

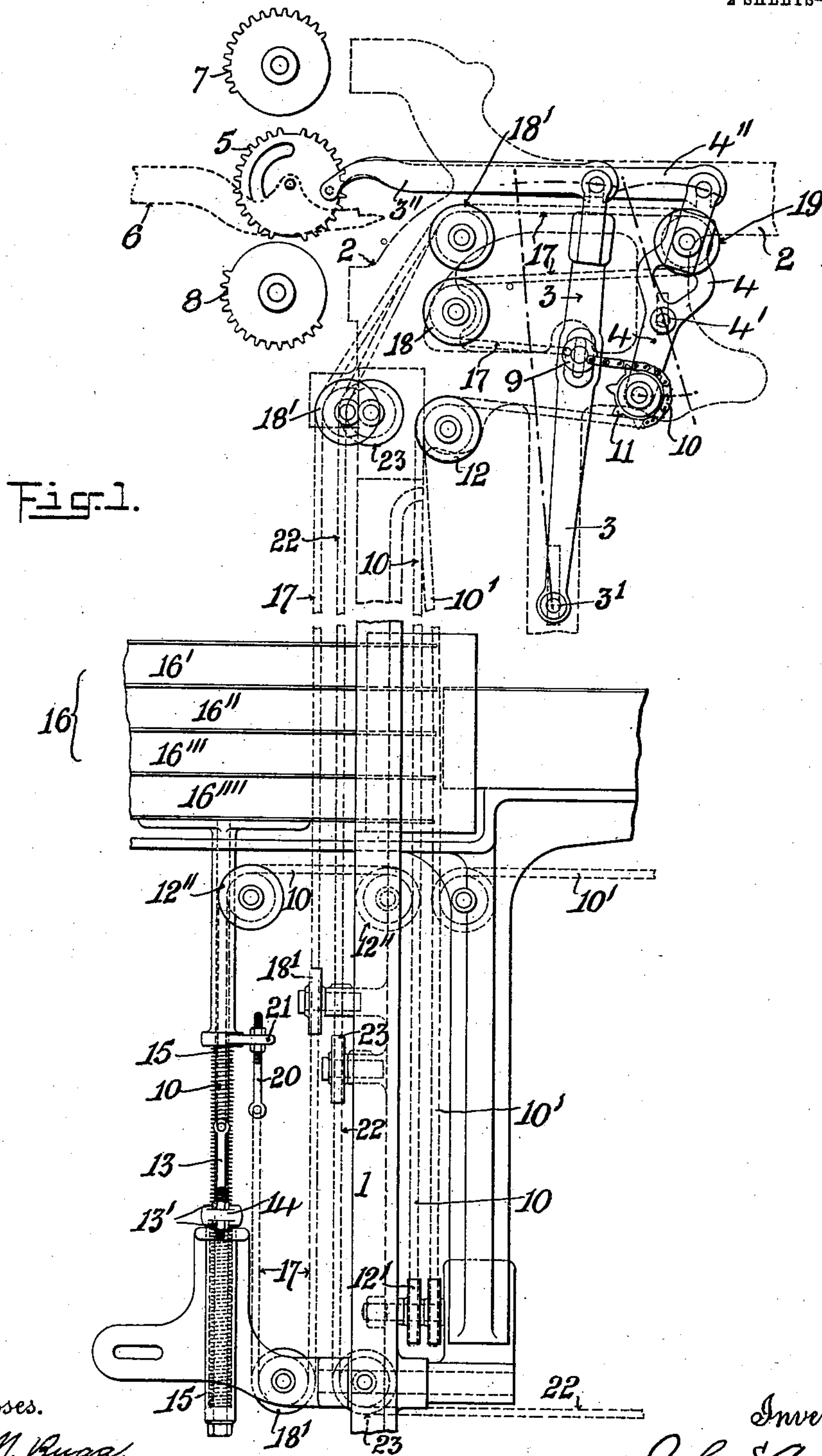
No. 744,273.

PATENTED NOV. 17, 1903.

J. S. AINLEY.
SHUTTLE BOX MOTION.
APPLICATION FILED MAR. 3, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.

H. M. Rugg.
A. S. Cowan

Inventor.

John S. Ainley
by John C. Dewey
att'y.

