No. 685,855. Patented Nov. 5, 1901.

# J. T. MEATS.

## LOOM FOR WEAVING BAGS.

(Application filed Mar. 21, 1901.)

(No Model.) 3 Sheets—Sheet 1.

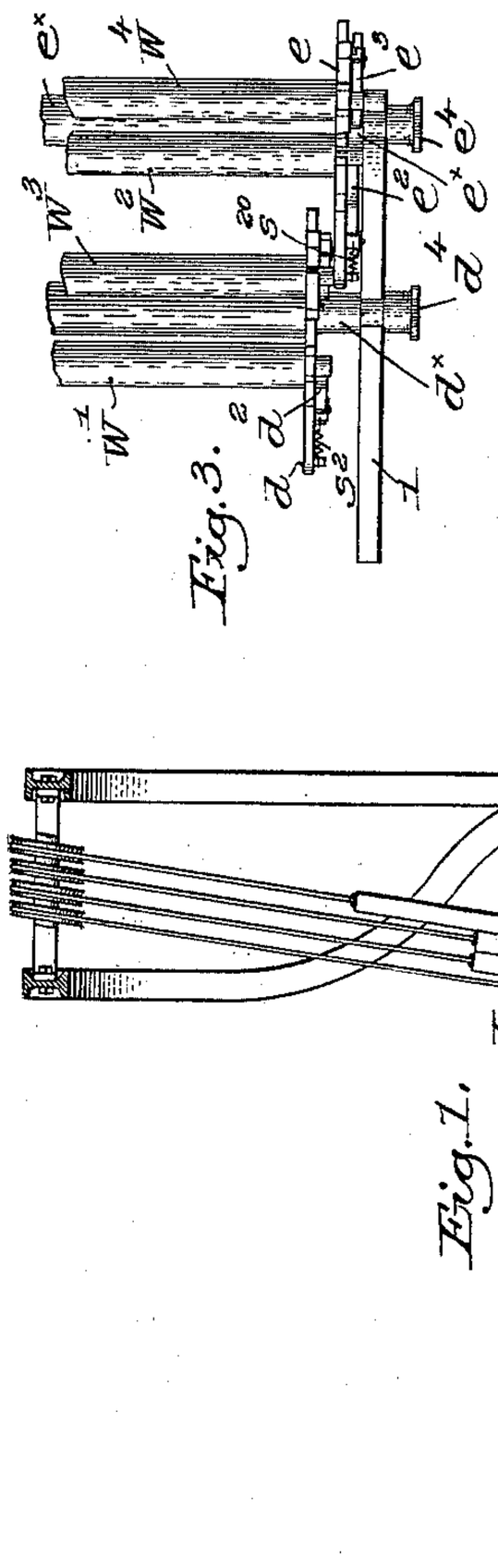

Fig. 3.



Fig. 1.



Fig. 5.



Fig. 6.



Fig. 10.



Fig. 11.

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## LOOM FOR WEAVING BAGS.

(Application filed Mar. 21, 1901.)

(No Model.) 3 Sheets—Sheet 2.

