No. 775,336. PATENTED NOV. 22, 1904.

J. T. MEATS.

LET-OFF MECHANISM FOR LOOMS.

APPLICATION FILED FEB. 6, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

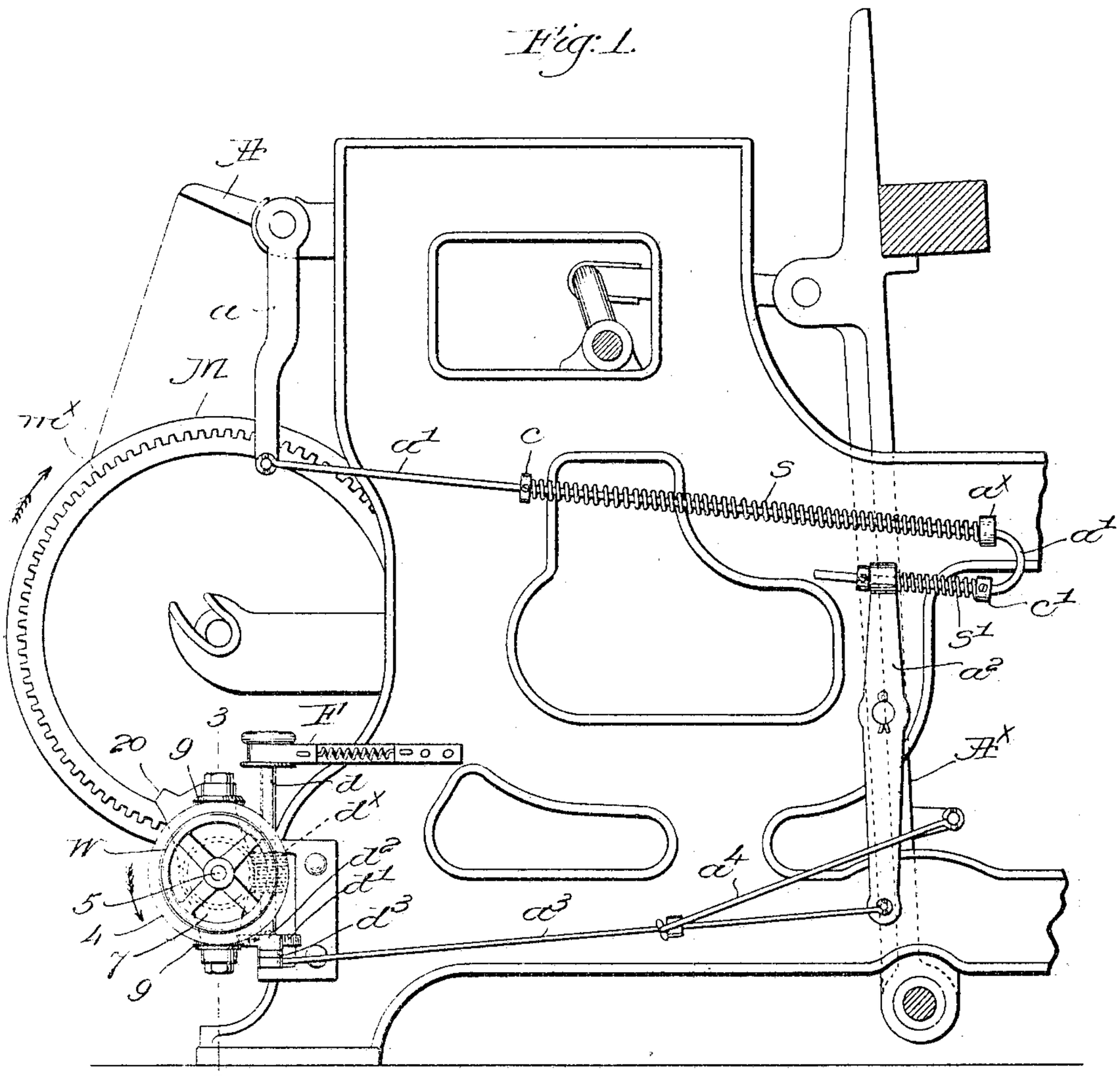


Fig. 4.

