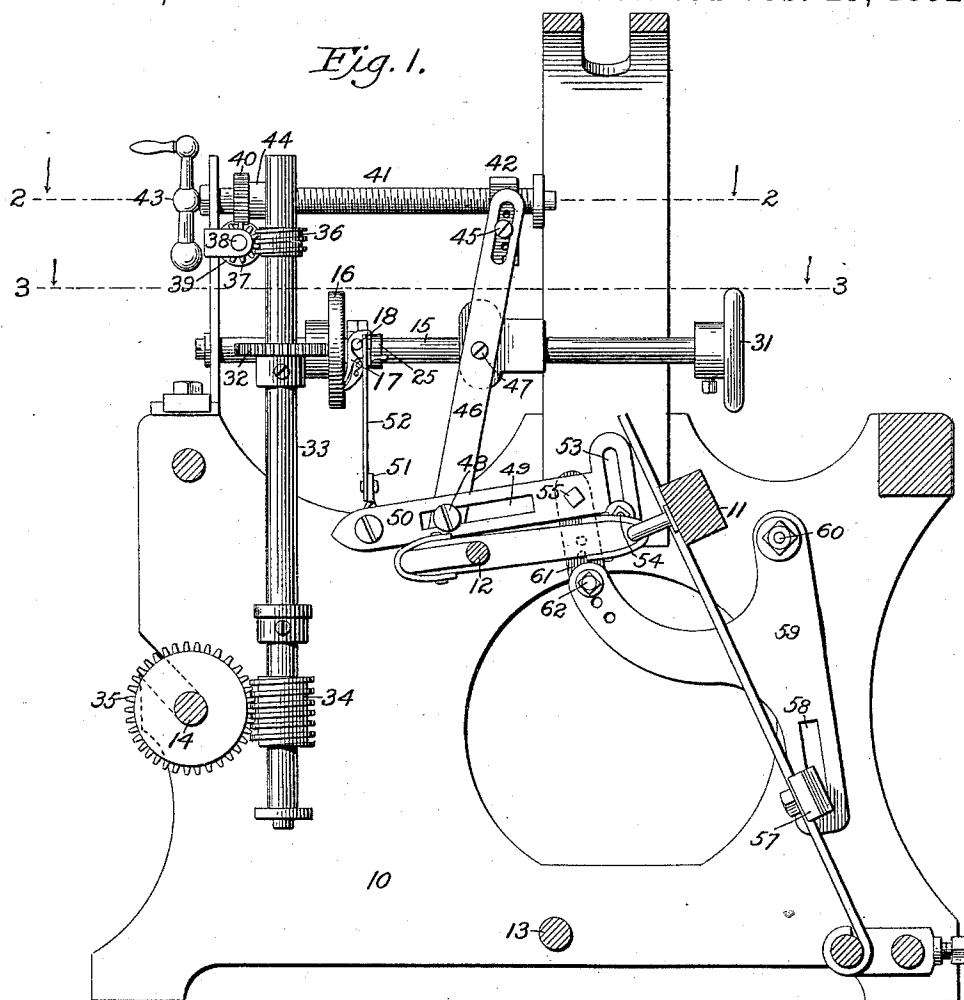
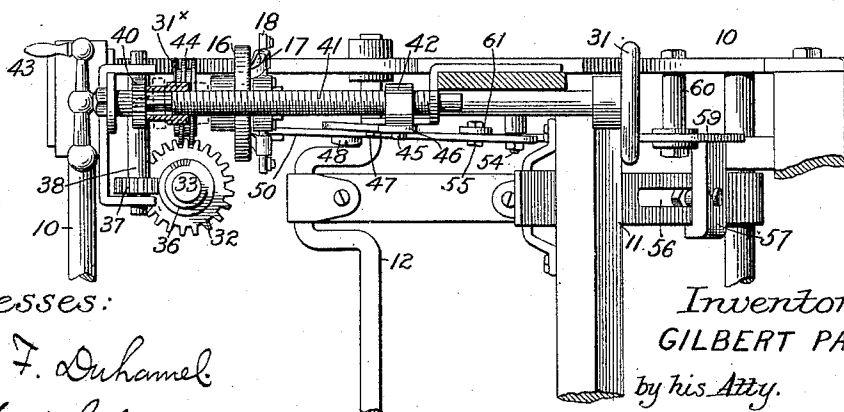


G. PARK.

POSITIVE LET-OFF MECHANISM FOR LOOMS.

