

Oct. 10, 1944.

E. SCHOLJ

2,360,075

SEWING MACHINE

Filed June 9, 1942

2 Sheets-Sheet 1

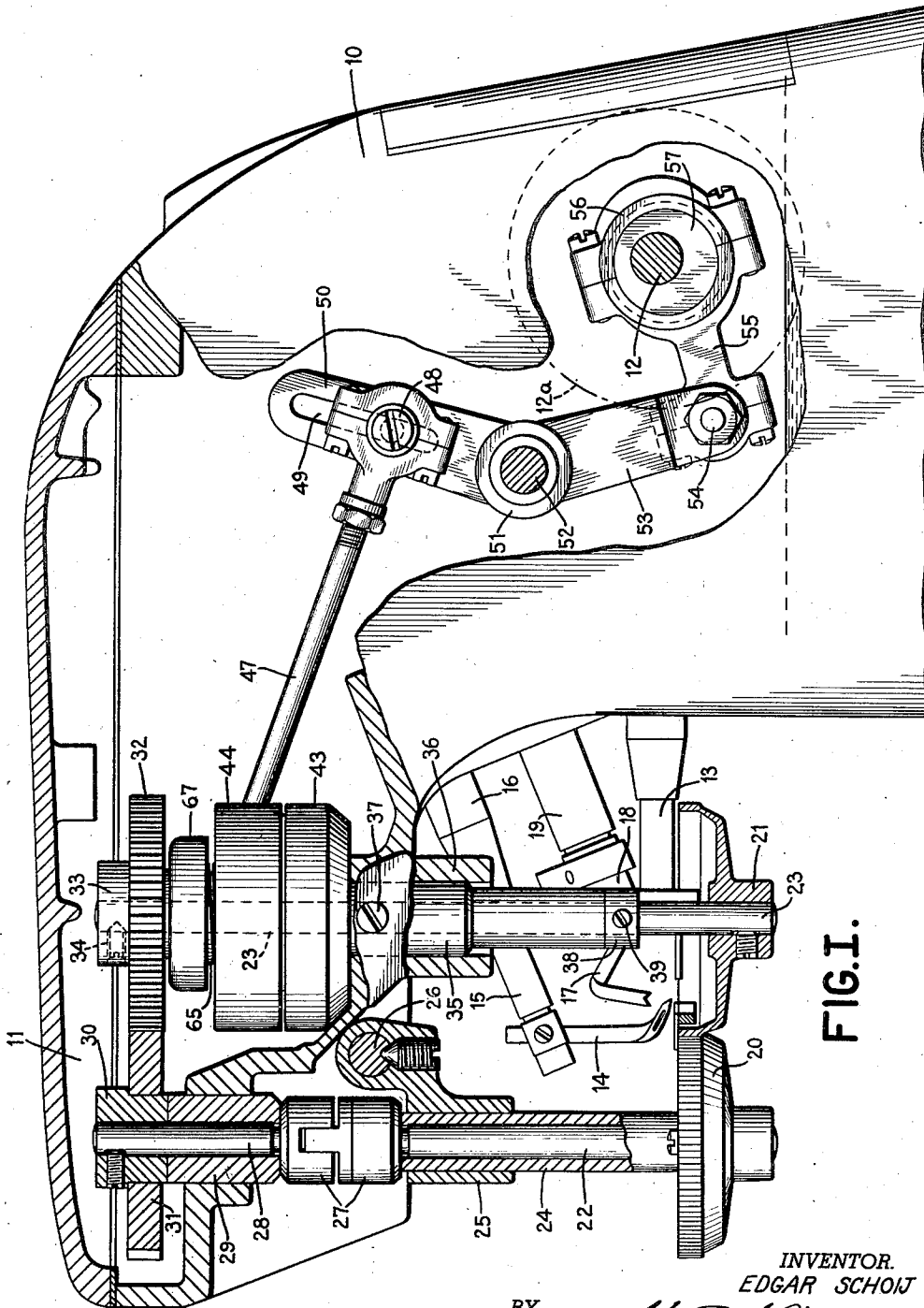


FIG. I.

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2 Sheets-Sheet 2

FIG. II.

