Aug. 13, 1929. E. EGLI ET AL 1,724,264

CHANGE BOX MECHANISM FOR LOOMS WITH TWO OR MORE SHUTTLES

Filed Aug. 15, 1927 4 Sheets-Sheet 1

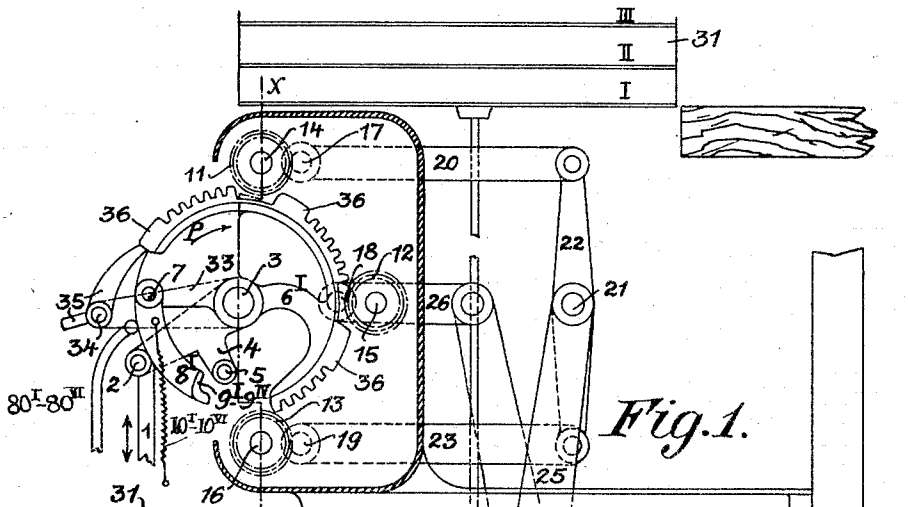


Fig. 1.

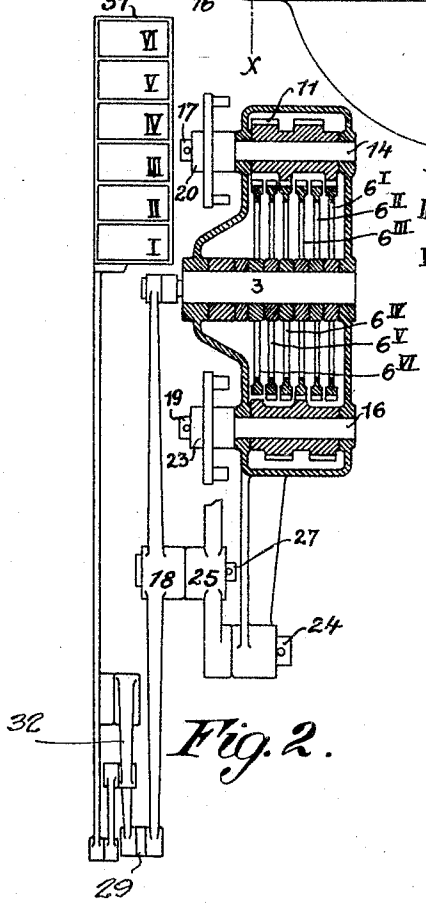


Fig. 2.

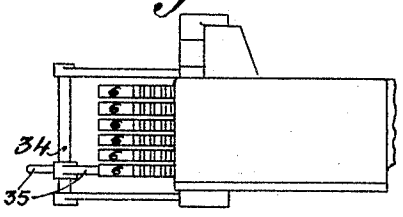


Fig. 3.

INVENTORS
E. Egli & R. Derrer
By Marks & Clerk
Attys.

Aug. 13, 1929. E. EGLI ET AL 1,724,264

CHANGE BOX MECHANISM FOR LOOMS WITH TWO OR MORE SHUTTLES

Filed Aug. 15, 1927 4 Sheets-Sheet 2

Fig. 5.