No. 469,267.

Patented Feb. 23, 1892.

*Fig. 1.**Fig. 2.*

Witnesses:

James F. Duhamel  
Geo. W. Whitney.

Inventor:  
GILBERT PARK,  
by his Atty.

*R. L. Ewin*

(No Model.)

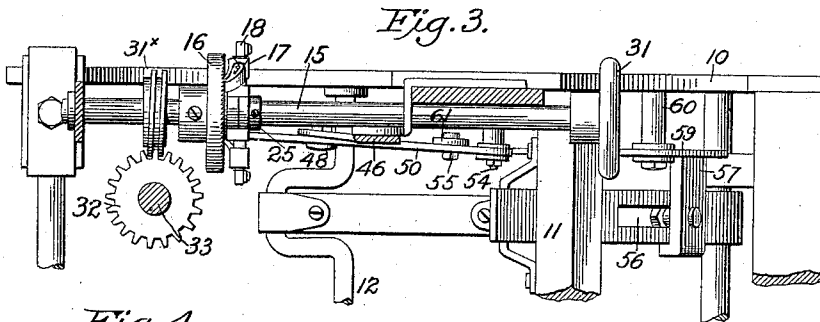
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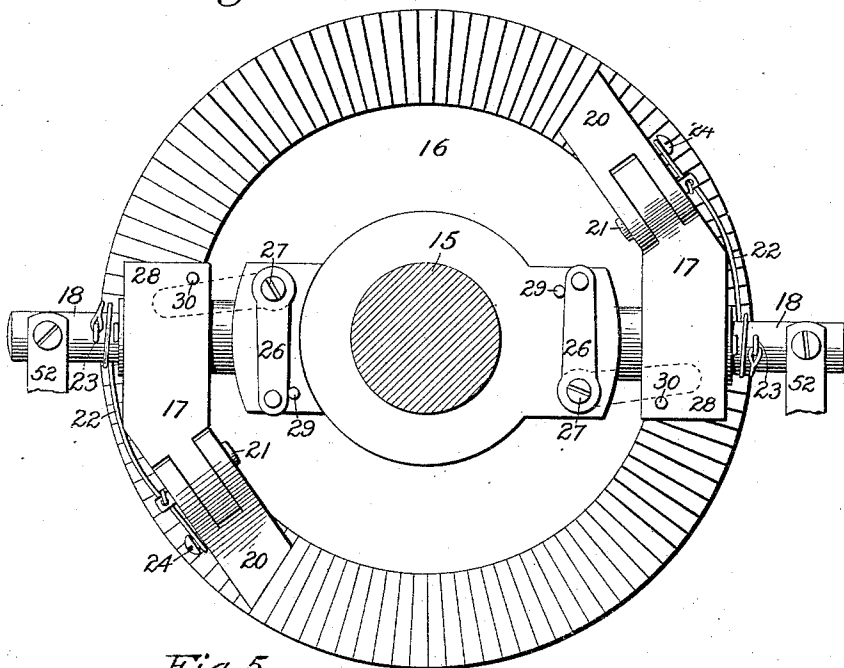
POSITIVE LET-OFF MECHANISM FOR LOOMS.

No. 469,267.

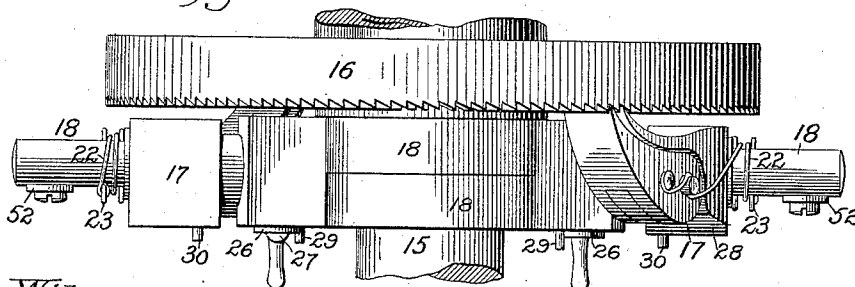
Patented Feb. 23, 1892.