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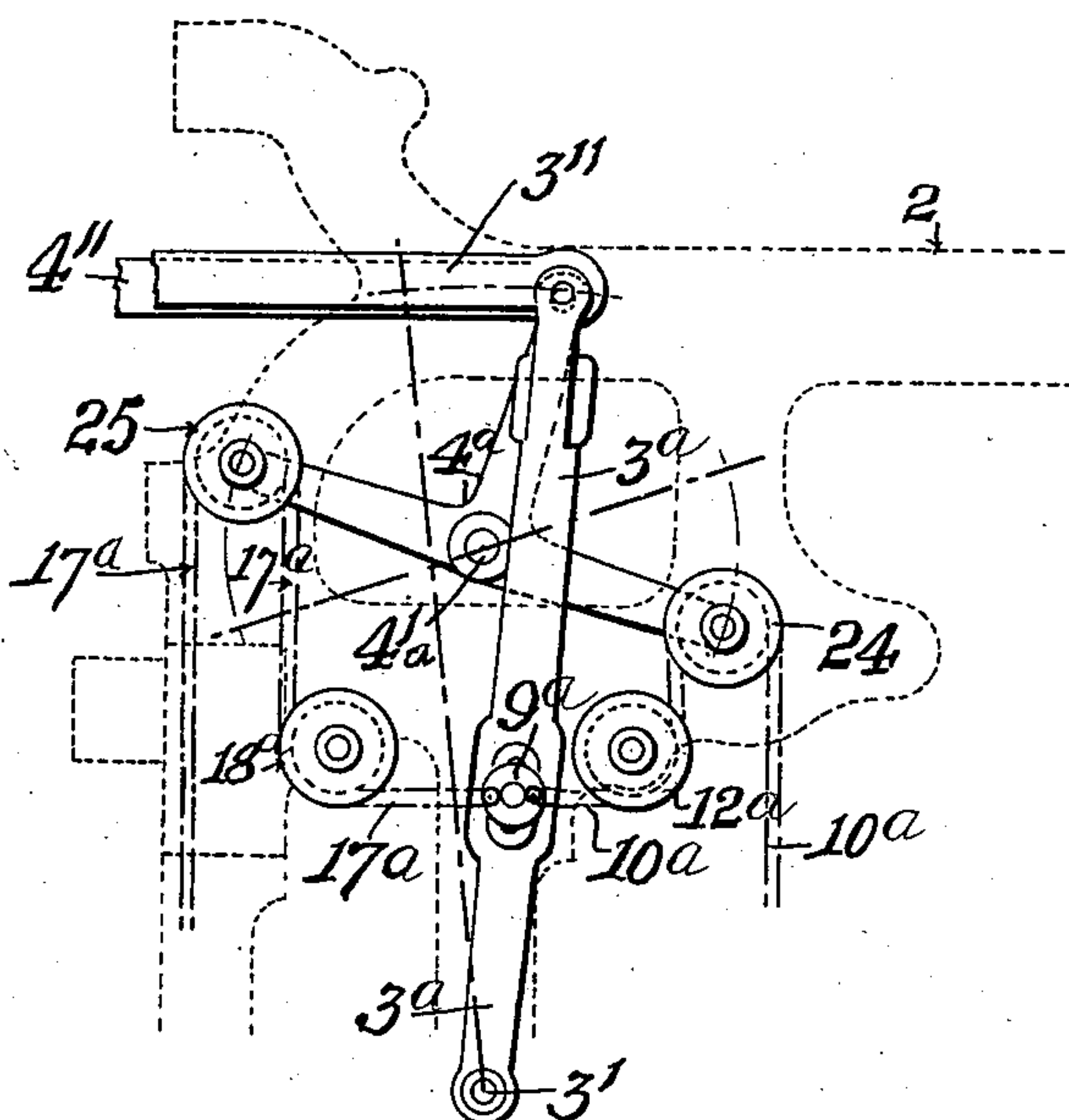
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NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

JOHN SHAW AINLEY, OF HUDDERSFIELD, ENGLAND.

SHUTTLE-BOX MOTION.

SPECIFICATION forming part of Letters Patent No. 744,273, dated November 17, 1903.

Application filed March 3, 1903. Serial No. 146,022. (No model.)

To all whom it may concern:

Be it known that I, JOHN SHAW AINLEY, woolen manufacturer, residing at Kirkheaton, Huddersfield, in the county of York, England, have invented certain new and useful Improvements in or Connected with the Shuttle-Box Motions of Looms for Weaving, of which the following is a specification.

This invention relates to the rising and falling shuttle-boxes of looms for weaving of that type in which the series of shuttle-boxes at each side of the loom are allowed to drop solely by gravity as soon as the pull on the lifting-chain carrying the respective boxes ceases and is paid out again to the extent called for by the box-motion to admit of the series of boxes descending to the full extent to bring the upper box of the series into alinement with the shed or to the extent of one or two boxes only to present the second or third box of the series in alinement with the shed.

