Dec. 15, 1942. A. J. HERARD, JR 2,305,422

WARP BEAM MOUNTING AND MECHANISM FOR LOOMS

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FIG. 1

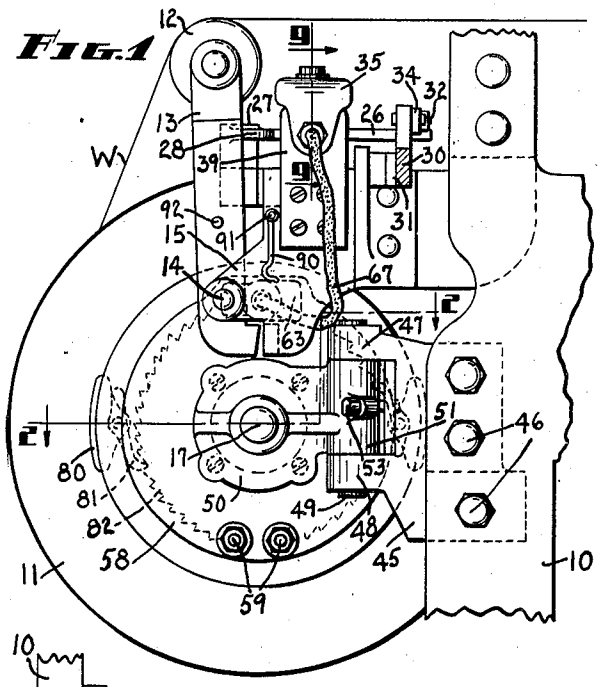


FIG. 4

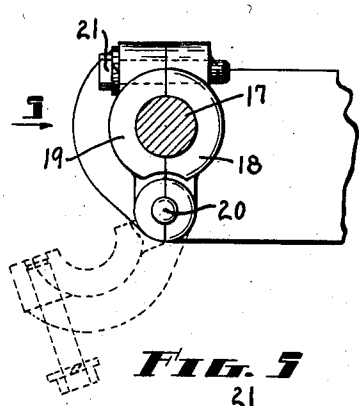


FIG. 5

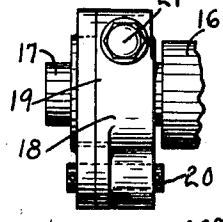


FIG. 2

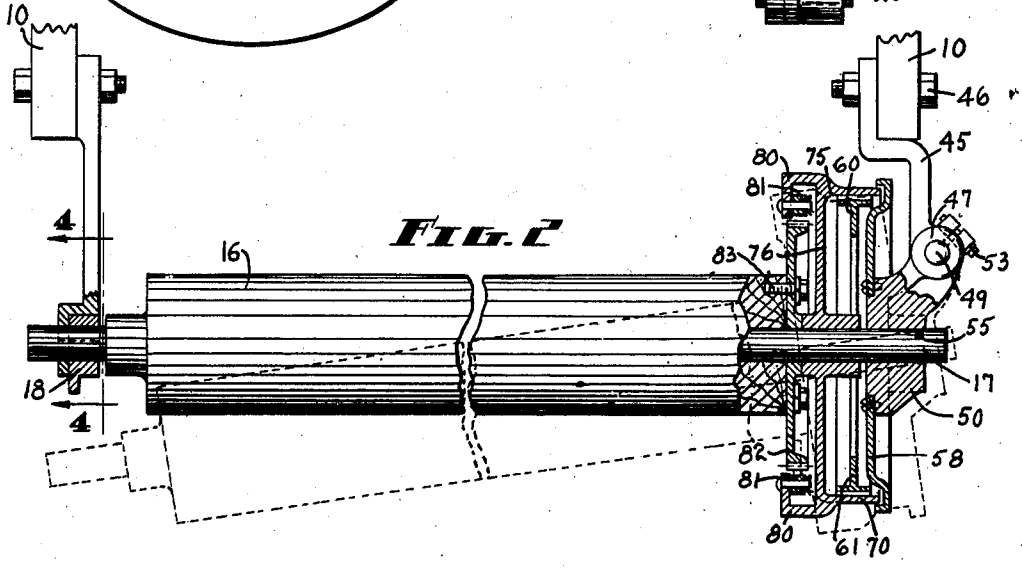
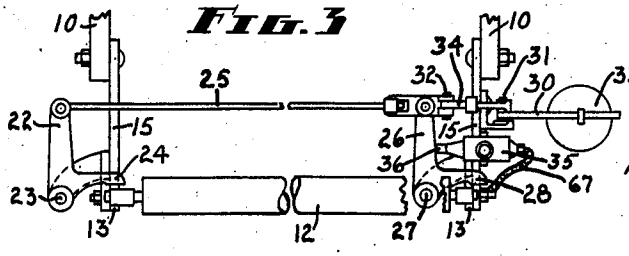


