

No. 698,821.

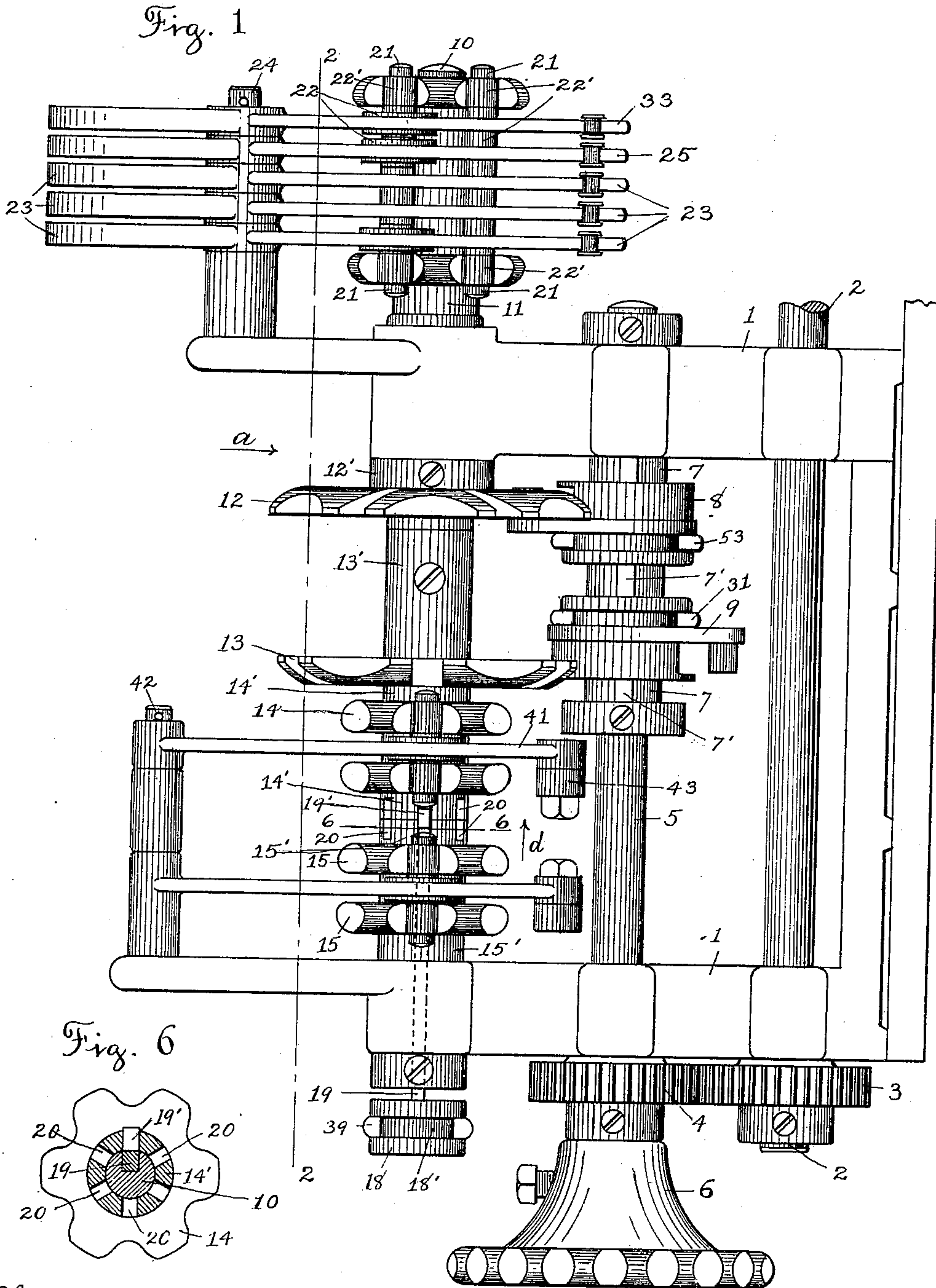
Patented Apr. 29, 1902.

A. S. COWAN & B. F. McGUINNESS.  
MULTIPLIER MECHANISM FOR LOOMS.

(Application filed Nov. 7, 1901.)

