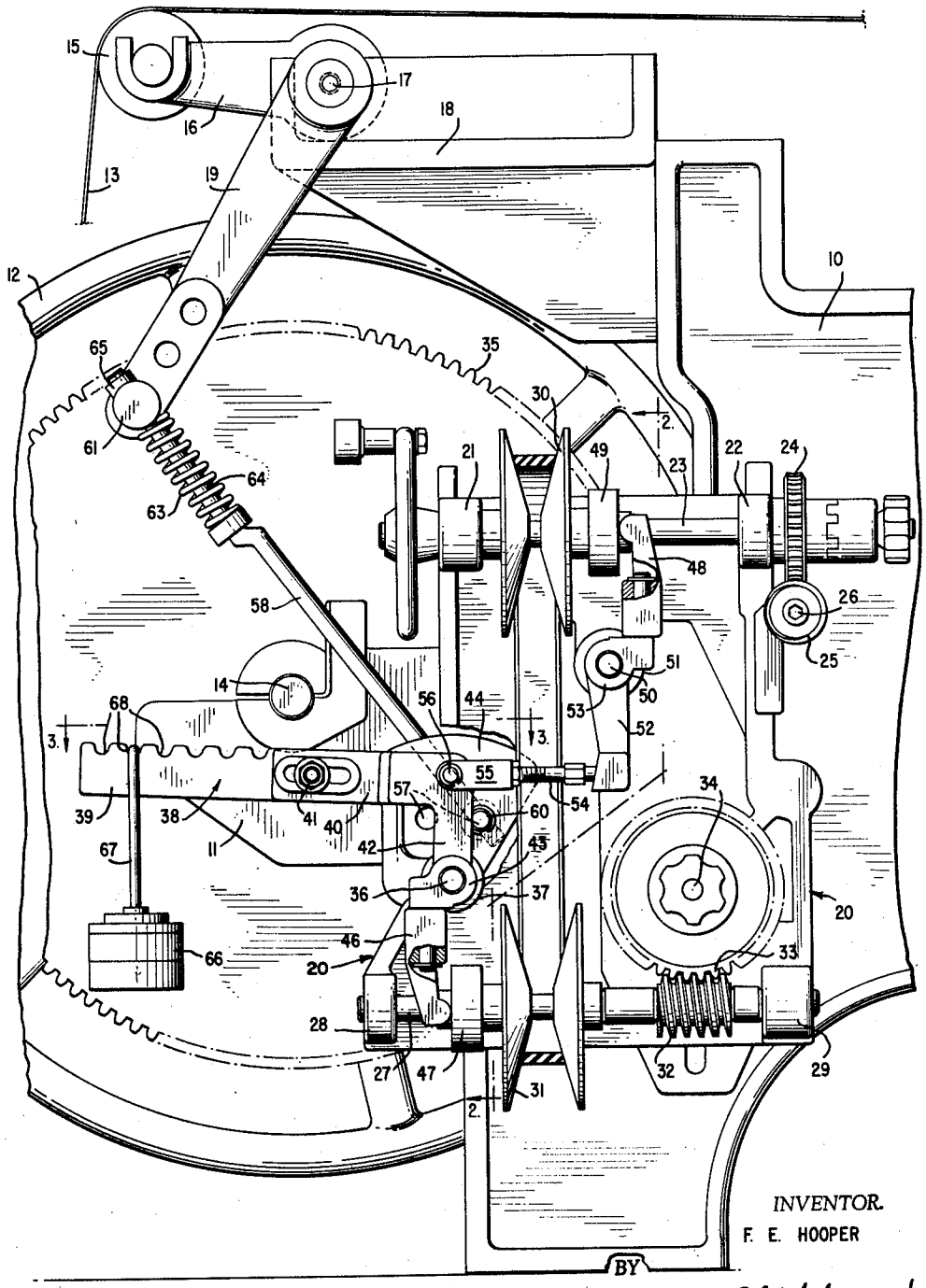
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LET-OFFS FOR LOOMS AND THE LIKE

