

(No Model.)

H. C. COCKERILLE.  
LET-OFF FOR LOOMS.

No. 590,001

Patented Sept. 14, 1897.

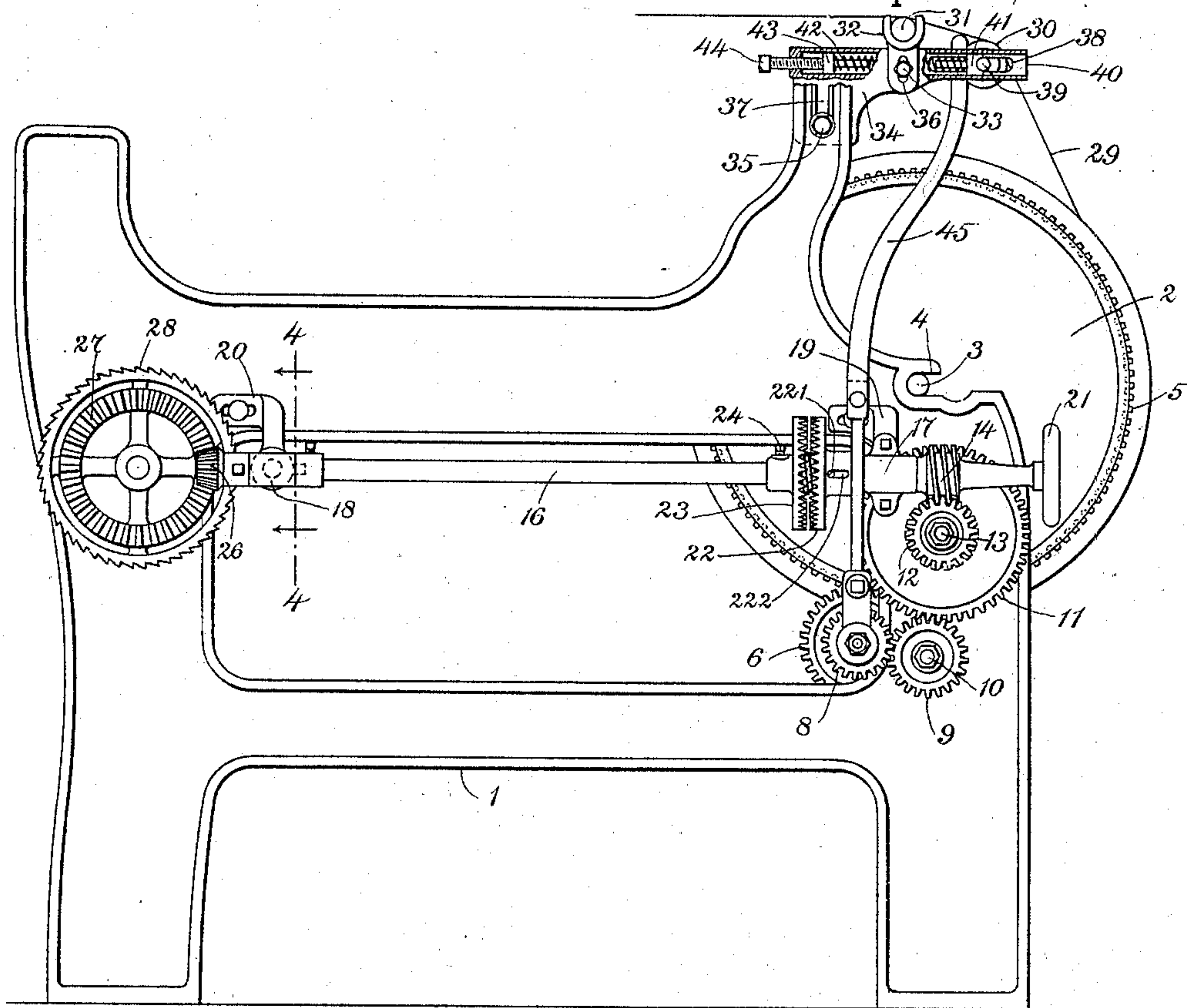


Fig. 1.

