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WARP KNITTING MACHINE

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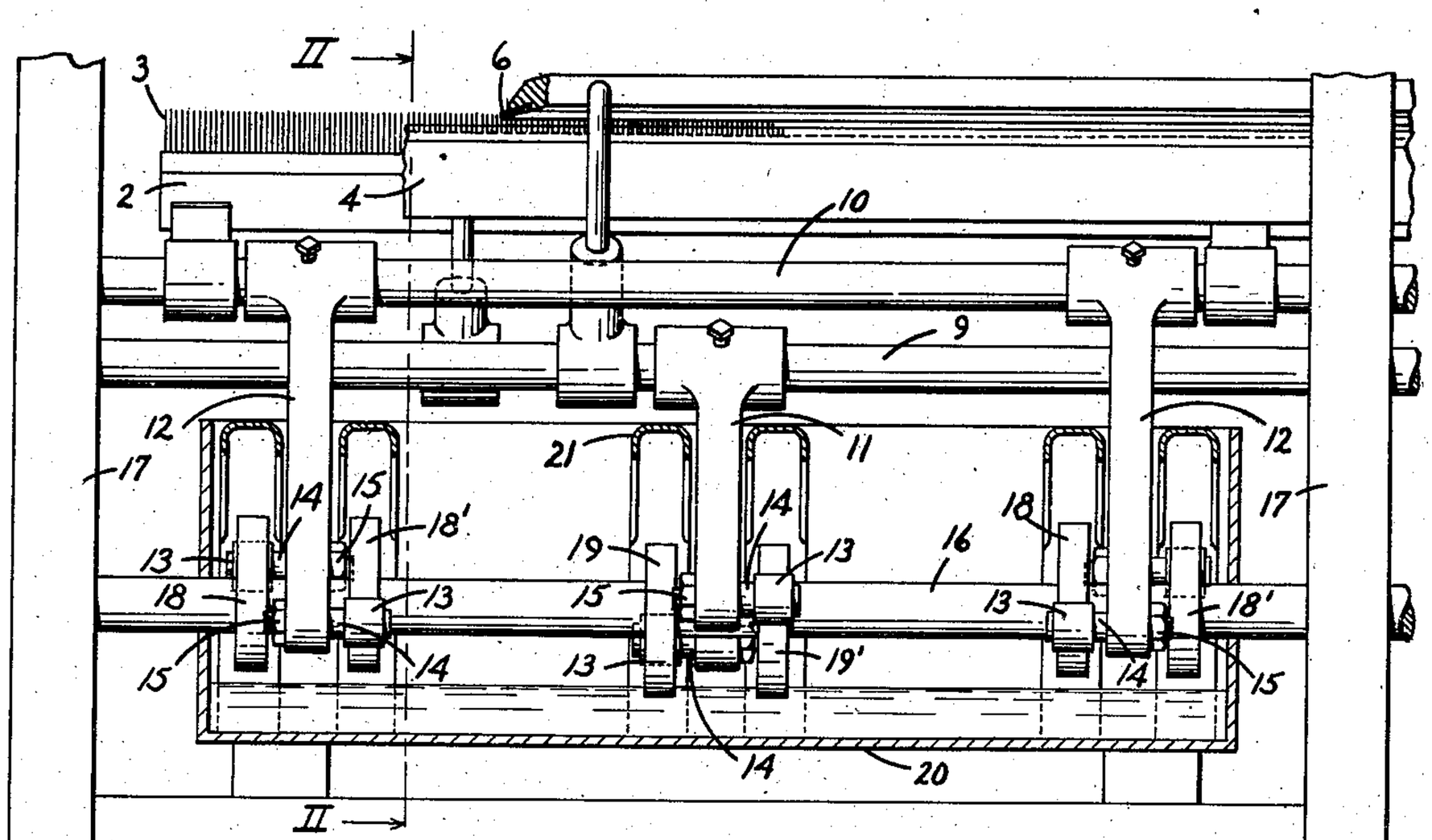

