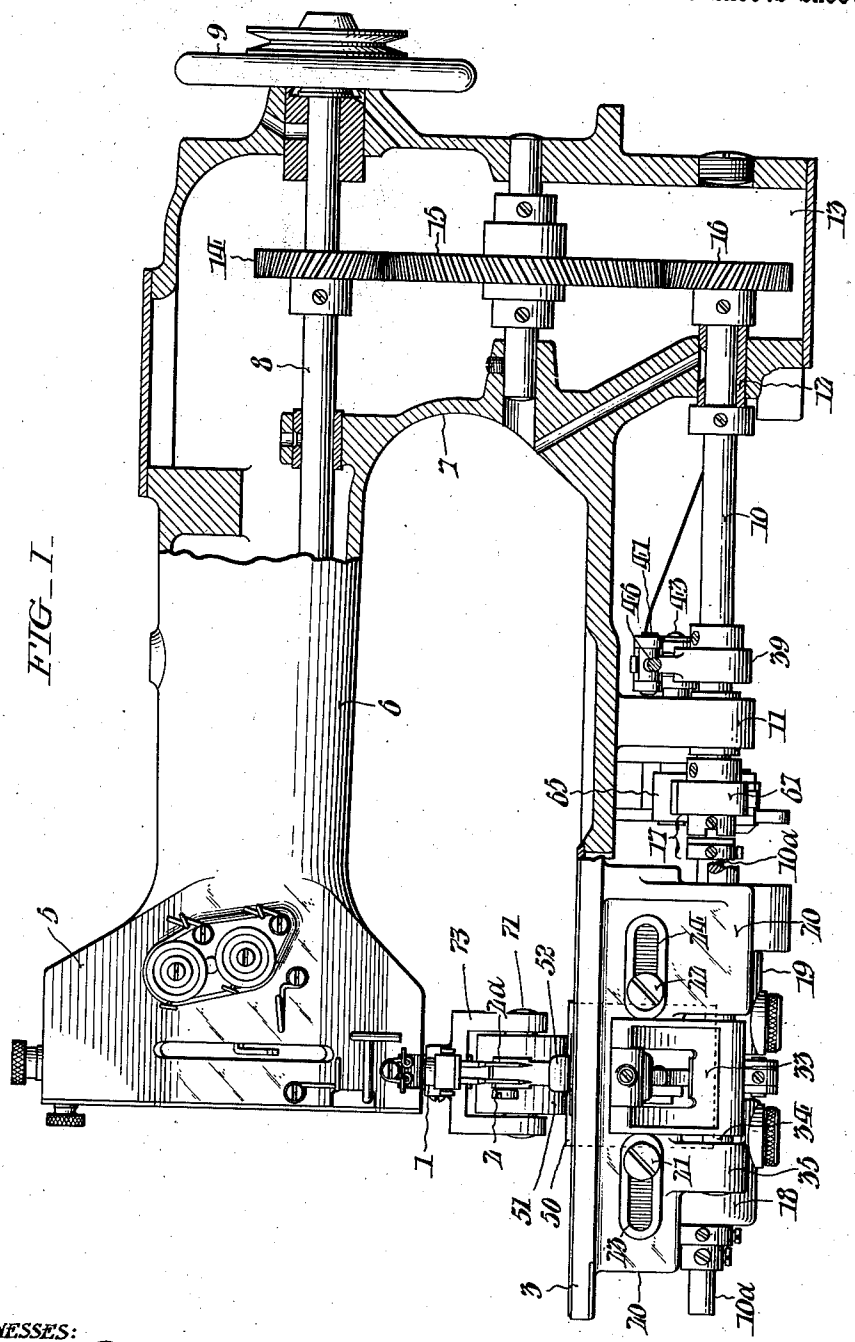
Sept. 7, 1937. G. SAUER ET AL 2,092,335

FABRIC PULLER MECHANISM FOR SEWING MACHINES

Filed Dec. 17, 1935 3 Sheets-Sheet 1

FIG. 1.



