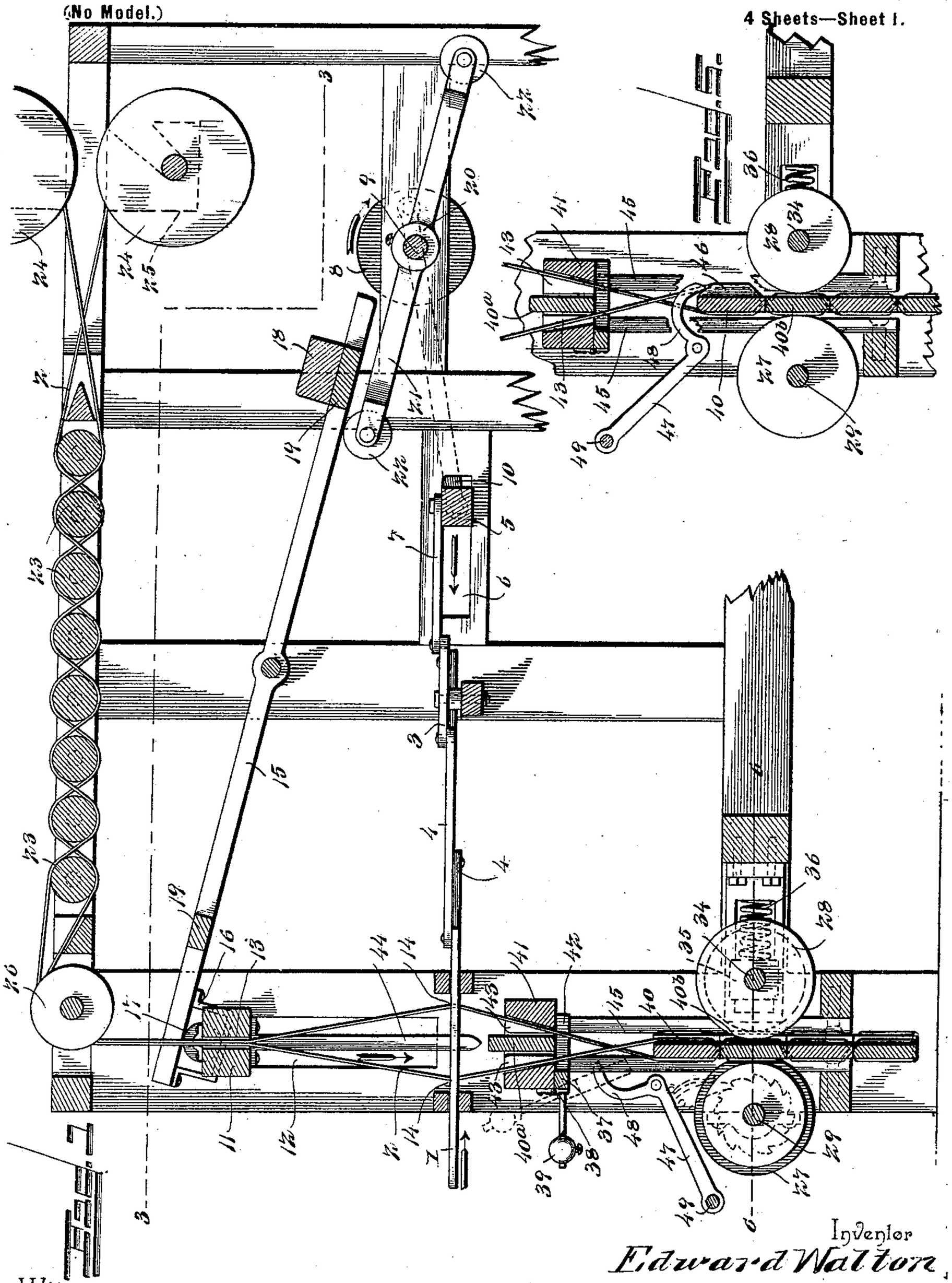
No. 618,925. Patented Feb. 7, 1899.

E. WALTON.

SLAT WEAVING MACHINE.

(Application filed Dec. 23, 1897.)

(No Model.) 4 Sheets—Sheet 1.