FIG. 3



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FIG. 6

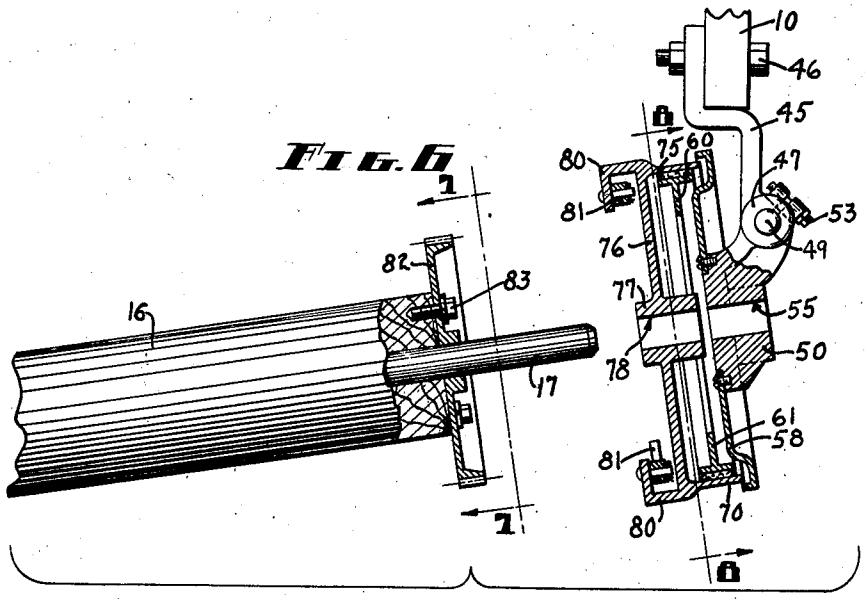


FIG. 7

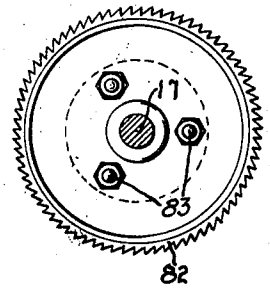


FIG. 8

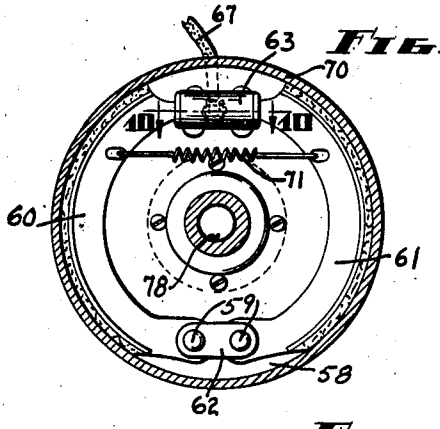


FIG. 9

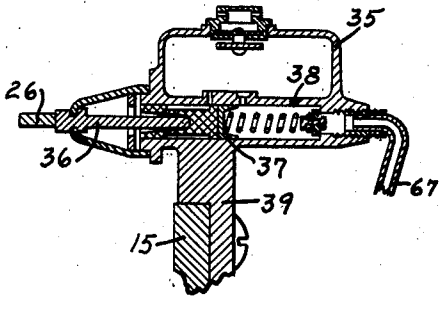
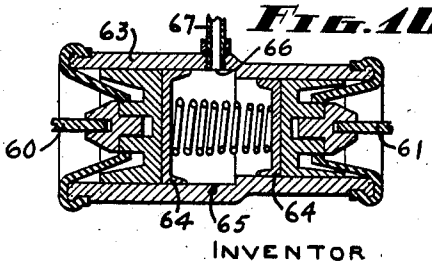


FIG. 10



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WARP BEAM MOUNTING AND MECHANISM FOR LOOMS

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Application June 4, 1942, Serial No. 445,790

12 Claims. (Cl. 139—109)

This invention relates to improvements in let-off mechanisms for looms and it is the general object of the invention to provide a let-off and mounting for the warp beam so constructed as to facilitate removal of the beam from the loom. Upon exhaustion of warp on the beam it is necessary to remove the latter from the loom and replace it with a full beam, but it is also desirable to disturb the let-off mechanism as little as possible in the exchange. It is an important object of my present invention to provide the warp beam with a pivoted support on which the let-off mechanism is mounted. The support swings on its pivot to permit the warp beam to be slid endwise away from the support and out of holding engagement with respect to the let-off mechanism without disturbing the latter.

