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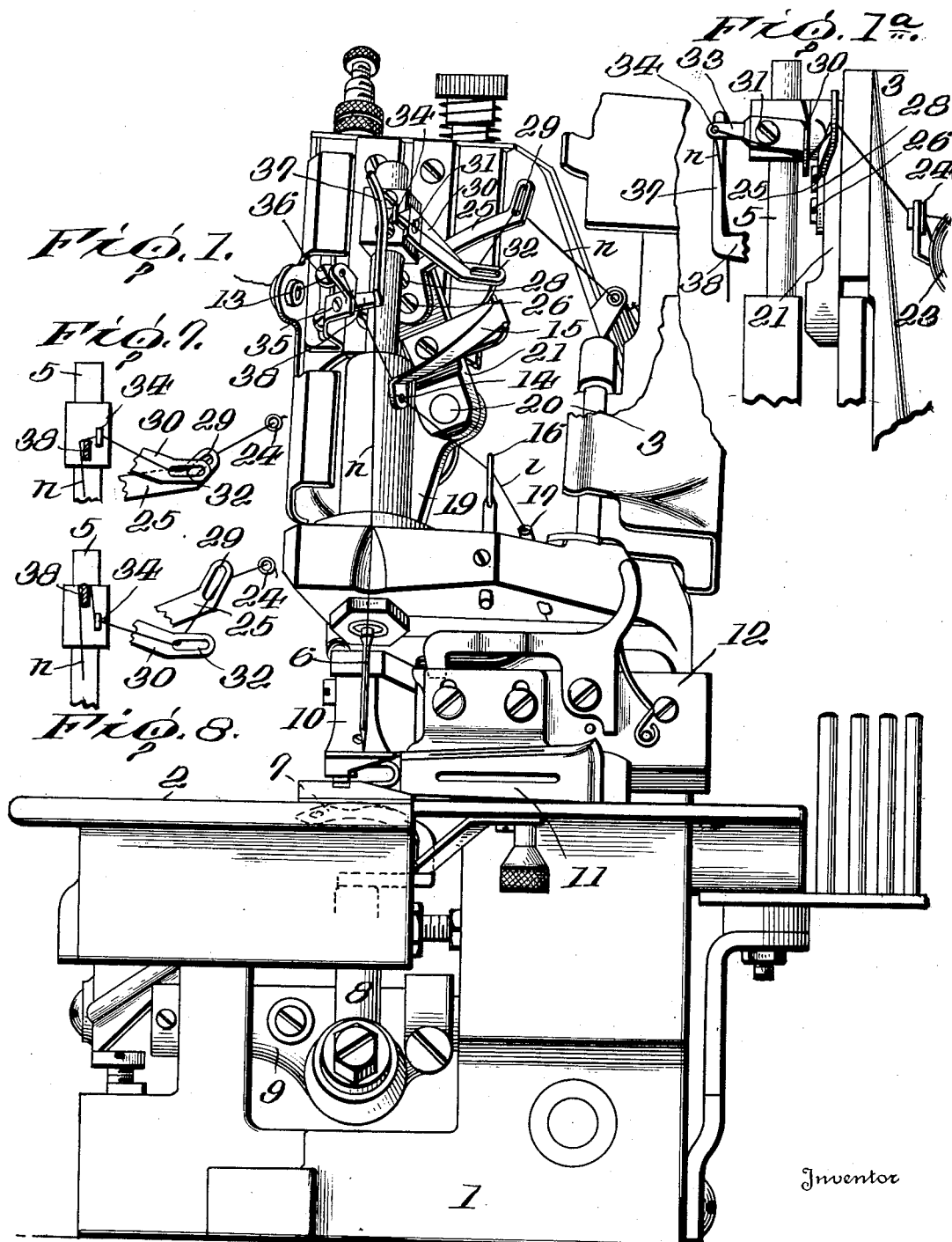
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2,019,097

