

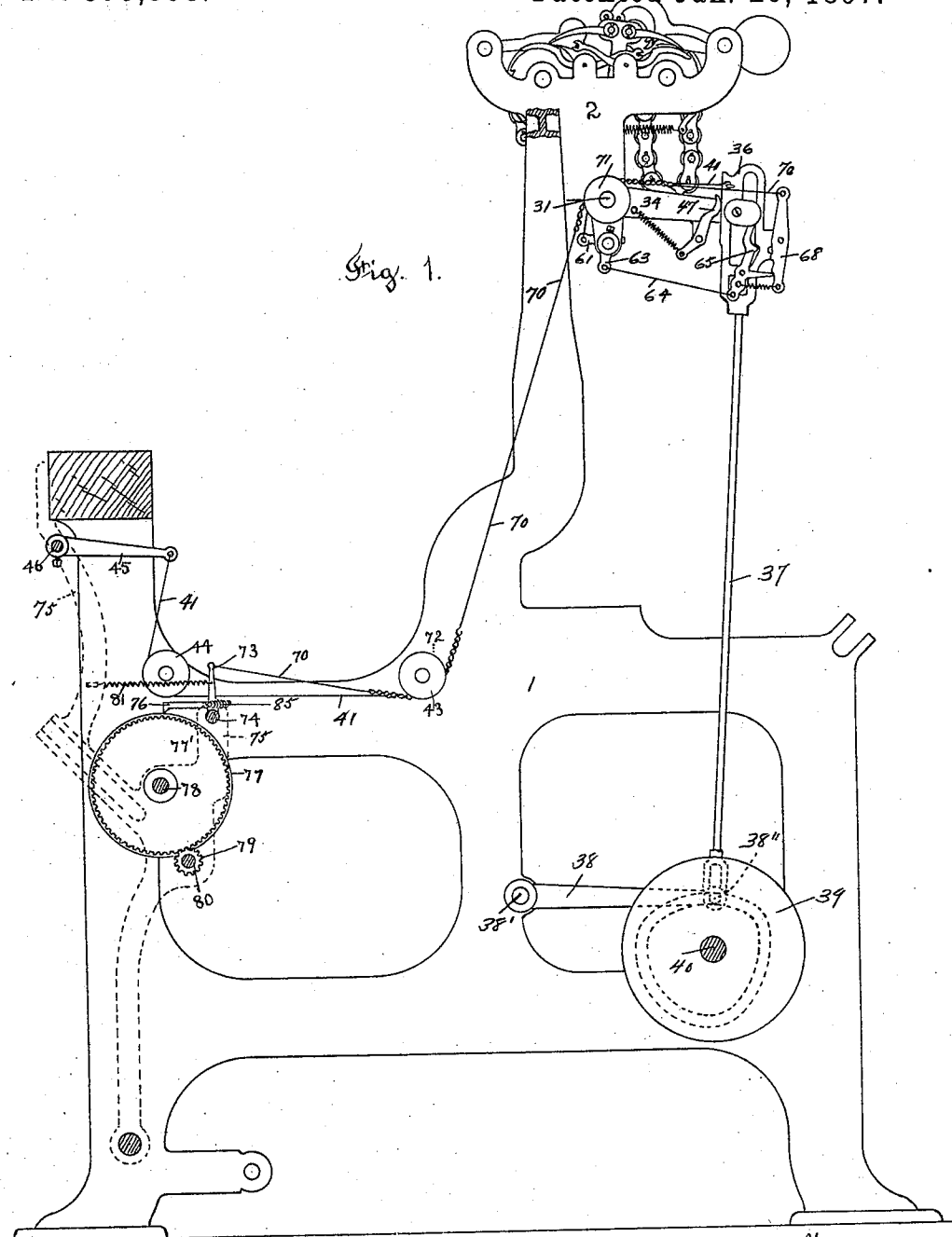
(No Model.)

6 Sheets—Sheet 1

W. WATTIE.
MULTIPLIER MECHANISM FOR LOOMS.

No. 575,833.

Patented Jan. 26, 1897.