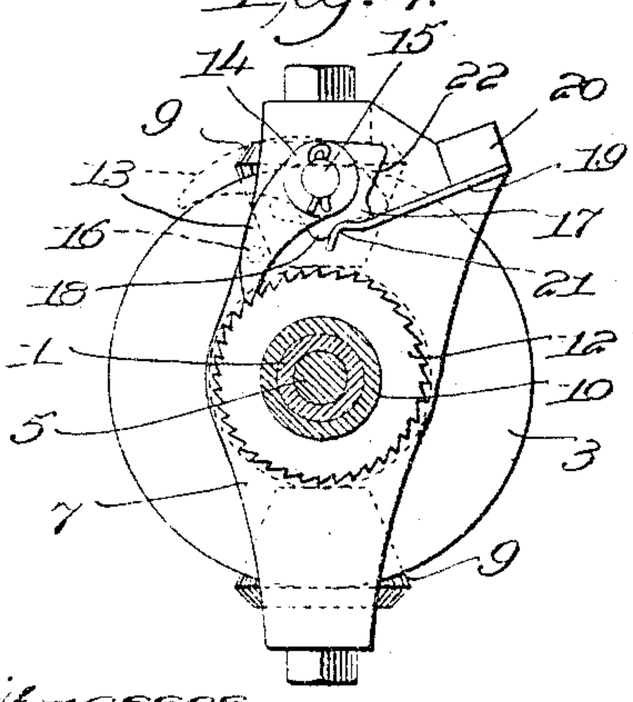
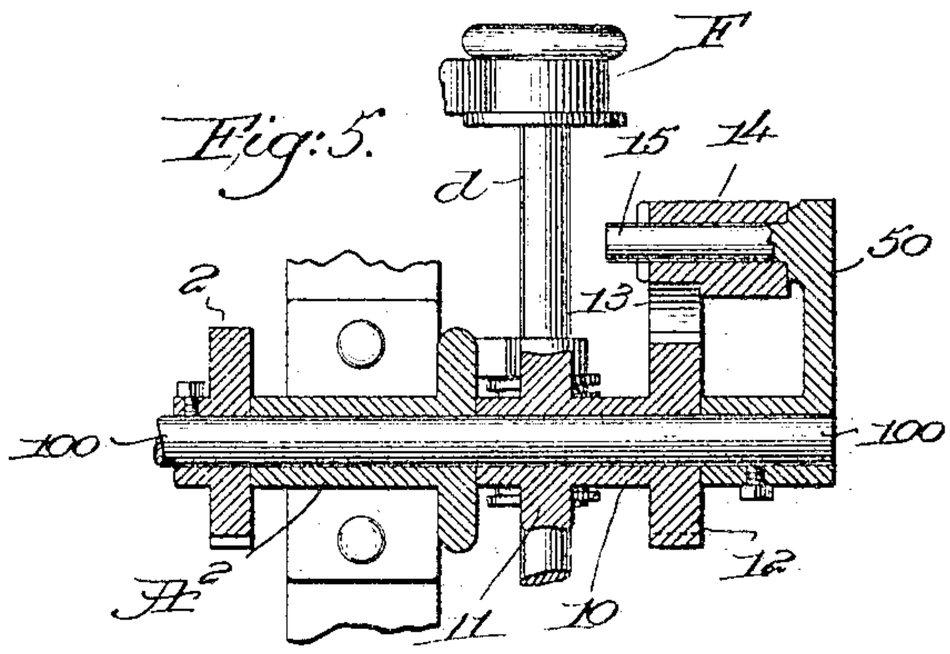


Fig. 5.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig: 2.

