

Dec. 8, 1959

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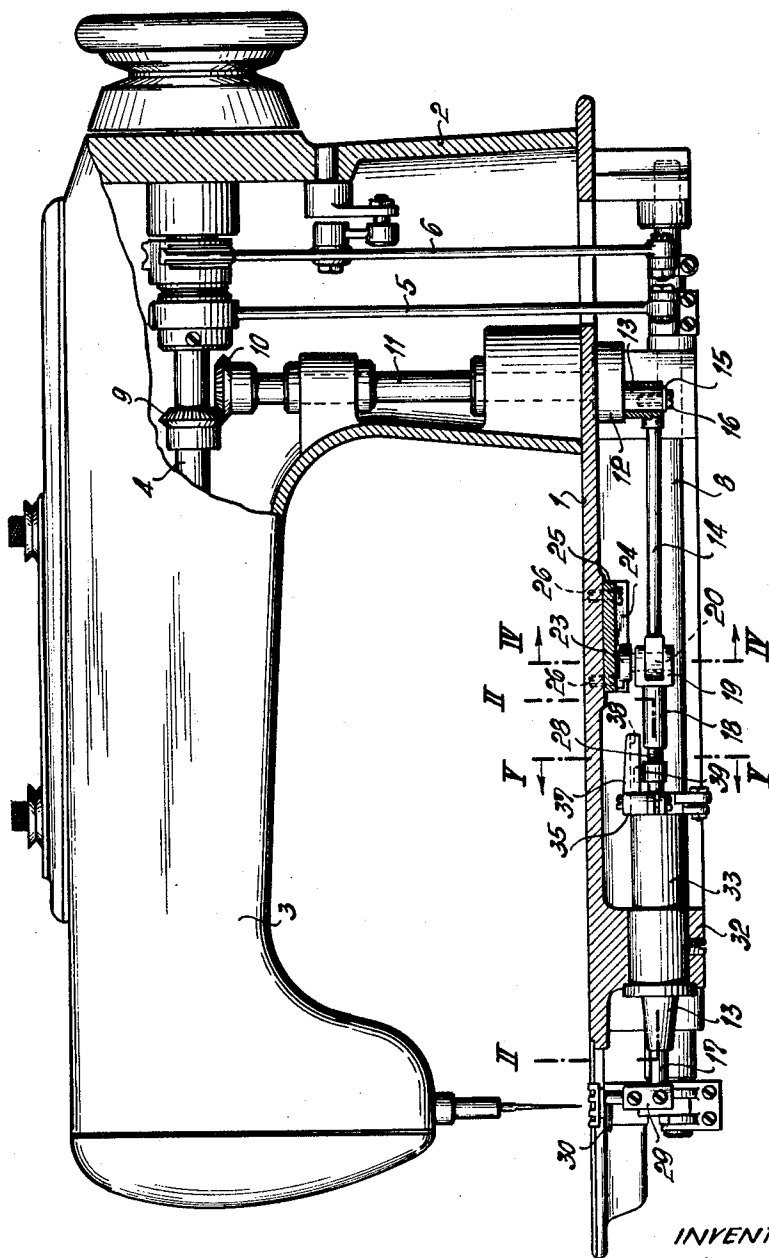
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LOOPER DRIVE MECHANISM FOR SEWING MACHINES

