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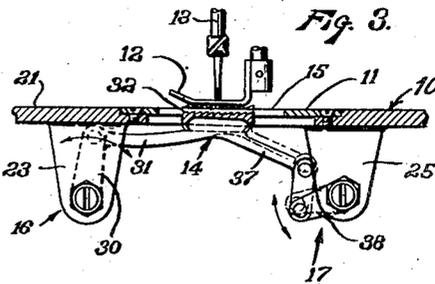
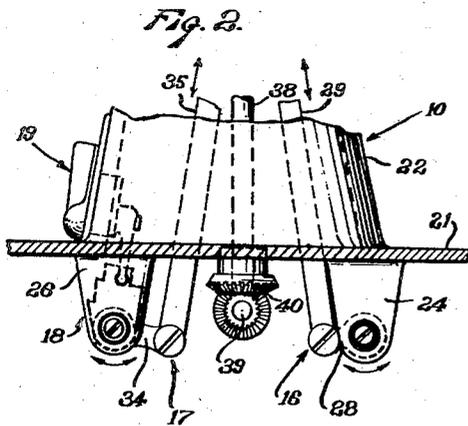
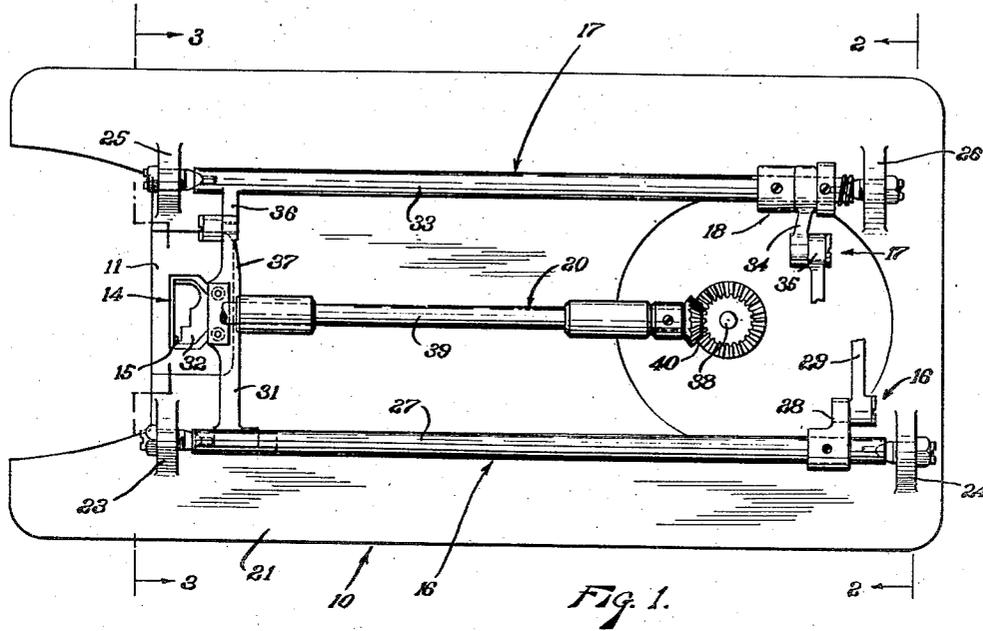
G. R. WAINWRIGHT