WITNESSES:
John C. Bergner.
Hubert Fuchs

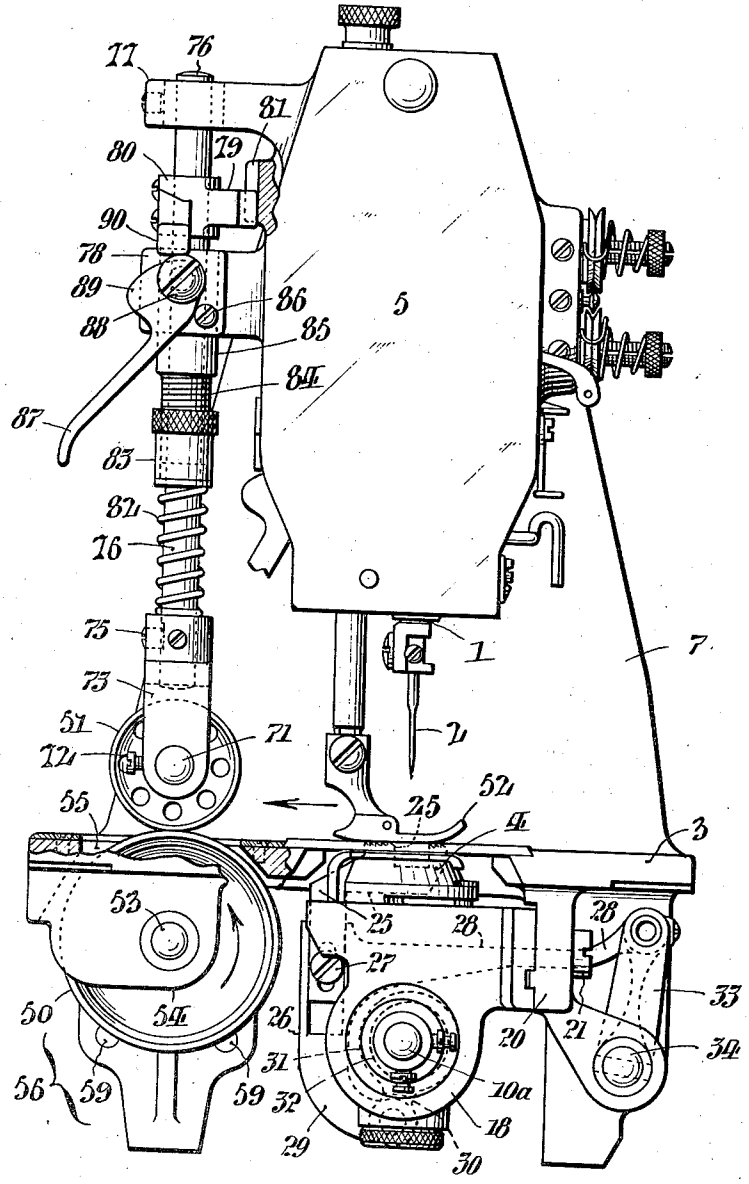
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FABRIC PULLER MECHANISM FOR SEWING MACHINES

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FIG. II



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FABRIC PULLER MECHANISM FOR SEWING MACHINES

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FIG. III.