In shuttle-box motions in which the boxes are raised by a chain connected at one end to the box-spindle and at the opposite end to the box-levers and fall by gravity with the paying out of the chain the weight of the boxes, more especially in fast-running looms, does not always insure them immediately following the paying out of the chain, and sometimes the chain from this cause becomes somewhat slack and causes the boxes to rebound when they have dropped to the limit called for. The slight delay in the boxes falling or in rebounding in looms running at high speeds injuriously affects the picking, as the shuttle-box called for may not be in proper alinement with the shed or at rest in alinement with the shed at the moment of picking. The shuttle-boxes are also liable to rebound when they drop instantly with the paying out of the lifting-chain.

The object of my invention is to provide, in combination with the lifting-chains for raising the two series of shuttle-boxes and upon which the whole weight of said shuttle-boxes rest, means for lowering the shuttle-boxes, so that they shall be lowered or drawn down positively as well as raised positively, said means leaving the shuttle-boxes free to be raised manually by the weaver when the loom is stopped to insert or remove a shuttle from one of the boxes of the series which is not op-

posite the shed and which it is not possible to do in the other forms of positive box raising and lowering motions.

My invention consists of the new and novel application and arrangement of a second or reversing chain for drawing down each series of boxes, said chain being arranged and operating as will be hereinafter fully described by the aid of the annexed drawings.

Referring to the drawings, Figure 1 is an elevation of one side of a loom looking from the rear of the loom, showing one series of shuttle-boxes and so much of the box-operating mechanism as is essential to show the embodiment of my improvements. Fig. 2 shows a modification in the arrangement of the reversing or positive drawing-down chain.

In the accompanying drawings, 1 designates the side frame of the loom, and 2 the top arch or stand carrying the pattern and box mechanism, the upper portion of the side frame 1 being broken off.

3 and 4 are the box-levers, pivoted on studs 3' 4', secured to the stand or arch 2 and connected at their upper ends by connectors 3'' 4'' to respective vibrator-gears 5, (only one of which is shown,) which are carried by the vibrators 6 and put into mesh with the upper or lower cylinder-gears 7 8 by the action of the pattern-surface on said vibrators to actuate the boxes in the usual way.

To the boss 9 on the box-lever 3 is connected one end of the lifting-chain 10, which passes around a toothed pulley or wheel 11 on the second box-lever 4 and is guided over a pulley or sheave 12, under a pulley 12', over pulleys 12'', and connected at its opposite end to the bolt or pin 13, secured by nuts 13' to the arm or projecting lug 14 on the rod or spindle 15, carrying the shuttle-boxes 16. A second lifting-chain 10', connected to separate box-levers for actuating the boxes at the opposite side of the loom, is guided by pulleys or sheaves to the bottom of and then across the loom, as usual. In the drawings the bolt or pin 13 is shown on the rear side of the spindle 15, whereas it is ordinarily at the front of said spindle, the position being reversed simply to show it plainly in full line.

The before-described mechanism is of the usual description, comprising the well-known motion for raising the boxes to present any

of the cells thereof in alinement with the shed as called for, the drawing over of the box-lever 3 to the position indicated by strong broken line taking up the chain 10 to the required extent to raise the boxes the distance of one cell to remove the first cell 16' from and present the second cell 16'' in alinement with the shed (the chain traveling around the loose toothed wheel 11 on box-lever 4 without affecting the said lever) and the drawing over of lever 4 to the position indicated by the broken center line with lever 3 in its first position—that is, as shown in full line—taking up sufficient chain to bring the third cell 16''' opposite the shed, while the drawing over of both levers together to the positions indicated by the respective broken center lines takes up a length of chain equivalent to the height of three cells and presents the fourth cell 16'''' of the boxes in alinement with the shed, all as is well understood by those skilled in the art to which my invention refers.

My invention consists in the application to and combination with an ordinary shuttle-box motion such as above described of a reversing-chain for drawing down the boxes positively.

I secure to the boss 9 on the box-lever 3 on the contrary side to that to which the ordinary lifting-chain is attached one end of a second chain 17, which is guided around a guide-pulley or sheave 18, mounted on a stud secured to the arch 2, then passes around a pulley or sheave 19, mounted on a stud secured to the upper arm of the box-lever 4 at the same distance from its pivot-center 4' as the toothed wheel 11 on the opposite or lower arm. From the said pulley 19 the chain is guided over and under a series of guide-pulleys 18' and is attached at its opposite end to the bolt or pin 20, secured by nuts to an arm or lug 21, extending out from the shuttle-box rod or spindle 15.