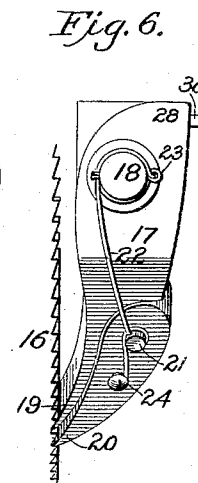
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*

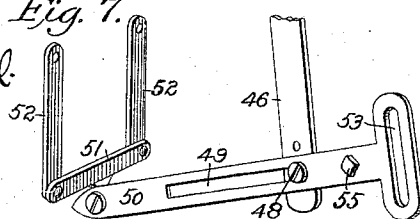


Witnesses

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*Fig. 7.*



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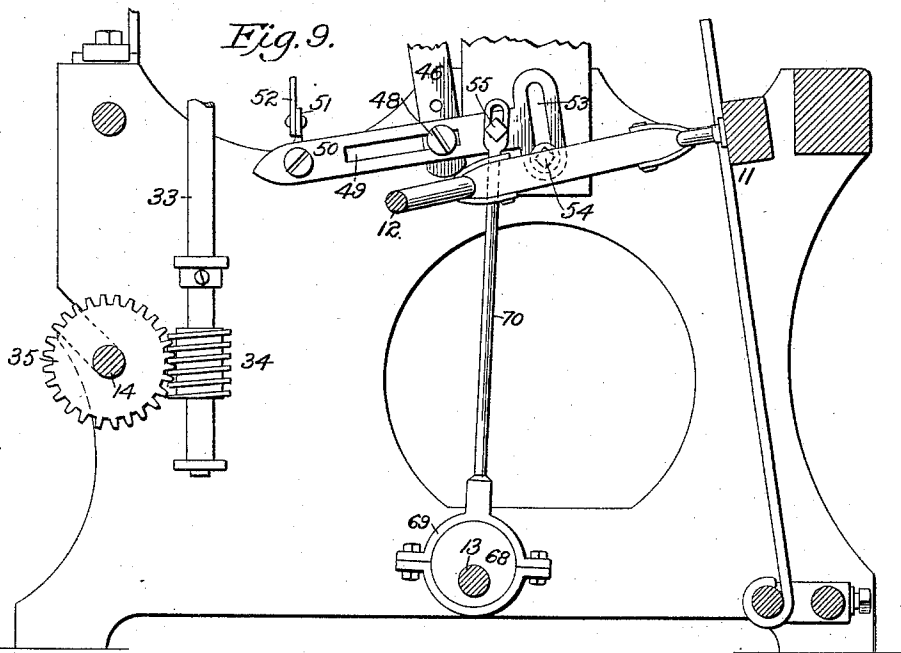
by his Atty.

*Wm. L. Edwin*

4 Sheets—Sheet 3.

# POSITIVE LET-OFF MECHANISM FOR LOOMS.

Patented Feb. 23, 1892.



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(No Model.)

