Dec. 20, 1932. F. C. MATTHEWS 1,891,648

SHUTTLE MOTION

Filed Sept. 30, 1931 2 Sheets-Sheet 1

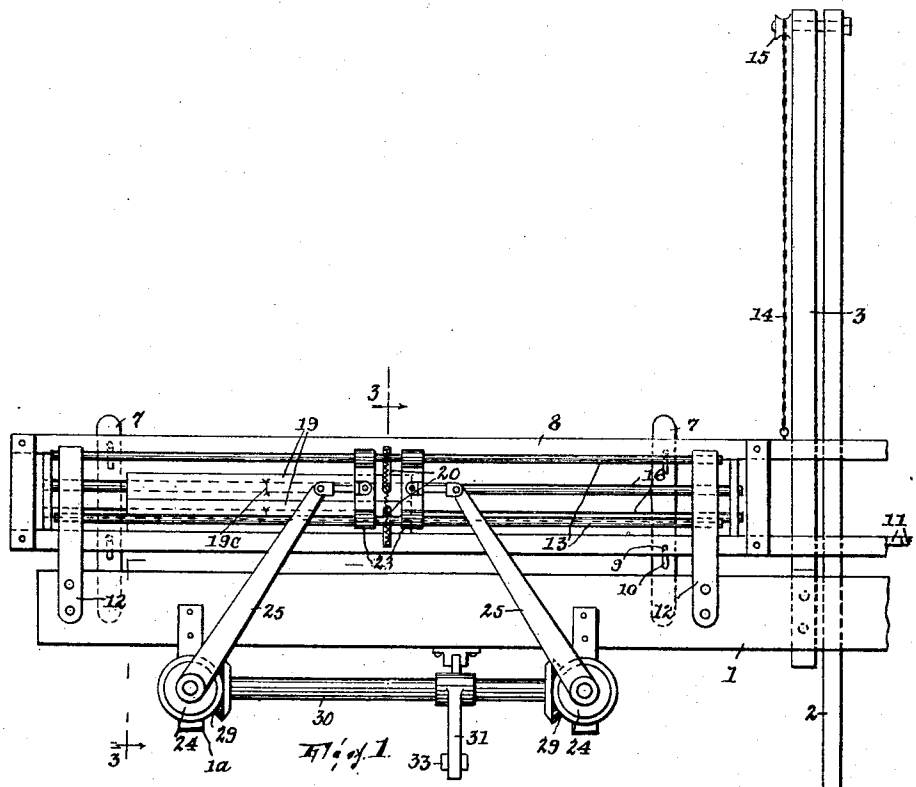


Fig. 1.

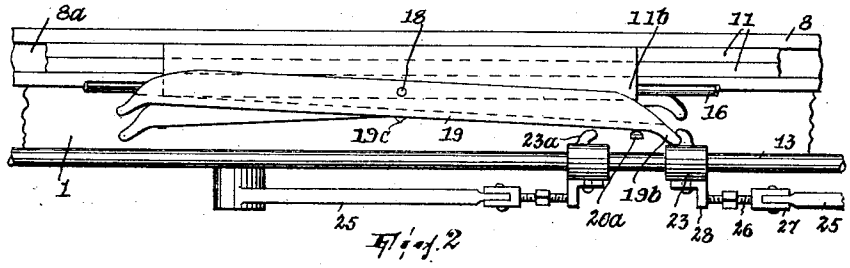


Fig. 2.

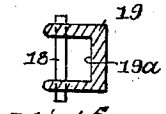


Fig. 5.

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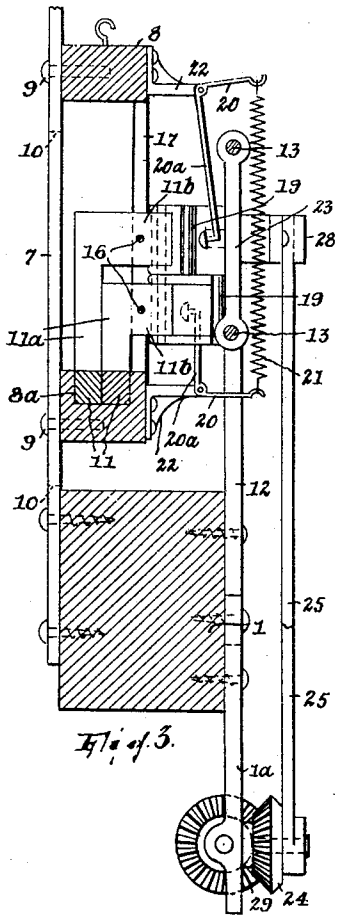


Fig. 3.

