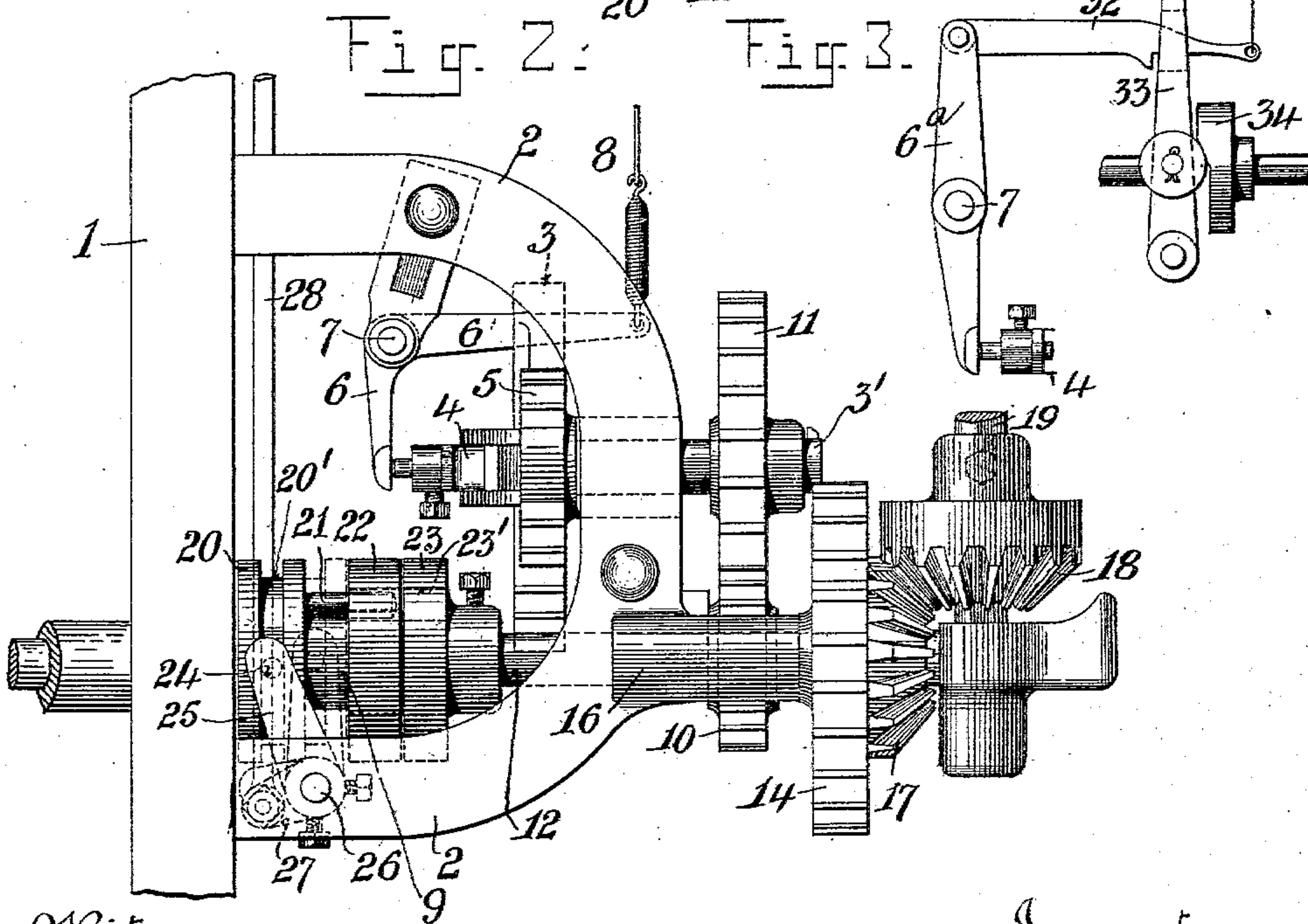
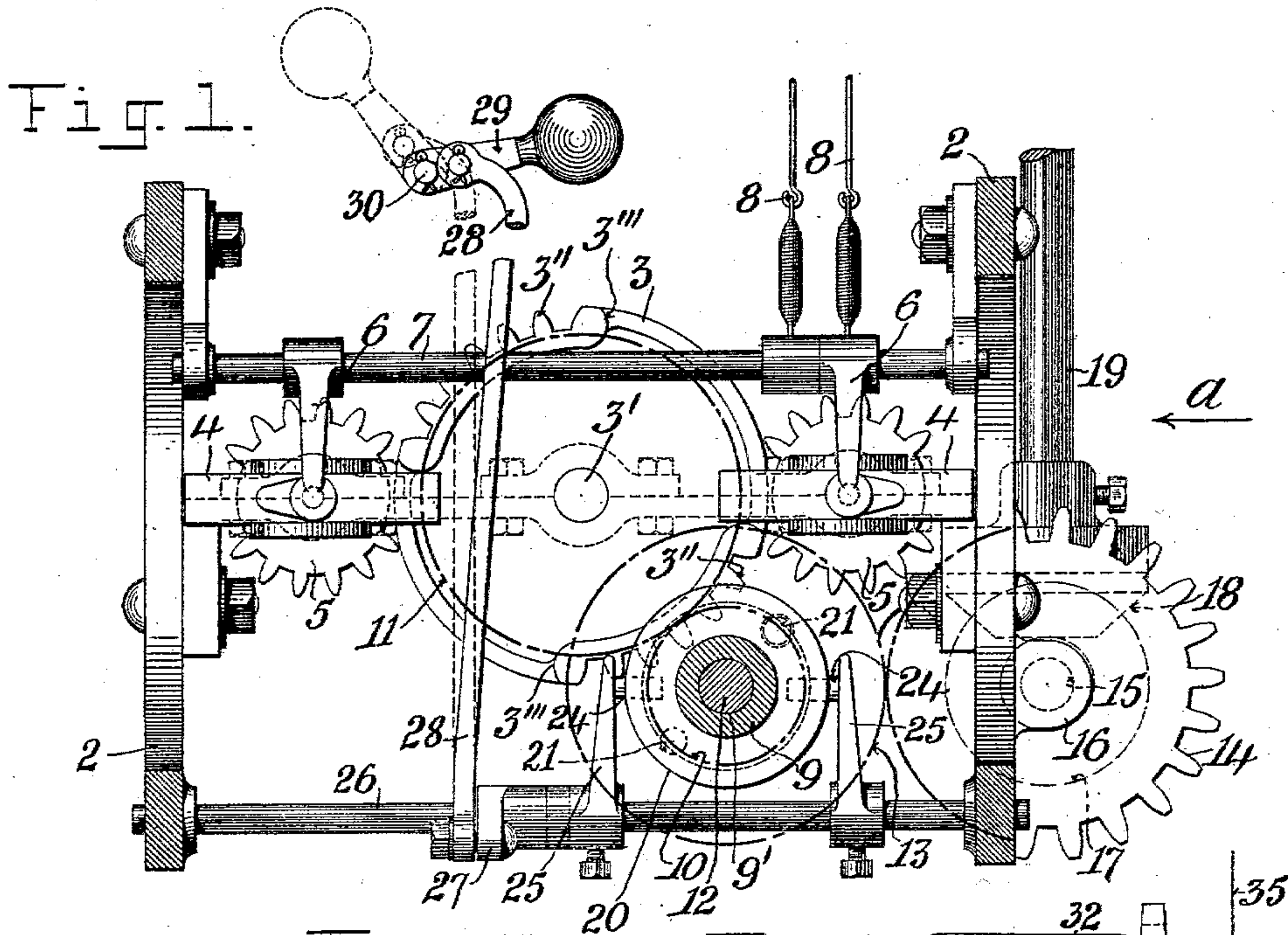


