

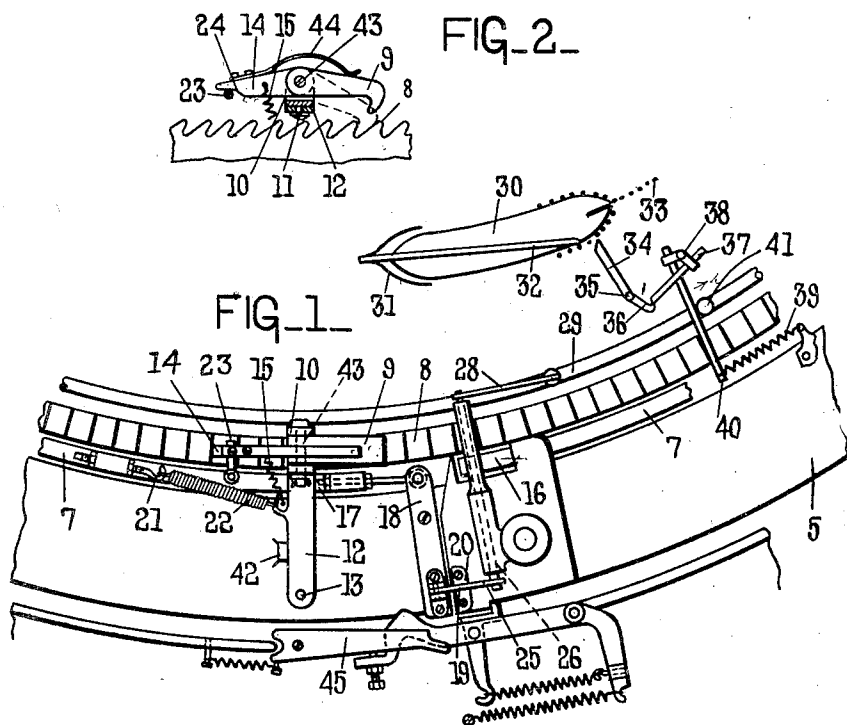
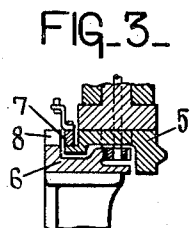
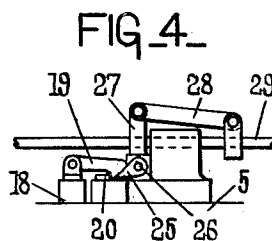
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STOP MOTION FOR CIRCULAR LOOMS

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STOP-MOTION FOR CIRCULAR LOOMS

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7 Claims. (Cl. 139—13)

This invention relates to circular looms, and has for its principal object to prevent damage occurring in the event of breakage or jamming of the warp threads.

U. S. Patent No. 1,822,292 describes a circular loom in which a feeler arranged in advance of each shuttle is adapted to be pressed back on jamming of the warp threads (and in this connection it is to be noted that breakage of a warp thread also results in a jam) so as to propel a rod through the warps to actuate a mechanism associated with a ring supporting the shuttles, and not only release said ring for rotation, but to put a clutch member into operation which causes the ring to rotate solidly with the warps. It has been found that difficulty is experienced in setting the shuttles into rotation in sufficient time to avoid the shuttles ploughing through the jammed warps and causing a serious breakage of the threads, this danger being particularly great when the loom is required to operate at a high speed.

The present invention enables this difficulty to be overcome by the application of a clutch member, e. g. a powerful brake-band which encircles one of the relatively rotatable parts of the loom and is connected to the other part, means being provided to effect a positive connection with the rotatable member of means which put the clutch rapidly into firm engagement. Suitable means being provided to effect this mechanical connection quickly after detection of the warp breakage or jamming, a short motion of the clutch-applying means suffices to pull the clutch positively into operation, so causing the two members to be connected solidly together.

It is preferable that some form of flexible connection should be inserted between the positive clutch-applying means and the clutch itself so as to avoid danger of breakage on too sudden application of the propelling load. For example, a spring may be used for this purpose, but such spring should be very strong in character so that it does not extend unduly and delay the time taken in applying the clutch.

As a means for effecting the positive mechanical connection, a row of ratchet teeth may be formed on one of the relatively rotating members and a pawl under the control of the warp feeler mechanism on each shuttle and carried by the other member is arranged to fall on to this row of teeth, a suitable connection being provided between the pawl pivot and the clutch, so that the clutch is applied by the pull exerted on the

pawl by the particular tooth with which it engages.

