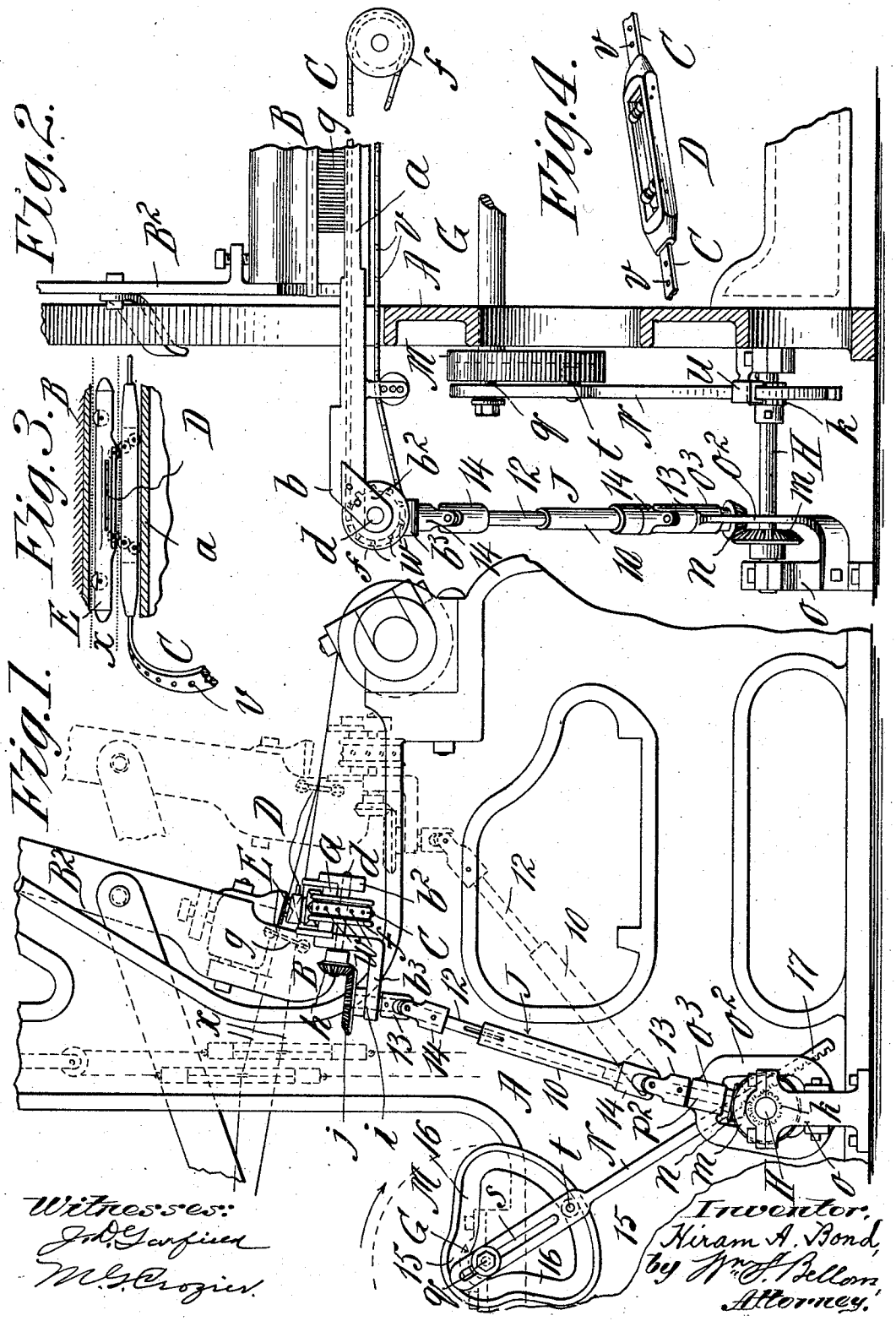
No. 785,655. PATENTED MAR. 21, 1905.

H. A. BOND.

SHUTTLE MOVING DEVICE FOR WIRE LOOMS.

APPLICATION FILED JULY 18, 1904.



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UNITED STATES PATENT OFFICE.

