The present invention pertains to let-off mechanisms for looms and has more particular reference to the manual resetting devices of such mechanisms, by which the warp beam is manually rotated to let off or take up the warp sheet.

In looms of the type to which my invention applies, the let-off mechanism includes a warp beam, a let-off shaft geared to the warp beam, and let-off controlling means for controlling the rate of rotation of the let-off shaft. Such mechanisms have also included a manually rotatable member for rotating the let-off shaft and thereby the warp beam, provision being made for manually disconnecting the controlling means prior to operation of the manual member in the direction to effect let-off movement of the shaft. The connection from the controlling means to the let-off shaft commonly included a pawl and ratchet which automatically permitted movement of the manual member in the direction to take up on the warp sheet, but required some further manual operation before the warp sheet could be manually let off. This further manual operation is time-consuming and inconvenient at best, and is very awkward and difficult when the manual member is located in a comparatively inaccessible position.

It is a principal object of the present invention to provide, a let-off mechanism having a warp beam, let-off shaft, and controlling means as aforesaid, a manually rotatable member for rotating the let-off shaft and means operating automatically for disconnecting or releasing the controlling means from the let-off shaft whenever the manually rotatable member is rotated in the direction effecting let off of the warp, thereby eliminating the aforementioned further manual operation.

The foregoing and other objects of the invention are accomplished by the construction illustrated on the accompanying drawing, of which:

Fig. 1 is a side elevation of a portion of a loom to which my invention has been applied;

Fig. 2 is a plan view of a part of the mechanism shown on Fig. 1; and

Fig. 3 is a view in cross-section taken approximately on line 3—3 of Fig. 1, but with parts of the let-off controlling means omitted.

There is shown at 1 on Fig. 1 of the drawing a part of the left hand loom side, and at 2 a part of a conventional warp beam which is rotatably mounted at the back of the loom. The warp threads are wound onto the warp beam and the latter slowly revolves to unwind, or let off, the warp threads in the form of a sheet, as is well-known in the art. The let-off mechanism, so-called, includes the warp beam and certain mechanism to be hereinafter described in detail, for controlling the rate at which the warp beam is allowed to revolve. The component mechanisms of the loom other than the let-off mechanism are of conventional construction forming no part of the present invention, and are accordingly not illustrated or described.

In common with the other let-off mechanisms, the present construction includes a let-off shaft 3 which is geared to the warp beam, such as by means of a pinion 4 fixed to the shaft 3 and meshing with a gear 5 fixed to the warp beam. It will be noted that the warp beam 2 revolves in a clockwise direction, Fig. 1, and that the shaft 3 revolves in the opposite direction. The pull or tension of the warp sheet (not shown) tends to thus revolve the warp beam and shaft 3 and a let-off controlling means acts on this shaft rather than directly on the warp beam.

The particular embodiment of the invention shown on the drawing includes a positively actuated let-off controlling means which may be substantially the same as in the well-known Roper let-off, disclosed in patent to C. F. Roper, No. 744,841, granted Nov. 24, 1903, except that the present construction incorporates means, not in the Roper patent, for disconnecting the controlling means from the let-off shaft 3. Such controlling means includes a link 6 for varying the working stroke of a reciprocating pawl 1 which engages and moves a ratchet 7. The ratchet 7 is loosely mounted on the shaft 3 and operates through reduction gearing (not shown) to positively rotate a gear 8. This gear is thus positively rotated in the direction of the let-off movement of the shaft 3 and is the final driven element for controlling the movement of such shaft. The gear 8 is not fixed to the shaft as is the corresponding gear a of the Roper patent, but is loosely mounted thereon.

The gear 8 is provided on one side face with a ratchet consisting of a circular series of ratchet teeth 8. A pawl 10 is pivotally mounted on an arm 11 for cooperation with the teeth 8, a spring 12 interposed between the arm and pawl urging the latter into cooperation with said teeth. The arm 11 is fixed to the shaft 3 as by means of set screws 13, 14. The ratchet teeth 8 face in the proper direction to positively prevent let-off (i.e., counterclockwise) movement of the shaft 3 at a rate faster than the rate at which the gear 8 revolves. The pawl 10 will, however, ride over the ratchet teeth if the arm 11 is manually turned.
clockwise to take up or rewind the warp sheet. The construction as thus far described provides a releasable driving connection between the let-off controlling means and the let-off shaft, which may be released whenever it is desired to manually rotate the shaft and the warp beam. However, the let-off shaft and warp beam cannot be manually rotated in the direction to effect let-off of the warp sheet, unless the pawl 10 is first disengaged from the ratchet teeth 9. The manual lifting of this pawl would seriously hamper the manual adjustment of the warp beam, particularly if access to the pawl is obstructed by another loom or by a wall or post as is usually the case.

My invention provides means for automatically disconnecting a let-off controlling means, such as that above described, from a let-off shaft, whenever the latter is manually rotated in the direction to effect let-off of the warp sheet. To this end, in the embodiment shown on the drawing, I have provided a manually rotatable member consisting of a wheel 14 mounted on the shaft 3 being loosely mounted on the hub 15 of the gear 5, and cam means, to be described, for automatically lifting the pawl 10 whenever the wheel is manually rotated in a counterclockwise direction.

