2 Sheets.

Sheet 1.

John Ashworth's
Improvements in Looms.

No. 121,838. Patented Dec. 12, 1871.

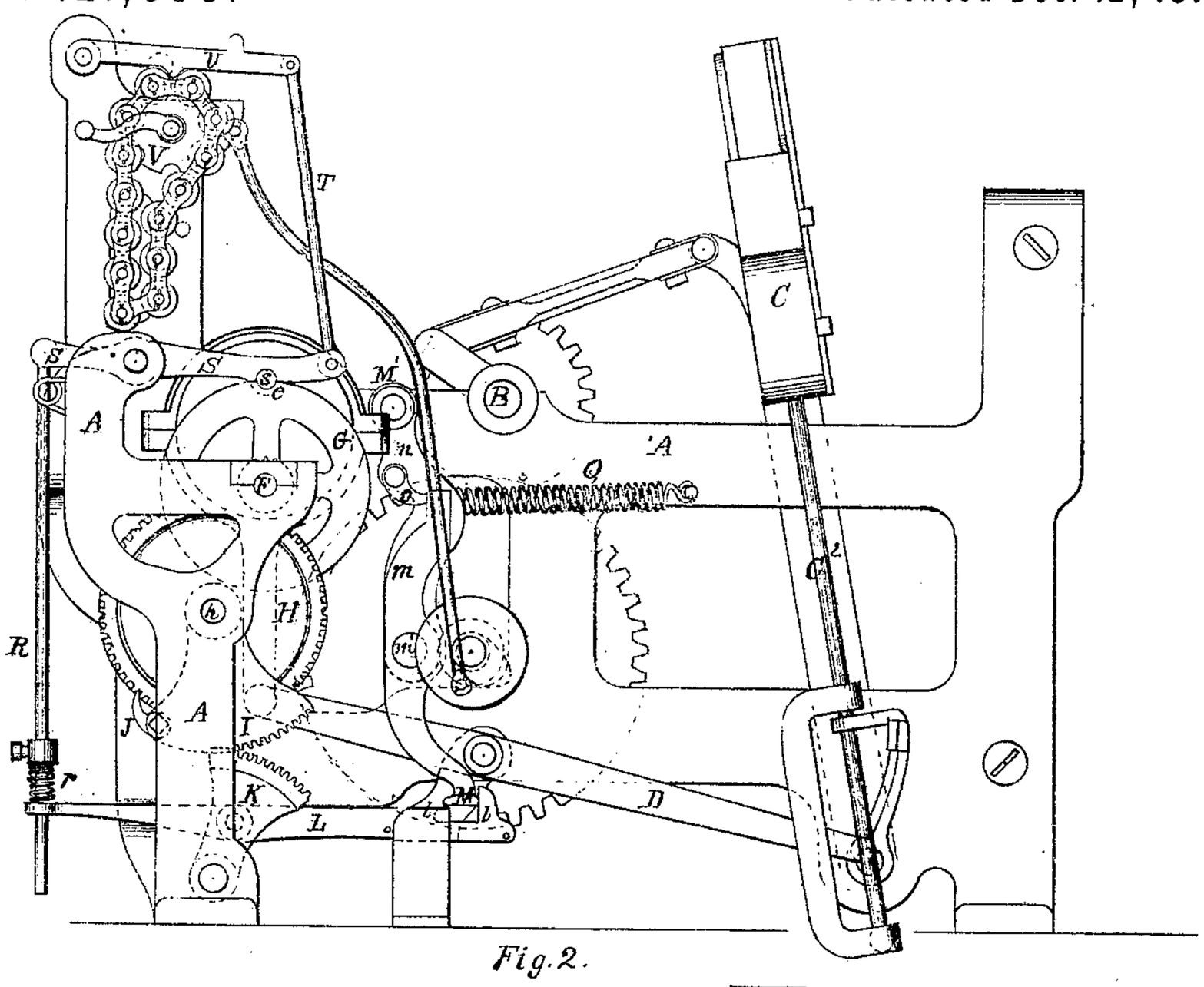

Fig. 2.

Fig. 1

Witnesses.

Wm. C. Hibbard

N. C. Lombaird

Inventor:

John Ashworth

2 Sheets

Sheet 2.

John Ashworth's
Improvements in Looms.