The invention can be applied alike to looms in which the shuttles rotate as to those in which the shuttles are stationary, the connection between the clutch and the member rotating relatively thereto serving in either case to apply the clutch rapidly.

The invention will now be described in greater detail with respect to the accompanying drawing which shows the application of the improved stop-motion to a stationary shuttle loom as described in U. S. Patent No. 2,007,397.

In the drawing:

Fig. 1 shows in plan view part of the periphery of the loom and the connection between the clutch-applying means and one of the shuttles;

Fig. 2 is a front elevation of the pawl connected to the clutch and of the rack associated with the pawl; and

Figs. 3 and 4 are details of the mechanism.

Between a stationary ring 5 carrying a plurality of shuttles in the manner and by the intermediary means described in U. S. Patent No. 2,007,397, and a ring 6 rotating with the warps is arranged a brake-band 7 substantially completely encircling the rotating ring. The ring 6 forms a part of the rotating warp system which includes the warp beams and the fabric take-up mechanism (not shown), all of which is driven from the main drive of the machine. The upper edge of the rotating ring is formed with a series of stout teeth 8 above which is suspended a pawl 9 pivoted in a forked member 10 itself pivotally mounted at 11 on one end of a lever 12 fulcrumed at 13 on the fixed ring 5. The pawl has a tail 14 between which and the fixed ring is arranged a spring 15 adapted to keep the pawl normally out of engagement with the teeth 8.

The brake-band 7 is secured at one end to the fixed ring and at the other end to a lever 18 pivoted on the fixed ring 5 and normally held by a latch 19 engaging a plate 20 so as to keep the brake expanded out of engagement with the rotating ring. At a point near the end of the brake-band is fixed a hook 21 adapted to receive a stout spring 22 forming a connection between the band and the lever 12 on which the pawl 9 is pivoted. A small pin 23 also secured near the end of the brake-band projects underneath the tail 14 of the pawl, which is inclined to form a cam, as shown at 24.

Lying under the end of the latch 19 is a short lever 25 carried by a horizontal spindle 26 terminating at its inner end in an upstanding lever

27. The lever 27 is connected by a link 28 to a ring 29 extending round the loom.

Each shuttle 30 carries at its forward end a warp feeler 31 connected to a horizontal rod 32 the rear end of which normally lies just inside the warps 33 passing outside the shuttle. A lever 34 pivotally mounted at 35 has one end just opposite the rear end of the rod 32 and carries a latch 36 at its other end. The latch 36 engages a lever 37 at the upper end of a vertical spindle 38 and holds the lever against the pull of a spring 39 connected to a lever 40 at the lower end of the spindle 38. A block 41 is secured to the ring 29 against the lever 40.

When the feeler 31 on any shuttle 30 encounters a warp jam, the rod 32 is pushed back through the warps, so rocking the latch 36 and freeing the lever 37 to permit the spring 39 to pull the lever 40 against the block 41 and rotate the ring 29. The link 28 rocks the spindle 26 and so lifts the latch 19 to free the lever 18.

By the tendency of the band 7 to contract and/or by the pull of the spring 22 (the lever 12 connected to the spring 22 being prevented from counter-clockwise movement by the stop 42), the end 17 of the band 7 moves to the right and carries the pin 23 along the cam 24 on the tail 14 of the pawl 9. The tail 14 is thus raised and the pawl 9 depressed, the latter engaging one of the teeth 8. In consequence, the pawl 9 is connected to the rotating ring 6 and is pulled round, so carrying with it the lever 12 on which it is pivoted, and in turn applying the brake-band 7 in a firm manner, round the toothed ring 6, through the spring 22 connecting the lever to the band.

In order to prevent breakage of the mechanism should the pawl fall on to the top of one of the teeth, the pawl 9 and tail 14 are made in two parts pivoted on the pin 43 in the forked member 10, a spring 44 connecting the parts enabling the device to give until the pawl falls into a succeeding tooth space. The spring 44 enables the tail 14 and pawl 9 to act as one member, while still enabling the device to give. On re-setting of the brake-band so as to free it from the rotating ring 6, the pawl 9 is automatically withdrawn from engagement with the toothed ring by the spring 15 as the pin 23 moves back along the cam 24.