Witnesses

Al Whiting

Irving H. Werry

Inventor

William Wattie

By his Attorney

John C. Dewey

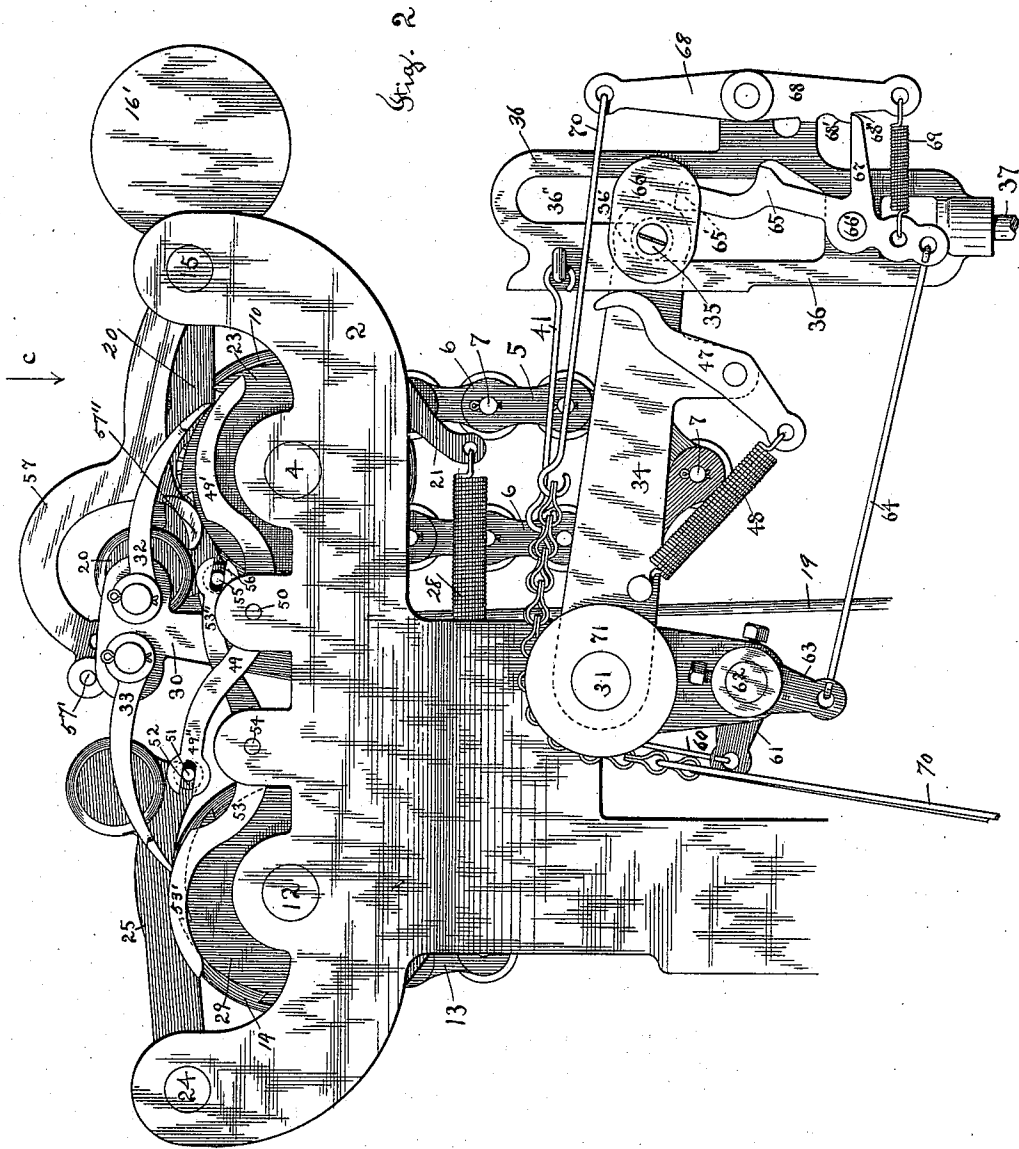
(No Model.)

6 Sheets—Sheet 2.

W. WATTIE.
MULTIPLIER MECHANISM FOR LOOMS.

No. 575,833.

Patented Jan. 26, 1897.



Witnesses

Albion

Irving

Inventor

William Wattie

By his Attorney

John E. Dewey

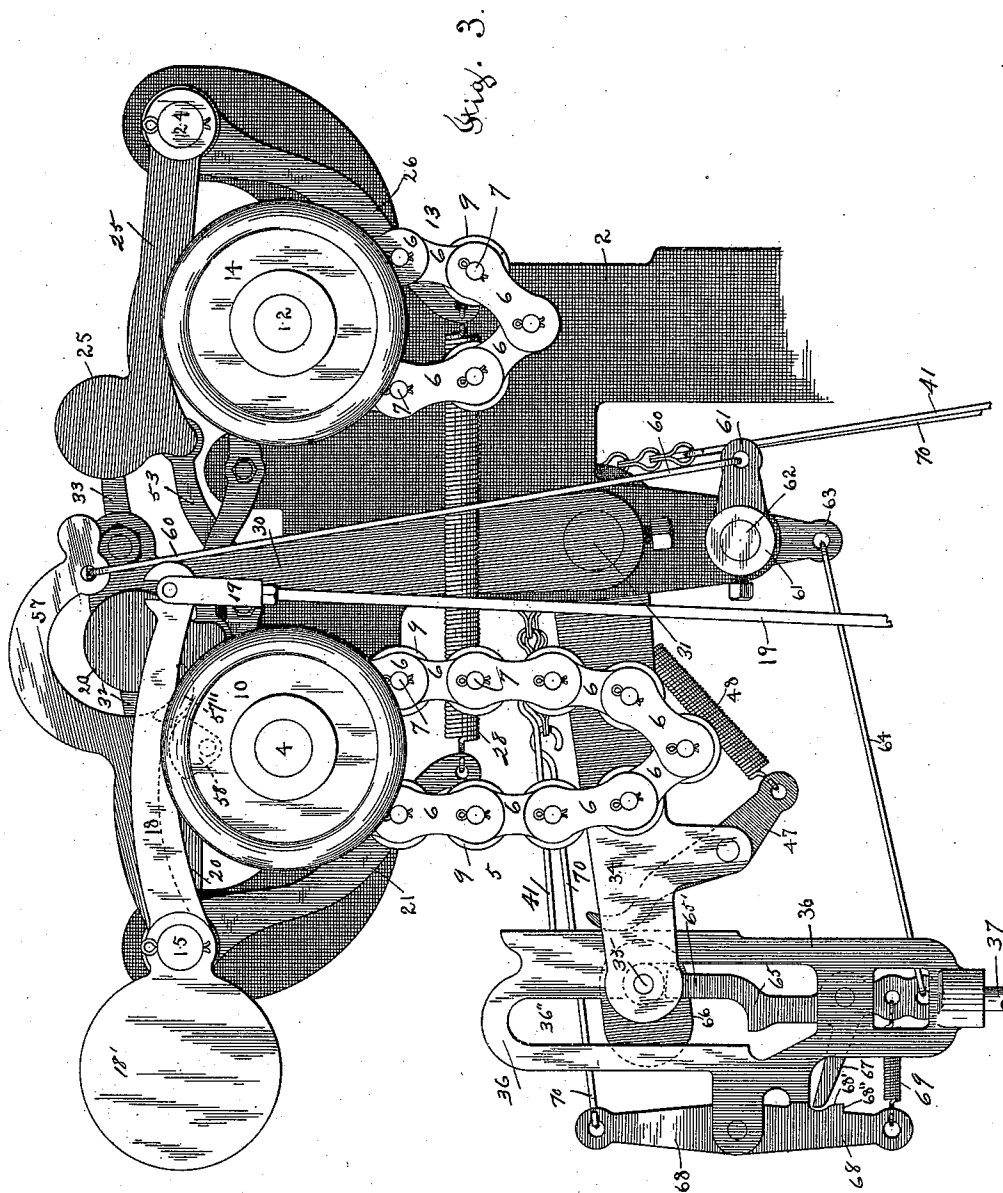
(No Model.)

