April 8, 1958 J. J. FEDEVICH 2,829,611

PICKER ARM DRIVING MECHANISM FOR STITCHING MACHINE

Filed June 2, 1955

3 Sheets-Sheet 1

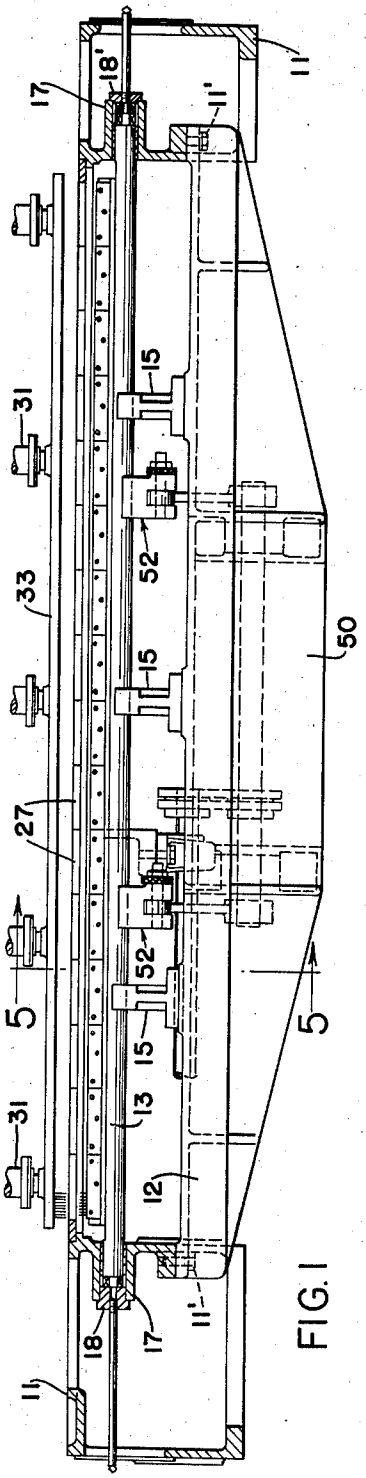

FIG. 1

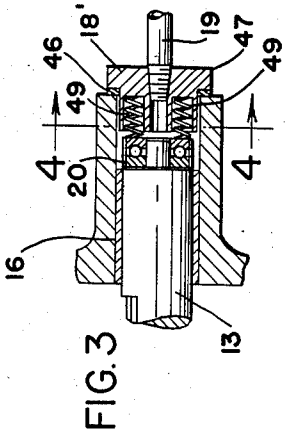

FIG. 3

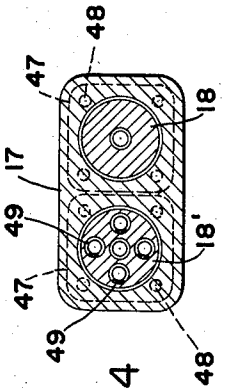

FIG. 4

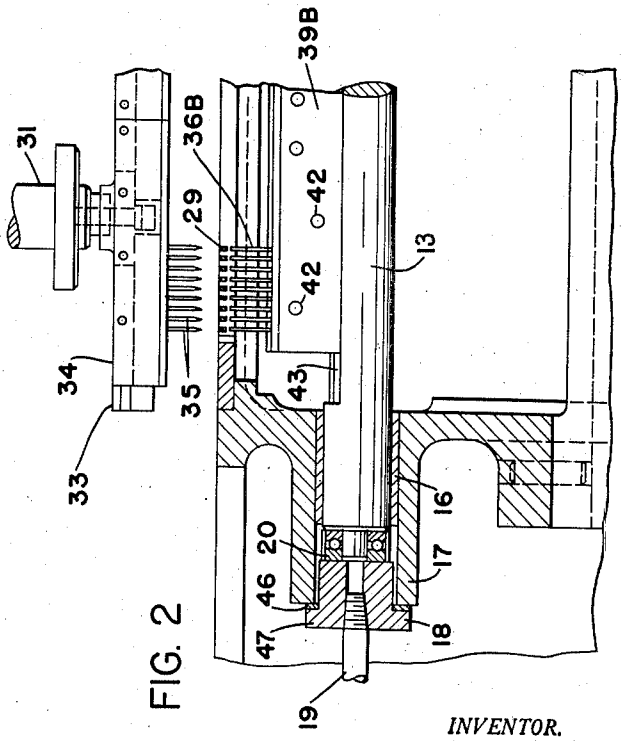

FIG. 2

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April 8, 1958 J. J. FEDEVICH 2,829,611

