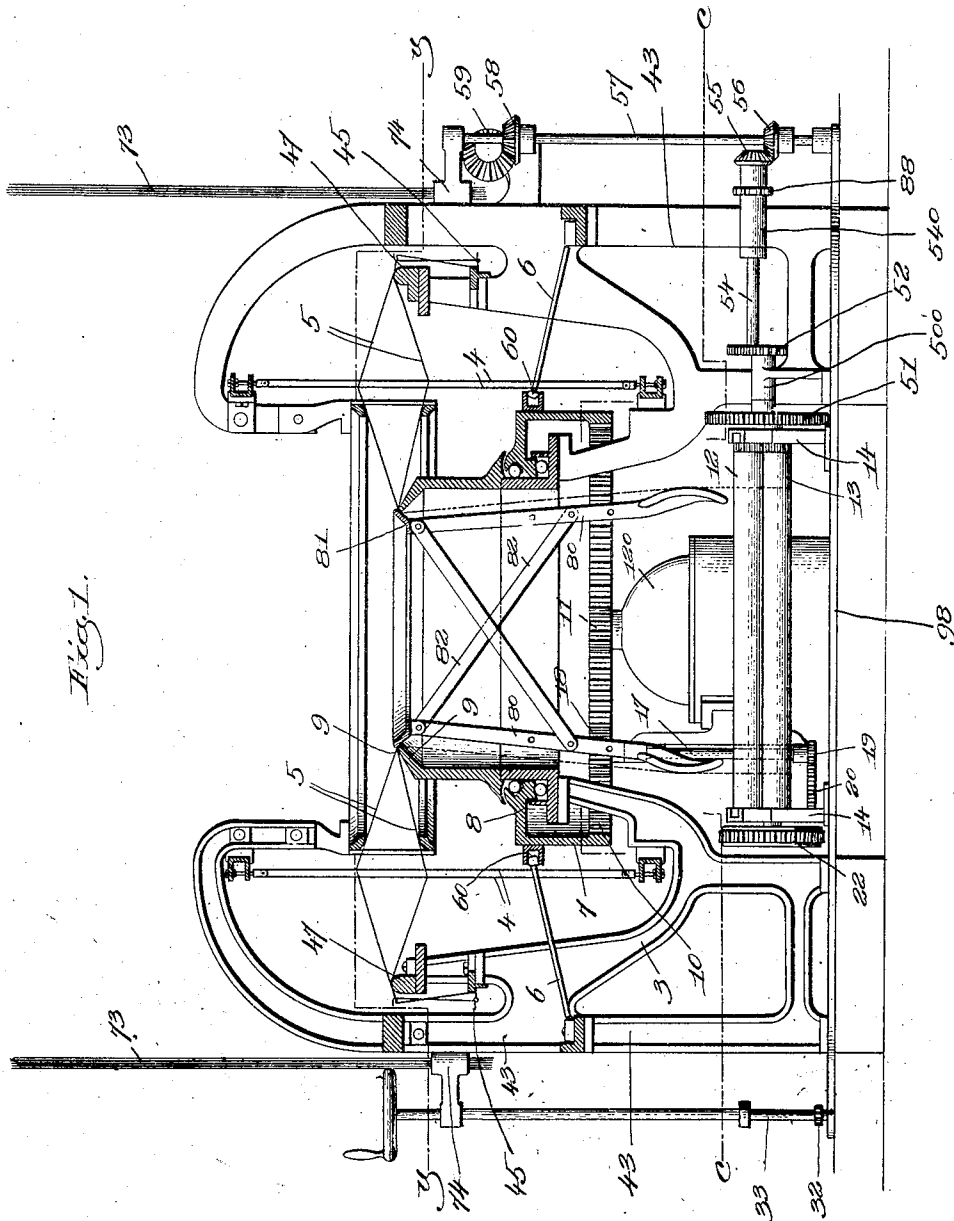


951,451.

A. PETERSEN.
CIRCULAR LOOM.
APPLICATION FILED MAY 12, 1908.

Patented Mar. 8, 1910.