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FIG. 1



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FIG. 2

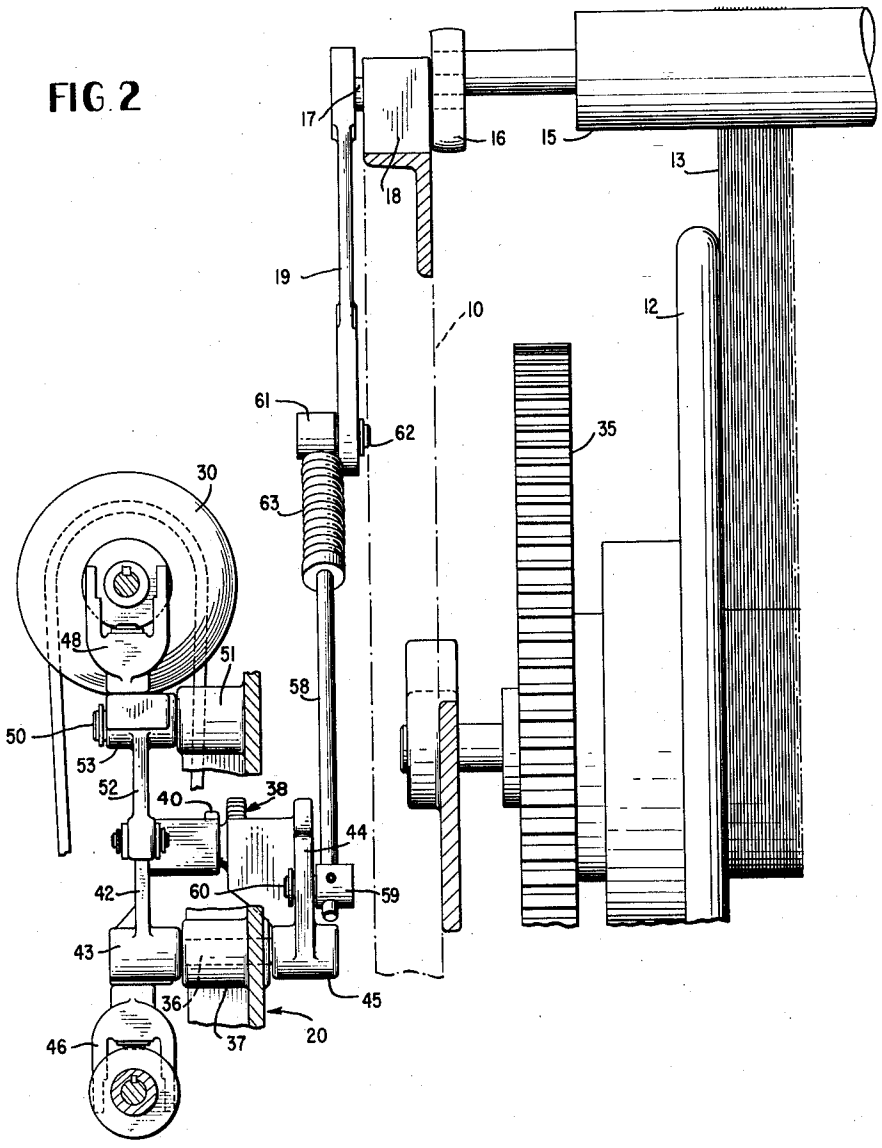
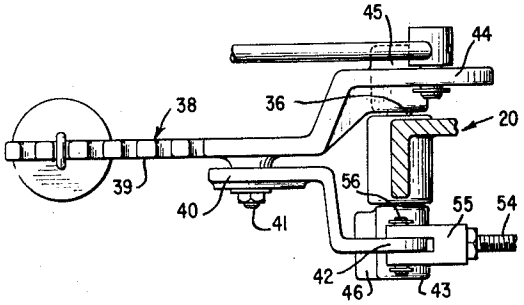


