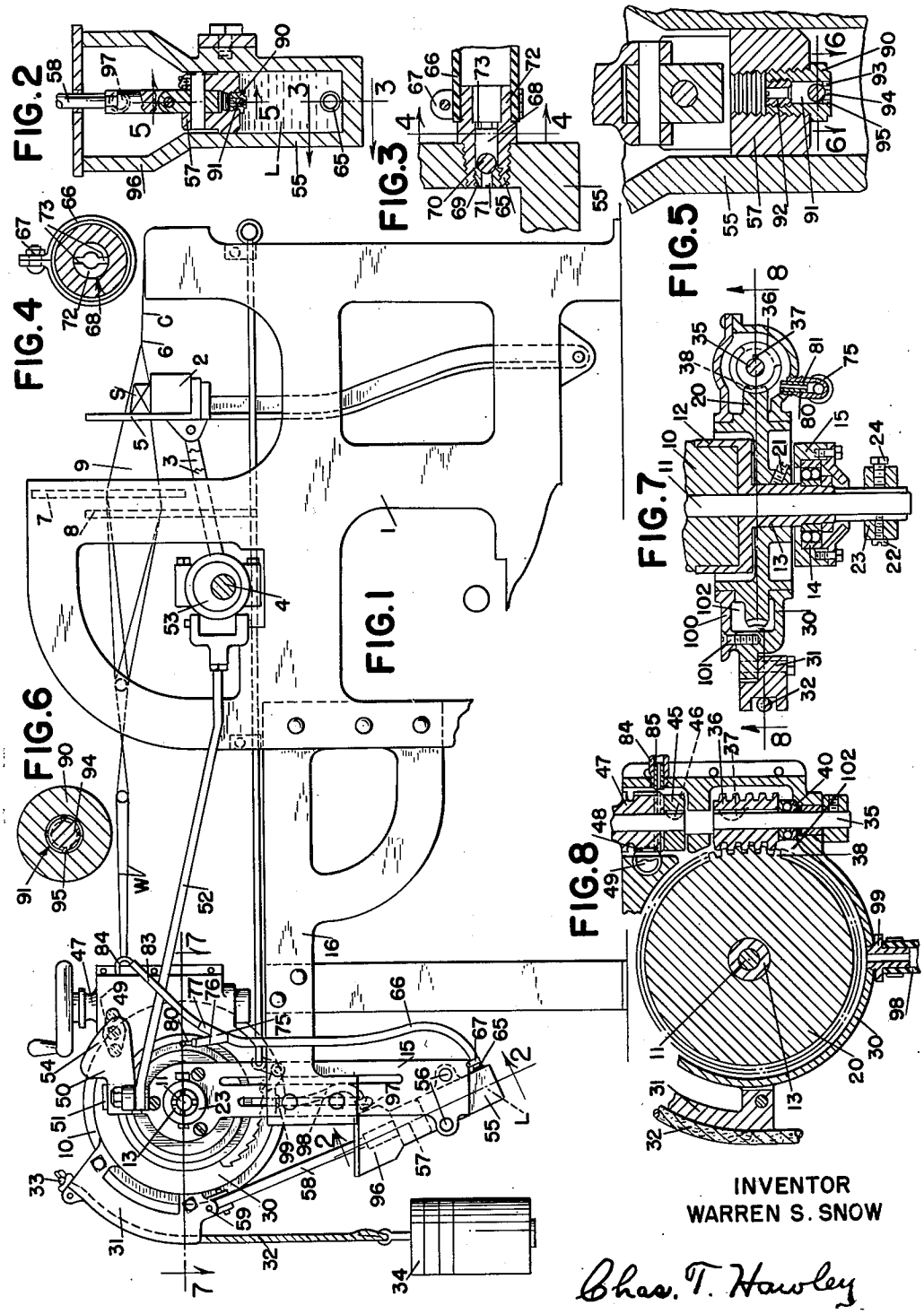
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LUBRICATING SYSTEM FOR LOOM LETOFFS

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LUBRICATING SYSTEM FOR LOOM LETOFFS

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This invention relates to improvements in loom letoff mechanism and it is the general object of the invention to provide simple means by which the mechanism can be lubricated by forces arising from operation of the letoff mechanism during loom operation.