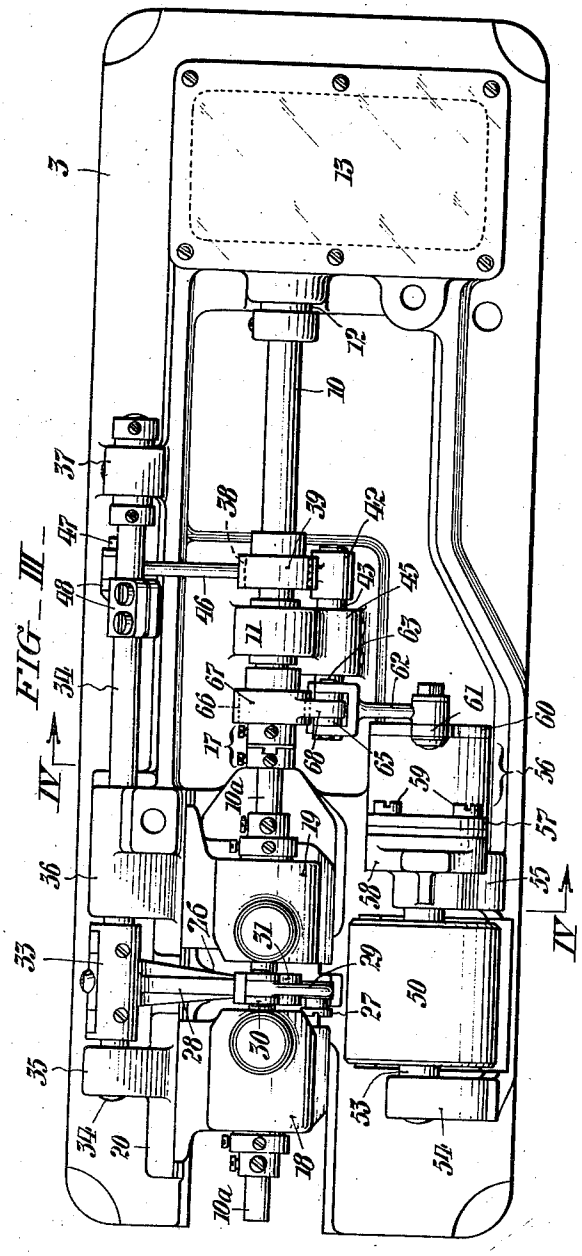
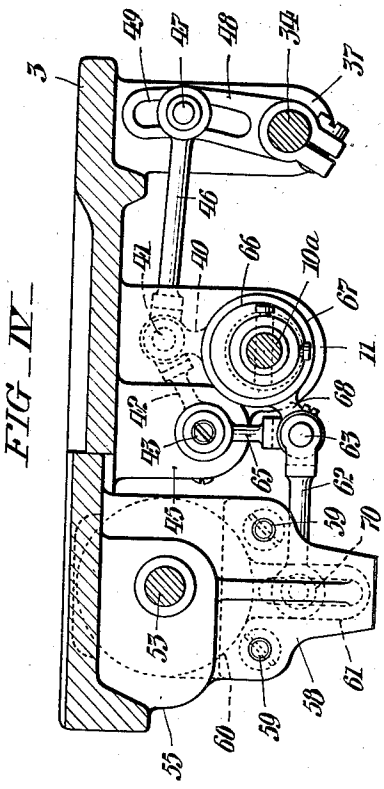


FIG. IV.



WITNESSES:
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UNITED STATES PATENT OFFICE

2,092,335

FABRIC PULLER MECHANISM FOR SEWING MACHINES

George Sauer, Berwyn, and Oscar Quist, Chicago, Ill., assignors to Union Special Machine Company, Chicago, Ill., a corporation of Illinois

Application December 17, 1935, Serial No. 54,806

12 Claims. (Cl. 112—214)

This invention relates to fabric puller means adapted to function either alone or in an auxiliary capacity with the usual feed mechanisms of sewing machines in advancing the fabric in respect to the needles.

Our invention is directed toward the provision of a mechanism which is simple in construction; which can be adjusted and relied upon to function in exact synchronism with the feed mechanism of a sewing machine to advance the fabric without stretching or buckling it; and which moreover is smooth and balanced in its action so that the sewing machine with which it is associated can be operated at high speeds with a minimum of noise and vibration.

The above indicated advantages we realize in practice, as hereinafter more fully disclosed, in a puller mechanism wherein a pair of nip rolls cooperate in drawing the fabric away from the seaming needle or needles, one of said rolls being positively driven intermittently through actuating connections with a shaft from which the feed element of the machine derives its movements, in such manner that the feeding movements of said roll are timed with the active feeding movements of said feed element.

Other objects and attendant advantages of this invention will appear from the detailed description of the attached drawings, wherein Fig. I is a view partly in side elevation and partly in longitudinal section, of a lock stitch sewing machine conveniently embodying our improved puller mechanism.

Fig. II is an elevation of the front end of the machine with portions broken away and others sectioned for the better showing of important structural details.

