J. F. CARPENTER.

LET-OFF MOTION.

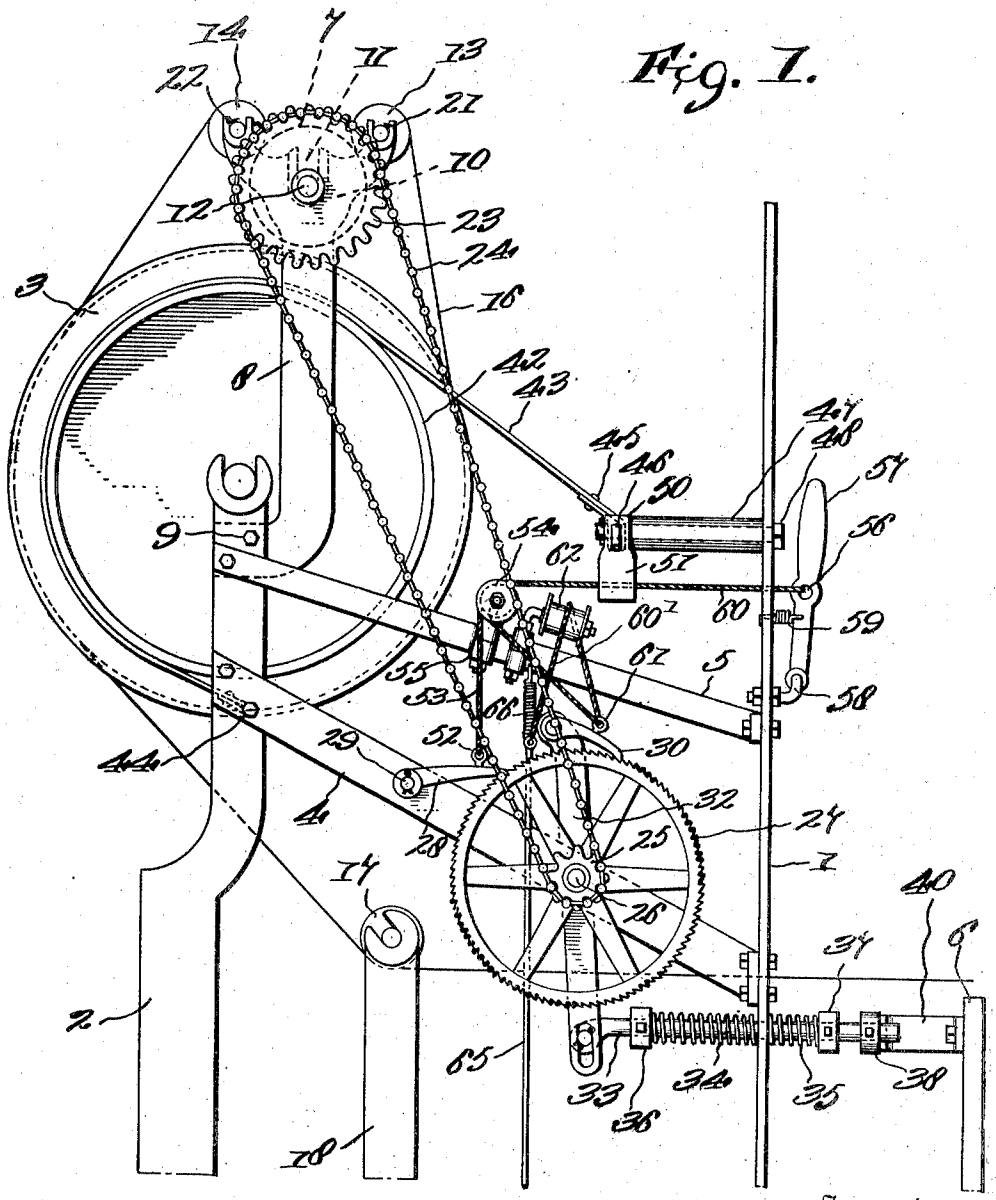
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Patented Dec. 11, 1917.

