side.
SCARF – usually on rotary hook machines. Non-scarf needle usually on oscillating hook (Shuttle) machines.
POINT – for rigging work we use regular (round) or ball point

Mark needle at 1/16" (.0625) and 1/8" (.125) above top of eye with sharpie pen (Fig 37)

3-NEEDLE CHART

NEEDLE SELECTION



OTHER DESIGNATIONS FOR THE 3 COMMON NEEDLES USED

SINGER	ORIENTAL	OTHER
135 X 7	DP X 7	SY 1955 134, 134KK, 797, 135 X 65
135 X 17	DP X 17	SY3355
16 X 95	DB X 1 DB X 257	16 X 257, 16 X 231 287 WH 1738

NEEDLE SHAFT SIZING CHART

SINGER	16	18	19	20	21	22
METRIC	100	110	120	125	130	140

"E" THREAD NEEDLE SIZING

CANOPY	16-18
LT CONTAINER	18-21
HW CONTAINER	20-22

GENERAL TIMING ROUTINE

- Always time by going forward
- Mark needle at 1/16" (.0625) and 1/8" (.125) inch above top of eye of needle
- Insert correct needle fully into needle bar with correct orientation. Largest size normally used.
- Hand wheel forward to bring needle bar to lowest point. Mark needle bar with 3/32" (.09375) inch mark below lower needle bar bushing. (Fig 38)
- Hand wheel forward to bring 3/32" (.09375) mark on needle bar up to bottom of lower needle bar bushing.

NOW: The point of the hook should be at the center line of needle between the 1/16 and 1/8 marks if the timing is correct.
If needed, rotate hook to line up with centerline of needle.

NOTE:
Moving needle bar up or down does not change the timing – it only changes the vertical location on the needle where the hook passes.

NEEDLE BAR:

Way too far up – hit bottom of lower needle bar bushing
Little to far up – loop forms above and is not captured by hook.

OK: At 3/32" needle rise the point of the hook lines up with the centerline of needle between 1/16" & 1/8" and it will sew.

TOO far down – loop deformed/deflected by hook parts.
Way to far down – needle hits something

TIMING OSCILLATING HOOK MACHINES

NOTE: Oscillating hook makes one cycle for each one top shaft (hand wheel) rotation.

On 31.15 type machine, the only adjustment is the needle bar height. The timing is built into the mechanism.
Adjust the needle bar height so that the hook is 1/16" above the top of the eye after coming up from the lowest position. (Fig 39)

On BARTACKS: 3/32" and 1/16" works well. Rotate needle bar to lowest point – mark 3/32" down on needle bar below lower needle bar bushing. - rotate forward to bring mark up to bottom of the lower needle bar bushing. Adjust rocker by loosening 2 screws and rotate rocker so point of hook is on centerline of needle and 1/16" above top of eye. (Fig 40)

HORIZONTAL AXIS ROTARY HOOK TIMING

NOTE: hook makes 2 rotations for each cycle of need bar (1 rotation of the top shaft)

- Set machine to 8 S.P.I.
- Remove throat plate, presser foot, and feed dogs.
- Insert largest diameter normally used needle correctly in machine, mark at 1/16 and 1/8 above eye of needle.
- Hand wheel needle bar to lowest position and mark needle bar at 3/32 inch below lower needle bar bushing. (Fig 41)
- Hand wheel forward to bring 3/32" mark up to bottom of lower needle bar bushing. (Fig 42)
- If hook not aligned properly – loosen set screws and rotate point of hook to center line of needle. (Fig 43 & 44)
- Try to get hook as close to needle as possible laterally without touching. To do this, move hook left or right on shaft and tighten set screws. (Fig 45)
- Set needle bar height so point of hook is between 1/16" and 1/8" marks.
- Replace parts and test sew.

VERTICAL SHAFT ROTARY HOOK TIMING

NOTE: Hook makes 2 rotations for each cycle of needle bar.