PICKER ARM DRIVING MECHANISM FOR STITCHING MACHINE

Filed June 2, 1955 3 Sheets-Sheet 2

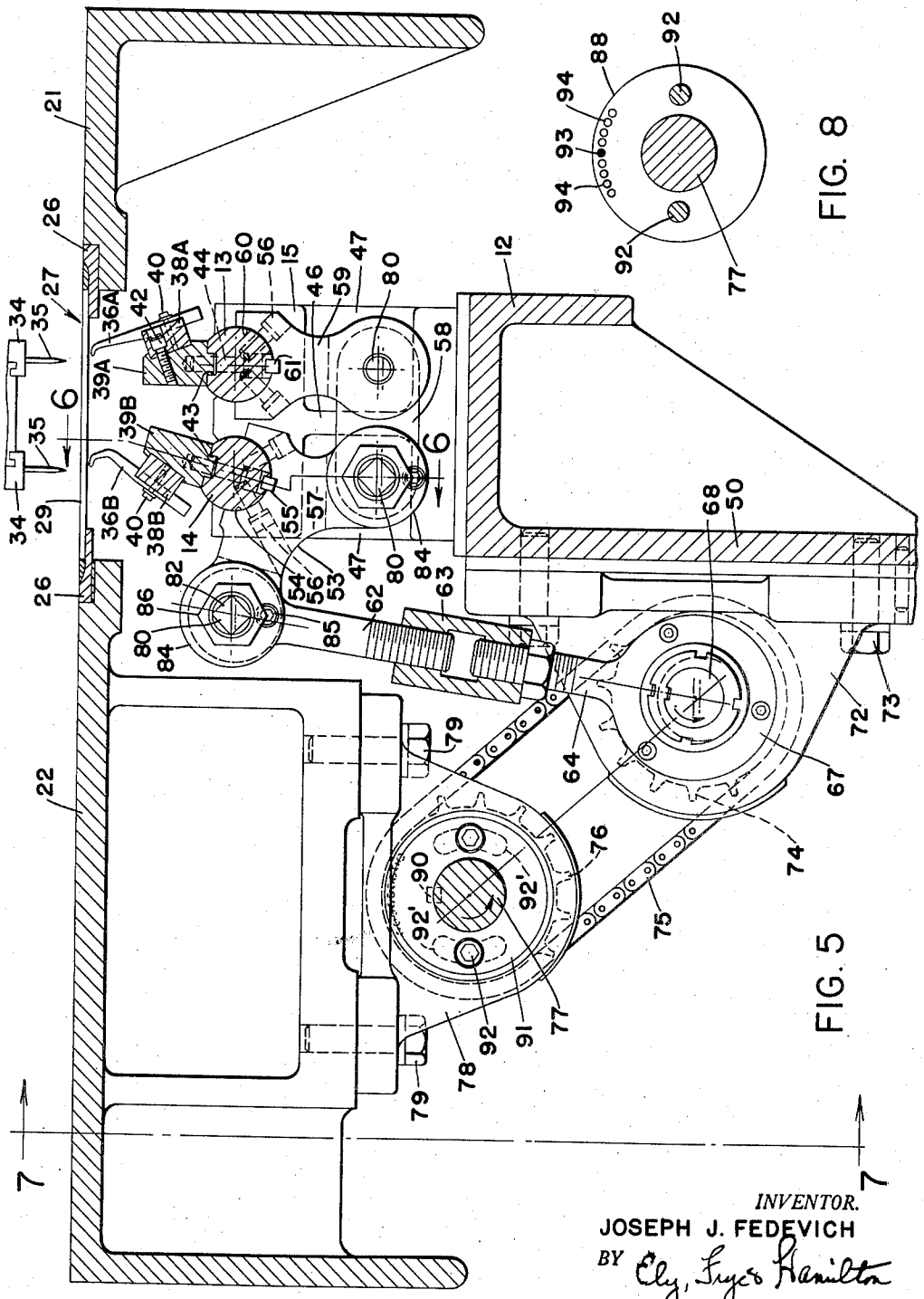

FIG. 8

FIG. 5

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PICKER ARM DRIVING MECHANISM FOR STITCHING MACHINE

Filed June 2, 1955 3 Sheets-Sheet 3

FIG. 6

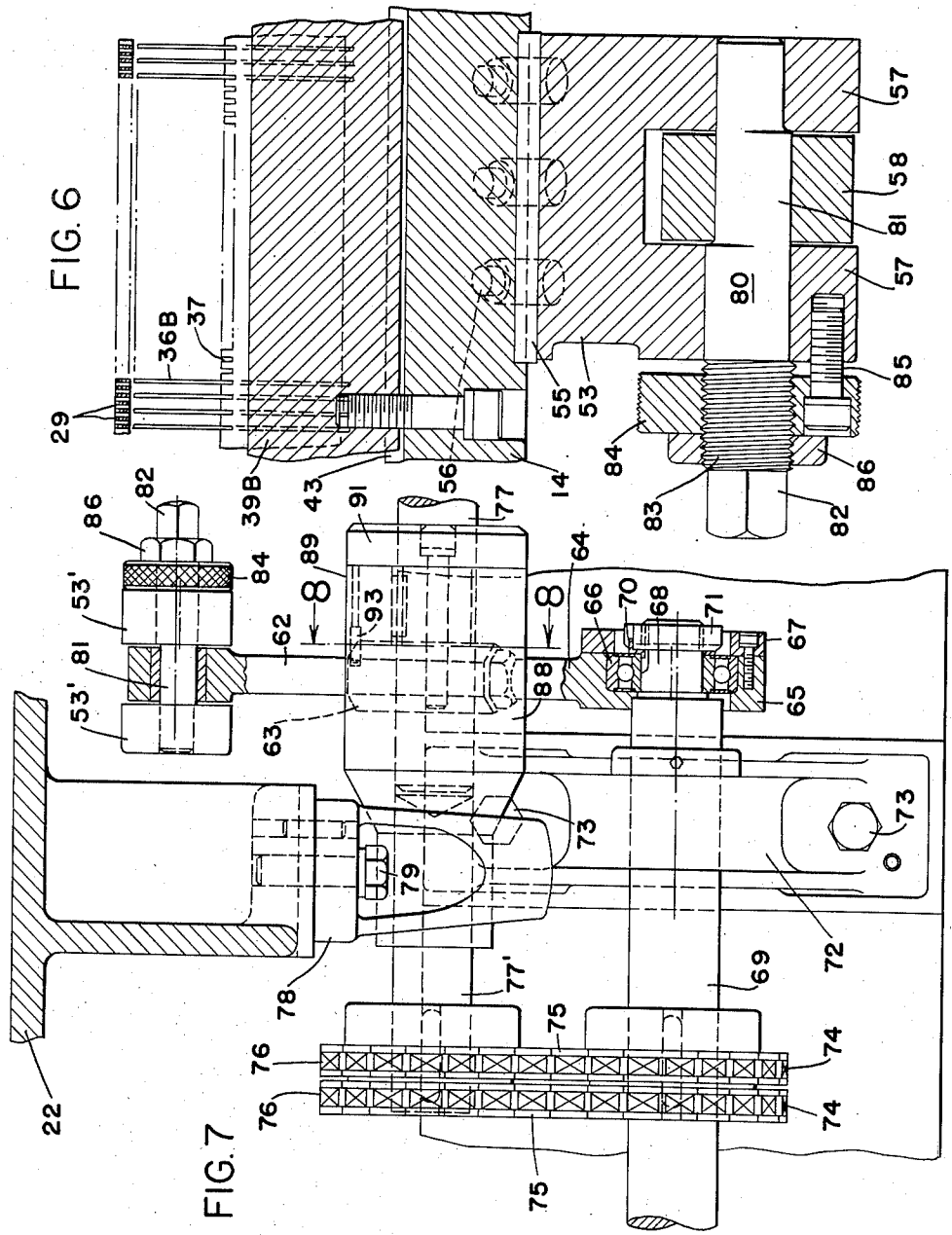

FIG. 7

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PICKER ARM DRIVING MECHANISM FOR STITCHING MACHINE

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Application June 2, 1955, Serial No. 512,821

9 Claims. (Cl. 112—79)

This invention relates generally to stitching machines for providing a looped pile surface on a fabric backing, and more particularly to improved mechanism for supporting and oscillating the picker arms which catch and hold the loops as they are stitched through the fabric backing.

In my copending application Serial No. 504,524, filed April 28, 1955, I disclosed an improved loop fabric stitching machine including a vertically reciprocable needle bar positioned above a moving fabric web and carrying one or more rows of needles for penetrating the web, and one or more rows of picker arms oscillatably mounted below the web for cooperating with the needles to form loops on the under side of the web. Said application disclosed but did not claim the mounting means per se for the picker arms, and did not disclose any specific means for oscillating the picker arms.

