

May 26, 1942.

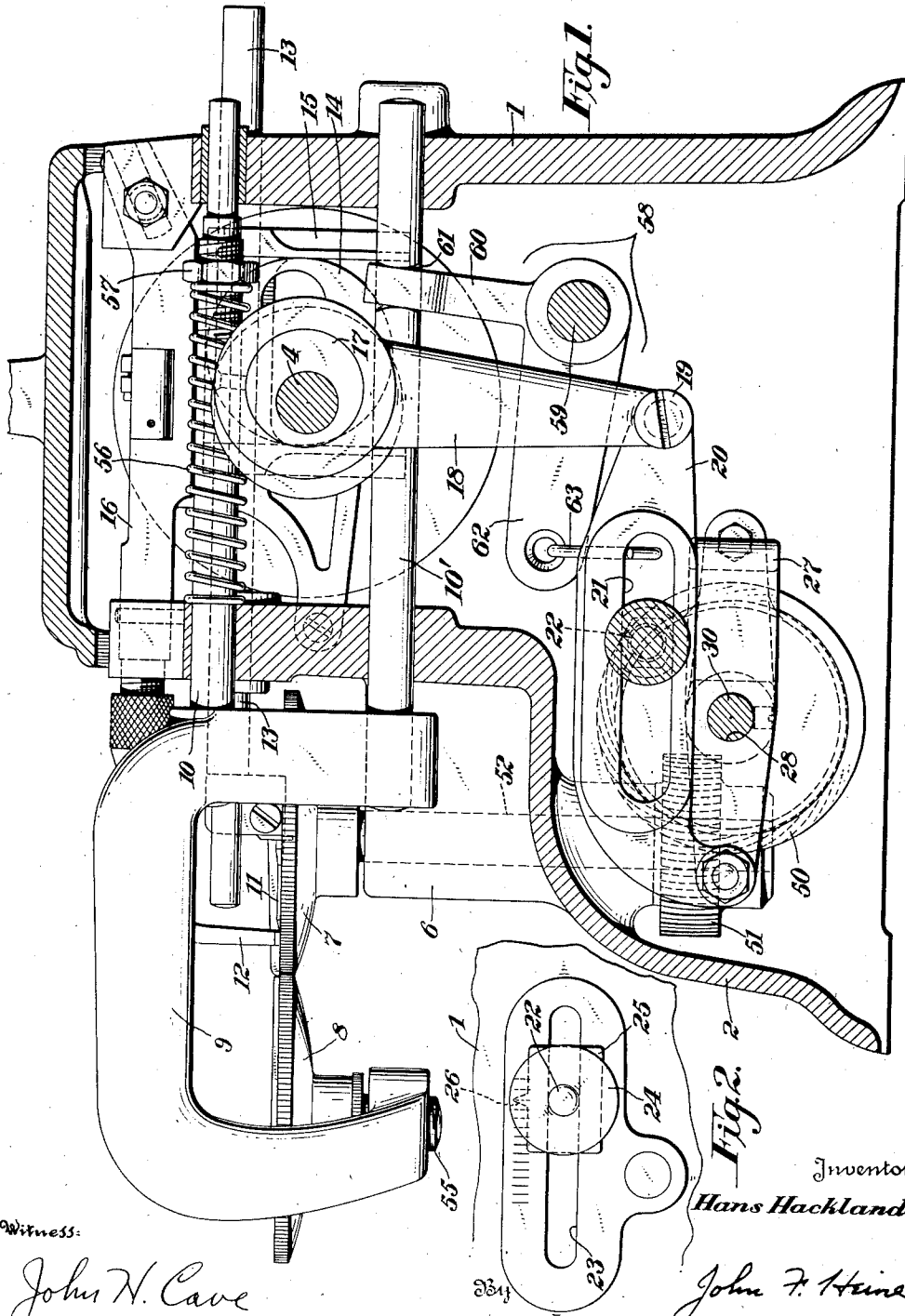
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2,284,471