4 Sheets—Sheet 4.

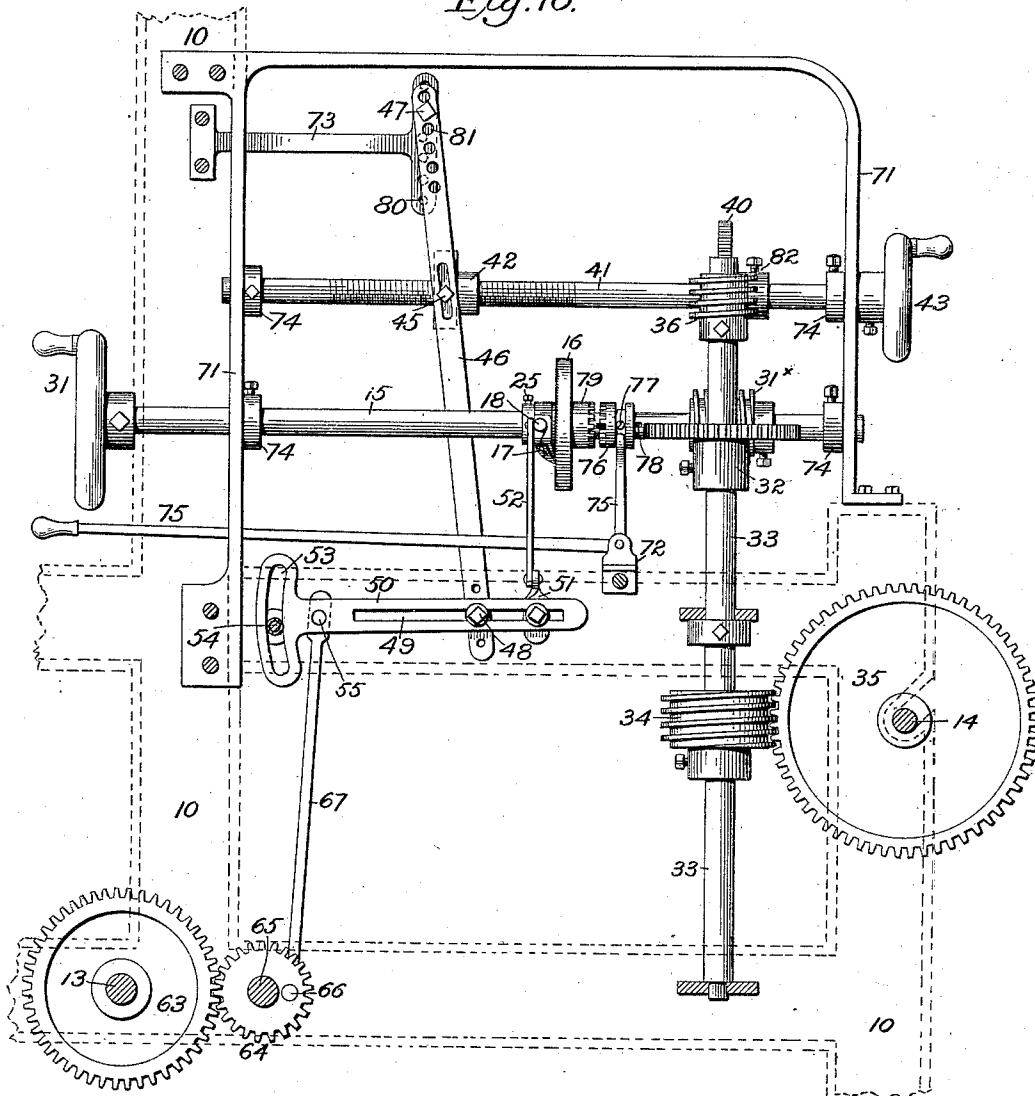
G. PARK.

POSITIVE LET-OFF MECHANISM FOR LOOMS.

No. 469,267.

Patented Feb. 23, 1892.

*Fig. 10.*



*Witnesses:*

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# UNITED STATES PATENT OFFICE.

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## POSITIVE LET-OFF MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 469,267, dated February 23, 1892.

Application filed January 29, 1891. Renewed December 2, 1891. Serial No. 413,787. (No model.)

*To all whom it may concern:*

Be it known that I, GILBERT PARK, a citizen of the United States, and a resident of Wales, in the State of Massachusetts, have invented a new and useful Improvement in Positive Let-Off Mechanism for Looms, of which the following is a specification.

This invention consists in certain novel combinations of parts hereinafter set forth and claimed.

Its general object is to provide ordinary power-looms with an absolutely "positive" let-off.

The objects of the respective new combinations are, first, to adapt the dogs of the ratchet mechanism to operate with certainty in transmitting the requisite slow motion when the warp-beam is full, as well as the more rapid motion which follows as the diameter of the warp-beam is reduced; secondly, to render the action of the dogs more nearly continuous, so as to facilitate accurately timing the motion of the beam; thirdly, to provide by novel means of superior simplicity for conveniently lifting the dogs when the warp-beam is to be turned by hand, in case of pick-outs and the like; fourthly, to connect a positive-motion "graduater" with the ratchet mechanism in a new and effective way; fifthly, to connect the graduater with the warp-beam by a novel combination and arrangement of parts, and, sixthly, to effectually transmit motion to the ratchet mechanism from the lay in a peculiar manner. The ratchet mechanism may alternatively receive its motion from the main shaft of the loom instead of from the lay, as hereinafter set forth.

Four sheets of drawings accompany this specification as part thereof.