4 SHEETS—SHEET 1.

Fig. 1.




Witnesses

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4 SHEETS—SHEET 2.

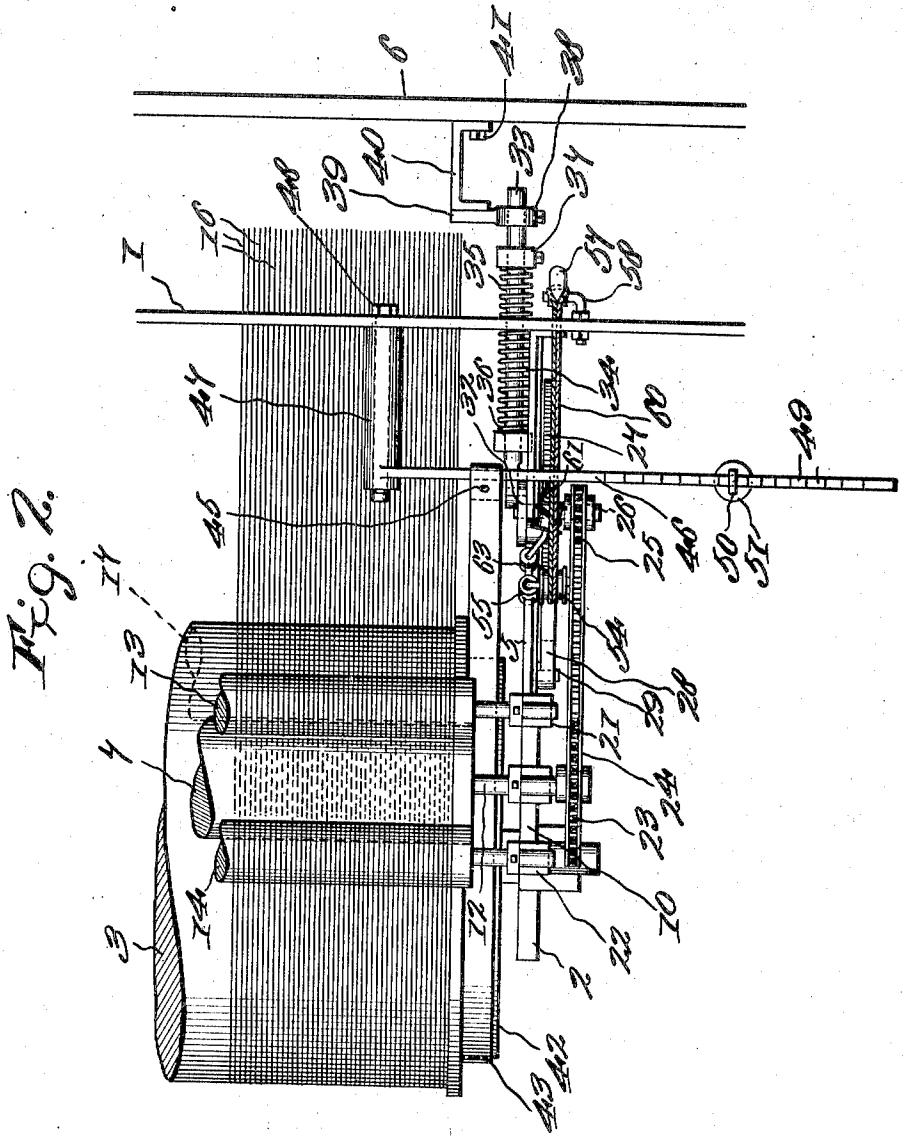


Fig. 2.

Witnesses

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4 SHEETS—SHEET 3.