In my co-pending application Serial No. 414,729 I have shown a hydraulically operated let-off mechanism for a loom which acts to permit rotation of the warp beam so that warp tension may be reduced when the tension reaches a given high maximum, and arrest rotation of the beam when sufficient warp has been paid off by turning of the beam. It is another object of my present invention to provide a hydraulic let-off mechanism mounted on an angularly movable support for one end of the warp beam which permits the latter to be swung out of alignment with its opposite support for the purpose of removal.

When a hydraulically operated let-off mechanism of the type set forth herein is employed it is desirable to hold the brake shoes against the beam drum so that these parts will not slip apart when the warp beam is removed from the loom. It is another object of my present invention to lock the hydraulic system so that it will hold the shoes and brake drum together during removal of the warp beam. The flexible hydraulic tube utilized in connection with my invention permits the angular motion of the beam support with respect to the loom while holding relation is hydraulically maintained between the two coacting parts of the brake.

In order to permit easy removal of the warp beam I employ a ratchet wheel fixed with respect to the beam for cooperation with holding pawls which are mounted on one of the brake parts. The ratchet wheel slides away from the pawls when the warp beam is removed and the beam is thus disconnected from the let-off mechanism without disturbance of the latter.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a side elevation of the rear portion of a loom having my invention applied thereto,

Fig. 2 is a horizontal section on line 2—2 of Fig. 1 showing the manner in which my invention operates to permit removal of the warp beam,

Fig. 3 is a diagrammatic plan view showing the control for the hydraulic system,

Fig. 4 is an enlarged vertical section on line 4—4 of Fig. 2,

Fig. 5 is a rear elevation looking in the direction of arrow 5, Fig. 4,

Fig. 6 is a view similar to a portion of Fig. 2 but showing the warp beam removed from its support and the let-off mechanism,

Fig. 7 is a vertical section on line 7—7 of Fig. 6, illustrating the ratchet wheel which may be employed with my invention,

Fig. 8 is a vertical section on line 8—8 of Fig. 6,

Fig. 9 is an enlarged vertical section on line 9—9 of Fig. 1 through the master cylinder of the hydraulic system, and

Fig. 10 is an enlarged horizontal section on line 10—10, Fig. 8, through the brake cylinder of the hydraulic system.

Referring to Figs. 1, 2 and 3, I have shown a loom frame 10 with a warp beam 11, and a whip roll 12 mounted on the upper ends of two levers 13, one at each side of the loom, pivoted at 14 to brackets 15 which are secured to and project rearwardly from the loom frame. The warp W extends upwardly from the warp beam, over the whip roll, and then forwardly, or to the right in Fig. 1, to the weaving instrumentalities of the loom not shown. The warp beam has a barrel 16 provided with a shaft 17 by which it is supported in the loom for rotation. The left hand bracket 15 as seen in Fig. 2 is provided with a bearing 18 for the left end of the beam shaft and a cap 19 pivoted at 20 to the bracket 15 is held in normal position by bolt 21 but can be swung down to the dotted line position shown in Fig. 4 when the beam is to be removed from the loom.

As seen in Fig. 3 the left hand bracket 15 has mounted thereon a lever 22 which swings horizontally about a vertical axis 23 on said bracket and has a lateral arm 24 for engagement with the adjacent upright lever 13. Lever 22 is connected to a rod 25 which extends across the loom and is connected to a second horizontal lever 26 pivoted at 27 with respect to the bracket 15 at the right side of the loom as suggested in Fig. 3,

Lever 26 is provided with an arm 28 similar to arm 24 and positioned for engagement with and movement by the lever 13 at the right side of the loom.

A lever 30 is pivoted at 31 to a fixed part of the bracket 15 at the right side of the loom and is connected by link 34 to pivot 32 at the right side of rod 25. A weight 33 is supported by the lever 30 and can move therealong to vary the amount of force exerted on the rod 25 and levers 22 and 26.