Figure 1 of the drawings represents a vertical cross-section through the frame warp-beam spindle through shafts and lay of an ordinary power-loom provided with my improved let-off mechanism. Fig. 2 is a fragmentary plan view, partly in section, on the line 2 2, Fig. 1. Fig. 3 is a like view, partly in section, on the line 3 3, Fig. 1. Fig. 4 is a face view of the crown-wheel of the ratchet mechanism, showing the dogs, dog-carriers, and dog-lifters on a larger scale. Fig. 5 is a top view of the dogs, dog-carriers, and dog-lifters as

seen in Fig. 4. Fig. 6 is a detail edge view of one of the dogs on the same scale as Figs. 4 and 5. Fig. 7 is a perspective view of some of the connections detached. Figs. 8 and 9 are partial views similar to Fig. 1, illustrating alternative connections between the main shaft and the ratchet mechanism; and Fig. 10 is a fragmentary end view of a different make of loom provided with improved let-off mechanism, illustrating additional modifications of the same invention.

Like reference - numbers indicate corresponding parts in the several figures.

The frames represented at 10 are those of ordinary power-looms, which are readily provided with the supplemental bearings and supports demanded by the improved let-off mechanism.

An ordinary lay is represented at 11. The ordinary crank-shaft for actuating the lay is represented at 12, the ordinary main shaft at 13, and an ordinary warp-beam spindle at 14.

The ratchet-shaft of the improved let-off mechanism (represented at 15) extends horizontally from front to rear and is provided with a crown ratchet-wheel 16, facing the front of the loom and provided with teeth as small as may be required. A pair of dogs 17 in mesh with the ratchet-wheel 16 are pivoted on a pair of dog-carriers 18, with their pivotal axes radial or substantially radial to the longitudinal axis of the ratchet-shaft and are preferably of the peculiar construction represented in Figs. 4, 5, and 6. As here shown, each dog is constructed with a main point 19 integral with its body and with a supplemental point 20 located on the back of said main point and connected with the body of dog by a pivot-pin 21, Fig. 6, which in common with the ends of the two points is radial to the axis of the ratchet-shaft. The extremity of the supplemental point is half a tooth or one and a half teeth in advance of the extremity of the main point, and it is thus readily insured that one point or the other shall be brought opposite the face of a fresh tooth by each backward movement of the dog-carrier. In the case of the dog shown at the left in Figs. 4 and 5 and represented by Fig. 6 such backward movement is upward. The backward movement of the other dog is down-

ward. As the face of the ratchet-wheel 16 is vertical, it is necessary to throw the points of the dogs into mesh therewith, by springs or thelike. A single spring-wire 22, attached to the pin or pins 23, by which the dog is held on the pivotal portion of its carrier and applied to the pivot-pin 21 and to a stud 24 on the point 20, as shown in Fig. 6, may suffice for this purpose and also to fasten in place the pivot 21. By duplicating the dogs, as well as their points, their adaptation to bite effectively after the smallest backward movement may be further increased; but the primary object of so duplicating the dogs in this improved let-off mechanism is to provide that one shall be working while the other is retracted, so as to render the transmitted motion practically continuous.

The two dog-carriers are pivoted together on the ratchet-shaft 15 immediately in front of the ratchet-wheel 16 and between its hub and a collar 25, Figs. 1 to 3 and Fig. 10, made fast on the ratchet-shaft. In said arrangement (represented by Figs. 1 to 7, inclusive) dog-lifters 26, Figs. 4 and 5, in the form of little hand-crankes are attached by pivotal screws 27 to the respective dog-carriers in front and coact with the inclined heel ends 28 of the respective dogs, and stops 29 30, suitably located on the dog-carriers and dogs, respectively, provide for stopping the lifters in the retracted positions in which they are shown in full lines in Fig. 4 and in their effective positions, in which they are represented by dotted lines in this figure. These dog-lifters are immediately in front of the operator at a convenient height and within easy reach from the front of the loom, and the front end of the ratchet-shaft is provided with a hand-wheel 31 for actuating it when the dogs are lifted, so as to turn the warp-beam by hand.