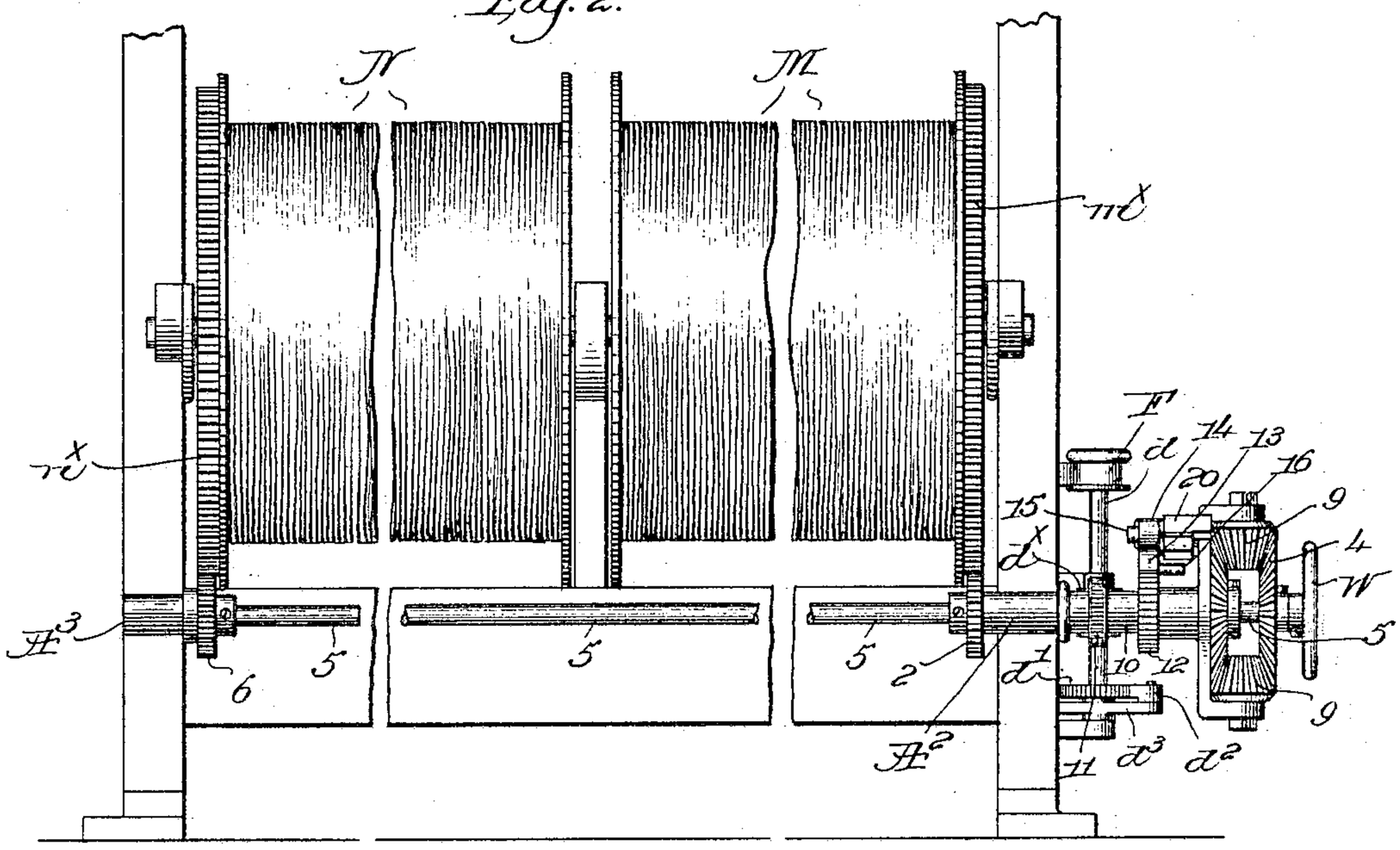
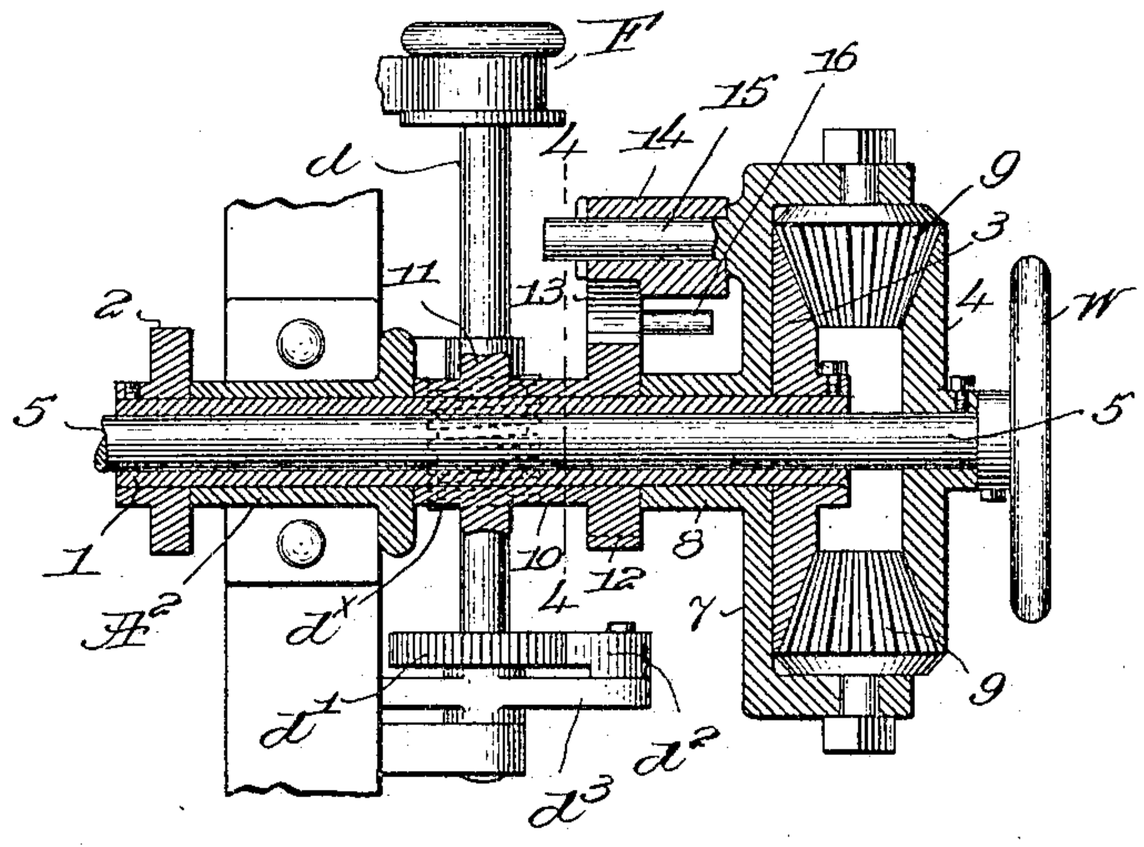


