Nov. 22, 1949 O. BOURQUE 2,489,231

MECHANISM FOR WEAVING SEERSUCKER CLOTH

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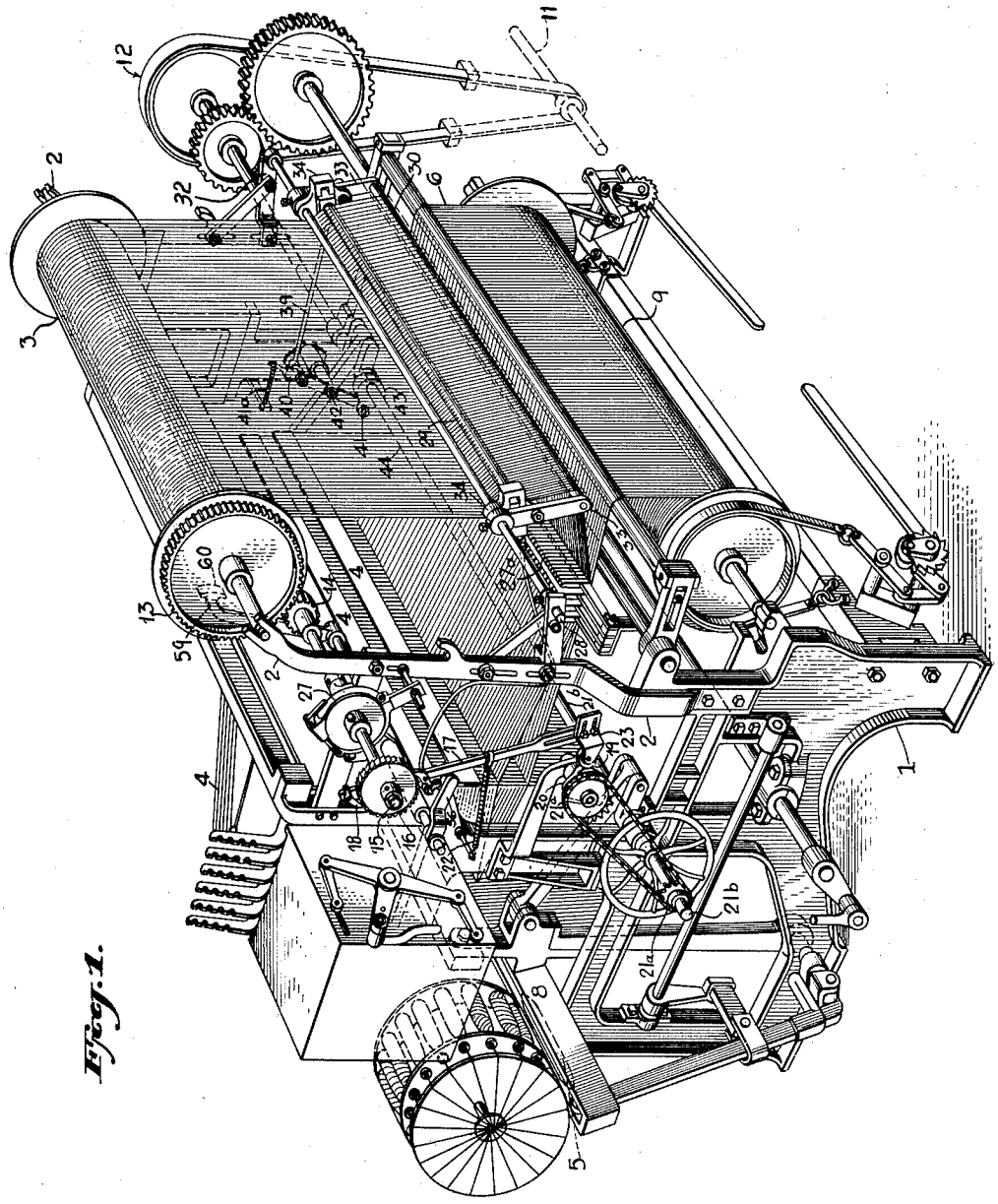


Fig. 1.