HIRAM A. BOND, OF SPRINGFIELD, MASSACHUSETTS.

SHUTTLE-MOVING DEVICE FOR WIRE-LOOMS.

SPECIFICATION forming part of Letters Patent No. 785,655, dated March 21, 1905.

Application filed July 18, 1904. Serial No. 217,025.

To all whom it may concern:

Be it known that I, HIRAM A. BOND, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Shuttle-Moving Devices for Wire-Looms, of which the following is a full, clear, and exact description.

This invention relates to improvements in the shuttle-motion of a loom, and particularly to the class exemplified in the well-known Lyall loom, in which the carrier for the shuttle is mounted on an endless band or strap, which latter is mounted on and bodily movable with the lay, and having a back-and-forth traveling movement across the warps closely under the shed, the shuttle, however, moving in the shed and being propelled by the carrier, moved by and movable with the band.

The object of the present invention is to devise an improved means for imparting back-and-forth movement to the band for the shuttle-carriage which is especially adaptable for employment on a wire-weaving loom of the particular description set forth in Letters Patent of the United States issued to me October 15, 1901, No. 684,536, and March 8, 1904, No. 754,192, in which the final portions of the beating-up motions of the lay are by an acquired momentum and not by a positive mechanically-imparted thrust to the end of the battening, and inasmuch as in the weaving of wire-cloth for paper-machines the quality of the product is dependent on the character of the beating-up motion of the lay, which lay is a suspended lay, it is necessary to devise a propulsion means for the shuttle-carriage-carrying band which will be practical and properly coöperative with a suspension-lay and which will be so sensitive in action as not to impede the highly-desirable movements of the lay or to impair the operative efficiency thereof.

The invention includes, in a loom, the combination, with the lay and the supporting-wheels at its opposite ends for the shuttle-carrier band and a gear-wheel having driving connection with one of the band-wheels mounted on and bodily movable with the lay and having an arbor, of a shaft and means for imparting back-and-forth rotary movements intermittently thereto and a gear-wheel in connection with and driven by said shaft, also having an arbor, and a shaft consisting of two sections relatively non-rotatable, but telescopically arranged for distention and contraction, and respectively endwise universal-joint-connected with the arbors of the aforementioned gear-wheels; and the invention furthermore consists in other subordinate combinations of parts and constructions thereof, all substantially as hereinafter more fully described, and set forth in the claims.

In the accompanying drawings so much of an end portion of a loom as is necessary to make apparent the composition of the present invention is illustrated, Figure 1 being an elevation as looking at the end of the lay and showing the novel mechanism coöperatively arranged in conjunction therewith and with the shuttle-carriage band mounted thereon and bodily movable therewith. Fig. 2 is an elevation of the parts as seen at right angles to Fig. 1. Fig. 3 is a view, on a somewhat larger scale, showing the somewhat well-known relations of the band-propelled carriage, the shed, and the shuttle. Fig. 4 is a perspective view showing parts of the band and the carriage for the shuttle.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A represents a part of one of the loom end frames, B representing the lay, the swords B^2 for which support the lay at their lower extremities, the same being understood as pivotally mounted at the top of the loom, substantially as represented in the aforementioned patents. The lay is constructed with a shelf-like portion *a*, with extensions *b* at opposite ends formed with brackets b^2, in which are supported the arbors *d* for wheels *f*, which support and guide the band C, made substantially endless by having the ends thereof connected to the carriage D for the shuttle E, *x* representing the shed made by the decussations of the warps, and it being perceived that the carrier D runs closely under the shed, while the shuttle having sup-

porting contact on and to be propelled by the carriage is within the shed, the carriage moving backward and forward alternately and in proper time to occupy positions at the opposite end extensions b of the lay outside of the location of the reeds g, and the warps running therethrough. The arbor d, supported in the bracket therefor at one end of the loom-lay, has at its extremity the bevel gear-wheel h, and on the horizontally-extending bracket portion b^3, which may be regarded as a part of the lay, is a substantially axially-vertical arbor i, having affixed at its upper end a bevel gear-wheel j of somewhat greater diameter than said bevel-wheel h.

