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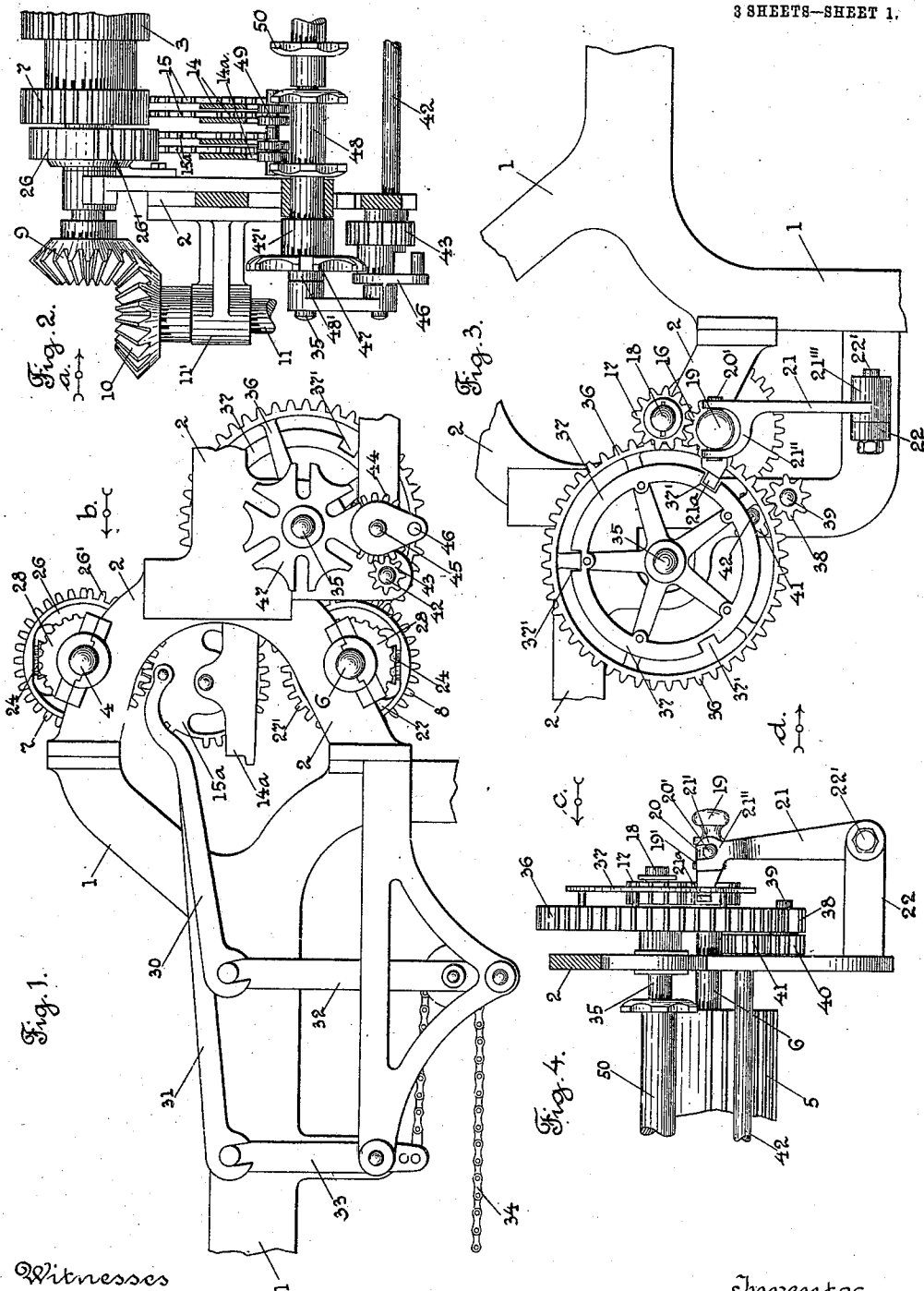
LOOM.

APPLICATION FILED NOV. 1, 1909.