Fig: 3.



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No. 775,336. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

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LET-OFF MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 775,336, dated November 22, 1904.

Application filed February 6, 1904. Serial No. 192,320. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. MEATS, a citizen of the United States, and a resident of Taunton, county of Bristol, State of Massachusetts, have invented an Improvement in Let-Off Mechanism for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to positively-driven let-off mechanism for looms wherein the warp-beam is positively rotated—as, for instance, in the well-known Bartlett let-off. In such type of mechanism it is necessary for the weaver to turn the warp-beam by or through the actuating worm-gearing whenever it is desired to turn the beam backward or forward—as, for instance, after making a pick out. Such operation is of course very slow and involves the handling of oily parts of the apparatus by the operative, tending to soil his hands and injure the cloth by subsequent handling.

One of the objects of my present invention is the production of simple and readily controlled means whereby the warp-beam can when desired be released or uncoupled from its actuating mechanism, so that the warp-beam can be readily turned manually in either direction for any distance and without involving the handling of numerous greasy or dirty parts by the operative. In this connection a simple device has been provided to maintain operative or inoperative the connection between the warp-beam and its actuating mechanism, so that there is no liability of accidental derangement of the parts.

Another object of my invention is the production of means for controlling a plurality of warp-beams in looms when the warp is mounted on a plurality of beams and an equal tension is required upon the warp-threads of the several beams. In this connection I have provided means to relieve the warp strain and equalize the tension, and the first-mentioned object of my invention is also made applicable in connection with the second object thereof, so that the plurality of beams can be turned by hand quickly and conveniently.

These and other novel features of my invention will be fully described in the subjoined specification with relation to one practical embodiment of my invention, and particularly pointed out in the following claims.