Fig. III is a bottom plan view of the machine; and

Fig. IV is a staggered transverse sectional view taken as indicated by the arrows IV—IV in Fig. III.

The sewing machine herein illustrated is a lock stitch machine of the type featured in a co-pending application, Serial No. 53,552 filed on December 9, 1935 in the names of Norman V. Christensen and Oscar Quist, having a vertically reciprocating needle bar 1 carrying two needles 2, 2a which cooperate with a pair of rotary hooks beneath the work support 3 of the machine, one of said hooks being shown at 4 in Fig. II. The needle bar 1, has guidance in a head 5 at the outer end of an arm 6 which overhangs the work support 3, and which, with the supporting standard 7 therefor, is integrally formed with said support. By suitable means (not illustrated) within the head 5, up and down movements are imparted to the needle bar 1 from a main shaft 8 which extends longitudinally through the hollow of the arm 6 and is fitted at the protruding right hand end with a combined hand and belt wheel 9 so that the machine can be driven either manually or by power. Extending horizontally beneath the work support 3 is a rotary shaft 10, which, at an intermediate point, is journaled in a pendant bearing 11 of said work support 3. At the right hand end of the machine, the shaft 10 extends through a bearing bushing 12 into a lubricant sump 13 located immediately below and communicating with the hollow of the standard 7. Unison rotary motion is imparted to the shaft 10 from the main shaft 8 by a train of intermeshing gears 14, 15, and 16 within the standard 7 and the lubricant sump 13. Connected to the forward end of the rotary shaft 10 by a universal coupling comprehensively designated 17, is a supplemental extension 10a of said shaft, said extension passing through hollow journal members 18 and 19 to drive the rotary hooks 4 through suitable gear connections not illustrated. The journal members 18 and 19 are secured, to a pendant flange 20 of the work support by means of headed screws 21 and 22 with shanks extending through longitudinal slots 23, 24 in said flange so that the rotary hooks can be accurately positioned independently for proper coaction with the respective needles 2 and 2a. Operating beneath the work support 3 centrally between the journal members 18 and 19 and in line with the needles 2 and 2a is a feed dog 25 which is secured, with capacity for vertical adjustment, to a feed bar 26 by means of a headed screw 27. As shown in Fig. II the feed bar 26 has a portion 28 which extends forwardly above the supplemental shaft 10a, as well as a downwardly and forwardly curved portion 29 which under-reaches said shaft. At its end, the under-reaching portion 29 of the feed bar 26 is pivotally connected to the suspension arm 30 of an eccentric strap 31 which embraces an eccentric 32 on the supplemental shaft 10a whereby the rise and fall movements are communicated to said feed bar. From Fig. II it will be observed that the over-reaching portion 28 of the feed bar 26 extends to the front of the machine forwardly of the needles 2 and 2a, and is there pivotally connected at its end to a bifurcated rocker 33 on an oscillating shaft 34 journaled in spaced bearing lugs 35, 36 and 37 depending from the work support 3. Secured to the shaft 10 imme-

diately to the right of the bearing 11 is an eccentric 38 embraced by a strap 39. As shown in Fig. IV, an upward arm 40 of the eccentric strap 39 has a common pivotal connection at 41 with the swinging end of a lazy bar 42 fulcrumed about one end of a fixed stud 43 in a depending lug 45 of the work support 3, and with one end of a horizontal link 46. At its opposite end, the link 46 has a pivotal connection at 47 with an actuating arm 48 on the oscillating shaft 34. The pivotal connection 47 is adjustable along a curved slot 49 in the actuating arm 48, said slot having its center of curvature substantially in the axis of the pivot connection 41 between the arm 40 of the eccentric strap 39 and said link. By adjusting the pivotal connection 47 along the slot 49 of the actuating arm 48 it is possible to increase or decrease the oscillation of the shaft 34. The described feed mechanism, per se, constitutes the subject matter of another application, Serial No. 54,805 filed concurrently herewith in the name of George Sauer.