Filed June 13, 1957

3 Sheets-Sheet 1

FIG. 1



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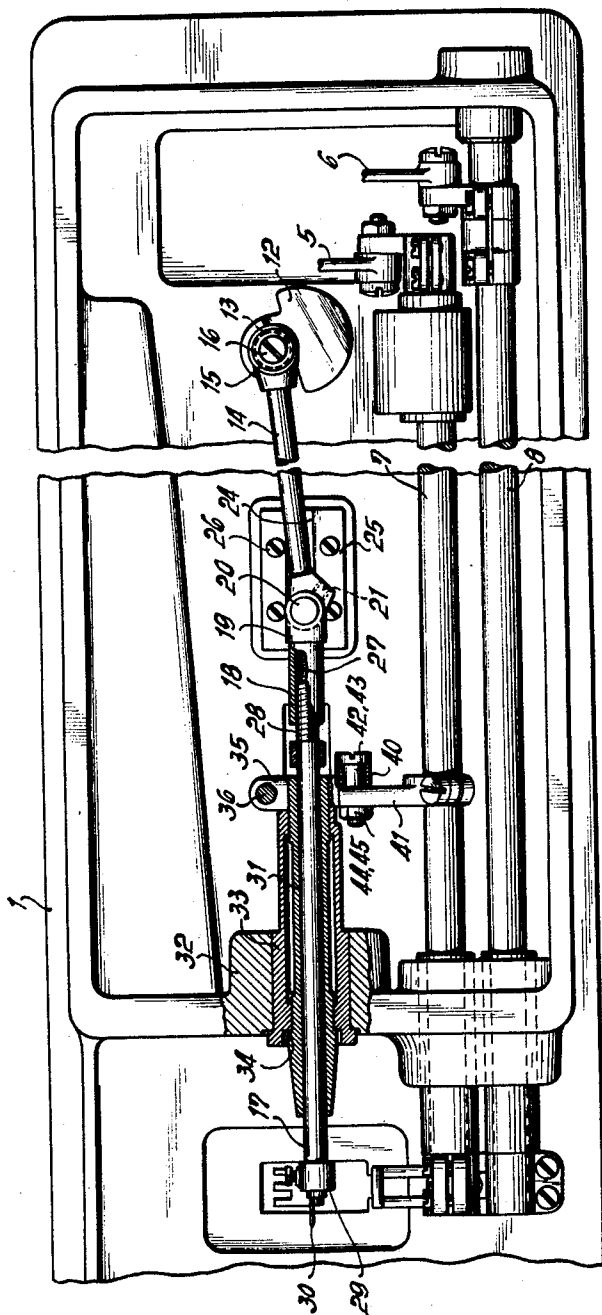
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FIG. 2



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3 Sheets-Sheet 3

FIG. 3

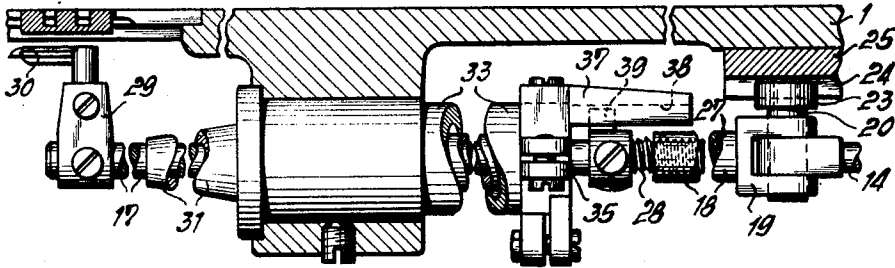


FIG. 4

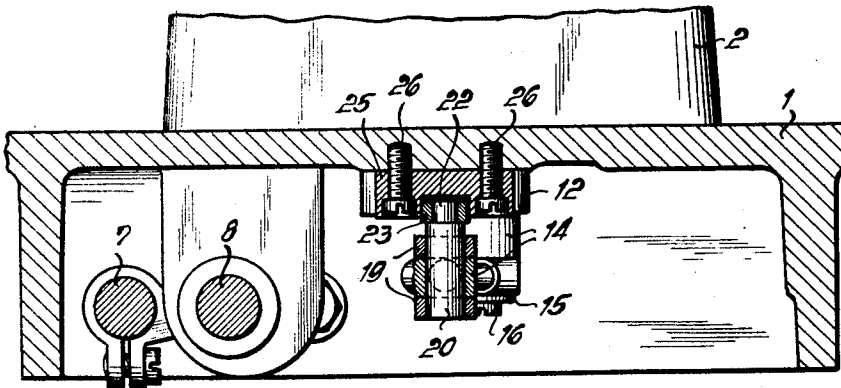
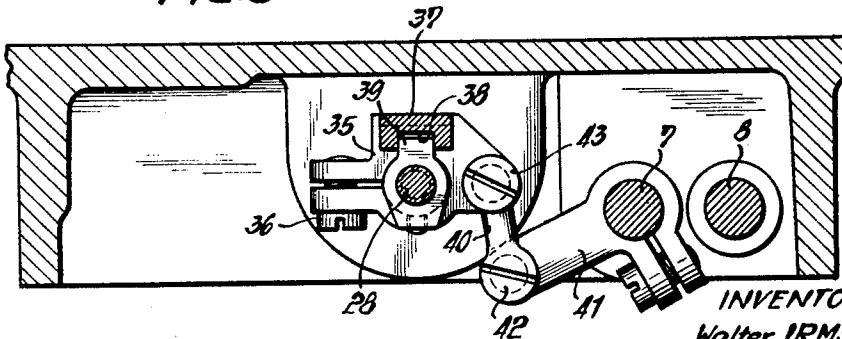