It is an object of the present invention to provide novel and improved mounting means for the picker arms.

Another object is to provide improved picker arm supporting means which allow quick removal and replacement of the picker arms.

A further object is to provide improved picker arm supporting means which will absorb shocks and vibrations.

Another object is to provide novel and improved mechanism for oscillating the picker arms in timed relation to the vertical movement of the stitching needles so as to form the looped pile surface on the underside of the web.

Further objects include the provision of driving connections for the picker shafts which distribute torque, and which are readily adjustable to vary the amount of oscillation.

These and other objects are accomplished by the improved constructions and combinations comprising the present invention, a preferred embodiment of which is shown by way of example in the accompanying drawings and described in detail herein. Various modifications and changes in details of construction may be made within the scope of the invention as defined in the appended claims.

In the drawings:

Fig. 1 is a vertical sectional view through the table portion of the improved stitching machine, taken transversely of the path of the web passing through the machine.

Fig. 2 is an enlarged fragmentary view similar to Fig. 1, showing one end of a picker supporting shaft.

Fig. 3 is a fragmentary sectional view showing the other end of the picker supporting shaft.

Fig. 4 is a transverse sectional view on line 4—4, Fig. 3.

Fig. 5 is an enlarged sectional view taken substantially on line 5—5, Fig. 1

Fig. 6 is an enlarged sectional view on line 6—6 of Fig. 5.

Fig. 7 is a view on line 7—7 of Fig. 5, with parts in section.

Fig. 8 is a fragmentary sectional view as on line 8—8 of Fig. 7.

Referring to Fig. 1, the table portion of the machine includes frame members **11** at each side of the path of the web, and these members may be carried on suitable supports (not shown). A transverse beam **12** is secured at its ends to the undersides of the frame members **11** by means of bolts **11'**. The shafts **13** and **14** (Fig. 5) on which the picker arms are mounted are supported at intervals in bearing brackets **15** supported on the beam **12**, and are journaled at their ends in oilless sleeve bearings **16** mounted in tubular bosses **17** formed in the frame members **11**. Thrust bearing caps **18** and **18'** are secured in the bosses **17** at the ends of shafts **13** and **14**, and each cap has an axial lubricant opening connected to a lubricant tube **19**. An anti-friction thrust bearing **20** is interposed between each cap and the adjacent end of the shaft.