Figure 1 is a side elevation of a loom provided with the well-known Bartlett let-off and with one embodiment of my present invention applied thereto. Fig. 2 is a rear elevation centrally broken out of the greater portion of the apparatus shown in Fig. 1, the loom being shown with two beams placed side by side. Fig. 3 is an enlarged sectional detail of the compensator and adjacent parts on the line 3 3, Fig. 1, looking toward the front of the loom. Fig. 4 is a transverse sectional detail of the clutch device on the line 4 4, Fig. 3, looking toward the right; and Fig. 5 is a modification to be referred to, showing one mode of construction when coöperating with a single beam.

Referring to Fig. 1, the rocking whip-bar A, having an attached arm a, the bent or trombone rod a' with usual springs s and s' and cooperating collars c and c', the fixed guide $a^{\times}$, the rocking lever a^2, operatively connected at one end with the trombone-rod a' and at its other end jointed to a connecting-rod a^3, the pawl-carrier d^3, having a pawl d^2 coöperating with the ratchet d' on the upright actuating or driving member or shaft d, and the link a^4, connecting the rod a^3 with a moving part of the loom, as the lay-sword $A^{\times}$, may be and are all of well-known or usual construction and constitute what is commonly termed the "Bartlett" let-off, the connecting-rod a^3 being pivotally attached to the pawl-carrier d^3. The worm $d^{\times}$ on the actuating member or shaft d and the friction device F for the latter are also of well-known construction and operate in usual manner, said worm constituting a driving-gear.

Referring to Fig. 2, I have shown two warp-beams M N mounted side by side with their axes in alinement, such an arrangement being employed in broad looms where the great number of warp-threads make it expedient to use a plurality of beams. Said beams have attached gears $m^{\times}$ $n^{\times}$, shown herein on their

outer heads, and while the two beams are positively driven from a common actuating member I have provided compensating means to relieve and equalize the warp strain, the arrangement being such that one beam can turn faster or slower than its fellow when necessary. An elongated horizontal bearing A^2 is secured to one of the loom sides adjacent the beams, and a tubular transmitting-shaft 1 is rotatably mounted therein and extended beyond the ends of the bearing, a gear 2 being secured to the inner end of the shaft and meshing with the beam head-gear $m^\times$. Upon the outer end of said shaft and at some distance from the bearing A^2 a spur-gear 3 is secured, forming a member of the compensating device or "compensator," as hereinafter termed, a similar and oppositely-located spur-gear 4 being made fast on the adjacent end of a second transmitting-shaft 5, rotatably mounted in the tubular shaft 1. Said shaft 5 extends across the loom and at its other end is supported in a suitable bearing A^3, Fig. 2, and has fast upon it a gear 6, in mesh with the beam-gear $n^\times$. A yoke 7 has an elongated hub 8, which is rotatably supported upon the outer end of the shaft 1, adjacent the spur-gear 3, as clearly shown in Fig. 3, the yoke carrying rotatable, opposite, and like bevel-pinions 9 9, which are interposed between and mesh with the spur-gears 3 4. Manifestly rotation of the yoke 7 will through pinions 9 cause simultaneous rotation of the spur-gears and their attached shafts 1 and 5 in the same direction and normally at the same speed; but if the warp pull or tension on either beam varies from the pull on the other beam one can advance or hang back relatively to the other and there will be a relative rotation of the spur-gears and shafts to compensate therefor in the manner common to such compensators and so well known as to require no detailed explanation. It will be readily understood that the compensator while connecting the two shafts thus provides for the equalization of warp tension in an efficient and automatic manner.

Between the inner end of the yoke-hub 8 and the outer end of the bearing A^2 a sleeve 10 is loosely mounted on the tubular shaft 1 and has secured to or formed upon it a worm-gear 11 and a clutch member 12, herein shown as a ratchet. Endwise movement of shaft 1 in the bearing A^2 is prevented by the gear 2 at one end thereof and by the sleeve 10 and the long-hubbed yoke 7, interposed between the other ends of the bearing and the spur-gear 3. The worm-gear 11 is in continuous mesh with the worm $d^\times$ on the positively-driven actuating-shaft d, and it will be manifest that if the rotation of the worm-gear 11 is partaken of by the compensator the shafts 1 and 5 will transmit such rotation to the beams to effect let-off. To this end I have interposed a clutch or coupling between the worm-gear and the compensator, one member being herein shown as the ratchet 12, which rotates with the worm-gear. The other member of the clutch is shown as a pawl 13, having its hub 14 pivotally mounted on a stud 15, extended inward from the yoke 7 and eccentric to its axis of rotation, the pawl being manually movable into or out of engagement with its fellow clutch member, the pawl 12. When said members are in engagement, the positive rotation of the ratchet will act through the pawl to rotate simultaneously therewith the yoke 7 of the compensator, and thereby effect rotative movement of the beams. A lateral stud 16 on the pawl serves as a convenient handle to throw it into and out of engagement with the ratchet.

