

W. G. EATON.

MULTIPLIER MECHANISM FOR LOOMS.

APPLICATION FILED JAN. 17, 1901. RENEWED NOV. 6, 1901.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1

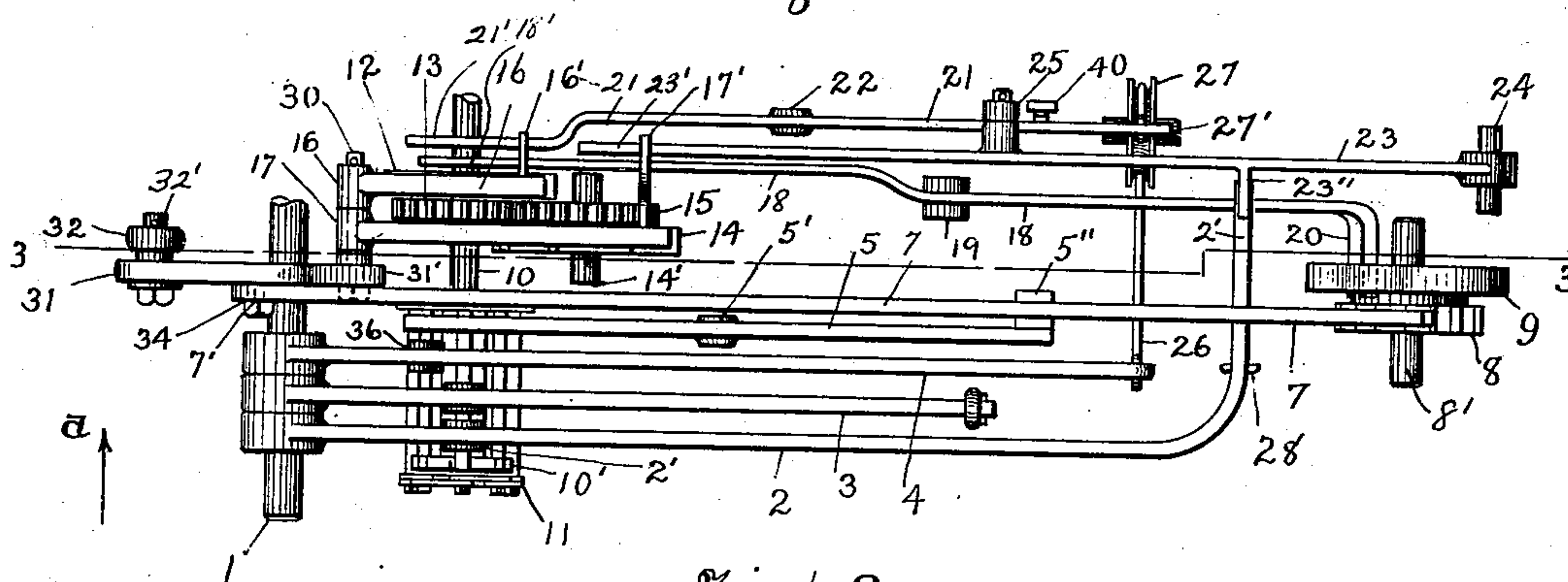


Fig. 2

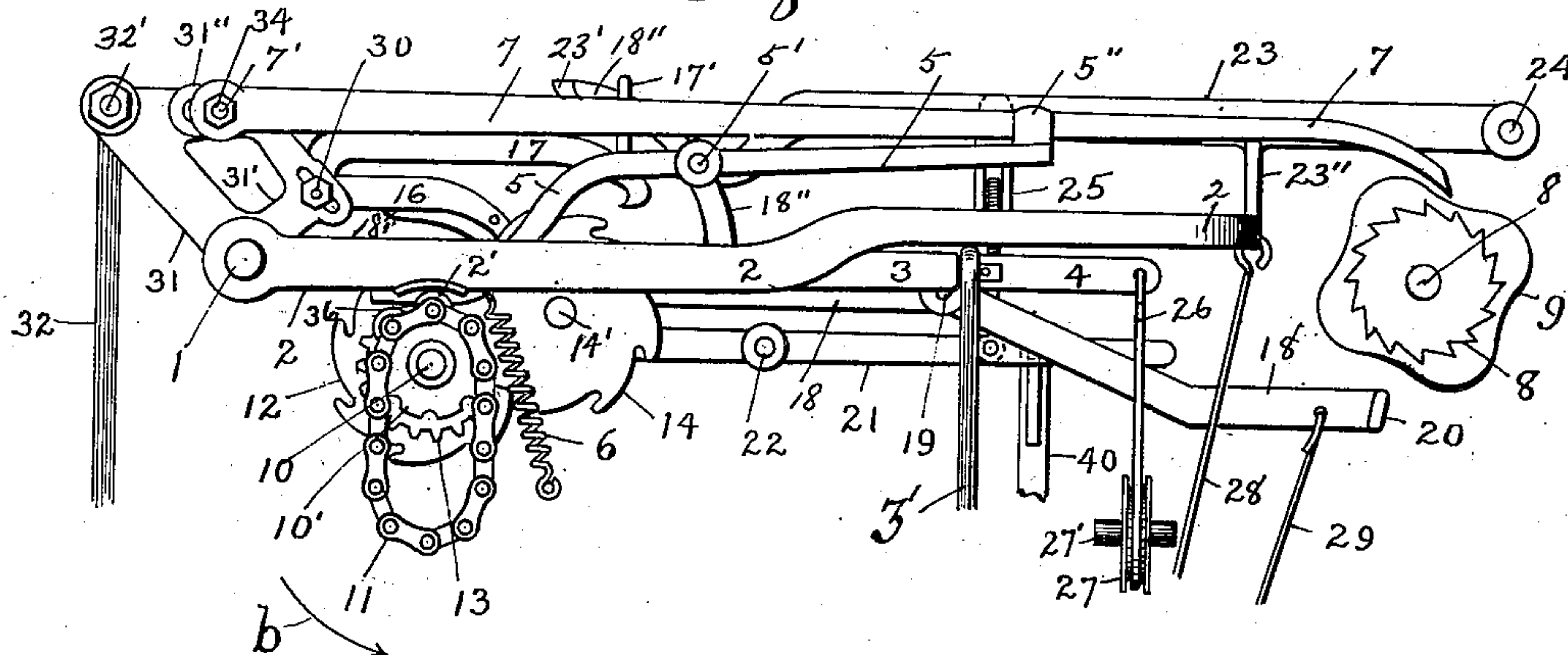
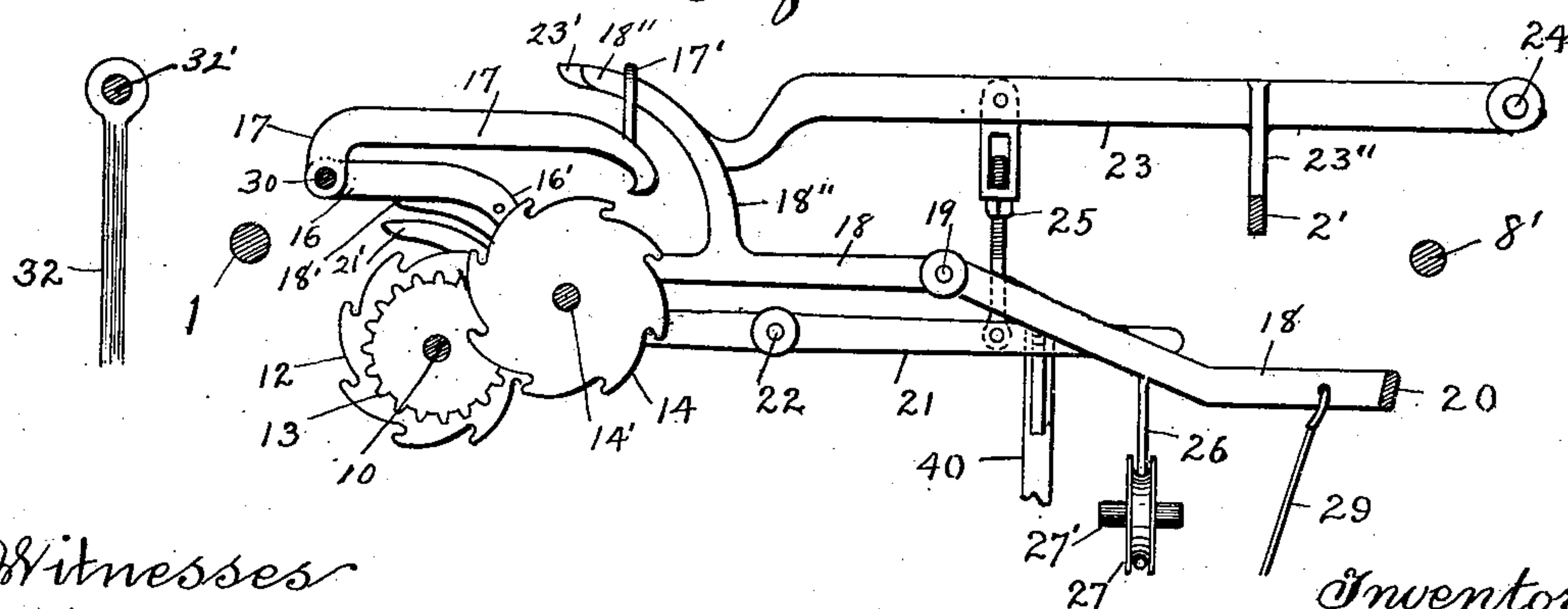


