

Dec. 6, 1938.

K. R. LIEBERKNECHT

2,139,278

KNITTING MACHINE

Filed May 6, 1937

3 Sheets-Sheet 1

Fig. 1

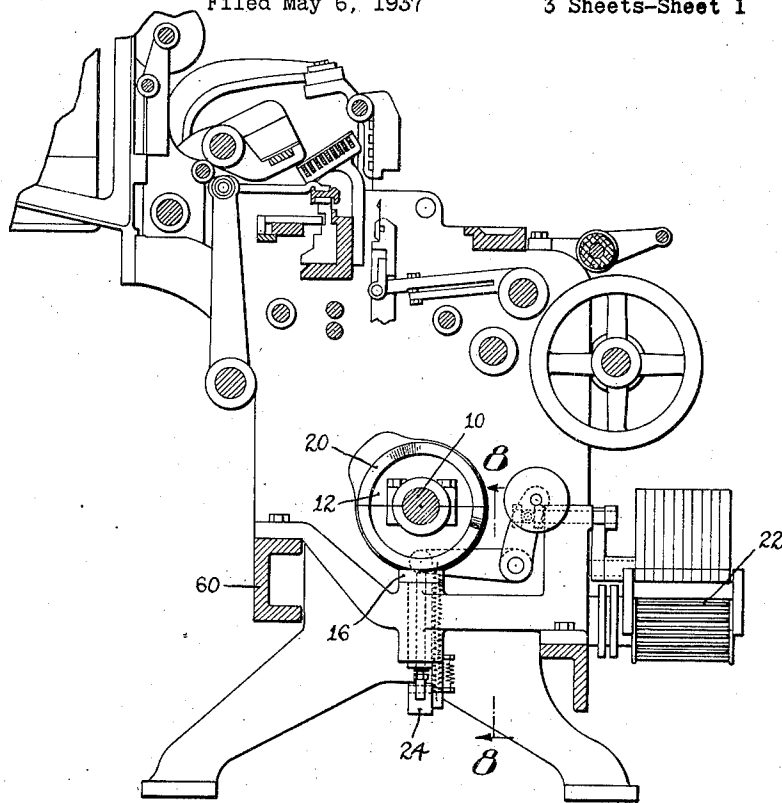


Fig. 7

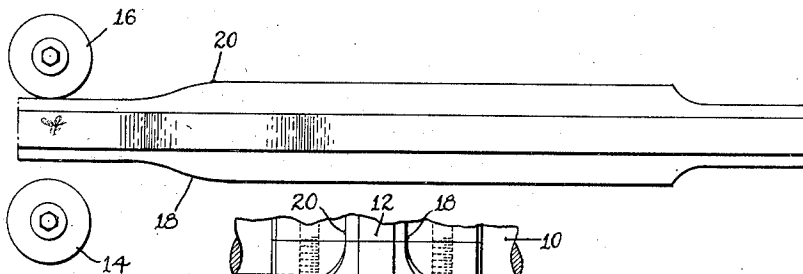
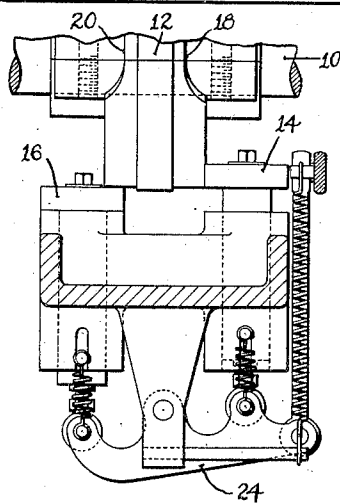


Fig. 8



Witness

H. E. Van Dine

Inventor
Karl Richard Lieberknecht
By his attorney
Fish, Hildreth, Grogan & Co.

Dec. 6, 1938.