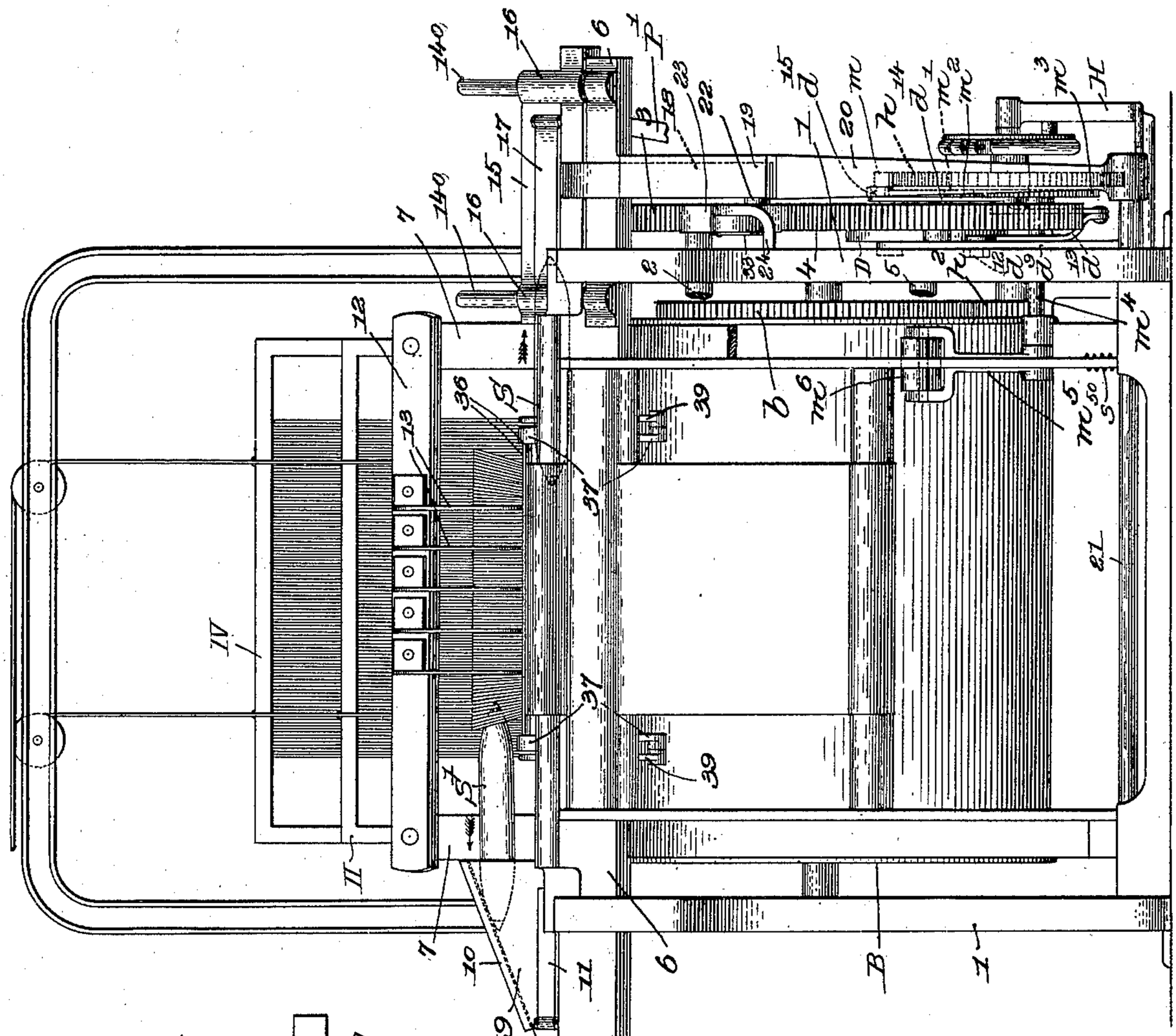

Fig. 2.

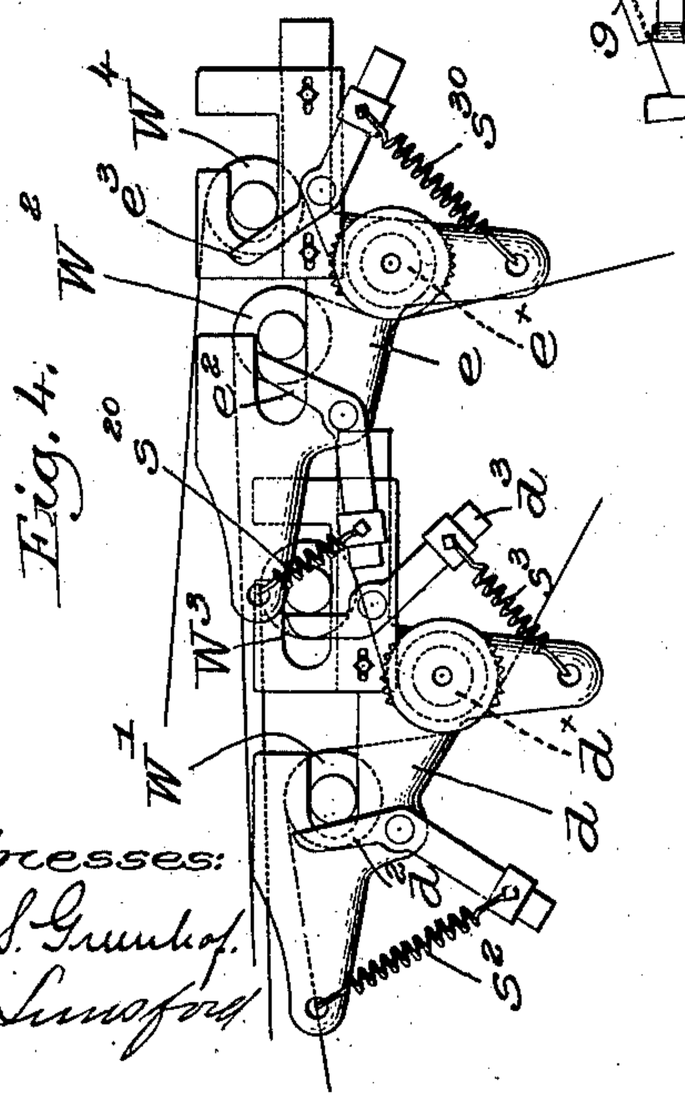

Fig. 4.

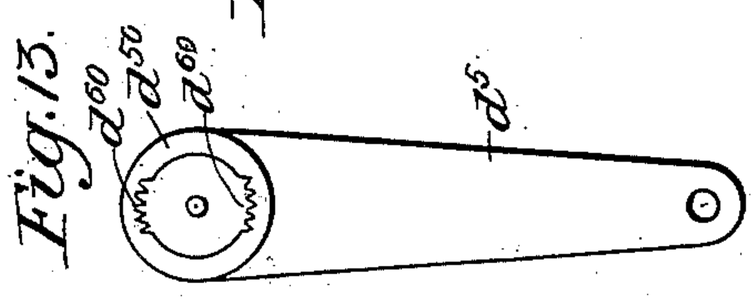

Fig. 13.

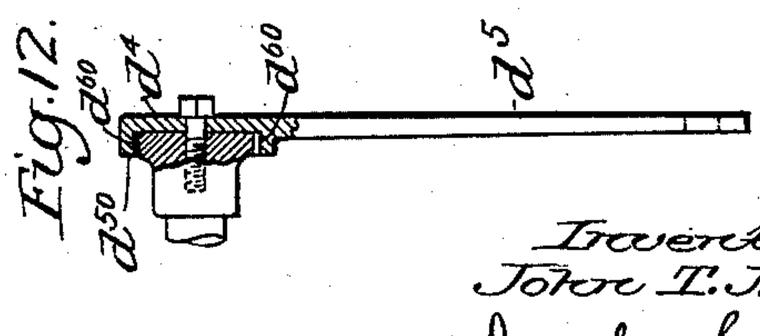

Fig. 12.