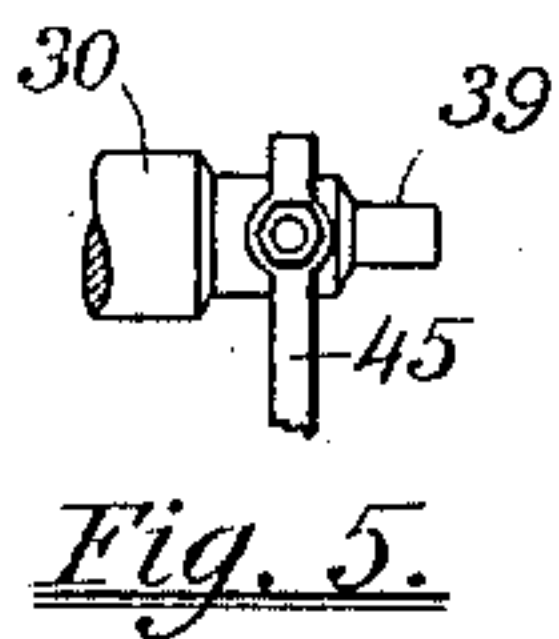


Fig. 5.

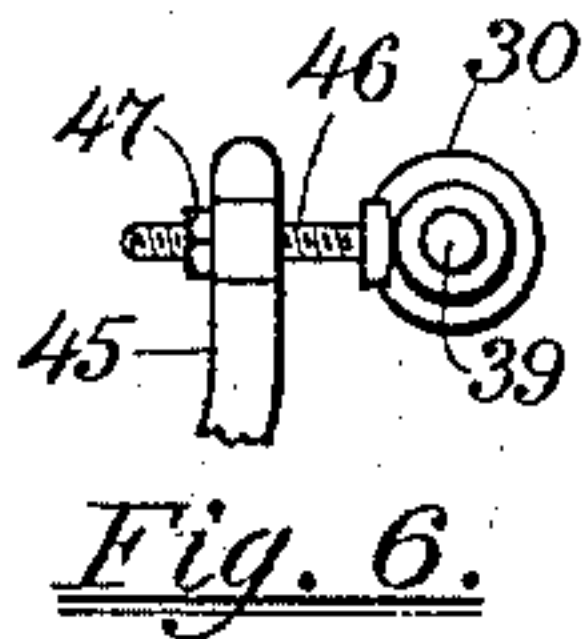


Fig. 6.