2,440,031

DROP FEED MECHANISM FOR SEWING MACHINES

Filed Sept. 15, 1945

2 Sheets-Sheet 1



INVENTOR.  
GEORGE R. WAINWRIGHT  
BY *W. H. Cleaveland*  
ATTORNEY

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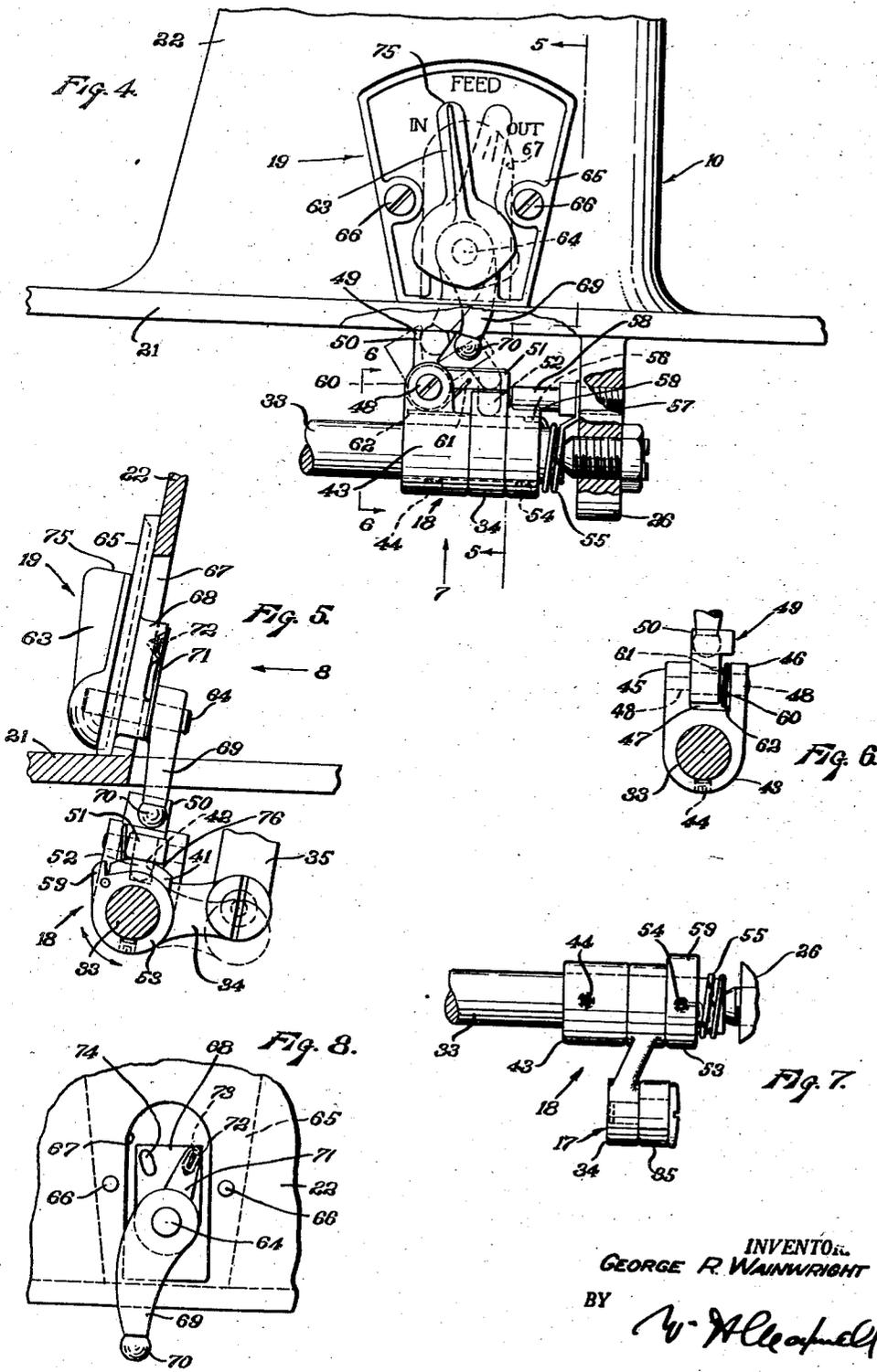
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DROP FEED MECHANISM FOR SEWING MACHINES

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2 Sheets-Sheet 2



INVENTOR  
GEORGE R. WAINWRIGHT

BY *W. H. Alford*  
ATTORNEY

# UNITED STATES PATENT OFFICE

2,440,031

## DROP FEED MECHANISM FOR SEWING MACHINES

George R. Wainwright, Glendale, Calif., assignor,  
by mesne assignments, to William H. Maxwell,  
Los Angeles, Calif.

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9 Claims. (Cl. 112—203)

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This invention relates to sewing machines and relates more particularly to a drop feed mechanism for sewing machines. An object of my invention is to provide simple, practical and efficient means for quickly and easily disengaging the feed dog of a sewing machine for the purpose of affording manual control of the material being stitched by the machine.