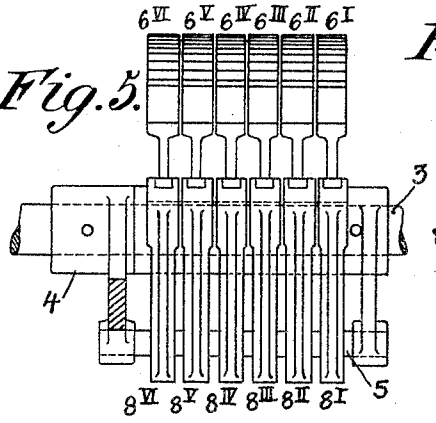
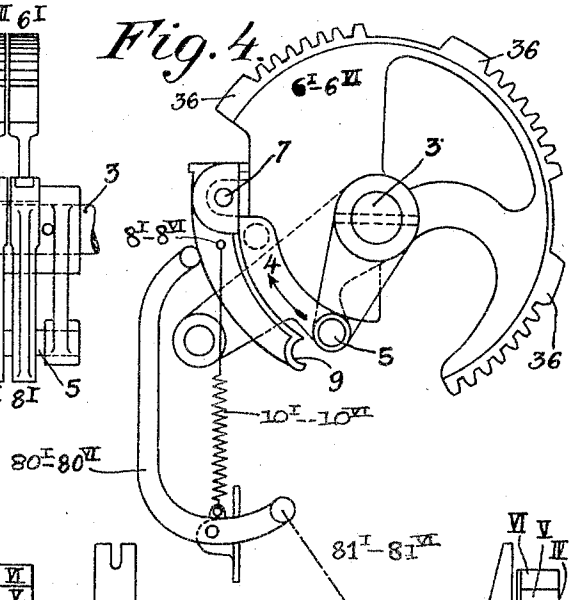


Fig. 4.



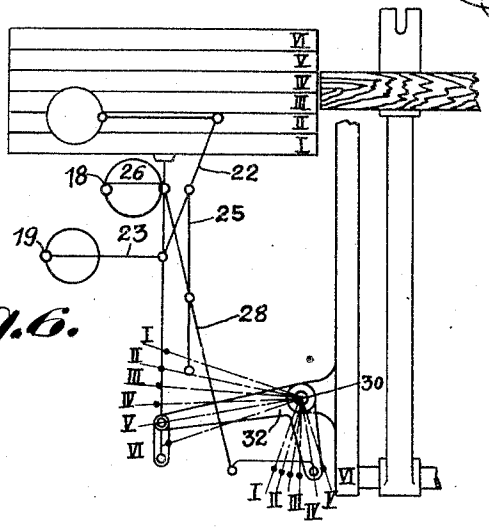


Fig. 6.

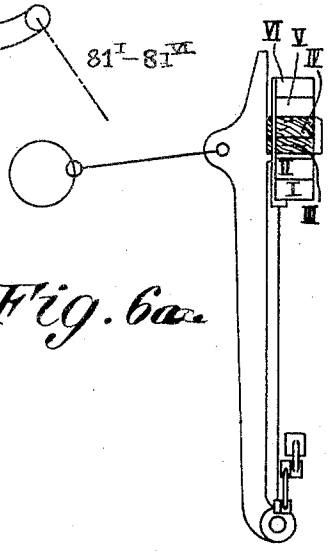


Fig. 6a.

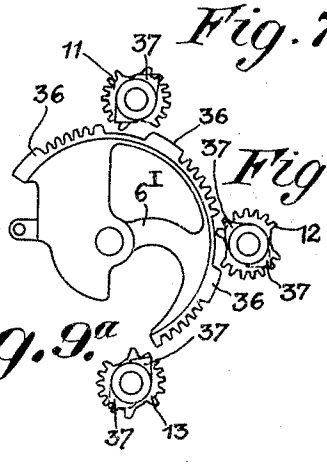


Fig. 9a.

Fig. 7.

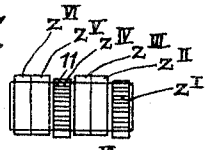
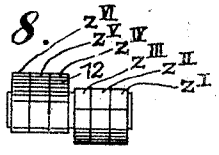


Fig. 8.