As shown in Fig. 5, the frame members **11** have table top portions **21** and **22** extending parallel to the beam **12** and the shafts **13** and **14**, and the fabric web passes over these table top portions between the stitching needles and the picker arms. The spaced-apart inner edges of the table top portions **21** and **22** are preferably recessed to provide ledges on which the end bars **26** of grating plate sections **27** are supported. The grating plate sections each have a plurality of parallel grating strips **29** which are uniformly spaced on a gauge conforming to the gauge of the stitching needles and picker arms.

The upper portion of the machine includes a frame (which is not shown in this application) from which a series of mounting heads **31** depend, and the needle mounting bar **33** is supported for vertical reciprocation on the heads **31**. As disclosed in said application Serial No. 504,524, the needle mounting bar **33** may be made in sections connected end-to-end and extends transversely of the machine above the grating plates. Needle retaining bar sections **34** (Figs. 2 and 5) are clamped against opposite sides of the mounting bar **33** for mounting two parallel rows of stitching needles **35**, the needles in the two rows preferably being staggered with respect to each other. The needles penetrate the fabric web moving over the table and pass between the grating strips. Below the grating strips the thread or yarn carried by the needles is caught and held by picker arms to form loops.

The picker arms **36A** and **36B** are held in upwardly extending slots **37** in picker arm holding bar sections **38A** and **38B** mounted end-to-end in arm mounting bars **39A** and **39B** extending along the upper sides of the shafts **13** and **14**, respectively. The slots **37** are uniformly spaced on the same gauge as the needles and grating strips so that there is a picker arm cooperating with each needle to form rows of loops below the grating. The picker arms **36A** and **36B** are held in the slots **37** by screws **40**, and the arms **36B** have a somewhat different shape at their upper ends from arms **36A**, to position them at the proper location relative to the needles **35**.

The bar sections **38A** and **38B** are secured in longitudinal grooves in the mounting bars **39A** and **39B** by screws **42**, and the bars **39A** and **39B** are keyed into grooves **43** running along the top sides of shafts **13** and **14**, respectively, and secured in said grooves by screws **44**. As shown in Fig. 1, the shafts extend the full width of the machine below the grating plates **27** and parallel to the needle mounting bar **33**. The bearing brackets **15** which support the shafts between the end bearings **16** are preferably uniformly spaced along the shafts and three such bearing brackets are shown, although the number may be varied.

As shown in Fig. 5, the bearing brackets **15** may be

T-shaped having vertical ribs **46** disposed longitudinally of the shafts **13** and **14**, and vertically disposed flanges **47** disposed transversely thereof. The journals for the shafts **13** and **14** are open at the tops of the brackets so that the top portions of the shafts are accessible for removably mounting the mounting bars **39A** and **39B** in the grooves **43**. Thus, by removing the screws **44**, the mounting bars **39A** and **39B** can be easily removed and replaced.

The caps **18** are preferably located at one end of the shaft **13** and at the opposite end of the shaft **14**, the caps **18'** being located at the other ends of said shafts. The positions of the shafts **13** and **14** may be adjusted slightly longitudinally by changing the number of shims **46** between the ends of bosses **17** and the flanges **47** of the caps **18** and **18'**. (See Figs. 2 and 3.) As shown in Fig. 4, the flanges **47** of caps **18** and **18'** are secured to the ends of the tubular bosses **17** by screws **48**. The end caps **18'** are provided with compression springs **49** which abut the thrust bearings to allow some yielding axial movement of the shafts **13** and **14**. This construction provides for keeping a constant tension on the shafts to absorb endwise shocks transmitted from the picker arms, as a result of the picker arms becoming bent or out of line, for example.

The deep vertical flange **50** of the supporting beam **12** provides a solid support for bearing brackets **15**, and serves to absorb shocks and vibrations caused by the oscillating action of the shafts **13** and **14** and the driving mechanism therefor.