Fig. 1

Fig. 2

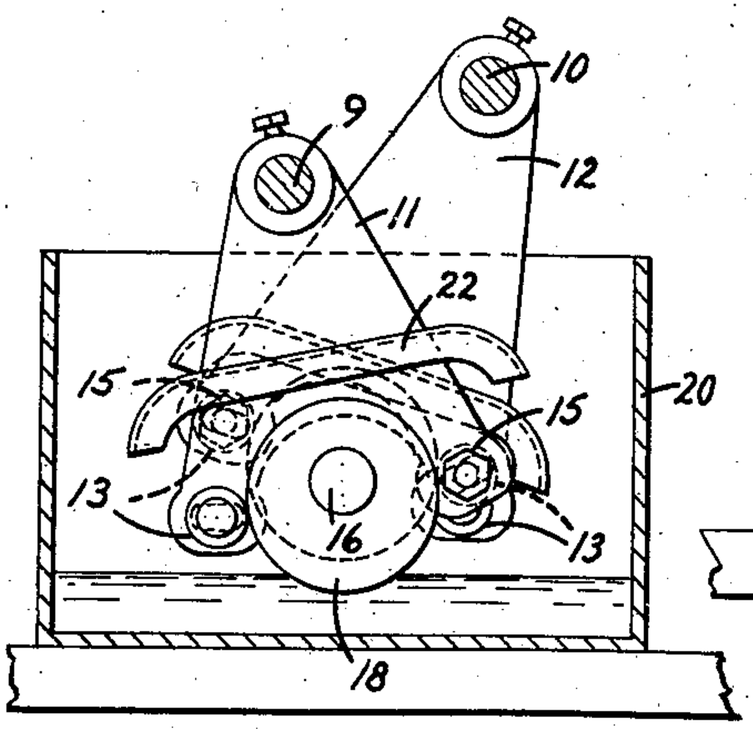

Fig. 3

INVENTOR.
RICHARD F. ESHLEMAN
BY
Thomas R. O'Malley

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WARP KNITTING MACHINE

Richard F. Eshleman, West Chester, Pa., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

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5 Claims. (Cl. 66—86)

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The invention relates to a warp knitting machine comprising knitting elements including needles and the like, and a cam shaft carrying cams which engage cam followers for controlling the knitting cycle of the elements.

In this type of warp knitting machine, it is virtually impossible to adjust the followers so that they engage the cam surfaces without play. Generally, it is the practice to provide for each movement, that is, for example, for the movement of the knitting bar, a plurality of cams spaced along the cam shaft, a plurality of countercams one adjacent each cam and followers for each cam and countercam set, each pair of followers being carried by a single lever mounted pivotally for transferring the motion to the particular bar carrying the knitting elements, such as the needle bar, guide bar, sinker bar, or presser bar. When it is desired to adjust the operation of the knitting elements, such as the operation of the needle bar, it is customary to effect the adjustment by moving the cam follower roller carried by the lever in a slot therein closer or farther from the cam and then taking up the slack by moving the other follower roller against the countercam. The impossibility of maintaining a complete absence of play between the several cams and followers results in excessive wear and vibration, particularly when it is desired to operate the machine at high speed, since the levers are given an oscillatory or rocking movement by the cams and a blow or shock is transmitted between them at every reversal of the direction of such movement.

In accordance with the present invention, the wear and the vibration are reduced to a negligible amount by supplying the peripheries of the cams with a film of viscous liquid, such as by allowing the cams to dip into, or run at least partially immersed in the body of the liquid. This liquid should preferably be stable and noncorrosive, and have a viscosity of at least S. A. E. 10. The viscous film between the cam surface and the follower occupies any clearance or play and exerts a cushioning effect between the cam and follower surfaces thereby greatly reducing the vibration and wear.

The drawing is illustrative of preferred embodiments of the invention and—

Figure 1 is a rear elevation, with parts broken away, of a warp knitting machine embodying the invention,

Figure 2 is a transverse section illustrating diagrammatically the connections between the knitting elements and the cam shaft, and

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Figure 3 is a transverse cross-section similar to Figure 2 of a modification.

As shown in Figures 1 and 2, the knitting machine comprises a needle bar 2 carrying needles 3, a sinker bar 4 carrying sinkers 5, a presser bar 6, and two or more guide bars (not shown) carrying guides 7 and 8 (Figure 2). The needle bar and presser bar are pivotally mounted on shafts 9 and 10. The guide bars are similarly mounted but to clarify the illustration and, to make it as simple as possible, the mounting of the guide bars is not shown, since they are in all respects similar to the mountings of the needle bar and presser bar. The needle bar, presser bar, etc., are rocked pivotally upon their shafts 9, 10, etc., by means of the levers 11 and 12 whose forked ends carry laterally offset roller followers 13. These roller followers are carried on stud shafts 14 mounted in slots through the forked ends of the levers 11 and 12 to permit adjustment by means of nuts 15 in conventional manner.

A cam shaft 16 is mounted in suitable bearings in the upright frame members 17 and carries a plurality of cams 18 and countercams 18′ for engagement with the roller followers carried by the forked levers 12 and a plurality of cams 19 and 19′ for engaging the followers 13 carried by forked levers 11. Additional cams which are not shown are provided for controlling the guide bars and tension bars. So far, the machine described is conventional in all respects.