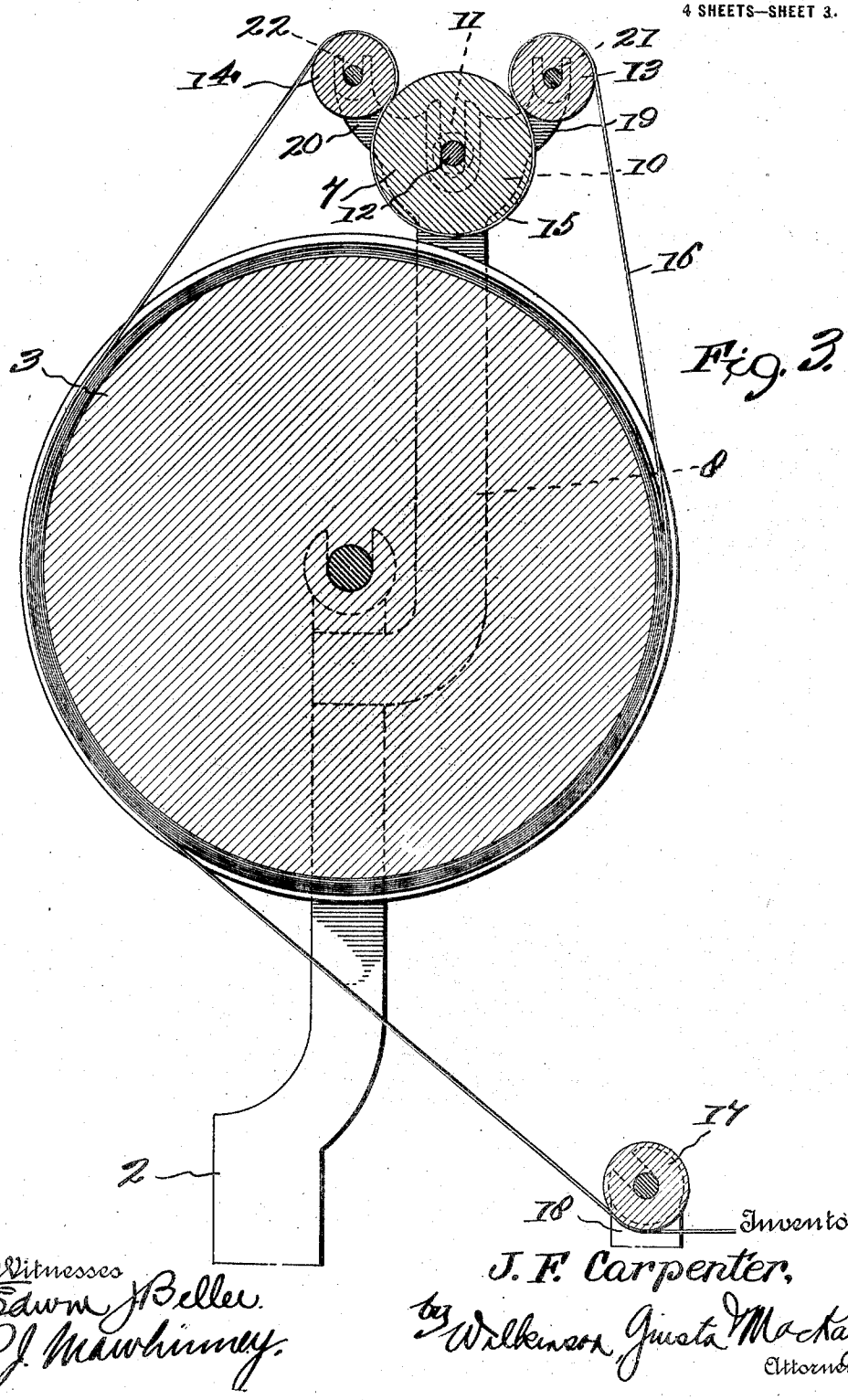



Fig. 3.