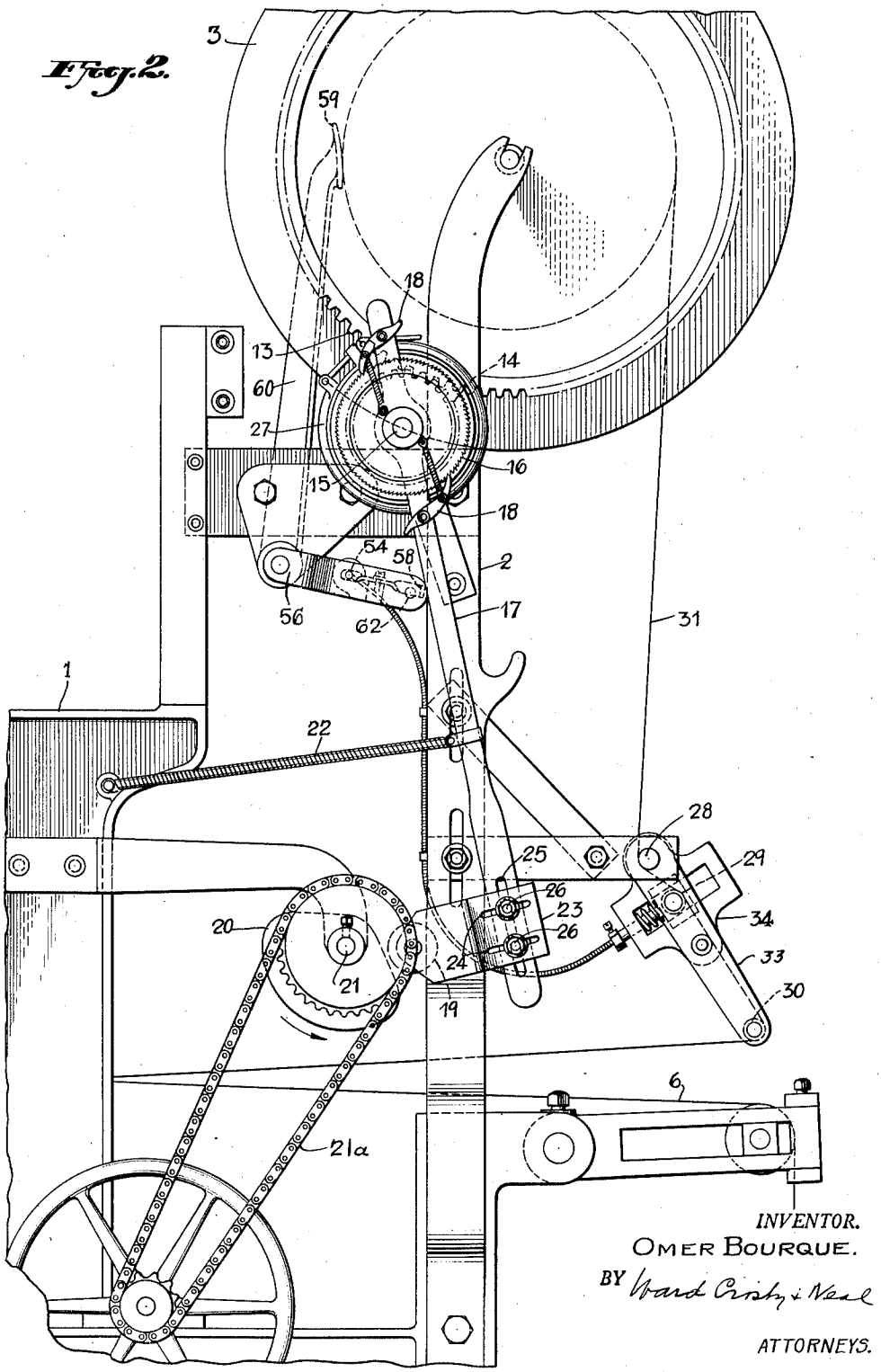
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MECHANISM FOR WEAVING SEERSUCKER CLOTH

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Fig. 2.



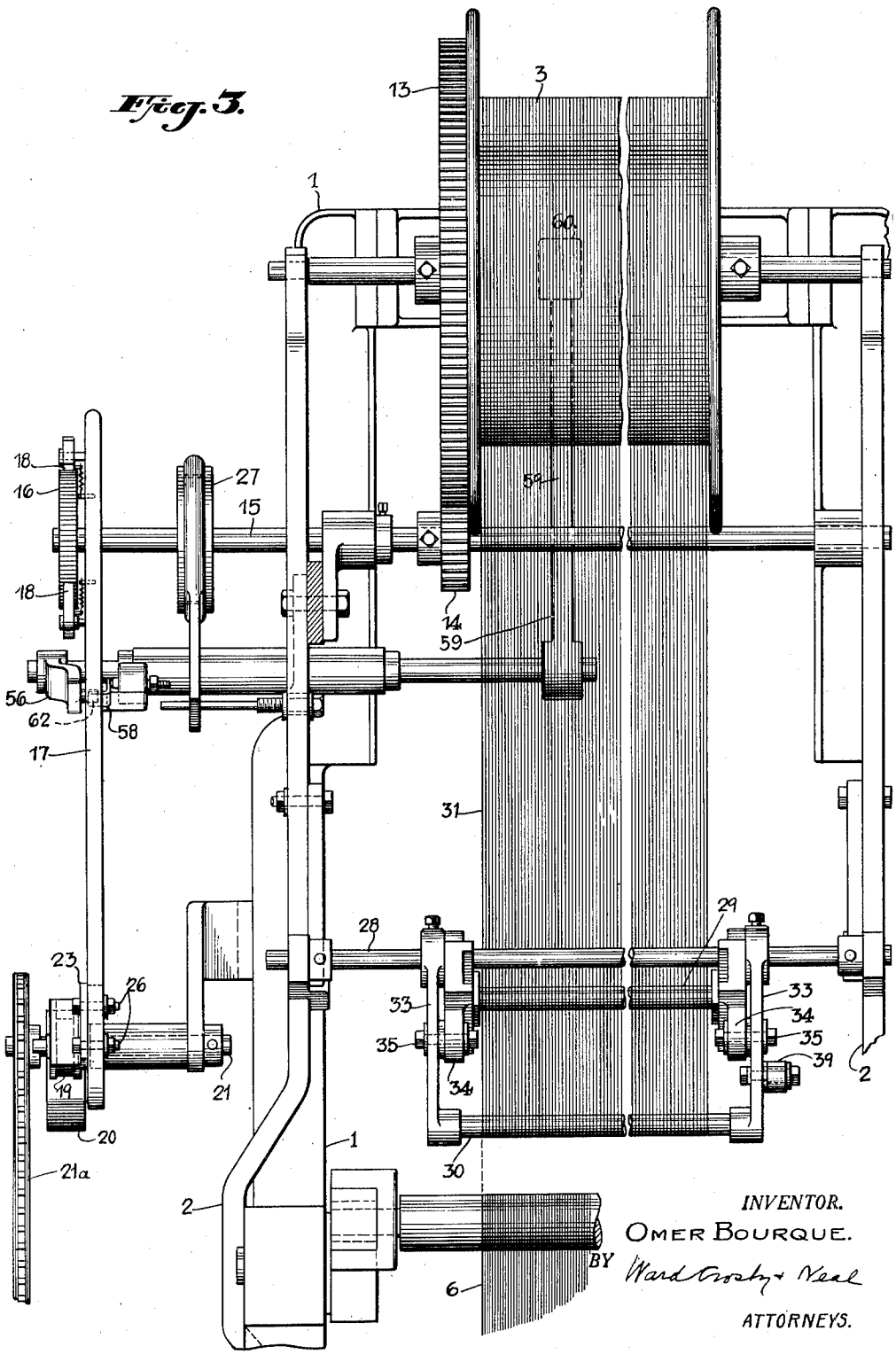
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MECHANISM FOR WEAVING SEERSUCKER CLOTH