The member 14 is connected to the shaft 3 for rotating the latter in either direction, but preferably such connection provides a certain amount of lost motion between the member and shaft. To this end, the member 14 may be provided with a stop 16 for engaging one side of the arm 17, and a stop 17 for engaging the other side thereof, the stops being spaced apart a distance sufficiently greater than the width of the arm to provide the desired lost motion, the member being thus connected to the shaft 3 through the medium of the arm 5.

The particular member 14 shown is positioned between the pawl 10 and the gear 5, and a nose 16 on the pawl projects between the spokes of the member to engage the ratchet teeth as shown by Figs. 2 and 3. An integral extension 19 of the pawl extends in a position to be engaged by cam means which may consist simply of a cam surface 20 formed on the rim of the member 14. The parts are so constructed that in the normal operation of the loom the extension 19 is in contact with the bottom 21 of the cam surface 20, and the pawl 10 is engaged with one of the teeth 9, as shown by Fig. 3. The arm 11 is then in engagement with the stop 16 and thereby the arm 17 causes the member 14 to revolve at the same speed as shaft 3 and gear 5.

The member 14 is so constructed that it can be conveniently rotated by an operator's hand or foot, and in actual practice access to the member is never so obstructed as to prevent such manipulation. When this member is rotated in the direction to effect a taking up of the warp sheet, i.e., clockwise on Fig. 1, the pawl 12 rides over the teeth 9 as above noted. However, when the member is rotated in the opposite direction the stop 16 moves away from the arm 11 and the latter is not rotated until the lost motion is taken up and stop 17 engages the arm. During this interval, the cam surface 20 moves relative to the extension 19 and cam or lifts the pawl out of engagement with the ratchet. Thus, the connection between the let-off controlling means and the let-off shaft is automatically released whenever the member 14 is manually rotated in the direction to effect let-off movement of such shaft.

Since the means just described for releasing the connection between the let-off shaft and the controlling means is operated by rotary movement of the manually rotatable member 14, the operator is not required to watch the shaft and the warp beam. The warp beam can be conveniently rotated even from the front of the loom.

Having fully disclosed the preferred embodiment of my invention, I claim:

1. In a let-off mechanism for looms, the combination of a warp beam, a let-off shaft geared to said warp beam, mechanically operated means for controlling the rate of rotation of said shaft, said means being connected to said shaft by a releasable driving connection, a manually rotatable member connected to said shaft for rotating the latter in either direction, and means operated by said member for releasing said connection whenever said member is manually rotated in the direction effecting let-off movement of said shaft.

2. In a let-off mechanism for looms, the combination of a warp beam, a let-off shaft geared to said warp beam, an arm fixed to said shaft, mechanically operated let-off controlling means, a releasable connection between said means and said arm, a manually rotatable member connected to said shaft and connected thereto for rotating the same in either direction, and cam means automatically releasing said connection whenever said member is manually rotated in the direction effecting let-off movement of said shaft.

3. In a let-off mechanism for looms, the combination of a warp beam, a let-off shaft geared to said warp beam, an arm fixed to said shaft, mechanically operated let-off controlling means, a releasable connection between said means and said arm, a manually rotatable member connected to said shaft and connected thereto for rotating the same in either direction, and means including a cam surface on said member for automatically releasing said connection by and upon manual rotation of said member in the direction effecting let-off movement of said shaft.

4. In a let-off mechanism for looms, the combination of a warp beam, a let-off shaft geared to said warp beam, an arm fixed to said shaft, mechanically operated let-off controlling means, means including a pawl and ratchet releasably connecting said controlling means to said arm, a manually rotatable member connected to said shaft for rotating the same in either direction, and means including a cam surface on said member for automatically disengaging said pawl from said ratchet whenever said member is manually rotated in the direction effecting let-off movement of said shaft.

5. In a let-off mechanism for looms, the combination of a warp beam, a let-off shaft geared to said warp beam, an arm fixed to said shaft, let-off controlling means, means including a pawl and ratchet releasably connecting said controlling means to said arm, a manually rotatable member connected to said shaft for rotating the same in either direction, and a cam surface on said member directly engaging said pawl and lifting the same out of engagement with said ratchet whenever said member is manually rotated in the direction effecting let-off movement of said shaft.

6. In a let-off mechanism for looms, the combination of a warp beam, a let-off shaft geared to said warp beam, an arm fixed to said shaft, let-off controlling means, means including a
pawl and ratchet releasably connecting said controlling means to said arm, a manually rotatable member loosely mounted on said shaft and having a lost-motion driving connection therewith, and a cam surface on said member directly engaging said pawl and lifting the same out of engagement with said ratchet whenever said member is manually rotated the direction to take up the lost motion in said connection.

7. In a let-off mechanism for looms, the combination of a warp beam, a let-off shaft geared to said warp beam, an arm fixed to said shaft, mechanically operated let-off controlling means, a releasable connection between said means and said arm, said connection consisting of a ratchet and a pawl pivoted on said arm and releasably engaging said ratchet, a manually rotatable wheel loosely mounted on said shaft and having lost-motion driving engagement with said arm, and a cam surface on said member directly engaging said pawl and lifting the same out of engagement with said ratchet whenever said wheel is manually rotated to take up the lost motion between the wheel and said arm.

WILLIAM EDWARD LUNDGREN.