4 SHEETS—SHEET 1.



witnesses:
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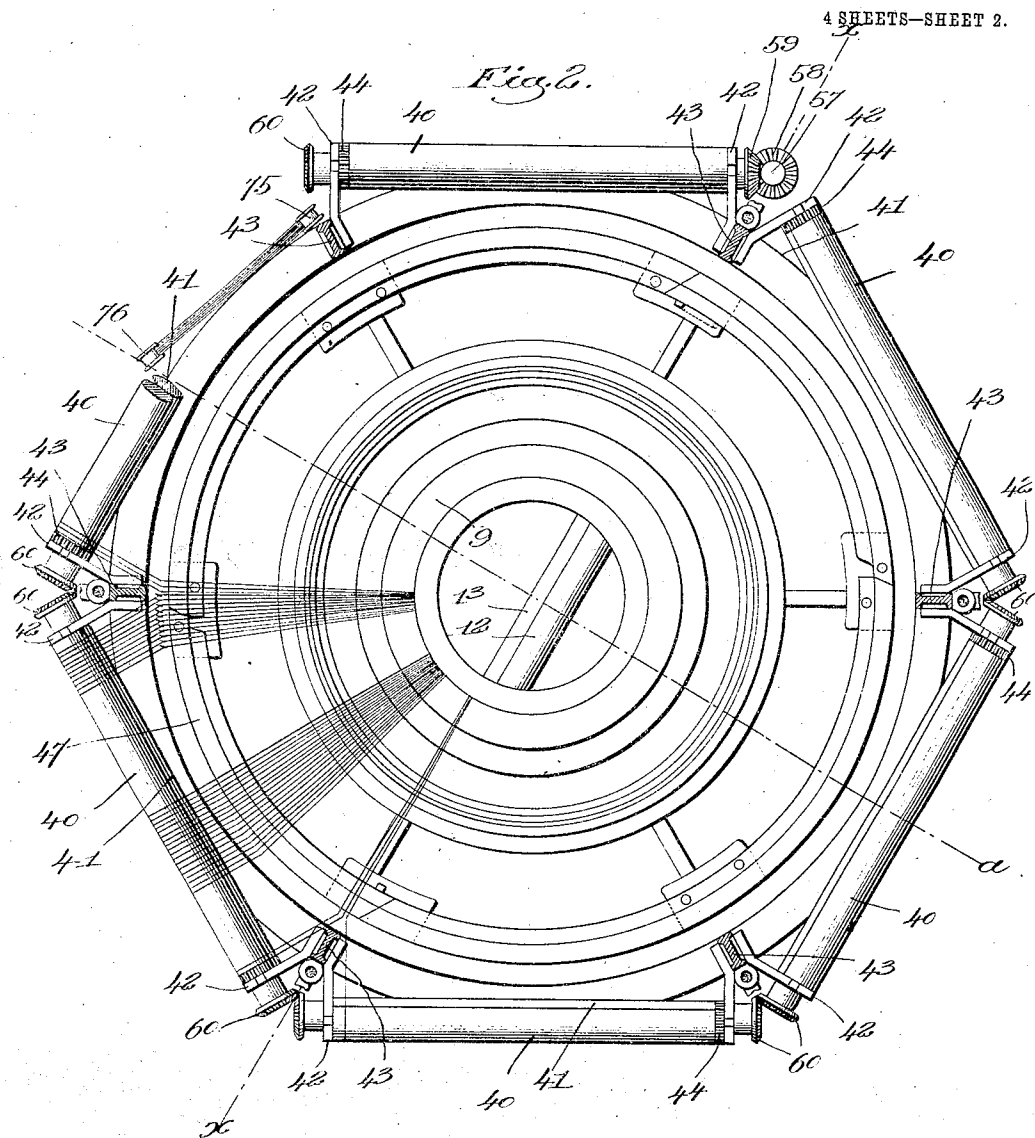