Fig. 3



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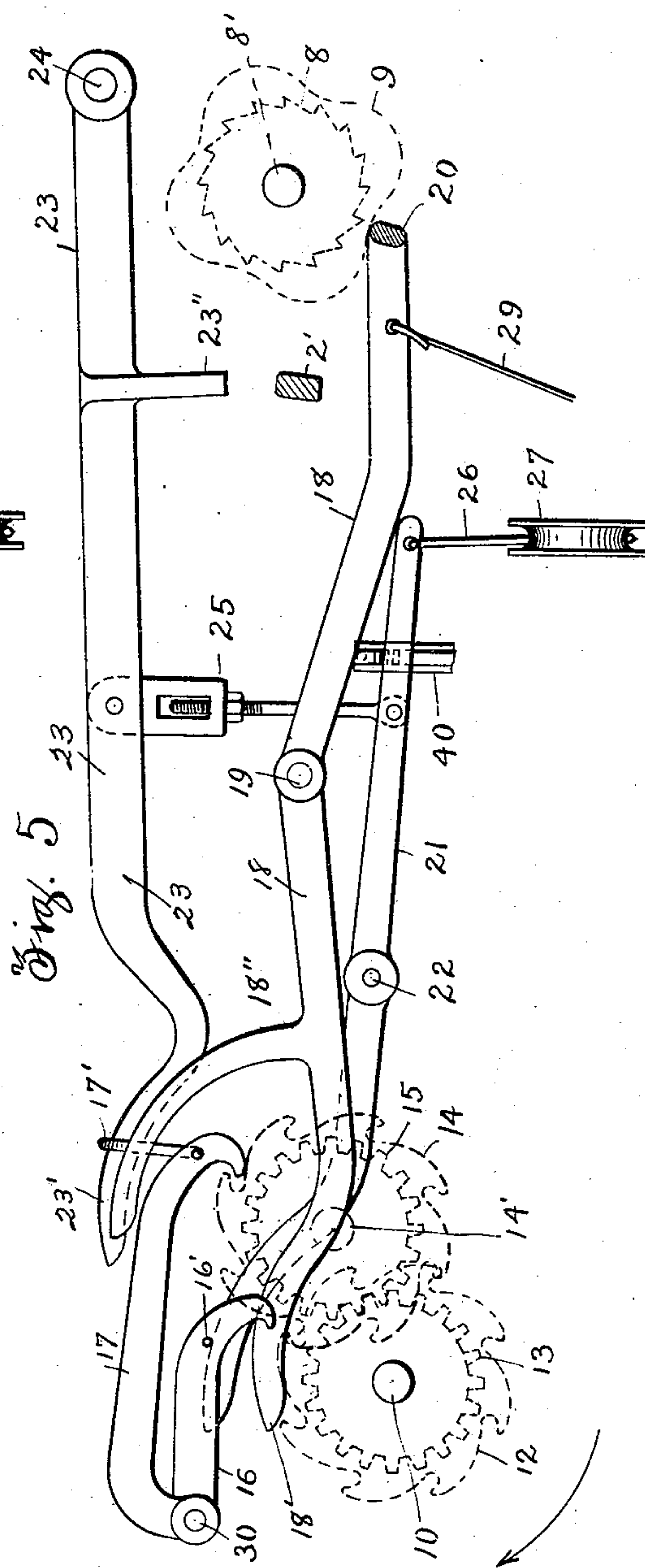
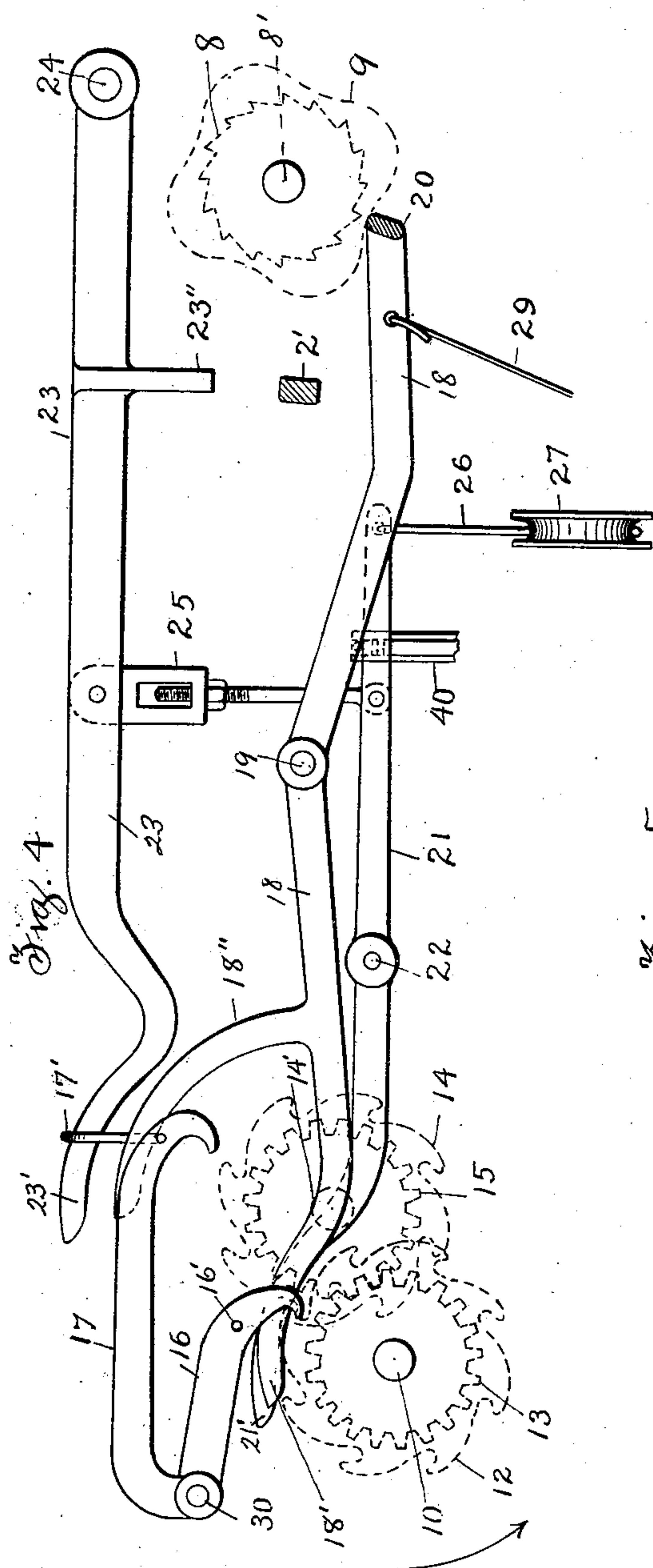
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3 SHEETS—SHEET 2.