Witnesses
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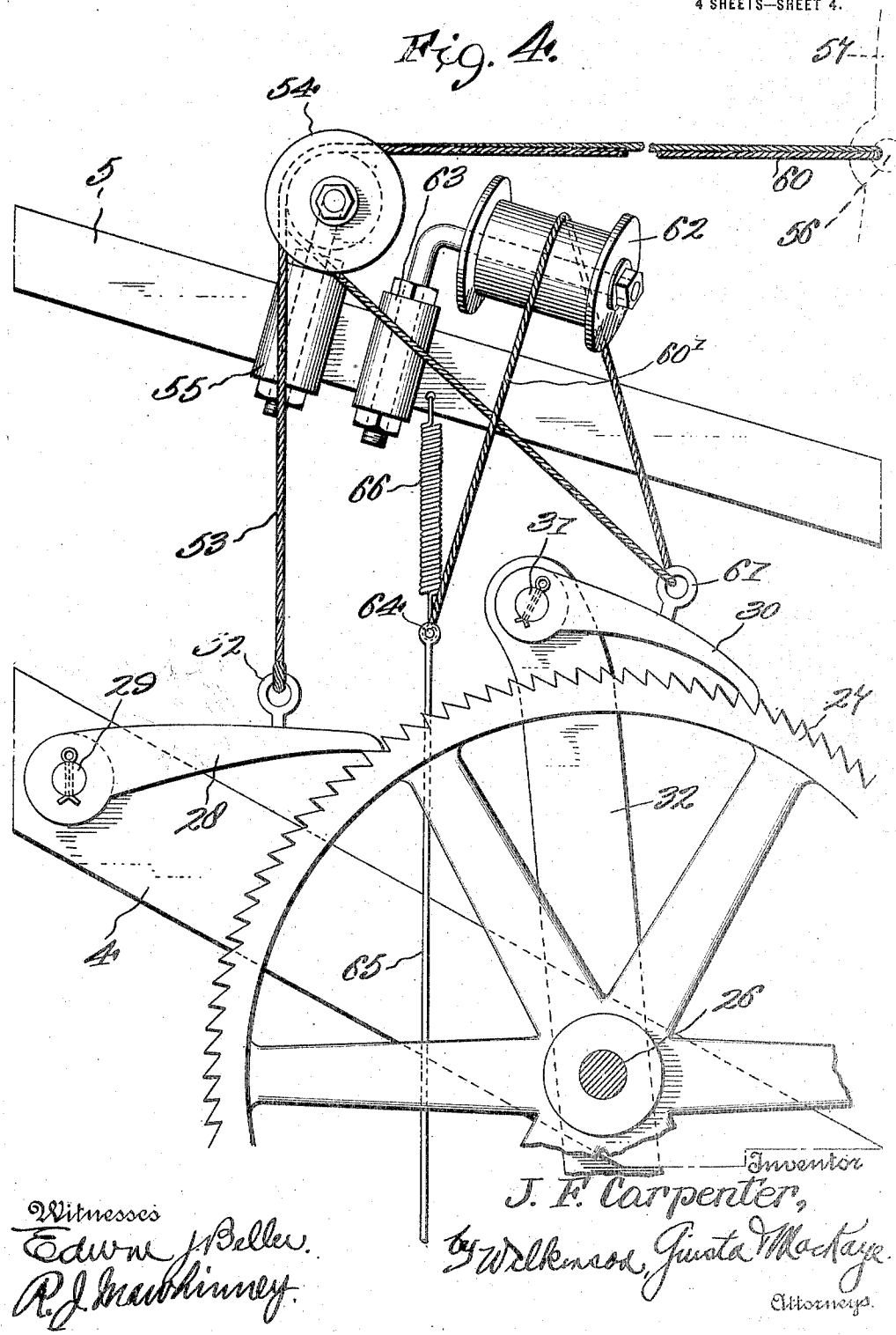
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4 SHEETS—SHEET 4.

Fig. 4.




Witnesses
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# UNITED STATES PATENT OFFICE.

JAMES FRANKLIN CARPENTER, OF COLUMBUS, GEORGIA.