966,402.

Patented Aug. 2, 1910.

3 SHEETS—SHEET 1.



Witnesses
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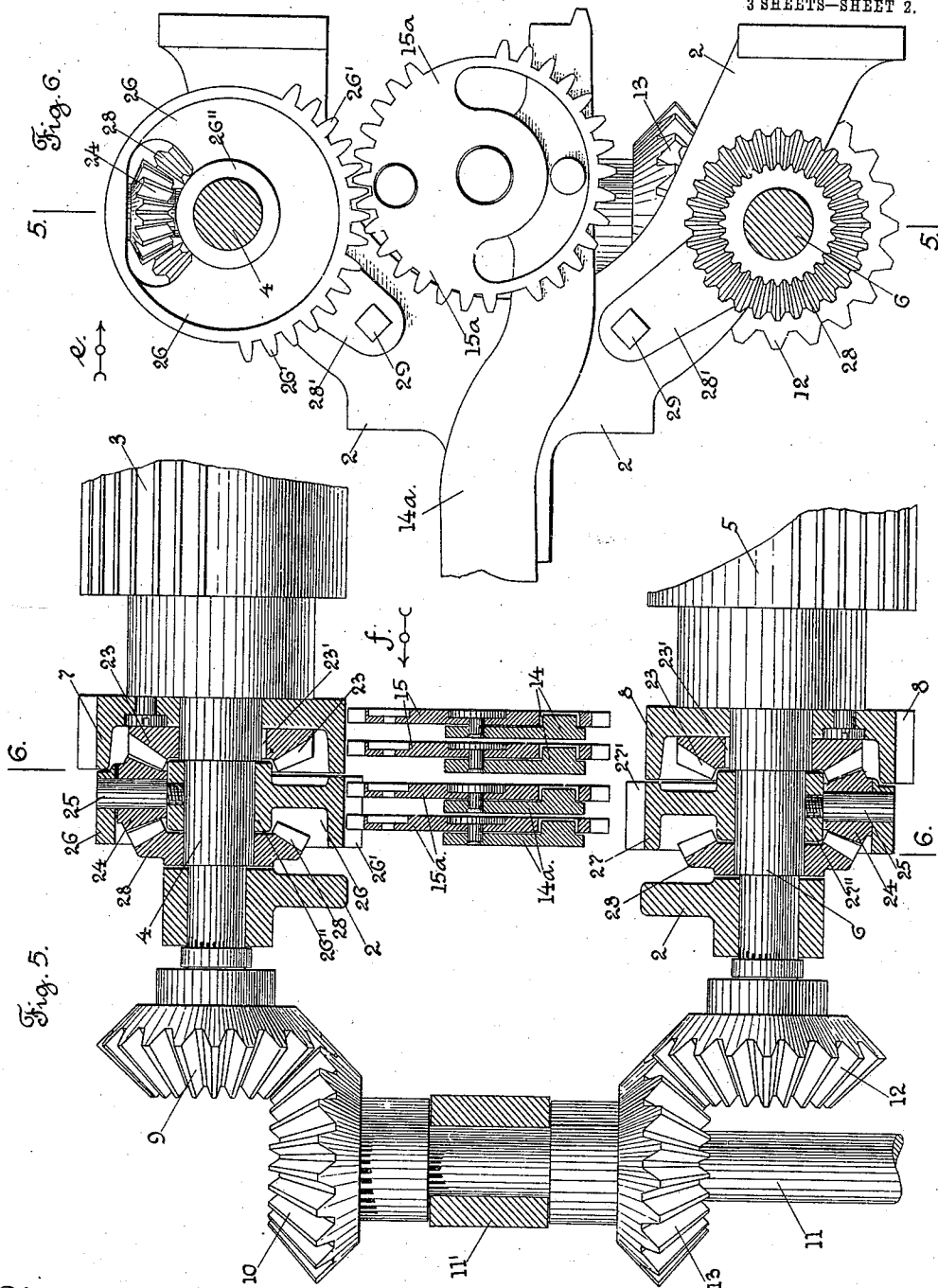
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LOOM.