6 Sheets—Sheet 3.

W. WATTIE.
MULTIPLIER MECHANISM FOR LOOMS.

No. 575,833.

Patented Jan. 26, 1897.



Witnesses
A. Whiting
Iring Merry.

Inventor
William Wattie
By his Attorney
John C. Dewey.

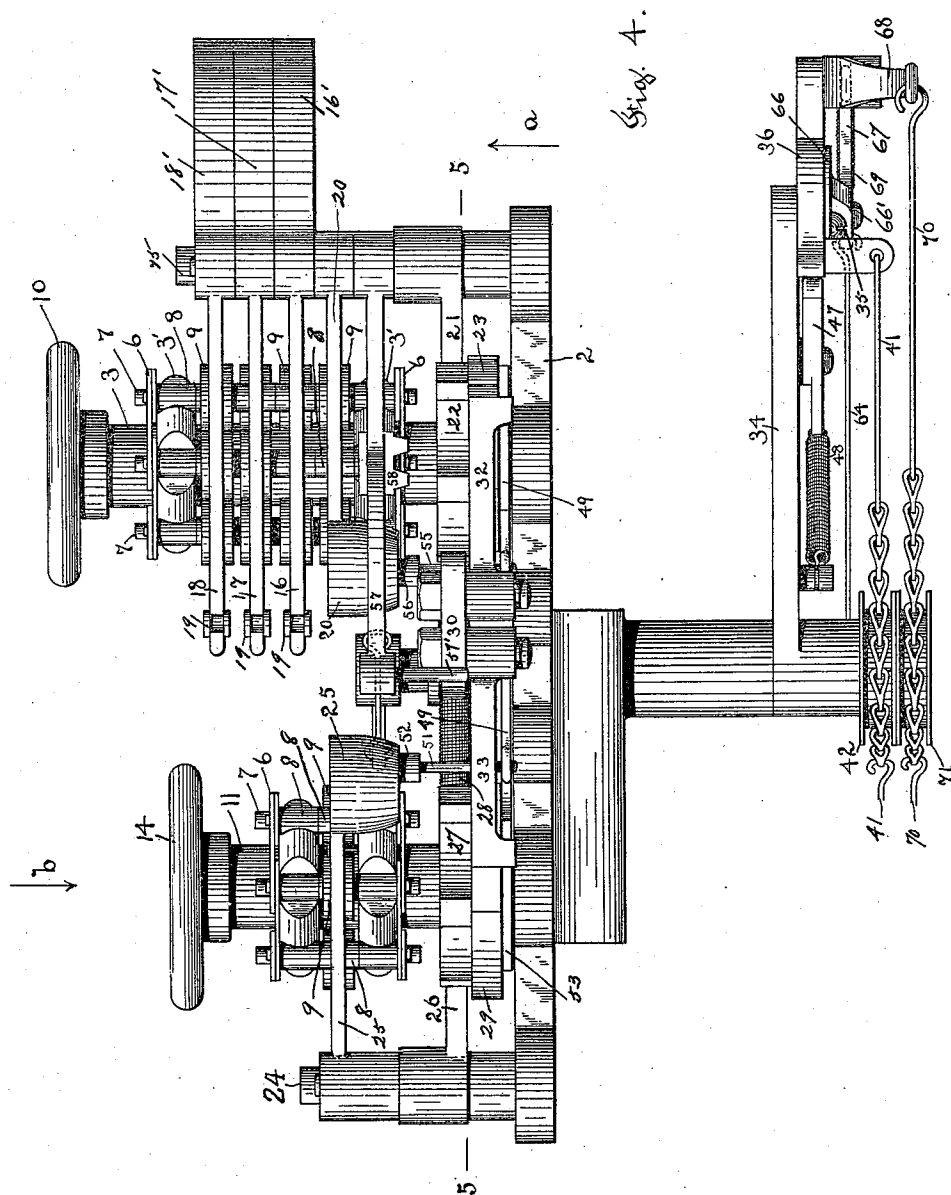
(No Model.)

6 Sheets—Sheet 4.

W. WATTIE.
MULTIPLIER MECHANISM FOR LOOMS.

No. 575,833.

Patented Jan. 26, 1897.



Witnesses

at Whiting.

Irving H. King.