(No Model.)

3 Sheets—Sheet 1.



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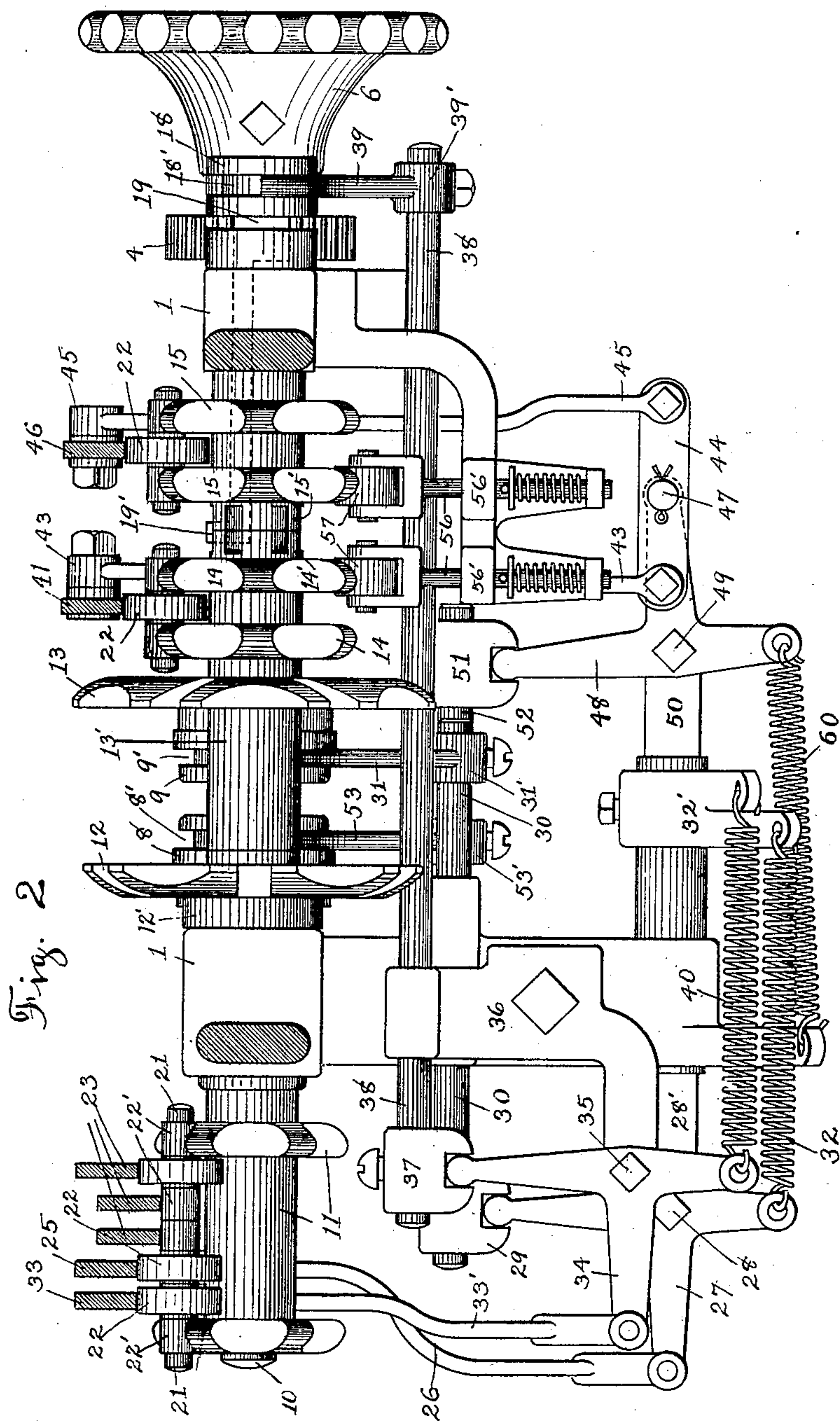
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# UNITED STATES PATENT OFFICE.

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## MULTIPLIER MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 698,821, dated April 29, 1902.

