The bottom thread (1) is supplied from a bulk source (2) via a thread supply shaft (11) to the rotary hook arrangement (14). The hook drive shaft (15) is coaxial with the thread supply shaft (11). A flexible needle or a pneumatic threading system may be used to pass the thread through the passage (12) in the thread supply shaft (11). The system can be applied to industrial sewing machines.
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DESCRIPTION

SEWING MACHINE BOTTOM THREAD SUPPLY SYSTEM
(Without Using Bobbins for Lock Stitch Sewing Machine)

There are many advantages to the idea of the bottom thread supply system for use in industrial applications because there is a predetermined, non-limited, non-stop, supply of bottom thread from a bulk source.

This bulk source is the same type and size of the top thread roll and can be used at the bottom of the machine.

Lining Up The Bottom Thread

When you line up the thread, use the thread needle as a guide. By hooking two centimeters of thread through the eye of the needle and inserting through the thread supply tunnel. After the thread has passed through the thread supply tunnel, hook it up with the bobbin case tension spring, then insert into the bobbin case holder.

In conventional sewing mechanisms, the thread comes from the top area of the sewing machine and goes down, by means of the needle, and catches up the top thread with a hook.

The hook then turns three hundred and sixty (360) degrees. At this time, the top thread catches up the bottom thread and pulls it to the top. Then, the actual sewing begins.

Once the bottom thread has been lined up, the sewing machine can be operated until the bottom thread supply from a bulk source is exhausted. This means that this system can be applied to industrial sewing automation. This also means that a lot of time and money are saved.

In my direct supply system, the problem of the supply of bottom thread is solved. This is done by the supply tunnel
which leads the thread directly to the bobbin case holder from a rear entrance. This system does not use a bobbin but continues to supply thread by using the bottom thread from a bulk source. Some inventors, however, supply thread from the front or side of the hook assemble through to the bobbin case. In these cases the machine must be frequently stopped and rewound to restart the process of sewing. This is because the front rotary mechanism turns three hundred and sixty degrees when operating the machine so that is why it can not supply thread continuously.

Figure One: Between 1 and 2, you use a thread line up needle and hook two (2) centimeters of thread through the eye of the needle, inserting to 12. When the needle passes through the tunnel, then hook up the bobbin case (not shown here). Insert the tension spring through the bobbin case holder.

In this case, the machine continues to operate without the use of the bobbin. Therefore, it is possible to apply this to an automation sewing system.

3 is part of the bottom thread rack.

Figure Two: 3 Is a funnel type opening which allows easy access to the finding of the thread tunnel when lining up the bottom thread. 4 is the hinge for the swivel rack. There is an angle of zero (0) to ninety (90) degrees between which 4 swivels. This means that more room is useful.

5 is a locking device for the swivel rack. 25 is a roller bearing that allows smooth rolling of the thread roll when
operating the machine. 24 is the bracket for the flat bed. Between 3, there are two screws of these that serve each bracket. 23 is engaged for the end of thread tunnel. The nut is u-shaped for easy fitting.

Figure Three: This is the most essential and practical part. The tunnel through the bobbin case holder. Thread enters the bobbin case from the rear. This system only solves the problem of the supply of bottom thread continually and can be a possible automation to industrial lock stitch sewing systems. This is my invention in its entirety.

Figure Four: This is the next most important factor. This line up needle (28), is a flexible, high tension, steel wire and 26 is a one side open eye to allow easy hooking of thread and any size of thread can be put automatically through without any complications. This is simple and safe to use. Complicated systems develop more problems than a simple system, when using the line up needle. In my system, there are no risks when using the needle to line up the bottom thread.

27 is for a handle. Without this handle it is possible to use a disposable plastic material.

Figure Five: This is an automatic thread line up system. 30 is a thread metering device. There is a small electric motor with high tension rubber rollers. When this motor is turned by pushing 37, the thread reaches 12, at the same time, 41, (the ON/OFF valve), is opened and blows air to the thread supply tunnel. This mechanism is operated by
solenoid. 40 is a very small nozzle for high speed blowing. The air that is blown in from an outer source, helps to pull the thread from the metering device. When 37 is pressed, at the same time it supplies power to 36, 30 and 41. This is because the entire system operates using switch 37.

33 is a safety valve. 32 is a thread guide to prevent tangles and to control loose thread.

42 is the thread guide tubing for adjusting the distance between 30 and 11. Therefore, this device is a combination of lining up thread manually or automatically.

11 does not turn because it is a standard sewing mechanism. The bobbin case holder is always standing ready for holding the bobbin case only. 14 and 15, however, do turn and the power coming to 19 and 20 is from the main shaft. 14 is a hook assemble. This hook assemble causes the top thread to lock with the bottom thread and then brings up the locked stitch to the top of the fabric.