By his Attorneys

John C. Dewey

Inventor

William Wattie

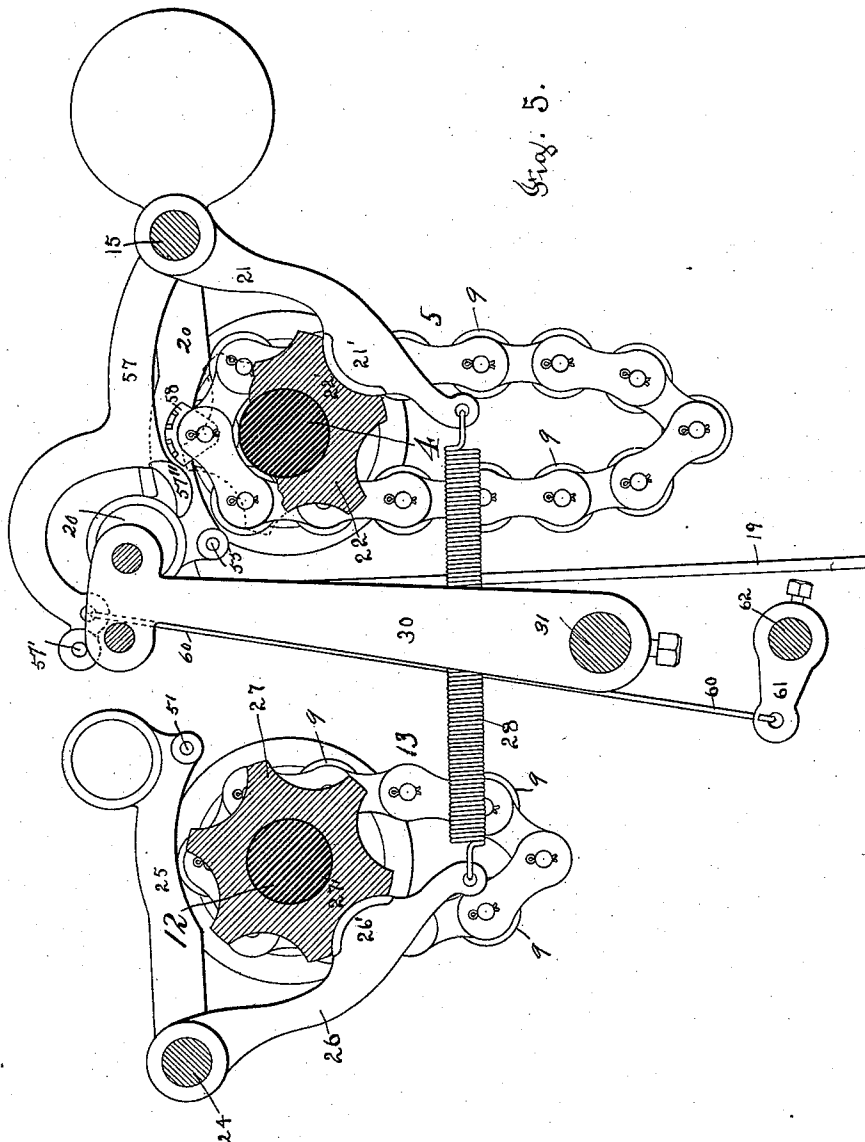
(No Model.)

6 Sheets—Sheet 5.

W. WATTIE.
MULTIPLIER MECHANISM FOR LOOMS.

No. 575,833.

Patented Jan. 26, 1897.



Witnesses

Alwhiting

Irving Henry

Inventor

William Wattie

By his Attorney

John E. Dewey—

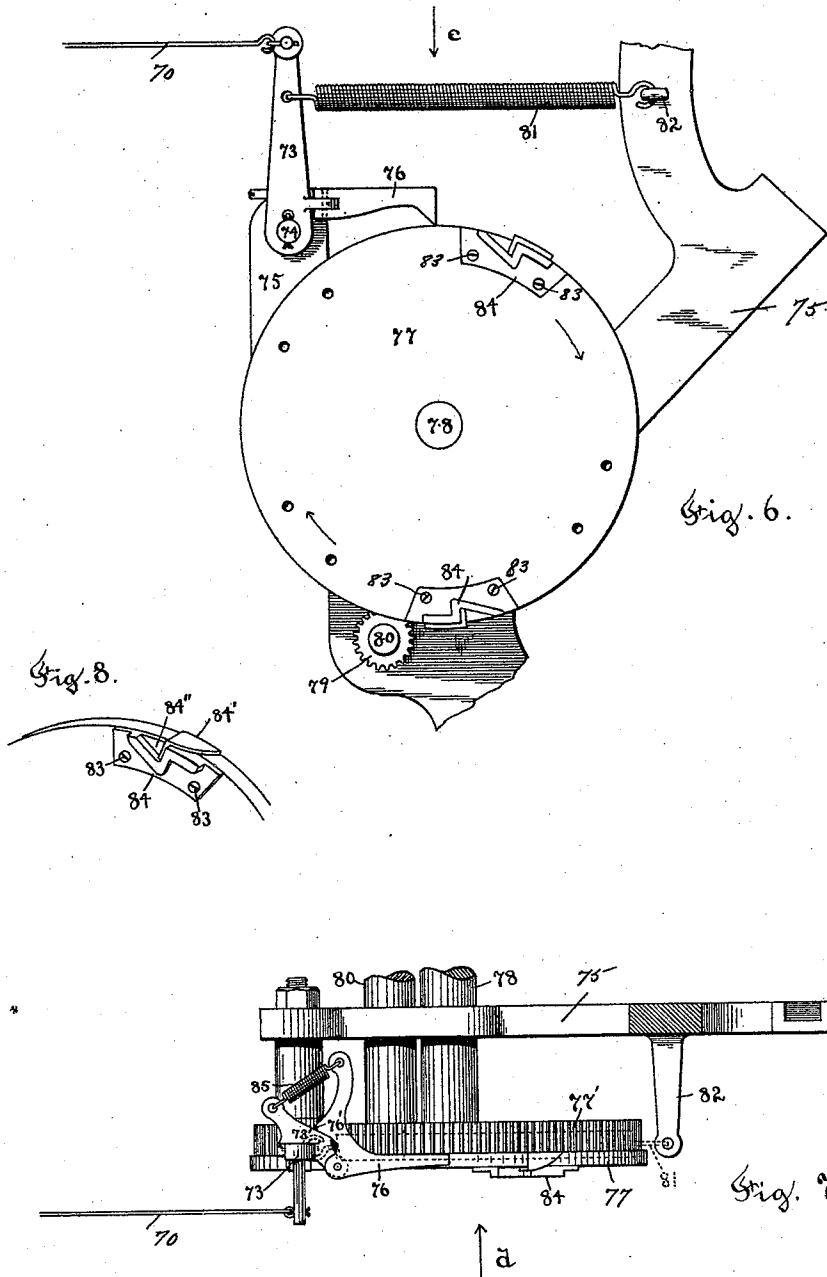
(No Model.)