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No. 742,404.

PATENTED OCT. 27, 1903.

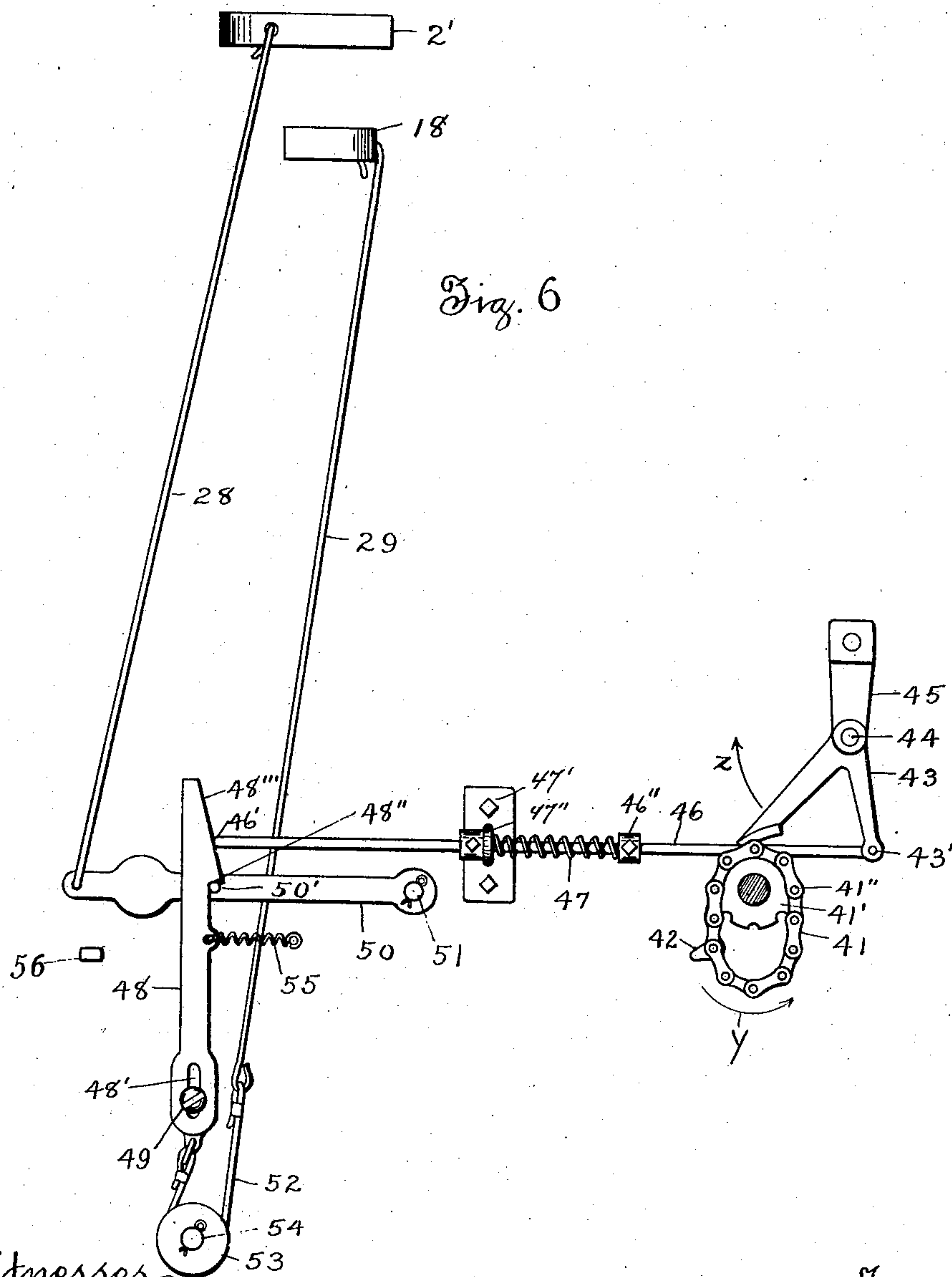
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APPLICATION FILED JAN. 17, 1901. RENEWED NOV. 6, 1901.