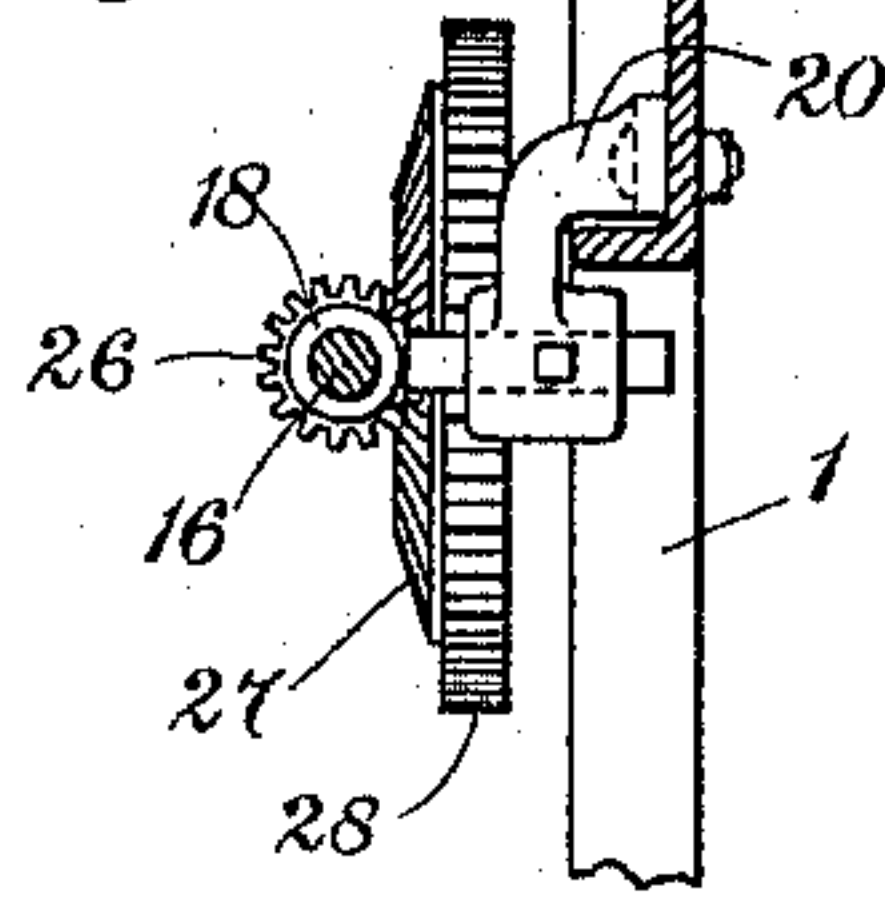


Fig. 4.

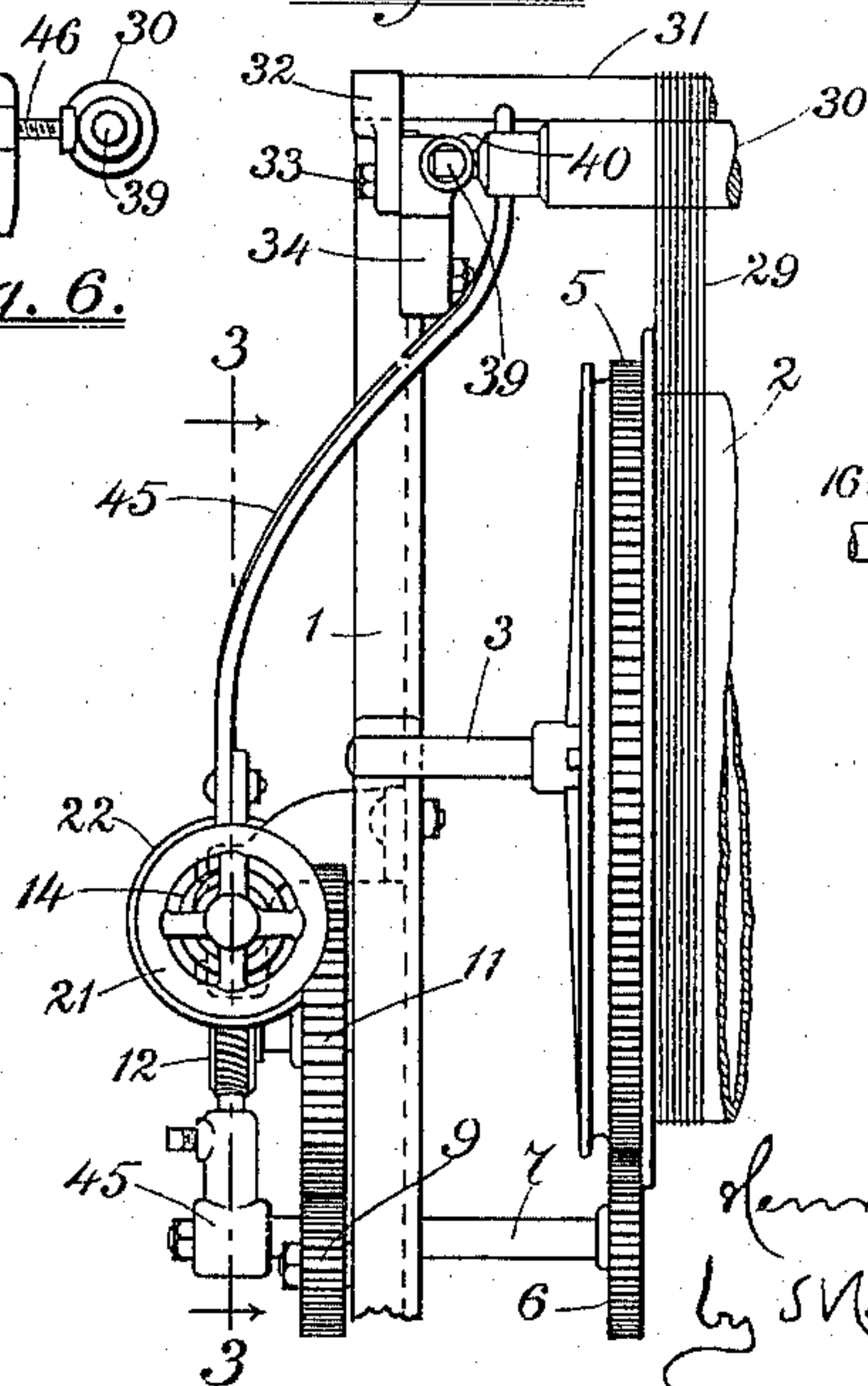


Fig. 2.