6 Sheets—Sheet 6.

W. WATTIE.
MULTIPLIER MECHANISM FOR LOOMS.

No. 575,833.

Patented Jan. 26, 1897.



Witnesses
Alwhiting.
Irving H. King.

Inventor
William Wattie
By his Attorney
John C. Dewey.

UNITED STATES PATENT OFFICE.

WILLIAM WATTIE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE
KNOWLES LOOM WORKS, OF SAME PLACE.

MULTIPLIER MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 575,833, dated January 26, 1897.

Application filed February 13, 1896. Serial No. 579,137. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WATTIE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Multiplier Mechanism for Looms, of which the following is a specification.

My invention relates to that class of looms which are provided with an auxiliary or multiplier pattern-chain in addition to the main pattern-chain.

It will be understood that by means of the auxiliary or multiplier pattern-chain certain bars of the main pattern-chain of the drop-box-indicating mechanism may be repeated without constructing successive similar bars in said main pattern-chain.

My present invention relates more particularly to a supplemental mechanism adapted in this instance to be combined with the form of multiplier mechanism shown and described in United States Letters Patent No. 544,356, dated August 13, 1895, to which reference is made.

The object of my invention is to provide a supplemental mechanism, to be combined with the main-pattern-chain and auxiliary or multiplier pattern-chain mechanism, which will operate automatically to stop, for a predetermined time, the mechanism which operates said pattern-chains and to start said mechanism to cause the pattern-chains to operate.

My supplemental mechanism may be combined with any loom of the class referred to, and is designed particularly for looms for weaving handkerchiefs, &c., in which a solid color is put into the body of the goods for a certain number of picks.

In using my improvements on looms of the class referred to I preferably combine the same with the cloth-take-up friction-roll, so that after a certain amount of cloth is taken up my mechanism will operate automatically to start the mechanism which drives the pattern-chains. I also combine my mechanism with indicating mechanism on the main-pattern-chain cylinder, so that said indicating mechanism will automatically operate my

mechanism to stop the mechanism which drives the pattern-chains when desired.

My invention consists in certain novel features of construction and operation of my supplemental mechanism, combined with the main and multiplier pattern-chain mechanisms, as will be hereinafter fully described.

I have shown in the drawings a multiplier mechanism for a six-by-one box-loom of substantially the same construction and operation as that shown in said Patent No. 544,356, with my improvements combined therewith.

Referring to the drawings, Figure 1 shows a loom side from the inside, the rear view of the box-pattern-indicating mechanism, and my supplemental mechanism combined therewith. Fig. 2 is a rear view of the box-pattern-indicating mechanism and a portion of my improvements, looking in the direction of arrow *a*, Fig. 4. Fig. 3 is a front view looking in the direction of arrow *b*, Fig. 4. Fig. 4 is a plan view looking in the direction of arrow *c*, Fig. 2. Fig. 5 is a section on line 55, Fig. 4, looking in the direction of arrow *a*, same figure. Fig. 6 is a detail of the indicating-disk on the friction take-up roll-shaft and the engaging finger or lever, looking in the direction of arrow *d*, Fig. 7. Fig. 7 is a plan view of the parts shown in Fig. 6, looking in the direction of arrow *e*, same figure; and Fig. 8 is a perspective view of one of the adjustable indicating cams or switches on the indicating-disk. Figs. 2 to 8, inclusive, are shown on an enlarged scale.

In the accompanying drawings, 1 is the loom side, on the upper part of which is secured the stand or frame 2, on which are supported the several parts of the drop-box-pattern-indicating mechanism. The drop-box-pattern-indicating mechanism is in this instance, as above stated, for a six-by-one box-loom and is of substantially the same construction and operation as the drop-box-pattern-indicating mechanism shown in said Patent No. 544,356, with the exception of my improvements combined therewith. In said pattern-indicating mechanism, 3 is the main-pattern-chain cylinder, loosely mounted on a stud 4, secured in the frame 2. Said cylinder or barrel 3 is of the ordinary construction, having the

grooved or notched heads or ends 3', and carries the main pattern-chain 5, made up of links 6, which connect the bars 7, upon which are mounted rolls 9 and tubes 8 in the ordinary way. The cylinder 3 is provided with

5 a hand-wheel 10, by means of which said cylinder is turned in either direction, as desired. The auxiliary or multiplier pattern-chain cylinder 11 is loosely mounted on a stud 12, secured in the frame 2, and carries the auxiliary or multiplier pattern-chain 13, made up of links 6, bars 7, rolls 9, and tubes 8, similar to the main pattern-chain 5. The auxiliary-pattern-chain cylinder 11 is provided with a

15 hand-wheel 14 to turn the same, as desired. On a stud 15, secured in the upper part of the frame 2, on the outside of the stud 4, are pivoted in this instance three shuttle-box indicator-levers 16, 17, and 18, which are operated by the main pattern-chain 5. The outer ends 16', 17', and 18' of said levers are preferably enlarged, as shown, to act as weights, and the inner end of each of said levers is pivoted to the upper end of the connector-rods 19, (see Fig. 3,) leading to the vibrator-levers of the box-motion, (not shown,) which may be of any ordinary construction and operation and is arranged at the lower part of the loom. Upon said stud 15 is also

30 pivoted one end of the weighted indicator-lever 20 and one end of the lock-lever 21, which is provided with a convex portion 21', adapted to extend into the concave portions 22' in the stop-wheel 22, fast on the pattern-chain cylinder 3. (See Fig. 5.)