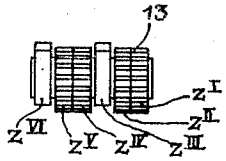


Fig. 9.

INVENTORS
E. Egli & R. Derrer
By Marks & Clark
Attys

Aug. 13, 1929. E. EGLI ET AL 1,724,264

CHANGE BOX MECHANISM FOR LOOMS WITH TWO OR MORE SHUTTLES

Filed Aug. 15, 1927 4 Sheets-Sheet 3

Fig. 10.

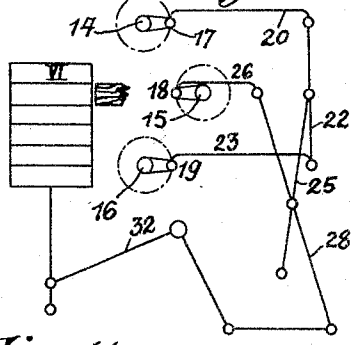


Fig. 11.

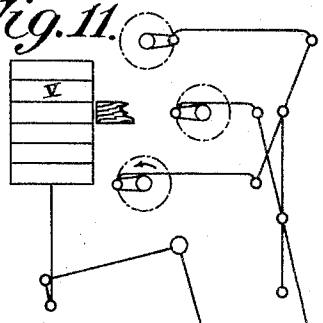


Fig. 12.

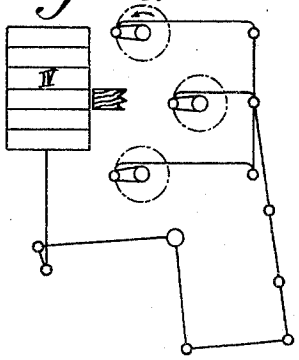


Fig. 13.

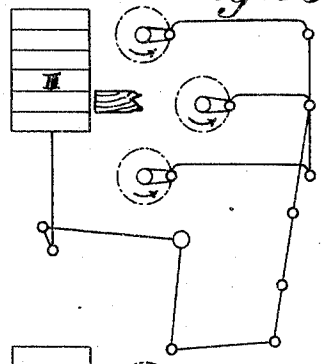


Fig. 14.

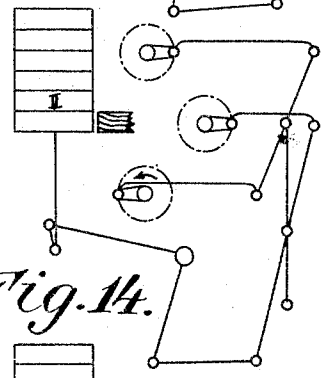
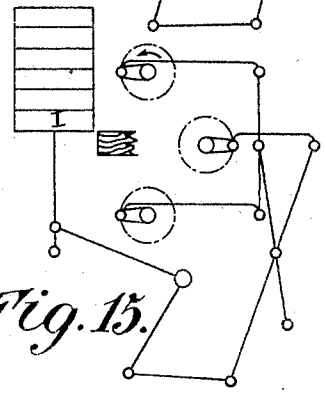


Fig. 15.



INVENTORS
E. Egli & R. Derrer
By Marks & Clark
Attys.