The pawl-hub 14 is enlarged to present two locking projections or shoulders 17 18, Fig. 4, and a spring locking-finger is adapted to coöperate with one or the other shoulder, the finger being preferably made as a metallic spring-plate 19, secured at one end to a lug 20 on the back of the yoke. At its free end the finger 19 is bent or crooked at 21 to engage one or other of the shoulders, the resiliency of said finger retaining it in engagement with a shoulder. When in the position shown in Fig. 4, the bend 21 is between the projections or shoulders and the pressure of the finger acts at one side of the pawl-fulcrum 15 to retain the pawl in engagement with the ratchet. If the pawl is swung up out of engagement with the ratchet, the bend of the finger snaps into engagement with the shoulder 17 and retains the pawl in inoperative position. (See dotted lines, Fig. 4.) At such time the flattened face 22 on the pawl-hub bears against the flat portion of the finger, and the pawl cannot accidentally move into coöperation with the ratchet. When the pawl is in its inoperative position, the beams are completely disconnected from the actuating member or worm $d^\times$ and can be turned forward or back by hand, as desired, and for convenience in turning the beam N a hand-wheel W is shown attached to the shaft 5 adjacent the spur-gear 4. By turning the hand-wheel the farther beam N will be turned, and if the other beam M is to be turned at the same time it can be accomplished by rotating the yoke in unison with the hand-wheel, or the weaver can take hold of the beam M with one hand and rotate it, while with the other hand he operates the hand-wheel to turn the beam N. By holding the yoke and turning the hand-wheel, or vice versa, either beam may be rotated manually without corresponding rotation of its fellow.

From the foregoing description, in connection with the drawings, it will be clearly manifest that the tension between the beams is equalized by or through the compensator interposed between the actuating member and the beams and connecting the latter and that

the actuating means of the let-off mechanism can be quickly and conveniently disconnected from the equalizing or compensating member, and hence from the beam or beams, materially increasing the convenience and efficiency of the let-off, and thereby improving the product of the loom so equipped. Release of the clutch is effected easily by one hand, and it is then unnecessary for the weaver to take hold of any of the oily parts of the loom in order to disconnect the warp-beam and the actuating mechanism therefor. Neither is any resetting or disturbance of the friction device F involved by release of the beam, the parts thus being in condition for immediate resumption of work when desired.

While I have shown my invention embodied in a loom provided with two beams, with transmitting means particularly designed to coöperate therewith, my invention is not restricted thereto nor to the precise details of construction and arrangement herein shown and described. It will be obvious that my invention is in part equally adapted for use in connection for a single beam, the compensator in that case being omitted, and the clutch members would be varied somewhat to correspond with the mechanical changes involved. One clutch member would rotate with the worm-gear 11, however, and the other clutch member with the transmitting-shaft. Supposing that one beam be used, the entire compensating device would be omitted, and one of the transmitting-shafts, as 5, the yoke 7 being replaced by a suitable arm or pawl-carrier for the pawl 13 and rigidly secured to the shaft 1, the latter being made tubular or solid indifferently.

Such a structure is shown in Fig. 5, the pawl-carrier 50 taking the place of the yoke 7 and being secured by a set-screw to the shaft 100, the equivalent of shaft 1, the other parts being substantially as hereinbefore described.