When the whip roll 12 moves forwardly the levers 13 engage the lateral arms 24 and 28 and cause counter-clockwise rotation of levers 22 and 26 as viewed in Fig. 3, thus causing movement of rod 25 to the left to rock lever 30 upwardly against the action of weight 33. When the whip roll is free to move rearwardly the weight 33 exerts a downward force on lever 30 and by means of link 34 and rod 25 causes the levers 22 and 26 to rock in a clockwise direction as seen in Fig. 3 to cause the arms 24 and 28 to move the levers 13 and therefore the whip roll rearwardly.

The matter thus far described may be similar to the structure set forth in the prior patent to Payne No. 2,184,059 to which reference may be had for a further description of the structure and operation of the mechanism which connects the whip roll and the weight.

The hydraulic system already referred to includes a master hydraulic pressure unit 35 which as shown in Fig. 9 is provided with a stem or plunger 36 connected to a piston 37 moving in a cylinder 38 containing oil or other fluid suitable for hydraulic operation. The unit 35 has a foot 39 secured to the adjacent bracket 15 and the stem 36 is positioned for engagement with lever 26 when the latter turns to the right as viewed in Fig. 3. When lever 26 moves to the left away from the stem pressure is relieved on the piston 37 and the latter can move to the left to relieve pressure on the fluid within the cylinder.

The master unit and the relation which it has to the lever 26 may be substantially the same as that set forth in my co-pending application previously mentioned. It is throught sufficient for present purposes to state that when the whip roll 12 moves forwardly lever 26 is rocked away from cylinder 38 and fluid pressure within master cylinder is reduced, but when the whip roll moves rearwardly the weight 33 acts to rock lever 26 against the stem 36 to increase pressure within the cylinder.

In carrying my present invention into effect I provide the loom frame with a beam bearing bracket 45 held in fixed position on the frame by bolts 46 and having top and bottom hubs 47 and 48, respectively, through which extends a pivot pin 49. The beam bearing 50 has a hub 51 which fits between the hubs 47 and 48 and turns on the pin 49. The hub or bearing 51 may be split if desired and clamped to the pin 49 by a bolt 53. The bearing 50 is provided with a bore 55 which receives the outer adjacent end of the beam shaft 17 and is the means by which the right end of the warp beam is supported for rotation. When the cap 18 is in the full line position shown in Fig. 4 the bearing 50 will be in the full line position shown in Fig. 2.

Secured to the bearing 50 is a disk 58 having secured thereto bolts 59 on which are pivoted front and back brake shoes 60 and 61, respectively, see Fig. 8. A link 62 may be used if desired to support the free ends of the bolts 59. A brake cylinder 63 is also secured to the disk and as shown in Fig. 10 is provided with a pair of pistons 64 slidable in a cylinder 65 having an inlet 66 connected by means of a flexible hydraulic tube 67 to the master cylinder 38. The pistons 64 engage the upper ends of the brake shoes and when the pistons are moved apart by an increase of fluid pressure within the brake cylinder the shoes are forced against a drum 70, but when fluid pressure within the brake cylinder is reduced a tension spring 71 connecting the brake shoes move the latter away from the drum.

As shown more clearly in Fig. 6 the drum 70 has a cylindrical shell 75 rigid with a web 76 provided with a hub 77 the bore 78 of which aligns with the bore 55 of the beam bearing 50. Oppositely disposed ears 80 on the web 76 have pivoted thereto hold pawls 81 for engagement with a ratchet wheel 82 bolted as at 83 to the adjacent end of the beam barrel 16. The pawls and teeth of the ratchet wheel are so related that when the drum 70 is held stationary as viewed in Fig. 1 the pawls will enter the ratchet teeth to prevent clockwise rotation of the beam, but when the drum is free to turn, tension in the warp will turn the warp beam clockwise as viewed in Fig. 1 and the ratchet wheel acting through the pawls will cause right hand rotation of the drum.

In normal operation the beam will be mounted as indicated in full lines in Fig. 2, and assuming that the whip roll 12 is in its rearmost position, lever 26 will force stem 36 to the right to develop sufficient fluid pressure within the hydraulic system to set the brake shoes against the drum 70 and prevent rotation of the latter and the warp beam. As the whip roll moves forwardly due to consumption of the warp, arm 28 will be advanced to move lever 26 away from the stem 36 and fluid pressure within the hydraulic system will be lowered to a point which will permit the spring 71 to move the brake shoes away from the drum 70. The warp beam is then free to turn to pay off sufficient warp to compensate for that previously used, and the resulting slackness in the warp thread will permit the weight 33 to move the whip roll rearwardly until the drum 70 is again locked stationary.