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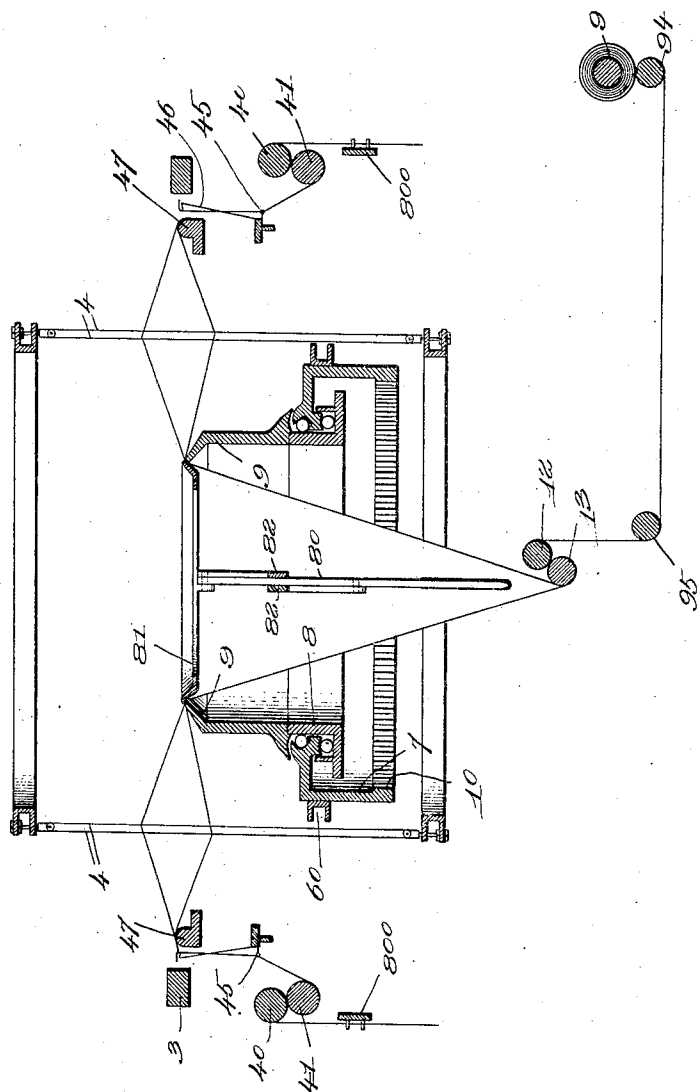
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