My invention accordingly is not restricted to the precise construction and arrangement shown and described herein, as the same may be modified or varied in different particulars by those skilled in the art without departing from the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In let-off mechanism for looms, a warp-beam, a positively-driven actuating member, a transmitting-shaft having a fast and a loose gear thereon, one of said gears coöperating with the warp-beam and the other with the actuating member, and a clutch to normally effect rotation of the loose gear with the shaft, release of the clutch permitting the warp-beam to be turned independently of the actuating member.

2. In let-off mechanism for looms, a warp-beam, an actuating or driving member therefor, driven by a moving part of the loom, gears on the beam and driving member, a transmitting-shaft having a gear fast thereon in mesh with the beam-gear, a second gear loose on the shaft and in continuous mesh with the driving-gear, and a clutch to connect the loose gear with or disconnect it from the transmitting-shaft.

3. In let-off mechanism for looms, a warp-beam having an attached gear, an actuating-worm driven by a moving part of the loom, a transmitting-shaft having a pinion fast thereon in mesh with the beam-gear, a fixed bearing in which the shaft is rotatably mounted, a worm-gear loose on said shaft and in continuous mesh with the worm, a clutch member on said worm-gear, a coöperating clutch member rotatable with the shaft and movable into and out of engagement with its fellow, and a spring to effect coöperation of the clutch members and thereby connect the worm-gear with the shaft.

4. In let-off mechanism for looms, a warp-beam having an attached gear, an actuating-worm driven by a moving part of the loom, a transmitting-shaft having a pinion fast thereon in mesh with the beam-gear, a fixed bearing in which the shaft is rotatably mounted, a worm-gear loose on said shaft and in continuous mesh with the worm, said pinion and worm-gear being located at opposite ends of the shaft-bearing, a clutch one member whereof rotates with the worm-gear and the other member with the shaft, the latter member being supported on the outer end of the shaft and manually movable in one direction relatively thereto to render the clutch inoperative, and a spring to effect coöperation of the clutch members.

5. In let-off mechanism for looms, a warp-beam having an attached gear, an actuating-worm driven by a moving part of the loom, a transmitting-shaft having a pinion fast thereon in mesh with the beam-gear, a fixed bearing in which the shaft is rotatably mounted, a worm-gear loose on said shaft and in continuous mesh with the worm, a clutch member on said worm-gear, a coöperating clutch member rotatable with the shaft and movable into and out of engagement with its fellow, and a spring to effect coöperation of the clutch members and thereby connect the worm-gear with the shaft, and also to maintain said clutch members out of coöperative engagement.

6. In let-off mechanism for looms, a warp-beam having an attached gear, an actuating-worm driven by a moving part of the loom, a transmitting-shaft having a pinion fast thereon in mesh with the beam-gear, a fixed bearing in which the shaft is rotatably mounted, a worm-gear loose on said shaft and in continuous mesh with the worm, a clutch member rotatable with said worm-gear, a coöperating clutch member operatively connected and rotatable with the shaft and manually

movable into and out of engagement with its fellow, locking-shoulders on the said coöperating clutch member, and a spring adapted to engage one or the other of said shoulders and thereby lock the clutch members in coöperative or inoperative relation.

7. In let-off mechanism for looms, a warp-beam having an attached gear, an actuating-worm driven by a moving part of the loom, a transmitting-shaft having a pinion fast thereon in mesh with the beam-gear, a fixed bearing in which the shaft is rotatably mounted, a worm-gear loose on said shaft and in continuous mesh with the worm, a ratchet carried by said worm-gear and forming one member of a clutch, a pawl forming the coöperating clutch member mounted on and rotatable with the shaft and manually movable into and out of engagement with the ratchet, and a spring to maintain the pawl in engagement with the ratchet or disengaged therefrom.

8. In let-off mechanism for looms, two warp-beams, a positively-driven actuating member, transmitting means between it and the beams, said means including a compensating device operatively connected with the beams, and a clutch intermediate the actuating member and the transmitting means, release of the clutch permitting the warp-beams to be turned independently of the actuating member.

9. In let-off mechanism for looms, two warp-beams, a positively-driven actuating member; two transmitting-shafts each having a gear fast thereon coöperating with one of the warp-beams, a compensator connecting said shafts, a gear loose with relation to said shafts and coöperating with the actuating member, and a clutch intermediate said loose gear and the compensator to effect through the latter rotation of the transmitting-shaft with the loose gear, release of the clutch permitting the warp-beams to be turned independently of the actuating members.