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E. HOLLINGWORTH.
SHUTTLE BOX MOTION FOR LOOMS.
APPLICATION FILED JULY 5, 1902.

NO MODEL.



Witnesses.
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SHUTTLE-BOX MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 752,973, dated February 23, 1904.

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To all whom it may concern:

Be it known that I, EDWARD HOLLINGWORTH, a subject of the King of Great Britain, residing at Dobcross, in the county of York, England, have invented certain new and useful Improvements Relating to the Positive Shuttle-Box Motions of Looms for Weaving, of which the following is a specification.

This invention relates to positive box-motions of looms for weaving, and particularly to positive box-motions in which the boxes are raised and lowered to bring any box of the series into alinement with the "shed" by means of mutilated pinions actuated by a segmental master driving-gear.

In looms provided with positive box-motions, such as above referred to, there has heretofore been no provision for disconnecting the box and dobby-pattern mechanism conjointly from the loom and admitting of same being turned back to find broken ends or for other purposes for which lagging back is requisite from time to time, and for this reason looms having positive box-motions have been under considerable disadvantage in this respect, as is well known.

One of the difficulties which has stood in the way of the adoption of means for disconnecting and turning back the boxes simultaneously with the disconnection and reversal of the harness or pattern mechanism, and in the same ratio, especially in looms having a box-motion such as above specified, has been the want of space for the introduction of an auxiliary cross-shaft for coupling the box-motions at each side of the loom, so that in reversing the action the two series of boxes could be operated in unison and to the extent called for by the pattern devices.