FIG. 5



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LOOPER DRIVE MECHANISM FOR SEWING MACHINES

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6 Claims. (Cl. 112—200)

The present invention relates to a looper drive for sewing machines, particularly chain stitch sewing machines of the type performing loop catching and loop discarding longitudinal looper movements, with superimposed lateral needle evading movements and retardations and accelerations in the longitudinal looper movements.

In a known construction the elliptical course of movement of the looper resulting from the loop catching and loop discarding movement perpendicularly to the direction of sewing and from the needle evading movement superimposed thereon is derived from an oblique crank or disk and transferred to a pivot axis which carries the looper. The retardation or acceleration of the longitudinal movements of the looper is obtained by obliquely disposing the pivot axis of the looper in a vertical plane.

However, oblique cranks or disks are subject to heavy wear due to the load caused by the great forces of momentum and are not suitable for high speed sewing machines alone because of their vibration.

It is an object of the invention to provide a looper drive for chain stitch sewing machines having a looper adapted for effecting loop catching and loop discarding movements perpendicularly to the direction of sewing with superimposed lateral needle evading movements and retardations and accelerations of the axial looper movements which, contrary to the known forms of construction, consists of only a few moving parts and the course of movement of which is made as short as possible in keeping with sewing practices, while insuring substantially vibrationless operation even at high speeds.

In accordance with a further object of the invention the control of the superimposed needle evading, retardation and acceleration movements is effected by the feed dog lifting shaft.

Structurally this can be accomplished by means of a looper shaft made in two parts comprising a linearly guided linking portion moved by the pusher bar of the crank drive for producing the loop catching and discarding movements of the looper, and a looper supporting bar which is rotatable and at the same time reciprocally movable in said linking portion. The looper supporting bar may be joined to the looper linking portion by a threaded connection. The turning movements of the looper supporting bar within the linking portion are guided by the feed dog lifting shaft.

It is a still further object of the invention to reduce the inertia forces by constructing the looper supporting bar, the pusher bar and the bolts in hollow form.

Further objects and features of the invention and details of the advantages obtained by the same will become apparent from the following description of the embodiment of the new looper driving mechanism illustrated in the accompanying drawings in which

Fig. 1 is a front view, partly in section, of a chain stitch sewing machine incorporating the control mechanism;

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Fig. 2 is a bottom view of the machine taken along line II—II in Fig. 1, partly in section;

Fig. 3 is a fractional view of a portion of the machine shown in Fig. 1 drawn to an enlarged scale;

Fig. 4 is a section of the base plate taken along line IV—IV in Fig. 1, and

Fig. 5 is a section of the base plate taken along line V—V in Fig. 1.

The machine comprises the material supporting or carrying plate 1, the standard 2 and the arm 3 supporting the machine head at its free end and including the main shaft 4 from which the swinging movements are transferred to the feeding dog lifting shaft 7 and to the advancing shaft 8 by way of two guide rods 5 and 6.

A vertical shaft 11 is driven by the main shaft 4 by way of bevel gears 9 and 10, which shaft supports a crank 12 and a crank stud 13. A push bar 14 is connected to the crank stud 13 (Figs. 1 and 2) which bar is secured against axial movement by means of a disk 15 and a screw 16. At its other end the push bar 14 is linked to a two part looper shaft 17, 18 which comprises a looper bar 17 and a link member 18.