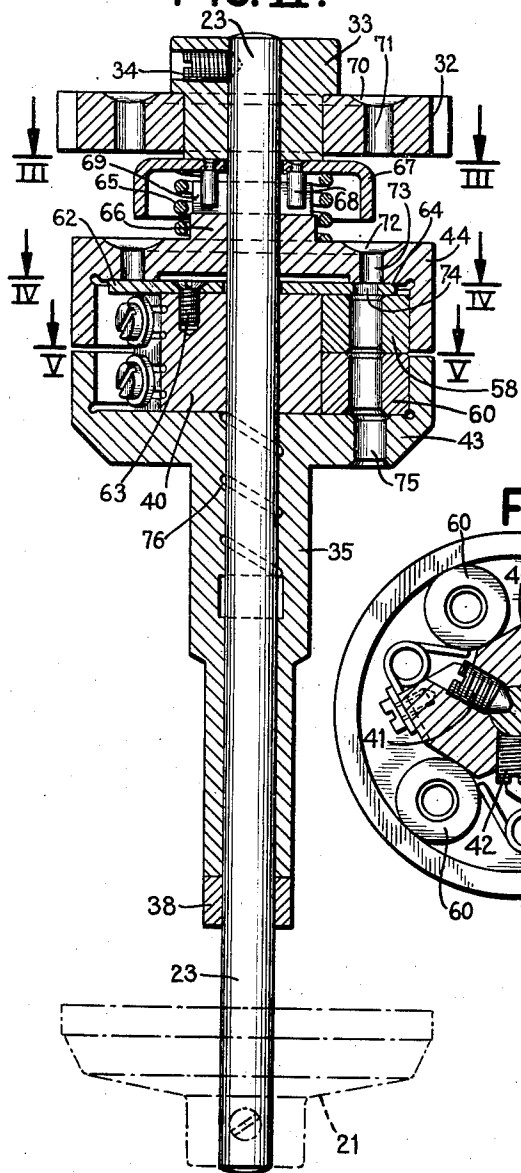


FIG. III.

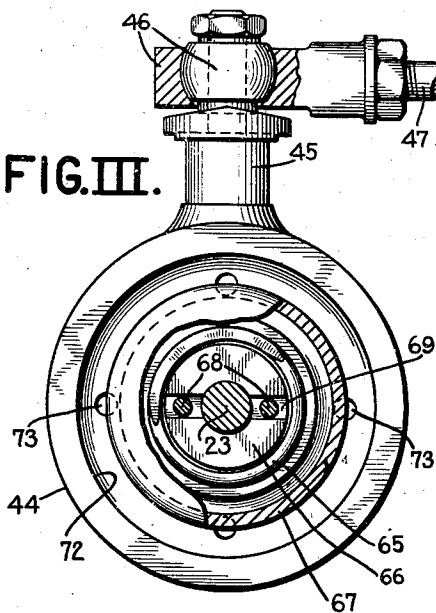


FIG. V.

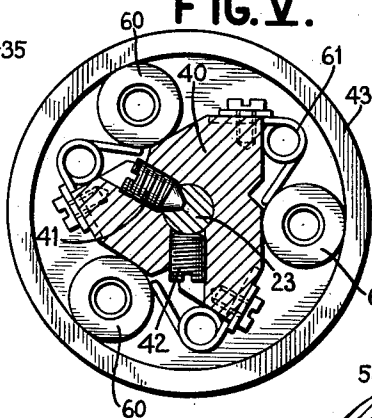
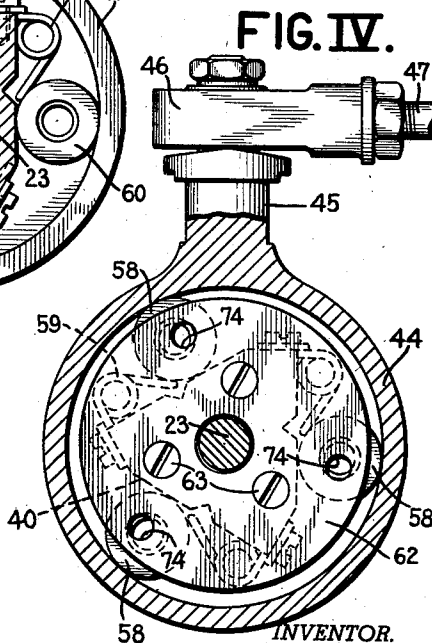


FIG. IV.