G represents what, so far as the present mechanism is concerned, may be considered the driving-shaft, and H represents a counter-shaft having the pinion spur-gear k thereon and a bevel-gear m thereon. The journal-supporting standard o for one end of the counter-shaft H is provided with a yoke-shaped bracket o^2, having the approximately vertical journal-hub o^3, through which is mounted for rotation the arbor p^2, at the lower end of which arbor is a bevel gear-wheel n, which is in mesh with the aforementioned bevel gear-wheel m on the counter-shaft H.

Intervening between and connected with the arbors i and p^2 for the respective bevel gear-wheels j and n is a distensible and contractible shaft J, the same comprising shaft-sections 10 and 12, the one telescoping into the other, and while therefore capable of relative endwise movement the two shaft-sections are non-rotatable relatively to each other by being spline-engaged. Each arbor i and p^2 at its end farthest from the respective gear-wheel thereby carried is equipped with a half member 13 of a universal joint, the other half member, 14, of each of the universal joints being affixed on the outer ends of the telescopic shaft-sections 10 and 12.

The aforementioned driving-shaft G has at its extremity closely outside of the end frame of the loom the cam-wheel M, the same having within its face the cam-groove, which, as shown in Fig. 1, comprises diametrically opposite concentric and non-working groove portions 15 15 and the relatively intermediate uniting and working groove portions 16 16, N representing a rack-bar, the rack-teeth 17 of which are in mesh with the spur-pinion gear k, and said rack-bar has somewhat below its upper end the roller-provided cam-stud t, engaging in the aforementioned cam-groove, and said rack-bar, moreover, has the longitudinal slot s, which has a guiding engagement over the axial end extension q of the driving-shaft, which projects outwardly beyond the face of the cam-wheel M, and the rack-bar is, furthermore, guided and held to mesh with the spur-pinion k by the shoe u. (Seen in Fig. 2.)

In operation one complete rotation of the cam-wheel is effective to drive the carriage D and shuttle from one side of the loom across to the other side, it after a pause returning to the side at which it was, again pausing, and insuring, because of the shape of the cam, the suitable operating rotary motions in opposite directions of one of the band-supporting wheels f being imparted through the gearing shown and described and the contractible and distensible shaft universal-joint-connected with the gearing proximate to the band supporting and driving wheel f and the counter-shaft h, it being apparent that the stated connections have the capabilities of conforming to the different locations of the lay, (see the dotted-line position of the lay and the changed position and distended condition of the telescopic shaft, Fig. 1,) and all without impediment or detrimental effect to that character of action of the lay which is especially highly desirable in a loom for weaving certain descriptions of wire-cloth.

In order that the shuttle-carrier may be moved with positiveness across the loom to reach and momentarily pause at its proper position transversely beyond the shed, the band C is provided with a series of evenly-spaced perforations v, in which radial studs w of one or both of the band supporting and propelling wheels f engage.

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

1. In a loom, the combination with the lay having supporting-wheels at opposite ends thereof, and one thereof provided with a gear-wheel, the band for the shuttle-carrier, arranged to run around said supporting-wheels backwardly and forwardly, another gear-wheel rotatably mounted on the lay in mesh with the gear of the band-supporting wheel, of a shaft and means for imparting intermittently rotary reciprocatory movements thereto, a gear-wheel on said shaft, and another gear-wheel in mesh therewith, and a shaft comprising telescopic sections endwise movable but non-rotatable relatively to each other, and having respectively universal-joint connections with the arbors of the aforesaid gear-wheels stated as in mesh with the gear on the band-supporting wheel and the gear on the first-named shaft.

2. In a loom, the combination with the lay and the supporting-wheels at its opposite ends for the shuttle-carrier band, and a gear-wheel having driving connection with one of the band-wheels, mounted on, and bodily movable with, the lay, and having an arbor, of a shaft and means for imparting back-and-forth rotary movements intermittently thereto, and a gear-wheel in connection with, and driven by, said shaft also having an arbor, and a shaft consisting of two sections relatively non-rotatable but telescopically arranged for distention and contraction, and respectively end-

wise universal-joint-connected with the arbors of the aforementioned gear-wheels.