- Set machine to 8 S.P.I.
- Remove presser foot throat plate and feed dog. Insert largest needle used and marked at 1/16" to 1/8" above top of eye.
- Hand wheel needle bar to lowest point (B.D.C.) and mark 3/32" below lower needle bar bushing. (Fig 46)
- Hand wheel forward to bring 3/32 markup to lower needle bar bushing.
- At this point the hook should be at the centerline of the needle and between the 1/16" to 1/8" marks. (Fig 47)
- Try to get the hook as close as possible to the needle laterally without touching – loosen 2 or 4 screws and move gear assembly left or right. Tighten screws. (Fig 48)

NOTE: center lines of gears should align. You may have to loosen set screws on horizontal shaft gear and move laterally to alignment.

- To rotate the point of the hook for alignment to centerline of needle – loosen set screws on vertical shaft gear – rotate hook – tighten set screws. (Fig 49)

- Set needle bar height so hook is between 1/16" to 1/8" marks. Tighten needle bar pinch bolt. (Fig 50)
- Hand wheel over and check timing.
- Replace parts and test sew.

REMEMBER: Indexing projection on bobbin holder must be in notch on bottom of throat plate. Test sew. (Fig 51)

SUPPLEMENTS

CHECKLIST WHEN YOU SIT DOWN AT THE MACHINE

1. Inspect top threading – follow with eyes and pointed finger.
2. Check needle point is good.
3. Check bobbin in bobbin case – check tension (2 hemostat rule) and bobbin case inserted correctly in hook.
4. Pin top thread against bed of machine and hand-wheel over to bring up bobbin thread.
5. Pull out the bobbin thread with fingers and see that it comes out smoothly and with proper tension.
6. Sew sample to get correct stitch length and set top tension.

LITTLE THINGS TO REMEMBER:

- Oscillating hook makes one cycle for each one top shaft (hand wheel) rotation or cycle.
- Rotary hook makes two rotations for each one top shaft (hand wheel) rotation or cycle.
- The sewing (thread, needles and materials) that we use are considered heavy by clothing standards.

- All lockstitch sewing machines make the same basic stitch and are timed very close to 3/32” rise and 1/16” to 1/8”.
- Presser foot force: 10-20 lbs.
- Elastic Rule: When sewing elastic material, elastic goes against feed dogs. Reduce presser foot pressure (elastic want to squeegee out) and up needle size.
- Check machine by slowly hand wheeling it over.
- Use least tension possible for strongest seam and least shrinkage.

FEED DOG HEIGHT

At maximum elevation of the feed dog, the bottom of the feed dog tooth notch is even with the top of the throat plate.

REMEMBER: Teeth must be below the throat plate on the return stroke. Loosen pinch bolt in throw arm. Adjust carefully so as not to hit the bottom of the throat plate. Pinch bolt usually left side of the machine nearest the operator.

OILING MACHINES: MINERAL/PETROLEUM OIL

OLD:

#1 STAINLESS OIL for self-oiling machines have sump you fill between high and low marks and oil pump provides oil throughout the machine (you hope)

#2 STAINLESS OIL for hand oiling and gravity feed oilers.

a. Gravity fees – fill reservoir plus hand oil all parts not fed by reservoir.
b. Hand oiler – open all access panels. Had wheel machines. If it moves. Oil it (not the belt). Don’t forget to tilt machine back and oil underside.

NEW:
Seems to be a #1-1/2 stainless oil but used as above.

TOOLS

- Lots of common screw drivers with GOOD tips.
- Mini screw drivers.
- Diamond hone/ceramic abrasive stone.
- Hemostats.
- Magnet.
- 3/32 gauge and pencils
- Magnifier
- Flashlight
- Adjustable wrenches
- Metric and American allen wrenches
- Toothbrush
- Brass drift
- Sandpaper and sanding cord
- Q-tips
- Brake parts cleaner – NOTE: May ruin finish or plastic
- Dremel tool
    - 424 mandrel with 427 polisher (Fig 53)
    - 402 mandrel with 409 and 420 cut- off disk, and 425 polisher (Fig 54)