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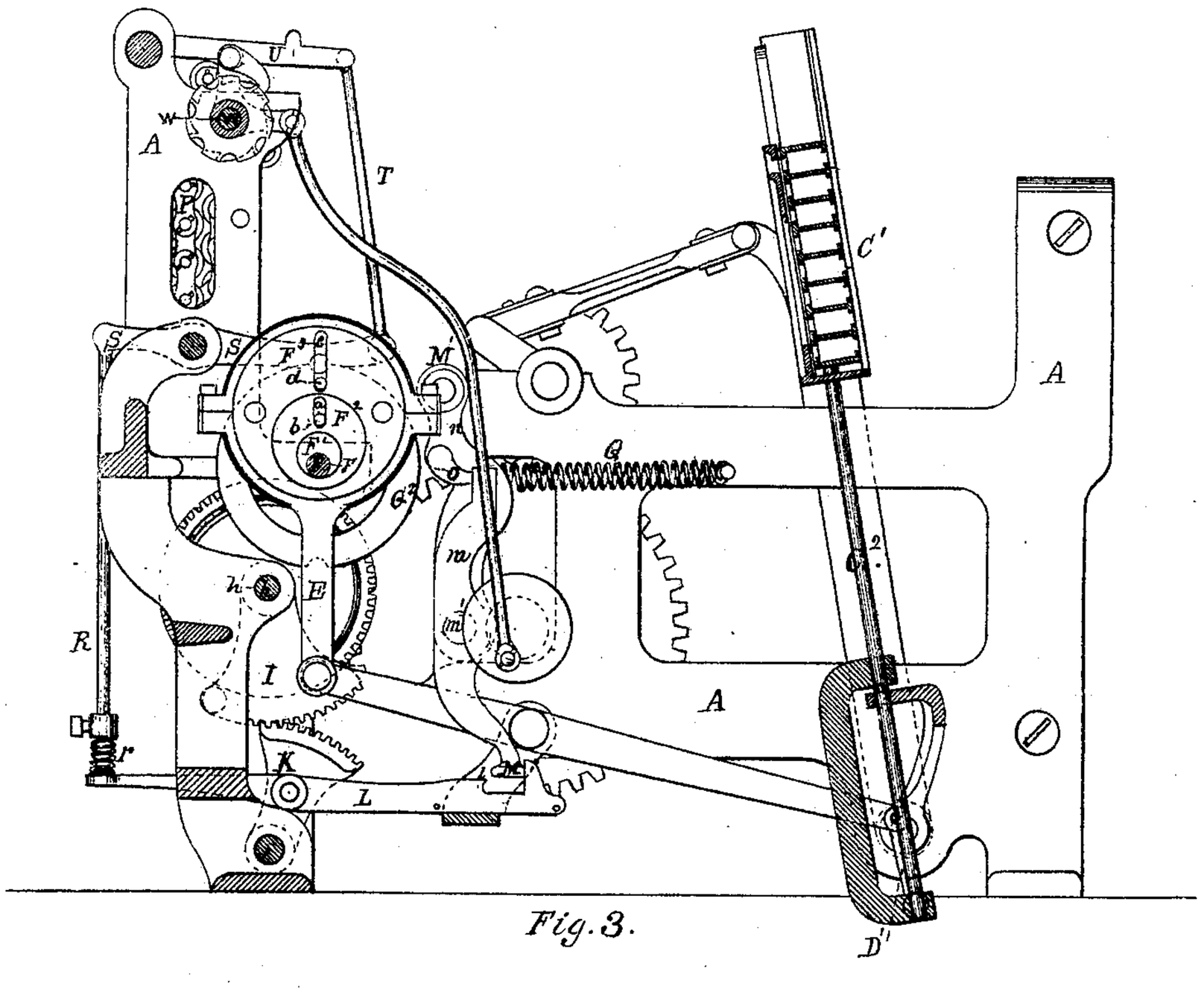

Fig. 3.