A form of letoff mechanism which has gone into general use employs a worm gear fixed with respect to the warp beam meshing with a worm carried by a weighted casing or the like. The warp beam and worm wheel turn progressively in a forward direction to provide warp for the weaving operation, but the operation of the harness frames and the beat-up of the lay cause a temporary forward motion of the warp. The weight exerts a rearward force on the warp beam tending to turn it in a reverse direction to move the warp rearwardly after beat-up. The harness frames and lay operate regularly and together with the weighted member produce oscillation of both the warp beam and the weighted member. This oscillation is dampened but not completely eliminated by a dashpot or the like.

It is an important object of the present invention to provide means associated with the dashpot for lubricating the worm and worm wheel so that these parts of the letoff mechanism may be more responsive to the means which effects turning of the worm in order to effect a step-back of the weighted member with respect to the warp beam.

The means for turning the worm includes a form of clutch and rack and rack gear, the rack being operated by some part moving in time with the loom and the rack gear turning one of the clutch members to cause the other clutch member to turn the worm relatively to the worm wheel. It is a further object of the invention to lubricate this turning means for the worm by oil derived from the dashpot and directed against the means incident to oscillation of the warp beam as the weaving process continues.

The mechanism to be lubricated is ordinarily above the dashpot and in order that lubrication may start immediately upon operation of the loom it is a further object of the invention to provide a valve which will prevent return of oil from the point of lubrication to the dashpot during periods of idleness of the loom.

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

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

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Fig. 1 is a side elevation of part of a loom showing a letoff equipped with the present invention,

Fig. 2 is an enlarged longitudinal section through the dashpot and parts associated therewith on line 2—2, Fig. 1,

Fig. 3 is an enlarged vertical detailed section on line 3—3, Fig. 2, showing the valve which prevents return of oil from the point of lubrication to the dashpot,

Fig. 4 is an enlarged vertical section on line 4—4, Fig. 3,

Fig. 5 is an enlarged vertical section on line 5—5, Fig. 2, showing the piston in part of the dashpot,

Fig. 6 is an enlarged horizontal section on line 6—6, Fig. 5, showing the ball valve retainer and its bleeders on the lower part of the piston,

Fig. 7 is an enlarged horizontal section on line 7—7, Fig. 1, and

Fig. 8 is a vertical section on line 8—8, Fig. 7.

Referring to Fig. 1 the loom frame 1 supports a lay 2 which is reciprocated backwardly and forwardly by connectors 3 driven by the top or crank shaft 4. The lay has a reed 5 which effects beat-up at the fell 6 of the cloth C of weft threads laid by a shuttle S. The beat-up of the reed occurs once for each flight of the shuttle and has the effect of momentarily increasing the tension of the warp threads W when engaging the fell 6.

The warp threads are controlled by harness frames two of which are shown at 7 and 8. The mechanism for raising and lowering these harness frames is not set forth herein but operates to separate the warp threads into two sheets which define the warp shed 9. When the harness frames form a warp shed there is a momentary increase in the tension of the warp threads. It will thus be seen that due to the back and forth reciprocation of the lay 2 and operation of the shedding mechanism represented herein by the harness frames 7 and 8 the warp threads are subject to a varying tension.

The warp threads extend rearwardly and are wrapped around a warp beam 10 on a shaft 11. The end of the beam shown in Fig. 7 is provided with a member 12 having an integral tube 13 through which the shaft 11 extends. The tube 13 is supported by a ball bearing 14 mounted on the upper end of a stand 15 held in vertically adjusted position on a frame 16 extending rearwardly from the loom.

Surrounding the tube 13 is a worm gear member 20 held to the member 12 as by a set screw 21. A set screw 22 in a collar 23 surrounding a

split extension of the tube 13 is set against the shaft 11 so that the latter, the member 12 and the worm wheel member 20 turns as a unit with the warp beam 10. Collar 23 is secured to tube 13 by a set screw 24.