Witnesses
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D. E. Hoyt

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(No Model.) 4 Sheets—Sheet 2.

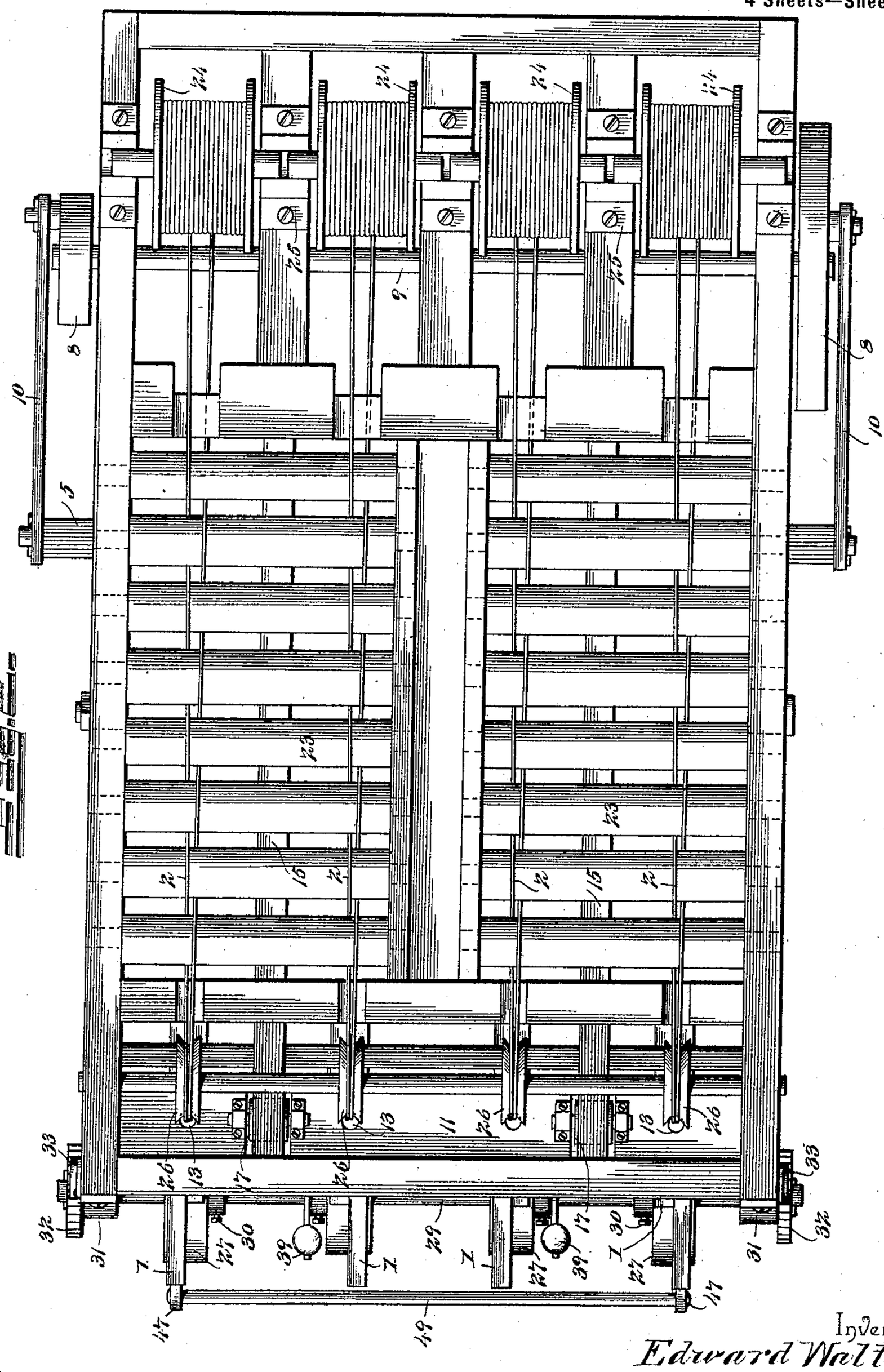

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

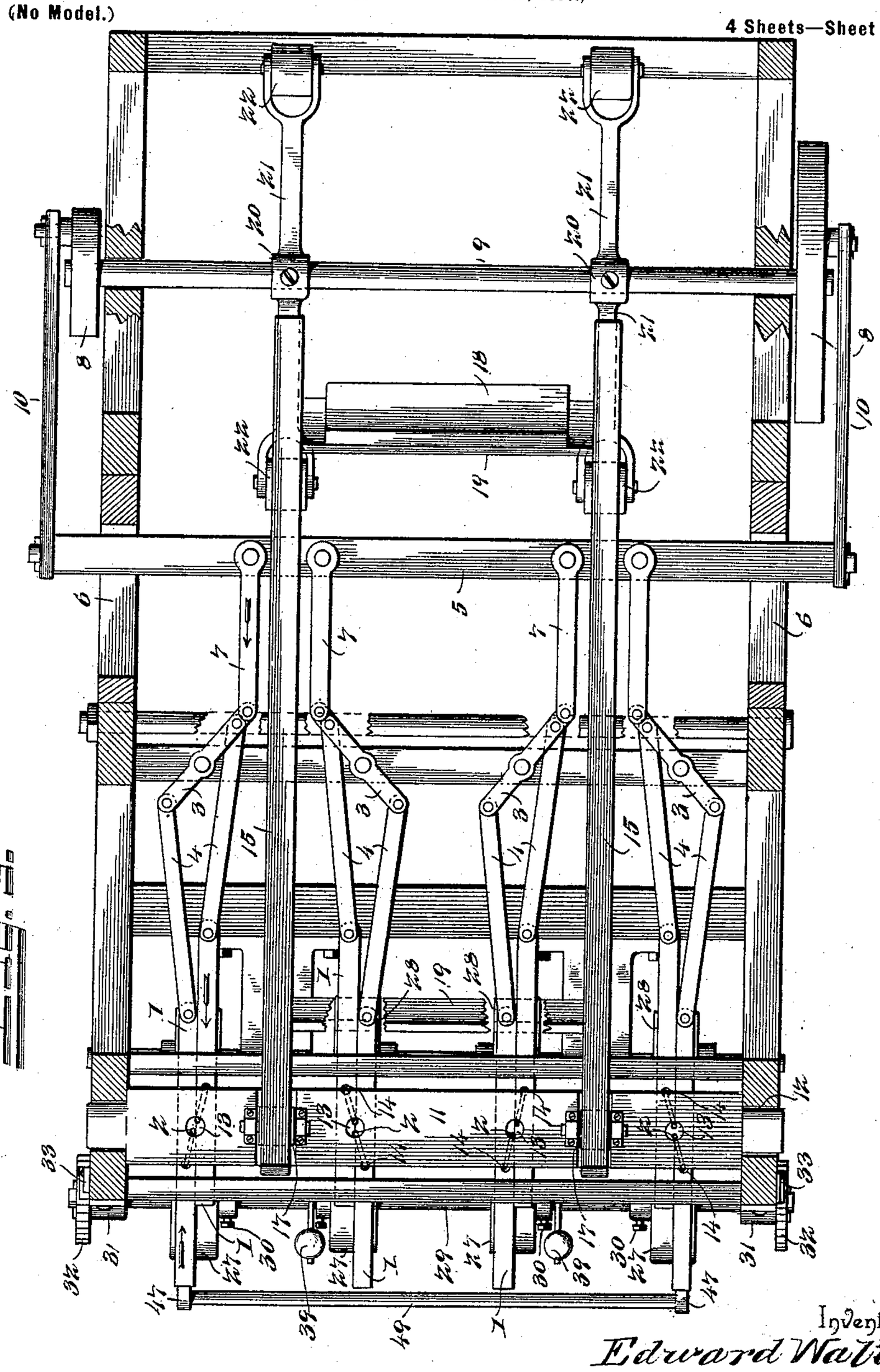

Fig. 9.

