A. L. MICHAEL.

LOOM FOR WEAVING BAGS.

APPLICATION FILED JUNE 7, 1909.

953,632.

Patented Mar. 29, 1910.

3 SHEETS—SHEET 1.

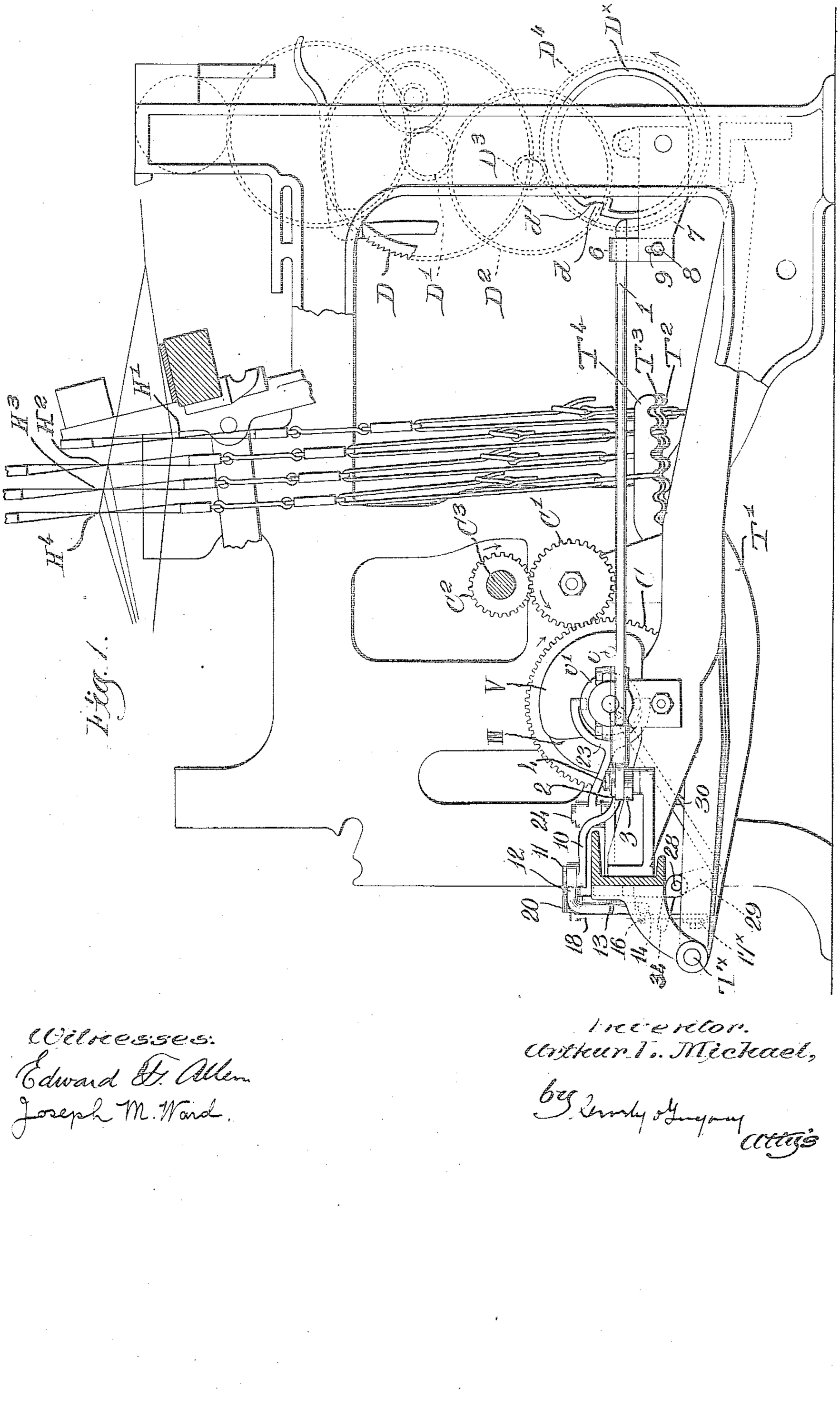

Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

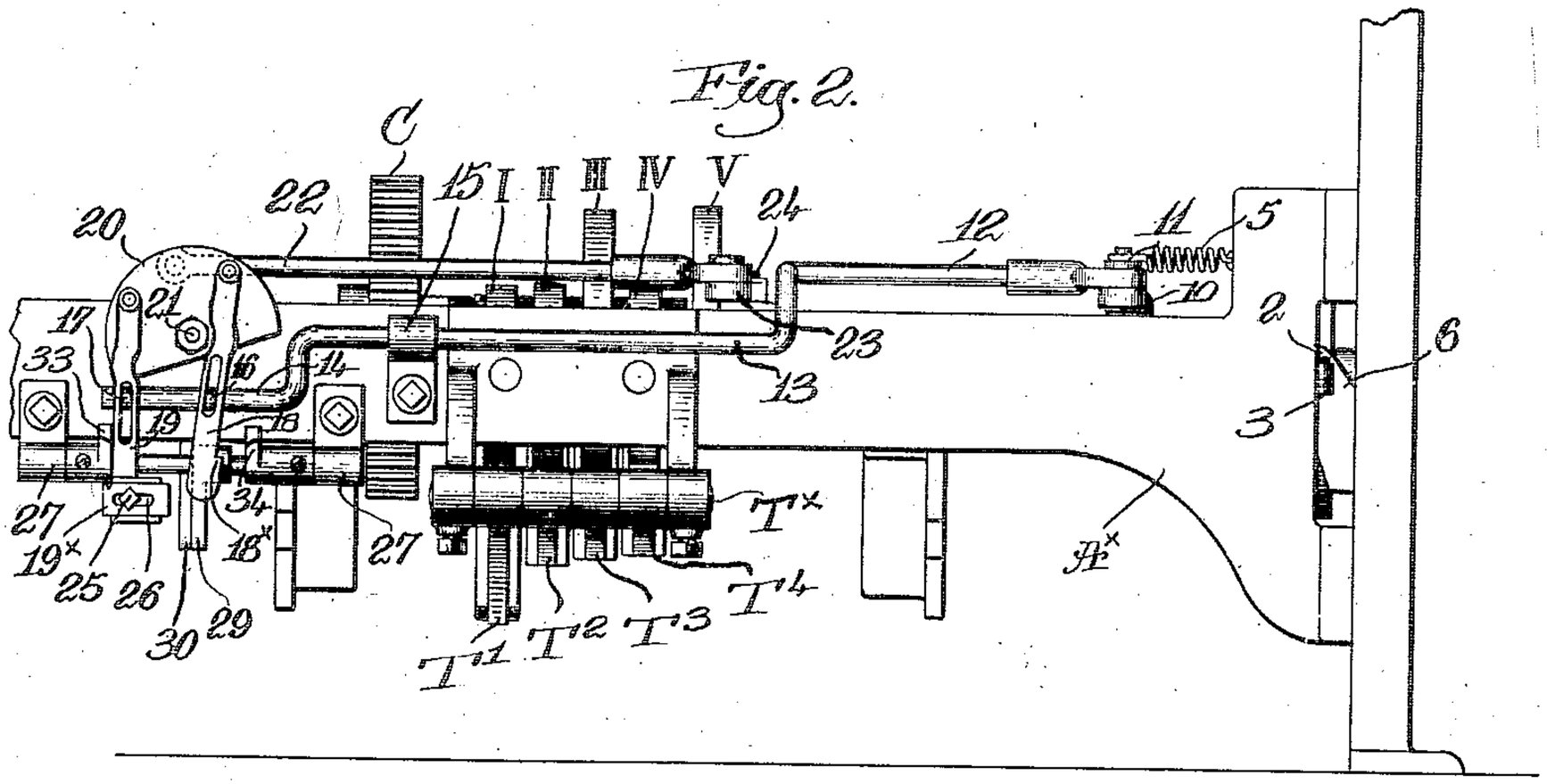
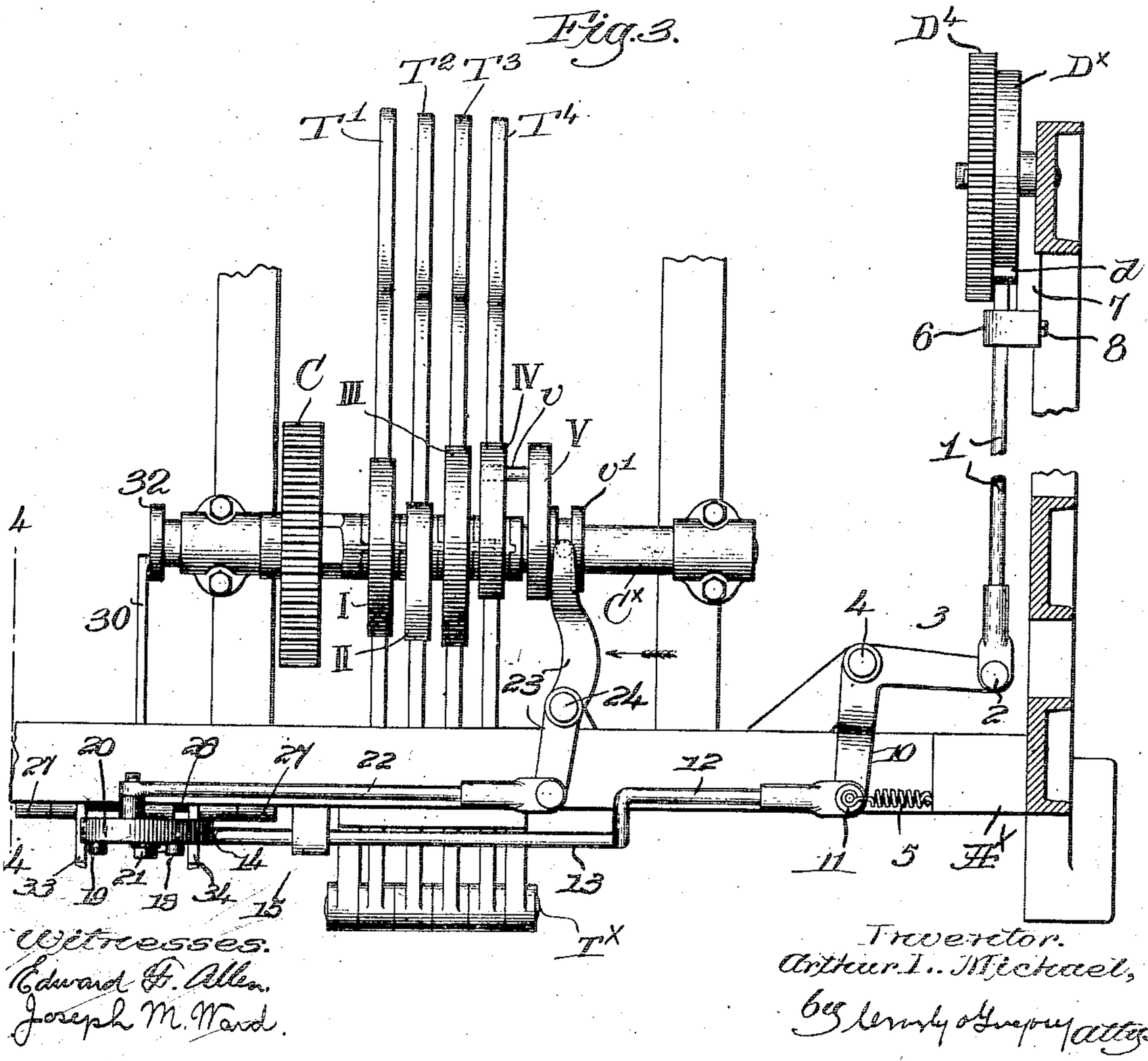