Application filed November 7, 1901. Serial No. 81,469. (No model.)

*To all whom it may concern:*

Be it known that we, ARTHUR S. COWAN and BENJAMIN F. MCGUINNESS, citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have jointly invented certain new and useful Improvements in Multiplier Mechanism for Looms, of which the following is a specification.

Our invention relates to looms, and particularly to the pattern chain mechanism of that class of looms in which in connection with the box-pattern chain mechanism an auxiliary or multiplier-pattern chain mechanism is used by means of which certain bars of the box-pattern chain are repeated as desired. This class of looms is now well known, and we refer to United States Letters Patent No. 413,369, of October 22, 1889, and No. 617,290, of January 3, 1899, as showing and describing the pattern chain mechanisms above referred to.

The object of our invention is to provide in the class of looms above referred to an additional multiplier-pattern chain mechanism combined with the ordinary box-pattern chain mechanism and the ordinary multiplier-pattern chain mechanism shown and described in the patents above mentioned and by means of which a shorter box-pattern chain can be used than when only one multiplier-pattern chain mechanism is used.

In our improvements we combine with the ordinary box-pattern chain-cylinder and the ordinary multiplier-pattern chain-cylinder a second multiplier-pattern chain-cylinder on the same shaft with said two first-mentioned cylinders and provide means for controlling the operation of the box-pattern chain-cylinder from either multiplier-pattern chain and the operation of either multiplier-pattern chain from the pattern-chain on the box-pattern chain-cylinder.

In our improvements we preferably employ a sliding key moving in a keyway in a shaft driven by pin-wheel and star-wheel mechanism. Said key serves to connect with said shaft to revolve therewith one of the two multiplier-pattern chain-cylinders loosely mount-

ed on said shaft, according as the key is in engagement with one or the other of said cylinders. The movement of the key above referred to is automatically controlled by an indicator-lever extending over the pattern-surface on the box-pattern chain-cylinder and connections from said lever to said key, as will be hereinafter described.

Our invention consists in certain novel features of construction of our improvements, as will be hereinafter described.

We have shown in the drawings a portion of the mechanisms shown in Figures 1 and 1<sup>a</sup> of the Patent No. 617,290, above referred to, with our improvements combined therewith, sufficient to illustrate the nature of our improvements and enable those skilled in the art to which our invention belongs to understand the construction and operation thereof.

Referring to the drawings, Fig. 1 is a plan view of the pattern mechanisms and other parts, corresponding to Fig. 1 of said Patent No. 617,290, with our improvements applied thereto. Fig. 2 is a sectional side elevation of the parts shown in Fig. 1, taken at a point indicated by line 2 2, Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 3 is a sectional side elevation of some of the parts of the pattern mechanism shown in Fig. 2, showing a modified construction and another means for operating the multiplier-pattern chain-cylinders by indicating with indications or pattern-surfaces of different sizes under the same lever. Fig. 4 corresponds to Fig. 3, but shows a different position of some of the parts. Fig. 5 corresponds to Figs. 3 and 4, but shows a still different position of some of the parts; and Fig. 6 is a sectional detail through one of the multiplier-pattern chain-cylinders, taken at a point indicated by line 6 6, Fig. 1, looking in the direction of arrow *d*, same figure.

In the accompanying drawings, 1 is a frame which has bearings for the shafts of the pattern chain mechanisms.

2 is a driven shaft shown broken off at one end and which may be operated at the proper time in any ordinary and well-known way—for example, as shown in Patent No. 617,290



above referred to. On one end of the shaft 2 is fast a gear 3, which engages a gear 4, fast on a shaft 5. The shaft 5 has a hand-wheel 6 fast thereon to turn the same as desired.