FEEDING MECHANISM FOR SEWING MACHINES

Filed Nov. 19, 1940

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

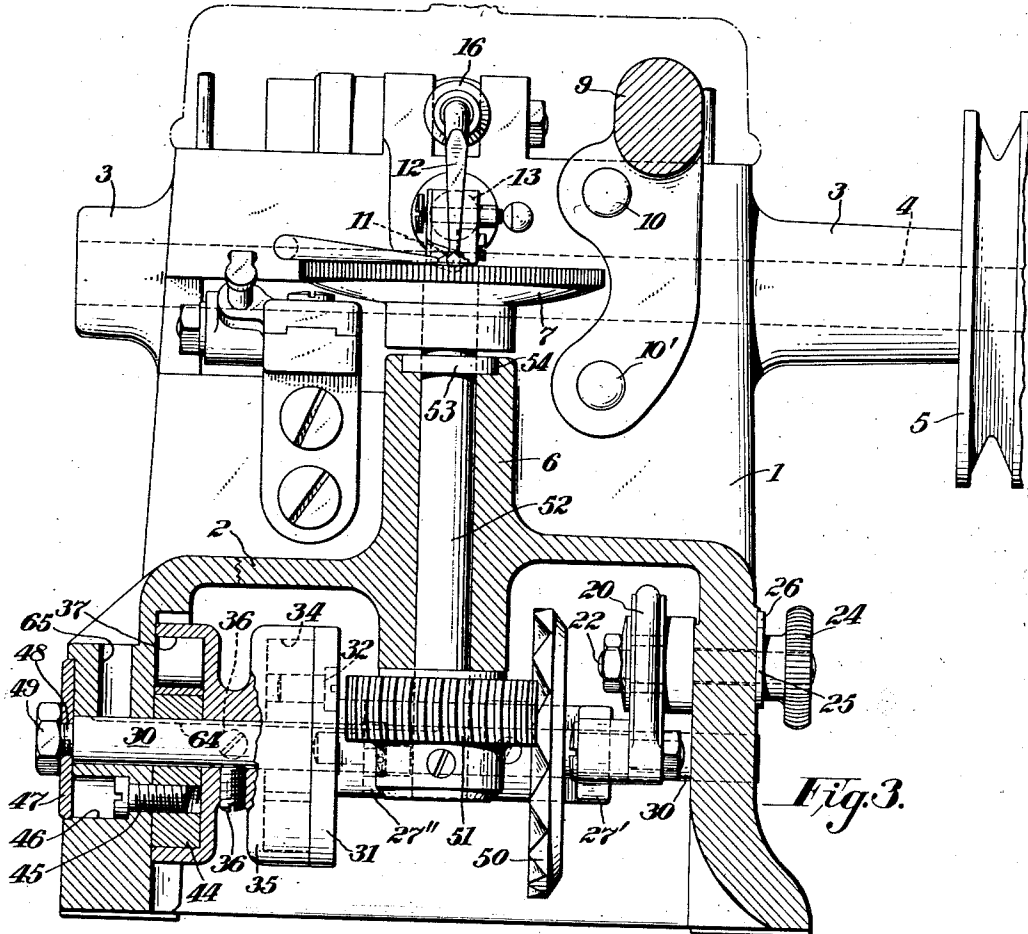


Fig. 3.

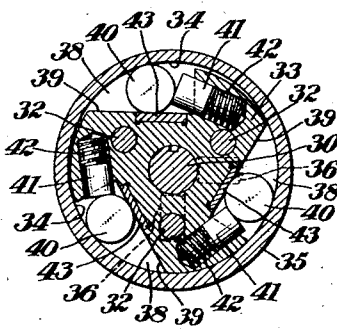


Fig. 4.

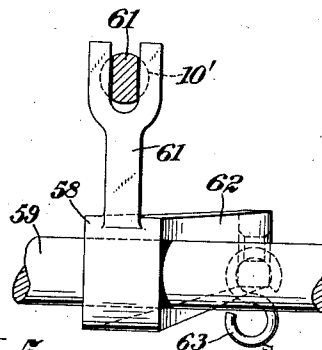


Fig. 5.