THREAD CONTROLLER FOR SEWING MACHINES

Filed Jan. 29, 1934

2 Sheets-Sheet 1



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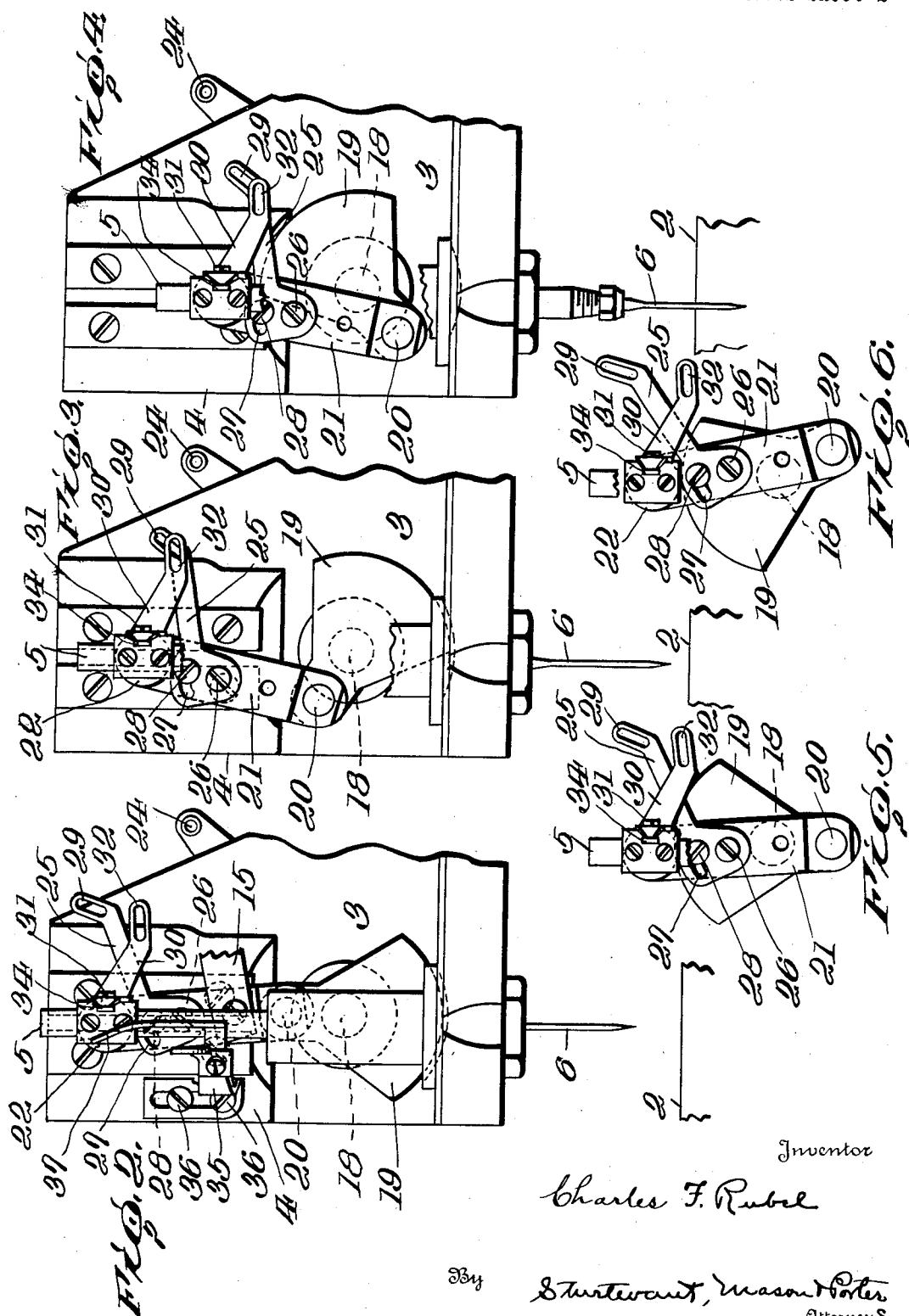
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UNITED STATES PATENT OFFICE

2,019,097

THREAD CONTROLLER FOR SEWING
MACHINESCharles F. Rubel, Chicago, Ill., assignor to Union
Special Machine Company, Chicago, Ill., a cor-
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Application January 29, 1934, Serial No. 708,915

5 Claims. (Cl. 112—241)

The invention relates to new and useful im-
provements in a thread controlling mechanism
for sewing machines, and more particularly to
a needle thread controlling mechanism of the
type shown in my co-pending application Serial
No. 603,291, filed April 5, 1932. In the machine
of my prior application, the needle thread is
taken up as the needle approaches the lower end
of its stroke to aid in drawing up the con-
catenated thread loops of the previous stitch
formation by a movable thread guide carried by
the needle bar and a movable thread guide car-
ried by the operating link which reciprocates
the needle bar, which movable thread guides con-
tacted with the needle thread between stationary
members on which the thread rests and is guided
during the thread drawing operation.

An object of the present invention is to pro-
vide an additional means operated by the needle
bar and contacting with the needle thread
for drawing up on the thread as the needle ap-
proaches the lower end of its stroke.