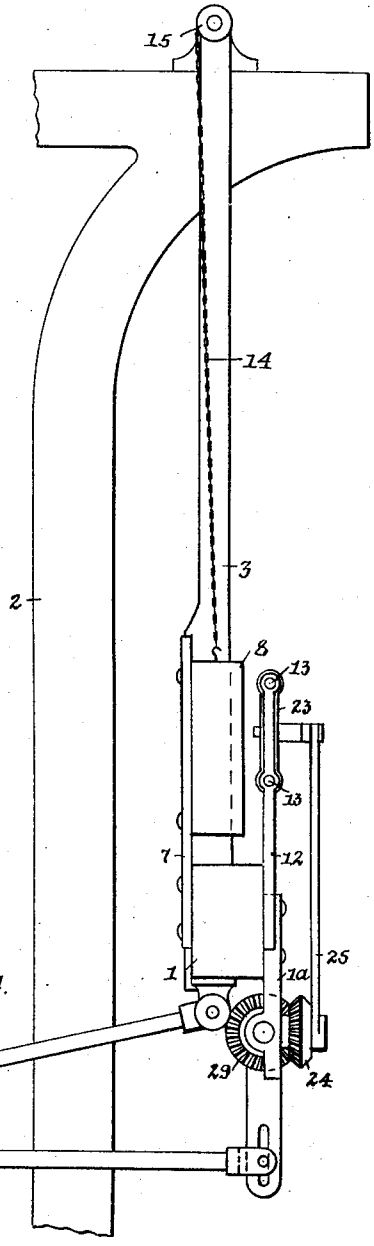


Fig. 4.

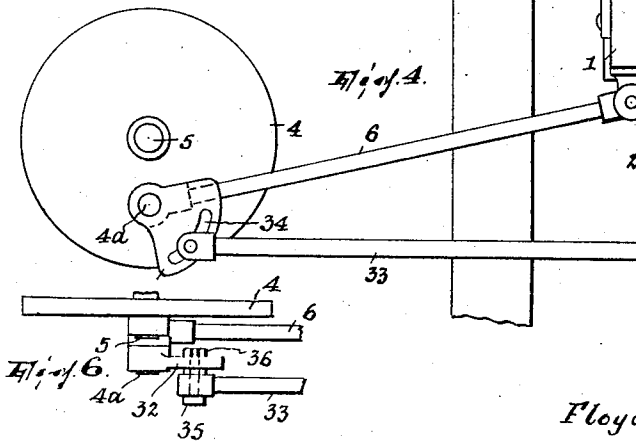


Fig. 6.

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Patented Dec. 20, 1932 1,891,648

UNITED STATES PATENT OFFICE

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SHUTTLE MOTION

Application filed September 30, 1931. Serial No. 566,030.

This invention relates to narrow-ware looms in which the shuttles are arranged in two or more superposed banks in a frame or lay which is movable up and down with respect to and so as to be guided by the main lay structure, so that one or another of the banks of shuttles may be brought into weaving position and thereby different colors or kinds of weft may be woven in; and it particularly relates to the mechanism by which the driving rack for any bank of shuttles so brought into weaving position is actuated, the object of the invention being to simplify such mechanism, to save the power required to operate the loom by reducing the weight of all that portion of the mechanism which is carried by the main lay and constructing said mechanism so that its parts coact with each other more certainly, directly and smoothly and with less lost motion and vibration, and in general to obtain greater efficiency.

In the drawings,

Fig. 1 is a rear elevation of the improved mechanism;

Fig. 2 a fragmentary plan of the principal elements in Fig. 1, with the top bar of the secondary lay omitted;

Fig. 3 is a section on line 3—3, Fig. 1;

Fig. 4 a side elevation including the means for actuating the main lay and said mechanism;

Fig. 5 is a cross section of one of the shoes 19; and

Fig. 6 shows in plan a detail of Fig. 4.