On the stud 4 and next to the frame 2 is loosely mounted a ratchet-wheel 23, which is secured to the main-pattern-chain cylinder 3, and through said ratchet-wheel said main-pattern-chain cylinder is operated, as will be hereinafter described.

On a stud 24, fast in the opposite end of the frame 2 from the stud 15, is pivoted one end of a weighted indicator-lever 25, which is acted on by the auxiliary or multiplier pattern-chain 13. On the stud 24 is also pivoted one end of the lock-lever 26, provided with a convex portion 26', adapted to extend into concave portions 27' in the stop-wheel 27, secured to the auxiliary-pattern-chain cylinder 11. The lower end of the lock-lever 26 is secured to the lower end of the lock-lever 21 by a spring 28, (see Fig. 5,) which acts to move said levers toward each other and hold them in engagement with their respective stop-wheels 22 and 27.

A ratchet-wheel 29 is mounted loosely on the stud 12 and is secured to the auxiliary-pattern-chain cylinder 11, and through said ratchet-wheel 29 said auxiliary-pattern-chain cylinder is operated, as will be hereinafter described.

The mechanism for operating the ratchet-wheel 23 to communicate motion to the main pattern-chain 5 and for operating the ratchet-wheel 29 to communicate motion to the auxiliary pattern-chain 13 consists in this in-

stance of an arm or lever 30, fast on a rock-shaft 31, journaled in the lower part of the frame 2. The arm or lever 30 carries at its upper end two oppositely-extending pawls 32 and 33, pivoted thereon. The pawl 32 is adapted to engage the teeth of the ratchet-wheel 23 of the main-pattern-chain cylinder 3, and the pawl 33 is adapted to engage the teeth of the ratchet-wheel 29 of the auxiliary-pattern-chain cylinder 11.

On the other end of the rock-shaft 31 is fast the inner end of an arm 34. Motion is communicated to said arm 34 and through rock-shaft 31 to the arm or lever 30, carrying the pawls 32 and 33.

A giveaway or lock connection intermediate the arm 34 and the driven part of the loom, from which said arm is operated, is provided and means preferably connected with the stop-motion shaft to automatically operate said giveaway connection to disconnect the arm 34 and immediately stop the movement of the pattern-surfaces in case the filling gives out, and the filling-stop-motion shaft acts to stop the loom. In this instance the outer end of the arm 34 is provided with a pin or screw 35, which is adapted to engage a notch 36' in the slotted head 36 on the connector-rod 37. (See Fig. 2.) The lower end of said rod 37 is connected with a lever 38, pivoted at 38' and carrying a pin 38'', which extends into a groove in a cam 39, fast on a driven shaft 40. (See Fig. 1.) A continuous up-and-down motion is communicated to said rod 37 and through the arm 34 to the rock-shaft 31 and the arm 30, carrying the pawls 32 and 33.

From the head 36 of the connector-rod 37 a chain or cord 41 leads over a pulley 42, loose on the rock-shaft 31, and over pulleys 43 and 44, mounted on the loom side, (see Fig. 1,) to an arm 45, fast on the filling-stop-motion shaft 46. The rocking of the stop-motion shaft 46 will, through arm 45 and cord 41, draw the head 36 on the rod 37 toward the front of the loom and cause the pin 35 to be disengaged from the notch 36' and be moved into the longitudinal slot 36'' in the head 36 to allow said head and the connector-rod 37 to move up and down without moving the arm 34, so that the pattern-indicating mechanisms may be instantly stopped, though the loom may continue to run.

A pawl 47, pivoted on the arm 34 and bearing at one end against the inner edge of the head 36 and attached at its other end to one end of a spring 48, acts to push outwardly the head 36 on the rod 37 and hold the pin 35 in the notch 36' to form a giveaway or lock connection between the connector-rod 37 and the arm 34.

In order to regulate the operation of the ratchet-wheels 23 and 29 of the main-pattern-chain cylinder 3 and the auxiliary-pattern-chain cylinder 11, respectively, by the pawls 32 and 33, a pawl guard or shield is provided for each pawl to keep the same out of engagement with its ratchet-wheel when desired.

The pawl 32, which operates the ratchet-wheel 23 of the main-pattern-chain cylinder 3, is provided with a pawl guard or shield 49, pivoted at about its central point on a pin 50 in the frame 2 in such a manner that the end 49', which acts as a guard for the pawl 32, will extend under said pawl. (See Fig. 2.) The other end 49'' of said shield 49 is connected by a pin 51 to a boss 52, which extends out from the free end of the weighted indicator-lever 25 of the auxiliary pattern-chain 13. The pawl guard or shield 53 for the pawl 33, which operates the ratchet-wheel 29 of the auxiliary-pattern-chain cylinder 11, is pivoted at about its central point on a pin 54 in the frame 2, with its other end 53', which acts as a shield for the pawl 33, adapted to extend under the outer end of said pawl. (See Fig. 2.) The inner end 53'' of said pawl-guard 53 is connected by a pin 55 to a boss 56, which extends out from the free end of the weighted indicator-lever 20 of the main pattern-chain 3.

All of the above-described mechanisms are of substantially the same construction and operation as the mechanism shown and described in said Patent No. 544,356.

I will now proceed to describe my supplemental mechanism combined with the mechanisms above described, whereby both the main pattern-chain and the auxiliary pattern-chain will be automatically stopped and automatically started when desired.

On the stud 15 is pivotally mounted one end of an indicating-lever 57, which, in this instance, is located between the indicator-lever 20 and the lock-lever 21. (See Fig. 4.)