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3 SHEETS—SHEET 3.



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MULTIPLIER MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 742,404, dated October 27, 1903.

Application filed January 17, 1901. Renewed November 6, 1901. Serial No. 81,351. (No model.)

To all whom it may concern:

Be it known that I, WILLIE G. EATON, a citizen of the United States, residing at Nashua, in the county of Hillsboro and State of New Hampshire, have invented certain new and useful Improvements in Multiplier Mechanism for Looms, of which the following is a specification.

My invention relates to looms for weaving textile fabrics, and particularly to the pattern mechanism of looms.

The objects of my invention are to reduce the length of the pattern-chain, to provide means for automatically reversing said chain—as, for instance, after nearly a complete revolution in one direction to automatically reverse the direction of movement of said chain—and to provide means for repeating a certain portion of said chain and multiplying a given pick.

My invention consists in certain novel features of construction of my pattern-chain mechanism, as will be hereinafter fully described.

My improvements in pattern-chain mechanism are herein described as being applied to a loom for weaving a double blanket; but it will be understood that my improvements may be applied to looms for weaving other kinds of fabrics, as towels, &c.

I have only shown in the drawings sufficient parts of a loom with my improvements applied thereto to enable those skilled in the art to understand the construction and operation of my improvements.

Referring to the drawings, Figure 1 is a plan view of a pattern-chain mechanism embodying my improvements. Fig. 2 is a side view of the parts shown in Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 3 is a sectional view taken at a point indicated by lines 3-3, Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 4 corresponds to Fig. 3, but shows a different position of some of the parts shown in Fig. 3. Fig. 5 corresponds to Fig. 4, but shows some of the parts in a different position; and Fig. 6 is a diagrammatic view showing parts of a loom which are used to call the pattern-chain into action. Figs. 4 and 5 are shown on an enlarged scale.

In Figs. 1, 2, and 3 the working parts are shown in the position required for weaving the body of the blanket.

In Fig. 4 the levers and pawls are shown in the position for turning the pattern-chain in a forward direction, and in Fig. 5 the levers and pawls are shown in the position for turning the pattern-chain in a reverse direction, and in Fig. 6 are shown the parts for calling the pattern-chain into action, all as will be hereinafter fully described.

Attached to the loom side (not shown) is a framework (not shown) having bearings for the various shafts shown in the drawings. The shaft 1 has loosely mounted thereon one end of the levers 2, 3, and 4, which extend over the bars of the pattern main chain 11 and rest on the tubes or rolls thereon. (See Fig. 1.) The lever 3 through the rod or connector 3' (shown in Fig. 2) operates the movable shuttle-boxes in the usual way, and it is therefore not necessary to describe the same herein. The lever 5, centrally pivoted at 5', has one end extending over and resting on the tubes or rolls of the pattern-chain and is held in contact therewith by a spring 6, Fig. 2. The opposite end of the lever 5 has a slotted side extension 5'', which extends under and holds the free end of the pawl 7 out of engagement with the ratchet-wheel 8, attached to the multiplier-cam 9 on a stud 8' (see Fig. 2) until it is desired to operate said multiplier-cam. The chain-shaft 10 carries the pattern-barrel 10', which supports the pattern-chain 11, made up of bars, which carry rolls and tubes in the ordinary way.