Motion is transmitted from the ratchet-shaft 15 by means of a worm 31<sup>x</sup>, fast thereon, and a worm-wheel 32, fast on a vertical shaft 33, which in turn carries a worm 34 in mesh with the customary worm-wheel 35, fast on the warp-beam spindle. The upper end of the vertical shaft 33 carries another worm 36, which in Figs. 1, 2, and 3 is meshed by a pinion 37 on a short horizontal shaft 38, which in turn carries a worm 39, and this is meshed by a pinion or small worm-wheel 40 on the graduator-shaft 41, common to all the improved arrangements. The graduator-shaft may be and is thus located above and parallel with the horizontal ratchet-shaft 15, and at the same time driven through wheels of small diameter, so as to be readily accommodated on looms as now made.

The graduator-shaft is screw-threaded and provided with a screw-nut 42, which in said Figs. 1, 2, and 3 travels backward under the action of the screw-thread as the warp unwinds. For returning the nut by hand when a new warp-beam is introduced the rear end of the graduator-shaft 41 is provided with a

hand-crank or crank-wheel 43, and the worm-gearing is adapted to be disconnected or unclutched—as, for example, by splining the little worm-wheel 40 to the graduator-shaft with provision for its lateral movement, as represented by dotted lines in Fig. 2, and further providing the graduator-shaft with a clutch-nut 44, Figs. 1 and 2, by which the worm-wheel is normally fastened in its working position.

In Figs. 1 and 2 the graduator-nut 42 is constructed with a depending wing, into which a screw 45 is tapped, the shank of which is embraced by a slot in the upper end of a lever 46, common to all the improved arrangements, having a fixed pivot 47 and carrying a tap-screw 48 at or near its lower end, which tap-screw 48, working in a slot 49 in the substantially horizontal portion of a lever 50, forms a movable fulcrum for said lever, which is the central and main device for transmitting motion to the dog-carriers 18, with which said lever 50 is connected at its rear end by a T-shaped link 51 and pitmen 52 at the respective extremities of the horizontal portion of this link and suitable pivotal connections, as indicated. The rear end of the lever 50 has a vertical or cross portion, rendering it also T-shaped or substantially of this form, and provided with a slot 53, through which a steady-pin or guide-stud 54 projects from the loom-frame.

Between the slots 49 and 53 the lever 50 is provided with a suitable connection 55 for the devices, whereby motion is transmitted to the ratchet mechanism.

In Figs. 1, 2, and 3 the lay 11 is provided with a slot 56 in its upright adjacent to said lever 50. A vertically-adjustable arm 57 is attached to the lay by a screw passing through said slot 56, and said arm 57 has a wrist which works in a slot 58 in the lower end of a three-ended lever 59, which is pivoted at one end on a fixed stud-pin 60 and is connected at the extremity of its third end with said lever 50 by means of its said connection 55 and a link 61, the link and the adjoining lever end being each provided with a series of holes common to their coupling-bolt 62, so as to render the connection adjustable.

In the modification represented by Fig. 8 the main shaft 13 is provided inside the frame with a spur-wheel 63, which is meshed by a spur-wheel 64, the circumference of which is preferably one-half that of said wheel 63 and which turns on a stud-shaft 65 and is provided with a crank-pin 66, from which a pitman 67 extends to said connection 55 of the lever 50, where it may be slotted, as shown, to reduce the transmitted length of stroke to any required extent. The remainder of the mechanism may be as already described.

In the modification represented by Fig. 9 the main shaft 13 is provided with an eccentric 68, embraced in customary manner by a "strap" 69, which is connected by a slotted rod 70 to the lever 50 at said connection 55.

An adjustable eccentric may obviously be substituted for the eccentric 68 on the main shaft, and other like modifications will suggest themselves to those skilled in the art.