1 is the forwardly and backwardly movable main lay structure, here pivotally suspended from the frame 2 by lay-swords 3, and it receives its motion from a wrist pin 4*a* of a crank-disk 4 on the revolving main shaft 5 through pitman 6; only one side standard of the frame and one of each of the parts 3, 4 and 6 appear in the drawings. The lay structure also includes the fixed rear uprights, as 7, which confine the auxiliary or secondary lay 8 (which is here a rectangular horizontally elongated frame), to motion up and down in a plane, as by this lay 8 having screws or equivalent headed devices 9 at the back engaged with vertical slots 10 in the uprights. This auxiliary lay has in its lower bar a longitudinal groove 8*a* in which are movable the racks 11 individually reciprocatory therein and assumed to drive pinions arranged in spaced blocks carried by this lay, which pinions in turn drive the shuttles (in two banks) guided in slots in these blocks, such pinions, blocks, and shuttles, and also reeds arranged between the blocks and for beating up the filling deposited by the shuttles in the warp-sheds, being not herein shown because well known (see Patent No. 1,057,133, for example) and being located to the right of Fig. 1 or between the side standard of the frame 2 there shown and the complementary side standard. The main lay structure also includes the fixed front spaced uprights 12 which are joined by the upper and lower horizontal guide bars 13.

The secondary lay is suspended by chains 14 or equivalent which reach over pulleys 15 on the lay swords to any pattern means, not shown, whereby in the usual way this lay is moved up or down a distance equal to the spacing of the shuttle banks so as to bring one such bank or the other in position for weaving.

Each rack 11 has an upstanding portion 11*a* formed with a forward projection 11*b*, that for the back rack overhanging the projection of the front rack, and these two projections may be guided by horizontal rods 16 which are fixed at their ends in vertical strips 17 connecting the upper and lower bars of the secondary lay and which are spaced apart to a distance equal to the rise or fall of such lay. On each such projection is pivoted at 18 a shoe 19. Each shoe is longitudinally grooved at 19*a* (Fig. 5) at the back to fit over the projection, which thus guides it in its pivotal motion, in a horizontal plane, and preferably each of its ends 19*b* is bent forward somewhat. When the shoe is rocked on its pivot the motion is limited by contact of one end or the other with the projection 11*b*, and each end of the shoe when forward occupies a certain vertical plane forward of and parallel with the corresponding rack. Cooperating with the shoes is a pair of bell-crank levers 20 whose arms 20*a* project to-

ward each other and have button-like or otherwise rounded ends to bear on the front faces of the shoes, being connected by a helical spring 21. These levers are fulcrumed in brackets 22 fixed to the secondary lay and each is arranged midway of the throw or reciprocating path of the corresponding shoe with the rack to which it appertains, wherefore in the reciprocation of the shoe the lever, held yieldingly pressing thereon by the spring, will cause the shoe to rock back and forth on its pivot 18.

Movable on the guide-rods 13 together toward and together from each other are slides 23 having at their inner sides hooks 23*a* projecting toward each other and arranged in the same horizontal line in the mentioned vertical plane to which each end of each shoe is movable, such line being in the horizontal plane occupied by one or the other shoe on the rise or fall of the secondary lay, so that such shoe will be positioned to be caught, as will appear, by these hooks on reciprocation of the slides. Each slide has a throw or range of movement which equals that of the shuttles in order to perform their part in the weaving, to wit, in order for each to pass from one side of the warp and through the shed to the other; and the length of each shoe, in order that the shuttle may be traversed their allotted distances, should be such as to approximate (i. e., be somewhat less than) the distance between the position of the hook of either slide when the slides are closest together and the position of the hook of the other slide when they are furthest apart.