When the warp beam is empty and its removal from the loom is necessary, the cap 19 will be swung to the dotted line position of Fig. 4, the warp beam will be swung rearwardly to the dotted line position of Fig. 2 and will then be moved endwise away from the bearing 50 and drum 70. The ratchet wheel 82 slides out of engagement with the pawls 81 and the parts are temporarily in the position shown in Fig. 6. The warp beam can then be removed, and a fresh beam with a full supply of warp substituted by having its shaft slid into the bores 78 and 55, and its ratchet wheel meshed with the pawls, after which the beam is swung forwardly to the full line position of Fig. 2 and cap 19 is replaced.

It is desirable that the drum be held in the position shown in Fig. 6 during removal of the warp beam and this result can be accomplished by having the hydraulic system under sufficient fluid pressure to force the brake shoes tightly against the drum 70. In order to insure sufficient pressure for holding the drum in position I use a hook 90 pivoted at 91 to bracket 15 and mount a holding pin 92 for the hook on the adjacent lever 13. The hook is of such

length as to maintain the whip roll rearwardly far enough to permit weight **33** to force lever **26** against the stem **36** and thus maintain pressure within the system. It will be understood that the flexible fluid conductor **67** permits turning of the bearing **50** and the disk **58** while the master cylinder is held in fixed position.

From the foregoing it will be seen that I have provided a loom with a let-off mechanism mounted on a pivoted support for the warp beam. It will also be seen that the flexible fluid conductor **67** permits turning of the let-off mechanism with the beam bearing and therefore enables the master cylinder **35** to maintain sufficient pressure within the brake to hold the drum **70** fixed in the position shown in Fig. 6 while the beam is being removed. It will also be seen that the ratchet wheel **82** and the connection with the let-off mechanism which it has through the pawls **81** facilitates removal of a warp beam without disturbance of the let-off mechanism. Also, the hook **90** or its equivalent can be utilized to maintain fluid pressure within the hydraulic system sufficient to hold the drum **70** in the position shown in Fig. 6 while the beam is being removed. Furthermore, it will be seen that the let-off mechanism and beam bearing which facilitates removal of the warp beam can conveniently be mounted on a unit which swings around the pivot pin **49**.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a warp let-off mechanism for a loom having a frame and a warp beam provided with a shaft, a support for the shaft pivoted on the loom frame, a drum operatively connected to the warp beam, a hydraulic system including a master cylinder mounted in fixed position on the loom frame, a flexible tube connected thereto, and a hydraulic brake for the drum mounted on the support and connected to said tube, said master cylinder capable of acting through the tube to cause the hydraulic brake to control movement of the drum as the support moves pivotally on the loom frame because of the flexibility of said tube.

2. In a warp let-off for a loom having a frame on which is removably mounted a warp beam provided with a shaft, a support for the shaft pivotally mounted on the loom frame and movable angularly with respect to the latter to facilitate removal of the warp beam, a brake drum operatively connected to the warp beam and a hydraulic system for the brake drum to control movement of the latter, said system including a master cylinder fixed with respect to the loom frame, a flexible tube connected to the cylinder, and a hydraulic brake for the drum connected to said tube and mounted on the support in position to engage the drum for all angular positions of the support with respect to the loom frame.

3. In a warp let-off mechanism for a loom having a frame carrying a warp beam provided with a shaft, a support pivoted on the loom frame for said shaft, a drum operatively connected to the beam, brake shoes for the drum mounted on said support, a hydraulic actuator for the brake shoes mounted on the support, a hydraulic master cylinder, means to support the master cylinder in fixed position on the loom frame, an operator for the master cylinder, and a flexible tube connecting the master cylinder and actuator, the operator effective for different angular positions of the support with respect to the loom to cause the master cylinder to operate the actuator and cause the latter to hold the shoes against the drum.

4. In a warp let-off mechanism for a loom having a frame on which a warp beam is removably mounted, a shaft forming part of the warp beam, a drum mounted on the shaft and rotating with the beam, an actuator movable with respect to the frame to holding position, a master hydraulic cylinder mounted in fixed position on the loom frame for engagement with and operation by said actuator when the latter is in holding position, a support for the shaft pivoted on the loom frame for swinging movement when the beam is removed from the loom, hydraulic brake mechanism for the drum mounted on the support, and a flexible connection between the master cylinder and the hydraulic brake mechanism effective to maintain holding relation between the drum and the hydraulic brake mechanism for all angular positions of the support with respect to the loom frame when the actuator is in holding position.