THIS CONCLUDES THE PRESENTATION

PICURES FOLLOW

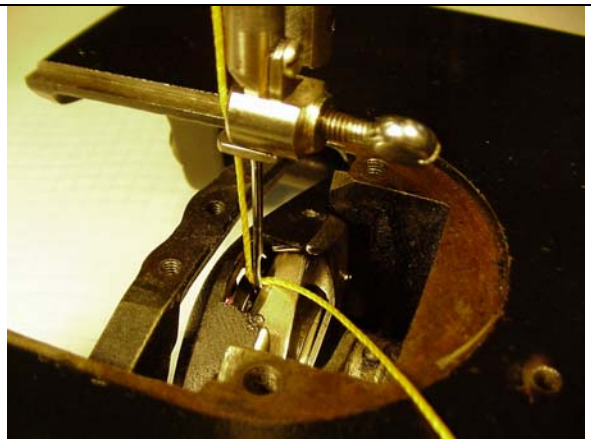


FIGURE 1

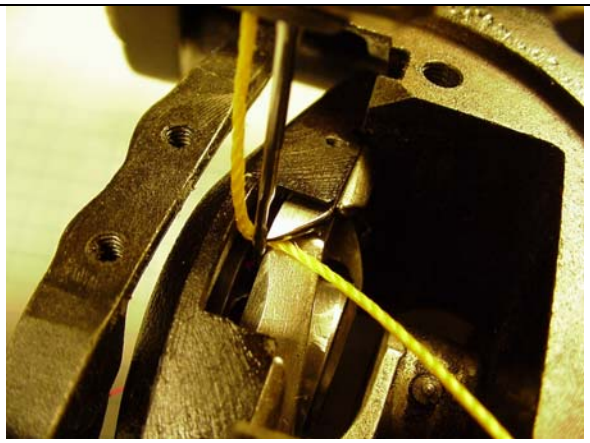
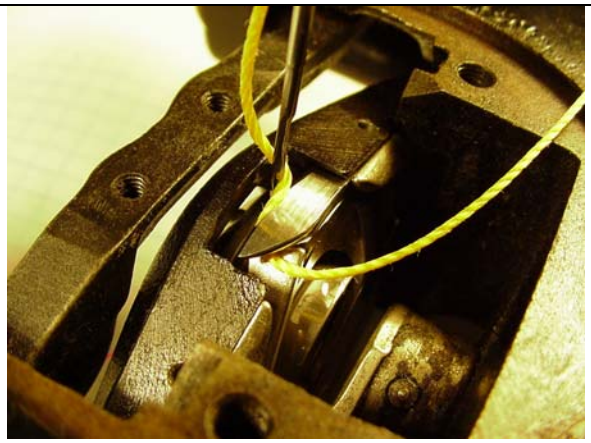


FIGURE 2 & 18



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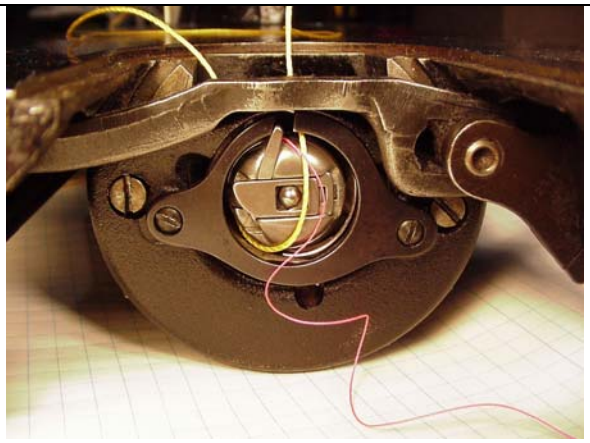