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Fig. 3.



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MECHANISM FOR WEAVING SEERSUCKER CLOTH

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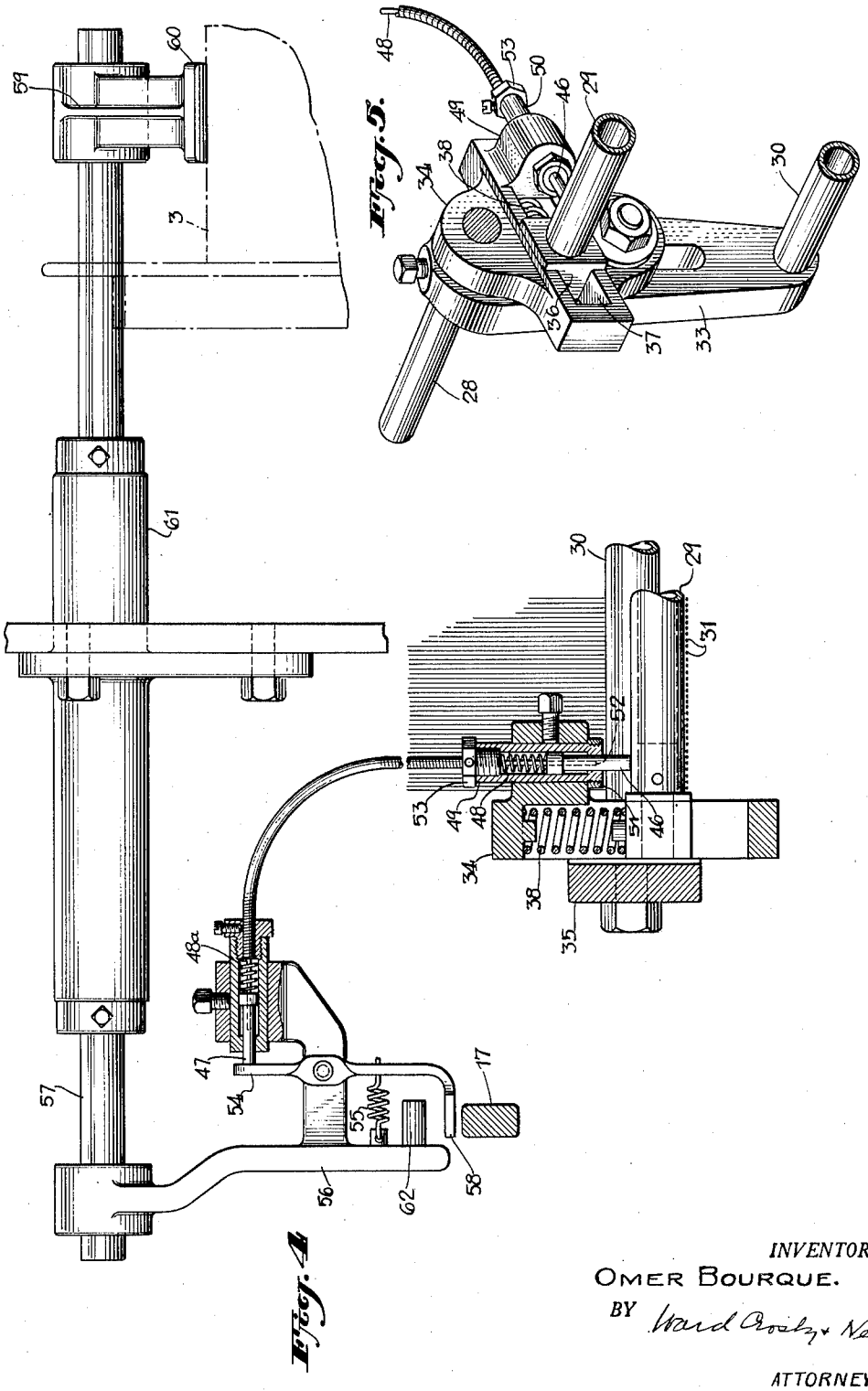


Fig. 5.