10. In let-off mechanism for looms, two axially-alined warp-beams, a common actuating member therefor driven by a moving part of the loom, gears on the beams and the driving member, a two-part transmitting-shaft having mounted upon it gears in mesh with the beam and driving-gears, one of the gears being loose on the shaft, a compensating connection between the shaft parts, and means to manually couple and uncouple the two-part shaft and the loose gear.

11. In let-off mechanism for looms, a plurality of warp-beams, a positively-driven common actuating member therefor, and transmitting means between it and the beams and including a device to equalize the warp strain upon the several beams.

12. In let-off mechanism for looms, a plurality of warp-beams, a positively-driven common actuating member therefor, transmitting means between it and the beams and including an equalizing or compensating device, and means to manually couple and uncouple the actuating member and said transmitting means.

13. In let-off mechanism for looms, two warp-beams side by side and each having an attached head-gear, a positively-driven common actuating member therefor, two shafts each having fast upon it a gear in mesh with one of the beam head-gears, a compensator connecting the shafts, a gear loose on one of the shafts and coöperating with the actuating member, and a clutch to normally effect rotation of the loose gear with the compensator, and through the latter with the two shafts.

14. In let-off mechanism for looms, two warp-beams side by side and each having an attached head-gear, a positively-driven common actuating member therefor, two coaxial shafts each having a gear fast upon it in mesh with one of the beam head-gears, a compensator connecting and providing for differential rotation of the shafts, a gear loose on one shaft and coöperating with the actuating member, a clutch member rotatable with said gear, and a coöperating clutch member bodily rotatable with the compensator and movable into and out of engagement with its fellow member, to effect rotation of the shafts through the compensator when said clutch members are in engagement.

15. In let-off mechanism for looms, two warp-beams in axial alinement and each having an attached gear, a positively-driven common actuating member therefor, two coaxial transmitting-shafts each having fast upon it a gear in mesh with a beam-gear, and a spur-gear on each shaft, said spur-gears facing each other, a yoke rotatable on one of the shafts and carrying bevel-pinions between and meshing with the spur-gears, a gear loose with relation to the shafts and coöperating with the actuating member, a clutch member rotatable with said loose gear, and a coöperating clutch member mounted on the yoke and movable into engagement with its fellow to cause rotation of the yoke and through it to transmit rotation to the shafts and beams.

16. In let-off mechanism for looms, two warp-beams side by side and each having an attached gear, an actuating member therefor driven by a moving part of the loom, a tubular shaft having a pinion fast thereon in mesh with one of the beam-gears, a fixed bearing in which said shaft is rotatably mounted, a gear loose on the shaft, and coöperating with the actuating member, a ratchet rotatable with said gear, a second shaft rotatably mounted in and extended through the tubular shaft and having a pinion fast upon it meshing with the second beam-gear, spur-gears fast on the adjacent ends of the two shafts and facing each other, a yoke mounted to rotate upon the tubular shaft and having bevel-pinions between and meshing with the spur-gears, and a pawl on said yoke adapted to coöperate

with said ratchet, to cause rotation of the yoke and shafts to thereby drive the beams, the compensating connection between the shafts serving to equalize warp tension, disconnection of the pawl and ratchet permitting manual rotation of the beams.

17. In let-off mechanism for looms, two warp-beams side by side and each having an attached gear, an actuating member therefor driven by a moving part of the loom, a tubular shaft having a pinion fast thereon in mesh with one of the beam-gears, a fixed bearing in which said shaft is rotatably mounted, a gear loose on the shaft and coöperating with the actuating member, a clutch member rotating with said gear, a second shaft rotatably mounted in and extended through the tubular shaft and having a pinion fast upon it meshing with the second beam-gear, a compensating connection between the adjacent ends of the shafts and including a yoke rotatable on the tubular shaft, a second clutch member carried by the yoke and adapted to coöperate with its fellow member to effect rotation of the compensating connection and the shafts, and a spring to retain the clutch members in operative or inoperative relation.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN T. MEATS.

Witnesses:

JOHN C. EDWARDS,

ELIZABETH R. MORRISON.