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No. 685,855. Patented Nov. 5, 1901.

# J. T. MEATS.

## LOOM FOR WEAVING BAGS.

(Application filed Mar. 21, 1901.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 7.

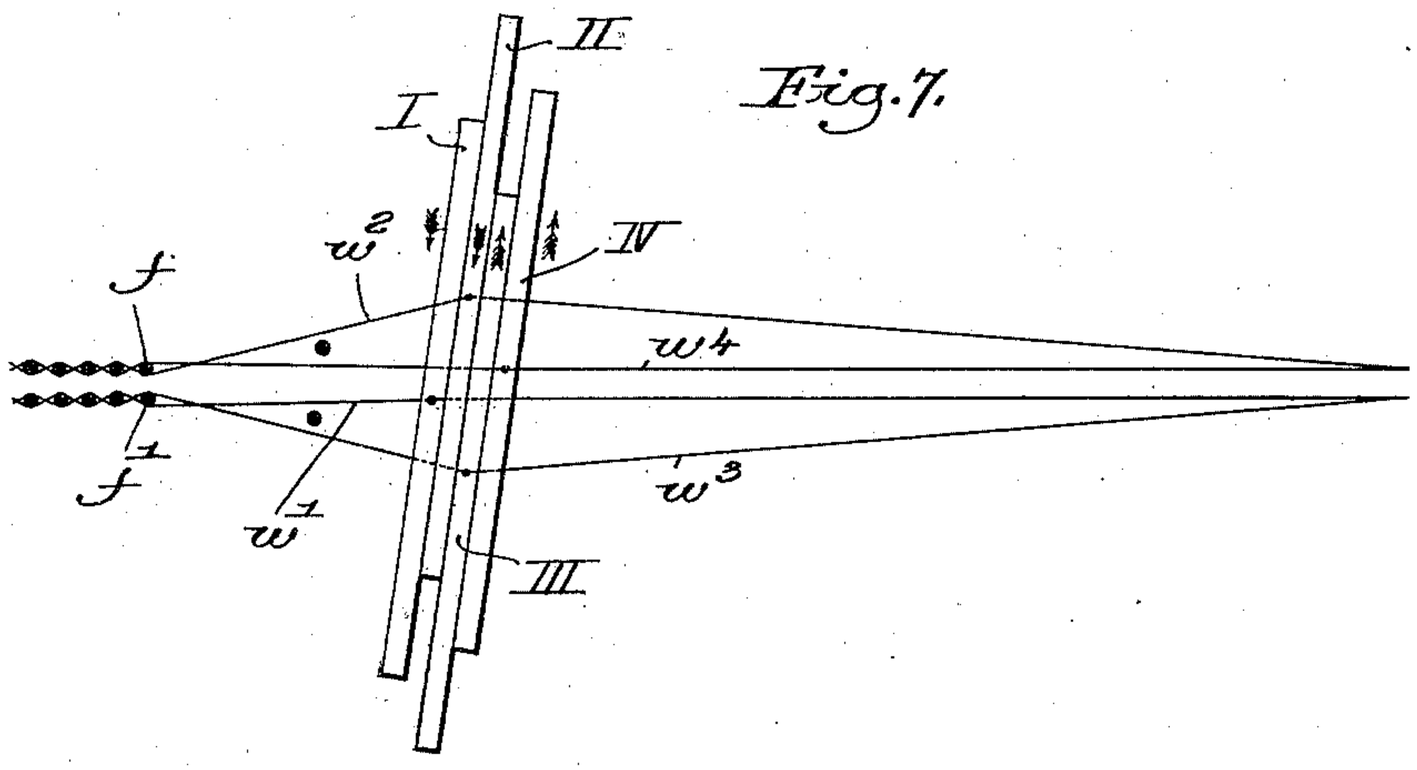



Fig. 8.