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

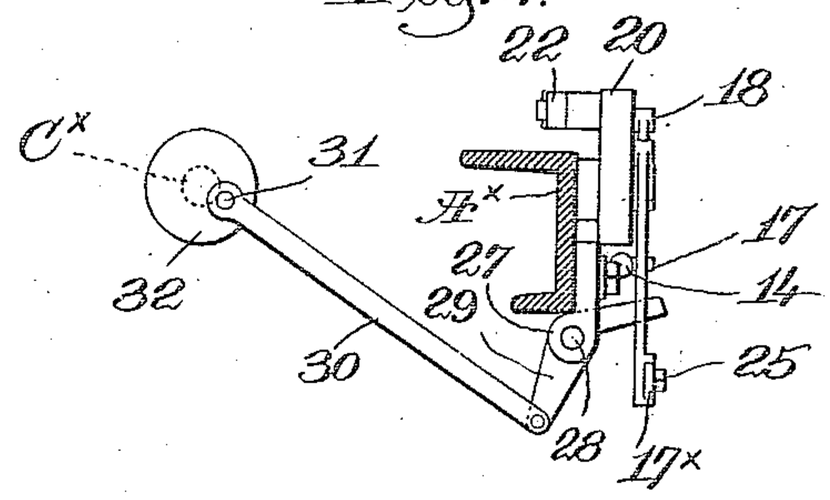


Fig. 5.

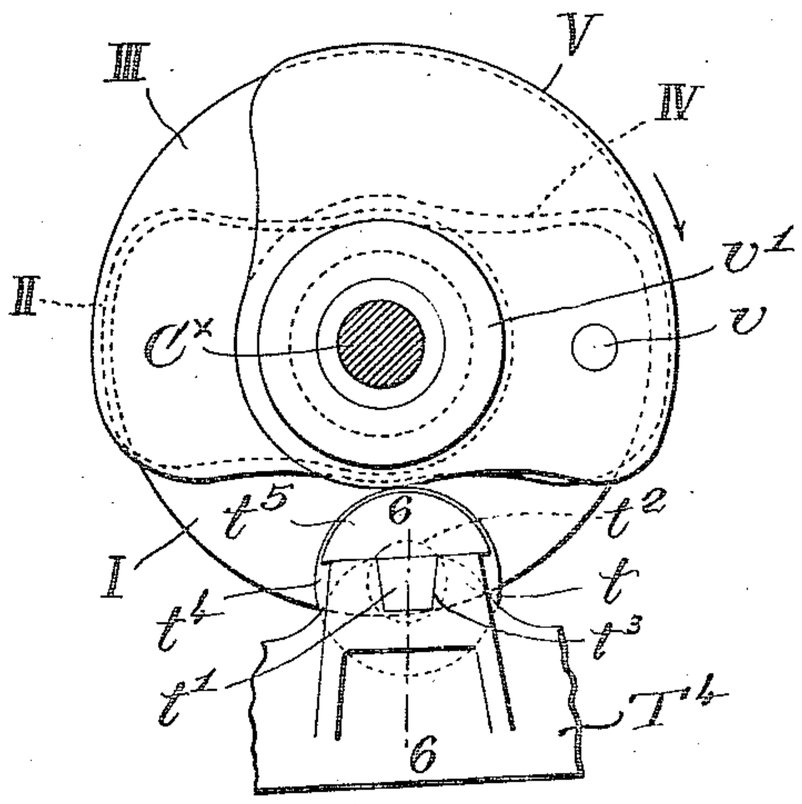


Fig. 6.