5 In Fig. 10 a different pattern of loom-frame is represented at 10 in the foreground by dotted outlines, and in full lines suitable frame attachments 71 72 73 are shown, additional to said guide-stud 54 and stud-shaft 65,  
10 by way of example, for supporting and guiding the moving parts of the modified let-off mechanism, more particularly represented by the figure. Said frame attachment 71 forms the bearings for the ratchet-shaft 15 and the  
15 graduator-shaft 41, which are conveniently provided with stop-collars 74 to coact therewith. Said frame attachment 72 forms a fulcrum for a fork-lever 75, the handle end of which projects below the hand-wheel 31 at the  
20 front of the loom as part of a substitute for said dog-lifters 26 and their appurtenances. The fork-lever 75 is of L shape, and its fork coacts with a clutch-slide 76, through which a screw 77 projects into a spline slot or groove  
25 78 in the ratchet-shaft 15. The other member of a spur-clutch is formed on the hub 79 of the ratchet-wheel 16, within which the ratchet-shaft turns freely when the clutch is open, as in the figure, so as to be manipulated  
30 by means of the hand-wheel 31 with great convenience. The weight of the handle end of the fork-lever 75 may suffice to render the clutch normally closed or a spring may be suitably applied, as between the clutch-slide  
35 76 and a collar on the shaft 15, for this purpose. Said frame attachment 73 forms an elevated support for the fulcrum 47 of the lever 46 and means for adjusting said fulcrum to vary the leverage of a given lever. For  
40 this purpose the flat vertically-extended extremity of the frame attachment is provided with a series of tapped holes 80 and the upper end of the lever 46 with a longitudinal series of smooth holes 81 to receive a shouldered screw in different positions, as the fulcrum 47. In this arrangement the graduator-nut 42 must travel forward together with the  
45 traveling fulcrum 48 of the transmitting-lever 50 as the warp unwinds, and the screw-thread of the graduator shaft and nut 41 42 of the worm 36 must be modified accordingly, as compared with those represented in Figs. 1, 2, and 3. The other worms are so cut as to properly transmit the unwinding motion from the ratchet-wheel 16 to the warp-beam. By  
50 employing a large enough wheel (one of ten hundred and twenty-four teeth) at 40 on the graduator-shaft 41 such wheel is adapted to be meshed directly by a suitable worm at 36, so as to dispense with said short shaft 38, together with its pinion 37 and worm 39, Figs. 1, 2, and 3; but the improved let-off mechanism can be used on looms as now made to better advantage by compounding the motion,  
55 as before set forth.

To provide for turning the graduator-shaft independently by means of the hand-wheel

43, said large wheel at 40 is simply fastened on the shaft by a screw 82, tapped into its hub, so as to be readily loosened when the  
70 graduator-nut lever and traveling fulcrum 42 46 48 are to be reset for a new warp-beam.

Details which have not been specified may be of any approved description.

The operation common to the several forms  
75 of the let-off mechanism is as follows: With a full warp-beam in the loom at 14, the movable fulcrum 48 at its starting-point, as in Fig. 1 or Fig. 10, the double-pointed dogs 17, lowered or in mesh with the ratchet-wheel 16,  
80 and the gearing and connections in working order, at each stroke of the lay 11 or each half-turn of the main shaft 13 motion is transmitted through the described connections 57 59 62, or 63 64 67, or 68 69 70 to the trans-  
85 mitting-lever 50, and therefrom through the connections 51 and 52 to the dog-carriers 18 and dogs 17, so that one dog is caused to make its effective stroke while the other is being retracted, as aforesaid. The ratchet-wheel 16  
90 is thus slowly turned and therewith the ratchet-shaft 15 and its worm 31<sup>x</sup>, the latter in turn driving the worm-wheel 32 and therewith the worm-shaft 33 and its worm 34, which, in mesh with the worm-wheel 35 on the  
95 warp-beam spindle, lets off the proper length of warp for a pick in a positive manner. Simultaneously with the movement of the warp-beam motion from the same source is transmitted through said worm-shaft 33 and  
100 the worm-gearing at 36 and 40 to the graduator-shaft 41, and the latter by its screw-thread actuates the graduator-nut 42, this nut in turn moving the lever 46, and thereby shifting the fulcrum 48 of said lever 50, so  
105 that the succeeding movement of the lay or half-turn of the main shaft shall transmit to the dogs 17 a stroke increased to the necessary infinitesimal extent. By properly proportioning the parts and by making suitable  
110 preliminary adjustments, as at 56, 58, 62, and 45, Figs. 1 and 2, or at 51, 80, and 81, Fig. 10, to suit the individual loom and the "heft" of warp-beam that is to be used, I am enabled in practice to empty the warp-beam without  
115 further attention to the let-off mechanism, unless a "pick-out" or like accident occurs. In this event the dogs 17 are lifted or the ratchet-wheel unclutched, as above described, and motion from the hand-wheel 31 is trans-  
120 mitted through the ratchet-shaft 15, worm 31<sup>x</sup>, worm-wheel 32, worm-shaft 33, worm 34, and worm-wheel 35 to the warp-beam until the loom is ready to start, when the dogs are lowered or the ratchet-wheel reclutched, and the  
125 operation proceeds as before. Finally after a warp-beam is emptied the worm-wheel 40 is unclutched or loosened and motion is directly transmitted from the hand-crank 43 through the shaft 41, nut 42, and lever 46 to the movable fulcrum 48 to readjust the latter for the  
130 beginning of the next weaving operation, after which readjustment said wheel 40 is immediately made fast again.