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3 Sheets-Sheet 3

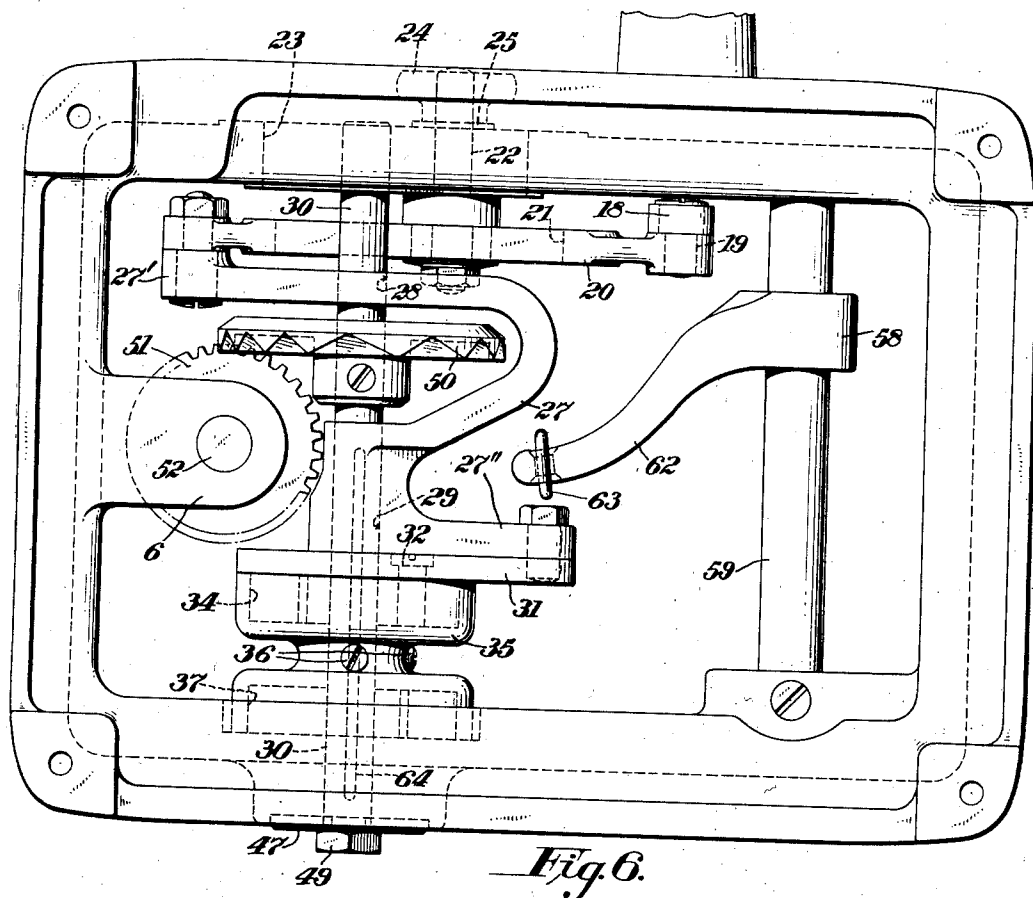


Fig. 6.

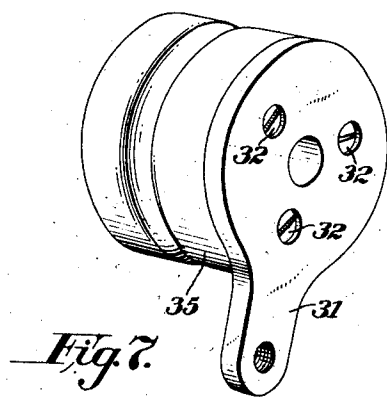


Fig. 7.

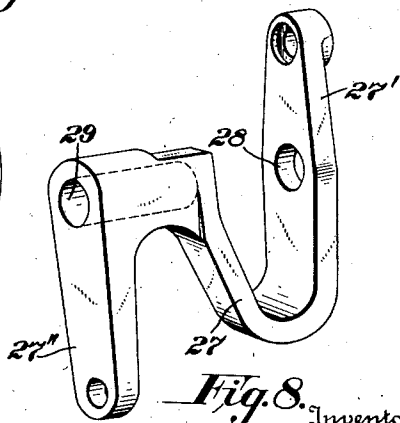


Fig. 8.