There are box-levers corresponding to levers 3 and 4, Fig. 1, for actuating the shuttle-boxes at the opposite side of the loom, these being located behind the levers 3 4 on the same centers as heretofore; but I have omitted them to avoid confusion. To the lever corresponding to lever 3 and on the opposite side to the end of the lifting-chain 10' for lifting the boxes at the opposite side of the loom is connected one end of a chain 22, which is guided to a pulley on the lever corresponding to lever 4, and from thence is guided over and under a series of pulleys 23 to the bottom of the loom and then across to the opposite side of the loom, the description with reference to the action of chain 17 in lowering the boxes 16 describing also the action of chain 22 in lowering the shuttle-boxes at the opposite side of the loom.

In the operation of the box-levers 3 4 the amount of chain 10 taken up to raise the shuttle-boxes causes the chain 17 to be paid out to a corresponding extent, and when the chain

10 is paid out to lower the boxes, as in the movement of levers 3 4, from the positions indicated by broken lines to the positions shown in full line the chain 17 is correspondingly taken up to the same degree and draws down the boxes positively and equally with the paying out of the lifting-chain 10. The equal distribution of force through the lifting and lowering chains insures proper alinement of each box called for with the shed, avoids the possibility of rebound or delay in the movement of the boxes, and therefore prevents faulty picking, both chains always being in tension.

It will be obvious that various alternative arrangements of levers or slides coupled to the connectors based on the employment of my improved reversing-chain 17 may be devised for the paying out or taking up the said chain along with and to the same extents as the taking up and paying out of the ordinary lifting-chain 10, this variation being a question of detail in the arrangement of the box-motion and not affecting the essential feature of my invention—as, for instance, my improvements may be applied to any construction of shuttle-box motion in which a lifting-chain is employed and not necessarily to the type of box-motion shown on the drawings.

In Fig. 2 I have shown one alternative arrangement of box-levers in which a T-lever 4^a, pivoted at 4'^a, is substituted for the ordinary two-lift lever, the vertical arm of said lever being coupled at the upper end to its respective connector 4''. On studs secured to the extremities of each horizontal arm of the T-lever are mounted pulleys 24 25, over which are passed, respectively, the ordinary lifting-chain 10^a and the reversing or lowering chain 17^a, each connected at one end to opposite sides of the boss 9 on box-lever 3 and guided around pulleys 12^a and 18^a to their respective pulleys 24 and 25 on lever 4^a, from whence they are guided around a series of intermediate guide-pulleys and secured at their opposite ends to the box-rod, as described with reference to Fig. 1. When lever 3 is drawn over to the position indicated by the broken center line to raise the boxes one cell, it takes up the chain 10^a and pays out the chain 17^a correspondingly. In like manner when lever 3 is in the position shown in full line and lever 4^a is drawn over to the position indicated by broken center lines to raise the boxes to the extent of two cells the chain 10^a is taken up by the elevation of pulley 24 and chain 17^a paid out to the same extent. In the reverse movement of the levers 3 or 4^a from the positions indicated by broken center lines to the positions shown in full lines the chain 10^a is paid out and chain 17^a taken up to draw down the boxes positively.

In the application of the reversing or draw-ing-down chain according to my invention to secure a positive chain-box motion there is, with the exception of the weight of the boxes which are supported by the lifting-chain, a

more equally-balanced motion, and to provide for a perfect balance a weight equal to the weight of the boxes may be secured at any suitable point on the lowering-chain, 5 which will act as a counterpoise to the boxes, whereby the power required in lifting said boxes will be only that needed to move the chains over and around the several pulleys.

I have only described my improvements 10 with reference to a four-cell shuttle-box; but it will be plainly seen that the reversing-chain can be equally as well applied in the case of shuttle-boxes having two, three, or other number of cells.

15 What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a shuttle-box-operating mechanism under control of pattern devices, the combination with a box-operating lever, a chain 20 connected with said lever and with the boxes, for positively raising the boxes, and a series of pulleys over which said chain passes, of a second chain also connected with said lever and with the boxes for positively lowering 25 the boxes, and a second lever, intermediate

the first-mentioned lever and the boxes, having pulleys thereon over which the first-mentioned and second-mentioned chains pass, before passing to the boxes, substantially as shown and described.

2. In a shuttle-box-operating mechanism 30 under control of pattern devices, the combination with a box-operating lever, and a chain connected with said lever and with the shuttle-box rod, for positively raising the boxes, 35 of a second chain, for positively lowering the boxes, also connected with said lever and with the shuttle-box rod, and said rod, and passing intermediately over a pulley on a second box-lever, and said second box-lever and 40 pulley, and a second pulley on said lever over which the first-mentioned chain passes, before passing to the shuttle-box rod, substantially as shown and described.

In testimony whereof I affix my signature 45 in presence of two witnesses.

JOHN SHAW AINLEY.

Witnesses:

THOMAS H. BARRON,
BERNARD HENRY.