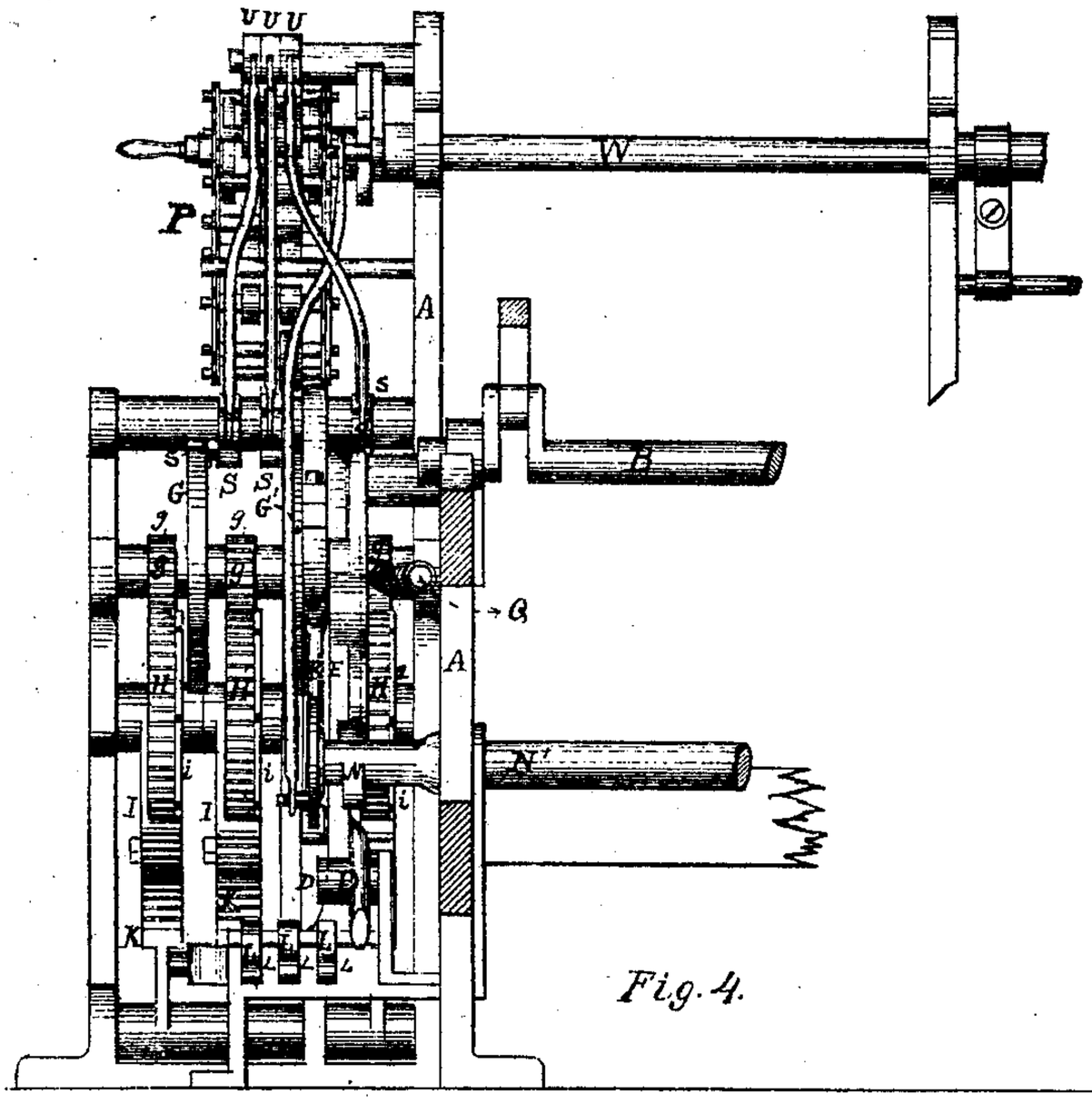

Fig. 4.

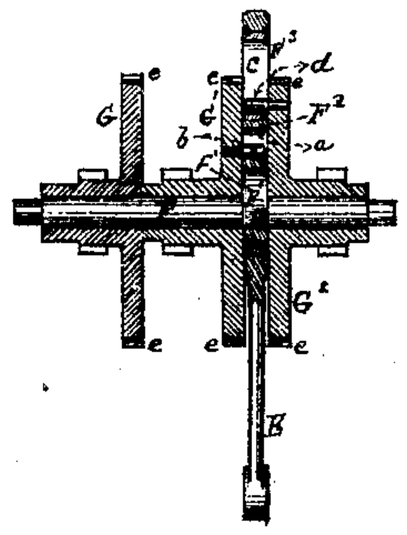

Fig. 5.

Witnesses.

Wm. C. Hibbard

N. C. Leonard

Inventor.

John Ashworth

UNITED STATES PATENT OFFICE.