The object of my invention is to enable the harness or pattern mechanism and the shuttle box-motions at each side of the loom to be disconnected from the loom and the action of same reversed for the purpose of lagging back with the same ease and facility as the harness or pattern mechanism alone is now disconnected and turned back or as lagging back is accomplished in looms having non-

positive box-motions, and, in particular, to overcome the difficulty of adding an auxiliary shaft without encumbering the loom or taking up any additional space.

My invention consists in certain novel features of construction of my improvements above referred to, as will be hereinafter more fully described.

I have only shown in the drawings sufficient parts of a positive box-motion in which the boxes are raised and lowered by means of mutilated pinions actuated by a segmental driving-gear with my improvements applied thereto to enable those skilled in the art to which my invention belongs to understand the same.

Referring to the drawings, Figure 1 is an elevation, seen from the inside of the loom, of the positive box-motion of the class described having my improvements applied, the near side frame of the loom being omitted. Fig. 2 is a front elevation looking in the direction of arrow *a*, Fig. 1. Fig. 3 is a detail of a modification hereinafter referred to.

In the accompanying drawings, 1 is the loom side, and 2 2 the frame or brackets bolted thereto for carrying the operative parts of the positive shuttle-box-operating mechanism.

3 is the rotating master-gear, mounted on the stud-shaft 3' and having the toothed segments 3'' thereon and starting-teeth 3''' projecting from the rear face thereof, which are adapted to engage as called upon by the pattern mechanism with diametrical levers 4 4, pivotally carried by the mutilated pinions 5 5, in order to turn said pinions far enough to bring the teeth of one of the toothed segments thereon into mesh with the teeth of a segment on the master-gear, so that movement may be transmitted by cranks (not shown) connected to the mutilated pinions and to the box-levers (also not shown) for raising or lowering the series of boxes to bring the required box of the series into alinement with the shed. The diametrical levers 4 4 are moved upon their centers to place the adjacent ends thereof into or out of the path of the starting-teeth 3''' on the master-gear by the levers 6 6', mounted on the rock-shaft 7 (one lever, 6, being fast

on said shaft, and the other, 6', loose) and which are actuated by connectors 8 8 from the pattern mechanism.

The construction and operation of the above parts will be well understood by those skilled in the art and form no part of my present improvements.

The master-gear 3 is driven in this instance from the picking-shaft 9 by pinion 10 meshing with a spur-wheel 11, fast on the stud-shaft 3', and said picking-shaft derives its motion through a spur-wheel fast thereon, which meshes with the usual spur-wheel fast on the crank-shaft of the loom at the opposite side of the loom to that shown on the drawings.

In my improvements I dispense with the usual solid picking-shaft or other shaft from which the positive box-motion is driven—ordinarily the picking-shaft—and I substitute for such ordinary solids haft a hollow shaft 9, which is mounted in bearings in the loom-frame in much the same way as heretofore. The central bore 9' through said shaft or sleeve is of suitable diameter to receive an auxiliary shaft 12, which extends through and beyond each end of the hollow shaft and has fast on each end thereof a pinion 10, meshing with a spur-wheel 11 on the stud-shaft 3' of the box-motions at each side of the loom. There is also fast on one end of the said auxiliary shaft 12 a gear 13, meshing with a gear 14 on a short stud-shaft 15, journaled in a bearing 16 on the frame or near bracket 2. On the face of the gear 14 is a bevel-gear 17, which meshes with a bevel-gear 18, fast on the usual upright shaft 19, geared up to the pattern mechanism (not shown) in the ordinary way. The box-motion at the opposite side of the loom to raise or lower the opposite series of boxes is a duplicate of that shown on the drawings, and the stud-shaft on which the master-gear is secured is driven by pinion on the auxiliary shaft meshing with a gear on the said stud-shaft precisely as shown and described with reference to Figs. 1 and 2, and for this reason I have not thought it necessary to show more than the box-motion at the side of the loom where the pattern mechanism is located.

The hollow picking-shaft 9 projects outward beyond the side frame 1 and has secured thereon by a sliding key movable in a keyway in the direction of the length of said shaft a clutch 20, having one or more pins 21 21, extending from one side thereof into corresponding openings in a boss or collar 22, fast on the end of the hollow shaft 9. Adjacent to the boss or collar 22 and the end of shaft 9 is a collar 23, fast on the auxiliary shaft 12 and provided with openings 23' through same, corresponding to the openings through the collar 22, and into which are adapted to enter when projected through the openings in the collar 22 the pins 21 21 on the sliding clutch

20. In the periphery of the said sliding clutch 20 is an annular groove 20', into which project studs or pins 24 24 on arms 25 25, secured to a rocking shaft 26, supported at each end in bearings in the frame or bracket 22. Fast on said rocking shaft is a lever-arm 27, having pivotally connected thereto one end of a rod 28, whose opposite end is cranked and pivotally connected to a weighted lever 29, mounted on a stud 30, carried by a bracket bolted to the loom side. This lever 29 is located in a convenient position on the loom side to be within easy reach of the weaver and is actuated by hand by the weaver to slide the clutch on the hollow shaft 9 to engage the pins 21 21 with the openings 23' in the collar 23 or to move them out of engagement with said collar.