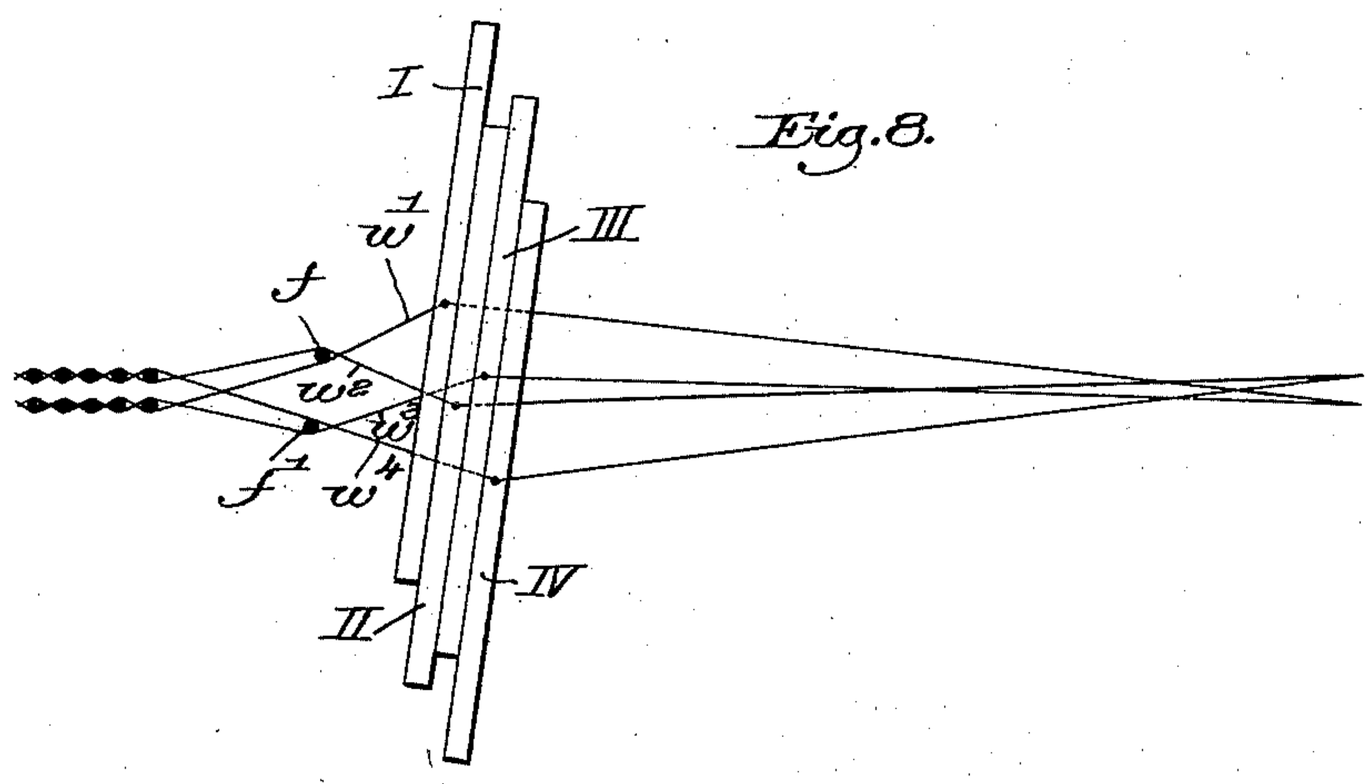
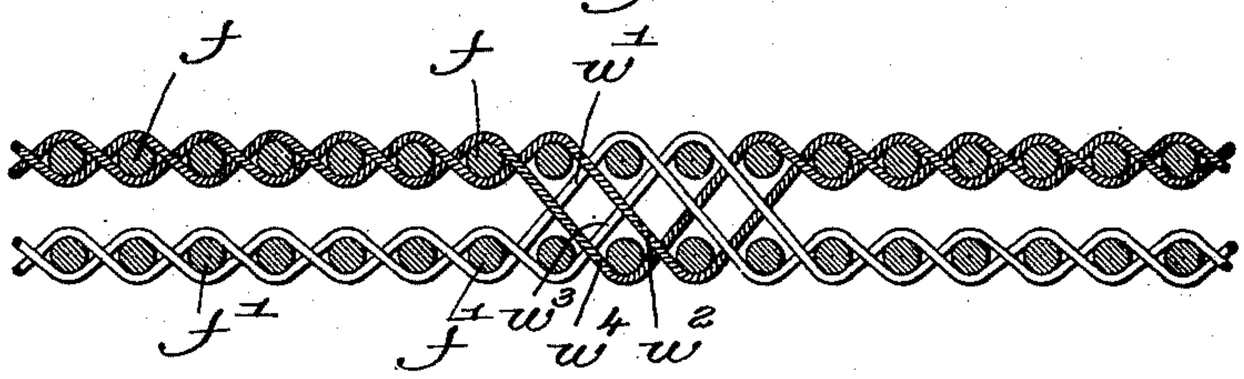



Fig. 9.

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# UNITED STATES PATENT OFFICE.

JOHN T. MEATS, OF TAUNTON, MASSACHUSETTS, ASSIGNOR TO MASON MACHINE WORKS, OF TAUNTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

## LOOM FOR WEAVING BAGS.

SPECIFICATION forming part of Letters Patent No. 685,855, dated November 5, 1901.

Application filed March 21, 1901. Serial No. 52,132. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN T. MEATS, a citizen of the United States, and a resident of Taunton, county of Bristol, State of Massachusetts, have invented an Improvement in Looms for Weaving Bags, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates more particularly to looms for weaving tubes, seamless bags, pockets, or any class of goods involving two thicknesses or plies of cloth, (separate or tied together transversely of the cloth,) two shuttles being employed and thrown simultaneously in opposite directions, thus producing cloth twice as rapidly as with one shuttle. Throwing two shuttles simultaneously through the warp is not broadly new; but so far as I am aware this has been effected in connection with changing shuttle-boxes at each end of the lay. In my present invention I have provided a shifting shuttle-box at one end only of the lay, and I believe it to be broadly new to combine a single shifting shuttle-box with two shuttles simultaneously and oppositely thrown. I have also provided novel shifting means for the shuttle-box, obviating the use of gearing or complicated actuating mechanism. I have also devised novel means for imparting elasticity to the let-off mechanism and increasing the automaticity of its operation from the full to the empty warp-beam, and by means to be described the whip-rolls are so arranged that the several sets of warps are permitted to yield independently of each other.

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

Figure 1 is a right-hand side elevation of a sufficient portion of a loom to be understood with one embodiment of my invention applied thereto, the lay being shown as just beginning its forward stroke. Fig. 2 is a front elevation thereof, showing the two oppositely-moving shuttles as just entering the fixed and the shifting shuttle-boxes. Fig. 3 is a top or plan view of the whip-rolls and the supporting means for the same at one side of the loom. Fig. 4 is an enlarged side elevation of such supporting means shown on a smaller scale at the right-hand end of Fig. 1. Fig. 5 is an irregular sectional view taken on the line $x\ x$, Fig. 1, looking toward the right, of the controlling-cam for the shifting shuttle-box. Fig. 6 is a perspective detail of the switch member of the cam detached. Fig. 7 is a side view showing the arrangement of the two sheds when the separate plies of cloth are being woven, the harnesses being shown diagrammatically. Fig. 8 is a similar view showing the transposition of the sheds when the two plies are to be tied together. Fig. 9 is an enlarged longitudinal section of a portion of the cloth, showing the two separate plies and also the manner in which they are tied together at intervals. Fig. 10 is a diagrammatic longitudinal section of the cloth, showing the separate plies and also the tie portions. Fig. 11 is a similar view showing a bag cut from the web on the lines $x'\ x^2$, Fig. 10, and turned inside out. Fig. 12 is a diametral vertical section through one of the heads $d^4\ e^4$ and the hub of the arm which is connected to said head, and Fig. 13 is an inner end view of the hub and its attached arm.