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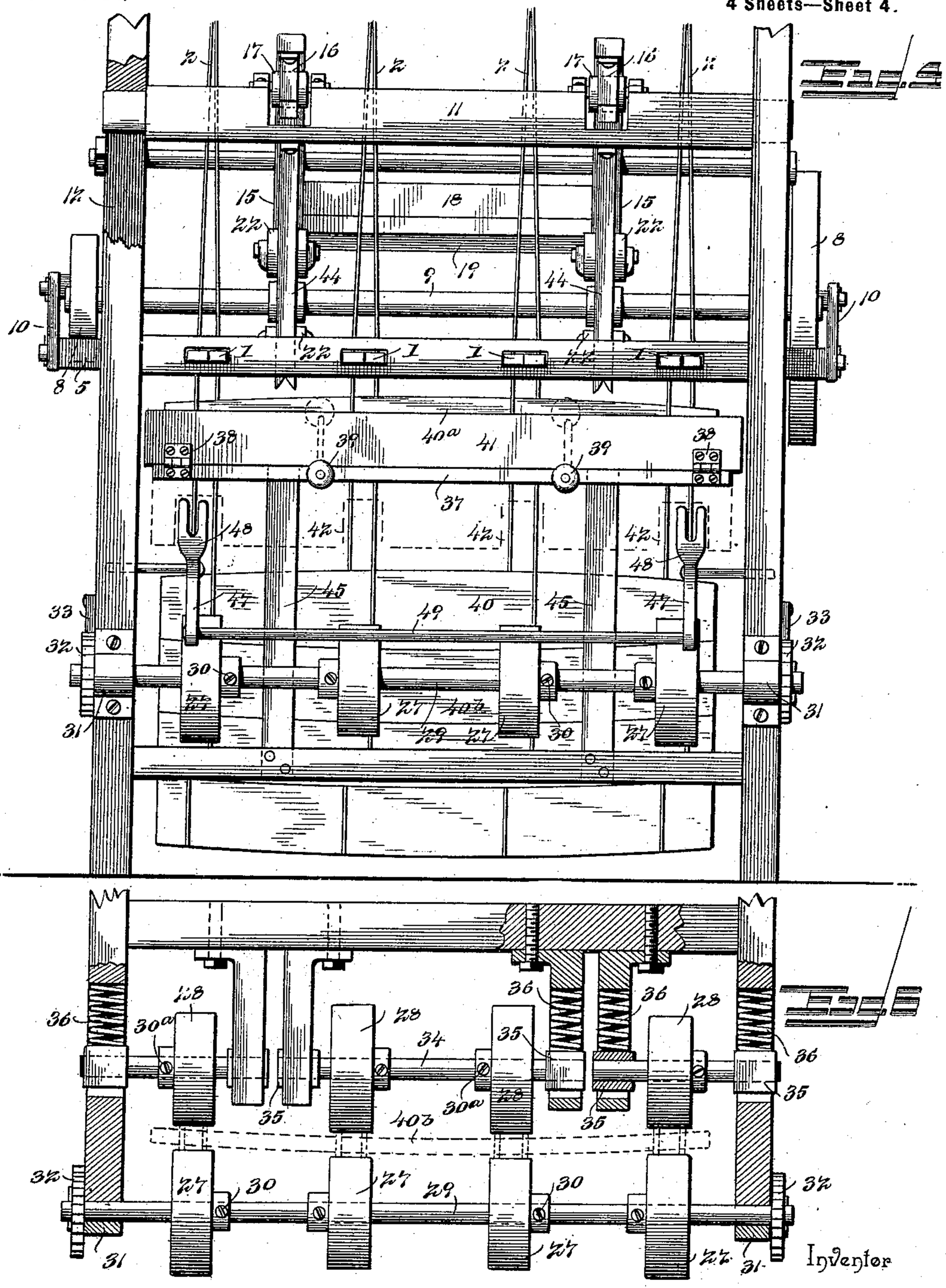

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UNITED STATES PATENT OFFICE.

EDWARD WALTON, OF PENRITH, VIRGINIA.

SLAT-WEAVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 618,925, dated February 7, 1899.

Application filed December 23, 1897. Serial No. 663,196. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WALTON, a citizen of the United States, residing at Penrith, in the county of Cumberland and State of Virginia, have invented a new and useful Slat-Weaving Machine, of which the following is a specification.