## LET-OFF MOTION.

1,249,899. Specification of Letters Patent. Patented Dec. 11, 1917.

Application filed December 26, 1916. Serial No. 138,852.

*To all whom it may concern:*

Be it known that I, JAMES F. CARPENTER, a citizen of the United States, residing at Columbus, in the county of Muscogee and State of Georgia, have invented certain new and useful Improvements in Let-Off Motions; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in let-off motions for looms; and, while the improved mechanism is adaptable for attachment to the usual warp or yarn beams, it is more particularly designed for use in connection with the top terry beams of pile fabric looms.

One object of the present invention resides in providing an improved let-off mechanism which will be entirely independent of the yarn beam and will be actuated by improved mechanism from the lay structure.

Another object of the present invention resides in providing a mechanism that will insure a uniform feed of the yarn to the loom harness at each stroke of the lay, with the result of an even terry throughout the entire unwinding of the yarn, and which will accordingly eliminate poor weaving and seconds.

It is a further object of the present invention to dispense with the weight and gears now usually employed to effect the let-off of the yarn, and at the same time to do away with the necessity of employing an operator to take care of this function; the present improved apparatus being automatic in action.

A still further object of my invention lies in equipping the apparatus with an adjusting mechanism whereby the feed of the terry may be controlled and the height thereof in the fabric correspondingly regulated.

In devices as heretofore constructed it has been the usual practice to connect the let-off mechanism directly with the yarn beam, or to have the mechanism arranged to pull against the weight of the beam. As the weight of the beam when full varied greatly from a beam that was nearly exhausted, an uneven terry was the result. With those types of let-off motions in which the actuating mechanism is connected directly with the yarn beam, uneven terry is found to be also the result because of the angular movement of the beam remaining the same throughout the entire operation, while the diameter of the beam varies widely from the full to the empty beam.

In accordance with the present invention the yarn or terry is driven by mechanism entirely independent of the beam on which the same is wound, and such mechanism delivers a predetermined length to the harness through each stroke of the lay, in accordance with the desires of the loom operator, who has set the adjusting device prior to the commencement of the weaving operation.

In the accompanying drawings forming a part of this application, and in which similar reference symbols indicate corresponding parts in the several views:

Figure 1 is a fragmentary side elevational view illustrating an improved let-off motion constructed in accordance with the present invention as applied on a loom.

Fig. 2 is a fragmentary top plan view of the same.

Fig. 3 is an enlarged vertical sectional view through the yarn beam and driving rolls; and

Fig. 4 is a fragmentary elevational view of a portion of the driving mechanism.

Referring more particularly to the drawings, 1 designates a portion of a loom frame and 2 the standards for supporting the yarn or terry beam 3. 4 and 5 are braces extending between the frame part 1 and standards 2 for the purpose of supporting certain of the let-off motion elements, as will more particularly hereinafter appear. At 6 is indicated generally the lay structure, with which the actuating mechanism of my improved let-off motion is operatively associated.

The above described parts are of the usual construction and to be found on approved types of looms as now in use.

Coming now to a consideration of the present improved let-off motion, the same essentially consists in a drive roll 7 mounted independently of the yarn beam 3, it advantageously being supported in suitable bearings on brackets 8 fastened as indicated at 9 to any part of the loom frame, preferably the upper ends of the standards 2, as shown in Figs. 1 and 3 of the drawings. The bearings 10 on the brackets 8 are vertically slotted, as at 11, to slidingly receive the journals 12 of the drive roll 7; the lat-

ter thus having a vertical movement, permitting it and the friction rollers 13 and 14 to separate should any inequality in the yarn be encountered or foreign matter carried by the yarn pass therebetween. The slotted bearing also permits the drive roll 7 to be readily detached from the loom and to be yieldingly supported by a loop 15 in the yarn 16, which loop is formed by passing the yarn 16 from the beam up over the friction roll 13, down beneath the drive roll 7 and up on the opposite side and over the companion friction roll 14, all in a manner which will be apparent from an inspection of Fig. 3.