The link member 18 (Figs. 1, 2 and 3) presents a forked end 19 in which push bar 14 is rotatably journaled by means of a bolt 20 secured thereto with a threaded pin 21. Bolt 20 is provided with a stud end 22 supporting a slide roller 23. This slide roller 23 serves for linearly guiding the link member 18 in a guide groove 24 in a slide member 25 which is secured to the lower portion of the base plate 1 by means of screws 26.

The link member 18 is provided with an internal thread 27 threadedly engaged by the looper bar 17 which has an external thread 28.

Looper bar 17 is threadedly engaged by a looper carrier 29 which supports a looper 30. The looper bar 17 is reciprocally mounted in a sleeve 31 (Fig. 2) which is rotatably received in a bearing sleeve 33 which is secured in the bearing socket 32 of the base 1. For this purpose the forward end of the sleeve 31 is provided with a shoulder 34 with which the sleeve 31 rests against the bearing sleeve 33. Axial displacement of the sleeve 31 inside the bearing sleeve 33 is prevented by a crank 35 which abuts the bearing sleeve 33 and which is clamped to the sleeve 31 by means of a clamp means including a screw 36.

Crank 35 is provided with an arm 37 (Figs. 1 and 5) including a guide track 38. The latter serves for guiding a shoe 39 secured to the looper shaft 17.

Crank 35 is jointed to a pivot arm 41 by way of a link 40 which is secured to the feeding dog lifting shaft 7. The connection of the link 40 to the crank 35 and to the pivot arm 41 is made by means of collar screws 42 and 43 which are screwed with their threaded portions into crank 35 and into pivot arm 41 and are secured by lock nuts 44 and 45.

In the operation of the new looper drive the looper secured to the looper shaft 17, 18 is primarily driven from vertical shaft 11 by way of the stud 13 of the crank and push bar 14. The movements for the lateral evading or sidestepping of the needle and the retardation and acceleration of the looper are produced as set forth hereinafter.

The pivot arm 41 mounted on the feed dog lifting shaft 7 continuously transmits rocking movements of equal magnitude by way of the link 40 to crank 35, having the arm 37 and to looper supporting shaft 17 by way of shoe 39 secured to said shaft and guided in the track 38 of said arm 37. These lateral fluctuations of the looper bar 17 which are superimposed on the principal movements which are effected in a direction perpendicular to the direction of sewing, result in the needle

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evading movements for the looper 30; they commence shortly before the looper reaches its forward point of dead center and continue while the looper begins its return movement.

At the start of the evading movement the looper bar 17 is turned outwardly on its outer thread 28 relative to the linearly moved link member 18 as a result of the sliding movement of shoe 39 in track 38 thus effecting an acceleration prior to attaining the forward dead center position and a retardation during the return movement. In this manner the needle point is placed in an advantageous relationship with respect to the looper as the needle enters the thread triangle.

Shortly before attaining the rear dead center position the looper support bar 17 is screwed into the link member and thus imparts an acceleration to the looper 30 for casting off the needle thread loop. Inasmuch as the evading motion is not yet ended upon passing the rear dead point the helical movement acts counter to the movement of the looper bar 17, thus effecting a retardation in the movement of the looper 30 as it enters into the needle thread loop.

The additional retardation and acceleration of the looper can be adapted to prevailing conditions by suitable choice of the pitch of the outer thread 28 and of the internal thread 27.

Having now fully described the structural features of my invention and its operation with reference to the embodiment illustrated in the drawings, I do not wish to be limited thereto, but what I desire to protect by Letters Patent of the United States of America is set forth in the appended claims.

I claim:

1. A looper drive mechanism for sewing machines including a base plate, a looper mounted below said base plate, a machine arm extending over said base plate and supporting a main drive shaft means adapting said looper to effect loop catching and discarding movements and means adapted to superimpose lateral needle evading movements and retardations and accelerations on the axial movements of said looper; said drive mechanism including a reciprocable looper drive shaft mounted below said base plate and supporting said looper at one end, an intermediate mechanism reciprocably connecting the other end of said looper drive shaft to said main drive shaft, a feed dog raising shaft extending substantially parallel to said looper drive shaft, and a motion superimposing device comprising guide means adapted to impart rotary movement to said looper drive shaft and a pivot arm connected at one end to said guide means and at the other end to said feed dog raising shaft; said looper drive shaft comprising a looper bar and a link member joined at a threaded connection to each other and axially movable by said intermediate mechanism, and said guide means comprising a crank presenting an arm having a guide track movable with said crank, and a shoe associated with said looper bar and slidable in said guide track, said link member and said intermediate device being connected to each other by means of a bolt and forming a pivot point at their junction, a grooved slide member being secured to the base plate of the machine and said bolt extending at one end into said grooved slide member.