My invention relates to looms for weaving slat-and-wire fabrics to form webs adapted especially for the sides of barrels, kegs, hogsheads, and similar receptacles; and the object in view is to provide a novel construction and arrangement of parts whereby slats may be woven either in a flat or a centrally-bulged form, to provide a web wherein the slats or woof members are in contact, to adapt a receptacle constructed from the web or fabric to exclude light and air.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a longitudinal sectional view of a machine constructed in accordance with my invention. Fig. 2 is a plan view of the same. Fig. 3 is a horizontal section on the plane indicated by the line 3 3 of Fig. 1. Fig. 4 is a front end view. Fig. 5 is a detail vertical section in the plane of Fig. 1, showing the slat box or receptacle, presser-rolls, and contiguous parts with the block-holding levers in operative position. Fig. 6 is a detail horizontal section on the plane indicated by the line 6 6 of Fig. 1.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

Mounted in a suitable supporting-frame, preferably for horizontal reciprocation, are heddle-bars 1, arranged in pairs for alternate movement in opposite directions, a pair of said bars being employed for each "run" of warp-wires 2. In the construction illustrated four pairs of heddle-bars are employed, and the means for reciprocating the same consist of rocking levers 3, connected by links 4 with the heddle-bars and actuated by a reciprocable follower 5, which is mounted in suitable guides 6 in the frame and is connected with each rocking lever by means of a pitman 7. Any suitable means may be employed for reciprocating the follower, such as crank-wheels 8 on the driving-shaft 9, connected by pitmen 10 with the opposite extremities of the follower.

Coöperating with the heddle-bars is a lay 11, mounted for vertical reciprocation in suitable guides 12, provided with reeds 13, through which the warp-wires extend before reaching the eyes 14 of the heddle-bars. The means illustrated in the drawings for operating the lay include intermediately-fulcrumed levers 15, having antifriction-bearings at their front ends upon the lay by means of yokes 16, carried by the levers, and antifriction-rolls 17, mounted upon the lay within the yokes, the pressure of the levers being applied directly to the antifriction-rolls during the downstroke of the lay and the pressure of the yokes being applied to the under sides of said rolls during the upstroke of the lay. The lay is yieldingly held in its retracted or inoperative position, as at the upper ends of the guides in which it is mounted, by suitable means, such as a counterbalancing-weight 18, applied to the rear ends of the levers, said levers being connected for simultaneous movement by means of cross-bars 19, and in order to elevate the rear ends of the lay-operating levers to depress the lay at each stroke I employ cross-heads 20, fixed to the driving-shaft 9 and having arms 21, which successively come in contact with the under surfaces of the levers. In practice I prefer to provide said arms with antifriction-rolls 22.

In order to insure the compact arrangement of the slats in the web and at the same time embed the warp-wires in the surfaces and edges of the slats, I have provided a construction wherein tension is applied to the warp-wires before passing through the lay-reeds and have also provided means for resisting this tension by means of presser-rolls, which bear against opposite sides of the completed fabric. The tension device which I have illustrated in the drawings consists of a series of tension bars or rollers 23, around which the warp-wires of each run extend in opposite directions, said wires being conveyed from suitable spools 24, mounted in a rack 25 on the frame of the machine. After leaving the tension-rolls said warp-wires pass over guides, such as direction-pulleys 26, and thence

through the lay-reeds. The presser-rolls are arranged in pairs, comprising stationary front rolls 27 and yielding rear or opposing rolls 28, said stationary front rolls having a common shaft 29, to which they are fixed by means of set-screws 30 or their equivalents, and said shaft is mounted in suitable bearing 31 in the frame and is fitted with ratchet-wheels 32, engaged by holding-pawls 33, whereby at each forward movement of the presser-rolls they are locked against return movement.

It will be understood that the term "stationary" as used in connection with the front presser-rolls 27 merely indicates that said rolls are not mounted for yielding movement toward and from the plane of the fabric, whereas the rear rolls 28 have their shafts 34 mounted in sliding bearing-blocks 35, held by the pressure of springs 36 or their equivalents in their normal position to clamp the fabric between the two sets of rolls. Furthermore, while the stationary rolls have a common shaft 29 the terminal and intermediate yielding rolls 28 have independent shafts, for a reason which will be clearly explained hereinafter.