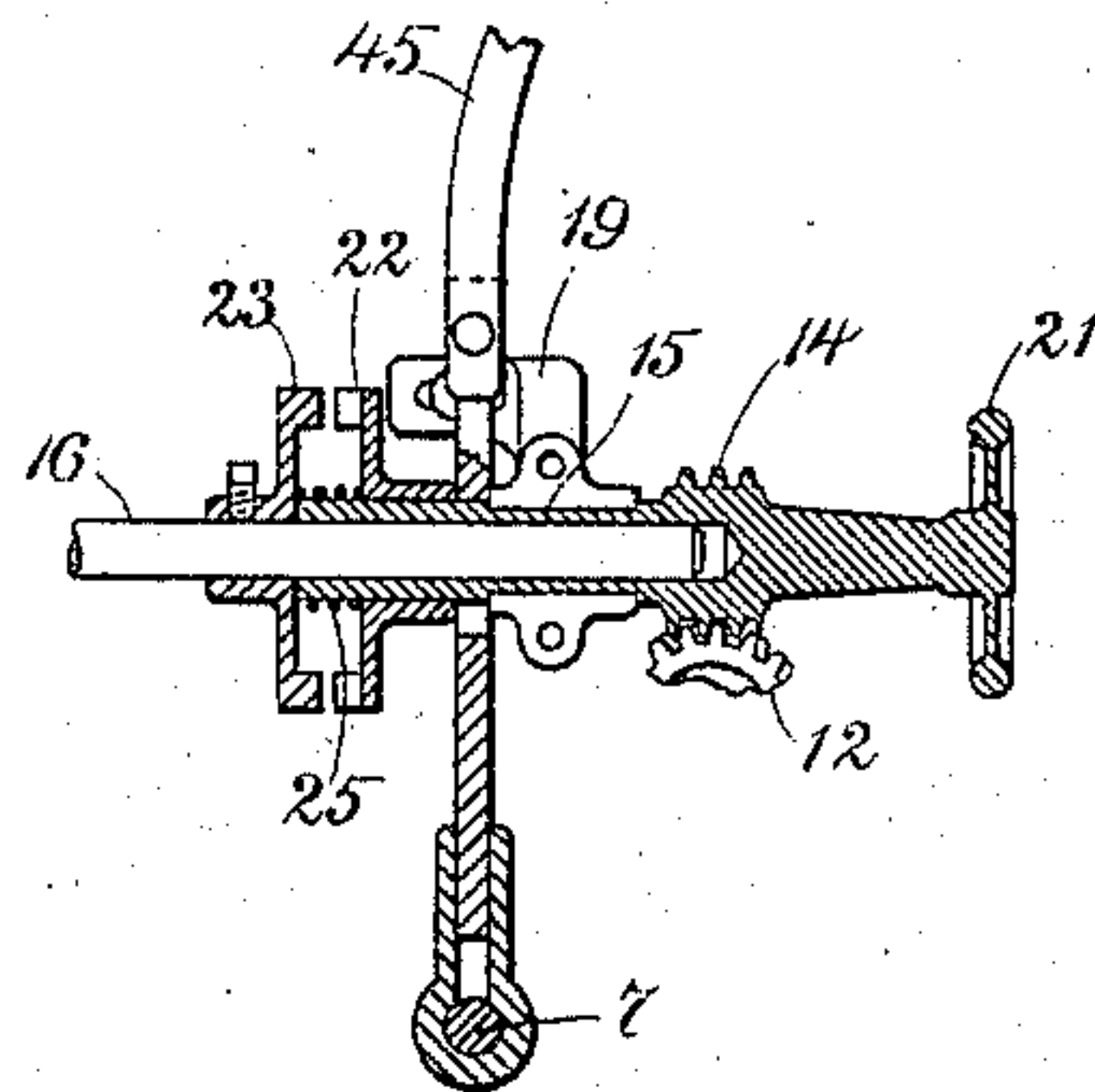


Fig. 3.