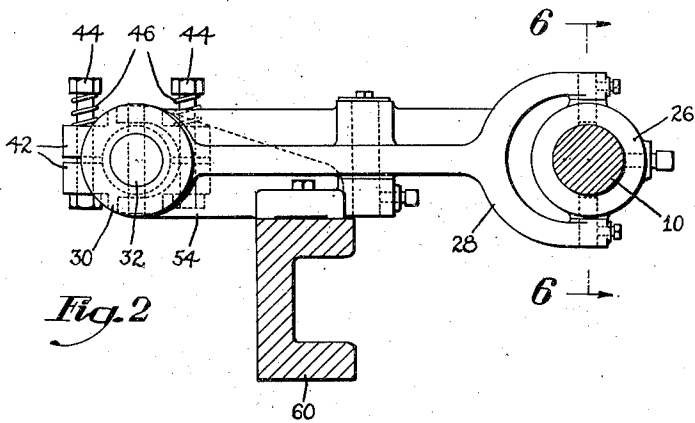
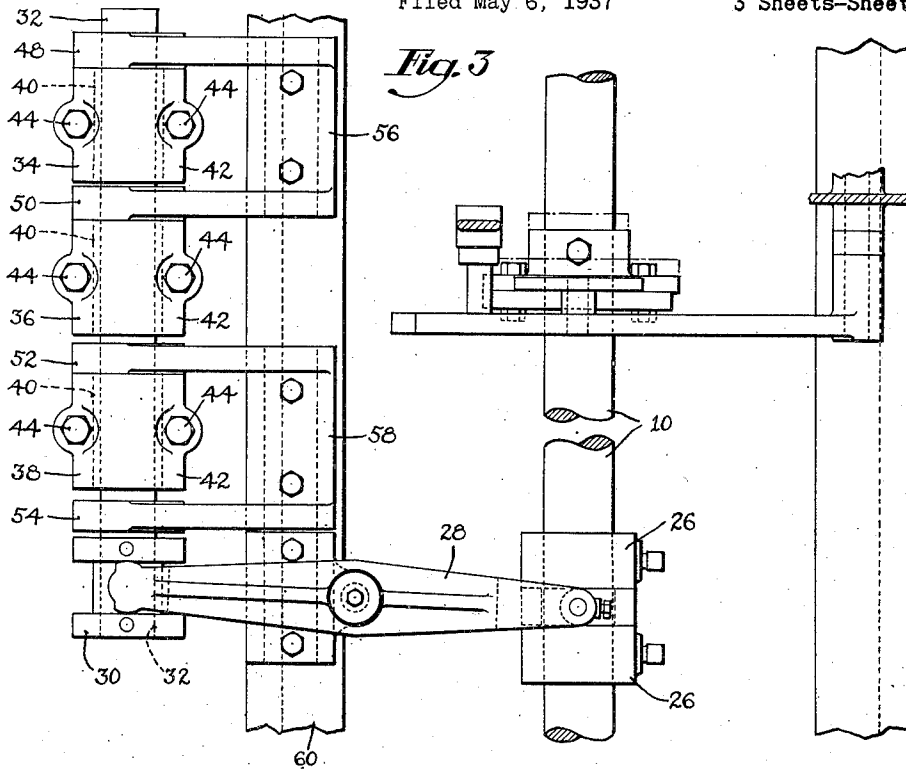
K. R. LIEBERKNECHT

2,139,278

KNITTING MACHINE

Filed May 6, 1937

3 Sheets-Sheet 2



Dec. 6, 1938.