Fast on the chain-shaft 10 is the ratchet 12, having integral with it the gear 13. (See Figs. 2 and 3.) An auxiliary ratchet 14, mounted on a stud 14', has the gear 15 integral therewith, which meshes with the gear 13. (See Fig. 1.) The pull-pawl 16 is adapted to engage with its free end the ratchet 12 to turn said ratchet and the gear 13. The pull-pawl 17 is adapted to engage with its free end the auxiliary ratchet 14 to turn said ratchet and the gear 15.

The lever 18 is centrally pivoted at 19 and has the upwardly-curved branches or extensions 18' and 18''. The extension 18' extends

under a pin 16' on the pawl 16, and the extension 18'' extends under the bent end of the pin 17' on the pawl 17. The opposite end of the lever 18 has a side extension 20 thereon to engage with the multiplier-cam 9 when required.

The lever 21, centrally pivoted at 22, has one end 21' bent to extend under the pin 16' on the pawl 16. (See Fig. 1.) The lever 23, pivoted at one end on a stud 24, has at its other end a curved extension 23', which extends under the bent end of the pin 17' on the pawl 17. (See Fig. 1.) The levers 21 and 23 are connected by an adjustable connector 25. (See Fig. 3.) To one end of the lever 21 is connected the end of a flexible connector 26, which passes under a roll 27 on a stud 27'. (See Fig. 3.) The other end of the chain 26 is attached to the free end of the lever 4. (See Fig. 2.)

The downward projection or extension 23'' on the lever 23 rests on the bent free end 2' of the lever 2. (See Figs. 1 and 2.) The free end 2' of the lever 2 is connected by a rod or connector 28 to the free end of the lever 50, (see Fig. 6,) pivoted at 51 and having a pin 50' thereon. The end of the lever 18 is connected by a rod or connector 29 to a flexible connector 52, which passes under the pulley 53, pivoted at 54. The opposite end of the flexible connector 52 is secured to the lower end of a latch 48, pivotally mounted on a screw 49, extending through an elongated slot 48' in the latch 48. The latch 48 has a notch 48'' to engage the pin 50' on the lever 50 and at its upper end an inclined surface 48''', which is engaged by the end 46' of the rod 46. A spring 55, secured to the latch 48, acts to hold the latch in engagement with the pin 50'.

A bell-crank lever 43 is pivoted on a stud 44 in a stand 45, and one end of the bell-crank lever 43 is connected at 43' to the rod 46, the opposite end 46' of which engages the inclined edge 48''' on the latch 48, as above stated. The opposite arm of the angle-lever 43 extends over the auxiliary pattern-chain 41 on the pattern-barrel 41', fast on the shaft 41''. A spiral spring 47, loosely coiled around the rod 46 and bearing at one end against an arm 47' on the stand 47'' and at its other end against a collar 46'', adjustable on the rod 46, acts to keep the arm of the angle-lever 43 in engagement with the auxiliary pattern-chain 41, as shown. The parts shown in Fig. 6 operate to call the pattern-chain-driving mechanism into action, as will be hereinafter described.

Referring now to pawls 16, 17, and 7, the pawl 16 is pivoted on a pin 30 on an arm 31' of the crank 31, mounted on the shaft 1, and the pawl 17 is also pivoted at 30 on arm 31' of the crank 31. The pawl 7 is pivoted at 7' on a stud 34, fast in the extension 31'' on the crank 31. A regular oscillating movement is communicated to the crank 31 and to the three pawls 16, 17, and 7 through the rod 32, piv-

oted at 32' to the crank 31 and connected at its lower end to some driven part of the loom. (Not shown.)

When the parts are in the position shown in Figs. 1, 2, and 3, the body of the blanket is being woven, and to put these parts in the position shown in said figures, with the pawls 16, 17, and 7 out of engagement with their respective ratchets, a roll 2' on the pattern-chain 11, Fig. 1, was brought under the lever 2 to raise said lever and through extension 23'' on the lever 23, resting on said lever 2, to raise the lever 23, which engaging the bent end of the pin 17' on the pawl 17 lifts said pawl out of engagement with the ratchet 14. The raising of the lever 2 causes a downward pull on the lever 18 through connector 28, lever 50, pin 50', latch 48, flexible connector 52, and connector 29, attached to said lever 18. (See Fig. 6.) The downward pull on the lever 18 through the extensions 18' and 18'', which extend under and engage the pins 16' and 17' on the pawls 16 and 17, raises said pawls and holds them out of engagement with their respective ratchets 12 and 14, as shown in Fig. 2. The pawl 17 is held up by both levers 23 and 18, as above described, while the pawl 16 is held up by the lever 18 alone. At this time there is no roll on the chain under the lever 5, and therefore the spring 6 acts to raise the other end 5'' of said lever 5 and hold the pawl 7 out of engagement with the ratchet-wheel 8, as shown in Fig. 2, so that both chain-driving pawls 16 and 17 and the multiplier-pawl 7 are out of engagement with their respective ratchets.