The mechanism for oscillating the shafts **13** and **14** in timed relation to the stitching action of the needles **35**, so that the picker arms will catch and hold rows of loops each time the needles pass below the grating strips is best shown in Figs. 5, 6 and 7. The driving connections with the shafts are made at intermediate locations along the shafts; in this case, two connections are made as indicated generally at **52** in Fig. 1. These driving connections are spaced at substantially equal intervals between the ends of the shafts to distribute the torque of the oscillating action.

Because the shafts are relatively long and are weakened in cross section by the longitudinal grooves **43** in their top portions, a substantial variation in torque would occur if the driving connections were made at or near one end of the shafts. This would result in improper coordination between the picker arms along the shafts with the stitching needles, causing unsatisfactory operation and probable breakage.

The driving connections **52** are identical so that only one will be described. Each connection includes a lever arm **53** having a semicylindrical groove **54** at its central portion which is keyed to the shaft **14** by key **55** and secured by screws **56**. The lower end of the arm **53** is preferably forked to form ears **57** which are pivotally connected to one end of a link **58**, the other end of which is pivotally connected to the lower end of a forked lever arm **59**. The upper end of arm **59** has a semi-cylindrical groove **60** in which shaft **13** is secured by key **61** and screws **56**.

The upper forked end of arm **53** has arms **53'** pivotally connected to a connecting rod **62** connected to a turnbuckle **63**, and the other end of the turnbuckle is adjustably connected to the stem **64** of a connecting link having a cylindrical journal portion **65**. The outer race of an anti-friction bearing **66** is held in said journal portion **65** by a cap ring **67**, and within bearing **66** is journaled the eccentric or crank end **68** of a drive shaft **69**. The inner race of the bearing is retained by a lock washer **70** and a lock nut **71**.

The drive shaft **69** is journaled in spaced bearing brackets **72** mounted on the flange **50** of beam **12** by bolts **73**, and the shaft is connected at its ends with the two driving connections **52**. The means for driving shaft **69** preferably comprises sprockets **74** fixed on shaft **69** and operatively connected by chains **75** to sprockets **76** on the end portion **77'** of a power shaft **77** driven by a suitable motor (not shown) and journaled in brackets **78** mounted on frame member **22** by bolts **79**. Rotation of shaft **69** will cause reciprocation of the connecting rod **62** and oscillation of the lever arms **53** and **59**, resulting in oscillation of the shafts **13** and **14** about their axes.

Referring to Fig. 5, the pivot pins **80** which connect the lever arm **53** to the rod **62** and to the link **58**, and which connect the link **58** to the arm **59** all have the same construction, although the pin **80** connecting link **58** and arm **59** is turned end for end relative to the other pins. This construction is best shown in Fig. 6. Each pin **80** includes an eccentric portion **81** between the ears of the lever arms, which are the ears **57** in Fig. 6. The eccentric portion **81** is journaled in the link **58** which connects the lever arms **53** and **59**. On the outer end of the pin is a squared portion **82** for engagement by a wrench and an adjacent threaded portion **83**. By rotating the pin a slight adjustment is made in the distance between the pivot pins which adjusts the amount of oscillation of the shafts **13** and **14**.

Preferably, a knurled washer **84** is screwed on the threaded portion **83** of the pin, and the washer is secured to the adjacent ear **57** by a screw **85**. A lock nut **86** is also screwed on the threaded portion **83** in abutment with washer **84**. Thus, the washer **84** prevents axial movement of the pin **80** and the lock nut prevents rotation thereof.

In order to adjust the amount of throw or oscillation of the shafts **13** and **14** by rotating the eccentric portion **81** of any of the pins **80**, the lock nut **86** is removed and the pin turned by engaging the squared portion **82**.

The end portion **77'** is axially rotatably adjustable with respect to shaft **77**, so that when originally setting the machine the shaft **69** may be timed relative to the stitching action of the needle mounting bar, or in other words, the oscillation of the picker arms timed in respect to the vertical reciprocation of the needles. The end portion **77'** is accordingly provided with a cylindrical socket body **88** in which the end of shaft **77** is received.