5 On the shaft 5 is fast a sleeve 7, having in this instance a spline or key 7' thereon. Two pin-wheels 8 and 9, each having an annular groove in its hub and one pin, are mounted on the sleeve 7 and are caused to revolve with

10 said sleeve and the shaft 5 by means of the spline 7', extending into grooves in the hubs of the pin-wheels 8 and 9 and to be moved in the direction of the length of the shaft 5 in the manner to be hereinafter described. A

15 third shaft 10, parallel with the shafts 2 and 5, is mounted to turn in bearings in the frame 1. On one end of the shaft 10 is loosely mounted a box-pattern chain-cylinder 11, which has a hub on one end which extends

20 through the bearing in the frame 1 and has fast thereon the hub 12' of the star-wheel 12, which is operated by the pin-wheel 8 to turn the pattern chain-cylinder 11. A second star-wheel 13 has a hub 13', which is fast on the

25 shaft 10, and said star-wheel 13 is operated by the pin-wheel 9.

On the shaft 10 is loosely mounted the hub 14' of the multiplier-pattern chain-cylinder 14, carrying a pattern chain made up of bars

30 carrying rolls and tubes and connected by links in the usual way. The hub 15' of a second multiplier-pattern chain-cylinder 15 is also loosely mounted on the shaft 10 and carries a pattern chain made up of bars carry-

35 ing rolls and tubes and connected by links in the usual way. In this instance only one bar 16 is shown on each cylinder 14 and 15, with a roll 17 thereon. (See Figs. 1 and 2.)

40 A hub 18, having an annular groove 18' therein, rotates with the shaft 10 through a sliding key 19, fast to the hub 18 and moving in a keyway in the shaft 10. The extreme inner end 19' of the key 19 has an outward projection thereon which extends through and

45 engages one of a series of open-end slots 20 in the hubs 14' and 15' of the cylinders 14 and 15, as shown in Figs. 1, 2, and 6.

There are the same number of slots 20 in each hub 14' and 15' of the cylinders 14 and

50 15 as there are depressions in the heads or ends of the cylinders, as shown in Fig. 6, so that each cylinder 14 and 15, rotating independently of the other, is stopped in such a position that the open-end slots 20 of one cylinder-hub are in exact alinement with the

55 open-end slots of the other cylinder-hub, as shown. By this construction there is a free passage from one hub to the other through the slots 20 for the passage of the key 19 and

60 projection 19' thereon, as will be hereinafter described.

The box-pattern chain-cylinder 11 carries a pattern-chain made up of bars, carrying-rolls, and tubes and connected by links in the usual

65 way. Two bars 21, with tubes 22' and rolls 22 on one of the bars and only tubes 22' on the other bar, are shown in Fig. 1.

Extending over the pattern-surface on the box-pattern chain-cylinder 11 are in this instance three box indicator-levers 23, which

70 are pivotally mounted on a stud 24 and are connected at their outer ends through connections (not shown) with the drop-box mechanism in the usual way. Also extending over the pattern-surface on the box-pattern chain-

75 cylinder 11 is an indicator-lever 25, pivoted on the stud 24, for moving, through intermediate connections, to be hereinafter described, the pin-wheel 9 into and out of engagement with the star-wheel 13.

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The intermediate connections between the indicator-lever 25 and the pin-wheel 9 may be made substantially as shown in said Patent No. 617,290, and consist of a connector 26, pivotally attached at one end to the end of

85 the lever 25 and at its other end to one arm of an angle-lever 27, pivoted at 28 on a support 28'. The other arm of the angle-lever 27 extends into a recess in a collar 29, fast on a longitudinal sliding rod 30, having bearings

90 in the frame 1. On the opposite end of the rod 30 is secured the lower end 31' of a fork 31, which extends into the annular groove 9' in the hub of the pin-wheel 9. A roll 22 under the lever 25 will raise said lever and,

95 through connector 26, move the angle-lever 27 against the action of the spring 32, attached at one end to the angle-lever 27 and at its other end to a stationary collar 32', and also move the rod 30 and the fork 31 to move the

100 pin-wheel 9 into engagement with the star-wheel 13 to turn the same, and to move the multiplier-pattern chain-cylinder 14 or the multiplier-pattern chain-cylinder 15 according as the projection 19' on the key 19 is in

105 engagement with an open-end slot in the hub 14' or in the hub 15' of the cylinders 14 and 15. When a tube 22' comes under the lever 25, the spring 32 acts to move the angle-lever 27 in the opposite direction, and with it the

110 rod 30 and fork 31, to move the pin-wheel 9 out of engagement with the star-wheel 13 in the ordinary way.