In the drawings—

Figure 1 is a view from the front of a machine
embodying the improvements with the cover plate
turned to one side in order to expose the thread
controlling devices associated with the needle
bar;

Fig. 1a is a detail showing in side view the
thread controlling elements operating upon the
needle thread;

Fig. 2 is a view from the front of the machine
at right angles to the plane of reciprocation of
the needle bar and showing, in particular, the
thread controlling elements and their position
relative to each other when the needle is at the
upper end of its stroke;

Fig. 3 is a view similar to Fig. 2, but showing
the needle as having moved downward through
the upper portion of its stroke;

Fig. 4 is a view similar to Fig. 3, but showing
the needle bar well down toward the lower end
of its stroke;

Fig. 5 is a diagrammatic view showing the po-
sition of the thread controlling devices when the
needle is at the lower end of its stroke;

Fig. 6 is a view similar to Fig. 5, but showing
the first part of the upward movement of the
needle bar;

Fig. 7 is a detail taken from the side of the
machine showing the position of the thread con-
trolling members as the needle approaches the
lower end of its stroke, and

Fig. 8 is a similar view showing the needle all
the way down.

The invention is shown as applied to a machine
of the type shown in the patent granted Nor-
man V. Christensen and Frederick F. Zeier, March
25, 1930, No. 1,751,508. In this machine, the op-
erating shaft is located above the work support
and extends in the general direction of the line
of feed. The needle bar is located at the for-
ward end of the shaft and is operated by a link
connected to a crank carried by the end of the
shaft. Cooperating with the needle beneath the
work support is a thread carrying looper which
oscillates in a plane at right angles to the line
of feed when entering the needle thread loop.
The present invention has particularly to do with
a thread controlling mechanism for the needle
thread in this type of machine. The needle
thread is controlled by the movements of the
needle bar and the link which reciprocates the
needle bar. In my prior application Serial No.
603,291, there is shown a thread controlling
mechanism for the needle thread wherein the
moving parts are operated by the needle bar
and the link which actuates the needle bar. One
of these moving parts is a thread guiding eye
which is rigidly attached to the needle bar. The
other moving part is an arm which is attached
to the link which reciprocates the needle bar
so as to project at an angle thereto. There is
a stationary thread guide on the arm of the ma-
chine through which the needle thread passes
before entering the movable thread guides. There
is also a fixed arm on the needle head which is
disposed so that the needle thread comes into
contact with said arm as the needle approaches
the lower end of its stroke. Thus it is that the
moving thread guides are caused to take up
on the needle thread after the previous needle
thread loop has been dropped from the looper
and while the needle is approaching the lower
end of its stroke so that the previous needle
thread loop can be drawn up to aid in the mak-
ing of a tight stitch. The link which reciprocates
the needle bar moves to a vertical posi-
tion when the needle is at the lower end of its
stroke and this necessarily causes the thread
guide to reach its extreme lower position and be
slightly retracted or moved upwardly just as the
needle is reaching the lower end of its stroke.
This modifies the extent to which the needle
thread can be drawn up by these moving parts.
In the present machine, there is an added mov-
ing thread guide associated with these two mov-
able thread guides referred to above, which add-
ed thread guide continues its downward move-
ment until the needle reaches the end of its

stroke, and therefore, a greater amount of thread is drawn up and a tighter stitch produced.

Referring more in detail to the drawings, the thread controlling mechanism is shown as applied to a sewing machine having a bed 1 carrying a work support 2. Extending upwardly from the bed 1 is a standard 3 carrying a needle head 4 in which the needle bar 5 reciprocates. Said needle bar is provided with a needle 6. Cooperating with this needle 6 beneath the work support is a thread carrying looper 7 of the usual type. Said thread carrying looper 7 is mounted on a looper carrier 8 for oscillations at right angles to the line of feed, and the looper carrier 8 is in turn mounted on a looper support 9 for oscillations longitudinally of the feed for giving to the looper its needle avoiding movement.

The material is held on the work support by a presser foot 10. The machine as illustrated is provided with an English type of binder 11 carried by a sliding bar 12 supported by the standard 3. The manner of mounting and supporting the binder forms no part of the present invention. The machine is particularly adapted for the stitching of a binding strip to the edge of a fabric.

The looper thread is indicated at 1 in the drawings. Said looper thread is led from the supply through a thread guide 13, thence through a thread guide 14 at the outer end of an arm 15. The looper thread after leaving the thread guide 14 passes through a thread guide 16, thence through a guiding tube 17 and suitable guides beneath the cloth plate to the looper.