A driving disk **89** abuts the ends of body **88** and is fixed on shaft **77** by a key **90**, and a clamping ring **91** abuts the end of disk **89**. The ring **91** is secured to the body **88** by bolts **92** which pass through arcuate slots **92'** in the disk **89**, so that the disk is clamped between the body and the ring. The inner face of the disk has a projecting dowel pin **93** therein, and the abutting face of the body has a circumferential series of holes **94** for selectively receiving the pin **93**. Thus, by removing the dowel pin **93** and rotating shaft **69** slightly to allow insertion of pin **93** in a different hole **94**, the relative position of shaft **69** and the picker arms operated thereby is adjusted for an original setting of the machine. Thereafter, fine adjustments of the picker arm oscillation are obtained by adjusting the eccentric pins **80** in the manner previously described.

In operation, the shafts **13** and **14** are oscillated in timed relation with the vertical reciprocation of the stitching needles **35** so that the fingers **36A** and **36B** pick and hold rows of loops of yarn each time a stitch is made. Obviously, the throw of the picker fingers must be adjusted precisely to pick, hold and release the loops in the proper sequence during the rapid stitching operation, and the several eccentric pins **80** provide for such adjustment.

The improved picker arm driving mechanism provides for distributing torque along the oscillating shafts carrying the picker arms, and the shafts are solidly mounted to absorb vibration and yet are yieldable axially to absorb shock resulting from misalignment or bending of the picker arms. The supporting means for the shafts allows quick removal and replacement of the picker arms, as well as precision adjustment of the amount of oscillation of the shafts.

What is claimed is:

1. In a loop fabric stitching machine having a table top frame portion for supporting a moving fabric web, a vertically reciprocable needle mounting bar extending transversely above said table top, and an oscillatable picker arm mounting bar extending transversely below the table top, a shaft coextensive with said picker arm mounting bar and having its ends journaled in said table top portion, said shaft having a groove along its upper surface in which said picker arm mounting bar is directly removably secured, a transverse beam coextensive with said shaft and secured at its ends to said table top portion, and open top bearing brackets supporting said shaft on the beam at intervals longitudinally thereof.

2. In a loop fabric stitching machine having a table top frame portion for supporting a moving fabric web, a vertically reciprocable needle mounting bar extending transversely above said table top, and an oscillatable picker arm mounting bar extending transversely below the table top, a shaft coextensive with said picker arm mounting bar and having its ends journaled in said table top portion, a transverse beam coextensive with said shaft and secured at its ends to said table top portion, open top bearing brackets supporting said shaft on the beam at longitudinal intervals, the upper portion of said shaft being accessible above said bearing brackets, and means removably securing said picker arm mounting bar directly in said upper portion of said shaft.

3. In a loop fabric stitching machine having a table top frame portion for supporting a moving fabric web, a vertically reciprocable needle mounting bar extending transversely above said table top, and an oscillatable picker arm mounting bar extending transversely below the table top, a shaft coextensive with said picker arm mounting bar and having its ends journaled in said table top portion, a transverse beam coextensive with said shaft and secured at its ends to said table top portion, open top bearing brackets supporting said shaft on the beam at longitudinal intervals, the upper portion of said shaft being accessible above said bearing brackets, means removably securing said picker arm mounting bar directly in said upper portion of said shaft, and means at one end of said shaft for yieldingly absorbing shocks transmitted axially of said shaft.

4. In a loop fabric stitching machine having a table top frame portion for supporting a moving fabric web, a vertically reciprocable needle mounting bar extending transversely above said table top, and an oscillatable picker arm mounting bar extending transversely below the table top, a shaft coextensive with said picker arm mounting bar and having its ends journaled in said table top portion, a transverse beam coextensive with said shaft and secured at its ends to said table top portion, open top bearing brackets supporting said shaft on the beam at longitudinal intervals, the upper portion of said shaft being accessible above said bearing brackets, means removably securing said picker arm mounting bar directly in said upper portion of said shaft, caps secured to said table top frame at the ends of said shaft, and spring means between one of said caps and the shaft for yieldingly absorbing shocks transmitted axially of said shaft.