Fig. 4

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MECHANISM FOR WEAVING SEERSUCKER CLOTH

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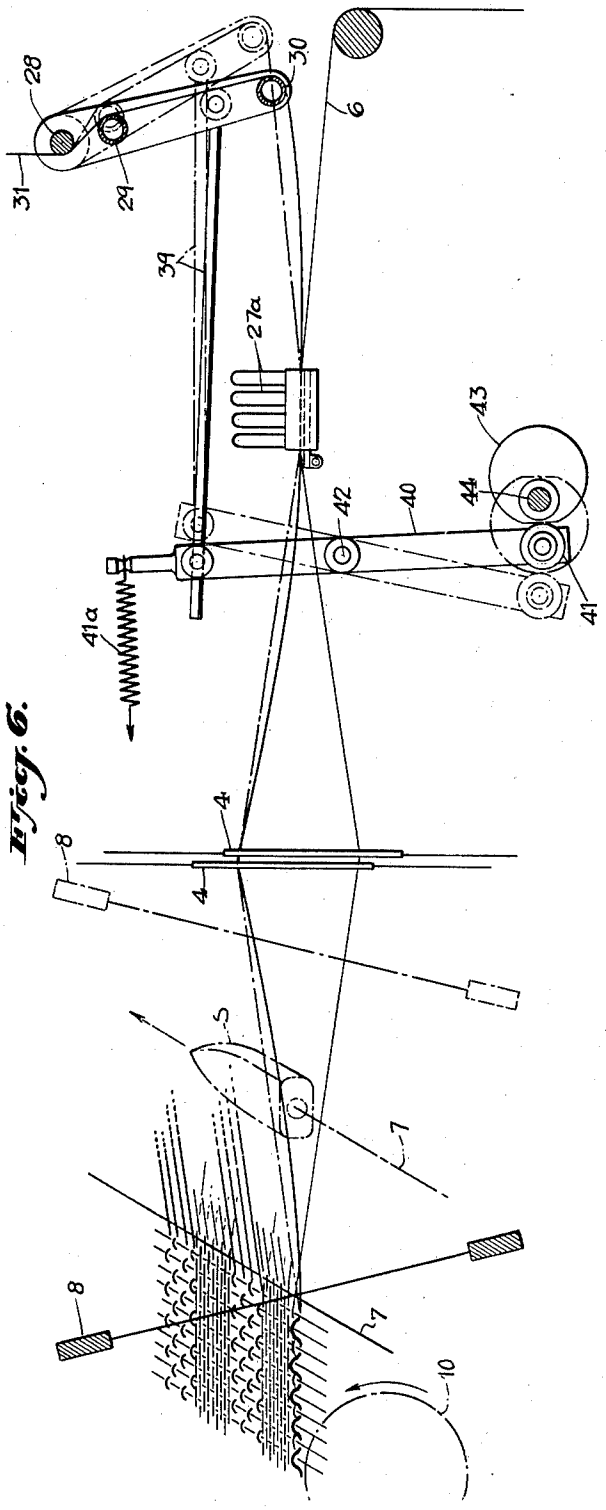


Fig. 6.

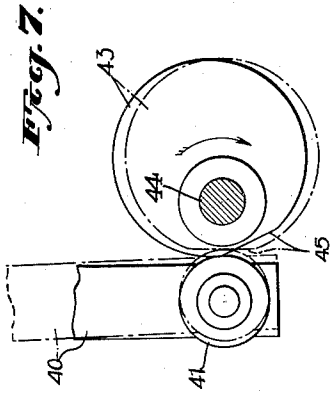


Fig. 7.

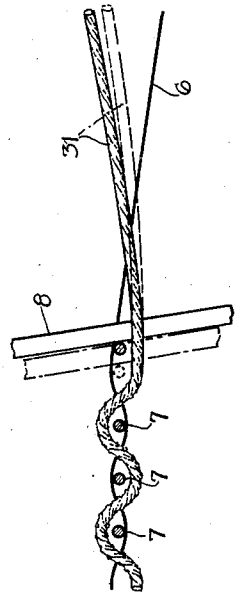


Fig. 8.

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Patented Nov. 22, 1949

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UNITED STATES PATENT OFFICE

2,489,231

MECHANISM FOR WEAVING SEERSUCKER CLOTH

Omer Bourque, Putnam, Conn., assignor to Grosvenor-Dale Company, Inc., Grosvenor-Dale, Township of Thompson, Conn., a corporation of Delaware

Application July 2, 1946, Serial No. 680,972

14 Claims. (Cl. 139—24)

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This invention relates to apparatus for producing seersucker or like cloth. The warp for such looms is fed from two beams. The ground warp is drawn under regular tension from one of the beams and from the other beam, the warp is drawn at intervals in an amount in excess of the ground warp. The weaving of the warp including excess warp with the ground warp causes the puckered or seersucker effect. Looms heretofore used for weaving in this manner have produced large quantities of "seconds"; that is, cloth in which the seersucker effect was imperfect or else there was no seersucker effect at all.

The principal object of this invention accordingly is to produce an improved loom to eliminate, in large part, such "seconds."

The invention accordingly consists of the novel apparatus and combinations thereof, specific embodiments of which are described herein by way of example only and in accordance with the manner in which I now prefer to practice the invention.

I have found in accordance with my invention that controlled positive feeding of the crinkle warp, that is, the warp fed in excess, will eliminate a substantial proportion of "seconds" as heretofore produced. My invention accordingly includes a positive feed means for crinkle warp and a control therefor in accordance with tension in the warp. It also includes a cradle over which the crinkle warp passes and cradle-oscillating means. The oscillating means has a quick release member which quickly supplies an excess of crinkle warp to the harness, and this warp is in slack condition as it reaches the harness and passes beyond it, so that the beater beats up the slack warp with ground warp to form the seersucker cloth. I also control the feed of the crinkle warp in accordance with the size of the warp roll on the beam.