The improved mechanism which we have devised for progressively drawing the fabric away from the needles 2 and 2a comprises a pair of cooperating puller rolls 50 and 51 which are arranged in superimposed relation, one above the work support 3 and the other below it, rearward of the presser foot 52 in respect to the direction of fabric advance and comparatively close to the needle 2 within the confines of said work support, such allocation of the rolls being possible due to the fact that the actuating elements for the feed dog are disposed at the front of the machine. The lower roll 50 is secured to a shaft 53 journaled at opposite ends in spaced pendant bearings 54 and 55 of the work support 3. As shown in Fig. II, the roll 50 projects up through a clearance opening 55 in the work support 3 to a level slightly above the top of said support 3. The roll 50 is intermittently rotated by a clutch device 56 which is preferably of the type disclosed in U. S. Patent 1,692,130 granted to William B. Long et al. on November 20, 1928. The braking member 57 of the clutch device 56 is secured to a lug 58 on the bearing 55 by screws 59, while the driving member 60 of said device has a slotted arm 61 which is coupled by means of a horizontal link 62 with a pivot pin 63 at the swinging end of a lazy bar 65 fulcrumed on the end of the fixed pin 43 hereinbefore referred to opposite to that occupied by the lazy bar 42 of the feed mechanism. The driving member 60 of the clutch device 56 is actuated by an eccentric 66 on the shaft 10 at the left of the bearing 11, through a strap 67 associated with said eccentric, said strap having an arm 68 pivotally connected to the pin 63 of the lazy bar 65. The pivotal connection 70 of the link 62 is adjustable along the slot of the arm 61 of the clutch driving member 60 so that the circumferential shifts of the roll 50 can be made to correspond exactly to the feed movements of the feed dog 25.

The idler roll 51 of the puller mechanism, revolves freely about an axle 71 whereof the ends are secured by set screws 72 in the extremities of a vertical carrier yoke 73, see Fig. II. As shown, the yoke 73 is in turn secured by set screws 75 to the lower end of a presser bar 76 which is confined to axial movement in vertically spaced guide lugs 77, 78 projecting laterally from the head 5 of the arm 6. Rotation of the bar 76 is prevented through engagement of a lateral projection 79 of a collar 80 thereon with a vertical guide slot 81 on the head 5. The idler roll 51 is yieldingly urged downward by a spring 82 which surrounds the presser bar 76 in the interval between the top of the carrier yoke 73 and an abutment collar 83. As shown, this collar 83 has the form of a knurled finger nut and engages the threaded downward extension 84 of a bushing 85 in the guide lug 78, which latter is split and provided with a clamp screw 86 whereby said bushing is secured. Obviously, by adjusting the finger nut 83, it is possible to regulate the force of the spring 82 and, in turn, the gripping pressure of the idler roll 51 upon the fabric which, during the operation of the machine, is passed between said idler roll and the driven roll 50. In order that the idler roll 51 may be lifted clear of the fabric and locked in raised position when desired or required, there is provided a finger lever 87 which is fulcrumed about a screw stud 88 on the guide lug 78, and which is formed with a shouldered cam portion 89 for cooperation with a projection 90 of the collar 80 on the presser bar 76.

During operation of the machine, the feed dog 25, by coaction with the presser foot 52, progressively advances the fabric in respect to the needles 2 and 2a in the direction indicated by the arrow in Fig. II. At the same time, the cooperating rolls 50 and 51 assist in the feeding by progressively drawing the fabric away from the needles 2 and 2a. As the shaft 10 rotates, the eccentric 66 moves the eccentric strap 67 (Fig. IV) back and forth, the pivotal connection 63 being confined by the lazy bar 65 to swing in an arc having its center in the axis of the fulcrum pin 43. Accordingly, the movement of the eccentric 66 is communicated substantially direct to the link 62 with impartation, in turn, of a fixed oscillatory swing to the driving arm 61 of the clutch device 56, and a corresponding rotary shaft to the roll 50. By adjusting the pivotal connection 70 of the link 62 up or down along the slotted arm 61 of the clutch driving member 60, the feeding movements of the roll 50 can be increased or decreased to correspond exactly to the feeding movements of the feed dog 25 so that the fabric is advanced without attendant stretching or buckling. The eccentrics 38 and 66 are of course accurately set on the shaft initially to predetermine synchronous operation of the feed dog 25 and the puller roll 50. The idler roll maintains the fabric in gripping pressure contact with the surface of the driven roll 50, and can yield upwardly against the pressure of the spring 82 to facilitate passage beneath it of fabrics of different thicknesses. Due to the suspension of the pivotal connection 63, joining the eccentric strap 67 and the link 62 by the lazy bar 65, the functioning of the puller mechanism is rendered easy and smooth, and by virtue of like functioning of the feed mechanism, the combined action of these mechanisms is balanced to a degree which favors high speed operation of the sewing machine with absence of excessive noise and vibration.