A hollow casing 30 is mounted to turn on the worm wheel member 20 concentric with the axis of the warp beam and shaft 11 and has secured to the rear part thereof, the left in Fig. 1, an arcuate casting 31 to the upper end of which a cable or rope 32 is held as at 33. The lower end of the cable supports a weight 34.

The casing 30 has journaled therein a shaft 35 to which a worm 36 is keyed as at 37. The worm 36 meshes with the worm wheel proper indicated at 38 forming part of the member 20. A bearing 40 between the casing 30 and the lower end of the worm 36 limits movement of the latter downwardly with respect to the casing, as will be apparent from Fig. 8. The weight 34 tends to turn the casing 30 in a counter-clockwise direction as viewed in Figs. 1 and 8 and the casing acting through the bearing 40 and the worm 36 tends to turn the worm wheel and the beam in a counter-clockwise direction so as to create tension in the warp threads.

As weaving continues the warp beam turns in a clockwise direction as viewed in Fig. 1 in order to supply weft for the cloth C and this effects clockwise movement of the casing against the action of weight 34, lifting the latter. In order to step the casing backwardly or in a counter-clockwise direction as viewed in Fig. 1 with respect to the beam, means shown more particularly in Figs. 1 and 8 is provided to turn the worm. A clutch member 45 is keyed as at 46 to shaft 35 and meshes with a second clutch member 47 slidable along shaft 35. This second clutch member is formed in part as a gear designated at 48 to mesh with a rack 49 slidable horizontally in the casing 30.

The support 15 has an operating lever 50 pivoted thereon as at 51 and a rod 52 extending forwardly from the lever to an eccentric 53 on the crank shaft 4 effects rocking of lever 50 during loom operation. The lever has a wing 54 for engagement with the rack 49 when the casing has been turned a sufficient angular distance in a clockwise direction as viewed in Fig. 1 to bring the rack within the range of operation of the wing 54. When this happens clutch member 47 will be turned to effect turning of the clutch member 45 keyed to shaft 35 and the resultant turning of the worm 36 will be in such direction as to permit the casing and the parts carried by it to be moved in a reverse direction, or counter-clockwise as viewed in Figs. 1 and 8 for a step back motion with respect to the warp beam. The rack 49 tends to move toward the wing 54, but when the casing has its reverse motion the rack will be moved to the left, Fig. 1, out of the range of the reciprocating wing 54 where it will remain until it is again moved forwardly for a repetition of the operation already described. In this way the casing is stepped back to keep the weight 34 rearward of the beam to maintain tension on the warp threads as the warp beam turns to supply warp for the weaving operation. During the time the rack is out of the range of action of the wing the worm and its worm wheel will be stationary with respect to each other and if there is any considerable force exerted by the weight 34, as may be necessary with certain types of warps, the lubrication between the worm and its wheel is squeezed out of place so as to increase the frictional resistance to turning of the worm with respect to the worm wheel.

During loom operation, the periodic forward motion of the warp due to action of the lay and shedding mechanism, and the subsequent rearward motion due to weight 34 as the lay moves away from the fell, causes the beam and the weighted casing to oscillate. Means to dampen this oscillation includes an oil cylinder 55 secured as at 56 to the support 15 and having mounted for reciprocation therein a piston 57 at the lower end of a rod 58 the upper end of which is connected as at 59 to the arcuate casting 31. The cylinder contains oil designated herein at L.

The matter thus far described may be substantially the same as that shown in prior patent to Payne No. 1,803,143 to which reference may be had for a more complete description of the operation of the letoff.

In carrying the present invention into effect provision is made for enabling reciprocation of the piston 57 in the cylinder 55 to lubricate parts of the letoff mechanism. A fitting 65 is screw threaded into the lower part of the cylinder 55 and has a flexible preferably rubber or neolite hose clamped thereto as at 67. Fitting 65 has a passage or bore 68 the left end of which as viewed in Fig. 3 is provided with a valve seat 69 for a ball valve 70. The seat has a port 71 through which oil can pass from the cylinder to the interior of the hose 66.