FIG. 3



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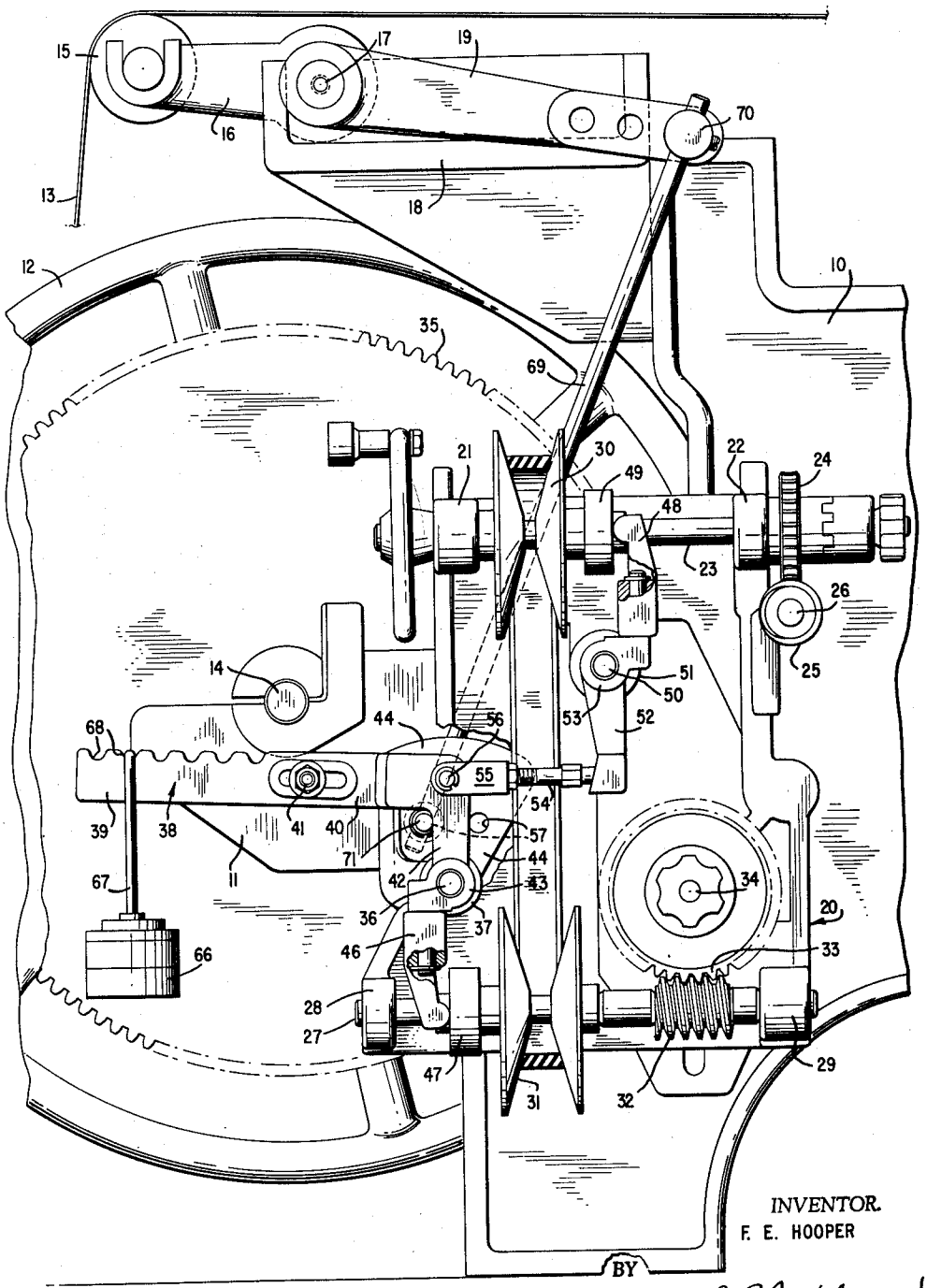
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FIG. 4



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LET-OFFS FOR LOOMS AND THE LIKE

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7 Claims. (Cl. 139—110)

This invention relates to let-offs for looms and the like and more particularly is an improvement and refinement of the let-off mechanism in United States Patent 2,786,491 to Hunt.

The Hunt let-off covered by the above-mentioned prior patent is a commercially successful device but like all such devices involves certain weaknesses and undesirable features, and it is the primary object of this invention to eliminate the weaknesses and undesirable features of the Hunt let-off and to generally simplify and render more economical the construction and maintenance of the same and to also render more efficient and reliable the operation of the let-off mechanism.