Supported by the bracket 3 are suitable bearings in which the main actuating shaft 18 rotates. Said shaft carries a crank arm or disk 19 on which is mounted a crank 20. Cooperating with the crank 20 is a link 21, which at its other end is attached to a stud 22 carried by the needle bar 5. As the shaft 18 rotates, it will rotate the crank 20, and the crank 20, through the link 21, will cause the needle bar to reciprocate. The thread controlling arm 15 for the looper thread is fixed to this link 21. This looper thread controlling mechanism per se forms no part of the present invention, but is shown and described in my co-pending application referred to above.

The present invention has particularly to do with a thread controlling mechanism for the needle thread. The thread passes from the supply through a suitable tension 23, and thence through a thread guiding eye 24 which is stationary and has no movement. Mounted on the link 21 is an arm 25. This arm 25 is secured to the link by a screw 26. There is a slot 27 in the arm, and a screw 28 passes through this slot and is threaded into the link. By loosening these screws, the arm may be adjusted to different set positions on the link. There is a limit to the range of adjustment, and in all of its set positions, the arm extends in a direction approximately at right angles to the longitudinal axis of the link. At the outer end of this arm there is an elongated thread guiding slot 29. The needle thread which is indicated at *n*, after passing through this thread guiding eye 24, passes through the slot 29 in the outer end of this arm.

Fixed to the needle bar is an arm 30. This arm is secured to the needle bar by a screw 31. Said arm is clearly shown in Fig. 1a extending outwardly from the needle bar in a plane parallel with the plane of movement of the arm 25. At the outer end of the arm 30 is an elongated thread guiding slot 32. The needle thread *n*,

after passing through this thread slot 29 in the arm 25, then passes through the slot 32 in this arm 30. Also attached to the needle bar by this set screw 31 is an arm 33. This arm 33 and the arm 30 are preferably formed integral. The arm 33 projects from the needle bar in a plane at right angles to the plane in which the arm 30 is located. The needle thread *n* after leaving the thread slot 32, passes through a thread eye 34 in the outer end of the thread arm 33.

Fixed to the needle head is a bracket 35. Said bracket is provided with slots therein through which screws 36, 36 pass for securing the bracket to the needle head so that it may be adjusted vertically on the needle head. The bracket extends around in front of the needle bar and is provided with an upstanding finger 37. Said finger 37 is located at the outer end of the bracket, and adjacent the base of the finger is a shoulder 38. The needle thread *n* after leaving the thread eye 34, passes down alongside of the bracket carrying the finger 37 and to the left thereof as viewed in Figures 1, 7 and 8.

Starting with the parts as shown in Fig. 2, and with the needle bar at the upper end of its stroke, when said needle bar moves downward, the outer end of the arm 25 will move downward faster than the downward movement of the arm 30. This will give slack to the needle thread preparatory to the needle entering the fabric and forming the needle loop therein. From the position shown in Fig. 3, the outer end of the thread arm 25 and the outer end of the thread arm 30, together with the thread eye 34, move downward together until the needle approaches the lower end of its stroke. This downward movement of the thread engaging members gives slack to the needle thread as they move to a position horizontally beneath the thread guiding eye 24. When, however, the parts reach the position shown in Fig. 4, the thread eye 34 passes beneath the shoulder 38 (see Fig. 7) and the needle thread will be laid on this shoulder. Inasmuch as this shoulder is stationary, as it is carried by the bracket attached to the needle head, a continued downward movement of the thread eye 34 will cause a drawing up of the needle thread. The outer end of the thread arm 25 which has been moving downward substantially in unison with the outer end of the thread arm 30 will now begin to move upward, due to the fact that the link which reciprocates the needle bar is approaching a vertical position. This upward movement of the arm 25 does not give any appreciable slack to the needle thread, for the reason that the arm 30 continues its downward movement with the arm 33 carrying the thread eye 34. This arm 30 continues with the arm 33 to draw on the needle thread until the needle reaches the lower end of its stroke. Furthermore, the slot 29 is elongated so that the upward movement of the arm 25 as the needle approaches the lower end of its stroke, does not give any appreciable added pull on the needle thread. By this thread controlling mechanism there is produced a pulling up action on the needle thread as the needle approaches the lower end of its stroke which continues until the needle reaches the lower end of its stroke. This will draw sufficiently on the needle thread to pull up the previous needle loop which has been dropped from the looper and produce a relatively tight setting of the stitches.

As the needle moves upward, there is a slight taking up action on the needle thread, but not

sufficient to interfere with the needle throwing out its loop for the looper to enter. When the needle bar approaches the upper end of its stroke, then the arm 25 will move downward relative to the outer end of the arm 30, and the line between this arm 30 and the needle thread guiding eye 24. This gives up needle thread at the time when the feed of the fabric takes place. After the looper has entered the needle thread loop, the upward movement of the thread arms 25 and 30 which retain their position relative to each other during a considerable portion of the upward movement of the needle bar, will pull thread from the supply for the next stitch.