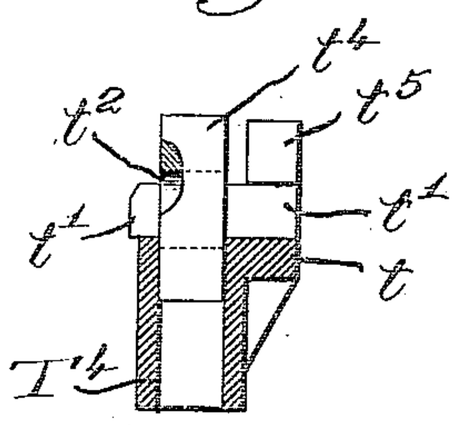


Fig. 8.

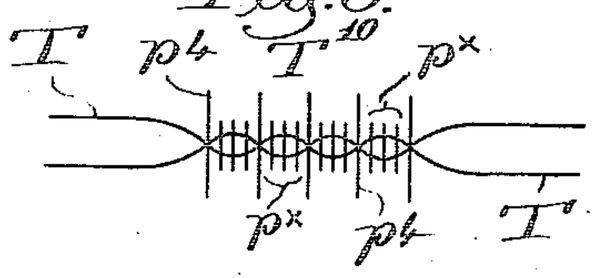
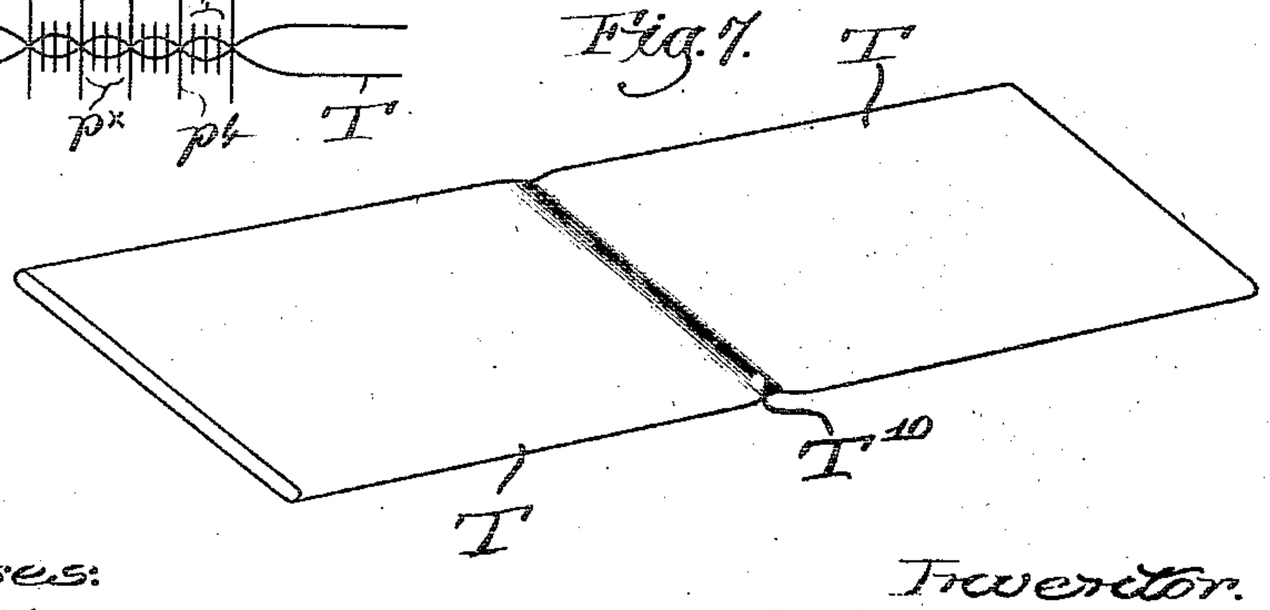


Fig. 7.



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UNITED STATES PATENT OFFICE.

ARTHUR L. MICHAEL, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

LOOM FOR WEAVING BAGS.

953,632. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed June 7, 1909. Serial No. 500,565.

To all whom it may concern:

Be it known that I, ARTHUR L. MICHAEL, a citizen of the United States, and resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Looms for Weaving Bags, 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 looms for weaving successive sections of tubular fabric connected by strips of fabric of a different weave, for the production of bags, each section of tubular fabric constituting the body of a bag the bottom of which is formed by the intervening strip, the bags being thereafter separated by transverse cuts. The separating cuts may be made at the middle of each tubular section and through the center of the intervening bottom strip between two adjacent tubular sections, if the latter are long enough to form two bags, or the separating cut may be made across each tubular section adjacent the bottom strip, when the length of each tubular section is only sufficient to form one bag.