I will now describe the operation of the mechanism for giving a forward movement to the pattern-chain when, for example, the body of the blanket is completed and the pattern-chain is called through the operation of the parts shown in Fig. 6. The parts shown in Fig. 6 are in the position they occupy when the pattern-chain is not in use, as above described in connection with the parts shown in Figs. 1, 2, and 3. The auxiliary pattern-chain cylinder 41 is revolving all the time in the direction of the arrow *y*, Fig. 6, and in the revolution of said pattern-chain cylinder the pattern indicator or ball 42 on the pattern-chain is brought under one arm of the bell-crank lever 43, which is then moved in the direction of the arrow *z*, and through rod 46, connected to the other arm of said bell-crank lever 43, the latch 48 is moved on its pivotal support 49 until it is disengaged from the pin 50' on the lever 50. Said latch will drop until the upper end of the slot 48' strikes the screw 49. The dropping of the latch 48 causes a slack in the flexible connector 52, which slack is taken up by the turning movement of the lever 18 on its pivotal support 19, which may be induced by gravity or suitable actuating means. The movement of the lever 18 allows the pawl 16 to drop into engagement and operate its ratchet 12 and start the chain 11 in the direction of arrow *b*, Fig. 2, for the rais-

ing of the lever 23, above described, through connector 25 moves lever 21 on its axis 22 and drops the end 21' out of contact with the pin 16' on the pawl 16. (See Figs. 3 and 4.) The
 5 revolution of the ratchet 12 through pawl 16, (see Fig. 4,) movement being communicated to said pawl through crank 31 and the rod 32, as above described, will revolve the chain 11 in a forward direction and remove the roll
 10 2', Fig. 1, from under the lever 2, allowing said lever to drop, and through connector 28 allowing the lever 50 to drop with the pin 50', (the stop 56 limits the downward movement of said lever,) and said pin 50' will
 15 again be engaged by the latch 48, the indicator-roll 42 having passed out from under the arm of the angle-lever 43 to allow the spring 47 to move the rod 46 and the spring 55 to move the latch 48 into position to be
 20 engaged by said pin 50'. The pattern-chain 11 will now advance a bar at a time for each movement of the ratchet 12 caused by the pawl 16.

In case it is desired to multiply a given
 25 pick a roll on the pattern-chain is brought under the lever 5 to raise the end thereof and at the same time lower the other end 5'' and allow the pawl 7 to turn the ratchet 8 and the multiplier-cam 9 thereon. The ro-
 30 tation of the cam 9 brings a projection thereon into contact with the extension 20 on the lever 18 and causes said lever to move on its pivotal support 19 to raise the pawl 16 and the pawl 17 out of engagement with their
 35 respective ratchet-wheels substantially in the same manner as described in Patent No. 364,696, dated June 14, 1887. A depression in the periphery of the cam 9 allows the lever 18 to move and take its opposite position
 40 and allow the pawls 16 and 17 to engage with their respective ratchet-wheels and again operate the pattern-chain and stop the multiplication.

I will now describe the reverse movement
 45 of the pattern-chain. In the above-described operation of the forward movement of the chain 11, the chain having completed one revolution, except one bar, it is now desired to reverse the movement of the chain. It
 50 will be seen that there is a roll 36 on the chain 11, Fig. 1, one bar in advance of the roll 2'. The roll 36 is under the lever 4, and when the chain 11 has completed one revolution in a forward direction the roll 36 comes
 55 under the lever 4 and raises said lever and through flexible connector 26, passing around the pulley 27, draws down the lever 21, pivoted at 22, and raises the opposite end 21' of said lever 21, which extends under the pin
 60 16' on the pawl 16 and raises the pawl 16 out of engagement with the ratchet 12. At the same time through the connector 25 the lever 23 is drawn down with the lever 21, allowing the pawl 17, held up by the end 23' of
 65 the lever 23, to engage with the ratchet-wheel 14, as shown in Fig. 5, and through pinion 15, fast to said ratchet-wheel and meshing

with pinion 13, fast to the ratchet 12, turn the pattern-barrel 10' and the pattern-chain 11 in the opposite or reverse direction.