The main-pattern-chain cylinder 3 is provided with indicating-surfaces to act on said lever 57. Said indicating-surfaces may form a separate row of tubes and rolls between the heads or ends 3' of the cylinder 3, or, as in this instance, the indicating surface or roll 58 may be substituted for one of the tubes 8, which extend into the notches or grooves in the ends 3' of the cylinder or barrel 3. (See Fig. 4.) In this way it is not necessary to use a longer barrel or cylinder. The inner end of the indicating-lever 57 is provided with a pin 57', which extends over the top of the arm 30, which forms a stop to limit the downward motion of said lever. (See Fig. 5.)

A link or connector 60 attaches the end of said lever 57 to an arm 61, fast on a shaft 62, mounted in the lower part of the frame 2. (See Figs. 2, 3, and 5.) A second arm 63 is also fast on said shaft 62 and is connected by a link or connector 64 to the lower end of a switch-lever 65, pivoted at 66' on the head 36. (See Fig. 2.) The upper end 65' of said lever 65 is adapted to extend under the pin or screw 35 in the outer end of the arm 34, as shown in Fig. 3, to cause said arm 34 to move up and down with the head 36 and rod 37 to operate the pattern-surfaces.

A guide plate or shield 66 is secured by the screw 35 to the end of the arm 34, as shown in Fig. 2, and extends over the slotted por-

tion of the head 36 to hold the head in proper position relative to the arm 34. By means of the indicating-surface 58, through the lever 57, link 60, arm 61, shaft 62, arm 63, and connector 64, a positive motion is communicated to the switch-lever 65 to move the upper end 65' thereof out from under the pin 35 in the arm 34, as shown in Fig. 2, to allow the head 36 and rod 37 to move freely up and down without moving the arm 34.

The switch-lever 65 is provided with an outwardly-extending arm 67, the outer end of which is adapted to ride over an inclined surface 68' on the lever 68 and extend into a notch 68'' in the inner edge of said lever. A spring 69 acts to hold said arm 67 in engagement with said notch 68'' in the lever 68, as shown in Fig. 2, and until said arm 67 is disengaged from said notch the switch-lever 65 will remain in the position shown in Fig. 2, in which position, as before stated, the head 36 and rod 37 are free to move up and down without moving the arm 34. Thus both the main pattern-chain and the auxiliary pattern-chain will remain at rest and the drop-boxes remain stationary while one shuttle is weaving in the body of the fabric.

To release the switch-lever 65 and allow the same to be moved back under the pin 35 to cause the arm 34 to be moved by the head 36 and rod 37 to operate the pattern-chains, I connect the upper end of the lever 68, through a connection 70, passing over a pulley 71, loose on the rock-shaft 31, and over a pulley 72, mounted on the loom side, (see Fig. 1,) to a lever 73, pivoted at its lower end on a stud 74 in the stand 75 (see Fig. 6) and provided with an arm or lever 76, pivoted thereon to move in a horizontal plane. The free end of the arm or lever 76 is adapted to travel on the periphery of a disk 77, which is the indicating-disk, and in this instance is made integral with the gear 77', fast on the shaft 78 of the friction take-up roll.

A pinion 79, fast on a driven shaft 80, meshes with the teeth on the gear 77'. (See Fig. 1.) A spring 81 is attached at one end to the projection 82 on the stand 75 and at its other end to lever 73 and acts to hold projection 73' on lower part of said lever in engagement with the heel or projection 76' on the arm or lever 76 and the free end of the arm or lever 76 on the periphery of the disk 77. (See Fig. 7.) Projections 73' and 76' are connected by a spring 85.

On the indicating-disk 77 are secured, in this instance by screws 83, indicating devices or switch-cams 84, in this instance two in number. Said indicating devices 84 may be adjusted on the indicating-disk 77 by providing said disk with a series of holes to receive the screws 83.

As the indicating-disk 77 revolves the arm or lever 76 travels on the periphery thereof until it engages the curved plate 84' of the switch-cam 84, which extends over the periphery of the disk, as shown in Fig. 8. The

curved plate 84' causes the arm 76 to leave the periphery of the disk 77, and the spring 81 acts to move the lever 73 on its pivot 74 and cause the free end of the arm 76 to drop into the notch 84" in the switch-cam 84 against the action of the spring 85. The movement of the lever 73, through connection 70, moves the lever 68 inwardly at its upper end and disengages the arm 67 on the switch-lever 65 from the notch 68" in said lever 68 and allows the spring 69 to act to move the upper end 65' of the switch-lever 65 under the pin 35 in the arm 34. (See Fig. 3.)

From the above description, in connection with the drawings, the operation of my supplemental mechanism, in connection with the operation of the main-pattern-chain and the auxiliary-pattern-chain mechanisms, will be readily understood by those skilled in the art.

The pattern-surfaces are made up to produce the desired pattern in the fabric, and the indicators, which operate the supplemental indicating-lever 57 of my mechanism, are arranged according to the length of the body of the fabric to be woven, and the indicating devices or switch-cams 84 on the indicating-disk 77 are adjusted to correspond.