JOHN ASHWORTH, OF NORTH ANDOVER, MASSACHUSETTS, ASSIGNOR TO GEORGE L. DAVIS, JOHN A. WILEY, JOSEPH M. STONE, GEORGE G. DAVIS, JOSEPH H. STONE, AND JAMES H. DAVIS, OF SAME PLACE.

IMPROVEMENT IN LOOM SHUTTLE-BOX MECHANISM.

Specification forming part of Letters Patent No. 121,838, dated December 12, 1871.

To all whom it may concern:

Be it known that I, JOHN ASHWORTH, of North Andover, in the county of Essex and State of Massachusetts, have invented certain Improvements in Looms, of which the following is a specification:

My invention relates to the construction of the mechanism by which the shuttle-boxes are changed in looms where several shuttles are employed, as is the case in what is called fancy or figure weaving, by which the shuttle-boxes are accurately shifted with an easy motion and also prevented from being thrown too far by the momentum of the moving parts. This consists in the employment of two or more eccentrics, one revolving upon the other and having different eccentricities, so that by their combined and separate motions an extent of motion may be given to the lever or other device that works the series of shuttle-boxes sufficient to move the boxes the number of grades or spaces required by the order of using the shuttles in weaving; and it also consists in the manner of constructing and arranging the devices employed to impart the motions to the eccentrics at the proper times under the control of a pattern-chain; and also in connecting the mechanism that operates the chains upon the opposite sides of the loom, so that they may be moved and kept in proper relation to each other.

In the drawing, Figure 1 is a plan of the mechanism. Fig. 2 is a side elevation. Fig. 3 is a vertical sectional elevation. Fig. 4 is an end elevation, and Fig. 5 is a separate view of the eccentric shaft and its attachments.

In the drawing a separate series of eight shuttle-boxes is shown upon each side of the loom with a separate arrangement of mechanism for operating each, connected only by the shaft which works two pattern-chains, which may also be made entirely disconnected if desired. A description therefore of the devices upon one side of the loom will serve for both, excepting the cross-shaft that works the pattern-chains.

A is the frame of the loom; B, the lay-shaft; C, the lay; and C′ the two series of shuttle-boxes, each made to receive eight shuttles, and sliding up and down in suitable guides by means of the levers D and links D^1 attached to the lower ends of the shuttle-box standards C^2 in a manner well known. To the opposite arm of the lever D is attached the eccentric-rod E, which embraces the outermost one of the series of eccentrics F^1 F^2 F^3, seen more clearly in Figs. 3 and 5. These eccentrics are mounted upon the shaft F, as shown, and the inner and smallest eccentric F^1 is formed upon it, and its eccentricity is sufficient to move the boxes one grade, or from one box to the next one to it. The shaft F and eccentric F^1 is revolved by the index-plate G, which is fixed upon the shaft. The next eccentric, F^2, is fitted to and revolves upon the periphery of F^1 and has an eccentricity sufficient to move the lever D a distance that will move the boxes two grades, and it has also a radial slot, *a*, which coincides with the radius of eccentricity, in which a stud, *b*, works, which is fixed in the index-plate G^1, which runs loosely on the shaft F, as seen in Figs. 3 and 5, and by means of which this eccentric is revolved. The outer eccentric F^3 is fitted to and revolves upon the periphery F^2 and has an eccentricity sufficient to move the lever D a distance that will move the boxes four grades, and it also has a radial slot, *c*, in which the stud *d* works, which is fixed in the index-plate G^2, which also revolves loosely upon the shaft F and turns the eccentric. Each of the index-plates G G^1 G^2 has two notches, *e*, in the periphery upon opposite sides corresponding to the dead-points of the eccentrics, and also has upon its hub a pinion, *g*, by which it is revolved by engaging with one of the gears H H^1 H^2 upon the shaft *h*, as shown. The number of teeth in the gears H are divisible by 8, and are so proportioned to the number of teeth in the pinions *g* that when the gears H are turned one-eighth of a revolution the index-plate and eccentric will be turned one-half of a revolution, or from one dead-point of the eccentric to the other. The gears H, &c., are turned one-eighth of a revolution at a time by means of the toothed sector I, which vibrates upon the shaft *h* and is provided with a pawl, J, which engages with the teeth of the gear H, as is seen in Fig. 2. Upon the side of each of the gears H is a disk or rim, *i*, of about the same exterior diameter as the extremities of the teeth of the gear, and at eight equidistant points in its periphery notches are cut which correspond to the spaces between the teeth of the gear. By this means the pawl J is