From the above description, it will be apparent that a thread controlling mechanism has been provided for the needle thread which is very simple and positive in its action as all of the moving parts are either fixed to the needle bar or fixed to the link which reciprocates the needle bar, and therefore, these parts must move in proper timing with the needle. Furthermore, a thread controlling means has been provided for the needle thread which pulls up on the needle thread as the needle approaches the lower end of its stroke, and this pulling up action on the needle thread continues until the needle has reached its full downward stroke.

While the needle thread controlling mechanism has been shown and described in connection with a specific type of sewing machine for securing a binding strip to the edge of a fabric section, it will be obvious that the needle thread controlling mechanism may be used in connection with any type of stitching mechanism for producing a two-thread lock chain stitch wherein the needle thread loops of a previous stitch can only be drawn up after the needle thread loop is shed from the looper. It is also obvious that minor changes in the details of construction and the arrangement of the parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters-Patent, is—

1. In a sewing machine, the combination of a needle, a needle bar, an operating shaft, a link connected to said operating shaft and said needle bar for reciprocating the same, thread controlling devices for the needle thread including an arm having a thread slot for the needle thread carried by said link, a stationary shoulder adjacent the path of reciprocation of the needle bar, a thread guiding eye carried by the needle bar and disposed so as to lay the needle thread over said shoulder as the needle approaches the lower end of its stroke, and a thread arm carried by the needle bar and having a thread slot in the outer end thereof disposed adjacent the path of reciprocation of the thread arm carried by the link and operating through its downward movement to take up the needle thread when said needle thread is released by the upward movement of the arm carried by the link as the needle approaches the lower end of its stroke.

2. In a sewing machine, the combination of a needle, a needle bar, an operating shaft, a link connected to said operating shaft and said needle bar for reciprocating the same, a stationary thread guide carried by the standard, a stationary thread shoulder carried by the needle head and located adjacent the path of reciprocation of the needle

bar, a thread guiding eye carried by the needle bar and movable beneath said shoulder and adapted to pull up on said thread laid on said shoulder as the needle approaches the lower end of its stroke, a thread arm carried by the link reciprocating the needle bar and having a thread slot in its outer end, said arm being disposed so as to engage the needle thread between the stationary thread guiding eye on the standard and the thread eye on the needle bar, and a thread arm carried by the needle bar and disposed for reciprocation in a plane parallel with the plane of movement of the first-named thread arm and with its outer end adjacent the outer end of the arm carried by the link, said thread arm carried by the needle bar being movable below a line through the stationary thread guide on the standard and the thread shoulder on the needle head and operating to pull up on the needle thread as the needle approaches the lower end of its stroke 20 and to continue its pulling up action until the needle reaches the lower end of its stroke.

3. In a sewing machine having a needle actuating mechanism including a rotatable shaft, a reciprocal needle bar and a link connecting said shaft and needle bar, the combination of needle thread controlling devices actuated by said needle actuating mechanism comprising a thread eye carried by and reciprocating with said needle bar, a fixed abutment disposed so as to engage the needle thread leading from said thread eye, whereby to exert an upward pull on the needle thread as the needle bar approaches its lowermost position and additional devices actuated in part by said needle bar and in part by said link for exerting an additional upward pull on said needle thread at the same time as the pull is exerted by said thread eye and abutment.

4. In a sewing machine having a needle actuating mechanism including a rotatable shaft, a reciprocal needle bar and a link connecting said shaft and needle bar, the combination of a needle thread controlling mechanism including a thread eye carried by and reciprocating with the needle bar, a fixed abutment disposed so as to engage the needle thread leading from said thread eye whereby to exert an upward pull on the needle thread as the needle approaches the lower end of its stroke, and devices for exerting an additional upward pull on the needle thread at the same time comprising a second thread eye mounted on and reciprocating with the needle bar, and a thread eye mounted on said link and moving in an orbital path therewith.

5. In a sewing machine having a needle actuating mechanism including a rotatable shaft, a reciprocal needle bar and a link connecting said shaft and needle bar, the combination of needle thread controlling devices actuated by said needle actuating mechanism comprising a thread eye carried by and reciprocating with said needle bar, a fixed abutment disposed so as to engage the needle thread leading from said thread eye, whereby to exert an upward pull on the needle thread as the needle bar approaches its lowermost position, and additional devices actuated in part by said needle bar and in part by said link for exerting an additional upward pull on said needle thread at the same time as the pull is exerted by said thread eye and abutment, said additional devices also operating to pull off thread from the supply when the needle bar is in the vicinity of its uppermost position.

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