In accordance with the present invention, a receptacle 20 is provided beneath the cam shaft. This receptacle is adapted to receive a viscous liquid at a sufficient level so that the cams are at least partially immersed. The immersion may be sufficient to cause the cams to run constantly through the liquid, or it may be somewhat less (as shown) to assure that the cams dip into the liquid at least part of the cycle of revolution.

The receptacle 20 may be covered or open as shown. When open, means for deflecting any spray of the liquid out of the receptacle is provided above the cams when the machine is adapted to operate at high speeds to prevent soiling the materials being knitted. As shown in Figures 1 and 2, the deflecting means comprises transverse members 21 which extend across the receptacle and are secured thereto, one deflector over each cam. A modification is shown in Figure 3 in which a deflector member 22 is carried on each side of each of the forked levers 11, 12, etc., so that such a deflector member is positioned above each cam.

These systems eliminate the necessity to pro-

vide a flexible seal between the cover of the receptacle and the oscillating forked levers.

As will be seen from the drawings, the cams dip into the viscous liquid and carry a film thereof into engagement with the roller followers, thereby eliminating to a large extent undesirable vibration and wear and allowing higher speeds to be attained.

Any suitable liquid having sufficient stability, viscosity and non-corrosiveness may be supplied to the container **20** which preferably is made of sufficient length to supply all of the cams between any two upright frame members **17** of the machine, such as those at the ends of the machine. In case the machine has great length for producing broad fabrics, one or more upright frame members **17** may be disposed between those at the ends of the machine, and a separate receptacle may be provided between each adjacent two of such upright members. If desired, however, the receptacle may extend through the frame members or communicate with the receptacle on the other side of such a frame member. Again, each set of cams (that is, an associated cam and countercam) may be provided with a separate receptacle.

Numerous liquids of stable, viscous, non-corrosive character may be used in the machine, provided they have a viscosity of at least S. A. E. 10. Examples are the liquid silicones produced by the condensation of silica with alkylene halides. Hydrocarbons and their condensation products having the desired viscosity, stability and non-corrosiveness are also suitable. These hydrocarbons may include the paraffins, the naphthenes and the aromatics.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a warp knitting machine, elements comprising needles, a cam shaft for controlling the knitting cycle of the elements, means for rotating the cam shaft, cams on the shaft, a receptacle under the cam shaft, means for applying a stable, viscous, non-corrosive liquid to the periphery of each of the cams, cam follower means engaging the cams through a viscous film of the liquid thus applied and an individual deflecting member extending across the receptacle above each cam for returning liquid sprayed from the cam to the receptacle.

2. In a warp knitting machine, elements comprising needles, a cam shaft for controlling the knitting cycle of the elements, means for rotating the cam shaft, a receptacle under the cam shaft for containing a stable, viscous, non-corrosive liquid, cams on the shaft dipping into the liquid, cam follower rollers engaging the cams through a viscous film of the liquid lifted by the rotation of the cams to the position of engagement with the follower rollers, and an individual deflecting member extending across the receptacle above each cam for returning liquid sprayed from the cam to the receptacle.

3. In a warp knitting machine, elements comprising needles, a cam shaft for controlling the knitting cycle of the elements, means for rotating the cam shaft, a receptacle under the cam shaft for containing a stable, viscous, non-corrosive liquid, cams on the shaft dipping into the liquid, cam follower means engaging the cams through a viscous film of the liquid lifted by the rotation of the cams to the position of engagement with the follower means, and deflecting means carried by the follower means above the cams for returning liquid sprayed from the cams to the receptacle.

4. In a warp knitting machine, elements comprising needles, a cam shaft for controlling the knitting cycle of the elements, means for rotating the cam shaft, a receptacle under the cam shaft for containing a stable, viscous, non-corrosive liquid, cams on the shaft dipping into the liquid, cam follower means comprising forked levers carrying rollers engaging the cams through a viscous film of the liquid lifted by the rotation of the cams to the position of engagement with the rollers, and an individual deflecting member carried by the forked lever and extending transversely of the receptacle above each cam for returning liquid sprayed from the cam to the receptacle.

5. In a warp knitting machine, elements comprising needles, a cam shaft for controlling the knitting cycle of the elements, means for rotating the cam shaft, a receptacle under the cam shaft and extending at least the full length of the cam-carrying portion of said shaft for containing a stable, viscous, non-corrosive liquid, cams on the shaft dipping into the liquid, cam follower means comprising forked levers carrying rollers engaging the cams through a viscous film of the liquid lifted by the rotation of the cams to a position of engagement with the rollers, and an individual deflecting member carried by each forked lever and extending transversely of the receptacle above each cam for returning liquid sprayed from the cam to the receptacle.

RICHARD F. ESHLEMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Country	Date
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