It will be seen that the pattern-chain 11 in reversing will perform all of the operations described in connection with the forward movement of the pattern-chain, including the multiplication of certain picks, if desired, 75 but exactly in the reverse direction. The pattern-chain 11 will continue to move in the reverse direction until the roll 2' is again brought under the lever 2 and the chain is stopped, as above described, and the reversing of the body of the blanket is completed. 80

A spring-latch 40 of any convenient form may be used to hold up the lever 21 when the support of the lever 23, having the extension 23'' resting on lever 2, is withdrawn by the 85 roll 2' passing from under the lever 2.

It will be understood that the details of construction of my pattern-chain mechanism may be varied, if desired, and it may be adapted to be used on looms for weaving dif- 90 ferent kinds of fabric.

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

1. In the pattern mechanism of a loom, the 95 combination with a pattern-barrel carrying pattern-surfaces, and having a ratchet thereon, and a gear meshing with a second gear connected with a second ratchet, and said second gear and ratchet, and two pawls, one 100 for each ratchet, and means for actuating said pawls in the same direction to cause the one which is in engagement with its ratchet to rotate the pattern-barrel and pattern-sur- 105 faces, one pawl rotating the barrel in one direction, and the other in the other direction, of means for controlling the engagement of each pawl with its ratchet, said means consisting of a lever having extensions thereon engaging both pawls, and two levers one en- 110 gaging each pawl, and connections between said two levers, and two levers extending over the pattern-surfaces and actuated thereby, and connections between said two levers, and the three levers engaging the pawls to 115 control the movements of said three levers from said two levers, substantially as shown and described.

2. In the pattern mechanism of a loom, the 120 combination with a pattern-barrel carrying pattern-surfaces, and having a ratchet thereon, and a gear meshing with a second gear connected with a second ratchet, and said second gear and ratchet, and two pawls one 125 for each ratchet, and means for actuating said pawls in the same direction to cause the one which is in engagement with its ratchet to rotate the pattern-barrel and pattern-sur- 130 faces, one pawl rotating the barrel in one direction, and the other in the other direction, of means for controlling the engagement of each pawl with its ratchet, said means consisting of a lever having extensions thereon engaging both pawls, and two levers one en-

gaging each pawl, and connections between said two levers, and two levers extending over the pattern-surfaces and actuated thereby, and connections between said two levers and the three levers engaging the pawls to control the movements of said three levers from said two levers, and means for calling the pattern-chain into action, substantially as shown and described.

3. In the pattern mechanism of a loom, the combination with a pattern-barrel carrying pattern-surfaces, and having a ratchet thereon, and a gear meshing with a second gear connected with a second ratchet, and said gear and ratchet, and two pawls one for each ratchet, and means for actuating said pawls in the same direction to cause the one which is in engagement with its ratchet to rotate the pattern-barrel and pattern-surfaces, one pawl rotating the barrel in one direction, and the other in the other direction, of means for controlling the engagement of each pawl with its ratchet, said means consisting of a lever having extensions thereon engaging both pawls, and two levers one engaging each pawl, and connections between said two levers, and two levers extending over the pattern-surfaces and actuated thereby, and connections between said two levers and the three levers engaging the pawls, to control the movements of said three levers from said two levers, and means for multiplying certain picks if desired, substantially as shown and described.

4. In a loom, the combination with a main pattern-surface adapted to control the operation of mechanism, pawls to move it in either direction, and means for actuating said pawls, of a lever controlled as to its position by indications on said main pattern-surface, and intermediate means between said lever and said pawls, to reverse the direction in which said pattern-surface is moving, substantially as shown and described.

5. In a loom the following instrumental-

ities, viz: a main pattern-surface carrying indicators, means to move said main pattern-surface either forward or backward, a series of levers controlled from the main pattern-surface, a multiplier pattern-surface, means other than said series of levers referred to operative from the main pattern-surface to control the actuation of the multiplier pattern-surface and devices operative from the multiplier pattern-surface for controlling the operative condition of the main pattern-surface-actuating means.

6. In a loom, the combination of a main pattern-surface, means for moving said main pattern-surface either forward or backward, and devices operative from the main pattern-surface to determine the operative condition of the main pattern-surface-actuating means.

7. In a loom, the combination of a main pattern-surface, means for moving said main pattern-surface forward or backward, controlling-levers for determining the direction of movement of the main pattern-surface, a multiplying mechanism provided with devices for determining the relation of the controlling-levers of the main pattern-surface-actuating means, and means operable from the main pattern-surface for controlling the multiplier mechanism.

8. In a loom, the combination of a main pattern-surface, means for moving said pattern-surface step by step either forward or backward, controlling-levers for controlling the direction of movement of the main pattern-surface, a multiplier pattern-surface, means controlled from the main pattern-surface for operating the multiplier pattern-surface to thereby determine from the main pattern-surface the operating conditions of the controlling-levers and the direction of movement of the main pattern-surface.

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