By suitable modifications within the scope of the appended claims, our improved puller mechanism is adaptable to sewing machines having feed mechanisms other than of the type herein shown and described for convenience of exemplification, without sacrifice of any of the advantages which have been pointed out.

Having thus described our invention, we claim:

1. Fabric puller mechanism for sewing machines comprising a fabric-engaging roll, a device for intermittently rotating the roll, a shaft, an eccentric on said shaft, a strap embracing the eccentric, a link connected at one end with a

driving member for the device aforesaid, and having its other end pivoted to an arm on the eccentric strap, and a lazy bar fulcrumed on a fixed center and having its swinging end connected at the pivot between the link and the eccentric strap arm.

2. Fabric puller mechanism for sewing machines comprising a fabric-engaging roll, a device for intermittently rotating the roll, a shaft; an eccentric on said shaft, a strap embracing the eccentric, a link connected at one end with a drive member for the device aforesaid and having its other end pivoted to an arm on the eccentric strap, and a lazy bar fulcrumed to swing about a fixed center and supporting the pivotal connection between the link and the eccentric strap arm in suspension.

3. Fabric puller mechanism for sewing machines comprising a fabric engaging roll, a device for intermittently rotating the roll, a shaft, an eccentric on said shaft, a strap embracing the eccentric, a link with a pivotal connection at one end adjustable along a driving arm for the device aforesaid, and with its other end pivoted to an arm on the eccentric strap, and a lazy bar fulcrumed on a fixed center and having its swinging end connected at the pivot between the link and the eccentric strap arm.

4. Fabric puller mechanism for sewing machines comprising a fabric-engaging roll, a device for intermittently rotating the roll, a shaft, an eccentric on said shaft, a strap embracing the eccentric, a link with a pivotal connection at one end adjustable along a driving arm for the device aforesaid and with its other end pivoted to an arm on the eccentric strap, and a lazy bar fulcrumed to swing about a fixed center and supporting the pivot between the link and the eccentric strap arm in suspension.

5. Fabric puller mechanism for sewing machines comprising a pair of cooperative nip rolls to engage the fabric between them, means for yieldingly urging the rolls toward each other, a device for intermittently rotating one of said rolls, a shaft, an eccentric on said shaft, a strap embracing said eccentric, a link connected at one end with a driving member for the device aforesaid and having its other end pivoted to an arm on the eccentric strap, and a lazy bar fulcrumed on a fixed center and having its swinging end connected at the pivot between the link and the eccentric strap arm.

6. Fabric puller mechanism for sewing machines comprising a driven roller and a cooperative idler roller between which the fabric is passed, a presser bar with a yoke bearing in which the idler roller is journaled, an adjustable spring influential upon the bar to yieldingly urge the idler roll toward the driven roll, a device for intermittently rotating the driven roll, a shaft, an eccentric on said shaft, a strap embracing the eccentric, a link connected at one end with a driving member for the device aforesaid and having its other end pivoted to an arm on the eccentric strap, and a lazy bar fulcrumed on a fixed center and having its swinging end connected at the pivot between the link and the eccentric strap arm.