Assume the slides to be reciprocated together toward and together from each other and the secondary lay to have been shifted to one of its upper or lower limits so that one of the shoes is in the same horizontal plane as the hooks of the slides such shoe and the corresponding rack and shuttles actuated therefrom will be reciprocated, thus: Such shoe has been moved from its right-hand to its left-hand limit by the right-hand slide in the previous movements of the slides together, subject of course to the pressure of the corresponding device 20 which, as soon as the pivot 18 passed it, tended to rock the shoe so that its right-hand end when released by the hook of such slide will be moved back out of and its left-hand end moved forward into the vertical plane of the hooks. When the slides move apart said shoe is released by the right-hand hook and therefore said device now rocks the shoe to its new position and as they approach their limits apart the hook of the left-hand slide cams past the left-hand end of the shoe, leaving it positioned to be caught on the next motion together of the slides and be shifted by the left-hand slide to the right. In other words, each two reciprocations or back and forth movements of the slides result in one such reciprocation or back and forth movement of the shoe and hence of the rack. This will continue as long as the secondary lay retains its stated position; and when it is shifted to bring the other shoe in the horizontal plane of the hooks that shoe will be reciprocated by the slides in the same way. The rise or fall of the secondary lay may occur whenever the shoe last actuated by a slide has been moved to one end of its throw.

The use of members, as slides, movable together toward and together from each other so that on alternate movements together one such member would cause movements of a rack structure one way and on the remaining movements together would cause movements of such structure the other way is not broadly new as shown by the mentioned patent. But by providing the rack with a shoe pivoted substantially as stated and causing the shoe to rock first one way and then the other as its pivot passes the means (as levers 20) for pivotally shifting it I avoid complications of structure and occasional failure of a "picking" engagement as between a slide and a rack structure characterizing known mechanisms of this class.

Whereas my invention perhaps assumes the simplest form when the means to be reciprocated (as one of the racks) includes the herein described shoe pivoted to shift back and forth to bring one end into and the other end out of the paths of the respective actuators (slides 23) and vice versa, repeatedly, nevertheless since the ends of said shoe may be regarded as catching portions of said means movable into the paths of the respective actuators, and device 20 as means to move said portions one into and the other out of the path of its respective actuator on the alternate reciprocations, and vice versa on the remaining reciprocations, of the actuators, I claim accordingly. Indeed, so far as I am aware this is the first instance in which said actuators and means have a pair of catching portions one of which is movable into and out of position to transmit movement from one actuator to said means and the other of which is movable into and out of position to transmit movement from the other actuator to said means, and there is means (as 20) to move said portions one into and the other out of such position on the alternate, and vice versa on the remaining, reciprocations of the actuators.

By providing the shoe opposite pivot 18 with a hump, as 19*c*, over which device 20 wipes the latter will urge the shoe to canted position even when pivot 18 is opposite device 20; therefore the shoe is always positioned to be engaged by one slide or the other and there is no possibility of the shuttles being left in the sheds and causing a "smash".

The slides are preferably reciprocated as

follows: In brackets 1*a* of the main lay structure are journaled on horizontal axes transverse to and here beneath the lay a pair of bevel gears 24 having cranks or arms 25 each pivotally connected with one of the slides by a link which preferably comprises (Fig. 2) a right- and left-hand threaded screw 26 whose oppositely threaded ends are tapped into a clevis 27 and an angle-piece 28 pivoted respectively to the crank and slide. Each bevel gear 24 meshes with a bevel gear 29 fixed on a rock-shaft 30 journaled in a bracket 1*a* of the main lay structure and common to the gears 24, extending lengthwise of the lay, and this has a crank 31 which is pivotally connected with a segment 32 fast on the wrist-pin 4*a* by a pitman 33. The connection between the pitman and segment, for the purpose of timing the movements of the gears 24 (to cause "picking" of the shoes and hence of the racks) relatively to those of the main lay structure, consists preferably of an eccentric slot 34 in the segment and a stud 35 adjustable (different distances from the axis of shaft 4) in and adapted to be clamped by a nut 36 thereon to the segment. This means for transmitting motion to the systems (including the slides and arms) to which a rack is adapted to be coupled as explained is much simpler than corresponding means heretofore used in these mechanisms, it adds less weight to the main lay structure, and it operates more smoothly and with greater efficiency, especially since each such system is actuated directly or independently of the other, and in fact by a member 30 whose axis is parallel with the path of the rack and hence itself may be actuated through simple and directly acting mechanism.

Having thus fully described my invention what I claim is:

1. In a shuttle motion, the combination of supporting structure, means therein to be reciprocated, a pair of actuators movable in said structure in paths substantially parallel with the path of the first means, means to move the actuators together toward and together from each other in said paths, repeatedly, the first means having catching portions movable into the paths of the respective actuators, and means to move said portions one into and the other out of the path of its respective actuator on the alternate reciprocations, and vice-versa on the remaining reciprocations, of the actuators.