Aug. 13, 1929. E. EGLI ET AL 1,724,264

CHANGE BOX MECHANISM FOR LOOMS WITH TWO OR MORE SHUTTLES

Filed Aug. 15, 1927 4 Sheets-Sheet 4

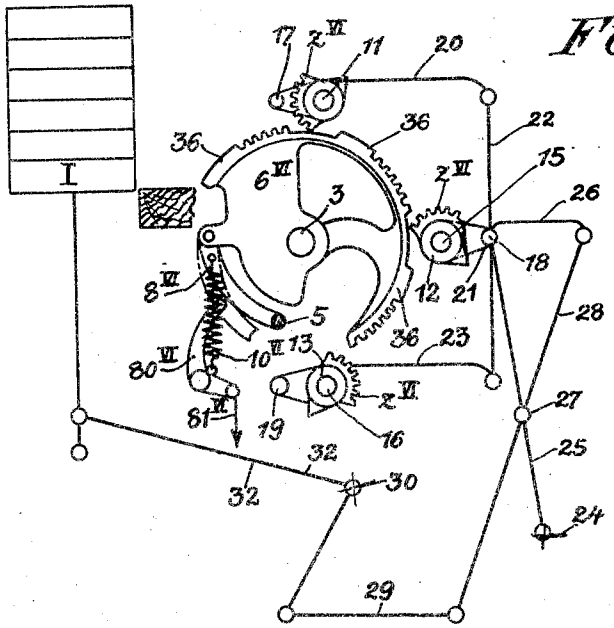


Fig. 16.

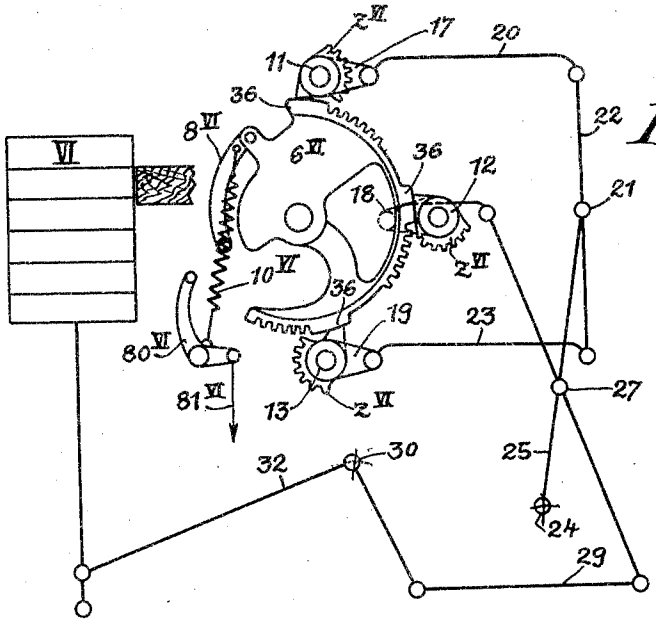


Fig. 17.

INVENTORS
E. Egli & R. Derrer
By Marks & Clerk
Attys.

Patented Aug. 13, 1929. 1,724,264

UNITED STATES PATENT OFFICE.

ERNST EGLI AND RUDOLF DERRER, OF RUTI, SWITZERLAND, ASSIGNORS TO MASCHINENFABRIK RÜTI VORMALS CASPAR HONEGGER OF RÜTI, ZURICH, SWITZERLAND.

CHANGE-BOX MECHANISM FOR LOOMS WITH TWO OR MORE SHUTTLES.

Application filed August 15, 1927, Serial No. 213,124, and in Switzerland August 31, 1926.

In change-box mechanisms for looms the device is known of shifting sideways, according to a pattern card, a rod which is capable of being set in constant up-and-down movement, thereby bringing it under the change box into engagement with racks which bring about the desired position of the shuttle boxes by engaging with toothed pinions that drive on to eccentrics and levers, chains establishing the connection between the transmission levers, and a hand lever with a toothed segment being provided which operates the racks and pinions and enables the shuttle boxes to be raised and lowered by hand. In a change-box mechanism of another kind, heavy, toothed frames acting upon adjusting wheels are moved up and down according to the pattern card, the weight of the change box being counterbalanced by a spring.

Now the above mentioned change-box mechanisms have the disadvantage that they are not suitable for high speeds of revolution of the change-box loom, and therefore can no longer suffice for the present-day requirements of rational operation.

The change-box mechanism forming the subject-matter of the present invention has the advantages of both the systems mentioned without exhibiting their disadvantages. It therefore unites, since it has no heavy oscillating masses, the advantage of a higher speed of revolution of the change-box loom than has hitherto been usual, with that of convenient adjustability at will of the box compartments by hand.