FIGURE 4 & 11

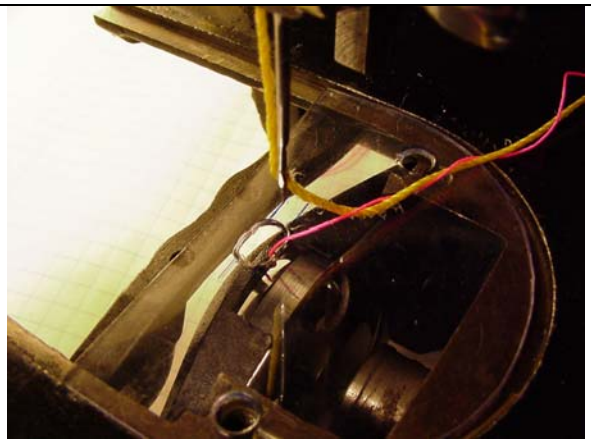


FIGURE 5 & 10

FIGURE 6

FIGURE 7

FIGURE 8 & 42

FIGURE 9

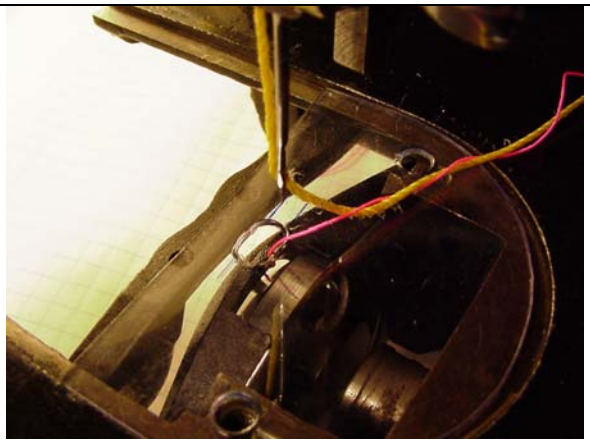


FIGURE 10

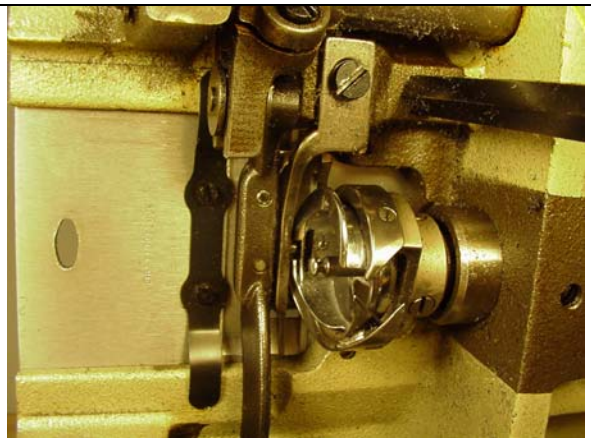


FIGURE 12 & 35

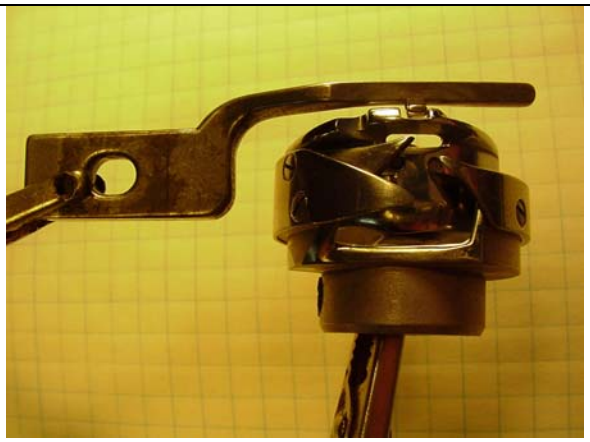


FIGURE 13 & 34

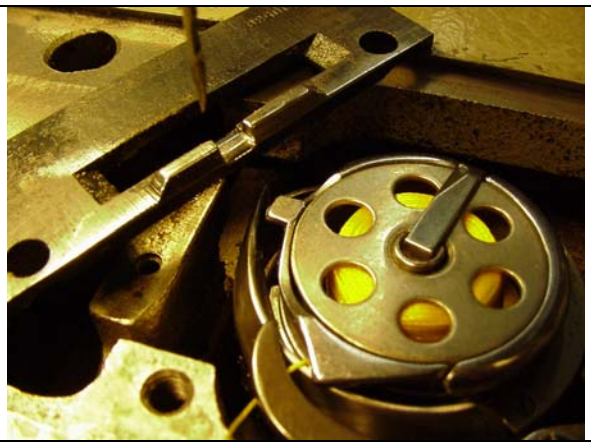
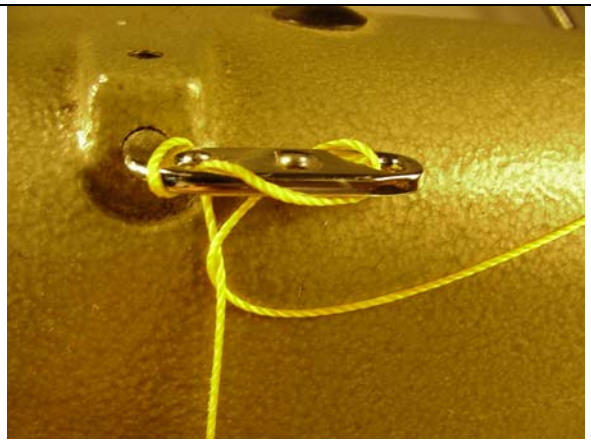
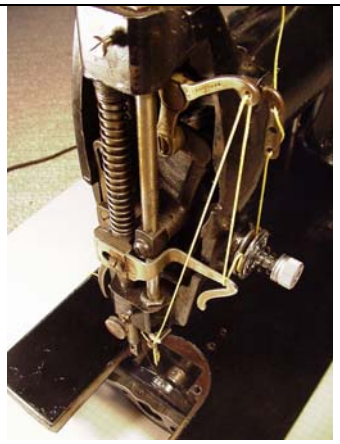