Looms of the character referred to are commonly termed "bag looms", and are provided with a set of four harnesses, which by means of suitable cams and connections are given a 3 up, 1 down, 1 up, 3 down, motion to form the tubular fabric, and an auxiliary cam is thrown into operation at the proper time to change the regular sequence or cycle of the harness cycle and effect the weaving of the strip of fabric which is to form the bag bottom.

Heretofore there has been considerable indefiniteness in the control of the change cam, as it may be termed, owing to the gradual movement thereof into inoperative position, so that the strip of connecting fabric has not been as sharply defined as it should be.

My present invention has for its object the production, in a bag loom of the type specified, of means to positively and quickly effect the control of the change cam so that the intermediate or bottom strips of fabric shall be of an exact length, and well defined, resulting in a better product. I have also provided means whereby the length of the intervening strip may be varied, the adjustment whereby such variation is secured being effected readily and quickly.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a transverse section and partial left-hand side elevation of a sufficient portion of a bag loom to be understood, with one embodiment of my present invention applied thereto, the mechanism being shown as weaving a tubular section and nearly ready to change for weaving an intermediate or bottom strip of fabric; Fig. 2 is a rear elevation of a portion of the apparatus, shown in Fig. 1, illustrating more clearly certain novel features of my invention; Fig. 3 is a top plan view thereof, showing the regular harness cams and their treadles, the change cam, and the controlling means whereby the latter is shifted into and out of operative position; Fig. 4 is a detail taken on the line 4—4, Fig. 3, and looking toward the right, of a portion of the change cam controlling means; Fig. 5 is an enlarged side elevation of the regular shedding and change cams, and showing a portion of the treadle and the follower thereon with which the change cam coöperates; Fig. 6 is a sectional detail taken on the line 6—6, Fig. 5, to be referred to; Fig. 7 is a perspective view of a portion of the fabric woven on the loom; Fig. 8 is a longitudinal and diagrammatic section through the fabric, showing more clearly the mixed weave which forms the bottom or intervening strip of fabric between each two adjacent tubular sections.

Referring to Fig. 1 the four harnesses H', H^2, H^3, H^4, their connected treadles T', T^2, T^3, T^4, all fulcrumed at T^x at the back of the loom; the four regular shedding cams I, II, III and IV, set to operate in a fixed cycle, and also shown in Fig. 5 in their relative position on the cam shaft C^x, and the change cam V loose on said shaft and rotating with the same by means of the lateral pin *v* slidably entering a hole in the cam IV, Fig. 3, the cam V having an annularly grooved hub *v'*, are all of substantially well known construction, the shedding cams being set on the shaft to ordinarily effect the 3 up, 1 down motion of the harnesses for the formation of the tubular sections T, T of the fabric, Figs. 7 and 8. A gear C on the cam shaft C^x is driven by gears C', C^2 from the shaft C^3, Fig. 1, the latter

being actuated as usual from the driving shaft of the loom and forming no part of my present invention.

I have indicated in Fig. 1 a portion of the take-up mechanism, the take-up ratchet D having an attached pinion D′ which drives a gear D^2 having an attached pinion D^3 in turn meshing with a gear D^4, (said gears and pinions being indicated by dotted double circles) the gear D^4 being connected with and effecting the rotation, in the direction of the arrow and at a slow speed, of a measuring member D^x, shown as a disk having a notch *d* in its periphery. The gearing between the take-up mechanism and the measuring member constitutes a speed reducing mechanism, as will be manifest. The leading side of the notch is radial, and the opposite side *d′*, is cam-shaped to give a gradual rise from the bottom of the notch to the periphery of the disk.