Patented Aug. 2, 1910.

3 SHEETS—SHEET 2.

966,402.



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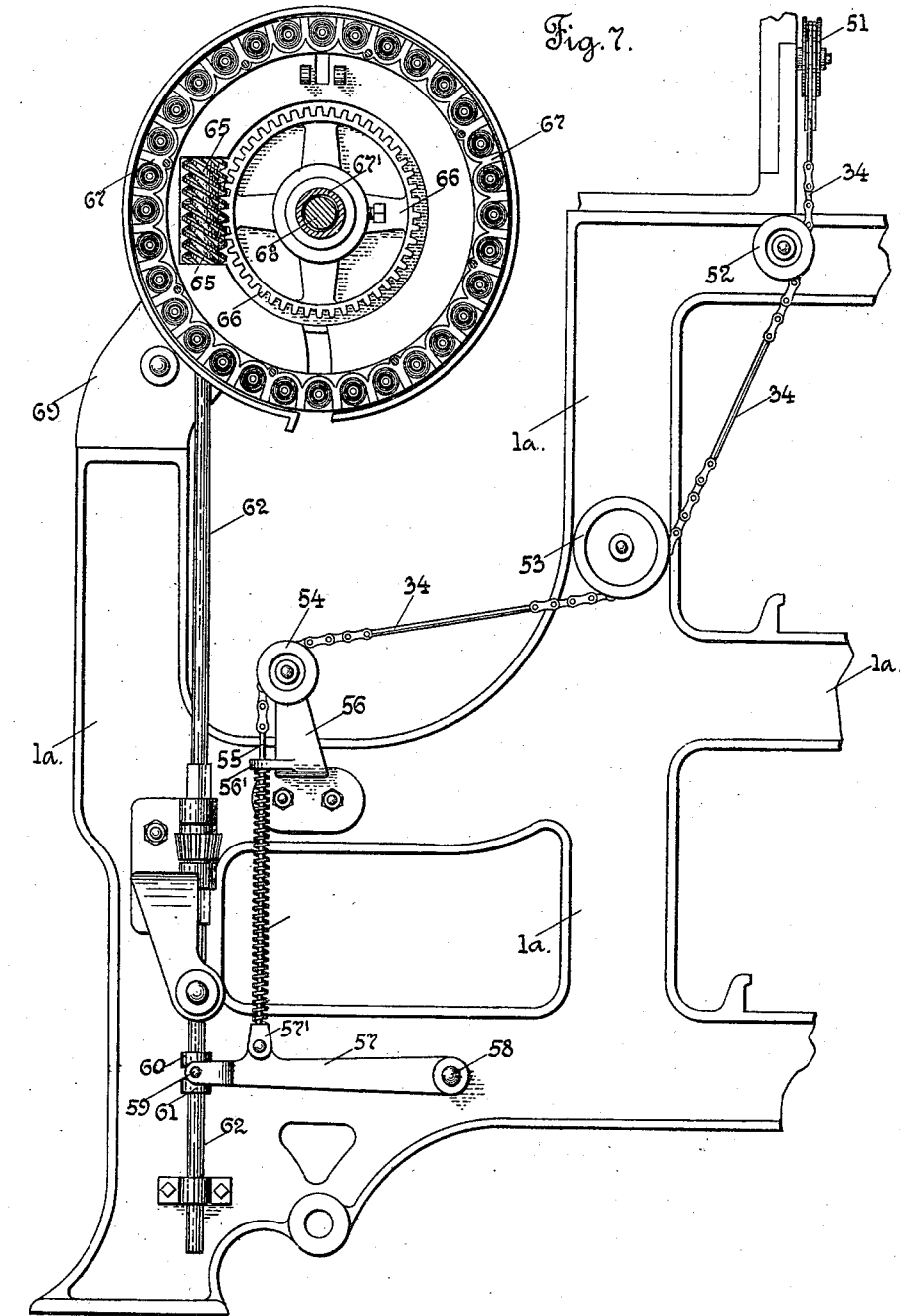
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3 SHEETS—SHEET 3.