When the loom is weaving, the positive box-motions at each side of the loom are actuated as heretofore, the clutch 20 being in the position indicated by dotted line in Fig. 2 and the pins 21 21 registered in the openings 23' in the collar 23 on auxiliary shaft 12, so that the said auxiliary shaft forms a part of and rotates with the hollow shaft 9, which is driven direct from the crank-shaft of the loom, and there is essentially no difference in the motions; but when the loom is stopped for lagging back for any purpose the weaver draws over the lever 29 from the position shown in dotted line, to that shown in full line in Fig. 1 and by means of rod 28, lever-arm 27, rocking shaft 26, and fork 25 25, fast thereon, moves the clutch 20 away from the boss or collar 22 to the position shown in full line, Fig. 2, and thereby places the pins 21 21 clear of the collar 23 on auxiliary shaft 12, disconnecting said shaft 12 from the hollow shaft 9 and permitting it to be rotated to any extent independently of the loom.

The disconnection of the pattern mechanism from the loom is effected as usual, and the said pattern mechanism is turned back by hand-wheel in the ordinary way as far as may be desired. The reversal of motion of the pattern mechanism is transmitted through the upright shaft 19, bevel-gears 18 and 17, and spur-gears 14 and 13 to the auxiliary shaft 12, thereby rotating said shaft freely within the hollow shaft 9 and conveying motion across the loom, so that the pinions meshing with the spur-gears on the shafts of the respective master-gears at each side of the loom transmit motion to the master-gears of each box-motion to operate them positively in a reverse direction to the normal motion and in unison with the pattern mechanism, the parts always being brought back to their proper positions for recommencing weaving.

In harness-jacquards, where the connection from the harness is by lengths of string or wire, I employ the means shown at Fig. 3 and consisting of levers 6^a, pivoted at 7, and adapted at their lower ends to contact with the re-

spective diametrical levers 4 and carrying at their upper ends catch-levers or latches 32, which pass through openings in a frame 33, to which a rocking or oscillatory motion is imparted by means of a side cam or tappet 34, driven from any rotary part of the loom. The ends of the catch-levers 32 have attached thereto the lengths of string or wire 35, connected to the respective lift-wires of the harness-jacquard.

The actuation or non-actuation of the catch-levers 32 by the lifting or non-lifting of the strings 35, as determined by the pattern-cards, either moves the catches or shoulders on the levers 32 clear of or allow them to engage with the rocking frame 33, in which latter event the catch-levers 32 are moved with the frame, and drawing over the pivoted levers 6 cause the latter to act on the required diametrical lever and through the mutilated pinion or pinions to call the proper box.

The details of construction of my improvements may be varied, if desired.

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

1. In looms for weaving, the combination of the pattern-controlled positive shuttle-box mechanism for operating the shuttle-boxes, said mechanism including a master-gear, means for imparting motion to the master-gear, said means comprising two separate shafts, devices for connecting said shafts for operating the box-motion, and for disconnecting said shafts to permit the shuttle-box mechanism to be reversed to the same extent as the pattern mechanism when lagging back.

2. In looms for weaving, the combination with positive shuttle-box mechanism, connections from the pattern mechanism for actuat-

ing said shuttle-box mechanism to bring the required box into alinement with the shed, and means for transmitting motion from the pattern mechanism to the shuttle-box mechanism when reversing the pattern mechanism, of a hollow shaft driven from the loom, an auxiliary shaft extending through said hollow shaft and supported therein, means for connecting the two said shafts together to form a single driven shaft for imparting motion to the shuttle-box mechanism in the usual way when the loom is weaving, and disconnecting the shafts when the loom is stopped for reversing the pattern mechanism, the outer shaft remaining idle while the auxiliary shaft derives motion from the reversal of the pattern mechanism and conveys it to the rear box mechanism and across the loom to the box mechanism at the opposite side, substantially as set forth.

3. In a positive shuttle-box motion for looms, the combination, with the mechanism for determining the operation of the parts for bringing the desired box in the series to the level of the shed, of a shaft for driving said motion, an auxiliary shaft for imparting motions thereto when the loom is stopped and the pattern mechanism is being turned back, means for conveying motion from the pattern mechanism to said auxiliary shaft when reversing, and means for connecting or disconnecting the auxiliary shaft so as to form a part of the loom and revoluble therewith, or to form an independent shaft for reversing the motion of the shuttle-box mechanisms, substantially as set forth.

EDWARD HOLLINGWORTH.

Witnesses:

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