A bevel-ended latch 1 inside of the left-hand loom side, (partly shown in Fig. 1) is extended rearwardly and pivotally connected at 2 with an arm 3 of a bell-crank, Fig. 3, fulcrumed at 4 on a part of the loom frame and acted upon by a suitable spring, as 5, to normally hold the free end of the latch against the periphery of the measuring member D^x, as in Figs. 1 and 3. The front end of said latch is slidable in a guide 6 vertically adjustable on a fixed bracket 7 by means of a set-screw 8, Fig. 1, working in a slot 9 of the bracket. By setting the guide higher the beveled end of the latch 1 will be raised, to thereby enter the notch *d* earlier, but it will not move so far into the notch as it will engage the cam-shaped side *d′*, thereof nearer the periphery of the member D^x and hence will be sooner moved out of the notch by the continued rotative movement of the measuring member. This adjustment, as will appear hereafter, enables me to change from tubular weaving sooner than would otherwise be the case, but the bag-bottoming strip (woven during the time the latch is in the notch *d*) will be terminated sooner. The bell-crank arm 10 is bent up and extended rearward above the cross-girth A^x of the loom from which the harness-treadles are hung, and is pivotally connected at 11 with a peculiarly bent link or controller, the shape of which is very clearly shown in Figs. 2 and 3, the three straight portions 12, 13 and 14 being in parallelism but in different horizontal planes. As shown the part 12 of the controller is above the girth A^x while the other parts are back of it, the part 13 being slidably mounted in a fixed support and guide 15, while the part 14 carries two horizontal, rearwardly extended pins 16, 17, which enter elongated slots in two depending jacks 18, 19 pivoted at their upper ends on a segmental shifter 20, fulcrumed on the girth A^x at 21, Fig. 2, the fulcrum being below and between the points at which the jacks and the shifter are connected. A link 22 is pivotally and eccentrically connected at one end with the shifter and at its other end it is jointed to one arm of a yoke-lever 23, having a fixed fulcrum at 24, and operatively connected with the grooved hub *v′* of the change cam V. The latter is shown in inoperative position, Figs. 2 and 3, but when the link 22 is moved to the right the yoke-lever 23 will be swung on its fulcrum to move or shift the cam V into operative position nearer to the cam IV of the set of shedding cams. Thus the segment 20 and the intervening connections between it and the change cam constitute shifting means therefor by which it is shifted from operative to inoperative position, and vice versa, and the shifting means is positively actuated, as will be described, by a single actuating device, the time of such actuation being controlled through the instrumentality of the measuring member D^x, the latch 1, and the link or controller moved thereby. At the lower end of the jack 18 is a hook 18^x, Fig. 2, while an adjustable hook 19^x is carried by the jack 19, and is held in adjusted position by a bolt 25 passing through a slot 26 in the hook, the latter being shown as a laterally movable block supported in the recessed part of the jack 17.

Bearings 27 on the girth A^x support a shifter-actuating rock-shaft 28 having a rigid arm 29 connected by a link 30, Fig. 4, with a wrist-pin 31 on a disk 32 fast on the end of the cam shaft C^x, whereby the rock-shaft is constantly oscillated, when the loom is in operation, in time with the rotation of the cam shaft. Said rock-shaft is provided with radially extended actuating fingers 33, 34, which are arranged to coöperate respectively with the jacks, 19, 18 according to which of said jacks is operatively positioned, such positioning being effected by movement of the bent controller to change the position of the pins 17 and 16 and the jacks governed thereby.

The constantly oscillating rock-shaft 28 and its rigidly attached fingers 33, 34, constitute a single actuating device for the cam-shifting means, for by said device the segmental shifter 20 is rocked in one direction to operatively position the cam V, or in the other direction to move said cam to inoperative position, the controlling instrumentality governing the coöperation of the actuating device with the shifter 20 and determining in which direction it is to be moved by such actuating device.

In the relative position of the parts shown herein, see particularly Figs. 2 and 3, the latch 1 acts through the controller to position the jack 19 operatively, with its hook 19^x at the lower end of the path of the ac-

tuating finger 33, (which has previously engaged said hook and pulled down the jack 19 and turned the shifter 20 to the position shown) the change cam V being positioned inoperatively, so that the regular bag weave is carried on, forming a tubular section T of the fabric, Figs. 7 and 8. When the latch 1 enters the notch *d* in the measuring member the spring 5 at once moves the controller 12—14 to the right, Figs. 2 and 3, thereby swinging the jack 19 into inoperative position and moving the hook $18^{\times}$ of jack 18 into position to be engaged and depressed by the finger 34 on its downward stroke. This down-pull on the jack 18 swings over the shifter 20 to the right, Fig. 2, and through the link 22 and yoke-lever 23 the change cam V is moved toward the adjacent shedding cam IV, into operative position.

Referring to Figs. 5 and 6 the treadle T^4 has a housing *t* in which is seated a non-rotating stud *t'* having a cylindrical part t^2 on which rotates a follower-roll t^4 for the cam IV, the outer end of the stud having an enlarged and substantially semi-circular head t^5 which constitutes a follower to co-operate with the change cam V when operatively positioned. The socket t^3 for the outer end of the stud *t'* is clearly shown in Fig. 5, whereby the stud is prevented from rotating.

Remembering that the change cam V rotates with the other or regular shedding cams, it will be seen by inspection of Fig. 5 that when the change cam is operatively positioned the treadle T^4 and its harness H^4 will be held down for two successive picks, first by the action of cam IV on the follower roll t^4, and then by the cam V acting on the follower t^5, thereby changing the harness motion from the 3 and 1 movement to 2 up, 2 down, breaking up the tubular or bag weave, and making a plain weave for one pick. Thereafter the cams I, II, III and IV operate the harnesses for three picks with the 3 and 1 motion, and on the fourth pick the regular cycle is again broken up and the plain, or 2 and 2, weave is formed, this mixed weave being continued while the latch 1 is in the notch or recess *d* of the measuring member, such mixed weave forming the connecting strip or bag bottom T^{10}, Fig. 7.