Supposing the parts to be in the position shown in Fig. 3 and the loom running, as long as a tube 8 on the main pattern-surface comes under the indicator-lever 20 said lever will stay down and through the pawl-shield 53 prevent the pawl 33 on the arm 30 from engaging with the ratchet-wheel 29 to turn the auxiliary pattern-chain 13, and a roll 9 on said auxiliary pattern-chain 13, being under the indicator-lever 25, (see Fig. 4,) will hold said lever up and keep the end 49' of the pawl-shield 49 down, as shown in Fig. 2, so that the pawl 32 will engage with the ratchet 23 and turn the main pattern-chain 5. The next turn of the main pattern-chain 5, as shown in the drawings, will bring a roll 9 under the indicator-lever 20, (see Fig. 4,) which will raise said lever and at the same time lower the end 53' of the pawl-shield 53, connected with said lever 20, so that on the return movement of the arm 30 the pawl 33 will engage with the ratchet-wheel 29 and move the auxiliary pattern-chain 13 to bring a tube 8 under the indicator-lever 25, (see Fig. 4,) which will cause said lever to drop down and at the same time raise the end 49' of the pawl-shield 49, connected with said lever 25, so that on the return movement of the arm 30 the pawl 32 will be held out of engagement with the ratchet-wheel 23, thus leaving the main pattern-chain 5 at rest as long as the multiplier-chain 13 runs and a tube comes under the indicator-lever 25. As soon as a roll 9 comes under said lever 25 the same is raised and the end 49' of the pawl-shield 49 dropped, and then the main pattern-chain 5 is operated, as above described, and so the operation continues until in the revolution of the main-pattern-chain cylinder 3 the indicating-surface 58 is brought un-

der the projecting point 57" of the indicator-lever 57. The next revolution of the main-pattern-chain cylinder will raise said indicating-lever 57 and, through link 60, arm 61, shaft 62, arm 63, and connector 64, move the switch-lever 65 into the position shown in Fig. 2. The switch-lever 65 will be held in this position by means of the arm 67, engaging the notch 68" in the lever 68, as above described. The head 36 and rod 37 are now free to move up and down without moving the arm 34, which operates the pawl-carrying arm 30. The body of the fabric is now woven, the main pattern-chain and the auxiliary pattern-chain remaining at rest.

The projecting end 57" of the indicating-lever 57 is so made relative to the indicating-surface 58 that it will engage said surface to operate the lever 57 in advance of the indicating-surfaces which act on the other levers over the main pattern-chain, and before the surface 58 reaches the top of the cylinder or barrel 3 (as shown in Fig. 5) the pawl-carrying arm 30 will continue to operate by the downward movement of the head 36 and arm 37 to move the cylinder 3 of the main pattern-surface sufficiently to carry the indicating-surface 58 beyond the projecting end 57" of the indicating-lever 57 to drop at the proper time.

When the desired length of the body of the fabric is woven, the revolution of the indicating-disk 77, as the friction take-up roll is revolved, will bring the switch-cam 84 into engagement with the arm 76 and, through spring 81, lever 73, and cord connection 70, the lever 68 will be moved in at its upper end, releasing the switch-lever 65, which is then moved by the spring 69 into the position shown in Fig. 3, with the end 65' extending under the pin 35 in the arm 30. The main pattern-surface and the auxiliary pattern-surface are then again put into operation.

If at any time in the operation of the loom the filling runs out, the giveway or lock connection between the arm 34 and the head 36 on the rod 37 operates through the cord or chain 41, attached to the arm 45 on the filling-stop-motion shaft 46, to move in the head 36 and cause the pin 35 to extend into the upper slotted part 36' of the head 36 and allow said head and rod 37 to move up and down without moving the arm 34. After the filling is replaced the return movement of the filling-stop-motion shaft 46 will slacken the cord 41 and allow the spring-actuated pawl 47 to act to push out the head 36 and bring the pin 35 on the arm 34 into the notch 36' and hold it there to make a connection between said arm 34 and the head 36 on the connector-rod 37.

The advantages of my supplemental mechanism, combined with the main-pattern-chain and the auxiliary-pattern-chain mechanisms, will be readily appreciated by those skilled in the art.

I am enabled, automatically, through a supplemental indicating-surface and mechanism

operated thereby to automatically stop the operation of the main pattern-chain and the multiplier pattern-chain, and through an indicating-disk on the take-up-roll shaft or
 5 other driven shaft of the loom I am enabled through intervening connections to automatically put into operation the main and auxiliary pattern mechanisms.

My supplemental mechanism may be readily
 10 combined with looms of ordinary construction of the class referred to, and by means of the adjustable indicating devices or switch-cams on the indicating-disk 77 I can adjust the same according to the length of
 15 the body of the fabric desired to be woven without changing the disk. By changing the gears 77' and 79 I can vary the speed of the indicating-disk 77 to make it revolve faster or slower, as desired.

20 It will be understood that the details of construction of my supplemental mechanism may be varied somewhat, if desired.

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

1. In a loom provided with main-pattern-chain and auxiliary-pattern-chain mechanisms, the combination with said mechanisms, of a supplemental mechanism, consisting of
 30 a supplemental indicating-lever, a supplemental indicating-surface, to engage said lever in advance of the engagement of the other indicating-surfaces on the main-pattern-chain cylinder with their respective indicating-levers, and connections from said supplemental indicating-lever to automatically dis-

engage the mechanism which operates the main and auxiliary pattern-chain cylinders, and mechanism to automatically connect and put in operation the mechanism which oper-
 40 ates the main and auxiliary pattern-chain cylinders, substantially as set forth.

2. In a loom provided with main-pattern-chain and auxiliary-pattern-chain mechanisms, the combination with said mechanisms, of a supplemental pattern-operating mechanism for automatically stopping the mechanism which operates said pattern-chains, and for automatically starting said mechanisms to operate said chains, said supplemental
 45 mechanism consisting of a supplemental indicating-lever adapted to be engaged by a supplemental indicating-surface on the main-pattern-chain cylinder in advance of the engagement of the other indicating-surfaces on
 50 said cylinder with their respective indicating-levers and said indicating-surface, and main-pattern-chain cylinder, and connections from said supplemental indicating-lever, to automatically disengage the mechanism which
 55 operates the main and auxiliary pattern-chain cylinders, and mechanism connected with the cloth-take-up roll to automatically connect and put in operation the mechanism which operates the main and auxiliary pattern-chain
 60 cylinder and said cloth-take-up roll, substantially as set forth.

WILLIAM WATTIE.

Witnesses:

M. J. GALVIN,
 J. C. DEWEY.