In the drawings, Figs. 1 and 2, the roll 22 under the lever 25 is supposed to be just be-

115 ginning to engage and raise said lever by the revolution of the box-pattern chain-cylinder 11, and consequently, through intermediate connections, the pin-wheel 9 is being moved to the right, Fig. 1, and into engagement with

120 the star-wheel 13 to turn either multiplier-pattern chain-cylinders 14 or 15, as desired. Also extending over the pattern-surface on the box-pattern chain-cylinder 11 is an indicator-lever 33, Figs. 1 and 2, pivoted on the

125 stud 24, for moving, through intermediate connections, the sliding key 19 to cause the projection 19' thereon to enter one of the slots 20 in either one of the hubs 14' or 15' of the multiplier-pattern chain-cylinders 14

130 and 15.

The intermediate connections between the indicator-lever 33 and the sliding key 19 consist of a connector 33', pivotally attached at



one end to the end of said lever 33 and at its other end to one arm of the angle-lever 34, pivoted at 35 on a stand 36. The other arm of the angle-lever 34 extends into a recess in a collar 37, fast on one end of the sliding rod 38, mounted and sliding in suitable bearings. On the opposite end of the sliding rod 38 is secured the lower end 39' of a fork 39, which extends into the annular groove 18' in the hub 18, fast on the end of the key 19.

A roll 22 under the lever 33 will raise said lever and, through connector 33', angle-lever 34, rod 38, fork 39, and hub 18, move the sliding key 19 outwardly or to the right in Fig. 2 to carry the projection 19' on said key out of one of the open-end slots 20 in the hub 14' of the multiplier-pattern chain-cylinder 14 and into one of the open-end slots 20 in the hub 15' of the multiplier-pattern chain-cylinder 15, so that the revolution of the star-wheel 13 will move the cylinder 15 and the cylinder 14 will remain at rest.

If a tube 22' comes under the indicator-lever 33, the spring 40, attached to one end of the angle-lever 34 and at the other end to the stationary collar 32', will move the angle-lever 34 and cause the rod 38, the fork 39, and the hub 18 to move in the opposite direction—that is, to the left, Fig. 2—to move the projection 19' on the key 19 into one of the open-end slots 20 in the hub 14' of the multiplier-pattern chain-cylinder 14 and out of a slot 20 in the hub 15' of the cylinder 15, so that the revolution of the star-wheel 13 will move the cylinder 14 and the cylinder 15 will remain at rest.

In the drawings, Figs. 1 and 2, the roll 22 under the lever 33 is supposed to be just beginning to engage said lever 33 by the revolution of the box-pattern chain-cylinder 11, and consequently, through intermediate connections, the sliding key 19 is moving to the right, Fig. 2, to carry the projection 19' thereon from a slot 20 in the hub 14' of the pattern chain-cylinder 14 into a slot 20 in the hub 15' of the pattern chain-cylinder 15.

We will now describe the connections intermediate the pattern-surface on the two multiplier-pattern chain-cylinders 14 and 15, and the pin-wheel 8, which operates the star-wheel 12 on the box-pattern chain mechanism. Extending over the pattern-surface on the multiplier-pattern chain-cylinder 14 is an indicator-lever 41, pivotally mounted at one end on the pin 42, Fig. 1, and connected at its other end with one end of a connector 43. The other end of said connector 43 is pivotally attached to one end of a centrally-pivoted lever 44. To the other end of said lever 44 is pivotally attached the lower end of the connector 45, the upper end of which is attached to an indicator-lever 46, extending over the pattern-surface on the multiplier-pattern chain-cylinder 15 and pivotally mounted on the pin 42, Fig. 1. The lever 44 is centrally pivoted on a pin 47 in the outer end of one

arm of an angle-lever 48, pivoted at 49 on a support 50. The upper end of the other arm of the angle-lever 48 extends into a recess in a collar 51, fast on a sliding rod 52, which is mounted to slide in bearings and has fast thereon the lower end 53' of the fork 53. The upper end of the fork 53 engages the annular groove 8' in the hub of the pin-wheel 8.