Referring to Figs. 1 and 2, the loom-frame 1 is of suitable shape and adapted to support the various operative parts, and the crank-shaft 2, having a gear 3 in mesh with a large gear 4 on a cam-shaft 5, the lay 6, the lay-sword 7, and the pitman 8 may be and are of usual construction and operate in usual manner; but the construction and arrangement of the shuttle-boxes herein shown is novel.

Referring to Fig. 2, the lay has mounted upon it at one end a fixed shuttle-box 9, provided with an inclined guide-cover or top plate 10 and a binder 11 of suitable construction, the inner end of the said shuttle-box being tall enough to receive a shuttle from the upper or auxiliary raceway, to be described, it being understood that the loom herein shown and described is arranged for weaving a fabric of two plies or layers transversely connected with each other only at intervals.

The top of the lay constitutes the main raceway, as usual, and the shifting shuttle-box, to be described, is arranged to receive an incoming shuttle from the main or lower raceway and to lift the shuttle into position to be thrown across the upper auxiliary raceway, and in Fig. 2 the shuttles S S' are shown as about to enter the opposite shuttle-boxes.

The top bar 12 of the reed is herein shown as provided with a series of separated fingers 13, which are extended forward and downward and are then bent rearwardly with their upper surfaces in parallelism with the top of the lay, as at 14, Fig. 1, to form an auxiliary raceway across which the uppermost of the two shuttles is thrown by suitable picking mechanism, the picker-sticks P P' only being herein shown.

At the right-hand end viewing Figs. 1 and 2 the lay is provided with two upright guide-bars 140, on which is mounted the shifting shuttle-box 15, said shuttle-box having elongated bearings 16 to embrace the guide, and the box is provided with a suitable binder 17. In Figs. 1 and 2 the shifting shuttle-box is shown in its lowermost or receiving position ready to receive the shuttle S, which is just completing its traverse of the lower or main raceway.

The shifting shuttle-box 15 is provided with a depending leg 18, movable in an elongated guide 19, the upper end of which is secured to the lay, and its lower end is extended, as at 20, to the lower end of the lay-sword, so that the guide moves with the lay. The leg 18 is provided on its inner side with a laterally-extended cam-follower 22, shown as a roller or other stud adapted to engage and follow the path of a cam 23, herein shown as provided with a bracket 24, rigidly secured to the loom side. The cam has a substantially pear-shaped and continuous path, comprising substantially straight portions 25 26, which diverge from the apex 27, the latter being so located that when the lay has completed its forward stroke the follower will enter such apex. From the divergent portion 25 the cam-path is substantially horizontal, as at 28, and merges into a downwardly-directed portion 29, the lower end of the latter being connected by another substantially horizontal portion 30 with the other divergent portion 26. The cam is cut away at the bottom of the portion 26 to receive a switch 31, (shown separately in Fig. 6,) the switch being fulcrumed on a pivot 32, Figs. 1 and 5, and normally the switch is maintained by a spring 33 in the position shown in Figs. 1 and 5 with a beveled or inclined face 34, forming a movable bottom for the part 26 of the cam-path, while a straight face 35 of the switch at such time forms a continuation of the inner wall of the other divergent portion 25 of the cam-path. Now as the lay beats up from the position shown in Fig. 1 the follower 22 traverses the part 30 of the cam-path and then the upwardly-inclined portion 26, the inner end of the follower pressing the switch down until the follower reaches the apex 27, and as soon as the follower arrives at the apex the spring 33 throws the switch up into normal position, with its straight face 35 behind the follower, thus closing the inclined part 26 of the cam-path, so that as the lay moves back the follower must traverse the upwardly-inclined portion 25 of the cam-path and thence to the next succeeding portion 28, at which time the shifting shuttle-box will be at its highest point, and the shuttle, which was received in the shuttle-box during the traverse of the follower along the part 30 of the cam-path, will be thrown across the upper raceway, and as the shuttle leaves the box the follower will have passed into the part 29 of the cam-path and will descend to the position shown in Fig. 1, ready to receive the incoming shuttle on the lower raceway. The follower traverses the continuous path of the cam, as has been described, and by means of the switch it is prevented from returning along the lower inclined portion 26 after the movement of the lay has been reversed from forward to backward stroke. The shuttle, thrown across the upper raceway, enters the fixed shuttle-box, as shown in Fig. 2, and by gravity and by the inclined guide or cover 10 it is directed downward to the main raceway or top of the lay ready to be thrown across the main raceway at the next pick. The means for shifting the shifting shuttle-box operates directly by or through the movement of the lay to effect a change in the position of such shuttle-box without the use of complicated controlling mechanism and forms a very positive and simple shifting mechanism.