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UNITED STATES PATENT OFFICE

2,360,075

SEWING MACHINE

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Application June 9, 1942, Serial No. 446,323

19 Claims. (Cl. 192—12)

This invention relates to an improved sewing machine and more particularly a cup-feed sewing machine of the type commonly employed in seaming silk hosiery.

In a machine of the character indicated there is ordinarily provided a pair of feed cups adapted to support and advance the work in proper relation to the stitch forming devices. These feed cups are driven step by step through the conversion of the rotary movement of a cam or eccentric into an oscillatory motion, of small magnitude, imparted to a clutch member. The clutch is of the one-way drive type so that the oscillatory motion imparted to said member is transmitted in small unidirectional, intermittent increments to one or both of the feed cups. At the high speeds now attained in the operation of machines of this character it is extremely difficult to maintain uniformity of stitch length, particularly as the speed of the machine is varied during the formation of a seam. The parts of the clutch which receive the intermittent, unidirectional movement have a tendency to overthrow and this tendency increases with the speed of the machine.

An important object of the present invention has been to prevent overthrowing of the feed cups and thereby render the stitch formation uniform at all speeds, even up to and above 5000 R. P. M. Toward this end the invention contemplates the reduction, to a minimum, of the mass and moment of inertia of the parts which are subjected to the intermittent increments of movement and at the same time the application of a braking force to such parts when they reach the end of each increment of movement.

A special feature of the invention is the provision of the clutch and braking means as a unitary assembly which is of simple and compact construction.

Another feature is the provision of a brake, in association with a clutch of the character indicated, which assists the driving connections of the clutch in transmitting the desired torque and which opposes overthrow of the driven parts by imparting an opposing torque.

While the invention is particularly applicable to the driving of the feed cups of a machine of the character mentioned, it is applicable also to other machines or devices presenting similar problems.

Other objects, features and advantages of the invention will appear from a detailed description of an illustrative form of the same which

will now be given in conjunction with the accompanying drawings, in which:

Fig. I is a view partly in side elevation and partly in vertical section, showing the upper portion of a cup-feed sewing machine embodying the invention.

Fig. II is a vertical, axial section through the clutch and associated devices for driving one of the feed cups, the latter being shown in dot and dash lines.

Fig. III is a horizontal, sectional view along the line 3—3 of Fig. II.

Fig. IV is a horizontal, sectional view along the line IV—IV of Fig. II, and

Fig. V is a horizontal, sectional view along the line V—V of Fig. II.

Referring now to the drawings, the invention has been shown applied to a machine of the type illustrated in the Rubel et al. Patent No. 2,043,711 granted June 9, 1936. It comprises a hollow frame 10, the lower portion of which is not shown but which, it will be understood, is adapted to be supported upon a suitable work table. At its top the frame is provided with a laterally extending, hollow bracket portion 11 adapted to house the driving mechanism for the feed cups, as will be hereinafter more fully explained. Suitably journaled in the walls of the frame 10 is a main drive shaft 12 which extends, at one or both ends, beyond the wall of the frame and is provided with a suitable hand wheel or pulley, not shown, by which power is supplied to the machine. Suitable connections, not shown herein but fully disclosed in said Rubel et al. patent, are provided from the shaft 12 for reciprocating a needle bar 13 extending through a bearing bushing in the front wall of the frame. Other connections are provided from said shaft for imparting both an oscillatory and bodily movement to a primary looper 14 carried by a bar 15 adapted to be both rocked and shifted axially within a bearing sleeve 16. Still other connections from said shaft are provided for oscillating a secondary looper 17 carried by a bar 18 adapted to be rocked in a bearing bushing 19. As will be seen by reference to the Rubel et al. patent, appropriate movements are imparted to the various stitch forming devices described, on each cycle of the machine, by means of eccentrics carried by the shaft 12.

For supporting and feeding the work in proper relation to the stitch forming devices, a pair of feed cups 20 and 21 is provided. These are secured, respectively, to the lower ends of shafts 22 and 23. Shaft 22 is journaled within a sleeve

24 mounted in a socket at the end of a bracket 25 pivoted by means of a rock shaft 26 to the under side of the bracket 11. A suitable spring, not shown, which may be of the type disclosed in said Rubel et al. patent, serves to rock the arm 25 in a counter-clockwise direction, Fig. I, and thus urges the feed cup 20 yieldingly against the cup 21. The upper end of the shaft 22 is connected by a universal coupling 27 with a shaft 28 journaled in a bushing 29 carried by the bracket 11. Above the bushing there is secured to the shaft 28 the hub 30 of a gear 31, which meshes with a gear 32 whose hub 33 is secured by a set screw 34 to the shaft 23.