5. In a warp let-off mechanism for a loom having a frame on which is removably mounted a warp beam having a shaft, a support for the shaft mounted pivotally on the loom frame to facilitate removal of the warp beam from the loom, brake shoes mounted on the support, a brake drum for the beam to engage the shoes and mounted on the shaft, a driving connection between the drum and the warp beam releasable by movement of the beam in the direction away from the drum, and hydraulic means including a master hydraulic cylinder fixed on the loom frame and a flexible tube connecting the master cylinder to the brake cylinder to hold the shoes against the drum to support the latter when the warp beam and shaft are moved longitudinally away from and out of engagement with the drum.

6. In a warp let-off for a loom having a frame on which is removably mounted a warp beam having a shaft, a support on the loom frame for the shaft, a drum on the shaft normally operatively connected to the beam and turning therewith but disconnectable from the beam by movement of the latter in a direction away from the drum, hydraulic brake means on the support to engage the drum, a hydraulic system including a master cylinder hydraulically connected to the brake means, and means to cause the master cylinder to actuate the brake means and cause the latter to hold the drum and prevent the latter from moving with the beam when the beam moves away from the drum.

7. In a warp let-off for a loom having a frame on which is removably mounted a warp beam having a shaft, a support on the loom frame for the shaft, a ratchet wheel surrounding the shaft and secured to the beam, a drum on the shaft, pawls on the drum to engage the ratchet and cause the drum and beam to turn together in one direction, said ratchet wheel being movable away from the pawls when the beam is moved in a direction away from the drum, hydraulic brake means on the support to engage the drum, a hydraulic system including a master cylinder hydraulically connected to the brake means, and means to cause the hydraulic system acting through the brake means to prevent the drum and pawls from moving with the beam when the latter moves away from the drum.

8. In a warp let-off for a loom having a frame on which is removably mounted a warp beam having a shaft, a support for the shaft pivotally mounted on the loom frame, a ratchet wheel surrounding the shaft and secured to the beam, a drum loosely mounted on the shaft, pawls on the drum to engage the ratchet wheel and cause the drum and beam to move together in one direction, said ratchet being movable away from the pawls when the beam moves away from the drum, a hydraulic brake on the pivoted support to engage the drum, a master hydraulic cylinder, a flexible tube to maintain hydraulic connection between the master cylinder and the brake when the support moves pivotally on the loom frame to facilitate removal of the beam, and means to cause the master cylinder acting through the tube and brake means to hold the drum and prevent movement of said drum and pawls with the beam when the latter and the ratchet wheel move away from the drum.

9. In a warp let-off for a loom having a frame on which is removably mounted a warp beam having a shaft, a support on the loom frame for the shaft, a drum on the shaft normally operatively connected to the beam and turning therewith but disconnectable from the beam by movement of the latter in a direction away from the drum, hydraulic brake means on the support to engage the drum, a hydraulic system including a master cylinder hydraulically connected to the brake, an operator for the master cylinder which when in holding position causes the master cylinder acting through the brake to hold the drum, and means to hold the operator in holding position and thereby hold the brake and drum during movement of the warp beam away from the drum.

10. A combined beam bearing and let-off unit for a loom having a frame supporting a master hydraulic cylinder and a warp beam provided with a friction drum and a shaft, said unit comprising a support having provision for pivotal mounting on the loom frame and having a bearing for the shaft, brake shoes on the support for the drum, a hydraulic brake cylinder mounted on the support and connected to the shoes for operation of the latter, and a flexible tube connected to the brake cylinder for attachment to the master hydraulic cylinder.

11. A combined beam bearing and let-off unit for a loom having a frame provided with a pivot and a warp beam provided with a friction drum and a shaft, said unit provided with means to receive the pivot of the frame and having a bearing for said shaft, a disk secured to said support around said shaft bearing, a hydraulic cylinder mounted on said disk, and brake shoes for the drum pivotally mounted on the disk and extending into operative relation with respect to the hydraulic cylinder.

12. A combined beam bearing and let-off unit for a loom having a frame provided with a pivot and a warp beam provided with a friction drum and a shaft, said unit having means for receiving said pivot of the frame, a bearing on said support to receive the shaft, a hydraulic brake cylinder mounted on the support, and brake shoes pivoted on the support and extending substantially concentrically around the axis of said shaft bearing and operatively related to the hydraulic brake cylinder.

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