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Witnesses

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UNITED STATES PATENT OFFICE.

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LOOM.

966,402.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed November 1, 1909. Serial No. 525,611.

To all whom it may concern:

Be it known that I, EPPA H. RYON, 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 Looms, of which the following is a specification.

My invention relates to looms, and more particularly to improvements in the Knowles head motion, so-termed, shown and described in Reissue Letters Patent, No. 7784.

The object of my invention is to improve upon the construction of the Knowles head motion referred to, and more particularly to adapt said head motion to be used in connection with a rotary and oscillating magazine in weft replenishing looms, of the type shown and described in U. S. Letters Patent, No. 939,326; and more particularly to provide said head motion with what I term differential gearing, by means of which the cylinder gear, which communicates the oscillating motion to the rotary magazine, runs half as fast as the cylinder gear for the box operating mechanism. In said Patent, No. 939,326, the rotary magazine consists of a centrally movable device, which has holders to retain the bobbins or filling carriers at their ends. The filling carriers are arranged in groups; each group contains filling carriers of different colors or characters, which correspond with the filling in the bobbin used in a series of shuttles. The magazine is oscillated or moved positively, and in unison with each change of position of the shuttle boxes, preparatory to supplying the shuttle with a fresh bobbin on the practical or substantial exhaustion of filling in the active shuttle. The rotary magazine is located above the lay, and on the stationary shuttle box end of the lay, and has an oscillating movement communicated thereto, preferably from the box pattern chain, according to the rise and fall of the change shuttle boxes, and as the magazine has to be in its required position on the transfer of a bobbin or filling carrier only on every other pick, and when the active shuttle arrives in the stationary shuttle box, the oscillating movement of the rotary magazine may have half the speed of the speed of the mechanism by which the change shuttle boxes are operated.

In addition to my improvements above referred to, a further improvement is to have the pattern cylinder for the box pat-

tern chain, run half as fast as the cylinder for the harness pattern chain, and to improve upon the construction of the reverse gears shown and described in U. S. Letters Patents, No. 398,328, and No. 810,680, so that the operator will put into operation the reverse gear mechanism only every other pick.

My invention consists in certain novel features of construction of my improvements as will be hereinafter fully described.

Referring to the drawings:—Figure 1 is an end view of the Knowles head motion, looking in the direction of arrow *a*, Fig. 2. Fig. 2 is a rear view of the parts shown in Fig. 1, looking in the direction of arrow *b*, same figure. Fig. 3 is a front, or opposite end view of the head motion shown in Fig. 1, and also shows the reverse gear mechanism, looking in the direction of arrow *c*, Fig. 4. Fig. 4 is a rear view of the parts shown in Fig. 3, looking in the direction of arrow *d*, same figure. Fig. 5 shows, on an enlarged scale, the differential gear mechanism in section, taken at a point indicated by line 5, 5, Fig. 6, looking in the direction of arrow *e*, same figure. Fig. 6 is a section, on line 6, 6, Fig. 5, looking in the direction of arrow *f*, same figure. Fig. 7 is an end view of a detached portion of a weft replenishing loom, having in this instance a rotary and oscillating magazine.

In the accompanying drawings, 1 is the loom arch, 2 a stand secured thereto for supporting the several parts of the head motion. The head motion is of the well-known Knowles type, shown and described in Reissue Letters Patent, No. 7,784, above referred to, and consists of the upper cylinder gear 3, fast on the cylinder gear shaft 4, and the lower cylinder gear 5, fast on the cylinder gear shaft 6, which shafts are journaled in suitable bearings on the stand 2.

7 is the upper cylinder gear for the box section, and 8, see Fig. 5, is the lower cylinder gear for the box section, which operates in this instance one pair of vibrator gears.