A ball trap 72, see Fig. 4, is located at the right end of the passage 68, Fig. 3, to limit travel of the ball within the fitting and has openings 73 which permit oil to pass around the ball when the latter is at the right end of the passage 68. The tube 66 extends upwardly and in the present instance is attached to a Y fitting 75 one branch 76 of which is for the worm and worm wheel and the other branch 77 of which is for the turning means for shaft 35 and worm 36. The branch 76 is connected to a fitting 80 tapped into the casing 30 and provided on the interior thereof with a reducer 81 the bore of which is directed toward the point of mesh between the worm and the worm wheel. Similarly, the branch 77 is attached to a hose 83 leading to a fitting 84 similar to fitting 80 but tapped into the casing 30 in a position so that it can direct oil against the upper clutch member 46, see Fig. 8. This fitting 84 may be provided with a reducer 85 similar to reducer 81.

The piston has screw threaded in the under side thereof a fitting 90 having a passage or bore 91 at the upper end of which is a valve seat 92. The lower end of the fitting is provided with a trap or stop 93 for a ball valve 94 movable in the passage 91. The trap 93 may be provided with bleeder ducts 95, see Fig. 6, which affords communication for oil from that part of the cylinder below the piston with the passage 91 and through the valve seat 92 to the part of the cylinder above the piston.

The cylinder may have a bell shaped upper end 96 into which is tapped a fitting 97 connected to the lower end of a return tube 98 the upper end of which is attached to a fitting 99 communicating with the interior of the casing 30. The latter is made substantially oil-tight by a plate 100, which as shown in Fig. 7, is secured to the casing as by a screw 101 so that the worm wheel 38 turns within a substantially closed compartment or space designated at 102 to the bottom of which oil will drip and thence through the tube 98 back to the bell 96.

In operation, the piston 57 will be moved downwardly in the cylinder 55 due to action of the weight 34 when there is a temporary slackening of the tension of the warp thread, and as the piston moves down the ball valve 94 will rise in the bore 91 against the valve seat 92 to prevent flow of oil upwardly from the cylinder through the piston. This exerts a force on the oil moving it through the port 71 and bore 68 and through the bleeder by-pass 73 into the tube 66, thereby raising the column of oil in the tube 66 and directing oil through the reducers 81 and 85 against their respective mechanisms to lubricate them.

When the piston 57 rises in the cylinder due to a temporary increase in the tension of the warp threads at beat-up of the lay or warp shed opening the ball 70 will move to the left, Fig. 3, against the seat 69 to prevent return of oil from the hose 66 to the cylinder 55, thereby maintaining the column of oil in the hose 66. During this upward motion of the piston the ball 94 will be in low position, but oil can pass through the bleeder passages 95 downwardly from the bell 96 into the lower part of the cylinder. Any excess of oil provided by the lubricating system will pass out of the bottom of the casing 30 into the bell 96 and be re-used for lubricating purposes as the loom continues to run.

While provision is shown herein for lubricating both the worm and worm wheel and also the means for turning the worm, lubrication of the latter may be omitted, but it is desirable to lubricate the worm and worm wheel since considerable force is exerted between these two parts and their engaging surfaces should be kept lubricated.

From the foregoing it will be seen that the invention sets forth simple means for lubricating parts of a letoff mechanism by a dashpot which serves to dampen oscillation of the warp beam. The piston 57 on its downward stroke causes oil to issue from the reducers 81 and 85 against their respective mechanisms, and when the piston rises in the cylinder 55 the ball valve 70 will prevent return of oil from the tube 66 to the cylinder, thereby maintaining a column of oil in the tube so that lubrication will start immediately upon resumption of weaving after a period of idleness on the part of the loom. While a specific form of letoff mechanism has been shown the invention is not necessarily limited to such a mechanism but is useful wherever the letoff operation has some part which oscillates and has other parts requiring lubrication. The invention can be readily applied to letoffs now in use with the addition of very little more oil than that required for the dashpot. No additional means, such as a pump, is required to effect circulation of oil through the system and this circulation starts immediately upon resumption of weaving and stops as soon as the loom is brought to rest.

Having thus described the invention it will be seen that changes and modifications of the foregoing specific disclosure may be made without departing from the spirit and scope of the invention.