prevented from engaging with the teeth of the gear except at these notches, so that the mechanism acts as a ratchet with eight teeth. The sectors I are respectively oscillated by the toothed sectors K, which engage with them, and these are oscillated by the hook-rods L, the forward ends of which are provided with hooks or catches *l*, which engage with the vibrating driver M, when they are raised by the pattern-chain P, as is shown. The driver M is vibrated by the cam N upon the cam-shaft N^1, which makes one revolution to two of the lay-shaft. The driver is made in the form of a pendulous lever having its fulcrum at M^1, and is in two parts, *m* and *n*, which are jointed together at m^1, as shown. The upper end of the part *m* is held by the yielding catch *o*, which swings on a fulcrum in the part *n*, as shown, and is held against the part *m* in an inclined position by the spring Q, which is attached to an arm or stud upon the catch at the opposite side of the part *n* and serves to hold the catch against the part *m* with sufficient force to withstand the ordinary strain upon the driver in working the machinery, and it also serves to retract the driver, holding the lever against the cam N; but, in case any undue resistance is opposed to the movement of the driver, the catch *o*, by reason of its inclined position, yields and allows the cam N to make its revolution without breaking the machinery. The back ends of the hook-rods L extend some distance from their points of connection with the sectors K and are connected by means of the vertical rods R with the horizontal levers S, which, at their opposite ends, are, by the rods T, connected with the levers U, which work upon the pattern-chain P in the usual manner. The rods R are connected with the hook-rods L by a sliding joint and spring, *r*, so as to form a yielding connection to compensate for the curved motions of the sector K and the driver M. The levers S are each provided with a pin or detent, *s*, which engages with the notches *e* in the periphery of each index-plate G to hold them at rest with the eccentries at their dead-points, when the levers are not raised by the pattern-chain. The pattern chain may be made in any of the usual forms with corresponding details of construction; but the one shown is that where the levers U are operated by large and small rollers or balls arranged in an endless chain, which moves the levers by the intermittent rotation of the sprocket-wheel V that supports the chain in a well known manner. The sprocket-wheels V, upon each side of the loom, are connected by the cross-shaft W, so that both pattern-chains may be worked from one ratchet, and also may be kept together in their proper relations to each other in case it is necessary to turn the chain backward or forward by hand, as in case of a mispick or the failure of the weft.

In this combined arrangement of several eccentries to work a series of shuttle-boxes it may be seen that when all the eccentrics are worked together with the eccentricities of all of them upon the same side of the center they give to the lever D a movement sufficient to carry the boxes from one extreme to the other; or, if one or two eccentries only are rotated in connection, it will carry the boxes a distance corresponding to the sum of their eccentricities; or, if rotated, so that their eccentricities will act opposite to each other, it will carry the boxes a distance corresponding to the difference of their eccentricities, so that by means of the sum or difference of the joint action of the eccentrics any box of the series may be brought to the race from any position at any pick; and so of other numbers of shuttle-boxes in the series; a series of four boxes, for instance, would require only two eccentrics, namely, one throwing one grade and the other throwing two grades.

These examples will show the manner of constructing and combining the eccentrics to adapt them to any number of boxes in the series.

It is obvious that many forms of devices may be used to turn the eccentrics intermittently instead of those shown, and I have already devised several for that purpose, some of which are simpler and better adapted to be used when a less number of eccentrics are used; but I have employed the mechanism herein described to show the application of my invention to a large number of boxes. And so also as regards the yielding devices in combination with the driver for preventing the breaking of the machinery, as before described, other equivalent devices may obviously be employed which will accomplish the same purpose; but that herein shown is simple and efficient.

What I claim as my invention is—

1. The combination and arrangement of two or more eccentries, substantially as described, to operate a series of shuttle-boxes.

2. In combination with two or more eccentries and the series of shuttle-boxes, constructed substantially as described, the devices shown, or their equivalents, by which a joint or separate action may be given to either eccentric under the control of the pattern-chain.

3. The inclined yielding catch O in combination with the two parts *m* and *n* of the driver M, constructed and operating substantially as described.

Executed February 14th, 1871.

JOHN ASHWORTH.

Witnesses:

WM. C. HIBBARD,

N. C. LOMBARD.

(95)