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UNITED STATES PATENT OFFICE

2,284,471

FEEDING MECHANISM FOR SEWING MACHINES

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Application November 19, 1940, Serial No. 366,224

12 Claims. (Cl. 112—18)

This invention relates to sewing machines of the "cup-feed" type and has to do more particularly with an improved high-speed actuating mechanism for rotating the feed-cup thereof.

The present invention has for its primary object the provision of an improved and novel feed-cup drive incorporating therein a ball or cylinder clutch capable of sustained high speeds of operation.

It is a further object of the present invention to provide an improved feed-cup drive which can be applied to conventional fur machines already on the market with only a small amount of alteration.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combination and arrangement of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings,

Fig. 1 is a vertical sectional view taken in a plane at right angles to the axis of the main-shaft, showing the essentials of the improved feed-cup driving mechanism.

Fig. 2 is a fragmentary elevational view of the feed-throw adjusting and locking screw.

Fig. 3 is a vertical sectional view taken through the forward portion of the machine-frame, showing the improved clutch partly in section and the actuating connections thereof in elevation.

Fig. 4 is a sectional view taken through one of the clutch-sections to illustrate the internal workings of the clutch.

Fig. 5 is a rear elevational view of the bell-crank lever employed for separating the presser-cup from the feed-cup, showing its connection with the lower guide-rod of the overhanging presser-cup supporting bracket.

Fig. 6 is a bottom plan view of the machine.

Fig. 7 is an enlarged perspective view of the clutch assembly and its operating arm.

Fig. 8 is an enlarged perspective view of the novel actuating lever used to operate the clutch.

Referring more in detail to the drawings, the machine illustrated is a modification of the machine forming the subject of the U. S. patent to R. L. Plumley, No. 897,486, dated Sep. 1, 1908, and comprises a frame including a rectangular standard 1 formed with a lateral extension 2. Journalled in bearings 3 in the standard 1 is a

transverse main-shaft 4 having fixed thereon a belt-pulley 5 and a plurality of actuating eccentrics for operating the stitch-forming mechanism and the feeding mechanism. Supported in a bearing boss 6 integral with the frame above the lateral extension 2 is a driven feed-cup 7 which has yieldingly cooperating therewith a presser-cup 8 carried on the bracket 9 supported by two vertically spaced parallel guide-rods 10 and 10' endwise slidably received in the front and rear walls of the standard 1.

The stitch-forming mechanism of the machine illustrated is of common construction and comprises a needle 11 and a complementary looper 12. The needle 11 is carried in the exposed end of a horizontal needle-bar 13 journaled in the front and rear walls of the standard 1 and endwise reciprocated by the eccentric 14 through the yoke 15. The looper 12 is carried by a loop-frame 16 actuated from the main-shaft 4 in a manner fully disclosed in the above mentioned Plumley patent.

Referring now to the novel feeding mechanism, it will be seen in Fig. 1 that the main-shaft 4 has secured thereto an actuating eccentric 17 embraced by the upper end of a pitman 18 connected at its lower end preferably by a shouldered screw 19 to the rearward end of an oscillatable lever 20 slotted horizontally as at 21 and fulcrumed upon a pivot-stud 22 which extends through said slot. The pivot-stud 22 is adapted to be adjusted endwise of the slot 21 and is formed with a threaded extension which passes through a slot 23 in the standard 1, (see Figs. 1 and 2), and may be clamped in any desired adjusted position lengthwise of the slot by the thumb-nut 24. Mounted on the extension of the pivot-stud 22 between the thumb-nut 24 and the wall of the machine-standard is a dished spring-plate 25 formed with a pointer 26 cooperating with indicia on the machine-standard, the dished spring-plate 25 serving as means for frictionally holding the thumb-nut 24 against accidental turning during the operation of the machine, and the pointer 26 and indicia providing means to facilitate obtaining the desired length of work-feeding stroke.