K. R. LIEBERKNECHT

2,139,278

KNITTING MACHINE

Filed May 6, 1937

3 Sheets-Sheet 3

Fig. 4

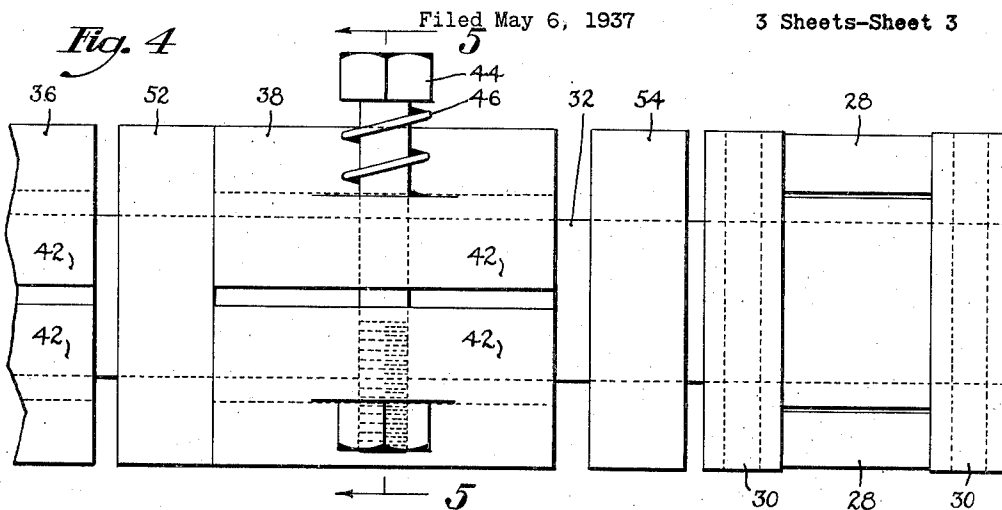


Fig. 5

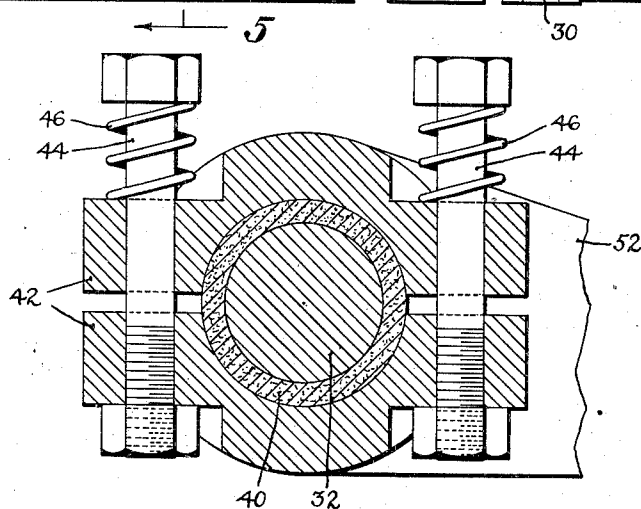
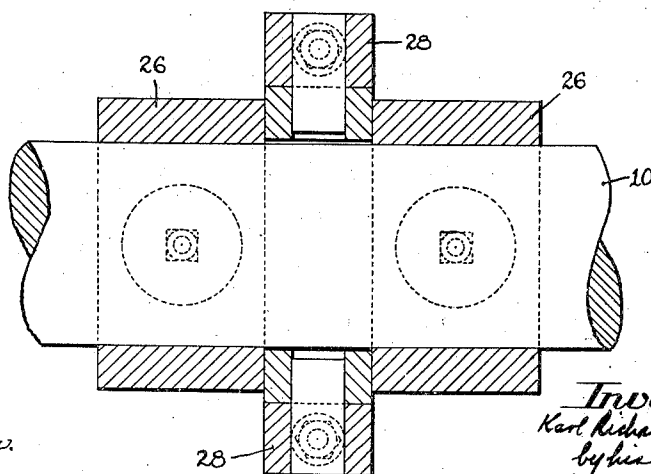


Fig. 6



Witness

H. E. Van Dine

Inventor

Karl Richard Lieberknecht
by his attorneys
Fish, Willard, Carr & Johnson

UNITED STATES PATENT OFFICE

2,139,278

KNITTING MACHINE

Karl Richard Lieberknecht, Oberlungwitz, Germany, assignor to Kalle, Inc., New York, N. Y., a corporation of New York

Application May 6, 1937, Serial No. 141,007

10 Claims. (Cl. 133—71)

The present invention relates to knitting machines, and more particularly to a cam shaft brake operable during the shifting movement of the cam shaft.

5 According to the usual and well-known procedure, the cam shaft is shifted or shogged to change from knitting to narrowing, and back again to knitting. Because of the weight of the cam shaft and its associated cams, and the high speed of shift, it is necessary to arrest the momentum developed in the shifting operation. According to the usual method a simple brake flange was used to provide the braking effect, but the braking action took place abruptly and with considerable shock to the parts.