The lever 18 is re-set by means of the lever 45 which can be pushed inwards to engage the outer end of the lever 18. By pulling the loom round a little, the lever 45 is made to push the lever 18 until the latch 19 on the lever re-engages the plate 20.

The latch mechanism comprising the members 36 at each shuttle to free the springs 39, and the member 19 effects very sensitive and rapid functioning of the stop motion, so that the pawl 9 is forced into engagement with the teeth 8 very early after operation of any feeler 31. Connection between the rings 5 and 6 is complete practically as soon as the band 7 has been pulled by the teeth 8 firmly round the ring 6, so that relative motion between the shuttles and the warps ceases before the shuttle has moved far enough to damage the warps.

Means may be provided to bring the rotating parts automatically to rest after operation of the brake-band to set the shuttles in motion, for example a switch operated by the rotation of the normally stationary member 5 carrying the shuttles, as described in U. S. Patent No. 2,007,397.

It will be understood that similar mechanism

to that described above may be employed in the case where the warps are stationary while the shuttles rotate or even where both the shuttles and warps are carried by rotating members, the relative motion between the rings 5 and 6 connected to the shuttles and warps respectively being available for application of the brake-band in either case. In a loom in which the shuttles rotate while the warps are stationary, the device is very effective in operation, since the relatively light mechanism associated with the shuttles can rapidly be brought to rest.

It is important, however, to see that the parts required to be set in motion or stopped, as the case may be, are as light in weight as possible. For this purpose, light metals may be used, while the shuttles themselves may be constructed as described in U. S. application S. No. 706,322 filed January 12, 1934 corresponding to British Patent No. 413,376.

What I claim and desire to secure by Letters Patent is:—

1. In a circular loom stop mechanism comprising two parts between which there is relative rotation similar to that between the shuttles and the warps, clutch means connected to one of said parts but normally out of engagement with the other of said parts, and feeler-controlled means adapted to effect a positive connection between said clutch means and said second-mentioned part so that the relative rotation brings about firm engagement between the parts through the clutch means and the two parts are connected both by the engagement of said clutch means and by the said positive connection.

2. In a circular loom having stationary shuttles and rotating warps, a stationary part, a part rotating with the warps, clutch means connected to one of said parts but normally out of engagement with the other of said parts, and feeler-controlled means adapted to effect a positive connection between said clutch means and said second-mentioned part so that the relative rotation brings about firm engagement between the parts through the clutch means and the two parts are connected both by the engagement of said clutch means and by the said positive connection.

3. In a circular loom having stationary shuttles and rotating warps, a stationary ring, a ring adapted to rotate with the warps, a brake-band surrounding one of said rings and connected at one end to the other ring, and feeler-controlled means adapted to effect a positive connection between the other end of said brake-band and the ring surrounded by the band, so that the relative rotation between the rings pulls the brake-band into firm engagement with said ring, and clutches the two rings together both by frictional engagement of the said brake-band and by said positive connection.

4. In a circular loom having stationary shuttles and rotating warps, a stationary ring, a ring adapted to rotate with the warps, a brake-band surrounding one of said rings and connected at one end to the other ring, a ring of teeth on the ring surrounded by the band, a pawl disposed over said teeth and connected to the other end of the band, and feeler-controlled means adapted to bring the pawl into engagement with the teeth so that the relative rotation between the rings pulls the brake-band into firm engagement with the ring surrounded by the band.

5. Stop-mechanism according to claim 4 comprising a tail on said pawl, a cam on said tail, a pin carried by the brake-band and resting against

the cam, a lever pivotally connected to the end of the band near the pawl, and feeler-controlled latch means locking said lever, release of said
5 movement of the brake-band to cause the pin to ride along the cam on the tail of the pawl and press the pawl into engagement with the teeth.

6. Stop-mechanism according to claim 4 comprising a tail pivoted with said pawl, a spring
10 connecting said tail to said pawl and adapted to permit the pawl mechanism to give if the pawl engages the top of a tooth, a cam on said tail, a

pin carried by the brake-band and resting against the cam, a lever pivotally connected to the end of the band near the pawl, and feeler-controlled latch means locking said lever, release of said
5 latch freeing the lever and permitting an initial movement of the brake-band to cause the pin to ride along the cam on the tail of the pawl and press the pawl into engagement with the teeth.

7. Stop-mechanism according to claim 4 wherein the pawl is connected to the brake-band
10 through a spring.

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