To lock or hold the multiplier-pattern chain-cylinders 14 and 15 and prevent their turning except at the proper time, we provide in this instance a locking device for each cylinder, consisting of a spring-actuated pin 56, mounted in suitable bearings 56' and having a vertical movement and carrying at its upper end a roll 57 to engage one of the depressions in the periphery of one of the heads or ends of the pattern chain-cylinders, as shown in Fig. 2.

It will be seen that the movement of the pin-wheel 8 into engagement with the star-wheel 12 to revolve said star-wheel and the box-pattern chain-cylinder 11 or out of engagement with said star-wheel to leave the box-pattern chain-cylinder 11 at rest is controlled by the movement of the indicator-lever 41, extending over the pattern-surface on the multiplier-pattern chain-cylinder 14, and the indicator-lever 46, extending over the pattern-surface on the multiplier-pattern chain-cylinder 15 through connectors 43 and 45, lever 44, angle-lever 48, sliding rod 52, and forked arm 53, according to whether a roll or a tube on the pattern-surface on each cylinder comes under the indicator-levers 41 and 46.

There is only one roll 22 on each pattern chain of the multiplier-pattern chain-cylinders 14 and 15.

The removal of a roll 22 from under either indicator-lever 41 or 46 will lower the pivot-point of the lever 44 and allow the spring 60 to act to move the angle-lever 48 to the right at its upper end, Fig. 2, and also move the sliding rod 52 and fork-arm 53 and move the pin-wheel 8 out of engagement with the star-wheel 12 and leave the box-pattern chain-cylinder 11 at rest.

When either of the multiplier-pattern chain-cylinders 14 and 15 is operated by means of the projection 19' on the sliding key 19, through indications from the indicator-levers 41, 46, as above described, the roll 22 under the indicator-lever 41 or 46, as shown in Fig. 2 of the drawings, will be removed from under its lever and the spring 40 will operate to move the angle-lever 48, the rod 52, and the fork 53 and move the pin-wheel 8 out of engagement with the star-wheel 12 and leave the drop-box-pattern chain-cylinder 11 at rest, as above described. The multiplier-pattern chain, through the star-wheel 13 and the pin-wheel 9, continues to rotate until a roll 22 again comes under the lever extending over its pattern-surface when through connections to said lever the angle-lever 48 is operated to



move the sliding rod 52 and fork 53 and carry the pin-wheel 8 into engagement with the star-wheel 12 to rotate the drop-box-pattern chain-cylinder 11.

5 If it is desired to repeat the multiplication of the pattern-surface on either multiplier-pattern chain-cylinder 14 or 15, it will be necessary to repeat the preceding indication under the indicator-lever 33. For example, if  
10 the pattern chain-cylinder 15 is in use a roll 22 under the lever 33 will cause the projection 19' on the key 19 to remain in the slot in the hub 15' of the cylinder 15, while a tube 22', repeated under the indicator-lever 33,  
15 will retain the projection 19' on the key 19 in the hub 14' of the cylinder 14, and in either case it is necessary to repeat the roll 22 under the indicator-lever 25 in order to hold the pin-wheel 9 in engagement with the star-  
20 wheel 13.

Referring to Figs. 3, 4, and 5, in these figures we have shown a modified construction of the pattern-surface and the pattern mechanism of the box-pattern chain mechanism.  
25 We do away with the indicator-lever 25 and intermediate connections between said lever and the pin-wheel 9 to move said pin-wheel into and out of engagement with the star-wheel 13, as shown in Fig. 2 and above described. We use pattern surfaces or indicators of three different sizes under the indicator-lever 32, as a roll 22, Fig. 5; a smaller roll 22'', Fig. 4, and a tube 22', Fig. 3. We attach the fork-arm 31, which operates the  
35 pin-wheel 9, to the sliding rod 38 and make the pin 9'' on the pin-wheel 9 longer and the hub 14' on the multiplier-pattern chain-cylinder 14 longer, and the open-end slots 20 therein also longer, as shown in Figs. 3, 4,  
40 and 5.