By making each of the dogs 17 double-pointed in the particular manner above described I am enabled to actuate the ratchet-wheel with absolutely unvarying leverage, which is not the case with other arrangements, and to lift both points for freeing the ratchet-wheel by a single movement. Moreover, making and keeping the points of the required minute difference of length may be accomplished without the aid of the very nice measurements and tests which are otherwise necessary and lost motion at the pivots is reduced. By employing a pair of such dogs, working alternately, as above described, the movement of the ratchet-wheel, and consequently that of the warp-beam, becomes practically continuous, and the mechanism is freed from the excessive wear due to overcoming inertia in ordinary ratchet mechanisms.

Having thus described the said let-off mechanism, I claim as my invention, and desire to patent under this specification—

1. In combination with a crown ratchet-wheel and its shaft in a let-off mechanism for looms and with a suitable dog-carrier pivoted on said shaft, a dog having a biting-point integral with its body and a supplemental biting-point pivoted to the body of the dog by a pin radial to the axis of the ratchet-shaft, both biting-points being normally in contact with the ratchet-teeth and provided with faces which are in common radial to said axis of the ratchet-shaft, substantially as hereinbefore specified.

2. In combination with a crown ratchet-wheel and its shaft in a let-off mechanism, a pair of dog-carriers pivoted on said shaft immediately in front of said wheel, a pair of dogs pivoted on the respective carriers and which project in the same circumferential direction, and suitable means for simultaneously oscillating the respective dog-carriers, substantially as hereinbefore specified.

3. In combination with a crown ratchet-wheel in a let-off mechanism, a horizontal ratchet-shaft extending from front to rear of a loom, a dog-carrier pivoted on said shaft immediately in front of said wheel, a dog pivoted on a radial portion of such dog-carrier and constructed with a forwardly-inclined heel end, and a dog-lifter in the form of a hand-crank pivoted to an adjacent portion of the dog-carrier and adapted to engage with

said heel end of the dog to "lift" the dog out of contact with the face of the ratchet-wheel, substantially as hereinbefore specified.

4. The combination, in a let-off mechanism for looms, of a ratchet-shaft, ratchet mechanism and connections for actuating said shaft, including a transmitting-lever 50 and connections with a moving part of the loom, a graduator-shaft provided with a screw-thread and with a traveling screw-nut, worm-gearing connections between said shafts, whereby said graduator-shaft is actuated, and a lever 46, transmitting motion from said traveling nut and provided with a movable fulcrum for said transmitting-lever, which fulcrum is thus gradually moved by power exerted through the medium of said transmitting-lever itself, substantially as hereinbefore specified.

5. The combination, with the warp-beam spindle having the customary worm-wheel fast thereon, of the vertical shaft 33, carrying the worms 34 and 36, the lower of which is in mesh with said worm-wheel on the warp-beam spindle, worm-gearing connections driven by the upper of said worms, an elevated horizontal graduator-shaft 41, a traveling screw-nut 42 on said graduator-shaft, a hand-crank 43, applied to said graduator-shaft, and means for disconnecting the graduator-shaft, so as to permit it to be rotated independently by means of said hand-crank for returning the said traveling nut when a new warp-beam is introduced, substantially as hereinbefore specified.

6. The combination, with the lay having a slotted upright, of the arm 57, vertically adjustable on said upright, the three ended lever 59, having a fixed pivot 60, the transmitting-link 61 and its connections, the transmitting-lever 50, the T-shaped link 51, the pitmen 52, dog-carriers 18 and dogs 17 in duplicate, the ratchet-wheel 16, ratchet-shaft 15, the warp-beam spindle, and motion-transmitting connections between said ratchet-shaft and spindle, whereby the alternating motion of the lay is converted in a positive manner into a nearly-continuous let-off movement of the warp-beam, in the manner and for the purposes hereinbefore set forth.

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