Witnesses.  
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# UNITED STATES PATENT OFFICE.

HENRY C. COCKERILLE, OF LOWELL, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JEREMIAH CLARK, OF SAME PLACE.

## LET-OFF FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 590,001, dated September 14, 1897.

Application filed April 8, 1897. Serial No. 631,247. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY C. COCKERILLE, a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Let-Offs for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

As is well known to those who are skilled in the art, various forms of so-called "friction let-offs" are in use at the present time. In the case of such let-offs the unwinding of the yarn from the warp-beam is resisted or retarded by means of frictional drag or brake devices, and the feeding or unwinding of the yarns is permitted to take place only when the strain or tension of the warp-yarns due to the action of the take-up reaches a certain point. In such let-offs the actual work of turning the warp-beam as the warp unwinds therefrom devolves on the yarns themselves. A great many endeavors have been made to provide a positive let-off—that is, one in which the unwinding or delivery of the warp-yarns shall be effected by the positive action of gearing or other driving connections and various forms of positive let-offs have been contrived. Up to the present time, however, no great practical success has been attained in this direction and exceedingly few positive let-offs are actually in use. The most, if not all, of the looms which are employed in the manufacture of cotton fabric are equipped, so far as I am at present aware, with frictional let-offs. A successful positive let-off is greatly to be desired and is much looked for by manufacturers.

The aim of my present invention is to provide a positive let-off which shall meet all practical requirements.

The invention consists in certain features of novel construction and in novel combinations and arrangements of parts, all as is illustrated in the drawings, and as first will be described fully in the present specification, and afterward particularly pointed out and distinctly defined in the claims at the close of this specification.

The accompanying drawings illustrate the

best form in which I have thus far embodied my invention.

Figure 1 of the drawings represents in side elevation one side frame of a loom with the said embodiment of the invention applied thereto, certain small portions adjacent to the whip-roll being represented as broken away or in section in order the better to illustrate certain features which otherwise would not be visible. Fig. 2 is a view in rear elevation—that is, looking from the right-hand side in Fig. 1 of one end of the warp-beam and the parts which are adjacent thereto. Fig. 3 is a view in vertical section on the line 3 3 of Fig. 2, looking in the direction of the arrows which are placed at the ends of the said line. Fig. 4 is a view in vertical section on the dotted line 4 4 of Fig. 1, looking in the direction of the arrows which are placed at the ends of the said line. Figs. 5 and 6 are detail views taken at right angles to each other and serving to illustrate how the clutch-actuating lever may be operated from the whip-roll.

1 designates the loom-frame.

2 is the warp-beam, it being mounted and supported by its journals 3 in usual manner in bearings 4, which are provided therefor in the side frames of the loom.

5 is the usual gear with which the warp-beam is provided. 6 is a pinion meshing with the said gear and mounted upon a short shaft 7, which latter is supported suitably on the loom side, the said shaft having also a pinion 8, which meshes with a pinion 9, that is mounted to turn on a stud or pin 10 applied to the loom side, the said pinion 9 meshing also with a gear 11.

12 is a worm-gear which turns in unison with the spur-gear 11, both being mounted on stud 13, which latter is applied to the loom side.

14 is a worm which engages with the teeth of the worm-gear 12, the said worm being formed or provided on the sleeve 15, the latter being applied to one end of the side shaft 16. 17 and 18 are bearings in which the said side shaft 16 is mounted to turn, the said bearings being connected with brackets 19 and 20, which are bolted to the loom side, as shown. The sleeve 15 normally is free to turn upon the shaft 16 independently of the latter