The shaft 23 is journaled in a bearing sleeve 35 mounted in a downwardly extending boss 36 on the under side of the bracket 11. A set screw 37 serves to retain the sleeve in the boss. Secured to the shaft 23 by a set screw 39, just below the sleeve 35, is a collar 38 which serves to retain the shaft against upward movement in the sleeve 35; the hub 33 and other parts, to be presently described, serve to retain the shaft against downward movement.

For the purpose of imparting intermittent increments of rotary movement to the shaft 23, a one-way clutch of improved construction is provided. This includes a driven member 40 in the form of a block, of substantially triangular cross section, secured by set screws 41 and 42 to the shaft 23 just above a cup-shaped portion 43 formed at the upper end of the sleeve 35. The block 40 rests upon the upper surface of the bottom wall of the cup which, as previously noted, is held stationary. Above the cup 43 is an inverted cup 44 which is mounted freely upon the shaft 23 for oscillation thereon. Cup 44, which is the driving member of the clutch, is complementary to the cup 43 and forms with the latter a clutch housing or drum which encloses the driven member 40 and various other elements, to be presently described.

The cup or upper drum section 44 is oscillated about the shaft 23 by suitable connections extending to and operated by the shaft 12. These connections include an arm 45 extending laterally from the cup 44 and having a ball and socket connection 46 with a link 47 pivoted at its opposite end upon a pin 48 carried by a block which is adjustable to any appropriate position within an elongated slot 49 in an arm 50 of a rock member 51 mounted on a shaft 52 supported by the frame. It will be understood that the block which carries the pin 48 is adapted to be clamped in any desired position within the slot 49 to vary the magnitude of the arc through which the cup 44 is oscillated. A downwardly extending arm 53 of the rock member 51 is connected by a pin 54 with a pitman 55 having an eccentric strap portion 56 surrounding an eccentric 57 secured to the shaft 12. As will be apparent, upon rotation of the shaft 12 the pitman 55 will rock the member 51 and, through the link 47, will oscillate the cup or upper drum section 44.

Movements of the cup 44 in a clockwise direction (Fig. IV) will be imparted to the driven member 40 by means of a series of rollers 58, in a well known manner. Movements of the cup in a counter-clockwise direction, however, will be idle due to the action of springs 59 carried by the member 40 adjacent its corners. The construction is preferably such, as disclosed in the patent to Long et al., No. 1,692,130, granted Nov. 20, 1928, that the rollers 58 cooperate with dif-

ferent portions of the flat surfaces of the member 40 at different times to minimize wear.

As the member 44 is shifted in the counter-clockwise direction (Fig. IV), turning of the member 40 in this direction is definitely prevented by the action of clutch rollers 60, which are squeezed, at this time against the wall of the cup portion 43 of the stationary sleeve 35. Rollers 60, however, do not interfere with the clockwise rotation of the member 40 due to the action of the springs 61 mounted at the corners of the member 40. The action of this one-way clutch construction is, in general, similar to that of the clutch disclosed in said Long et al. patent.

Now, there is a tendency of the member 40 to overthrow, particularly during high speed operations. Thus, as the member 44 attains its maximum velocity, at about the mid-point in its clockwise movement, the momentum imparted to the member 40 tends to carry it on at a higher velocity than the driving member, which now begins to decelerate. Accordingly, during the last half of the feed stroke the member 40 has a tendency to travel further than the member 44. This tendency is reduced by the construction herein disclosed, due to the reduction of both the mass and the diameter of the intermittently rotated member. The advantages of this construction over prior one-way clutch mechanisms are disclosed in the pending application of Harold J. LeVesconte, Ser. No. 443,892 filed May 21, 1942.