3. In a loom, the combination with the lay and the supporting-wheels at its opposite ends for the shuttle-carrier band, and a gear-wheel having driving connection with one of the band-wheels, mounted on, and bodily movable with, the lay, and having an arbor, of a shaft having a spur-gear thereon, a rack-bar in mesh with such spur-gear and means for intermittently imparting back-and-forth movements to the rack-bar, and a gear-wheel in connection with, and driven by, said shaft, having an arbor, and a shaft consisting of two sections relatively non-rotatable but telescopically arranged for distention and contraction, and respectively endwise universal-joint-connected with the arbors of the aforementioned gear-wheels.

4. In a loom, the combination with the lay and the supporting-wheels at its opposite ends for the shuttle-carrier band, and a gear-wheel having driving connection with one of the band-wheels, mounted on, and bodily movable with, the lay, and having an arbor, of a shaft, having a spur-gear thereon, a cam-shaft and cam-wheel thereon having a groove comprising diametrically opposite concentric and non-effective portions with relatively intermediate eccentric groove portions oppositely uniting the concentric groove portions, a rack-bar in mesh with said spur-gear, and having a stud engaging in the groove of the cam-wheel, and a gear-wheel in connection with, and driven by, said spur-gear-carrying shaft, having an arbor, and a shaft consisting of two sections relatively non-rotatable but telescopically arranged for distention and contraction, and respectively endwise universal-joint-connected with the arbors of the aforementioned gear-wheels.

5. In a loom, the combination with the lay and the supporting-wheels at its opposite ends for the shuttle-carrier band, and a gear-wheel having driving connection with one of the band-wheels, mounted on, and bodily movable with, the lay, and having an arbor, of a shaft, having a spur-gear thereon, a cam-shaft and cam-wheel thereon having a groove comprising diametrically opposite concentric and non-effective portions with relatively intermediate eccentric groove portions oppositely uniting the concentric groove portions, and said cam-shaft having a portion axially projecting beyond the outer face of the cam-wheel, a rack-bar in mesh with said spur-gear, and having a stud engaging in the groove of the cam-wheel, and formed with a longitudinal slotted portion having a guiding engagement about the said projecting shaft portion, and a gear-wheel in connection with, and driven by, said spur-gear-carrying shaft, having an arbor, and a shaft consisting of two sections relatively non-rotatable but telescopically arranged for distention and contraction, and respectively endwise universal-joint-connected with the arbors of the aforementioned gear-wheels.

6. In a loom, in combination, the lay carrying at its ends the wheels *f f*, one thereof having on its arbor the bevel gear-wheel *h*, and an arbor *i* having the bevel gear-wheel *j* in mesh with the gear-wheel *h* and bodily movable with the lay, the driving-shaft G having the cam M thereon and the counter-shaft H having the spur-pinion gear-wheel *k* and the bevel gear-wheel *m* thereon, an arbor p^2 journaled for rotation about a stationary axis and having the bevel gear-wheel *n*, the shaft J comprising the sections 10 and 12 combined as described, and each having at its extremity a universal-joint member 14, complementary universal-joint members 13 respectively on the arbors *i* and p^2, and the rack-bar N engaging the cam M, and in mesh with the gear-wheel *k*, substantially as described and shown.

7. In a loom, the combination with the lay, the supporting-wheels at the opposite ends, one or both thereof having radially-projecting studs, the shuttle-carrier band, having regularly-spaced perforations, and a gear-wheel having driving connection with one of the band-wheels, mounted on, and bodily movable with, the lay, and having an arbor, of a shaft having a spur-gear thereon, a rack-bar in mesh with such spur-gear, and means for intermittently imparting back-and-forth movements to the rack-bar, and a gear-wheel in connection with, and driven by, said shaft, having an arbor, and a shaft consisting of two sections relatively non-rotatable but telescopically arranged for distention and contraction, and respectively endwise universal-joint-connected with the arbors of the aforementioned gear-wheels.

Signed by me at Springfield, Massachusetts, in presence of two subscribing witnesses.

HIRAM A. BOND.

Witnesses:
A. V. LEAHY,
WM. S. BELLOWS.