From the friction roll 14 the yarn 16 is carried downwardly and about the opposite side of the beam 3, and to a guide roll 17, removably fitted in suitable supports 18 carried on the loom frame, and thence to the loom harness, as indicated in the drawings. The bearings 19 and 20 for the respective friction rolls 13 and 14 are advantageously formed in one piece with the bearings 10 of the drive roll 7, and such bearings have vertically disposed slots 21 and 22 to permit a relative movement between the same and the drive roll 7 for purposes already referred to.

On one extended journal 12 of the drive roll 7 is made fast a sprocket 23, over which is trained a chain 24 from a second sprocket 25 on a shaft 26 journaled in the brace 4. Other connections may be provided for actuating the drive roll 7, as will be apparent to those skilled in this art.

On the shaft 26 and fitted to rotate with the sprocket 25 is also a ratchet wheel 27. A dog 28 pivoted as at 29 on the brace 4, has its end engaging the teeth on the ratchet wheel 27 for preventing retrograde movement; and a pawl 30 is provided to intermittently drive said ratchet wheel 27, such pawl 30 being pivoted as at 31 on an arm or lever 32 having its center of oscillation coinciding with the center of the ratchet wheel 27 and being, for advantages in construction, mounted on the shaft 26.

At its opposite end this arm 32 is pivotally connected to a rod 33 slidably fitted through the framing 1, and being encircled by a tension coil spring 34 and a compression coil spring 35 with their ends bearing respectively against the framing 1 and set collars 36 and 37, through which the springs may be adjusted as required. These springs 34 and 35 normally operate to move and maintain the rod 33 in the position shown in Fig. 1, and restore the rod and the associated parts to this position after each actuation by the lay structure as hereinafter described. A set collar 38 is slidably and adjustably mounted on the opposite end of the rod 33, and a finger 39 is carried on the set collar 38 which projects in the path of a piece 40 attached as at 41 to the lay structure 6. The lay 6 thus actuates the terry feeding mechanism in a manner which will be apparent on present fuller explanation.

On the beam 3 is formed a brake drum 42 embraced by a brake band 43 rigidly attached at one end to a stud 44 on the beam 4, and at its other end 45 to a lever 46 having an elongated bearing 47 journaled to swing about a bolt 48 extending from the frame 1. In the outer end of this lever is a series of notches 49 adapted to receive the strap 50 on a weight 51. By moving the weight 51 along the lever 46 the tension of the brake band 43 on the drum 42 may be diminished or increased as operating needs demand, and in this way a suitable tension is imposed on the yarn or terry 16. The dog 28 is fitted with an eye 52, in which is secured one end of a cord or other flexible connection 53. The cord is carried vertically from the eye 52 to and over a pulley 54 supported on a stand 55 on the beam 5.

From the pulley 54 the connection 53 is directed horizontally, passing through the framing 1 and through an opening 56 in a hand lever 57 fulcrumed at 58, and connected to a spring 59 for keeping the same in the position shown in Fig. 1, where the connection will be slack. After passing through the opening 56 the connection 53 is returned on itself, as indicated at 60 in Fig. 4, and is carried back horizontally to the pulley 54, whence it is directed diagonally to and through an eye 61 in the pawl 30. It is then carried upwardly and reeved about a pulley 62 in a pulley stand 63 which extends at an angle to the pulley 54, such cord having its other end 60′ extending downwardly from pulley 62 secured as indicated at 64 to a rod 65. This rod 65 is supported on the end of a coil spring 66, normally holding the same in the elevated position shown in Figs. 1 and 4. The rod 65 runs to the usual mechanism for disengaging the terry driving apparatus when the terry is to be temporarily dispensed with and a plain weaving accomplished.