However, to offset more completely the overthrow tendency of the member 40, a friction brake is provided, in accordance with the present invention. For this purpose a plate or disc 62 is secured by screws 63 to the driven member 40. With the upper surface of this plate there cooperates an annular rim 64 on the inner or under surface of the top of the cup member 44. The annular surface 64 is urged into frictional engagement with the upper surface of plate 62 by means of a spring 65 which surrounds a hub portion 66 of the member 44. At its upper end the spring 65 bears against the inner bottom wall of a bell or cup 67 freely mounted upon the shaft 23. The spring 65 urges the upper surface of the cup 67 into engagement with the lower end of the hub 33 of the gear 32. Thus, it will be seen that the spring 65 urges the cup 67 in one direction and the member 44 in the opposite direction, all of these parts being confined between the hub 33 and member 40. Pins 68, which extend downwardly from the top wall of the cup 67, are engaged in a transversely extending slot 69 formed in the upper end of the hub 66 of member 44. This prevents relative rotation between the member 44 and cup 67 but permits relative axial movement between these parts.

As will be seen from Fig. II, all of the elements therein disclosed in full lines constitute a unitary assembly which may be formed outside of the machine and then introduced by simply passing the sleeve 35 through the opening in the boss 36, the parts being clamped in position by means of the set screw 37. Subsequently, the feed cup 21 may be applied to the lower end of the shaft 23.

In operation of the machine, a disc 12a, indicated in dot and dash lines and carried by the shaft 12, dips into the oil at the bottom of the hollow frame 10 and serves to whip the oil into a fine spray, which is distributed throughout the interior of the frame. A portion of this spray

is delivered over and around the gears 31 and 32 and the clutch unit. To insure adequate lubrication of the clutch unit, the gear 32 is preferably provided on its upper face with a number of depressions 70 adapted to collect some of the oil and deliver it through passages 71 to points beneath. Similar depressions 72 in the upper surface of the member 44 collect a portion of the oil and deliver it through passages 73 to the interior of the housing or drum formed by the complementary cup-shaped members 43 and 44. Apertures 74 are provided in the brake disc 62 to assist in delivering some of the lubricant to the rollers 58 and 60. Excess lubricant is discharged from the clutch housing through a passage 75 which serves to return the excess to the reservoir in the frame 10. Some of the lubricant in the clutch housing is delivered by a spiral groove 76 along the bearing surface of the sleeve 35 to provide adequate lubrication for the shaft 23.

The operation of the improved one-way clutch and brake construction is as follows: Upon each revolution of the shaft 12, the eccentric 57 oscillates the rock member 51 and reciprocates the rod or link 47. This causes oscillation of the driving clutch member 44. Upon the clockwise movements of member 44, the rollers 58 serve to drive the block 40 and shaft 23 a corresponding extent, while upon the reverse movements of the member 44, the rollers 58 are idle while rollers 60, acting between the fixed member 43 and the driven member 40, serve to prevent reverse movement of the latter. Throughout the operation of the member 44, its annular surface 64 is in frictional engagement with the disc 62 secured to the driven member. During clockwise movement of the member 44, or at least until the midpoint in this movement is reached, the friction so created assists in driving the member 40. After the member 44 has attained its maximum velocity in its clockwise movement, however, the friction between it and the disc 62 provides a retarding or braking action which substantially prevents overthrow of the member 40. Moreover, any tendency of the member 40 to continue its feed movement after the member 44 has reached the end of its stroke is more positively prevented than by a simple, stationary brake due to the fact that the surface 64 is promptly moved in the opposite direction and through its frictional engagement with disc 62, tends to impart a reverse torque to the member 40. During the oscillations of the member 44, the spring-retaining cup 67 will turn with the hub 33 on the clockwise movements (Fig. III) but will turn relative to the hub 33 on the counter-clockwise movements.

While an illustrative form of the invention has been described in considerable detail, it will be understood that numerous changes may be made in the construction and arrangement of the several parts without departing from the general principles and scope of the invention. The terms and expressions used herein have been employed as terms of description and not of limitation.

I claim:

1. In a machine of the class described a part adapted to be rotated intermittently, a constantly rotating shaft, and connections from said shaft for imparting intermittent movements to said part, said connections comprising a driving clutch member adapted to be oscillated from said shaft, a driven clutch member connected with said part and adapted to be rotated in one direction by said driving member, means for prevent-

ing reverse rotation of said driven member, and brake means for preventing overthrow of said driven member, said braking means comprising friction surfaces and pressure creating means operable constantly to maintain the same in cooperative relation irrespective of wear.