The above-mentioned advantages are obtained according to the invention owing to the fact that toothed elements of small mass, arranged side by side, and individually reciprocable, are only capable of being positively actuated from the loom shaft in one direction of movement, and axially undisplaceable pinions acting upon the adjusting cranks or eccentrics always rotate in the same direction, and that each of the said toothed elements can be actuated by hand independently of the others by an axially slidable hand tappet whereby the shuttle boxes corresponding to these elements can be brought to the level of the shuttle race without interrupting the drive and irrespective of the previous adjustment of the shuttle box.

The accompanying drawings illustrate two constructional examples of the invention:

Figure 1 is a front elevation of the mechanism, partially in section,

Figure 2 is a sectional elevation on the line x—x in Fig. 1 and

Fig. 3 is a fragmentary top plan detail of part of the arrangement shown in Fig. 1.

Figs. 4 and 5 illustrate on a larger scale details of the mechanism.

Figs. 6 and 6^a are diagrams for the purpose of illustrating the change-box mechanism in another position, and

Figures 7, 8 and 9 are side elevations of the three pinions for the adjustment of the cranks.

Fig. 9^a is a side elevational detail of one of the toothed segments and adjacent pinions.

Figs. 10 to 15 are diagrammatic illustrations of the crank and lever positions pertaining to the six change-box positions, and Figures 16 and 17 are two views, partly constructional and partly diagrammatic, illustrating the adjusting of the shuttle-box compartment VI to the level of the shuttle race from the position with compartment I at the level of the shuttle race.

In Fig. 1 the rod 1 is capable of being moved up and down from the loom shaft by intermediate members not shown, and is connected by the pin 2 with a tappet lever 4 freely oscillatable about a shaft 3. The tappet lever 4 carries the tappet pin 5. Upon the shaft 3 are rotatably mounted six parallel toothed segments 6^I to 6^{VI} of small mass. Each segment 6^I to 6^{VI} carries three groups of teeth mounted upon the same pitch circle, each group containing the same number of teeth, and the arrangement of these groups of teeth being the same in all the segments. To each of these toothed segments is pivoted by means of a pin 7 a tappet pawl 8^I to 8^{VI}, which carries a finger 9^I to 9^{VI} capable of swinging over the pin 5 of the lever 4. Upon each tappet pawl 8^I to 8^{VI} there acts a bell-crank lever 80^I to 80^{VI}, which can be actuated from the pattern card by means of a pulling element 81^I to 81^{VI}. During the ascent of the tappet pin 5 according to the measure of the pattern-card not shown, the toothed segment, the pawl 8 of which was engaged by the lever 80 and by the pattern card, has swung into the path of tappet pin 5 and is rotated upon the shaft 3. From

the pawls 8^{I} to 8^{VI} are suspended springs 10^{I} to 10^{VI}, which on the one hand effect the backward rotation of the associated toothed segment 6^{I} to 6^{VI} and on the other hand the swinging of the pawl 8^{I} to 8^{VI} out of reach of the tappet pin 5.

Within the range of rotation of the toothed segment 6^{I} to 6^{VI} are secured three pinions 11, 12 and 13 upon shafts 14, 15 and 16. Each pinion has six axially displaced groups of teeth z^{I} to z^{VI}, of which one group is displaced in the peripheral direction, and, as already stated, in the axial direction in relation to the other. The relative angular positions and arrangement of the groups of teeth z^{I} to z^{VI} upon the three pinions 11, 12 and 13 is such that each toothed segment 6^{I} to 6^{VI}, regardless of the preceding adjustment of the shuttle box, always brings the same box compartment to the level of the race board, as will hereinafter be described in greater detail. This is also rendered possible by the independent rotatability of each toothed segment.

Upon each pinion shaft 14, 15 and 16 is mounted a crank pin 17, 18 and 19 respectively. The crank pin 17 is connected by a link or guide rod 20 with one arm of a two-armed lever 22, which is rotatable about a pin 21, and the crank pin 19 is connected by a link or guide rod 23 with the other arm of this lever. The lever 22 is carried by the end of a one-armed lever 25 rotatable about a pin 24. The crank pin 18 is connected by a link or guide rod 26 with one arm of a two-armed lever 28 rotatable about a pin 27. The pin 27 is carried by the lever 25. The lower end of the lever 28 is connected by a rod 29 with one arm of a bell-crank lever 32, oscillatable about a pin 30 on the frame and carrying the shuttle box 31.