15 The principal object of the present invention is to provide an improved cam shaft shift mechanism involving a brake by which the braking action is smoothly increased during the shifting operation. Another object of the invention is to provide adjusting means by which the braking action may be properly controlled throughout the shift stroke.

25 With these objects in view, the principal feature of the invention comprises devices acting to effect a progressive increase in the braking surface available throughout the shifting operation. In the preferred form of the invention such means comprises a series of friction collars associated with a reciprocating shaft and cooperating with stops, which are so arranged as to apply the frictional braking action of the several collars in progression.

35 Other features of the invention consist of certain novel features of constructions and combinations and arrangements of parts hereinafter described, and particularly described in the claims.

40 In the accompanying drawings Fig. 1 is an end cross-sectional elevation of a knitting machine illustrating the cam shaft and shift control therefor; Fig. 2 is a detailed cross-sectional view of the cam shaft and the associated brake assembly in accordance with the present invention; Fig. 3 is a plan view of the parts shown in Fig. 2; Fig. 4 is an elevation on an enlarged scale, of a portion of the brake devices; Fig. 5 is a section on line 5—5 of Fig. 4; Fig. 6 is a section on an enlarged scale on line 6—6 of Fig. 2; Fig. 7 is a development of the shogging cam and Fig. 8 is a detailed view of the shogging cam and rollers thereof.

50 In the machine shown in Fig. 1, the cam shaft 10 is provided with a shogging cam 12 of usual form, having associated therewith a roller 14 to

determine the knitting position of the cam shaft and a roller 16 to determine the narrowing position. As shown in the development of Fig. 7 the shogging cam has faces 18 and 20 cooperating with the rollers 14 and 16 respectively. The shogging action is under the control of a pattern mechanism indicated generally at 22, having suitable connections to operate the rollers 14 and 16 through a rocker-arm 24 to bring one or the other of the rollers into position for engagement with the shogging cam as illustrated in Fig. 8.

Secured to the cam shaft is a shift collar 26 connected by a pivoted fork lever 28 with a collar 30, secured to a reciprocating shaft 32. At intervals along the shaft 32 are mounted a plurality of friction collars designated 34, 36 and 38, each of which comprises, as shown in Fig. 5, a ring 40 of leather or other frictional material encircling the shaft, together with a pair of clamping members 42 which are connected together by bolts 44. The clamping members are yieldingly pressed together by springs 46 surrounding the shanks of the bolts.

Cooperating with the friction collars is a series of stationary stop brackets shown particularly in Fig. 3, and indicated at 48, 50, 52 and 54. Each bracket is formed at its outer end as a ring or flange embracing the brake shaft 32. For convenience, the brackets are cast in pairs; for example, the brackets 48 and 50 are made integral with a web 56, and the brackets 52 and 54 are made integral with a web 58; the two webs 56 and 58 being bolted to the back beam 60 of the machine. The brackets are disposed in such a manner that each collar is free to move lengthwise between two adjacent brackets, but as shown in Fig. 3, the spaces between the adjacent brackets are not uniform. The distance between brackets 48 and 50 is only slightly greater than the length of the friction collar 34 which lies between them, the space between brackets 50 and 52 is somewhat larger and the space between the brackets 52 and 54 is larger still, whereby upon movement of the brake shaft 32, the collars strike their respective stops successively.

55 The cam shaft is shown in Fig. 3 in its position for a knitting operation. When narrowing is to be effected the cam shaft is shifted by the shogging cam, the direction of shift being upwardly of the sheet as viewed in Fig. 3. This causes a corresponding movement of the brake shaft 32 in the opposite direction through the motion of the forked lever 28. During the first part of this movement represented by the space between the collar 34 and the bracket 50, no braking ac-

tion occurs. When the collar 34 strikes the stop 50, its motion is arrested and the braking surface of the collar 34 is brought into action. Continued movement of the shaft causes the collar 5 36 to strike the stop 52 and the additional braking surface of the second collar is then brought into action. Finally, upon further movement of the shaft, the collar 38 strikes its stop 54, thus further increasing the active braking surface to 10 give maximum available braking action.