In the accompanying drawings forming part of this specification, Figure 1 is a perspective view of a loom including my invention;

Fig. 2 is a detailed, enlarged end elevation showing the beam stand with the top beam feed device;

Fig. 3 is an elevation viewed from the left in Fig. 2;

Fig. 4 is an enlarged detailed view, partly in section, of the mechanism for increasing the throw of the oscillating arm controlling the rotation of the top beam;

Fig. 5 is a detailed perspective view of a pin and wire and associated parts for increasing the throw of the oscillating arm of Fig. 4;

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Fig. 6 is a schematic view of the cradle, harness and beater, together with crinkle and ground warp passing therethrough to form the cloth received by the take-up roll;

Fig. 7 is a fragmentary, enlarged view of the cradle-cam as its flattened contour is contacting the roller on the arm and lever mechanism for oscillating the cradle, and

Fig. 8 is a detailed, enlarged cross section of a seersucker cloth in process of formation showing the filling being set in place by the beater.

Referring now to the drawings, the numeral 1 represents the frame of the loom on which the various members are mounted. It includes beam stands 2 in which are mounted an upper beam 3 for a roll of crinkle warp. The numeral 4 designates the usual harness, and 5 designates the usual shuttle. 6 designates the ground warp. The shuttle carries the filling thread 7 (see Fig. 6). The numeral 8 designates the beater of a known type. The numeral 9 designates the usual bottom beam or beam for ground warp 6, and 10 designates the known take-up roll for the finished cloth. The loom is driven from a source of power 11 (see Fig. 1) in the usual way here shown as a belt and pulley mechanism 12 serving to operate the various parts of the loom including my improvements, as described more in detail below.

The top beam 3 holding the crinkle warp is provided at one end with a gear 13 cooperating with the pinion 14 mounted at one end of a shaft 15. On rotation of the shaft 15, the pinion 14 cooperates with the gear 13 to rotate the upper beam. Near the end of the shaft 15 opposite the pinion, a ratchet gear 16 is mounted. This ratchet gear is arranged to be driven intermittently to thereby intermittently rotate the shaft 15 and correspondingly, the upper beam 3. For this purpose, an oscillating arm 17 (see Fig. 2) has one end mounted on the pinion shaft 15 adjacent the ratchet gear. On this arm spaced at its upper end and substantially diametrically opposite one another, with respect to the ratchet gear, are mounted pawls 18 cooperating with the teeth on the ratchet gear. A cam-follower roller 19 is mounted on the opposite end of the arm from the pawls. Cooperating with this roller is a cam 20 which is mounted on a stub-shaft 21 operated from the source of power through chain and sprocket drive 21*a* and shaft 21*b*. The roller contacts with the cam during at least a portion of its motion to oscillate the arm 17. A spring 22 tends to restrain the motion of the arm and to return it to the left in Fig. 2. The roller 19

is mounted on an angular plate 23. Attached to this plate is the lower end of the arm 17, the plate being provided with slots 24 and the arm being provided with a slot 25, through which pass bolts 26 to permit adjustment of the arm with respect to the roller.

A brake 27 is mounted on one of the beam stands 2 and operates to restrain the motion of the shaft 15. In accordance with the above construction, the arm 17 is oscillated by the action of the cam, this oscillation moving the pawls back and forth on the ratchet gear teeth to drive the ratchet gear, the shaft 15, pinion 14 and top beam 3 intermittently, thus positively feeding the crinkle warp from the beam 3.

In accordance with my invention, the crinkle warp in tensioned condition passes over an oscillating cradle and from there through the usual detectors 27a to the harness 4 (Fig. 6). The mechanism for oscillating the cradle has a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness. The cradle as here shown consists of three rods 28, 29, 30. The crinkle warp 31 passes from the top beam 3 under tension under rod 28, over rod 29 and over rod 30 (Fig. 2) and thence toward the harness 4. The upper rod is the cradle-supporting rod and is fastened by brackets 32 projecting from the beam stands 2. The arms 33 are pivotally mounted adjacent each end of the rod 28 and hang downwardly. The rod 30 is held by the lower ends of arms 33. The intermediate rod 29 is resiliently held in position by blocks 34, the upper portions of which are journaled about the rod 28 and the lower portions of which are bolted by bolts 35 to arms 33. Each of the blocks 34 is provided with a slide-block 36 operating in a slideway 37 being resiliently held in an advanced position by a spring 38 as shown in Fig. 5. Change in tension of warp 31 on the resiliently held rod 29 in conjunction with other mechanism to be described below is used to control the positive feed of the crinkle warp from the upper beam.

The cradle is oscillated while supplying tensioned crinkle warp thereon to the harness and the oscillating mechanism has a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness. The crinkle warp also passes the harness in slack condition and is woven in such slack condition with the ground warp on the bottom beam 9 and the filling thread 7 to form the crinkle or seersucker cloth.

In order to oscillate the cradle, a link 39 is pivotally connected at one end to the arm 33 shown at the right in Fig. 1. The opposite end of the link 39 is adjustably connected to the upper end of an oscillating arm 40. The lower end of arm 40 holds a cam follower 41. The arm 40 is pivotally attached to the frame of the loom by a pivot 42. The cam follower 41 is spring pressed by spring 41a against an eccentrically mounted cradle cam 43 mounted on a rotatable shaft 44 supported by the loom frame, the shaft 44 being continuously rotated by a connection with the main drive. Upon continuous rotation of the cam 43 mounted on shaft 44, the arm 40 is continuously oscillated and thereby, through lever 39, continuously oscillates the cradle.