Connected to the depending forward end of the oscillatable lever 20 is one limb 27' of a substantially N-shaped lever 27 apertured as at 28 and 29 to provide spaced bearings receiving the transverse feed-actuating shaft 30 rotatably journaled at its opposite ends in the side walls of the lateral extension 2. The N-shaped lever 27 is freely fulcrumed on the transverse feed-ac-

tuating shaft 30 and it is adapted to be oscillated about the axis of the feed-actuating shaft 30 by the lever 20. The oscillations of the N-shaped lever 27 are transmitted through its other limb 27' to a clutch actuating-arm 31 (see Figs. 4 and 7) fastened by three screws 32 to a clutch-member 33 disposed within a cavity 34 formed in a clutch-housing 35. The clutch-housing is rigidly fastened upon the transverse feed-actuating shaft 30 by two set-screws 36 so that the intermittent rotary motion of the housing 35 imparted to the same through the clutch actuating-arm 31 and its connections may be transmitted directly to the feed-actuating shaft 30.

The unitary clutch-assembly embodied in the machine shown in the drawings is of the intermittent or one-way type and its details of construction are similar to those of the clutch disclosed in my copending application Serial No. 293,155, filed Sep. 2, 1939. Referring in a general way to the clutch assembly illustrated in Fig. 4 of the drawings, the housing 35 is formed with spaced circular chambers or cavities 34 and 37. Cavity 34 houses that part of the clutch which imparts to the feed-cup 7 its work-advancing movements, while cavity 37 houses that part of the clutch which retains or prevents retrograde movement of the feed-cup. As described hereinbefore, the actuating-arm 31 is rigidly fastened by the three screws 32 to the clutch-member 33 disposed within the cavity 34. The clutch-member is preferably formed with three suitable undercuts or recesses 38 providing inclined surfaces 39. Disposed in each of the recesses 38 is a short cylinder or roller 40 which is engaged by a plunger 41 backed by a coil-spring 42, the plunger 41 acting to yieldingly bias the roller 40 toward the narrow end of the recess and wedge the same between the clutch-member 33 and the periphery of the cavity 34. In order to increase the life of the clutch, each inclined surface 39 is fitted with a hardened steel wear-plate 43. To distribute the wear of the rollers 40 across a substantial area of the hardened steel wear-plates 43 the center of the cavity 34 is slightly eccentric to the longitudinal axis of the feed-actuating shaft 30. This slight eccentricity is clearly shown in Fig. 4, wherein at the bottom of the cavity 34 the periphery of the clutch-member 33 is shown to be substantially in contact with the outer wall of the cavity 34, while at the top of the cavity the periphery of the clutch-member is spaced from said outer wall. This slight eccentricity between the cavity 34 and the clutch-member 33 permits the rollers 40 to travel in and out of the recesses 38, and in different relative positions of the clutch-member and the housing 35 the rollers have line-contact with the surfaces of the wear-plates at different points lengthwise of the latter.

It will be understood that the portion of the clutch which acts as a retainer and prevents retrograde movement of the feed-cup 7 is housed in the cavity 37, and that the elements comprising this portion of the clutch-assembly are duplicates of the work-advancing portion of the clutch-assembly above described and therefore need no further description. It will be understood, of course, that in this portion of the clutch-assembly the clutch-member 44 (see Fig. 3) is, in effect, a locking member and is rigidly fastened preferably to the wall of the machine-frame by a plurality of screws 45 disposed in countersunk holes 46 in the machine-frame and threaded into the locking member 44. The

countersunk holes 46, at their outer ends, are adapted to be closed by a circular plate 47 mounted upon the reduced end-portion 48 of the feed-actuating shaft 30 and clamped to rotate therewith by a nut 49 threaded upon said reduced end-portion. In operation, as the N-shaped lever 27 is oscillated on the actuating shaft 30, the work-advancing portion of the clutch assembly functions to intermittently turn the feed-cup 7 in a direction to advance the work past the stitching mechanism, while the remaining portion of the clutch assembly functions to prevent retrograde motion of the feed-cup 7.

Fixed upon the transverse feed-actuating shaft 30 and straddled by the main body of the N-shaped lever 27 and its limb 27' is a suitably formed gear-wheel 50 meshing with a second gear 51 fixed upon the lower end of a vertical feed-cup supporting shaft 52 journaled in the bearing boss 6 of the machine frame. At its upper end the vertical shaft 52 has secured thereon the feed-cup 7. Integral with the vertical shaft 52 beneath the feed-cup 7 is a flange 53 (see Fig. 3) which is disposed in a circular recess 54 formed in the top of the bearing boss 6. The flange 53 acts with the upper face of the hub of gear 51 to engage between them the opposite ends of the bearing boss 6 and thereby confine the vertical shaft 52 against endwise movement. With the shaft 52 so confined the feed-cup 7 may be adjusted vertically up and down without the necessity of disturbing the gear 51.