More specifically, a main object of the invention is to provide an improved let-off mechanism for looms which compared to the mechanism in said prior patent eliminates a number of parts without eliminating their functions, the resulting new mechanism being considerably cheaper to manufacture and considerably more efficient in operation.

Another object is to improve upon and simplify the counterweight lever linkage of the let-off mechanism, thereby increasing the sensitivity of the let-off and eliminating entirely the tendency of binding in the main pivot of the counterweight lever as well as twisting of this lever, these objectionable features being present to a certain degree in the mechanism covered by the mentioned prior patent.

Another important object is to provide a loom let-off mechanism which may receive the operating force transmitted by the whip roll either as a tension force or as a compressive force, as found desirable for various applications.

Other objects and advantages of the invention will be apparent during the course of the following detailed description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

FIGURE 1 is a fragmentary side elevation of a loom equipped with the improved let-off according to one preferred embodiment of the invention,

FIGURE 2 is a fragmentary vertical section with parts omitted taken on line 2—2 of FIGURE 1,

FIGURE 3 is a fragmentary horizontal section taken on line 3—3 of FIGURE 1, and

FIGURE 4 is a side elevational view similar to FIGURE 1 showing a slight modification of the let-off mechanism.

The prior Hunt Patent 2,786,491, above-mentioned, fully describes the purpose and mode of operation of the let-off upon a loom in connection with regulating the feeding of warps from the beam of the loom continuously and with a substantially constant linear velocity and under substantially constant tension. The basic purpose and mode of operation of the let-off remains the same for the present invention and the basic construction is the same and it is therefore unnecessary in this application to repeat in detail all of the basic construction and mode of operation as set forth in the mentioned Hunt patent, which patent is incorporated herein by reference.

Referring first to FIGURES 1–3 of the drawings, the numeral 10 designates one loom side including a bearing bracket 11 rigid therewith. Another like bearing bracket, not shown, is carried by the opposite loom side, not shown. The loom beam 12 from which the warps 13 are unwound under control of the let-off has an arbor 14 journaled upon the bearing brackets 11 and supported thereby between the loom sides. The usual whip roll 15 over which the warps 13 pass under tension is cradled on whip roll mounting arms 16, carried by shafts 17, rockably mounted upon the support extensions or brackets 18, rigid with the loom sides, as shown. As shown in FIGURE 1, operating arms or levers 19 adjustably rigidly secured to the rockable shafts 17 depend therefrom outwardly of bearing brackets 18 and form with the arms 16 generally L-shaped bell cranks which are vertically swingable on the axes of the shafts 17.

The improved let-off comprises generally a mounting plate 20, rigidly secured to the adjacent loom side 10 in the manner disclosed in the aforementioned Hunt patent and this mounting plate constitutes the member upon which the operating components of the let-off mechanism are supported.

Mounting plate 20 has upper bearing parts 21 and 22 integral therewith, upon which is journaled for rotation an input let-off shaft 23 carrying a worm gear 24, driven by a worm 25, on a shaft 26, which rotates continuously throughout the operation of the loom. An output left-off shaft 27 is journaled for rotation in bearing parts 28 and 29 carried by the lower end of mounting plate 20 and the input and output shafts 23 and 27 are parallel. Power is transmitted from the input shaft 23 to the output shaft 27 by adjustable cone pulleys 30 and 31 on the input and output shafts respectively, as fully described in the Hunt patent. Output shaft 27 carries a worm 32 meshing with and driving a worm gear 33 on a let-off shaft 34, and which shaft carries a spur pinion, not shown, meshing with and driving a large spur gear 35, rigid with the beam 12 and serving to turn the latter. All of this construction is conventional and is fully shown and described in the aforementioned Hunt patent.

In the improved let-off, a sturdy pivot pin or shaft 36 is rockably mounted in a bearing 37 formed integral with the mounting plate 20 near the left-hand side thereof, FIGURE 1, and somewhat above the output shaft 27. The location of the pivot pin 36 constitutes an important feature of this invention and an important change over the construction in the Hunt patent. As shown best in FIGURES 2 and 3, the pivot pin 36 extends through the bore of bearing part 37 and beyond opposite sides of mounting plate 20, for the pivotal support of a two-part vertically swingable weight lever 38 including sections 39 and 40, rigidly connected at 41. As viewed in FIGURE 1, the two-part weight lever 38 is generally L-shaped and rockable upon the axis of the pivot pin 36. It is shorter than the corresponding weight lever 57 in the Hunt patent, which long lever is pivoted at 58 to the distant side of the mounting plate 14 in such patent.