5. In a loop fabric stitching machine having a table top frame portion for supporting a moving fabric web, a vertically reciprocable needle mounting bar extending transversely above said table top, and an oscillatable picker arm mounting bar extending transversely below the table top, a shaft coextensive with and directly supporting said picker arm mounting bar and having its ends journaled in said table top portion, means supporting said shaft intermediate its ends, driving connections with said shaft spaced longitudinally thereof between the ends of the shaft, each driving connection comprising a lever arm secured to the shaft, a connecting rod and pivot means connecting said lever arm to said rod, a drive shaft rotatably mounted on said frame, and eccentric means connecting said drive shaft to said connecting rod for reciprocating the connecting rod as the drive shaft is rotated, said pivot means being adjustable to vary the throw of said lever arm.

6. In a loop fabric stitching machine having a table top frame for supporting a moving fabric web and a vertically reciprocable needle mounting bar extending transversely above said table top, two parallel oscillatable picker arm mounting bars extending transversely below said table top in side-by-side relation, two shafts coextensive with and directly supporting said picker arm mounting bars having their ends journaled in said frame, means supportng said shafts intermediate their ends on said frame, and driving connections with said shafts at intervals between their ends, each driving connection comprising a lever arm secured to one of said shafts, a connecting rod pivotally connected to one end of said lever arm, a second lever arm secured to the other shaft, a link pivotally connecting said lever arms, and means for reciprocating said connecting rod to oscillate said shafts in timed relation to the reciprocation of the needle mounting bar.

7. In a loop fabric stitching machine having a table top frame for supporting a moving fabric web and a vertically reciprocable needle mounting bar extending transversely above said table top, two parallel oscillatable picker arm mounting bars extending transversely below said table top in side-by-side relation, two shafts coextensive with and directly supporting said picker arm mounting bars having their ends journaled in said frame, means supporting said shafts intermediate their ends on said frame, and driving connections with said shafts at intervals between their ends, each driving connection comprising a lever arm secured to one of said shafts, a connecting rod pivotally connected to one end of said lever arm, a second lever arm secured to the other shaft, a link pivotally connecting said lever arms, the pivoted connections of the lever arms comprising pins having eccentric portions for adjusting the amount of oscillation of said shafts.

8. In a loop fabric stitching machine having a table top frame portion for supporting a moving fabric web, a vertically reciprocable needle mounting bar extending transversely above said table top, an oscillatable picker arm mounting bar extending transversely below said table top, a shaft coextensive with and directly supporting said picker arm mounting bar and having its ends journaled in said table top portion, means supporting said shaft intermediate its ends, driving connections with said shaft spaced longitudinally thereof between the ends of the shaft, each driving connection comprising a lever arm secured to the shaft and a connecting rod pivoted to the lever arm, a drive shaft rotatably mounted on said frame portion and eccentrically connected to said connecting rod for reciprocating the rod as the drive shaft is rotated, a power shaft having an end portion operatively connected to said drive shaft, and means detachably connecting said drive shaft and end portion for relative axial rotational adjustment.

9. In a loop fabric stitching machine having a table top frame portion for supporting a moving fabric web, a vertically reciprocable needle mounting bar extending transversely above said table top, an oscillatable picker arm mounting bar extending transversely below said table top, a shaft coextensive with and directly supporting said picker arm mounting bar and having its ends journaled in said table top portion, means supporting said shaft intermediate its ends, a lever arm secured to the shaft, a drive shaft, eccentric and connecting rod means connecting said drive shaft and lever arm for oscillating said first shaft as said drive shaft is rotated, a power shaft having an end portion operatively connected to said drive

shaft, and means detachably connecting said drive shaft and said end portion for relative axial rotational adjustment, whereby the relative position of the picker arm mounting bar may be adjusted relative to the position of the needle mounting bar.

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