Cooperating with the feed-cup 7 is the presser-cup 8 freely journaled upon a pivot-stud 55 clamped in the free end of the overhanging bracket 9. The bracket 9 is supported by the two horizontal, parallel guide-rods 10 and 10'. The presser-cup 8 is adapted to be yieldingly biased toward the feed-cup 7 and to this end the guide-rod 10 supports a coil-spring 56 one end of which bears against the inner face of the front wall of the standard 1, while the other end acts against a regulating nut 57 threaded upon the guide-rod 10. The regulating nut 57 is provided so that the force exerted by the spring 56 can be adjusted to the required amount.

To facilitate the introduction and removal of the work from between the feed-cup 7 and presser-cup 8, treadle or knee-shift controlled means is provided for shifting the presser-cup 8 away from the feed-cup 7. This means is best shown in Figs. 1 and 6, and comprises a bell-crank lever 58 pivoted upon a stationary fulcrum-rod 59 fixed in the side walls of the machine-standard 1. The bell-crank lever 58 is formed with a vertically disposed limb 60 forked at its upper end to straddle the reduced portion 61 of the guide-rod 10', and with a substantially horizontal limb 62 apertured at its free end to receive the connection 63 from the usual treadle or knee-shift (not shown). In Fig. 6 it will be seen that the free end of the horizontal limb 62 of the bell-crank 58 is offset so that the connection 63 from the treadle or knee-shift will not interfere with the operating elements of the feeding mechanism.

To provide for lubricating the internal workings of the clutch-assembly and the longer of the two bearings of the N-shaped lever 27, the feed-actuating shaft 30 is formed with a longitudinal groove 64 which, at its outer end, registers with the lower end of a vertical oil-hole 65 in the wall of the lateral extension 2, as shown in Fig. 3. Periodically oil is introduced into the

oil-hole 65 from which it is conducted by the groove 64 to the interior of the clutch-assembly and the bearing 29.

From the above description, it will be understood that the present invention contemplates an improved feeding mechanism for a cup-feed sewing machine, which feeding mechanism has incorporated in it elements designed and apportioned to be successfully operated at high speed without excessive vibration and without variation in the length of the stitches.

It will be obvious that the present invention is susceptible of some change and modification without departing from the spirit thereof and for this reason I do not wish to be understood as limiting the invention to the precise arrangement and formation of the several parts herein shown and described except as hereinafter claimed.

Having thus set forth the nature of the invention what I claim herein is:

1. In a sewing machine having a frame, stitch-forming mechanism, and cooperating feed-cups exteriorly of said frame for sustaining and feeding fabric sections; a main-shaft; a feed-actuating shaft having a gear-wheel mounted thereon; a shaft carrying one of said feed-cups and a gear in mesh with said gear-wheel; a clutch-assembly located on one side of said gear-wheel for imparting operative movements to said feed-actuating shaft, said clutch-assembly comprising a unit including a work-advancing section and an adjacently positioned retainer section; and connections disposed on the other side of said gear-wheel and operated by said main-shaft for actuating said clutch-assembly, thereby to impart feed-advance movements to said feed-cup.

2. A sewing machine having, in combination, a frame including a standard and a lateral extension; stitch-forming devices including a needle carried by a reciprocatory needle-bar; cooperating feed-cups for sustaining and feeding fabric sections past said stitch-forming devices; a shaft supported in said extension and carrying one of said feed-cups; a main-shaft journaled in said frame; a feed-actuating shaft also journaled in said frame and having a gear-wheel fixed thereon, a gear on said feed-cup supporting shaft in mesh with the gear-wheel on said feed-actuating shaft; a clutch-assembly also mounted on said feed-actuating shaft entirely to one side of said gear-wheel, said clutch-assembly comprising a unit including a work-advancing section and an adjacently positioned retainer section; and connections disposed on the other side of said gear-wheel and operated by said main-shaft for actuating said clutch-assembly to impart intermittent feed-advance movements to said feed-cup.