What is claimed as new is:

1. In a loom having a warp beam turning progressively during loom operation in a direction to supply warp for the weaving operation of the loom, loom operated means periodically increasing warp tension and acting through the warp to turn said beam in said direction, weighted means effecting reverse turning of the beam, said loom operated and weighted means effecting oscillation of the beam during loom operation, gearing operatively connecting said beam and weighted means normally causing the beam and weighted means to oscillate in unison but effective incident to loom operation to reverse the weighted means relatively to the beam, a dashpot including a cylinder for oil and a piston therein operatively connected to the weighted means, and a lubricating system for said gearing connected to said cylinder and operative due to movement of the piston in said cylinder incident to oscillation of said weighted means to supply oil from the cylinder to said gearing.

2. In a loom having a warp beam turning progressively in a given direction to supply warp for the weaving operation of the loom, means tending to turn the beam in the opposite direction, gearing operatively connecting the means to the beam, loom operated mechanism cooperating with said means to effect oscillations of the beam and means during loom operation, a dashpot including a cylinder for oil and a piston therein operatively connected to the means to dampen said oscillations, and a lubricating system connected to said cylinder operative to lubricate said gearing due to movement of said piston in said cylinder incident to said oscillations.

3. The structure set forth in claim 2 wherein the lubricating system includes a return for oil from said gearing to said piston.

4. The structure set forth in claim 2 wherein the lubricating system includes a tubular member leading from the cylinder to said gearing and a valve preventing return of oil from said tubular member to said cylinder.

5. The structure set forth in claim 2 wherein a casing above said cylinder incloses said gearing and the lubricating system includes a gravity return for oil from the casing to the cylinder.

6. The structure set forth in claim 2 wherein a casing above said cylinder incloses said gearing and the lubricating system includes a tubular member leading from the cylinder to the casing to feed oil for lubricating said gearing and a check valve to prevent return of oil from the casing to the cylinder through said tubular member.

7. In a loom having a warp beam turning progressively in a given direction to supply warp for the weaving operation of the loom, a worm gear secured to and turning with the beam, weighted means coaxial with and mounted for rotation relative to said beam, worm means rotatable on said weighted means meshing with said worm gear and normally causing said weighted means and beam to move angularly in unison, means to rotate said worm on said weighted means to effect angular movement of the weighted means relative to the beam in a direction opposite to said given direction, loom operated means cooperating with the weighted means causing oscillation of said beam and weighted means during loom operation, and a lubricating system having a part connected to said weighted means effective due to said oscillation of the latter to lubricate said worm means.

8. In a loom having a lay and a warp beam turning progressively in a given direction to supply warp for the weaving operation of the loom, a worm gear secured to and turning with the beam, weighted means coaxial with and mounted for rotation relative to said beam, worm means rotatable on said weighted means and meshing with said worm gear, mechanism to turn the worm means to effect rotation of the weighted

means relative to the beam and worm gear in a direction opposite to said given direction, the lay cooperating with said weighted means and worm and worm gear causing oscillations of the beam and weighted means during loom operation, and a lubricating system having a part connected to said weighted means effective due to said oscillations to lubricate said worm means during loom operation.

9. In a loom having a warp beam turning progressively in a given direction to supply warp for the weaving operation of the loom, a worm gear secured to and turning with the beam, weighted means coaxial with and mounted for rotation relative to said beam and including an inclosed casing within which said worm gear is located, worm means rotatable on said weighted means and meshing with said worm gear, mechanism to turn the worm means to effect rotation of the weighted means relative to the beam and worm gear in a direction opposite to said given direction, means including a loom operated part cooperating with said weighted means and worm and worm gear causing oscillations of the beam and weighted means during loom operation, and a lubricating system connected to the interior of said casing having a part connected to said weighted means effective due to said oscillations

to lubricate said worm means during loom operation.

10. In a loom having a warp beam turning progressively in a given direction to supply warp for the weaving operation of the loom, means tending to turn the beam in the opposite direction, mechanism operatively connecting said means and beam effecting movement of the means relative to the beam in a direction opposite to said given direction, a lay cooperating with said means and mechanism to cause oscillation of said means during loom operation, and a lubricating system operative due to said oscillation of said means to lubricate said mechanism.

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