Part of the contour of the cam 43 as shown more clearly in Fig. 7 is flattened, as shown at 45. The flat portion of the cam serves to permit movement of the cradle quickly to its furthermost position toward the harness to give a quick supply of excess crinkle warp. In other words, as the

warp 31 passes over the cradle, in its furthermost position away from the harness, it is at maximum tension. As the cradle moves toward the harness, the tension is somewhat relaxed and at the moment when the face 45 contacts with the follower 41, there is a quick relaxation of the tension on the crinkle warp and this results in an excess supply of warp while the roller traverses the flat segment of the cam. The slack produced in the crinkle warp by this quick release of tension causes slack warp to pass through the harness and up to the finished cloth and as the filling thread 7 passes, it binds this slack into the cloth to make the crinkle effect.

The mechanism for controlling the positive feed of the crinkle warp from the beam 3 in accordance with tension of the warp on the cradle includes the spring-held intermediate rod 29 and two pins 46, 47 connected by a wire 48, so that motion of pin 46 is communicated by wire 48 to pin 47. The pin 46 is mounted in a housing 49 (see Figs. 4 and 5) forming part of the block 34. A collar 50 is screw-threaded into this housing and the pin 46 projects through a nut 51 closing one end of the collar. The pin projects substantially at right angles to the rod 29 and is held pressed against it by a spring 52 within the collar. The wire 48 is attached to the pin and passes out through the nut 53, closing the other end of the collar. At the opposite end of the wire, the pin 47 is attached to the wire 48, this pin being held in place by a collar 48a. The end of this pin when advanced by motion of the rod 29 to move the pin 46 against the spring 52 will contact a lever 54 held in position by a spring 55. The lever is mounted on a rotatable bracket 56 which in turn is mounted on a rotatable follower shaft 57 mounted on the frame, the bracket being rotatable for a purpose to be described below. The lever 54 has a finger 58 which normally contacts with the long arm 17 when there is substantially no tension of the crinkle warp on the intermediate rod 29 of the cradle. Under such conditions, where there is no such tension, the limit of the swing of the long arm 17 to the left in Fig. 2 produced by the cam 20 and roller 21 is fixed by this finger 58. By thus fixing the swing of arm 17, the swing of the pawls 18 is correspondingly limited. Thus, supposing that the cam 20 is capable of throwing the pawls 18 through a maximum of 20 teeth, for instance, but without limitation, such swing can be accomplished by having the roller 19 always in contact with the cam contour. The finger 58, however, interferes with such contact and prevents the roller from contacting with the cam for a period of the rotation of the cam, and thus the arm 17 and pawls 18 move over the ratchet gear for a less number of teeth, say 10 teeth, when after advancing the ratchet gear to its furthermost point in one stroke, the arm returns to the left in Fig. 2 to place the pawls in position for the next movement of the ratchet gear. However, when the lever 54 is actuated and the finger 58 is moved out of the path of the arm 17, then this arm is enabled to swing freely and, under such circumstances, it will pass over the maximum number of ratchet teeth, taken for example as 20 teeth, and will correspondingly feed the ratchet gear and the attached shaft 15, and thereby the top beam 3, through a greater angular distance, thus providing more crinkle warp. The arm 17, when swung left to its extreme position, rests on lug 62. The position of the roller 19 with respect to the cam 20 can be adjusted by adjusting the position

of the sleeve 23 and arm 17 by the bolt and slots 24 and 25. By such adjustment, the roller can be brought into contact with the contour of the cam 20 to give a normal feed, as desired.

As the crinkle warp is fed off the top beam 3, the cylindrical roll of such warp will diminish in size and, therefore, provision is made to control the feed of crinkle warp in accordance with the amount of the warp on the upper beam. This is obviously necessary because with a full-sized roll of warp, the movement of the beam 3 through a certain angular distance will deliver a far greater amount of warp than when the beam 3 is moved through the same angular distance when the roll is nearly empty. The mechanism for such control in the feed includes a beam follower arm 59 having a contact plate 60 (see Fig. 4) at one end contacting with the periphery of the crinkle warp on the beam 3. The opposite end of the arm 59 is attached to the shaft 57 rotatably mounted in the sleeve 61 which is attached to the frame of the loom. On the shaft 57 near the end opposite the follower arm 59 is mounted the rotatable bracket 56. Upon rotation clockwise, as shown in Fig. 2, the finger 58 is moved away from the arm 17, thus permitting the placing of the pawls 18 in a position to give a greater intermittent feed of the ratchet gear 16. The movement of the bracket 56 will occur as the size of the roll of crinkle warp on the beam 3 decreases or increases with the substitution of a new crinkle warp roll. With such decrease in size, the angular feed of the beam 3 is correspondingly increased by the amount of crinkle warp fed, thereby remaining substantially constant.

In operation, the crinkle warp which may be of any desired denier and usually consisting of cotton or other fiber, is supplied to the upper warp beam 3. The crinkle warp may be of one or more colors and is positioned and arranged as desired to combine with the ground warp 6 which may be of any color, size or kind desired, from the bottom beam 9 to give the desired effect. Where a striped seersucker effect is desired, the crinkle warp is arranged on the beam 3 to give the lines of white or colored warp which appear crinkled on the background of white or colored warp, the groups of warp as they come from the beams being arranged in a known manner to make alternate rows of crinkle warp and ground warp. The crinkle warp and ground warp being advanced through the loom to the take-up roll, the main drive is started to operate the loom. The crinkle warp is positively fed from the upper beam 3 to the cradle. The cradle is oscillated by the arm 40 and lever 39 controlled by the cam 43 and cam follower 41. At one time during each oscillation of the cradle, just before it reaches its furthest movement toward the harness, a quick release of crinkle warp occurs, supplying an excess of crinkle warp in slack condition to the harness. The excess so fed then passes through to the harness and on to the beater position. When it reaches the beater position, the filling thread shot across by the shuttle 5 is beaten with the slack crinkle warp and taut ground warp to form the crinkle or seersucker cloth which is then taken up on the take-up roll. The timing of the operations is such that the cradle cam 43 is timed to rotate once and to make a complete oscillation of the cradle for each passage of the shuttle. The feed of the crinkle warp is timed to supply warp including excess warp over the cradle in synchronism with the take-up roll. The beater and harness are timed to operate first. The slack in the