When sewing the seams of a garment or the like, greater seam strength is obtained if the end of the seam is stitched over several times. Since the feed dog of the conventional sewing machine, in association with the presser foot, always feeds or drives the material being sewn in one direction, a restitching operation is rendered cumbersome, inconvenient and time consuming. Heretofore, it was necessary to lift the sewing machine head to obtain access to the machine mechanism which operated the feed in order to disconnect the same before a restitching operation could be accomplished. Lifting the machine head for this purpose is not only time consuming but frequently causes needle breakage and disturbs the arrangement and disposition of the material being stitched.

Another object of my invention is to provide a drop feed mechanism for sewing machines which can be operated without lifting or otherwise disturbing the head of the machine.

Another object of my invention is to provide means for uncoupling or disconnecting the feed dog operating mechanism of a sewing machine by means of a control carried on the outside of the sewing machine head.

Another object of my invention is to provide a simple finger tip control carried on the outside of a sewing machine head for quickly and easily controlling the feed and non-feed condition of a sewing machine feed dog.

A further object of my invention is to provide simple, efficient and positive means for effecting coupling or uncoupling of the feed dog operating mechanism of a sewing machine, which means can be readily incorporated or embodied in existing sewing machines.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a bottom plan view illustrating the general arrangement of parts of a sewing machine head embodying my invention;

Fig. 2 is a cross-sectional view thereof taken

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substantially as indicated by line 2—2 on Fig. 1;

Fig. 3 is a vertical sectional view taken substantially as indicated by line 3—3 on Fig. 1 showing the relationship of the feed dog to the pressure foot.

Fig. 4 is an enlarged fragmentary detail side view, partly in section, of a drop feed mechanism embodying my invention;

Fig. 5 is a fragmentary detail vertical cross-sectional view taken in the direction of line 5—5 on Fig. 4, certain parts being shown in section while others are shown in elevation to illustrate the relationship of parts;

Fig. 6 is a view taken on the line 6—6 of Fig. 4;

Fig. 7 is a fragmentary detail view as seen in the direction of the arrow 7 of Fig. 4; and

Fig. 8 is a fragmentary view as seen in the direction of the arrow 8 of Fig. 5.

In the drawings I have illustrated a preferred embodiment of my invention as applied to a typical sewing machine. I wish it to be understood, however, that the particular design of drop feed mechanism which I show can be varied in many ways within the broad concepts of my invention and that said mechanism can be applied to various types of sewing machines.

In the embodiment of the invention which is illustrated, the drop feed mechanism may be said to comprise a sewing machine head 10 having a typical throat plate 11, presser foot 12 and reciprocating needle bar 13. A feed dog 14 operates through an opening 15 in the throat plate 11 and cooperates with the presser foot 12 to feed material in intermittent synchronous relation to the movement of the needle bar 13. A mechanism 16, of generally conventional form, imparts horizontal or feed movement to the feed dog 14 and a mechanism 17, also of conventional form, imparts vertical movement to the feed dog 14 synchronously with the horizontal movement of said feed dog whereby said feed dog has a gyrating movement to intermittently feed material being stitched. A means 18 is provided for uncoupling or disconnecting the mechanism 17 to stop the vertical movement of the feed dog 14 and to retain the latter in depressed or lowered position with respect to the throat plate 11 and a means 19 is carried on the outside of the head 10 for operating the means 18. The machine also includes various other details, parts and means such as a shuttle operating mechanism 20, etc.

The sewing machine head 10 is of conventional form and comprises a bed plate 21, a hollow column 22 for the arm of the machine, and

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integrally formed depending brackets 23, 24, 25 and 26. The brackets 23 and 24 are arranged as an aligned pair of supports for the horizontal feed rock-shaft 27 of the mechanism 16 which shaft carries a lever arm 28, connected to a link 29 which is reciprocated in the usual manner by the arm rock-shaft (not shown). The reciprocating movement of the link 29 imparts oscillating motion to the rock-shaft 27 which, in turn, oscillates a lever-arm 30 connected to an extension 31 of the toothed feed plate 32 of the feed dog 14. The lever arm 30 projects upwardly from shaft 27 and operates laterally or from side-to-side to cause the toothed feed plate 32 to reciprocate in a substantially horizontal path.