FIGURE 14 & 51	FIGURE 15 & 19
 FIGURE 16	 FIGURE 17 & 23
 FIGURE 20	 FIGURE 21 & 22 & 24
 FIGURE 25	 FIGURE 26 & 29

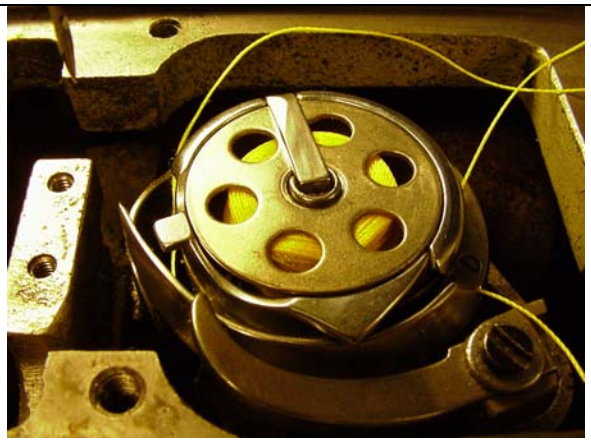


FIGURE 27

FIGURE 28

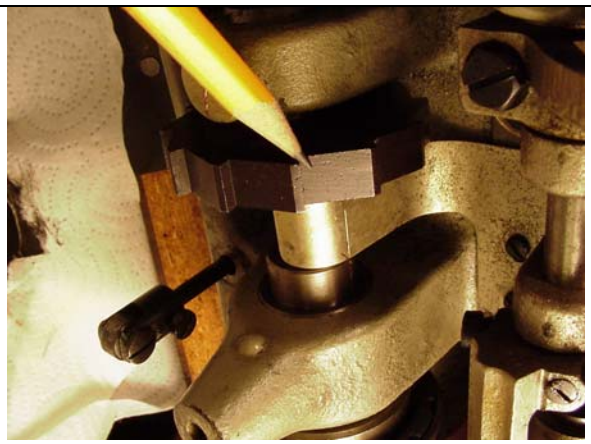


FIGURE 29

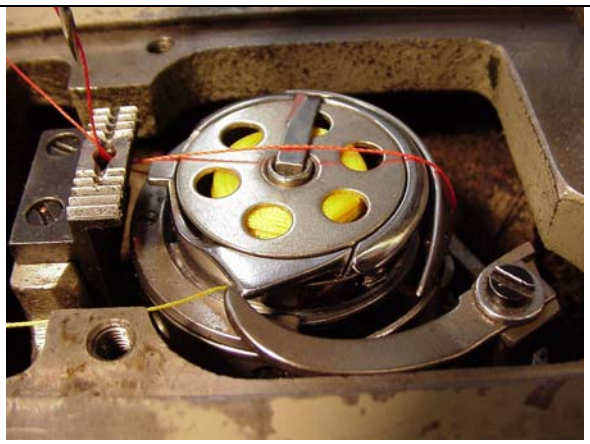
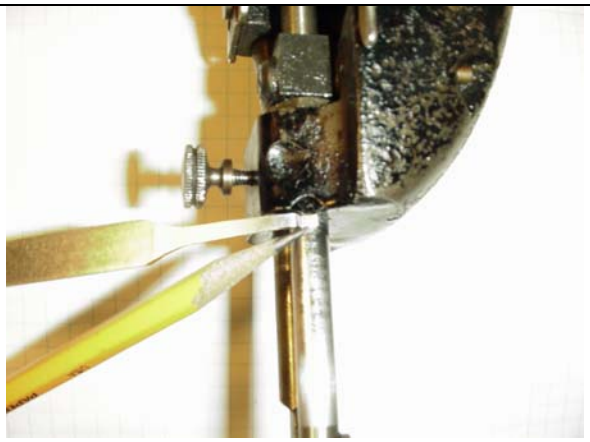