The method of working of the change-box mechanism described is as follows:—

For the adjustment of the uppermost shuttle box compartment VI to the level of the slay beam (Figs. 10 and 17) from the preceding adjustment of the box I for example to the level of the slay beam (Figs. 1, 15 and 16), the pawl 8^{VI} with the recess 9^{VI} would be rocked over the tappet pin 5 by the pattern-card. During the following stroke of the pin, the foremost toothed segment 6^{VI}, located next to the place where the weaver stands, would be rotated in the direction of the arrow P (Fig. 1) by the impact of the pin 5 upon the pawl 8^{VI}. The crank pins 17, 18 and 19, owing to the engagement of the groups of teeth z^{VI} of the pinions 11, 12 and 13 with the groups of teeth of the working segments 6^{VI}, would thereby be rotated and the box adjustment according to Figures 10 and 17 would be reached by co-operation of the levers 20, 23, 26, 22, 25, 28 and 32.

For the adjustment of the box compartment V to the level of the slay beam (Figs. 6 and 11) from the box position with the shuttle box VI at the level of the slay beam (Figs. 10 and 17), the crank rotates owing to the groups of teeth Z^{V} of the pinion. By this means the box adjustment according to Figs. 6 and 11 would be reached by the co-operation of the levers 26, 23, 22, 25, 28 and 32.

Every further box adjustment is effected similarly to the two examples described, by actuating the toothed segment 6^{I} to 6^{VI} in question, and by engagement with the corresponding groups of teeth z^{I} to z^{VI} on the pinions 11, 12 and 13.

The groups of teeth z^{I} to z^{VI} are so arranged on the pinions 11, 12 and 13 that the operation of a particular segment always causes a particular shuttle box to be raised to the level of the slay, irrespective of the previous adjustments of the shuttle boxes.

Thus after the shuttle box VI has been brought into active position, as shown in Figs. 10 and 17, the teeth on these pinions occupy such positions that pinion 11 is rotated when either segment I or IV is operated, and only when one of these segments is operated; pinion 12 is rotated by segments I, II and III and pinion 13 by segments I, II, IV and V. Figs. 7, 8 and 9 illustrate this point.

In order to enable any shuttle box to be brought to the level of the slay beam by hand from any position, a stirrup 33 with a bridge piece 34 is rotatably arranged about the shaft 3, and upon the bridge piece a two-armed hand-tappet 35 is rotatable and axially displaceable in such a way that it is adjustable to any toothed segment 6^{I} to 6^{VI}. During the ascent of the lower arm of the hand-tappet 35, the upper hand-tappet arm is rocked in towards the pawl 8^{I} to 8^{VI}, to which it is adjusted. Owing to the lock so produced, the segment 6^{I} to 6^{VI}, during the further ascent on the hand-tappet 35, is rotated, and the corresponding crank or box adjustment thereby effected. In order to prevent the cranks from rotating too far and obtaining an unobjectionable securing of the crank position reached, each toothed segment 6^{I} to 6^{VI}, at its junction with the three groups of teeth, has a raised tooth 36, which is several times as thick as the others, and each of the pinions 11, 12, and 13 has a cam 37 (Fig. 7). After the termination of the partial rotation of the pinion or the pinions, the cam or cams 37, by striking against the tooth or teeth 36 prevent any further rotation of the crank or cranks concerned. Similarly an unwanted backward rotation of the pinion or pinions is prevented by the impact of the last club tooth of the group in question against the tooth 36, and thus a thoroughly reliable locking of the required cranks is obtained.