Arranged between the fabric holding or clamping devices, consisting of the presser-rolls 27 and 28, and the plane of the heddle-bars is a slat-bed 37, which normally occupies a horizontal position, as shown in full lines in Fig. 1, but which is yieldingly mounted, as by means of hinges 38, for downward-swinging movement during the depression of a slat after the introduction of the same into the "shed" formed by the separated or bowed portions of the warp-wires of each run. In the construction illustrated this slat-bed is provided with counterbalancing-weights 39; but it is obvious that any equivalent yielding means may be employed for returning the bed to its normal position after the depression of a slat to the position occupied by the slat 40 of Fig. 1. Inasmuch, furthermore, as the slats are inserted in a cross-sectionally vertical or edgewise position into the shed, I have deemed it advisable to use a slat box or receptacle 41 having a parallel-sided space, into which the slats are fitted, and the bottom of this box or receptacle is closed by the slat-bed 37, which, however, is transversely slotted, as shown at 42, to allow the warp-wires to pass therethrough when the bed is in its normal or horizontal position; also, the side walls of the slat box or receptacle are grooved, as shown at 43, for a similar purpose and respectively in the planes of the slots 42.

The use, in connection with the other parts, of the slat box or receptacle necessitates the provision of the lay-bar 11 with push-bars 44, adapted to pass vertically downward through said box or receptacle to force the slat 40^a, which has been arranged in the box, to the position occupied by the slat 40 in Fig. 1. As the last-inserted slat 40^a is forced out of the slat box or receptacle by the depression of the lay and the slat-bed 37 is swung to the position indicated in dotted lines in Fig. 1 the warp-wires are gradually decussated by the opposite reciprocal motion of the heddle-bars, and the depression of the last-inserted slat continues until its lower edge strikes the upper edge of the previously-introduced or intermediate slat 40. After said contact the downward motion of the last-inserted slat continues, thereby pushing the intermediate slat 40 in a corresponding direction until the latter reaches the position occupied by the slat 40^b in Fig. 1—namely, fairly between the presser-rolls, where the opposing pressures of said rolls cause the warp-wires to be embedded in the opposite side surfaces thereof. The contact of the presser-rolls with the advance slat 40^b, together with the fact that backward rotation of the stationary presser-rolls is prevented by the clutch mechanism, consisting of the engaging ratchets 32 and pawls 33, firmly locks the completed portion of the fabric from backward movement, and thus insures the maintenance of the above-described positions of the parts until a succeeding slat, forced downward by the lay, takes the place of said advance slat.

As above indicated, the pressure of the rolls 27 28 is designed to embed the warp-wires in the opposite side surfaces of the slats in order to form a fabric having smooth or flush opposite surfaces; but it will be understood that this embedding of the wires will depend upon the pressure of the rolls and is not a necessary result in manufacturing fabrics for all kinds of receptacles. For instance, it is possible to manufacture a fabric by the mechanism herein described without embedding the wires when such is unnecessary, as in constructing rough receptacles, and therefore I have deemed it unnecessary in the drawings to illustrate the complete embedding of the wires in the side surfaces of the slats. At the edges of the slats, however, it is necessary to provide diagonally-disposed kerfs or seats converging from opposite side surfaces of the slat in a common direction and adapted to receive those portions of the warp-wires which pass from one side surface of a slat to the opposite side surface of the adjoining slat, and this diagonal crossing of the warp-wires enables me to bring the contiguous edges of adjoining slats into close contact, whereby the completed receptacle may be made practically air-tight.

When it is desired to form a fabric for constructing bulged receptacles, I employ presser-rolls of different sizes in order to properly shape the fabric, the slats being tapered from their centers toward their extremities, as will be seen by reference to Fig. 4. Thus the terminal stationary rolls or those which are located contiguous to the ends of the slats and bear upon the border warp-wires are of larger diameter than the coöperating and opposing terminal yielding rolls, whereas the intermediate stationary roll or rolls (which are located between the terminal stationary rolls)