The operation of the invention may be briefly described as follows:

The warp or terry having been previously wound on the beam 3, the ends thereof are trained about the friction rolls 13 and 14 and the drive roll 7 in the manner shown in Fig. 3 and above more completely described.

From the friction roll 14 the yarn is carried about the opposite side of the beam 3 and guide roller 17, and is then threaded through the harness and connected to the take-up in the usual manner. When the device is used in connection with terry-weaving looms, for which the same has been principally designed, the terry or loop warp 16 is woven in connection with the tight warp in the usual manner, in which case the beam 3 will be mounted above the tight

warp beam, as usual in looms of this type. A loose reed motion controls the formation of the terry, as will be well understood.

As the operation of weaving proceeds the lay structure 6 will be reciprocated and will alternately bring its piece 40 into and out of striking contact with the finger 39 on the set collar 38. When so encountered the finger 39 and set collar, together with the rod 33, will be moved in opposition to the coil springs 34 and 35, and will correspondingly swing the arm 32, which carries the pawl 30. This movement of the pawl will rotate the ratchet wheel 27 through a distance of one or more teeth, as previously determined by the operator in adjusting the set collar 38 on the end of the rod 33. By the simple adjustment of the set collar 38, therefore, the ratchet wheel 27 may be controlled to move through a very minute part of a rotation, thus delivering a small length of the yarn, or through a relatively larger part of a turn at each stroke of the pawl 30, yielding an appreciably greater length of the yarn to the reed and harness.

As the ratchet wheel 27 is thus periodically actuated, the same will turn the sprocket 25 and through the chain 24 the sprocket 23. This sprocket 23 being connected to the drive roll 7 the latter will be turned intermittently and through a proportionate distance with respect to the ratchet wheel 27, which may be regulated by the ratio of the gearing. The drive roll 7 is preferably covered with cloth to yield a high degree of adhesion, and in turning it draws on the yarn from the friction roll 13 and beam 3, passing the yarn through the friction roll 14, from which it is pulled by the loom mechanism. The adhesion between the periphery of the drive roll 7 and yarn 16 is further increased by the weight of said drive roll, which is supported in the loop 15 between the friction rolls 13 and 14. The drive roll 7 is further arranged to be in such close contact to the friction rolls 13 and 14 as to frictionally drive the same, and thus ease the passage of the warp to and from the same.

The above described operation is continued until the beam 3 is exhausted, and it will be appreciated that as the yarn 16 is delivered to the harness by the drive roll 7, the delivery of the yarn will be unaffected by any change in the diameter of the warp beam occasioned by the continued removal of the yarn therefrom. The amount of yarn to be delivered to the harness is not dependent on the beam 3 or the full or depleted condition of the same, but is solely controlled from the set collar 38, which may be adjusted in a few seconds.

Whenever it becomes necessary or desirable to discontinue the feeding of the terry, the operator may manually control the let-off motion through the hand lever 57. By pulling such lever away from the framing 1 against the influence of the coil spring 59, the flexible connection 53 will be drawn upon and will elevate the dog 28 and pawl 30 out of engagement with the ratchet wheel 27; in which event the lay 6 may continue to operate while the tight and terry warp are being woven alone, and will not be effective to deliver the terry from the beam 3 by reason of the fact that the pawl 30 will swing idly when the arm 32 is oscillated, it being held out of engagement with the ratchet teeth by the cord 53. The rod 65 will be automatically released by the operation of the chain motion when the terry is to be resumed, and the spring 66 will return the same to the position shown in Fig. 1, the dog 28 and the pawl 30 dropping by gravity into engagement with the teeth on the wheel 27. In effect there are three cords, the one, 53, extending from the lever 57 to the dog 28; the second cord, 60, being connected between said lever 57 and the pawl 30; while the third cord, 60′, has its ends fastened to the eye 61 on pawl 30 and a rod 65 which is coupled to the chain motion. The function of the two cords 53 and 60 is to raise the dog 28 and pawl 30, and thereby enable the weaver to slacken or tighten the terry warp in the event of having to pick out a bad place in the goods. The purpose of the cord 60′ is to raise the pawl 30 so that the weight of the beam will pull against the yarn when the tight weave of the border is being woven.