crinkle warp then occurs and the beater then beats the filling thread into position to hold the slack and thereby to produce a crinkled or seersucker cloth. During the operation if for any reason, such as a contraction of the crinkle warp due to atmospheric or other conditions occurs, increased tension occurs at rod 29 of the cradle and this in turn will control the positive feed of the warp from the upper beam delivering more warp to compensate for this changed condition. As the diameter of the roll of crinkle warp becomes smaller, the follower will allow a greater angular rotation of the beam so that the same amount of crinkle warp will be fed at each intermittent feeding thereof.

While the invention has been described with respect to a present preferred embodiment which has given satisfactory results, and certain modifications have been referred to, it will be understood by those skilled in the art, after understanding the invention, that various other changes and modifications may be made without departing from the spirit and scope of the invention and it is intended, therefore, in the appended claims to cover all such changes and modifications.

What I claim is:

1. In a loom, in combination, a harness, a beater, a beam for crinkle warp, a beam for ground warp, means to positively drive the beam for crinkle warp to feed the warp therefrom, a cradle, means to oscillate said cradle while supplying crinkle warp thereon toward said harness, said warp being tensioned by movement of the cradle, said last-mentioned means having a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness, means for controlling the positive feed of the crinkle warp from the beam in accordance with tension of the crinkle warp on the cradle, and means for moving said beater to beat up said slack warp with ground warp to form the cloth.

2. In a loom, in combination, a harness, a beater, a beam for crinkle warp, a beam for ground warp, means to positively drive the beam for crinkle warp to feed the warp therefrom, a cradle, means to oscillate said cradle while supplying crinkle warp thereon toward said harness, said warp being tensioned by movement of the cradle, said means having a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness, means for controlling the positive feed of the warp from the beam for crinkle warp in accordance with tension of the crinkle warp on the cradle, means for moving said beater to beat up said slack warp with ground warp to form the cloth, and a mechanism including a beam follower member to control the feed of crinkle warp in accordance with the amount of said warp on said beam.

3. A loom having a harness, a beater, a beam for crinkle warp, in combination with means to positively drive the beam for crinkle warp to feed the warp therefrom toward said harness and means for controlling the positive feed of the crinkle warp from the beam in accordance with the tension of said warp as it passes toward the harness, including a cradle over which the crinkle warp passes and means independent of the warp to oscillate said cradle.

4. A loom having a harness, a beater, a beam for crinkle warp, in combination with means to positively drive the beam for crinkle warp to feed the warp therefrom toward said harness, a cradle, means independent of said warp to os-

cillate said cradle while supplying crinkle warp thereon toward said harness having a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness, said warp being tensioned by movement of the cradle.

5. A loom having a harness, a beater, a beam for crinkle warp, a beam for ground warp, in combination with means to positively drive said beam for crinkle warp to feed the warp therefrom and means to control the feed of crinkle warp in accordance with the amount of said warp on said beam, a cradle, means independent of said warp to oscillate said cradle while supplying crinkle warp thereon toward said harness having a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness, said warp being tensioned by movement of the cradle.

6. In a loom, in combination, a harness, a beater, a beam for crinkle warp, a beam for ground warp, a ratchet and gear mechanism positively driving said beam for crinkle warp to feed warp therefrom, an oscillating arm holding said ratchet mechanism, a cradle, means to oscillate said cradle while supplying crinkle warp thereon to said harness, having a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness, said warp being tensioned by movement of the cradle, means for controlling the positive feed of the warp from the beam for crinkle warp in accordance with tension of the crinkle warp on the cradle including a device to control the throw of said arm and ratchet mechanism, and means for moving said beater to beat up said slack warp with ground warp to form the cloth.

7. In a loom, in combination, a harness, a beater, a beam for crinkle warp, a beam for ground warp, means to positively drive the beam for crinkle warp to feed the warp therefrom, a cradle, a cam and lever mechanism for oscillating said cradle while transmitting crinkle warp thereon toward said harness, said warp being tensioned by movement of the cradle, a portion of the contour of said cam being flat to move the cradle quickly toward the harness for quickly supplying an excess of crinkle warp in slack condition to the harness, means for controlling the positive feed of the warp from the beam for crinkle warp in accordance with tension of the crinkle warp on the cradle, and means for moving said beater to beat up said slack warp with ground warp to form the cloth.

8. In a loom for weaving seersucker, in combination, a harness, a beater, a rotatable upper beam for crinkle warp, a lower beam for ground warp, means to positively feed warp from said upper beam including a ratchet member operating through gear members to rotate said upper beam, a cradle comprising upper, intermediate and lower rod members over which the crinkle warp under tension passes, means to oscillate said cradle, said means having a quick release member for moving said cradle quickly toward said harness for quickly supplying an excess of crinkle warp in slack condition to the harness, said intermediate rod member being resiliently mounted and arranged to slide upon pressure of the crinkle warp thereon in excess of the resilient pressure on the rod, a device operated by the motion of said rod against the resilient pressure to trip a finger member to permit said ratchet member to operate through a greater arc to increase the positive feed of the warp from the upper beam, and means

for moving said beater to beat up said slack warp with ground warp to form the seersucker cloth.