The brackets 25 and 26 are arranged as an aligned pair of supports for the vertical feed rock-shaft 33 of the mechanism 17 which carries a lever arm 34 connected to a link 35 which is also reciprocated in the usual manner by the arm rock-shaft. The reciprocating movement of the link 35 imparts oscillating motion to the rock-shaft 33 which, in turn, oscillates a lever arm 36 connected to an extension 37 of the toothed feed plate 32 of the feed dog 14. The lever arm 36 projects from one side of shaft 33 and operates in a vertical arc to cause the toothed plate 32 to reciprocate in a substantially vertical path.

The mechanisms 16 and 17 above described are of conventional design and arrangement and may be varied as can be well understood. According to my invention, any mechanism for suitably moving the feed dog 10 in a gyrating path, moving to feed in its high or elevated position and recovering or retracting or lowered position, may be employed.

The shuttle or bobbin operating mechanism 20 is also of conventional form comprising a vertical oscillating shaft 38 extending downwardly in the column 22, a horizontal oscillating shaft 39, bevel gears 40 effecting a drive from the shaft 38 to the shaft 39, and a shuttle or bobbin-cage (not shown) carried by the shaft 39 and associated and synchronized with the movement of the needle bar 13 and the feed dog 14.

By means of the mechanism above set forth, the machine may perform a sewing operation upon material clamped between the throat-plate 11 and the presser foot 12, the feed dog 14 intermittently feeding said material synchronously with the movement of the needle bar 13. It will be seen that the material is under the control of the feed dog and is slid thereby past the smooth under surface of the presser foot.

I have provided the means 18 and 19 for quickly and easily uncoupling or disconnecting the rock-shaft 33 from the lever-arm 34 so that the continued movement of the link 35, as the sewing machine continues to operate, will not raise the feed dog 14 into material feeding position but said feed dog will continue to reciprocate in a depressed non-feeding position as driven by the mechanism 16.

I provide the lever arm 34, which is mounted for free rotation on the rock-shaft 33, with an upper extension 41 having an upwardly directed transverse notch 42. Alongside the lever arm 34 and on shaft 33, I provide a driving yoke 43. The yoke is fixed on shaft 33 by a set screw 44 to rock with the rock-shaft 33. Said driving yoke 43 is formed with upwardly extending ears 45 and 46, defining a transverse seat 47, and having aligned holes carrying a pivot pin 48. In the

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seat 47 and on the pin 48 I mount a latch lever 49 having a substantially normally vertical arm 50 and a normally horizontal arm 51 in overstanding relation to the notch 42. Arm 51 has a downwardly directed pin 52 engaged in the notch 42. It will be apparent that, with the pin 52 in the notch 42, the reciprocating movement of the link 35 will oscillate the rock-shaft 33 to raise and lower the feed dog 14. It will also be apparent from the dot-dash line position of the latch lever 49, in which position the pin 52 is withdrawn from the notch 42, that the driving yoke 43 will be uncoupled from the lever-arm 34 and that continued reciprocation of the link 35 will only oscillate the freely mounted lever arm 34 and will not rock the rock-shaft 33.

Upon the above-mentioned uncoupling of the lever arm 34 and the drive yoke 43, I desire that the feed dog 14 assume and keep a depressed position with respect to the throat plate 11 so as not to engage the material being sewn. For this purpose I provide a stop arm 53 fixed by a set screw 54 to the rock-shaft 33 and on the opposite side of the lever-arm 34 from the driving yoke 43. I also provide a coiled twist spring 55 around the rock-shaft 33, said spring having one end 56 connected to the stop arm 53 and the other end 57 anchored to a stop pin 58 carried by the bracket 26 and extending laterally for abutting or stopping engagement with a lug 59 formed on the stop arm 53. When the latch 49 is tilted to uncouple the lever arm 34 and the driving yoke, the spring 55 becomes effective to bring the lug 59 into abutment with the stop pin 58. In this position of the rock-shaft 33 the lever arm 36 assumes a depressed or low position to hold the feed dog 14 depressed with a resultant non-feeding relation with the material being sewn. Although the lever arm 34 continues to oscillate, the sewing machine feed is dropped and remains dropped until the lever arm 34 and the drive yoke 43 are recoupled. During the time the lever arm 34 and drive yoke 43 are uncoupled the machine operator is enabled to manually move the material being sewn backward and forward under the presser foot 12 to restitch the seam to strengthen the same, as before indicated.