are of smaller diameter than the coöperating or opposing intermediate yielding roll or rolls, as will be seen by reference to Fig. 6. This causes the centers of the slats to be bulged forwardly, while the extremities thereof are impelled in the opposite direction. Furthermore, it is desirable to provide for varying the distances between the presser-rolls to suit different lengths of slats and different intervals between the warp-wire runs, and hence each presser-roll is fitted for adjustment upon its respective shaft and is provided with a locking device, such as the set-screw 30, hereinbefore described in connection with the stationary rolls. The yielding rolls are provided with corresponding locking devices consisting in the construction illustrated of set-screws 30ª. The extremities of the slat after leaving the slat-receptacle preferably pass downward through parallel-sided guides 45, supported by the framework, and the lower extremities of the push-bars 44 are reduced or pointed to firmly engage the upper edges of the slats during the downward feeding movement thereof.

Instead of crozing the staves or slats when the fabric is designed for use in the manufacture of kegs, barrels, hogsheads, and the like I have found it desirable to apply what may be termed "croze-blocks," (shown at 46 in Fig. 5,) the length thereof being approximately equal to the width of the slats and being applied to the inner surfaces of the slats contiguous to their extremities and respectively in the planes of the warp-wires by which they are secured to the slats. Obviously these croze-blocks are applied at intervals to the fabric, with intervening plane slats, and when it is desired to introduce a croze-block it is slipped by hand or otherwise between a warp-wire and the surface of a slat after it has been depressed to the position (shown at 40 in Fig. 5) below the slat box or receptacle. Obviously this introduction of the croze-blocks deflects the engaging warp-wire out of its normal path, and in order to maintain the parts in the desired position during the depression of the succeeding slat in accordance with the above-described operation of the mechanism I employ a holding-lever 47, fulcrumed at an intermediate point upon the frame and provided with a jaw 48, curved to extend over the upper edge of the slat to which the croze-block has been applied and bear at its bifurcated extremity upon the upper edge of said block. Obviously the bifurcation of the jaw is designed to enable the lever to operate around the engaging warp-wire, as will be seen by reference to Fig. 4. When this lever is raised at its front end, it depresses the croze-block to the desired point and enables the operator to hold it in the proper position until permanently fastened by the depression of the succeeding slat, and hence the tightening of the warp-wires. In practice I prefer to employ a plurality of these holding-levers 47, which for convenience should be connected for simultaneous movement by means of a handle-bar 49 or its equivalent.

From the above description it will be obvious that the warp-wires are held under tension at a point in advance of the lay, while the fabric is held by clamping devices against backward movement, said clamping devices also performing the function of shaping means, whereby the slats are successively bulged as they are depressed to occupy their proper relative positions. Furthermore, in practice I prefer to so locate the parts that the presser-rolls will engage the second slat in advance of that which is located upon the slat-bed, whereby there is always an intermediate slat between that which is engaged by the presser-rolls and the last-introduced slat. This enables me to introduce a croze-block at the desired point without interfering in any way with the continuous operation of the machine. Obviously the extent of movement of the yielding presser-rolls is sufficient to allow the croze-blocks to pass the terminal rolls after being properly secured to the slats.

While in the above description I have referred to the warp-strands as being of wire, it will be understood that they may be of cord or any other equivalent flexible material.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. A slat-weaving machine having fabric receiving and holding devices, heddle-bars, a lay, and operating devices, and a slat-bed yieldingly held in its normal position to support the slats in the shed of the warp-strands, substantially as specified,

2. A slat-weaving machine having fabric receiving and holding devices, heddle-bars, a lay, and operating devices, and a continuous transversely-slotted slat-bed yieldingly held in its normal position to support the slats in the shed of the warp-strands, said strands passing through the slots of the bed, substantially as specified.

3. A slat-weaving machine having fabric receiving and holding devices, heddle-bars, a lay, and operating devices, and a slat-bed yieldingly held in its normal position to support the slats in the shed of the warp-strands, in combination with a slat-box closed at its bottom by the slat-bed, substantially as specified.

4. A slat-weaving machine having fabric receiving and holding devices, heddle-bars, a lay, and operating devices, and a slat-bed yieldingly held in its normal position to support the slats in the shed of the warp-strands, in combination with a slat-box closed at its bottom by the slat-bed, and having its walls provided with warp-strand-receiving grooves, alined with transverse slots in the slat-bed, substantially as specified.