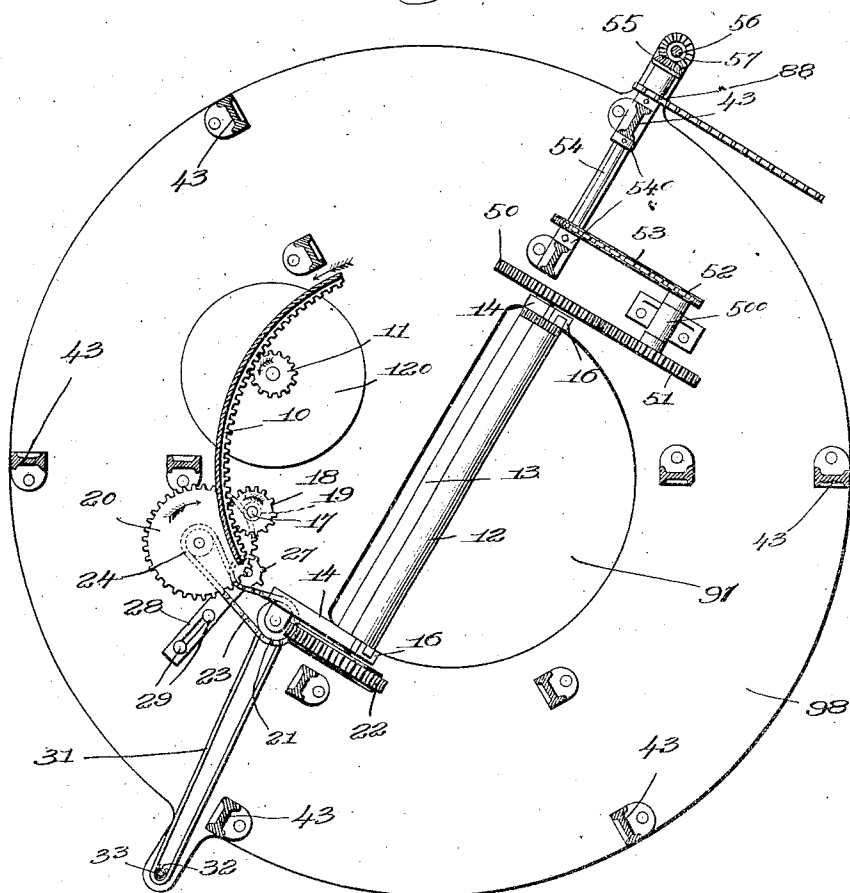


Fig. 5.

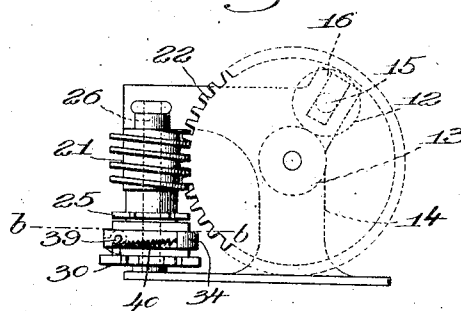


Fig. 6.

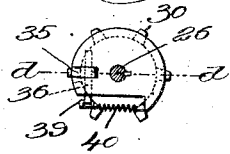
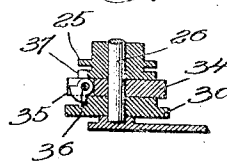


Fig. 7.



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UNITED STATES PATENT OFFICE.

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CIRCULAR LOOM.

951,451.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed May 12, 1908. Serial No. 432,490.

To all whom it may concern:

Be it known that I, ANKER PETERSEN, a subject of the King of Denmark, and resident of Chelsea, county of Suffolk, State of Massachusetts, have invented an Improvement in Circular Looms, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to circular looms and especially to the take-up mechanism for the cloth and the let-off mechanism for the warp-threads. The let-off mechanism comprises let-off rolls which frictionally engage the warp-threads, and the take-up mechanism also comprises a pair of take-up rolls which frictionally engage the fabric and operate to take it up as fast as it is woven. The take-up rolls are positively driven preferably by the loom-operating mechanism and the let-off rolls are geared to and operated positively by the take-up rolls so that the warp-threads will be let off at a speed which has a certain definite relation to the speed at which the woven fabric is taken up. By means of this construction the warp threads are maintained under a uniform tension throughout and a better fabric results.

My present invention also comprehends a construction by which the take-up and let-off mechanism may be disconnected from the loom-operating mechanism and operated in either direction by hand.

These and other features of my invention will be more fully hereinafter described and then the novel features of the invention will be pointed out in the appended claims.

In order to give an adequate description of the invention I have selected for the sake of illustration the preferred embodiment thereof and have illustrated such embodiment in the accompanying drawings wherein—

Figure 1 is a vertical section through a loom embodying my invention on substantially the line $x-x$, Fig. 2; Fig. 2 is a horizontal section on substantially the line $y-y$, Fig. 1; Fig. 3 is a section on the line $a-a$, Fig. 2, showing the parts more or less diagrammatically; Fig. 4 is a horizontal section on the line $c-c$, Fig. 1, said view showing part of the cam ring; Fig. 5 is a detail of the take-up mechanism; Fig. 6 is a section

on the line $b-b$, Fig. 5; Fig. 7 is a section 55 on the line $d-d$, Fig. 6.

So far as the main features are concerned, the loom herein illustrated is somewhat similar to that shown in my co-pending application Se. No. 311,846, filed April 16, 1906, and also similar to the construction shown and described in another co-pending application of mine Se. No. 432,489, filed May 12, 1908.