9. In a loom for weaving seersucker, in combination, a harness, a beater, a rotatable upper beam for crinkle warp, a lower beam for ground warp, means to positively feed warp from said upper beam including a ratchet member operating through gear members to rotate said upper beam, a cradle comprising upper, intermediate and lower rod members over which the crinkle warp under tension passes, means to oscillate said cradle, said means having a quick release member for moving said cradle quickly toward said harness for quickly supplying an excess of crinkle warp in slack condition to the harness, said intermediate rod member being resiliently mounted and arranged to slide upon pressure of the crinkle warp thereon in excess of the resilient pressure on the rod, a device operated by such sliding motion of said rod to trip a finger member to permit said ratchet member to operate through a greater arc to increase the positive feed of the warp from the upper beam, means for moving said beater to beat up said slack warp with ground warp to form the seersucker cloth, and a mechanism including a beam follower member to control the feed of crinkle warp in accordance with the amount of said warp on said upper beam.

10. In a loom for weaving seersucker, in combination, a harness, a beater, a take-up roll for cloth, an upper beam for crinkle warp, a lower beam for ground warp, said upper beam having a gear member at one end thereof, a shaft member having a pinion member at one end to drive said gear and at the opposite end having a ratchet gear member mounted thereon, an arm having a pawl member for operating said ratchet gear member, mechanism for oscillating the arm to thereby move the gear and pinion shaft members to rotate correspondingly the said upper beam, a cradle, means to oscillate said cradle while transmitting crinkle warp thereon toward said harness, having a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness, said warp being tensioned by movement of the cradle, means for controlling the positive feed of the warp from the upper beam in accordance with tension of the crinkle warp on the cradle, and means for moving said beater to beat up said slack warp with ground warp to form the seersucker cloth.

11. In a loom for weaving seersucker, in combination, a harness, a beater, a take-up roll for cloth, an upper beam for crinkle warp, a lower beam for ground warp, means to positively drive said beam for crinkle warp to feed the warp therefrom, a cradle including a resiliently held shaft member, a lever member, an oscillating arm connected thereto to oscillate the cradle, a cam member for oscillating said arm, a driving mechanism for operating the cam, said cam member providing a quick release contour to move the cradle quickly toward the harness to supply an excess of crinkle warp in slack condition to the harness, means for controlling the positive feed of the warp from the upper beam in accordance with tension of the crinkle warp on the cradle, and means for moving said beater to beat up said slack warp with ground warp to form the seersucker cloth.

12. In a loom for weaving seersucker, in combination, a harness, a beater, a take-up roll for cloth, an upper rotatable beam for crinkle warp, a lower beam for ground warp, means to posi-

tively rotate said upper beam and feed warp therefrom, a cradle, means to oscillate said cradle while transmitting tensioned crinkle warp thereon toward said harness, having a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness, a mechanism for controlling the positive feed of the crinkle warp in accordance with the tension of the warp passing over the cradle, said cradle including a resiliently held member, a spring-held pin member pressing thereagainst, said pin member moving against said spring member when said rod moves on increase of tension in the crinkle warp thereon, the mechanism including a spring-held lever member actuated by said pin member, said means for positively feeding warp from said upper beam including an oscillating arm member driving said upper beam, said lever member having a portion normally in contact with said oscillating arm member, said portion being withdrawn from contact upon movement of said lever member by said pin member to permit a greater movement of oscillation of said arm member, thereby to rotate said upper beam through a greater arc to supply a larger quantity of crinkle warp, and means for moving said beater to beat up said slack warp with ground warp to form the seersucker cloth.

13. In a loom for weaving seersucker, in combination, a harness, a beater, a take-up roll for cloth, an upper rotatable beam for crinkle warp, a lower beam for ground warp, means to positively feed warp from said upper beam, a cradle, means to oscillate said cradle while transmitting tensioned crinkle warp thereon toward said harness, having a quick release member for quickly supplying an excess of crinkle warp in slack condition to the harness, means for controlling the positive feed of the warp from the upper beam in accordance with tension of the crinkle warp on the cradle, means for moving said beater to beat up said slack warp with ground warp to form the seersucker cloth, and a beam follower having a portion adapted to contact the crinkle warp on said top beam, a follower shaft supporting said follower, said means for controlling the positive feed of said warp from the upper beam in accordance with tension thereof including a rotatable bracket member having a control finger, controlled by such tension, said lever member being mounted on an arm mounted on said follower shaft, said means to feed warp from the upper beam including an oscillating arm connected to rotate said beam, the oscillation of said arm being limited by said finger and said bracket member when rotated, moving said finger to give said arm a wider arc of oscillation to supply a greater arc of rotation for said upper beam, thereby to feed more crinkle warp in accordance with the movement of said follower and the corresponding rotation of said bracket member.

14. A loom having a harness, a beater, a beam for crinkle warp and a beam for ground warp, in combination with means to positively drive said beam for crinkle warp to feed warp therefrom toward said harness, and means for controlling the positive feed of the crinkle warp from the beam in accordance with the tension of said warp as it passes toward the harness, including a cradle over which the crinkle warp passes and means independent of said warp to oscillate said cradle.

OMER BOURQUE.

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