In the revolution of the box-pattern chain-cylinder 11, operated by the star-wheel 12 and pin-wheel 8, as above described, when a tube 22', Fig. 3, comes under the indicator-lever  
45 33 the spring 40 will move the angle-lever 34, sliding rod 38, and fork-arms 31 and 39 and carry the pin 9'' on the pin-wheel 9 out of engagement with the star-wheel 13 and the projection 19' on the key 19 toward the inner end  
50 of a slot 20 in the hub 14' of the multiplier-pattern chain-cylinder 14, as shown in Fig. 3, leaving the star-wheel 13 and both multiplier-pattern chain-cylinders 14 and 15 at rest. When the intermediate pattern-surface or  
55 smaller roll 22'' comes under the indicator-lever 33, (see Fig. 4,) the sliding rod 38, through connector 33' and the angle-lever 34, will be moved to the right far enough to bring the pin 9'' on the pin-wheel 9 into engagement  
60 with the star-wheel 13 and the projection 19' on the key 19 near the outer end of a slot 20 in the hub 14' of the cylinder 14, as shown in Fig. 4, and cause the multiplier-pattern chain-cylinder 14 to be revolved by the revolution of the star-wheel 13. When the roll

22, Fig. 5, comes under the indicator-lever 33, the sliding rod 38 is moved farther to the right to carry the pin 9'' on the pin-wheel 9 farther into a notch in the star-wheel 13 and the projection 19' on the key 19 into one of  
75 the open-end slots 20 in the hub 15' of the cylinder 15, as shown in Fig. 5, and cause the multiplier-pattern chain-cylinder 15 to be revolved, the multiplier-pattern chain-cylinder 14 being at rest. 75

The operation of the box-pattern chain-cylinder 11 from the multiplier-pattern chains in the modified construction shown in Figs. 3, 4, and 5 is the same as above described in connection with Figs. 1 and 2. 80

From the drawings, in connection with the description given above, the operation of our improvements will be readily understood by those skilled in the art.

It will be understood that the details of construction of our improvements may be varied if desired. 85

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is— 90

1. In a loom of the class described, a box-pattern chain-cylinder, and two multiplier-pattern chain-cylinders, all on the same shaft, mechanism for operating the box-pattern chain-cylinder, and the multiplier-pattern  
95 chain-cylinders, and mechanism, intermediate the box-pattern chain-cylinder and the multiplier-pattern chain-cylinders, substantially as shown and described.

2. In a loom of the class described, a box-pattern chain-cylinder, and two multiplier-pattern chain-cylinders, all on the same shaft, mechanism for operating the box-pattern chain-cylinder, and the multiplier-pattern  
105 chain-cylinders, and mechanism, intermediate the box-pattern chain-cylinder and the multiplier-pattern chain-cylinders, and mechanism, intermediate the box-pattern chain-cylinder and a sliding key, which engages with the hubs of the multiplier-pattern chain-  
110 cylinders, substantially as shown and described.

3. In a loom of the class described, the combination with the box-pattern chain-cylinder, of two multiplier-pattern chain-cylinders on  
115 the same shaft with the box-pattern chain-cylinder, substantially as shown and described.

4. In a loom of the class described, the combination with the box-pattern chain-cylinder, of two multiplier-pattern chain-cylinders on  
120 the same shaft with the box-pattern chain-cylinder, and mechanism intermediate the box-pattern chain-cylinder and the two multiplier-pattern chain-cylinders, substantially  
125 as shown and described.

5. In a loom of the class described, the box-pattern chain-cylinder, and two multiplier-pattern chain-cylinders on the same shaft with the box-pattern chain-cylinder, mech- 130



anism intermediate the two multiplier-pattern chain-cylinders and the box-pattern chain-cylinder, a pattern-surface on the box-pattern chain-cylinder, having three different  
5 sizes of pattern-surfaces, an indicator-lever for said different-sized surfaces, and connections, intermediate said lever and the multiplier-pattern chain-cylinders, to control the

operation of said cylinders, substantially as shown and described.

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