I have shown the means 19 for operating the latch 49 as functioning to positively withdraw the latch from coupling position and to permit said latch to resume coupling position automatically. Accordingly, I provide a coil spring 60 around the pivot pin 48 of the latch 49 and I anchor one end 61 of said spring to the latch and rest the other end 62 on the bottom of the seat 47 of the driving yoke 43. By means of this spring arrangement, the latch at all times seeks a coupling position with the lever arm 34.

The means 19 which I have provided, comprises a manually operable outer handle 63, carried on a pivot shaft 64, mounted in an escutcheon plate 65 which is secured to the column 22 as by screws 66. An over-size registering opening 67 is provided in the column 22 to accommodate a rearwardly directed boss 68 of the escutcheon plate 65, said boss affording a suitable bearing for the shaft 64 which also carries a control arm 69 disposed within the column 22. The arm 69 has an end 70 which is preferably spherical and which is directed toward and engageable with the arms 50 and 51 of the latch 49. I provide means for maintaining the handle 63 and lever 69 in set position. Said means is shown as comprising a leaf spring 71 carried by the shaft 64 or the lever 69, and having a detent 72 for

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selective engagement in detent seats 73 and 74 in the rear face of the boss 68. On the outer face of the escutcheon 65 and in relation to the detent seats 73 and 74, I provide suitable indicia comprising the words "IN" and "OUT" and readable in connection with an index portion 75 of the handle 63.

In the drawings and particularly in Fig. 4, I have shown the machine in normal operating condition with the feed in, with the detent 72 in the detent seat 73 and the handle index 75 indicating this "feed in" condition of the machine. When the operator desires to throw out or drop the feed, he merely flips the handle 63 so the index 75 points to the word "Out" on the escutcheon and the detent 72 finds the detent recess 74. This movement of the handle 63 will tilt the latch 49 against the action of the spring 60 to withdraw the pin 58 from the notch 42. The rock-shaft 33, now being freed from oscillation by the link 35, is rocked by the spring 55 to bring the lever arm 36 to a low position as determined by the stop pin 53 and its engaging lug 57. The lever arm 36, in its low position, holds the feed dog 14 depressed out of engagement with the material being sewn. The detent 72 will retain the parts in this condition until it is desired to throw the feed in again. By flipping the handle 63 back to its original position pointing to the word "In," the latch 49 is freed so that its spring 60 becomes effective to urge the pin 52 into coupling engagement in the notch 42. Since the lever arm 34 is in continuous oscillation, whether the feed is in or out, the latch pin 52 may seek the notch 42 when out of registry. In this case, the pin will come to rest momentarily upon the upper curved edge 76 of the extension 41 and as registry between the notch and pin is obtained, the latter will slip nicely into place. Also, since it is desired to operate the drop feed mechanism during any portion of the cycle of operation of the sewing machine, the latch arm 50 is made sufficiently wide to at all times be engageable by the control lever end 70.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A drop feed mechanism for sewing machines or the like including, a feed dog, means including a rock-shaft and a notched lever-arm thereon for normally imparting vertical reciprocatory movement to said feed dog, means for separably coupling said rock-shaft and said lever-arm including a latch pivotally carried by said rock-shaft and having latching engagement with the notch of said lever-arm, means for manually operating said latter means, and means operable upon uncoupling of said rock-shaft and lever-arm for holding said feed dog in non-feeding position.

2. A drop feed mechanism for sewing machines or the like including, a feed dog, means including a rock-shaft and a lever-arm thereon for normally imparting vertical reciprocatory movement to said feed dog, means for separably coupling said rock-shaft and said lever-arm including a latch pivotally carried by said rock-shaft and having latching engagement with said lever-arm, means for manually operating said latch includ-

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ing a pivotally mounted handle accessible from the outside of said sewing machine and detent means for maintaining said latching means in selected operating position, and means operable upon uncoupling of said rock-shaft and lever-arm for holding said feed dog in non-feeding position.