The upper cylinder gear shaft 4 has secured thereon a bevel gear 9, see Fig. 2, which meshes with and is driven by a bevel gear 10, fast on the upright shaft 11, which has a suitable bearing 11'. The lower cylinder gear shaft 6 has fast thereon the bevel gear 12, see Fig. 5, which meshes with and is driven by a bevel gear 13 fast on the upright shaft 11.

The vibrator levers 14, see Fig. 6, carry the vibrator gears 15, which are intermediate the cylinder gears 7, and 8, see Fig. 5. Said vibrator gears 15 operate the change shuttle boxes in the usual way. A second pair of vibrator gears, which will hereinafter be described, are adapted to communicate an oscillating motion to the rotary magazine.

The reverse gear mechanism is of the same construction and operation as the reverse gear mechanism shown and described in U. S. Letters Patents, No. 398,328, and No. 810,680, above referred to, and is briefly described as follows:—Loose on the end of the lower cylinder gear shaft 6 is a gear 16, see Figs. 3, and 4, which meshes with and drives a gear 17, of the same size, loose on a stud 18 fast in the frame 2. Secured on the gear 17, and in this instance integral therewith, is a smaller gear not shown, in line with a fourth gear not shown, on the shaft 6, and adjoining the first-mentioned gear 16. The last-mentioned gears are smaller than the gears 16 and 17, so that when the gears 16 and 17 are in mesh, the teeth of the other two gears will clear each other. The gear 16, and its second gear, are slotted internally, to receive a projecting end of a key which is adapted to slide freely in a slot in the outer end of the shaft 6, and is provided with an engaging end or knob 19, and also an annular groove 19', to receive an open end collar 20, having studs 20' projecting from opposite sides thereof, to enter the open end slots 21' in the upper forked end 21'' on a lever 21, which has its hub 21''' loosely mounted on a stud 22' in a stand 22 secured to the frame 2.

All of the above mentioned parts may be of the usual and well known construction.

I will now describe my improvements, which consists particularly in a differential gearing for the oscillating movement of the rotary magazine. The differential gearing, which is clearly shown in Figs. 5 and 6, and which is combined with each of the cylinder gears 7 and 8, consists in this instance of two bevel gears 23, preferably secured on the cylinder gear shafts 4 and 6, by a key 23'. Each bevel gear 23 meshes with and drives a bevel pinion 24. Each pinion 24 is loosely mounted on a stud 25, which is secured in a recess in the cylinder gears 26 and 27 respectively, to move therewith. The cylinder gears 26 and 27 have teeth 26' and 27' thereon, to communicate a rocking motion to the vibrator gears 15^a on the vibrator levers 14^a, in the usual way. The cylinder gears 26 and 27 have their hubs 26'' and 27'' loosely mounted on the shafts 4 and 6, respectively. Opposite each bevel gear 23, and in mesh with the pinion 24, is another bevel gear 28, having an extension 28' thereon, which is secured by a set screw

29, see Fig. 6, to the frame 2. Through the revolution of the cylinder gear shafts 4 and 6, the cylinder gears 26 and 27 will revolve in the same direction, but through the action of the differential gearing, only at one-half of the speed. The vibrator gears 15^a have the vibrator connectors 30 and 31 pivoted thereon, see Fig. 1, to communicate a rocking motion to the compound lever mechanism 32 and 33, of the usual construction, to communicate, through the chain connection 34, a rocking motion to the rotary magazine on the opposite side of the loom shown in Fig. 7.

The pattern cylinder shaft 35 has mounted thereon, on its front end, the gear 36, see Figs. 3 and 4, which meshes with and is driven by the reverse gearing above described. The gear 36 is provided with a shield 37, see Figs. 3, and 4, which has in this instance three notches 37' on its circumference. The shield 37 is adapted to hold an extension 21^a on the lever 21, to prevent said lever from being moved toward the right in Fig. 4, until a notch 37' comes in alinement with the extension 21^a, as shown in Fig. 3, so that the lever 21 can be moved only every other pick. The gear 37 meshes with and drives a pinion 38, loose on a stud 39. Secured to the pinion 38, and in this instance integral therewith, is a pinion 40, which meshes with and drives a gear 41 fast on one end of a transverse shaft 42; the other end of said shaft 42 is provided with a pinion 43; see Fig. 1, which meshes with and drives a gear 44, having its hub loosely mounted on a stud 45 on the frame 2.