3. A sewing machine having, in combination, a frame including a standard and a lateral extension; a main-shaft journaled in said frame; stitch-forming mechanism including a needle and a complemental loop-taker; cooperating feed-cups for sustaining and feeding fabric sections past said stitch-forming devices; a shaft rotatably mounted in said extension and having fixed thereon one of said feed-cups and a gear; a feed-actuating shaft rotatably journaled in said frame and having mounted thereon a clutch-assembly and a gear-wheel in mesh with the gear on said shaft supporting said feed-cup; a lever fulcrumed on said feed-actuating shaft and having oppositely directed limbs of which one is connected directly to said clutch-assembly; and means connecting the other limb of said lever to be oper-

ated by said main-shaft, thereby to impart feed-advance movements to said feed-cup.

4. A sewing machine having, in combination, a frame including a standard and a lateral extension; stitch-forming devices including a needle and a complemental loop-taker, cooperating feed-cups for sustaining and feeding fabric sections past said stitch-forming devices; a shaft rotatably mounted in said extension and carrying one of said feed-cups and having a gear fastened thereto; a main-shaft journaled in said frame; a feed-actuating shaft also journaled in said frame and having a gear-wheel fixed thereon in mesh with the gear on said feed-cup supporting shaft; a clutch-assembly also mounted on said feed-actuating shaft entirely to one side of said gear-wheel; a lever fulcrumed upon said feed-actuating shaft and having oppositely directed limbs, one of which is connected to said clutch-assembly and the other of which straddles said gear-wheel; and means operatively connecting said lever to said main-shaft.

5. In a sewing machine having a frame, stitch-forming mechanism, and cooperating feed-cups exteriorly of said frame for sustaining and feeding fabric sections; a feed-actuating shaft journaled in said frame; a feed-cup supporting shaft rotatably mounted in said frame and arranged substantially normal to said feed-actuating shaft, said feed-cup supporting shaft having a gear fixed on its lower end; a gear-wheel mounted on said feed-actuating shaft to one side of the feed-cup supporting shaft and in mesh with the gear on said feed-cup supporting shaft; a clutch-assembly mounted on said feed-actuating shaft on the other side of said feed-cup supporting shaft; and means for actuating said clutch for imparting intermittent movement to said feed-actuating shaft.

6. In a sewing machine having a frame, a main-shaft journaled therein, stitch-forming mechanism and cooperating feed-cups exteriorly of said frame for sustaining and feeding fabric sections; a feed-actuating shaft journaled in said frame; a feed-cup supporting shaft rotatably mounted in said frame and arranged substantially normal to said feed-actuating shaft; a gear fixed on said feed-cup supporting shaft; a gear-wheel mounted on said feed-actuating shaft to one side of the feed-cup supporting shaft and in mesh with the gear on said feed-cup supporting shaft; a clutch-assembly mounted on said feed-actuating shaft on the other side of said feed-cup supporting shaft; a lever fulcrumed on said feed-actuating shaft and having oppositely directed limbs of which one is connected to said clutch-assembly; and means connecting the other limb of said lever to said main-shaft for actuation thereby.

7. In a sewing machine having a frame, a main-shaft journaled therein, stitch-forming mechanism and cooperating feed-cups exteriorly of said frame for sustaining and feeding fabric sections; a feed-actuating shaft journaled in said frame; a feed-cup supporting shaft rotatably mounted in said frame and arranged substantially normal to said feed-actuating shaft; a gear fixed on said feed-cup supporting shaft; a gear-wheel mounted on said feed-actuating shaft to one side of the feed-cup supporting shaft and in mesh with the gear on said feed-cup supporting shaft; a clutch-assembly mounted on said feed-actuating shaft on the other side of said feed-cup supporting shaft; a lever fulcrumed on said feed-actuating shaft at opposite sides of said

gear-wheel and having oppositely directed limbs of which one is connected directly to said clutch-assembly; and means connecting the other limb of said lever to said main-shaft for actuation thereby.