3. A drop feed mechanism for sewing machines or the like including, a feed dog, means for moving said feed dog in normal operation and comprising mechanism for imparting reciprocating horizontal movement to the feed dog and mechanism for imparting synchronous reciprocating vertical movement to said feed dog, said latter means including a rock-shaft and a notched lever-arm freely mounted directly thereon, means for separably coupling said rock-shaft and said lever arm including a latch pivotally carried by said rock-shaft and having spaced arms one having latching engagement with the notch of said lever-arm, means for manually operating said latter means including a pivoted member having a handle accessible from the outside of said sewing machine and having a lever arm extending between the arms of the latch and detent means for maintaining said latch in selected operating position, and means operable upon uncoupling of said rock-shaft and lever-arm for maintaining said feed dog in depressed non-feeding condition during continued operation of the mechanism which imparts the horizontal movement to the feed dog.

4. A drop feed mechanism for sewing machines or the like including, a feed dog, means for moving said feed dog in normal operation and comprising mechanism for imparting reciprocating horizontal movement to the feed dog and mechanism for imparting synchronous reciprocating vertical movement to said feed dog, said latter means including a rock-shaft and a lever-arm surrounding and freely pivoted thereon, means for separably coupling said rock-shaft and said lever-arm including a latch pivotally carried by the shaft and engageable with the lever arm, means operable upon uncoupling of said rock-shaft and lever-arm for maintaining said feed dog in depressed non-feeding condition during continued operation of the mechanism which imparts the horizontal movement to the feed dog, and means normally yieldingly holding the latch in position to cooperatively engage the lever-arm, said latter means including a tension member normally urging the latch toward the lever arm.

5. In a sewing machine or the like, a feed dog, mechanism for imparting vertical reciprocating movement to said feed dog and including a rock-shaft connected with the feed dog and means for oscillating the rock-shaft including a lever-arm freely mounted on said rock-shaft, a latch carried by the rock-shaft, means normally engaging the latch and the lever-arm for the mentioned oscillation of the rock-shaft and comprising a tension member engaged with the latch, manual means for disengaging the latch and the lever-arm, and means operable upon said disengagement for positioning and maintaining the feed dog in non-feeding condition.

6. In a sewing machine or the like, a feed dog, mechanism for imparting vertical reciprocating movement to said feed dog and comprising a rock-shaft connected with the feed dog and means for oscillating the rock-shaft including a lever-arm freely mounted on said rock-shaft, a latch carried by the rock-shaft, means normally engaging the latch and the lever-arm for the

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mentioned oscillation of the rock-shaft, manual means for disengaging the latch and the lever-arm, and means operable upon said disengagement for positioning and maintaining the feed-dog in non-feeding condition, said latter means including an arm carried by the rock-shaft, an abutment engageable by the arm upon rotation of the rock-shaft in one direction, and a tension member around the rock-shaft and connected to the arm and to the abutment for rotating the rock-shaft to abut the arm and the abutment.

7. In a sewing machine or the like, a rock-shaft, a driven freely mounted lever-arm surrounding said rock-shaft and having a notch therein, means for separably coupling the rock-shaft and the lever-arm including a member fixed on the shaft adjacent the lever-arm and having a pair of spaced ears, a latch pivotally mounted between said ears and engageable with the notch, and tension means normally positioning the latch to engage the notch of the lever-arm.

8. In a sewing machine or the like, a rock-shaft, a driven freely mounted lever-arm on said rock-shaft and having a notch therein, means for separably coupling the rock-shaft and the lever-arm comprising a member adjacent the lever-arm, a pivoted latch carried by said member, tension means normally coupling the latch

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with the notch of the lever-arm, and manual means for tilting the latch against the force of the tension means to uncouple the latch and the notched lever-arm.

9. In a sewing machine and the like, a rock-shaft, a driven freely mounted lever-arm on said rock-shaft and having a notch therein, means for separably coupling the rock-shaft and the lever-arm comprising a member adjacent the lever-arm, a pivoted latch carried by said member, tension means normally coupling the latch with the notch of the lever-arm, manual means for tilting the latch against the force of the tension means to uncouple the latch and the notched lever-arm, and means operable upon uncoupling of the latch and lever-arm to maintain the rock-shaft stationary during continued driven movement of the lever-arm.

GEORGE R. WAINWRIGHT.

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