2. In a shuttle motion, the combination of supporting structure, means therein to be reciprocated, a pair of actuators movable in said structure, in paths substantially parallel with the path of the first means, means to move the actuators together toward and together from each other in said paths, repeatedly, the first means having catching portions movable into the paths of the respective actuators, and yielding means, in passing relation to which said portions travel with the first means, to move said portions one into and the other out of the path of its respective actuator on the alternate reciprocations, and vice-versa on the remaining reciprocations, of the actuators.

3. In a shuttle motion, the combination of supporting structure, a part to be reciprocated, a pair of actuators arranged in said structure, means to move the actuators in paths substantially parallel with the path of said part and together toward and together from each other, repeatedly, a shoe pivoted between its ends to said part and shiftable back and forth on its pivot to bring one end thereof into and the other out of the paths of the respective actuators and vice versa, repeatedly, and means, with respect to which said shoe is reciprocated with said part, to shift said shoe on its pivot in one direction on movements of said part in one direction and in the other direction on movements of said part in the other direction.

4. In a shuttle motion, the combination of supporting structure, a part to be reciprocated, a pair of actuators arranged in said structure, means to move the actuators in paths substantially parallel with the path of said part and together toward and together from each other, repeatedly, a shoe pivoted between its ends to said part and shiftable back and forth on its pivot to bring one end thereof into and the other out of the paths of the respective actuators and vice versa, repeatedly, and yielding means, past which the pivot of said shoe travels with said part as the shoe is reciprocated with the latter, active on the shoe to shift it on its pivot.

5. In a shuttle motion, the combination of supporting structure, a part to be reciprocated, a pair of actuators arranged in said structure, means to move the actuators in paths substantially parallel with the path of said part and together toward and together from each other, repeatedly, a shoe pivoted between its ends, to said part and shiftable back and forth on its pivot to bring one end thereof into and the other out of the paths of the respective actuators and vice versa, repeatedly, and yielding pressure means, past which the pivot of said shoe travels with said part as the shoe is reciprocated with the latter, active on the side of the shoe adjoining the actuators to shift the shoe on its pivot.

6. In a shuttle motion, the combination of supporting structure, means therein to be reciprocated, a pair of back-and-forth-movable arms pivoted on substantially parallel axes to move in substantial parallelism with the path of said means, back-and-forth moving means, engaged with each arm, for moving said arms together toward and together from each other repeatedly, and mechanism to couple the first means to one arm on the

alternate, and to the other arm on the remaining, back and forth movements of the arms.

7. In a shuttle motion, the combination of supporting structure, means therein to be reciprocated, a pair of back-and-forth-movable arms pivoted on substantially parallel axes to move in substantial parallelism with the path of said means, a back-and-forth-rotating member having its axis substantially parallel with said path and geared with each arm to move the arms together toward and together from each other, repeatedly, and mechanism to couple the first means to one arm on the alternate, and to the other arm on the remaining, back and forth movements of the arms.

8. In a shuttle motion, the combination of the frame, a back-and-forward-movable structure therein including a lay, a rotating driving member having its axis parallel with the lay and journaled in the frame, means to transmit movement from said member to said structure, means in said structure to be reciprocated, a pair of actuating systems connected to move in said structure together toward and together from each, repeatedly, mechanism to couple the second means to one system on the alternate, and to the other system on the remaining, back and forth movements of said systems, and means to transmit from said member to said systems movements of the latter together toward and together from each other, repeatedly, having a pivotal connection with said member adjustable different distances from its axis.

9. In a shuttle motion, the combination of supporting structure, means therein to be reciprocated, a pair of actuators movable in said structure in paths substantially parallel with the path of said means, means to move the actuators together toward and together from each other in said paths, repeatedly, said means and the actuators having a pair of catching portions one of which is movable into and out of position to transmit movement from one actuator to said means and the other of which is movable into and out of position to transmit movement from the other actuator to said means, and means to move said portions one into and the other out of such position on the alternate, and vice versa on the remaining, reciprocations of the actuators.

In testimony whereof I affix my signature.

FLOYD C. MATTHEWS.