2. In a machine of the class described a part adapted to be rotated intermittently, a constantly rotating shaft, and connections from said shaft for imparting intermittent movements to said part, said connections comprising a driving clutch member adapted to be oscillated from said shaft, a driven clutch member connected with said part and adapted to be rotated in one direction by said driving member, means for preventing reverse rotation of said driven member, and friction means constantly acting between said driving and driven members, said friction means comprising pressure creating means operable constantly to maintain surfaces on said driving and driven members in frictional engagement irrespective of wear.

3. In a machine of the class described a part adapted to be rotated intermittently, a constantly rotating shaft, and connections from said shaft for imparting intermittent movements to said part said connections comprising a driving clutch member adapted to be oscillated from said shaft, a driven clutch member connected with said part and adapted to be rotated in one direction by said driving member, means for preventing reverse rotation of said driven member, friction surfaces on said driving and driven members, and spring means for constantly urging said friction surfaces together.

4. In a machine of the class described a part adapted to be rotated intermittently, a constantly rotating shaft, and connections from said shaft for imparting intermittent movements to said part, said connections comprising a driving clutch member adapted to be oscillated from said shaft, a driven clutch member connected with said part and partly enclosed by said driving clutch member, a stationary member enclosing the rest of said driven member, clutch means effective in opposite directions between said driven member and said driving and stationary members, respectively, and brake means cooperating with said driven member for preventing overthrow thereof, said braking means comprising friction surfaces and pressure creating means operable constantly to maintain the same in cooperative relation irrespective of wear.

5. In a device of the class described a clutch unit comprising a shaft, a driving member oscillatable on said shaft, a driven member secured to said shaft, a fixed member in which said shaft is journaled, means between said driving and driven members for transmitting rotation in one direction only, means between said driven and fixed members for preventing relative rotation in one direction, and spring urged brake means acting upon said driven member to prevent overthrow thereof.

6. In a device of the class described a clutch unit comprising a shaft, a driving member oscillatable on said shaft, a driven member secured to said shaft, a fixed member in which said shaft is journaled, means between said driving and driven members for transmitting rotation in one direction only, means between said driven and fixed members for preventing relative rotation in one direction, and friction means comprising friction surfaces and pressure creating means operable constantly to maintain said surfaces

in cooperative relation irrespective of wear and arranged to apply a torque to said driven member opposed to said one direction of rotation to prevent overthrow.

7. In a device of the class described a clutch unit comprising a shaft, a driving member oscillatable on said shaft, a driven member secured to said shaft, a fixed member in which said shaft is journaled, means between said driving and driven members for transmitting rotation in one direction only, means between said driven and fixed members for preventing relative rotation in one direction, and friction means including yielding pressure creating means acting constantly between said driving and driven members.

8. In a device of the class described a clutch unit comprising a shaft, a driving member oscillatable on said shaft, a driven member secured to said shaft, a fixed member in which said shaft is journaled, means between said driving and driven members for transmitting rotation in one direction only, means between said driven and fixed members for preventing relative rotation in one direction, said driving and driven members having cooperating friction surfaces, and spring means urging said surfaces together creating a friction force serving to supplement said first-mentioned means upon movement of said driving member in one direction and to then oppose overthrow of said driven member.

9. In a device of the class described a clutch unit comprising a stationary member, a shaft journaled in said member, a block secured to said shaft, a member oscillatable on said shaft and slidable axially thereof into engagement with said block, spring means urging said member and block into frictional engagement, and one-way clutch means between said block and said stationary and oscillatable members, respectively, said spring means creating a braking action upon said block to prevent overthrow thereof.

10. In a device of the class described a clutch unit comprising a stationary member, a shaft journaled in said member, a block secured to said shaft, a member oscillatable on said shaft and slidable axially thereof into engagement with said block, one-way clutch means between said block and said stationary and oscillatable members, respectively, and spring means for urging said oscillatable member into frictional engagement with said block, thereby supplementing said one-way clutch means in driving said block and shaft and subsequently prevently over-throw thereof.

11. In a device of the class described a clutch unit comprising a stationary member, a shaft journaled in said member, a block secured to said shaft, a member oscillatable on said shaft and slidable axially thereof into engagement with said block, said stationary member and said oscillatable member having complementary cup-shaped portions forming a housing for said block, one-way clutch means between said block and said stationary and oscillatable members, respectively, and spring means urging said oscillatable member into frictional engagement with said block to assist in driving the latter and then prevent overthrow thereof.