The backward rotation of the segments 6^{I} to 6^{VI} into the basic position is effected by the springs 10 on the pawls 8^{I} to 8^{VI} and to externally fixed points, after descent of the tappet pin 5 or after backward rotation of the hand-tappet 35. These springs furthermore effect the rocking of the pawls 8^{I} to 8^{VI} out of reach of the tappet 5.

When the segments make their return movement under spring action, they are no more in meshing connection with the pinions 11, 12 and 13, so that these pinions are not driven backward (clockwise). This is due to the fact, that the teeth of the pinions extend only a limited part of the circumference of the pinions.

The eccentricity of the crank pins 17, 18 and 19 or of the eccentrics is equal to the division into compartments of the shuttle box.

The reciprocating movement brought about by the toothed segments, pinions, cranks or eccentrics, and change levers, may be transmitted to the shuttle box 31 by any suitable means.

In order to counterbalance the weight of the shuttle box a device oscillating with the slay is preferably employed.

Owing to the fact that the toothed segments 6^{I} to 6^{VI} are of small mass, that is to say, are comparatively light, it is possible to work the change-box loom at a high speed of revolution, whereby a high output is obtained.

The change-box mechanism obviously admits of being adapted to any number of shuttles, and instead of cranks, eccentrics may be employed.

What we claim is:

1. A change-box mechanism for looms, comprising in combination, a plurality of shuttles, adjusting cranks, change levers actuated thereby, toothed segments of low mass, arranged side by side and individually rotatable operatively in the same direction, means for positively actuating the segments from the loom shaft in one direction of movement only, axially undisplaceable pinions connected to the said adjusting cranks and an axially slidable hand tappet adapted to actuate each of the said toothed segments independently of the others for bringing the shuttle boxes corresponding to these toothed segments to the level of the shuttle race without interrupting the drive and irrespectively of the preceding adjustment of the change-box.

2. A change-box mechanism for looms, comprising in combination, a plurality of shuttles, adjusting cranks, change levers actuated thereby, toothed segments of low mass arranged side by side and individually rotatable operatively in the same direction, each segment having a raised and thickened tooth at the end of each range of normal teeth, means for positively actuating the segments from the loom shaft in one direction of movement only, axially undisplaceable pinions connected to the said adjusting cranks, each pinion having a cam thereon adapted to come in contact with one of said raised and thickened teeth on the respective toothed segment to prevent the pinion from rotating too far, while the last tooth of the pinion is adapted to come into contact with the said thickened tooth to prevent backward movement of the pinion, and an axially slidable hand tappet adapted to actuate each of the said toothed segments independently of the others for bringing the shuttle boxes corresponding to these toothed segments to the level of the shuttle race without interrupting the drive and irrespectively of the preceding adjustment of the change-box.

3. A change-box mechanism for looms comprising in combination, a plurality of shuttles, adjusting cranks, change levers actuated thereby, toothed segments of low mass, arranged side by side and individually rotatable operatively in the same direction, means for positively actuating the segments from the loom shaft in one direction of movement only, axially undisplaceable pinions connected to the said adjusting cranks, an axially slidable hand tappet adapted to actuate each of the said toothed segments independently of the others for bringing the shuttle boxes corresponding to these toothed segments to the level of the shuttle race without interrupting the drive and irrespectively of the preceding adjustment of the change-box, and an oscillatable stirrup, the bridge piece of which slidably and rotatably carries the said hand tappet.

4. A change-box mechanism for looms, comprising in combination, a plurality of shuttles, adjusting cranks, change levers actuated thereby, toothed segments of low mass, arranged side by side and individually rotatable operatively in the same direction, means for positively actuating the segments from the loom shaft in one direction of movement only, axially undisplaceable pinions connected to the adjustment cranks, each of these pinions having as many groups of teeth as there are adjusting cranks, and an axially slidable hand tappet adapted to actuate each of the said toothed segments independently of the others for bringing the shuttle boxes corresponding to these toothed segments to the level of the shuttle race without interrupting the drive and irrespectively of the preceding adjustment of the change-box.

In testimony whereof we have affixed our signatures.

ERNST EGLI.
RUDOLF DERRER.