I have not herein shown in detail the shedding mechanism, as the formation of the sheds may be effected by any suitable means—such, for instance, as shown in United States Patent No. 428,253, dated May 20, 1890—but I have herein shown four harnesses I III for the warp-sections $w'$ $w^3$, which form the lower ply of the cloth, and II IV for the warp-sections $w^2$ $w^4$, which form the upper ply, and in Fig. 7 the straight weaving is shown—that is to say, the weaving of the two plies separately—the upper and lower sets of filling being indicated at $f$ $f'$, respectively. Viewing Fig. 7, it will be manifest that at the next change of shed, provided the straight weaving is to continue, the harnesses II IV will be reversed for the upper shed and the harnesses I and III will be reversed for the lower shed. When, however, the two plies are to be united or bound together transversely, the harness IV will be depressed to carry the warps $w^4$ down into the lower shed and the harness I will be elevated to bring the warps $w'$ into the upper shed, while harness III is elevated and harness II depressed, as shown in Fig. 8, thus causing the former lower shed-warps $w'$ to bind the upper filling $f$ at the next pick, while the former upper shed-warps IV will coöperate with and bind the lower

filling $f'$, the binding or tying of the plies together being continued for as many picks as desired, and in Fig. 9 four picks of the upper and lower filling-threads are shown as bound together, as has been described.

In Fig. 10 a diagrammatic longitudinal section of the cloth is shown with pockets or bag-like portions formed at $p$ $p'$, bound or tied together at $p^{\times}$ in the manner hereinbefore described, and when the cut has been completed the cloth will be severed transversely between two of the binding portions—along the line $x'$, for instance, Fig. 10—and also through the binding portion $p^{\times}$, as along the line $x^2$, the two bags or pockets thus formed by the two-ply cloth between two of the binding portions $p^{\times}$ being turned inside out, as shown in Fig. 11, so as to bring the raw edge of the binding portion $p^{\times}$ inside, the upper open edges at the mouth of the bag or pocket being finished or not, as desired.

As the cloth is woven it passes between two transverse guide-bars 36, mounted on stands 37, fulcrumed at 38 to brackets 39, secured to the loom-frame, springs 40, fixed to the brackets at one end and at their other ends to extensions 41 of the stands, yieldingly maintaining the guide-bars 36 in proper position, the cloth thereafter passing thence over a suitable guide-roll 42 to the take-up mechanism, which may be of any suitable construction.

In order to impart greater elasticity to the let-off mechanism as well as to increase its automaticity and to adapt the let-off mechanism to the varying strains to which the warps may be subjected during the weaving, I have devised novel and simple let-off mechanism, now to be described, wherein the several sets of warps are permitted to yield independently and at the same time the mechanism which positively rotates the warps is controlled and modified as to its action in accordance with variations in warp tension and also in accordance with the diameter of the yarn mass on the beam.

Referring now more particularly to Figs. 1, 3, and 4, I have shown four independent whip-rolls $W'$ $W^2$ $W^3$ $W^4$, one for each of the correspondingly-lettered sets of warps $w'$ $w^2$, &c., the roll-journals extending into substantially ⌴-shaped slots in rocking supports $d$ $e$, the supports being arranged in pairs at opposite sides of the loom and rigidly connected by cross-rods $d^{\times}$ $e^{\times}$, which have their bearings in the loom sides at $d'$ $e'$, respectively. (See dotted lines, Fig. 1.) The rolls $W'$ $W^3$ are mounted in rocking supports $d$ and the rolls $W^2$ $W^4$ in the other supports $e$, as herein shown, and in order to provide for independent yielding controlling means for each of the several rolls I have arranged spring-controlled fingers on the supports to engage the journals of the whip-rolls and to yieldingly press them against the tension of the warps. Referring to Fig. 4, the support $d$ is provided with two pivotally-mounted fingers $d^2$ $d^3$, which bear against the journals of the rolls $W'$ $W^3$, respectively, springs $s^2$ $s^3$, connected at one end to the support and at their other ends to the fingers, respectively acting to yieldingly press the fingers against the journals of the rolls in opposition to the pull of the warps. By this arrangement each whip-roll can move back and forth in its bearings on the rocking frame in accordance with the variation in the tension of its own set of warps, it being understood that each rocking support $d$—that is, the one at each side of the loom—will be provided with the yieldingly-controlled finger described. So, too, the supports $e$ are provided with fingers $e^2$ $e^3$ to bear against the journals of the whip-rolls $W^2$ $W^4$, respectively, springs $s^{20}$ $s^{30}$ controlling the said fingers. The two sets of warps $w'$ $w^3$ pass from the warp-beam B around the connecting-bar $d^{\times}$ of the supports $d$, while the warps $w^2$ $w^4$ pass from the warp-beam around the connecting-bar $e^{\times}$ between the two supports $e$, so that the two connecting-bars also form guides for the warp-sections. The connecting-bars are extended at one side of the loom and are provided, as herein shown, with toothed heads $d^4$ $e^4$, which receive similarly and interiorly toothed hubs of depending arms $d^5$ $e^5$, (see Fig. 1,) pivotally connected by a link $e^6$, the arm $d^5$ having an extension $d^6$ below the point of connection of the link $e^6$. In Fig. 12 the hub $d^{50}$ of the depending arm $d^5$ is shown in section in engagement with the toothed head $d^4$, and in Fig. 13 the inner end of the hub is seen, showing the internal teeth $d^{60}$ to engage the teeth on the head, in the present instance the teeth on both head and hub being arranged in two separate groups. A rod $d^7$ is pivotally connected at one end to said extension, and at its other end it is pivoted at $d^8$ to a rocker-arm $d^9$, fulcrumed on the loom side at $d^{10}$ and provided with a roller or other stud $d^{11}$ to be acted upon by a double-throw cam D, fast on the cam-shaft 5, a spring 60 surrounding the rod $d^7$ between a collar 62, fast thereon, and a bracket 63, secured to the loom side, the spring normally tending to move the roll $d^{11}$ away from the cam D. The rocker-arm $d^9$ has adjustably connected therewith at $d^{12}$ a rod $d^{13}$, which is pivotally connected with the lower end of a pawl-carrier $d^{14}$, provided at its upper end with a pawl $d^{15}$, adapted to cooperate with a ratchet $h$, having its shaft $h'$, supported in a bracket H, Fig. 1, secured to the loom side. A pinion $h^2$, secured to or forming a part of the ratchet, is in mesh with a gear $b$ on the warp-beam, so that rotation of the ratchet will, through the pinion and gear, positively rotate the warp-beam in the direction of the arrow 70 to let off the warp. The rotation of the ratchet is effected by or through the pawl, the pawl-carrier $d^{14}$ being fulcrumed on the shaft $h'$, and the active throw or stroke of the pawl is effected by the engagement of the cam D with the roll $d^{11}$ to rock the rocker-arm $d^9$ in the direction of the