FIGURE 30

FIGURE 31

FIGURE 32 & 50

FIGURE 33 & 45	FIGURE 36
	
FIGURE 37	FIGURE 38

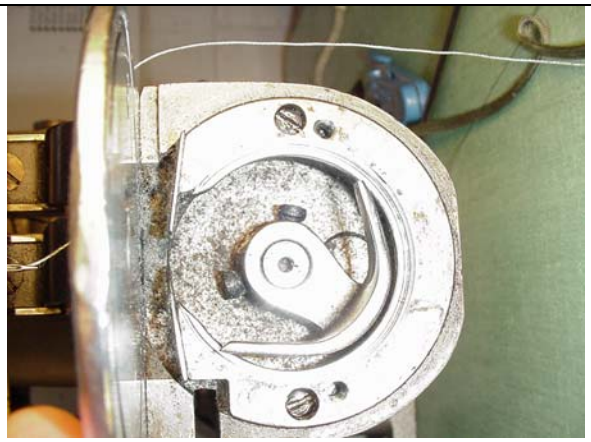



FIGURE 40	FIGURE 41
	
FIGURE 43	FIGURE 44

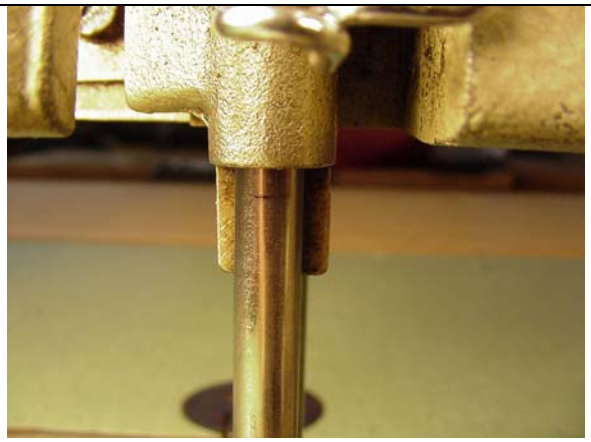


FIGURE 46

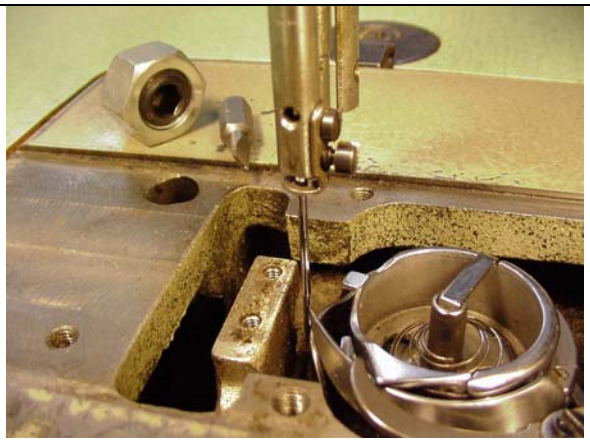


FIGURE 47

FIGURE 48

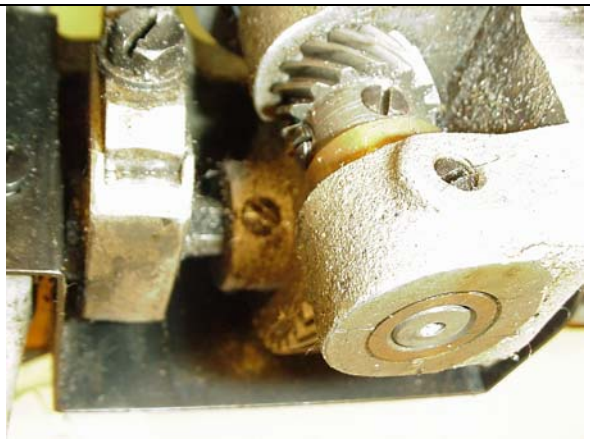


FIGURE 49

FIGURE 52

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