5. A slat-weaving machine having a shaping device provided with opposing faces, consisting of opposing rollers of which those upon one side of the plane of the fabric have a spindle mounted in fixed bearings, while those at the other side of the plane of the fabric are yieldingly mounted for movement toward and from the plane of the fabric, and means for preventing backward rotation of the first-named set of rolls, substantially as specified.

6. A slat-weaving machine having a shaping device provided with opposing rolling faces which are respectively convex and concave, and consist of opposing sets of rollers, mounted coaxially, the terminal and intermediate rollers of the set upon each side of the plane of the fabric being of different diameters, substantially as specified.

7. A slat-weaving machine having opposing sets of presser-rolls between which the fabric is received, one set of rolls being yieldingly mounted for movement toward and from the plane of the fabric, the terminal and intermediate yielding rolls having independently-movable spindles, substantially as specified.

8. A slat-weaving machine having a feeding and shaping device provided with opposing rolling faces, which are respectively convex and concave, substantially as specified.

9. In a slat-weaving machine, the combination with feeding-rolls, heddle-bars, a slat-bed, a lay, and means for operating said parts, of a croze-block-holding lever having a jaw adapted to engage and hold a block contiguous to the plane of a slat, substantially as specified.

10. In a slat-weaving machine, the combination with feeding-rolls, heddle-bars, a slat-bed, a lay, and means for operating said parts, of a croze-block-holding lever having a bifurcated jaw adapted to straddle a warp-strand and hold a block in operative relation with a slat, and between the same and said warp-strand, substantially as specified.

11. A slat-weaving machine having parallel reciprocable heddle-bars, a follower, and means for reciprocating the same in a path parallel with the heddle-bars, rocking levers having their arms connected respectively to the coöperating heddle-bars, and swinging connections between the rocking levers and the follower, in combination with fabric-holding devices, a lay, and means for operating the same, substantially as specified.

12. A slat-weaving machine having a reciprocable lay, levers operatively connected with the lay, a driving-shaft, and cross-heads carried by the driving-shaft in the planes of said levers for successive engagement therewith, in combination with heddle-bars and coöperating parts, substantially as specified.

13. A slat-weaving machine having a reciprocable lay, levers having fixed fulcrums and slidingly connected at one end with the lay, said connections consisting of antifriction-rolls carried by the lay for contact with the levers, yokes carried by the levers and inclosing antifriction-rolls, and rotary cross-heads arranged in the planes of the said levers for successive contact therewith, in combination with heddle-bars and coöperating parts, substantially as specified.

14. A slat-weaving machine having a reciprocable lay, operating-levers connected with the lay, yielding means for maintaining the lay in its retracted position, a driving-shaft, and cross-heads on the driving-shaft arranged in the planes of said levers and having arms for successive engagement therewith to advance the lay, in combination with heddle-bars and coöperating parts, substantially as specified.

15. In a slat-weaving machine, the combination with a supporting-frame provided with spool-racks, of tension-rolls for warp-strands, horizontally-reciprocable heddle-bars and means for actuating the same, a vertically-reciprocable lay arranged above the plane of the heddle-bars, and means, connected with the actuating devices of the heddle-bars, for operating said lay, a downwardly-yielding slat-bed arranged below the plane of the heddle-bars, a slat-box coöperating with the slat-bed, vertical guides communicating with the slat-box and extending downwardly therefrom, and presser-rolls arranged in opposing sets below the slat-bed, substantially as specified.

16. In a slat-weaving machine, the combination with a supporting-frame provided with spool-racks, of tension-rolls for warp-strands, horizontally-reciprocable heddle-bars and means for actuating the same, a vertically-reciprocable lay arranged above the plane of the heddle-bars, and means, connected with the actuating devices of the heddle-bars, for operating said lay, a downwardly-yielding slat-bed arranged below the plane of the heddle-bars, a slat-box coöperating with the slat-bed, vertical guides communicating with the slat-box and extending downwardly therefrom, push-bars depending from the lay to pass between the pairs of heddle-bars and through the slat-box, and presser-rolls arranged in opposing sets below the slat-bed, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

EDWARD WALTON.

Witnesses:
H. J. RHODES,
R. J. RHODES.