I have endeavored to illustrate the above described operation diagrammatically in Fig. 8, the long vertical lines p^4 indicating every fourth pick in which the change cam V breaks up the bag weave, while each set of three intervening short vertical lines $p^{\times}$ indicate the three picks with the 3 and 1 or bag weave. The slow speed of the measuring member $D^{\times}$ causes the end of the latch 1 to travel slowly over the inclined or cam-shaped side *d'* of the notch *d*, first moving the jack 18 to the left, Fig. 2, out of the control of the actuating finger 34, and thereafter the jack 19 is moved to effect coöperation between its hook $19^{\times}$ and the finger 33. At once the jack 19 is pulled down, and the shifter 20 is swung to the position shown, acting to simultaneously throw the change cam V out of operation, that is, to one side of the follower t^5, and immediately the regular tubular or bag weave begins. There is no gradual movement of the change cam, but the quick and positive actuation of the shifter 20 acts instantly through the intervening parts of the shifting means to throw the change cam out of operation, and the mixed weave T^{10} constituting the bag bottom is terminated definitely and exactly and the adjacent tubular section is definitely begun. Consequently each bottom section T^{10} will be of uniform length, clearly defined, and the fabric as a whole improved.

As has been stated, the lifting of the free end of latch 1 by the guide 6 causes it to enter the notch *d* sooner than it would otherwise, and it will be moved out sooner by the side *d'*, thereby reducing the length of the bottom strip T^{10}.

By moving the hook $19^{\times}$ to the left, Fig. 2, with relation to its jack 19, the length of the bottom strip in the fabric will be shortened, because the finger 33 will coöperate with said hook as quickly as desired after the hook $18^{\times}$ is inoperatively positioned, so that the return to bag weaving will be effected before the latch 1 has left the notch in the measuring member. This adjustment can be made within quite a wide range, permitting a considerable variation in the length of the bottom strip, and it is entirely independent of the adjustment of the guide 6, referred to. The latter adjustment advances the beginning of the strip, and hastens its termination, while adjustment of the hook $19^{\times}$ does not advance the beginning of the strip but does hasten its termination, so that either adjustment may be employed, or the two can be combined, if desired.

The shifting means for the change cam is positively actuated, to move or shift said cam quickly into and out of operative position, and the actuating device for said means is controlled by or through the measuring member and the controlling instrumentality governed thereby, while the timing of such instrumentality can be readily adjusted to vary the length of the strips between the tubular sections of the fabric, and which form the bag bottoms.

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

1. In a loom, shed-forming mechanism to effect the weaving of a tubular fabric, a change cam to alter the normal operation of said mechanism and cause a bottom-forming

fabric to be woven, means, including a segmental rocking member having a fixed fulcrum, to shift said change cam into and out of operative position, a constantly moving actuating device adapted to coöperate at times with the rocking member at one or the other side of its fulcrum, to rock it in one or the other direction, and a controlling instrumentality to effect intermittent cooperation of the actuating device with said rocking member and also to determine whether the latter is to be actuated at one side of its fulcrum and moved in one direction to operatively position the change cam, or at the other side of the fulcrum to be moved in the other direction to inoperatively position said cam.

2. In a loom, shed-forming mechanism, including a change cam, to effect the weaving of sections of tubular fabric and intervening connecting sections of a different weave, means, including a rocking member having a fixed fulcrum, connected with and to shift said cam into and out of operative position, a constantly oscillated actuating device adjacent said member, separate means to intermittingly connect the actuating device and the rocking member at one or the other side of its fulcrum respectively, to positively rock it in one or the other direction, and a controlling instrumentality, including a measuring member, to effect through one of the said connecting means the coöperation of the actuating device and the rocking member of the shifting means at and to definitely determine the beginning and end of each connecting section of fabric.

3. In a bag-loom, shed-forming mechanism, including a set of cams normally acting to weave a tubular fabric, and a shiftable cam to break up such normal action of said cams and effect the weaving of a bottoming fabric, a rocking shifter operatively connected with the shiftable cam to move it into and out of operative position, hooked jacks connected with the shifter, actuating fingers to coöperate with said jacks and rock the shifter in one or the other direction, and a controlling instrumentality to determine which jack is to coöperate with and be moved by its actuating finger.

4. In a loom, shed-forming mechanism to effect the weaving of a tubular fabric, a change cam to alter the normal operation of said mechanism and cause a bottom-forming fabric to be woven, a positively operated and constantly moving actuating device, shifting means for said cam, including a member movable in opposite directions, two separate connecting devices to connect temporarily the actuating device and said member, to move the latter in one or the other direction and thereby shift the change cam into or out of operative position, and a controlling instrumentality, including a measuring member and a coöperating latch, to effect automatically through one or the other of the two connecting devices positive movement of said member of the shifting means by the actuating device.