Connected with, or made integral with the gear 44, is a pin wheel 46, adapted to engage and drive a star wheel 47, which has its hub 47' secured on a sleeve 48' of the box pattern chain cylinder 48. The cylinder 48 is loosely mounted on the shaft 35, which carries the pattern chain 49 in the usual way. Through the rotary motion communicated to the box pattern chain cylinder 48 and the gear 36, said cylinder will be rotated only at one-half of the speed that the harness pattern cylinder 50 is rotated.

I will now describe the mechanism shown in Fig. 7.

The compound levers 32, and 33, see Fig. 1, have connected thereto a chain 34, made up in this instance of links pivotally connected, and rods. The chain 34 extends across the loom, and passes over guide sheaves 51, 52, 53, and 54, suitably supported, see Fig. 7. One end of a vertically extending rod 55 is connected to the chain 34, and has a bearing in a lug 56' on a stand 56 carrying the sheave 54. The lower end of said rod 55 is pivotally connected to a lever 57. A helically coiled expansion spring 58 encircles the rod 55 and bears at one end against the lug 56'; and at its other end

against the upwardly extending projection 57' on a lever 57, and acts to yieldingly move down said lever. The lever 57 is pivotally mounted on a stud 58 on the loom side 1^a.

5 The end of the lever 57 is made yoke-shaped and carries a pin 59, which extends between two collars 60 and 61 fast on a vertically extending shaft 62, which is guided in bearings 63 and 64 on the loom side 1^a. The upper end of the shaft 62 has a worm 65 thereon, which meshes with and drives a worm gear 66 on a sleeve 67' on a rotary magazine 67, and is mounted on a stand 69. The up and down movement of the worm 65, through intermediate connections from the compound levers 32 and 33, causes the rotary magazine 67 to oscillate, as desired.

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

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

1. In a loom of the class described having a magazine for bobbins or filling carriers, a head motion, comprising vibrator levers, vibrator gears, upper and lower rotatable cylinder gear shafts, and gears fast thereon, and gears loosely mounted on said shafts, and means for rotating said last-mentioned gears at a different speed from said gears fast on said cylinder gear shafts.

2. In a loom of the class described having a magazine for bobbins or filling carriers, a head motion, comprising vibrator levers, vibrator gears, upper and lower rotatable cylinder gear shafts, gears fast thereon, and differential gearing mounted on said shafts.

3. In a loom of the class described having a magazine for bobbins or filling carriers, a head motion, comprising two sets of vibrator

levers and vibrator gears, upper and lower rotatable cylinder gear shafts, gears fast thereon to operate one set of vibrator gears, and gears loosely mounted on said shafts, and driven at a different rate of speed from said first-mentioned gears fast on said shafts, to operate the other set of vibrator gears.

4. In a loom of the class described having a magazine for bobbins or filling carriers, a head motion, comprising two sets of vibrator levers, and vibrator gears, upper and lower rotatable cylinder gear shafts, gears fast thereon, to operate one set of vibrator gears, and gears loosely mounted on said shafts, and driven at a different rate of speed from said first-mentioned gears fast on said shafts, to operate the other set of vibrator gears, and connections from said vibrator gears.

5. In a weft replenishing loom, the combination with the movable magazine, and shifting shuttle box mechanism, of devices independent of the shuttle box operating mechanism, to move the magazine, said devices controlled by pattern indicators additional to the pattern indicators for the shifting shuttle boxes.

6. In a weft replenishing loom, the combination with the movable magazine, and shifting shuttle box mechanism, of devices independent of the shuttle operating mechanism, to move the magazine, and pattern surfaces to control the operation of said devices, and other pattern surfaces to control the operation of the shuttle box mechanism.

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