Between shafts 11 and 15, there is an oil supply channel to lubricate the area between 13 and 14. 28 is an oil entering hole. This hole is at a forty five (45) degree angle through the hook drive shaft. Each turn, when lined up to the top oil supply hole, that forty five (45) degree angle hole pushes oil between 11 and 15 to lubricate 13 and 14. This system applies to industrial high speed sewing machines because today's industrial sewing machine is a high speed stitch system, and is used continuously for long hours, meaning that there is an automatic oiling system.
16 is an oil seal for 15 to 11. 17 is a bearing block for 15. 14 and 13 are the standard size with conventional mechanisms and parts. This supply tunnel applies to the bottom thread supply system.

Once the bottom thread is lined up, the necessity of change in using the bobbin is no longer necessary. However, the bobbin can be used in such cases where only small amounts of thread are needed. The bobbin case holder and hook assemble mechanism are the standard size. Therefore, this system is interchangeable, that means it saves valuable time and is comfortable for the operator.

This disclosure is set forth for the multi-purposes as illustrated in order that others skilled in the art of great inventions and the superiority of applying for any type of lock stitch systems in the field of lock stitch sewing machines. The various production conditions and new demention of sewing machine revolution may well come about.
NAMING THE PARTS

1. Bottom thread from bulk source
2. Bottom thread roll (bulk)
3. Bottom thread rack housing
4. Thread rack swivel hinge
5. Thread rack stop and lock
6. Thread rack main shaft
7. Thread roll stop
8. Tension adjuster
9. Thread roll bar
10. Safety latch
11. Thread supply shaft
12. Thread supply tunnel
13. Cut off view of bobbin case holder
14. Hook assemble
15. Hook drive shaft
16. Oil seal
17. Bearing block
18. Oil supply tubing
19. Gears
20. Shaft
21. Divide box
22. Oil control valve
23. Bottom thread rack and thread supply shaft connector nut
24. Bottom thread rack hinge
25. Bottom thread main rack ball bearing
26. Bottom thread line up hook eye
27. Bottom thread line up hook handle
28. Bottom thread line up needle
29. Oil entering hole
30. Thread metering device
31. Air supply tubing (plastic)
32. Thread guide
33. Safety valve
34. Air reservoir
35. Air compressor
36. Electric motor
37. Push button switch
38. Electric wire
39. Switch box
40. Air nozzle
41. Solenoid for air (on/off)
42. Thread guide tubing
Claims

(Fig.3)

This is the most essential and practical part. The tunnel through the bobbin case holder. Thread enters the bobbin case holder from the rear. This system only solves the problem of the supply of bottom thread continually and can be possible automation to industrial lock stitch sewing system.

This is my invention in its entirety.

(Fig.4)

This is a line up needle. The flexible, high tension, steel wire and plastic material allow for durability.
AMENDED CLAIMS
[received by the International Bureau on 9 January 1992 (09.01.92);
original claim 3 amended;
new claim 1 added;
other claims unchanged (1 page)]

Claims

(Fig. 3)
This is the most essential and practical part: The use of the thread supply
shaft to guide the thread from the bulk source to the bobbin case holder.
The use of the bobbin is optional. This system is the only solution to the
problem of the frequent changing of bobbins in the supply of bottom thread.
The direct use of the bulk source enables continual feeding of the bottom
thread to effectively automate the Sewing Machine Bottom Thread Supply
System in the industrial lock stitch sewing system. This is my invention in
its entirety.

(Fig. 4)
This is a line up needle. The flexible, high tension, steel wire and plastic
material allows for durability.

(Fig. 1)
This system is unique in having an automatic lubrication between the thread supply
shaft (11) and the hook drive shaft (15), which are coaxial.
## INTERNATIONAL SEARCH REPORT

### I. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both National Classification and IPC

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### II. FIELDS SEARCHED

Minimum Documentation Searched

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched.

### III. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>FR.A,2 203 899 (M. B. GOULET) 17 May 1974 see the whole document</td>
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<td>FR.A,2 135 716 (R. LANET) 22 December 1972 see the whole document</td>
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<td>DE.A,3 309 671 (M. WEICHSELBAUMER) 20 September 1984 see the whole document</td>
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<td>JAPANESE PATENTS GAZETTE Section Ch, Week 8502, Derwent Publications Ltd., London, GB; Class F, AN 85-000062 &amp; JP.A,59 207 192 (KOKURA SHINGU KK) 11 May 1983 see abstract</td>
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### IV. CERTIFICATION

Date of the Actual Completion of the International Search: 08 NOVEMBER 1991

Date of Mailing of this International Search Report: 11. 12. 91

International Searching Authority: EUROPEAN PATENT OFFICE

Signature of Authorized Officer: D HULSTER E.W.F.
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