In the present construction, an inner laterally offset extension 42 of weight lever part 40 extends downwardly from the main body portion of the weight lever, FIGURE 1, and has a hub 43 rigidly mounted upon one end portion of pivot pin 36. A corresponding laterally offset portion 44 of lever part 39 extends downwardly in spaced opposed relation to the extension 42 and has an integral boss 45, rigidly mounted upon the other end portion of pivot pin 36. Consequently, the spaced offset parts 42 and 44 constitute a rather broad yoke on the weight lever 38 pivoted at the lower end of this yoke with the spin 36 upon the bearing 37, FIGURES 2 and 3. This construction provides a relatively wide and very stable pivotal mounting for the weight lever 38 which will not

bind or twist under the rather heavy stresses imparted through the weight lever to its pivot pin 36. The length of the weight lever 38 projecting from the pivot pin 36, FIGURE 1, is relatively short, compared to the length of the weight lever 57 projecting from its pivot 58 in the prior Hunt patent. However, due to the L-shaped configuration of the present weight lever 38 and the linkages to be described, connected therewith, no mechanical advantage is lessened or lost as compared to the Hunt patent construction and the pivotal mounting of the weight lever 38 is much more sturdy and much more resistant to binding on the pivot 36. Also the shorter weight lever 38 which is substantially symmetrical about the bearing 37, FIGURE 3, is much more resistant to twisting than is the corresponding longer weight lever 57 of the Hunt patent having a cantilevered support or pivot on one projecting end of the pivot pin 58 in the Hunt patent.

Rigid with the hub 43 and depending therefrom is a forked lever or yoke 46 engaging a thrust element 47 on the axially shiftable section of cone pulley 31. This lever or yoke 46 is therefore swingable on the axis of pivot pin 36 directly with the weight lever 38. In the prior Hunt patent, the corresponding lever 39 having arms 39*a* was mounted upon a separate pivot remote from the weight lever pivot 58, as shown in FIGURE 1 of the Hunt patent and this necessitated additional linkage parts which have been entirely eliminated in the present construction without the loss of their functions.

In the present construction, an additional forked lever 48 engages a thrust element 49 on the adjustable section of cone pulley 30, and the lever 48 is mounted upon a pivot pin 50, supported in a bearing part 51 formed integral with mounting plate 20. A depending lever extension 52, rigid with the hub 53 of lever 48, has its lower end connected with an adjusting screw shaft 54, in turn secured to a clevis 55, having its forward end pivoted at 56 to the extension 42 of weight lever 38 near the top thereof, FIGURES 1 and 3. Consequently, movement of two-part weight lever 38 upon its pivot pin 36 causes direct operation of forked levers 46 and 48 to directly adjust the variable diameter cone pulleys 31 and 30. In the prior Hunt patent, the weight lever 57 swings on its pivot 58 and the two pulley adjusting levers 38*a* and 32*a* are both swingable on independent pivots and through the medium of interconnecting linkage parts 56, 61, 62 and 39*a* which have all been totally eliminated in the present improved and simplified construction. The weight lever pivot 58 of the Hunt patent has also been eliminated in the present construction and the pivot pin 36 herein serves a dual function for the pivotal mounting of the weight lever 38 and the lever 46. The construction is much more simplified and more direct operating than in the prior Hunt patent and fewer adjustments are necessitated and there is much less chance for error in the let-off mechanism through a build up of manufacturing tolerances, as will be obvious to anyone skilled in the art.