The loom comprises the frame 3 of any suitable or usual construction which supports the heddles 4 through the eyes of which the warp threads 5 pass as usual. The heddles are operated by means of pivoted levers 6 which in turn are operated by a cam groove 60 formed in the driving or actuator ring 7 that is rotatably mounted on the support 8 and which operates to drive the shuttles. The support 8 also sustains the annular cloth support 9 at the edge of which the weft is interwoven with the warps. The actuator ring 7 may be operated in any suitable way, and it is herein shown as being in the form of an internal gear, it having on its interior gear teeth 10 which mesh with and are driven by a pinion 11 carried by the shaft of a motor 120.

The parts thus far described are or may be of any suitable construction and form no part of my present invention.

As the fabric is formed by the rotary movement of the shuttle through the shed as usual in this class of devices, the woven fabric is drawn down through the circular cloth support 9 by means of take-up rolls 12 and 13. These rolls are journaled in suitable stands 14 secured to the base 98 of the loom and are preferably geared together so that they rotate in unison. The roll 13 is supported in fixed bearings in the stands 14, as seen best in Fig. 5, while the roll 12 has its journals 15 mounted in bearings that are slidably sustained in slots 16 formed in the stands 14. These take-up rolls have roughened surfaces to form good frictional engagement with the cloth and the latter is passed underneath the roll 13 then up between the rolls and over the roll 12, as clearly seen in Fig. 3. In this way the rolls have sufficient frictional engagement with the cloth so that as they are rotated the cloth will be taken up. From the roll 12 the cloth passes down through an opening 97 in the

base 98 of the loom and thence passes to any suitable cloth roll 96, said base being elevated slightly from the floor to permit the cloth to pass under it as seen in Fig. 1. In the present embodiment of my invention I use a direction roll 95 to guide the cloth and a sand or other friction roll 94 to deliver the cloth to the cloth roll. The roll 94 is driven by a sprocket chain 87 from a sprocket wheel 88 on the shaft 54.

The take-up rolls are preferably driven from the actuator ring 7 which in turn is operated by the motor 120, and to accomplish this I have shown a vertically-arranged shaft 17 journaled in suitable bearings sustained by the frame which shaft has at its upper end a gear 18 meshing with and driven by the internal gear 10 and at its lower end a pinion 19 which meshes with and drives a gear 20 that is journaled in suitable bearings on the base of the frame. The gear 20 is connected to and drives a worm 21 which in turn meshes with and drives the worm gear 22 fast on the shaft of the roll 13. The worm 21 and the gear 20 are shown as connected together by a sprocket chain 23 which passes over a sprocket wheel 24 rigid with the gear 20 and also over a sprocket wheel 25 on the shaft 26 of the worm 21. When the sprocket wheel 25 is locked to the shaft 26 a positive driving connection is provided between the motor 120 and the take-up rolls 12 and 13. To maintain the proper tension on the sprocket chain 23, I have shown an idler sprocket wheel 27 which is sustained by an adjustable bracket 28, said bracket being held in its adjusted position on the base by means of screws 29 passing through a slot therein.

Provision is also made for disconnecting the take-up rolls from the actuator ring and for operating said take-up rolls by hand wherever such operation is desired as when the warp threads are being drawn into the loom as the cloth is being removed, etc. As one convenient way of accomplishing this I make the sprocket wheel 25 loose on the shaft 26 and provide said shaft with another sprocket wheel 30 loose thereon which is operated by a sprocket chain 31 which in turn leads around and is operated by a sprocket wheel 32 on a hand-operated shaft 33 suitably journaled in bearings in the frame. A clutch is provided for clutching either of the sprocket wheels 25 and 30 to the shaft 26 according as it is desired to operate the take-up rolls by power or by hand. While it is within my invention to employ a clutch of any appropriate type, I have herein shown one which comprises a clutch member 34 fast on the shaft 26 and provided with a clutch arm 35 which is adapted to engage a notch in the hub of either sprocket wheel 25 or 30 as desired. This clutch arm is mounted on