and is equipped with a hand-wheel 21, by means of which to enable it to be turned by hand for the purpose of adjusting the warp-beam—that is to say, turning the said wheel 5 to partially unwind the warps therefrom or to wind them thereon, as and when required. Upon the forward end of the sleeve 16 is mounted one member 22 of a finely-toothed clutch. A pin 221, projecting from the sleeve, 10 passes through a slot 222 in the hub of said clutch member 22 and compels the sleeve and said clutch member to turn in unison. The other member, 23, of the said clutch is fixed upon the side shaft 16, as by means of the 15 clamping-screw 24, which is shown in the drawings. A spiral spring 25, interposed between the two clutch members 22 and 23, normally holds the member 22 pressed away from the member 23 and out of engagement there- 20 with, as indicated in Figs. 1 and 3 of the drawings. Fast upon the forward end of the side shaft 16 is mounted the beveled pinion 26, which meshes with the beveled gear 27. The said beveled gear 27 rotates in unison with 25 the usual actuating ratchet-wheel 28 of the take-up mechanism, the said ratchet-wheel being operated in customary manner not necessary to be shown or explained herein.

The warp-yarns 29 on their way from the 30 warp-beam 2 pass over a whip-roll 30 and then over a guide-roll 31, from which last it extends to the heddles. The guide-roll 31 has its ends journaled in bearings in brackets 32, the latter being fixed by bolts 33 to the stands 35 34, the said stands in turn being fastened by bolts 35 to the loom sides. Each bracket 32 is slotted vertically, as at 36, to enable it to be adjusted up and down upon the corresponding stand 34, and the upwardly-projecting portion at the rear of each side frame is 40 slotted vertically at 37 to permit of vertical adjustment of the corresponding stand 34 upon the said side frame. Each stand 34 projects rearwardly, and it is slotted transversely, as 45 at 38, for the reception of the journal 39, which is provided on the corresponding end of the whip-roll 30, the slot permitting horizontal movement of the said journal forward and rearward in the loom. Each stand 34 is 50 formed also with a horizontally-extending hole or opening 40, in which is placed a block 41, a spiral spring 42, and a second block 43. The spring 42 is compressed between the blocks 41 and 43 and serves to press the block 55 41 against the journal 39 of the whip-roll 30 and to bear the whip-roll 30 rearwardly in the loom.

44 is a set-screw acting against the block 43, and by means of which the tension of the 60 spring 42 may be adjusted as required. The tension of the spring 42 determines the tension at which the warp-yarns shall be maintained in the course of the weaving.

45 is a lever having the free extremity 65 thereof extended up to a position in advance of one end of the whip-roll 30. The lower end of the said lever is sleeved on the short shaft

7, as shown in Figs. 1, 2, and 4, and an intermediate portion of the lever engages with the clutch member 22. If desired, the upper 70 end of the lever 45 may contact with one end of the whip-roll 30, but I find it more convenient in practice to apply to the said upper end an adjustable projection in the form of a bolt 46, having one end thereof arranged to come 75 in contact with one end of the roll 30, the threaded stem of the said bolt fitting a threaded hole in the upper end of the lever 45 and having a lock-nut 47 applied thereto.

In practice the parts will occupy normally 80 the positions in which they are represented at the right-hand side in Fig. 1, with the clutch member 22 separated from the clutch member 23 and the warp-beam stationary. In the course of the weaving as the take-up motion 85 draws forward the web and increases the tension of the warps the forward movement which the increased strain or tension of the warps will communicate to the whip-roll 30 will cause the said whip-roll to press forward the 90 lever 45, which will close the clutch member 22 into engagement with the clutch member 23, which is fast upon the side shaft 16. Thereupon the worm 14 will be caused to rotate in unison with the side shaft 16 and will trans- 95 mit through the gearing which has been described movement to the warp-beam and thereby unwind a supply of warp-yarns therefrom. Sufficient warp-yarns having been un- 100 wound from the warp-beam to allow the whip-roll to recede under the action of the spring 42, the lever 45 and movable clutch member 22 will be allowed to move under the action of the spring 25, so as to open the clutch and cause the unwinding movement of the warp- 105 beam to discontinue. In brief, an increase of tension on the warp-yarns acts through the whip-roll and the lever 45 to close the clutch, so as to cause the warp-beams to be driven positively from the side shaft 16 for the pur- 110 pose of delivering the required fresh portion of warp-yarn. A sufficient quantity or portion of warp-yarns having been unwound, the return of the whip-roll enables the clutch to be opened again, so as to arrest the unwind- 115 ing movement of the warp-beam.