With continued reference to the drawings, the offset portion 44 of weight lever 38, FIGURE 1, has a pair of spaced openings 57, above and on opposite sides of the pivot pin 36. When the reaction force through the whip roll 15 is to be transmitted to the weight lever assembly 38 as a compressive force, FIGURE 1, a compression rod 58 has its lower end secured within a swivel head 59, pivoted through a pin 60, mounted within the right-hand opening 57, FIGURE 1. The upper end of compression rod 58 is secured within a swivel head 61, pivoted at 62 adjustably on the lower end of arm or lever 19. The head 61 acts against a compressible coil spring 63 on an offset portion 64 of rod 58, said spring urging the head 61 upwardly toward a stop 65 on the upper end of rod 58 and forming a yielding connection between the arm 19 and the compression rod 58 through which force is transmitted compressively from the whip roll 15 to the weight lever assembly. Suitable weight means 66 is

suspended as at 67 from a selected notch 68 of weight lever portion 39, as shown.

The general mode of operation of the let-off for controlling the feeding of the warps 13 is substantially identical to the mode of operation fully described in the Hunt Patent 2,786,491. The weights 66 constantly tend to turn weight lever 38 counterclockwise on the axis of pivot pin 36. This also turns lever 46 counterclockwise on pivot pin 36 tending to increase the effective diameter of variable cone pulley 31. Simultaneously, through elements 55, 54 and 52, lever 48 tends to be turned clockwise on its pivot 50 by weights 66, tending to reduce the pitch diameter of variable cone pulley 30. Constantly counteracting the effect of weights 66 is the action of whip roll 15 under the tension of warps 13, tending to swing lever 19 counterclockwise on shaft 17 and through rod 58 tending to turn weight lever 38 clockwise on pivot pin 36 against the action of weights 66, as described in the Hunt patent.

As the supply of warp yarns on beam 11 diminishes in diameter, the angular velocity of the beam must increase in order to maintain the desired constant linear velocity of the warp yarns. The necessary adjustment of the variable pulleys 30 and 31 is automatically effected by the variations in tension of the warp yarns causing shifting of the whip roll 15 and therefore movement of the weight lever 38 and associated parts to regulate the variable cone pulleys as described in the Hunt patent. The improvement herein resides basically in simplification and strengthening of the mechanical construction and in a more direct, simplified and efficient mode of operation to accomplish the same objectives specified in the Hunt patent.

FIGURE 4 shows a slight modification of the invention wherein the effect of the tension of the warps 13 upon the whip roll 15 is transmitted to the weight lever 38 in tension rather than in compression, and this mode of operation is desirable in some applications of the equipment. To effect this result, each arm or lever 19 is first adjusted and locked on each shaft 17 so as to extend longitudinally of the adjacent arm 16 in opposed relation thereto. Instead of the compression rod 58 and spring 63, previously described, a straight tension rod or link 69 is employed, having its top end swiveled at 70 to the arm 19 and its lower end pivoted at 71 to the left-hand pivot opening 57 of lever portion 44. All other parts shown in FIGURE 4 and their functions are identical to the corresponding parts shown and described in connection with FIGURES 1–3.

In FIGURE 4, the warp tension on the whip roll 15 tends to turn arm 19 upwardly or counterclockwise upon its pivot 17 and tension is imparted through the rod 69 to the weight lever assembly 38, tending to turn the same clockwise on the axis of pivot pin 36, thus accomplishing the same results as by the use of the compression force transmitting means from the whip roll shown in FIGURE 1. In every other respect, the let-off is constructed and functions in the manner previously described for the prior embodiment of the invention and described in the mentioned Hunt patent.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

What is claimed is:

1. In a loom let-off, a mounting plate adapted to be secured to a loom side, an input rotary shaft journaled upon said mounting plate near the top thereof, a first variable pulley mounted upon said input shaft, means driven by the cam shaft of the loom to turn said input shaft, an output shaft journaled upon said mounting plate near the bottom thereof in space parallel relation to the input shaft, a second variable diameter pulley on said output shaft, a transmission belt engaging said pulleys to