ber 34 and plays in a slot formed in the periphery of the clutch member. The hubs of the sprocket wheels 25 and 30 are each provided with a notch 37. By turning the rock-shaft 36 the clutch arm 35 may be swung into either notch 37 thereby locking either one of the sprocket wheels to the shaft 26. The rock-shaft 36 is provided with a crank or offset 39 which is acted upon by a spring 40, said crank end being so positioned that the spring normally tends to hold the clutch arm into either one of the notches 37. When it is desired to operate the take-up rolls by hand, the rock-shaft 36 is turned to bring the clutch arm 35 into the notch in the sprocket gear 30, as shown in Figs. 5 and 7, so that said gear and the shaft 26 may be turned by hand from the shaft 33. When the clutch arm is in this position the motor is disconnected from the take-up rolls. When the clutch arm is thrown into engagement with the sprocket wheel 25, however, the hand-operated shaft 33 is disconnected from the rolls and the motor connected thereto.

The feeding of the warp threads to the heddles is controlled by let-off rolls. These let-off rolls are arranged in sets of two which are supported in suitable bearings around the exterior of the frame. The let-off rolls of each pair are designated 40 and 41. Each pair of rolls is sustained in suitable brackets supported by the uprights 43 of the frame and the rolls of each pair are geared together at 44 so that they rotate in unison. The upper roll 40 of each pair is supported in slotted bearings so that the full weight thereof will rest on the lower roll 41 and both rolls have friction surfaces to provide sufficient frictional engagement with the warp threads to positively feed them as the rolls are turned. The warp threads are arranged to pass up over the upper roll 40 of each pair and then down between the two rolls and under the roll 41 and thence to guide eyes 45, one for each thread, over the annular warp rest 47 between which and the cloth support 9 the shed is formed. The drawings also show the resilient arms 46 engaging the warp threads, said arms forming part of a warp stop motion not herein shown, but shown fully in my co-pending application Se. No. 492,489, filed May 12, 1908.

The let-off rolls 41 are driven positively from the take-up rolls 12 and 13 so that the two pairs of rolls work in unison and at a definite speed relative to each other. For thus operating the let-off rolls I have herein provided the take-up roll 13 with a gear 50 which meshes with and drives a gear 51 on a countershaft supported in suitable bearings 500, said countershaft having thereon a sprocket wheel 52 which is connected by a sprocket chain 53 with a sprocket on a shaft 54. The shaft 54 which is mounted in suit-

able bearings 540 in the frame, carries at its end a bevel gear 55 which meshes with and drives a bevel gear 56 on a vertically-arranged shaft 57. This shaft 57 which is supported in suitable bearings has thereon a bevel gear 58 which meshes with and drives a bevel gear 59 on one of the let-off rolls 41. Said let-off roll is thus positively driven from the take-up rolls. The other let-off rolls are driven from the particular let-off roll which receives its motion from the shaft 57, and for this purpose each of the let-off rolls 41 has rigid therewith at each end a bevel gear 60 which meshes with a corresponding bevel gear on the adjacent end of the adjacent let-off roll. All the let-off rolls 41 are thus geared together and work in unison, and each let-off roll 41 is geared to and drives its companion let-off roll 42 by means of the gearing 44, as above described. With this arrangement the warp threads are let off at a speed which has a certain definite relation to the speed at which the fabric is made and taken up and the warps, therefore, are entirely under control for their full length between the let-off rolls and the point where they are made into the fabric. Another advantage which this arrangement has is that all the warp threads are under a uniform tension regardless of the temperature or humidity of the room; and still another advantage is that the feeding of the warp threads into the loom is accomplished independently from the warp beams, and it is, therefore, possible to place the warp beam or warp beams at a distance from the loom. In the present drawing the warp threads are shown as being led to the loom in the form of warp chains 73 which may be taken from warp beams situated at a distance from the loom, as illustrated in my co-pending application Se. No. 432,489, filed May 12, 1908. These warp chains are led down through guides 74 formed on the frame and under guide rolls 75 and 76 to the combs 800 by which the threads are separated before they are delivered to the take-up rolls. This manner of handling the warps, however, forms no part of my present invention, but is described and claimed in my said co-pending application.