2. A looper drive mechanism in accordance with claim 1 including a roller at said one end of said bolt slidable in said slide member.

3. A looper drive mechanism in accordance with claim 1 wherein said looper bar and bolt are hollow to reduce the momentum of the mechanism.

4. A looper drive mechanism for sewing machines including a base plate, a looper mounted below said base plate, a machine arm extending over said base plate and supporting a main drive shaft means adapting said looper to effect loop catching and discarding movements and means adapted to superimpose lateral needle evading

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movements and retardations and accelerations on the axial movements of said looper; said drive mechanism including a reciprocable looper drive shaft mounted below said base plate and supporting said looper at one end, an intermediate mechanism reciprocably connecting the other end of said looper drive shaft to said main drive shaft, a feed dog raising shaft extending substantially parallel to said looper drive shaft, and a motion superimposing device comprising guide means adapted to impart rotary movement to said looper drive shaft and a pivot arm connected at one end to said guide means and at the other end to said feed dog raising shaft; said looper drive shaft comprising a looper bar and a link member joined at a threaded connection to each other and axially movable by said intermediate mechanism; and said guide means comprising a crank presenting an arm having a guide track movable with said crank, a shoe associated with said looper bar and slidable in said guide track, and a sleeve disposed around said looper bar intermediate said bar and said crank permitting rotary movements of said bar in said sleeve and forward and rearward movements of said bar relative to said link member by virtue of said threaded connection.

5. A looper drive mechanism for sewing machines including a base plate, a looper mounted below said base plate, a machine arm extending over said base plate and supporting a main drive shaft means adapting said looper to effect loop catching and discarding movements and means adapted to superimpose lateral needle evading movements and retardations and accelerations on the axial movements of said looper; said drive mechanism including a reciprocable looper drive shaft mounted below said base plate and supporting said looper at one end, an intermediate mechanism reciprocably connecting the other end of said looper drive shaft to said main drive shaft, a feed dog raising shaft extending substantially parallel to said looper drive shaft, and a motion superimposing device comprising guide means adapted to impart rotary movement to said looper drive shaft and a pivot arm connected at one end to said guide means and at the other end to said feed dog raising shaft; said looper drive shaft comprising a looper bar and a link member joined at a threaded connection to each other and axially movable by said intermediate mechanism, and said guide means comprising a crank presenting an arm having a guide track movable with said crank, and a shoe associated with said looper bar and slidable in said guide track.

6. A looper drive mechanism for sewing machines including a base plate, a looper mounted below said base plate, a machine arm extending over said base plate and supporting a main drive shaft, means adapting said looper to effect loop catching and discarding movements and means adapted to superimpose lateral needle evading movements and retardations and accelerations on the axial movements of said looper; said drive mechanism including a reciprocable looper drive shaft mounted below said base plate comprising a looper bar, a link member and a threaded connection between said bar and said member, said looper bar supporting said looper at its free end, an intermediate mechanism reciprocably connecting said looper drive shaft by way of the end of said link member remote from said threaded connection to said main drive shaft, a feed dog raising shaft extending substantially parallel to said looper drive shaft, and a motion superimposing device adapted to impart rotary movement to said looper bar to move said bar in said threaded connection relative to said link member comprising rockable means including a first slide member, a pivot arm connected at one end to said rockable means and at the other end to said feed dog raising shaft and a second slide member in engagement with said first slide member and secured to said looper bar operative in response to the movement of said rockable means to superimpose

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reciprocating axial movement to the reciprocating axial
movements of said looper drive shaft. 1,784,512
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