An important characteristic of the invention is the fact that the motion by means of which the warp-beam is actuated at the re- 120 quired times for unwinding fresh supplies of the warp-yarns is taken from a moving member of the take-up motion or mechanism. The take-up is the part of the loom which is effective in governing or determining the number of picks to the inch in the web, and by pro- 125 viding mechanism such as aforesaid so as to connect at the required times the warp-beam with the take-up ratchet or some other suitable part of the take-up mechanism, so as to enable the warp-beam to be operated from 130 the said take-up ratchet or other part of the take-up mechanism, I secure and maintain a definite and certain relation between the letting off and the taking up—that is to say, I



get a predetermined and exact proportion of the one to the other. It is easier to even up the tension and it enables the same tension to be maintained on the warp-yarns from one end thereof to the other throughout the weaving.

The roll 31 supports the warp-yarns intermediate the whip-roll and the heddles and constitutes a fixed rest for the said yarns. This roll takes a large part of the strain which comes upon the yarn at the time of the beat-up, thereby relieving the whip-roll of the sudden pull forward which is communicated to the warps at such time and holding the warp-yarns firmly while the last pick of weft is being driven home by the reed, securing better results in the weaving. The capacity for effecting vertical adjustment of this roll 31 enables me to vary within certain limits the action of the warp-yarns upon the whip-roll. As is well understood, the angle which the warps make in passing around the whip-roll varies according as the diameter of the warp-beam diminishes in the course of the weaving, becoming greater as the said diameter decreases. A difference in this angle varies the readiness with which a certain degree of tension of the warp-yarns acts to carry the whip-roll forward. By raising or lowering the guide-roll 31 I am enabled to regulate the angle that is formed by the yarn in passing the whip-roll, so that by giving the proper elevation to the said guide-roll I can secure greater uniformity of angle from the time of beginning with a full beam to practically the emptying of the said beam than would be possible if the guide-roll were not employed.

While I have shown the side shaft 16 actuated by means of a bevel-gear that is fast with the actuating ratchet-wheel 28 of the take-up mechanism, I contemplate in some cases actuating the said side shaft from some other suitable moving member of the said mechanism.

I claim as my invention—

1. In combination, the warp-beam, the side shaft having one member of a clutch applied thereto, a sleeve applied to the said shaft having the other member of the clutch applied thereto, one of such clutch members being movable relatively to the other, the spring interposed between the said clutch members, gearing intermediate the said sleeve and the warp-beam, the whip-roll, a lever operated by the movement of the said whip-roll and itself operating the movable member of the

clutch, and a moving member of the take-up motion actuating the said side shaft, substantially as described.

2. In combination, the warp-beam, the side shaft having one member of a clutch applied thereto, a sleeve applied to the said shaft and having the other member of the clutch applied thereto, one of such clutch members being movable relatively to the other, gearing intermediate the said sleeve and the warp-beam, the whip-roll, the lever operated by the whip-roll and itself operating the movable member of the clutch, means acting to move said movable member and lever in opposition to the pressure on the whip-roll, the adjustment device located between the said lever and the whip-roll, and means to operate the said side shaft, substantially as described.

3. In combination, the warp-beam, the side shaft having one member of a clutch applied thereto, a sleeve applied to the said shaft having the other member of the clutch applied thereto, one of such clutch members being movable relatively to the other, gearing intermediate the said sleeve and the warp-beam, the whip-roll, the lever operated from the whip-roll and operating the movable clutch member, the stand supporting the end of the whip-roll and permitting the whip-roll to slide backwardly and forwardly, the spring which presses the whip-roll rearwardly, and means to operate the said side shaft, substantially as described.

4. In combination, the warp-beam, the side shaft having one member of a clutch applied thereto, a sleeve applied to the said shaft having the other member of the clutch applied thereto, one of such clutch members being movable relatively to the other, gearing intermediate the said sleeve and the warp-beam, the whip-roll, the lever operated from the whip-roll and operating the movable clutch member, the stand supporting the end of the whip-roll and permitting the whip-roll to slide backwardly and forwardly, the spring which presses the whip-roll rearwardly, means to adjust the tension of the spring, and means to operate the said side shaft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY C. COCKERILLE.

Witnesses:

CHAS. F. RANDALL,  
WILLIAM A. COPELAND.