It is desirable to keep the woven tubular fabric in a flat condition as it is fed to the take-up rolls 12 and 13, and for this purpose I have provided a spreader which is situated within the fabric and acts to fold the fabric flat before it is delivered to the take-up rolls. This spreader comprises two spreader arms 80 which are hung from and pivoted to a sustaining ring 81 that rests on the top of the cloth support. These spreader arms 80 are held in their adjusted position by means of braces 82 which are secured to the sustaining ring 81 and are adjustably secured to the spreader arms. The warp threads

pass between the sustaining ring 81 and the cloth support and therefore the spreader arms are situated inside of the fabric. These spreader arms may be opened out as far as the size of the fabric will permit, thus stretching and folding said fabric in a flat condition preparatory to its being fed into the take-up rolls.

With the mechanism thus described it is possible to feed the warps into the loom or withdraw them from the loom by merely turning the shaft 33, for when the clutch member 34 is properly set, the turning of this shaft operates to positively feed the warp threads and to positively move the cloth either forward or backward and at all times the desired uniform tension on the warp threads and the cloth between the take-up rolls and the let-off rolls is maintained.

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

1. In a circular loom, the combination with shedding mechanism and shuttle-operating devices arranged to move the shuttle continuously in the same direction, of warp let-off rolls, cloth take-up rolls, and means to operate one set of rolls from the other.

2. In a circular loom, the combination with shedding mechanism and shuttle-operating devices arranged to drive the shuttle continuously in the same direction, of warp let-off rolls, cloth take-up rolls, and means to rotate the let-off rolls from the take-up rolls.

3. In a circular loom, the combination with shedding mechanism, shuttle-operating devices arranged to drive the shuttle continuously in the same direction and loom-operating mechanism, of warp let-off rolls, cloth take-up rolls, means to operate the take-up rolls from the loom-operating mechanism, and means to drive positively the let-off rolls from the take-up rolls.

4. In a circular loom, the combination with shedding mechanism and means to drive a shuttle continuously in one direction, of a plurality of connected pairs of warp let-off rolls, cloth take-up rolls, and means to drive one of said pairs of let-off rolls from said take-up rolls, the other pairs of let-off rolls being driven from said first-named pair.

5. In a circular loom, the combination with shedding mechanism and shuttle-operating devices arranged to drive a shuttle continuously in the same direction, of warp let-off rolls, cloth take-up rolls, connections for driving the let-off rolls from the take-up rolls, loom-operating mechanism, a hand-operated device, and means for connecting the take-up rolls either to the loom-operating mechanism or the hand-operated device.

6. In a circular loom, the combination with shedding mechanism and shuttle-op-

erating devices arranged to drive a shuttle continuously in the same direction, of cloth take-up rolls, loom-operating mechanism, a hand-operated device, and means to connect
5 said take-up rolls with either the loom-operating mechanism or the hand-operated device.

7. In a circular loom, the combination
10 with shedding mechanism and shuttle-operating devices arranged to drive a shuttle continuously in the same direction, of cloth take-up rolls, a worm for driving said rolls,
two sprocket wheels associated with said worm, hand-operated means to drive one
15 sprocket wheel, power-operated means to drive the other sprocket wheel, and means to connect either of said sprocket wheels to said worm.

8. In a circular loom, the combination with a cloth support at the edge of which
20 the fabric is formed, of a pair of take-up rolls situated below said cloth support, a ring sustained by said cloth support and resting on the cloth as it is formed thereover,
25 and a pair of adjustable arms 80 secured to and depending from said ring and situated within the tubular fabric to spread the latter and fold it flat.

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

ANKER PETERSEN.

Witnesses:

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THOMAS J. DRUMMOND.