Upon a reverse movement of the shaft; that is, from narrowing to knitting position, the collar 34 first strikes the stop 48, the collar 36 then strikes the stop 50, then finally the collar 38 15 strikes the stop 52, thereby giving the same progressive increase of braking surface. The collars are brought into braking action in the same order and the resultant braking effect is therefore identical regardless of the direction of shift.

20 It will be seen that since no braking effect is applied at the start of the movement, and since the braking action is progressively applied, the shaft may be shifted with maximum permissible speed, and with the assurance of bringing it 25 smoothly and properly to rest at the end of the stroke without undue shock to the shaft or any other part of the machine.

Although three friction collars are herein shown whereby the braking action is progressively increased in three steps, it will be understood that any number of collars may be employed. It has been found, however, that three 30 collars as shown in the drawings, provide sufficiently smooth braking action.

35 A feature of importance resides in the fact that the braking effect of the friction collars may be independently adjusted. This is readily accomplished by means of the bolts 44. By this means a suitable control of the distribution of braking effect throughout the stroke may be obtained. 40 Furthermore, the adjusting bolts 44 provide for a convenient take-up to compensate for wear.

Although the preferred embodiment of the machine has been shown and described, it will be 45 understood that the machine is not limited to such precise embodiment, but may be modified therefrom within the scope of the appended claims.

Having thus described the invention, I claim:

50 1. In a flat knitting machine having a shiftable cam shaft, braking devices controlled by the shaft to brake the shifting movement thereof constructed and arranged to progressively add increments of braking surface during a move- 55 ment of the shaft in either direction.

2. In a flat knitting machine having a shiftable cam shaft, a plurality of braking devices controlled by the shaft to brake the shifting movement thereof operating successively to progressively add increments of braking surface during a movement of the shaft in either direction. 60

3. In a flat knitting machine having a shiftable cam shaft, actuating means operative from the shaft, and braking devices controlled thereby 65 to brake the shifting movement of the shaft, con-

structed and arranged to add successive increments of braking surface during movement of the shaft in either direction.

4. In a flat knitting machine having a shiftable cam shaft, a plurality of brake collars operable to brake the shaft upon a shifting movement thereof, and stops associated with the collars to apply the braking effect thereof successively. 5

5. In a flat knitting machine having a shiftable cam shaft, a plurality of reciprocable braking collars, movable upon a shifting movement of the shaft, and means for successively stopping the collars to introduce progressively increasing braking surface against the movement of the shaft. 10 15

6. In a flat knitting machine having a shiftable cam shaft, a plurality of reciprocable braking collars, movable upon a shifting movement of the shaft, stop brackets associated with the collars, and arranged with respect thereto in a manner to permit different movements of the several collars, whereby the braking action progressively increases. 20 25

7. Cam shaft braking mechanism for a flat knitting machine comprising a plurality of friction collars, a reciprocating shaft on which the collars are mounted, and a plurality of stop brackets cooperating with the collars, the distances between successive stop brackets being related to the lengths of the collars in a manner to stop the collars successively upon reciprocation of the shaft and thereby to apply progressively increasing braking action against movement of the shaft. 30 35

8. In a flat knitting machine having a shiftable cam shaft, a plurality of brake collars operable to brake the shaft upon a shifting movement thereof, stops associated with the collars to apply the braking effect thereof successively, and means for individually adjusting the collars. 40 45

9. Cam shaft braking mechanism for a flat knitting machine comprising a plurality of friction collars, a reciprocating shaft on which the collars are mounted, a plurality of stop brackets cooperating with the collars, the distances between successive stop brackets being related to the lengths of the collars in a manner to stop the collars successively upon reciprocation of the shaft and thereby to apply progressively increasing braking action against movement of the shaft, and means for individually adjusting the frictional engagement between the collars and the shaft. 50 55

10. In a flat knitting machine having a shiftable cam shaft, a brake shaft, and connections operative upon axial movement of the cam shaft to effect a corresponding axial movement of the brake shaft, braking devices acting upon said brake shaft to brake the shifting movement thereof, said braking devices being constructed and arranged to add increments of braking surface acting upon said brake shaft during movement of the cam shaft in either direction. 60 65

KARL RICHARD LIEBERKNECHT.