7. In a sewing machine having a feed element; fabric puller mechanism operative in synchronism with the feed element and comprising a fabric-engaging roll, a device for intermittently rotating the roll, a shaft, an eccentric on said shaft, a strap embracing the eccentric, a link connected at one end with a driving member for the device aforesaid and having its other end pivoted to an arm on the eccentric strap, a lazy bar fulcrumed on a fixed center and having its swinging end connected at the pivot between the link and the eccentric strap arm, and means whereby the feeding movements of the fabric engaging rolls aforesaid can be adjusted to correspond exactly with the feed movements of the feed element of the machine.

8. In a sewing machine having a feed element; fabric puller mechanism operative in synchronism with the feed element and comprising a fabric-engaging roll, a device for intermittently rotating the roll, a shaft, an eccentric on said shaft, a strap embracing the eccentric, a link with a pivotal connection at one end adjustable along a driving arm for the device aforesaid so that the feeding movements of the fabric engaging roll can be regulated to correspond exactly to the feeding movements of the feed element, said link having its other end pivoted to an arm on the eccentric strap, and a lazy bar fulcrumed on a fixed center and having its swinging end connected at the pivot between the link and the eccentric strap arm.

9. In a sewing machine having a feed dog receiving its feed movements through oscillation of a shaft with an arm thereon connected by a link to the strap arm of an eccentric on a rotary shaft, and said eccentric strap arm pivotally connected to a lazy bar swingable about a fixed center; fabric puller mechanism adapted to operate in synchronism with the feed bar and comprising a fabric-engaging roll, a device for intermittently rotating the roll, another eccentric on the rotary shaft aforesaid, a strap embracing the last mentioned eccentric, a link connected at one end with a driving member for the device aforesaid and having its other end pivoted to an arm on the last mentioned eccentric strap, and a lazy bar fulcrumed on the fixed center aforesaid and having its swinging end connected at the pivot between said last mentioned link and said last mentioned eccentric strap arm.

10. In a sewing machine having a feed dog receiving its feed movements through oscillation of a shaft with an arm thereon connected by a link to the strap arm of an eccentric on a rotary shaft, and said eccentric strap arm pivotally connected to a lazy bar swingable about a fixed center; fabric puller mechanism adapted to operate in synchronism with the feed bar and comprising a fabric engaging roll, a device for intermittently rotating the roll, another eccentric on the rotary shaft aforesaid, a strap embracing the last mentioned eccentric, a link connected at one end with a driving member for the device aforesaid and having its other end pivoted to an arm on the last mentioned eccentric strap, a lazy bar fulcrumed on the fixed center aforesaid and having its swinging end connected at the pivot between said last mentioned link and said last mentioned eccentric strap arm, and means whereby the feeding movements of the fabric engaging roll can be adjusted to correspond exactly with the feed movements of the feed dog.

11. In a sewing machine having a feed dog receiving its feed movements through oscillation of a shaft with an arm thereon connected by a link to the strap arm of an eccentric on a rotary shaft, and said eccentric strap arm pivotally connected to a lazy bar swingable about a fixed center; fabric puller mechanism adapted to operate in synchronism with the feed bar and comprising a fabric engaging roll, a device for inter-

mittently rotating the roll, another eccentric on the rotary shaft aforesaid, a strap embracing the last mentioned eccentric, a link connected at one end with capacity for adjustment along a driving arm for the device aforesaid so that the feeding movements of said roll can be made to correspond exactly with the feed movement of the feed dog, said last mentioned link having its other end pivoted to an arm on said last mentioned eccentric strap, and a lazy bar fulcrumed on the fixed center aforesaid and having its swinging end connected at a pivot between said last mentioned link and said last mentioned eccentric strap arm.

12. In a sewing machine comprising a work support, a needle operating above said work support, a feed dog and a rotary shaft beneath said support, a feed dog carrier, means for imparting horizontal or feed movements to the feed dog carrier disposed forward of the needle including an arm overreaching said shaft, an eccentric on the said shaft for imparting lift movements to the feed dog carrier, a strap engaging the eccentric and having a suspension arm pivotally connected to an arm on the feed dog carrier underreaching said shaft; the combination of fabric puller mechanism operated in synchronism with the feed dog, said puller mechanism comprising a pair of superposed fabric-engaging rolls respectively above and below the work support and immediately rearward of the needle in the direction of feeding.

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