12. In a cup-feed sewing machine having a main drive shaft, a pair of feed cups, inter-connected shafts supporting said feed cups and driving the same, and connections from said main drive shaft to one of said inter-connected shafts for driving the same intermittently through predetermined increments at high frequency, the improvement which comprises including in said con-

nections an oscillatable driving clutch member, a driven clutch member driven in one direction by said driving member, means for preventing reverse movement of said driven clutch member, and additional means comprising friction surfaces and pressure creating means operable constantly to maintain said surfaces in cooperative relation irrespective of wear and serving to apply a braking action to said driven member to prevent overthrow thereof.

13. In a cup-feed sewing machine having a main drive shaft, a pair of feed cups, inter-connected shafts supporting said feed cups and driving the same, and connections from said main drive shaft to one of said inter-connected shafts for driving the same intermittently through predetermined increments at high frequency, the improvement which comprises including in said connections an oscillatable driving clutch member, a driven clutch member driven in one direction by said driving member, means for preventing reverse movement of said driven clutch member, and friction means including separate pressure creating means and friction surfaces urged together thereby for applying a reverse torque to said driven member upon the completion of each forward movement of said member, said pressure creating means being operable constantly to maintain said surfaces in cooperative relation irrespective of wear.

14. In a cup-feed sewing machine having a main drive shaft, a pair of feed cups, inter-connected shafts supporting said feed cups and driving the same, and connections from said main drive shaft to one of said inter-connected shafts for driving the same intermittently through predetermined increments at high frequency, the improvement which comprises including in said connections an oscillatable driving clutch member, a driven clutch member driven in one direction by said driving member, means for preventing reverse movement of said driven clutch member, said driving and driven clutch members having cooperating friction surfaces, and separate spring means for maintaining said surfaces in frictional engagement.

15. A unitary assembly comprising a bearing sleeve, a shaft journaled in said sleeve, a driven clutch element secured to said shaft, a driving element oscillatable on said shaft, clutching means between said driving and driven elements for imparting movements to said driven element in one direction, clutching means acting between said sleeve and said driven element to prevent reverse movement of said element, means for confining said shaft against any substantial axial movement relative to said sleeve, and yielding means for urging one of said driving and driven clutch elements axially toward the other and thereby applying friction to said driven element to prevent overthrow thereof.

16. A unitary assembly comprising a bearing sleeve, a shaft journaled in said sleeve, a driven clutch element secured to said shaft, a driving element oscillatable on said shaft, clutching means between said driving and driven elements for imparting movements to said driven element in one direction, clutching means acting between said sleeve and said driven element to prevent reverse movement of said element, said driving and driven elements having cooperating friction surfaces, and spring means for urging said surfaces together.

17. A unitary assembly comprising a bearing sleeve, a shaft journaled in said sleeve, a driven

clutch element secured to said shaft, a driving element oscillatable on said shaft, said sleeve and driving element having complementary cup-shaped portions forming a housing around said driven element, clutching means between said driving and driven elements for imparting movements to said driven element in one direction, clutching means acting between said sleeve and said driven element to prevent reverse movement of said element, and a spring surrounding said shaft arranged to urge said driving element against said driven element.

18. A unitary assembly comprising a bearing sleeve, a shaft journaled in said sleeve, a driven clutch element secured to said shaft, a driving element oscillatable on said shaft, said sleeve and driving element having complementary cup-shaped portions forming a housing around said driven element, clutching means between said driving and driven elements for imparting movements to said driven element in one direction only, clutching means acting between said sleeve and

said driven element to prevent reverse movement of said element, means for delivering a lubricant to the interior of said housing, and spring means for urging said driving element against said driven element.

19. A unitary assembly comprising a shaft, a bearing therefor, a driven clutch element secured to said shaft, a member secured to said shaft in spaced relation to said driven clutch element, driving means oscillatable on said shaft between said driven clutch element and said member, one-way clutch means between said driving means and said driven element for rotating the driven element in one direction, one-way clutch means between said driven element and bearing to prevent reverse rotation of said element, said driving means having friction surfaces thereon adapted to cooperate with friction surfaces on said driven clutch element and said member, respectively, and spring means for urging said friction surfaces into cooperative relation.

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