arrow 72, the return movement or stroke of the pawl being effected through the rod $d^7$ by the warp tension. The throw of the cam D is of course constant, and therefore the end of the active stroke of the pawl will always terminate at the same point; but the starting-point of the stroke will vary in accordance with the warp tension. The greater the tension on the warps the more will the arms $d^5$ $d^6$ be swung to the right, viewing Fig. 1, to thus cause the roll $d^{11}$ to engage the cam D sooner than it would otherwise, and obviously the greater the effective stroke of the pawl the greater will be the angular movement through which the ratchet-wheel will be turned, and correspondingly the amount of the warp let off by the rotation of the beam will be greater to decrease the tension of the warps. On the other hand, if the warp tension decreases improperly the spring 60 will operate to move the roll $d^{11}$ away from the cam D to a greater or less degree to thus decrease the distance between the starting and finishing point of the pawl-stroke. The double-throw cam provides for a stroke of the pawl at each pick, so that the warp is constantly under control as to its tension. It is also necessary to provide means for controlling the tension of the warp as the diameter of the mass of yarn on the beam decreases, in order that the decreasing leverage as the warps are drawn in may be compensated for. For this purpose I have provided a shield $m$, extending over a portion of the periphery of the ratchet and interposed between it and the pawl $d^{15}$, the shield being mounted on a shield-carrier $m'$, fulcrumed on the shaft $h'$ of the ratchet and having an attached gear $m^2$ in mesh with a gear $m^3$, mounted on the loom-frame, said gear having secured to its shaft $m^4$ an arm $m^5$, provided at its free end with a roll $m^6$, which is held against the periphery of the yarn mass on the beam by a spring $s^{50}$. With the full beam the roll $m^6$ will be in the position shown in Fig. 1 and the shield $m$ will be so positioned as to permit the minimum effective length of the pawl-stroke, as it will be of course obvious that entirely irrespective of the length of the stroke of the pawl its effective stroke will only be the distance between the end of the shield and the next tooth of the ratchet which is exposed. As, however, the diameter of the yarn mass decreases the roll $m^6$ will move in toward the center of the beam, and through the arm $m^5$ the gear $m^3$ will be slowly rotated in the direction of the arrow 80, Fig. 1, to thereby oppositely rotate the gear $m^2$ and gradually move the shield more and more to the left to thus expose more of the periphery of the ratchet to the action of the pawl, so that the effective stroke of the pawl will gradually increase as the diameter of the yarn mass on the beam decreases, and at the same time the variation in warp tension will also be governing the active stroke of the pawl.

The construction of the let-off mechanism is simple, effective, and positive in its operation and the automatic action of the let-off mechanism is very greatly increased.

Various modifications may be made in the details of my invention without departing from the spirit and scope thereof, I having shown herein one practical embodiment of my invention.

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

1. In a loom, the lay, a fixed shuttle-box at one end of the lay, a rising-and-falling shuttle-box mounted at the other end of the lay, and means, including a fixed cam, independent of the lay, to shift the latter box by or through the movement of the lay.

2. In a loom, the lay, a fixed shuttle-box at one end of the lay, a shifting shuttle-box mounted at the other end of the lay and having an attached follower, and a fixed cam mounted independently of the lay, and with which cam said follower coöperates, by or through the movement of the lay to thereby shift the shifting shuttle-box.

3. In a loom, the lay, a shifting shuttle-box mounted thereon and having an attached follower, a fixedly-positioned cam with which the follower coöperates, and a switch on the cam to control the follower when the movement of the lay is reversed.

4. In a loom, the lay, a shifting shuttle-box mounted thereon and having an attached follower, a fixed cam having a continuous path for the follower, and an automatic switch to prevent retrograde movement of the follower when the movement of the lay is reversed.

5. In a loom, the lay, a shifting shuttle-box mounted thereon and having an attached follower, a fixed cam having a continuous path provided with a reversed portion, and a switch to prevent retrograde movement of the follower at such reversed portion.

6. In a loom, the lay, a shifting shuttle-box mounted thereon, a controlling-cam having a substantially pear-shaped path, a coöperating follower connected with the shuttle-box, and a switch located adjacent the apex of the divergent portions of the cam-path, permitting the passage of the follower to the apex along one divergent portion as the lay beats up, and compelling its passage along the other divergent portion when the lay moves back.