transmit power from the input to the output shaft, a let-off shaft extending at right angles to the ouput shaft and driven thereby and journaled upon said mounting plate, the improvement comprising a bearing part on said mounting plate near one side thereof and intermediate the input and output shafts and relatively close to the output shaft and having a through bore, a pivot pin extending through said bore and projecting beyond opposite sides of the mounting plate, a weight lever unit, said unit comprising an elongated weight holding arm spaced above and extending beyond one side of said pivot pin and an integral depending extension on one end of said arm which is outwardly offset from said arm to lie on one side of the mounting plate, said extension provided at its lower end with a bearing part receiving one end portion of said pivot pin, said unit further comprising an L-shaped arm secured to one side of said arm in opposed relation to said extension and being outwardly offset to lie upon the other side of said mounting plate and depending from said arm and provided at its lower end with a bearing part receiving another end portion of said pivot pin, said unit rockable upon the axis of said pivot pin, a dependent forked lever integral with the bottom of said L-shaped arm and straddling said output shaft and engaging said pulley of the output shaft to operate the same directly in response to swinging movement of said unit, a second forked lever independently pivoted to said mounting plate above said unit and pivot pin and straddling the input shaft and engaging said pulley thereon, adjustable linkage means interconnecting the second forked lever and said L-shaped arm near the top of the latter so that swinging movement of said unit causes pivoting of the second forked lever, and additional linkage means connected with said extension and with the whip roll of the loom and operated by the latter to turn said unit in a direction opposite to its movement under influence of weights on said weight holding arm.

2. In a loom let-off, a mounting plate attachable to a loom side, input and output rotary shafts journaled upon said mounting plate in space parallel relation, variable pulley means interconnecting the input and output shafts, power operated means on the loom to rotate the input shaft during loom operation, let-off shaft means on the loom driven by said output shaft and controlling the feeding of warp yarns from the beam of the loom, the improvement comprising a pivot pin intermediate said input and output shafts at right angles thereto and mounted upon the mounting plate and extending on opposite sides thereof, a generally L-shaped weight lever unit including a weight holding arm which is generally parallel to said shafts and a dependent portion at one end of said arm which is bifurcated to straddle said mounting plate, the lower ends of said bifurcated dependent portion mounted upon end portions of said pivot pin, whereby said weight lever unit is swingable upon the axis of said pivot pin, a forked lever integral with one side of said bifurcated portion and depending therefrom and extending below the pivot pin and engageable with said pulley means on the output shaft, another forked lever independently pivoted to the mounting plate above and on one side of the pivot pin and engageable with said pulley means on the input shaft, linkage means interconnecting said unit and last-named forked lever, and additional linkage means interconnecting said unit and the whip roll of said loom.

3. In a loom let-off, a mounting plate attachable to a loom side, a pivot pin secured to the mounting plate near one edge thereof and extending substantially at right angles to the plane of the mounting plate and having projecting parts on opposite sides of the mounting plate, a generally L-shaped weight lever unit including a bifurcated end portion which straddles said one edge of the mounting plate, the lower ends of said bifurcated portion having openings receiving said projecting parts of the pivot pin, the said weight lever having an elongated generally level weight holding arm which is substantially centered between said projecting parts and spaced above said pivot pin at the top of said bifurcated portion, variable speed transmission means on the mounting plate driven by the loom and connected with and driving the loom beam, control linkage means for said transmission means connected with one side of said bifurcated portion, and means operated by the whip roll of the loom and connected with the other side of said bifurcated portion eccentrically of the pivot pin.

4. The invention as defined by claim 3, and wherein the last-named means includes a compression rod to transmit force from the whip roll to the weight lever unit.

5. The invention as defined by claim 4, and resilient means connected with said compression rod to cushion the reaction force from the whip roll.

6. The invention as defined by claim 3, and wherein the last-named means includes a tension rod to transmit the reaction force from the whip roll to the weight lever unit.

7. In a loom let-off, a mounting plate attachable to a loom side, a pivot pin mounted upon the mounting plate and having end portions projecting beyond opposite faces of the mounting plate, a weight lever unit, said unit including an elongated generally level weight holding arm and a bifurcated depending extension on one end of said arm straddling said mounting plate and having openings receiving said end portions, variable speed transmission means on the mounting plate driven by the loom and connected with and driving the loom beam, control linkage means for said transmission means connected with one side of said bifurcated extension, the other side of said extension having a pair of spaced openings formed therethrough eccentrically of the pivot pin for selective attachment to additional linkage means connected with the whip roll of the loom.

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