8. In a sewing machine having a frame, a main-shaft journaled therein, stitch-forming mechanism and cooperating feed-cups exteriorly of said frame for sustaining and feeding fabric sections; a feed-actuating shaft journaled in said frame; a feed-cup supporting shaft rotatably mounted in said frame and arranged substantially normal to said feed-actuating shaft; a gear fixed on said feed-cup supporting shaft; a gear-wheel mounted on said feed-actuating shaft to one side of the feed-cup supporting shaft and in mesh with the gear on said feed-cup supporting shaft; a clutch-assembly mounted on said feed-actuating shaft on the other side of said feed-cup supporting shaft and having an operating arm; a lever fulcrumed on said feed-actuating shaft at opposite sides of said gear-wheel and having oppositely directed limbs of which one is connected to the operating arm of said clutch-assembly; and means connecting the other limb of said lever to said main-shaft for actuation thereby, said last named means adapted to be adjusted for effecting a change in the work-advancing stroke of said feed-cups.

9. A sewing machine having, in combination, a frame including a standard and a lateral extension; a main-shaft journaled in said frame; stitch-forming mechanism; cooperating feed-cups exteriorly of said frame for sustaining and feeding fabric sections; a feed-actuating shaft; a feed-cup supporting shaft rotatably mounted in said lateral extension and arranged substantially normal to said feed-actuating shaft; a gear fixed on said feed-cup supporting shaft; a gear-wheel mounted on said feed-actuating shaft to one side of the feed-cup supporting shaft and in mesh with the gear on said feed-cup supporting shaft; a unitary clutch-assembly mounted on said feed-actuating shaft on the other side of said feed-cup supporting shaft, said clutch-assembly comprising a retainer section of which the locking member is secured to the machine-frame and a work-advancing section fitted with an operating arm; a lever fulcrumed on said feed-actuating shaft and having oppositely directed limbs of which one is connected to said clutch operating arm; and means connecting the other limb of said lever to said main-shaft for actuation thereby.

10. In a sewing machine having a frame, stitch-

forming mechanism, and cooperating feed-cups exteriorly of said frame for supporting and feeding fabric sections; a main-shaft; a feed-actuating shaft having a gear-wheel mounted thereon; a feed-cup supporting shaft journaled in said frame and having fixed thereon a gear in mesh with the gear-wheel on said feed-actuating shaft; a clutch-assembly mounted on said feed-actuating shaft for imparting intermittent movements to the same; a substantially N-shaped lever fulcrumed intermediate the extremities of its limbs on said feed-actuating shaft and operatively connected to said clutch-assembly, and means connecting the N-shaped lever to said main-shaft for actuation thereby.

11. In a sewing machine having a frame, stitch-forming mechanism, and cooperating feed-cups exteriorly of said frame for supporting and feeding fabric sections; a main-shaft; a feed-actuating shaft disposed substantially parallel to said main-shaft and having a gear-wheel secured thereon; a feed-cup supporting shaft rotatably mounted in said frame and arranged substantially normal to said feed-actuating shaft; a gear fixed on said feed-cup supporting shaft and adapted to mesh with the gear-wheel on said feed-actuating shaft; a clutch-assembly mounted on said feed-actuating shaft for transmitting intermittent motion to the same; a horizontal substantially N-shaped lever fulcrumed intermediate the extremities of its limbs on said feed-actuating shaft and operatively connected to said clutch-assembly; and means connecting the N-shaped lever to said main-shaft for actuation thereby.

12. In a sewing machine having a frame, stitch-forming mechanism, and cooperating feed-cups exteriorly of said frame for sustaining and feeding fabric sections; a main-shaft; a feed-actuating shaft having a gear-wheel mounted thereon; a shaft carrying one of said feed-cups and a gear in mesh with said gear-wheel; a clutch-assembly mounted on the feed-actuating shaft on one side of said gear-wheel for imparting operative movements to said shaft, said clutch-assembly comprising a unit including juxtapositioned work-advancing and retainer sections of which the latter is secured to said frame; and connections disposed on the other side of said gear-wheel and operated by said main-shaft for actuating the work-advancing section of said clutch-assembly, thereby to impart feed-advance movements to the feed-cup.

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