7. In a loom, the lay, a shifting shuttle-box mounted thereon, a controlling-cam having a continuous path provided with a reversing portion, a follower movable in said path by or through the movement of the lay, and a switch adjacent the reversing portion of the cam-path and movable by the follower out of the way thereof on its advance, said switch returning automatically to normal position behind the follower to compel the latter to traverse the cam-path beyond the reversing portion.

8. In a loom, the lay, a shifting shuttle-box

mounted thereon, a controlling-cam having a continuous path converging at a point corresponding to the position of the lay at the end of its forward stroke, a follower movable with the lay and connected with the shuttle-box, and a movable switch permitting movement of the follower along one part of the path to the apex as the lay beats up, and to thereafter close such part and compel the follower to traverse another portion of the path as the lay moves back.

9. In a loom, a lay having two raceways, fixed and shifting shuttle-boxes at opposite ends of the lay, two shuttles adapted to simultaneously traverse the raceways in opposite directions, and means to shift the shifting shuttle-box to receive a shuttle from one raceway and move it into position to be thrown across the other raceway.

10. In a loom, a lay having two raceways, one above the other, a fixed shuttle-box at one end of the lay, adapted to receive a shuttle from the upper raceway and having means to direct the shuttle to the plane of the lower one, a rising-and-falling shuttle-box at the opposite end of the lay, means to move it to receive a shuttle from the lower raceway and to lift it into position to be thrown across the upper raceway, and two shuttles adapted to traverse said raceways simultaneously in opposite directions.

11. In a loom, a lay having two raceways one above the other, a fixed shuttle-box at one end of the lay, having an inclined guide-cover, to depress an incoming shuttle, the bottom of the shuttle-box being in the plane of the lower raceway, a shifting shuttle-box at the other end of the lay, and means directly controlled by the movement of the lay to alternately raise and lower the shifting shuttle-box to the planes of the upper and lower raceways.

12. In a loom, the lay having a fixed shuttle-box at one end and a shifting shuttle-box at the other end, a series of separated fingers mounted on the lay and extended transversely thereto above the raceway, to form a second raceway, two shuttles, adapted to simultaneously traverse the raceways in opposite directions, and means to shift the shifting shuttle-box into the plane of one, and then of the other, of the raceways.

13. In a loom, a lay having two raceways, fixed and shifting shuttle-boxes at opposite ends of the lay, two shuttles adapted to simultaneously traverse the raceways in opposite directions, and means to shift the shifting shuttle-box to receive a shuttle from one raceway and move it into position to be thrown across the other raceway, said means including a cam and a coöperating follower, one being fixedly mounted and the other carried by the lay and connected with the shifting shuttle-box.

14. In a loom, the lay having upright fixed guides at one end thereof, a shuttle-box adapted to rise and fall on the guides and having a depending leg, a cam-follower on the leg, a fixed cam having a continuous path for the follower, and means to prevent retrograde movement of the follower when the movement of the lay changes from its forward to its backward stroke.

15. In a loom, the lay, a shifting shuttle-box mounted thereon, and means to shift it, comprising a fixed cam having a continuous path including two converging portions, a spring-controlled switch in the approach portion adjacent the apex, said switch having a cam-face forming a part of the bottom of the path of the cam, and a follower movable with the lay and also relatively thereto, and extended into the path of the cam, the switch being depressed by the follower traversing the approach portion of the cam-path as the lay beats up, and thereafter closing the same, to cause the follower to traverse the contiguous divergent portion of the path as the lay moves back.

16. In a loom, the lay having two raceways, two shuttles adapted to simultaneously traverse said raceways in opposite directions, two pairs of whip-rolls, for the four sets of warp, pivotally-mounted supports for each pair of whip-rolls, and independent, yielding controlling means for each roll.

17. In a double-shed loom, independent tension-controlling means for each set of warps, including whip-rolls mounted for each set of warps, including whip-rolls mounted in pairs, connected movable supports for each pair, the warp-beam, means to rotate it, including a ratchet and pawl, an actuating device to move the pawl to a fixed point at each pick, and means controlled by the warp tension, transmitted through said connected supports, to determine the starting-point of each pawl-stroke.

18. In a loom, a plurality of whip-rolls, one for each set of warps, a rocking support in which a pair of whip-rolls are mounted, independent yielding controlling means for each roll, acting against the warp tension, the warp-beam, means to rotate it, including a ratchet and pawl, an actuating device to move the pawl to a fixed point at each pick, and means controlled by angular movement of the rocking support, due to changes in warp tension, to determine the starting-point of each pawl-stroke.

19. In a loom, two whip-rolls, one for each set of warps, rocking supports for the ends of the whip-rolls, independent yielding controlling means for each roll, carried by the supports, the warp-beam, means to rotate it, including a ratchet and pawl, an actuating device to move the pawl to a fixed point at each pick, a movable shield adapted to be interposed between the pawl and ratchet, to determine the effective length of the pawl-stroke, and means connected with the shield to position the latter in accordance with the diameter of the yarn mass on the beam.

20. In let-off mechanism for looms, a plu-

rality of yieldingly-controlled whip-rolls, movable supports therefor, the warp-beam, means to rotate it, including a ratchet and pawl, an actuating device to move the pawl to a fixed point at each stroke, connections between the said device, and the whip-roll supports, to vary the starting-point of the pawl at each stroke, a shield interposed between the pawl and ratchet, and means controlled by the diameter of the yarn mass on the beam to position the shield and thereby determine the effective length of each pawl-stroke.

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

JOHN T. MEATS.

Witnesses:

JOHN C. EDWARDS,

AUGUSTA E. DEAN.