5. In a loom, shed-forming mechanism, including a change cam, to effect the weaving of sections of tubular fabric and intervening connecting sections of a different weave, shifting means, including a rocking member having a fixed fulcrum, to move the change cam into and out of operative position, a constantly oscillating actuating device having fingers moving in unison at opposite sides of the fulcrum of said rocking member, means to operatively connect said member temporarily with one or the other finger, to rock said member in one or the opposite direction, and a controlling instrumentality to determine automatically which finger of said actuating device shall actuate the rocking member, to thereby fix definitely the beginning and ending of each section of fabric connecting two tubular sections.

6. In a loom, shed-forming mechanism, including a change cam, to effect the weaving of sections of tubular fabric and intervening connecting sections of a different weave, shifting means for the change cam, a notched measuring member, a latch cooperating therewith, means controlled by entrance into and exit of the latch from the notch to effect the operation of the shifting means, and manually adjustable means to vary the period in which the latch remains in the notch of the measuring member.

7. In a loom, shed-forming mechanism, including a change cam, to effect the weaving of sections of tubular fabric and intervening connecting sections of a different weave, shifting means for the change cam, and a controlling instrumentality governing the operation of said means, said instrumentality including a notched, revolving measuring member, a coöperating latch, and manually adjustable means to hasten the entrance of the latch into the notch.

8. In a loom, shed-forming mechanism, including a change cam, to effect the weaving of sections of tubular fabric and intervening connecting sections of a different weave, shifting means for the change cam, including a pivotally mounted shifter having connected jacks each provided with a hook, oscillating actuating fingers, one for each jack and adapted when coöperating therewith to swing the shifter on its pivot, means to adjust one of the hooks on its jack to advance or delay engagement thereof by its actuating finger, and a controlling instrumentality operating automatically to move one jack into and the other out of engagement with its actuating finger at predetermined inter-

vals, to thereby determine the beginning and ending of each strip of fabric connecting two tubular sections.

9. In a bag-loom, shed-forming mechanism, including a change cam, shifting means therefor including a pivoted segment connected with the cam and oppositely movable to effect movement of the cam into and out of operative position, hooked jacks connected with the segment at opposite sides of its pivot, connected and oscillating fingers, one for each jack, and an automatic controlling instrumentality to effect coöperation between one jack and its finger and throw the other jack and its finger out of coöperation at predetermined intervals.

10. In a bag-loom, shed-forming mechanism, including a change cam, shifting means therefor including a pivoted segment connected with the cam and oppositely movable to effect movement of the cam into and out of operative position, hooked jacks connected with the segment at opposite sides of its pivot, connected and oscillating fingers, one for each jack, and an automatic controlling instrumentality to effect coöperation between one jack and its finger and throw the other jack and its finger out of coöperation at predetermined intervals, combined with manually adjustable means to vary the duration of the period of operation of the change cam.

11. In a bag-loom, shed-forming mechanism, including a change cam, a rocking shifting member connected therewith, hooked jacks connected with said member at opposite sides of its fulcrum, to rock it in opposite directions, actuating fingers oscillating in unison and adapted each to coöperate with a jack, and means to effect automatically the coöperation of one jack and its finger and then the other jack and its finger, at predetermined intervals, the actuation of one jack operatively positioning the change cam and actuation of the other jack rendering said cam inoperative.

12. In a bag-loom, shed-forming mechanism, including a change cam, a rocking shifting member connected therewith, hooked jacks connected with said member at opposite sides of its fulcrum, to rock it in opposite directions, actuating fingers oscillating in unison and adapted each to coöperate with a jack, and means to effect automatically the coöperation of one jack and its finger and then the other jack and its finger, at predetermined intervals, the actuation of one jack operatively positioning the change cam and actuation of the other jack rendering said cam inoperative, combined with adjustable means to vary the period during which said change cam is in operative position.

13. In a bag-loom, shed-forming mechanism, including a change cam, a rocking shifting member connected therewith, hooked jacks connected with said member at opposite sides of its fulcrum, to rock it in opposite directions, actuating fingers oscillating in unison and adapted each to coöperate with a jack, and means to effect automatically the coöperation of one jack and its finger and then the other jack and its finger, at predetermined intervals, the actuation of one jack operatively positioning the change cam and actuation of the other jack rendering said cam inoperative, combined with adjustable means on the jack which inoperatively positions the change cam to vary the period of operation of such cam.

14. In a bag-loom, a set of four harnesses and actuating cams therefor operating in a regular cycle to weave a tubular fabric, a change cam acting, when operative, to form a plain weave at the end of each regular cycle, a pivotally mounted rocking shifter having a fixed pivot and operatively connected with the change cam, a single actuating device to act in alternation upon the shifter at opposite sides of its pivot, to swing it positively in one or the other direction and thereby move the change cam into and out of operation, and a controlling instrumentality for said actuating device to cause it to act at one side of the shifter pivot and rock the shifter in one direction and operatively position the change cam at a predetermined time and thereafter to cause said actuating device to act upon the shifter at the other side of its pivot and rock the shifter in the opposite direction and render the change cam inoperative at the end of a period governed by the controlling instrumentality.

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

ARTHUR L. MICHAEL.

Witnesses:
ROBERT JAMISON,
E. D. OSGOOD.