The pawl 30 is also movable automatically by means of its connection with the rod 65, and the terry may be in a similar manner discontinued when the mechanism to which the rod 65 is coupled is actuated to draw said rod down in opposition to the influence of spring 66. When the rod 65 is released, the spring 66 will return the same to the normal position shown clearly in Fig. 4, and by its weight, pawl 30 will again reëngage the ratchet wheel 27, the delivery of the terry being thus automatically resumed.

The parts may or may not be duplicated on the opposite side of the loom, as found in any specific case to be necessary or desirable. The rewinding and replenishing of the beam 3 with yarn may be effected by disengaging the dog and pawl from the ratchet wheel 27, whereupon such wheel will form a convenient means to be grasped by the operative and rotated in the reverse direction.

I am familiar with let-off motions employing whip rolls; which, however, have a tendency to weaken and snap the yarn by reason of their sudden and unyielding pull.

From the foregoing it will be appreciated that the improved let-off motion is simple both in construction and in operation, and is designed for attachment to existing types of looms without appreciable alteration therein.

It is obvious that those skilled in the art may vary the details of construction and arrangements of parts without departing from the spirit of my invention, and therefore I do not wish to be limited to such features except as may be required by the claims.

I claim:

1. In combination, a beam, means imposing a tension on said beam, means independent of said beam for unwinding the yarn therefrom consisting of horizontally-spaced guide rollers for receiving the yarn from said beam and forming a loop therein extending between such rollers, a vertically-movable drive roll supported in said loop and having a frictional driving engagement with said rollers through the yarn, means for carrying the yarn from said unwinding means about said beam and to the loom, and a flexible transmission element for imparting a rotary movement to said drive roll, substantially as described.

2. In combination, a yarn beam, means for receiving the yarn and between which the yarn is suspended to form a loop, a drive roll supported in said loop, a flexible transmission element for rotating said drive roll, and means for intermittently actuating said element including adjustable means adapted to be engaged by the lay, adjustable spring tension and spring compression means for returning said last-named means to initial position after each actuation by the lay, and means for suspending the actuation of said drive roll, substantially as described.

3. In combination, a yarn beam, means for receiving the yarn and between which the yarn is suspended to form a loop, a drive roll supported in said loop, a loose transmission element for rotating said drive roll and permitting same to move vertically, actuating means for said transmission element including a part for engagement by the lay, means for adjusting said part to vary the throw of said actuating means, a spring tension and spring compression device for returning said part in the reverse direction after operation by the lay, means for preventing retrograde motion of said drive roll and actuating means, means for suspending the movement of said drive roll, and means for disengaging said retrograde-motion-preventing means, substantially as described.

4. In combination, a yarn beam, means for receiving the yarn and between which the yarn is suspended to form a loop, a drive roll suspended in said loop, a sprocket connected to said drive roll, a ratchet wheel, a sprocket turning with said wheel, a chain connecting said sprockets, an oscillating pawl engaging said ratchet wheel, a part engageable by the lay to operate said pawl, adjusting means for said part, spring tension and compression means to return said part after each actuation, a dog engaging said ratchet wheel, hand-actuated means for simultaneously disengaging said pawl and dog, and means for disengaging said pawl independently of said hand-actuated means, substantially as described.

5. In combination, a yarn beam, a drive roll for unwinding the yarn therefrom, a ratchet wheel, gearing between said wheel and roll, an oscillating arm, a pawl carried on said arm and engaging said wheel, a reciprocating rod connected to said arm, a set collar on said rod, a finger on said set collar projecting in the path of the lay, compression and tension springs encircling said rod, and set collars for adjusting said springs, substantially as described.

In testimony whereof, I affix my signature.

JAMES FRANKLIN CARPENTER.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."**