Feb. 4, 1930. W. KAHRE **1,745,543**

LOOM

Filed Sept. 11, 1928 2 Sheets-Sheet 1

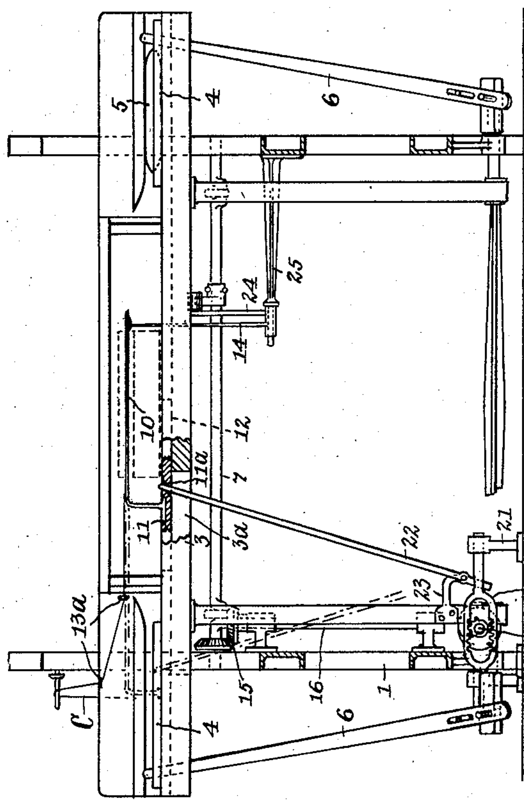

Fig. 2.

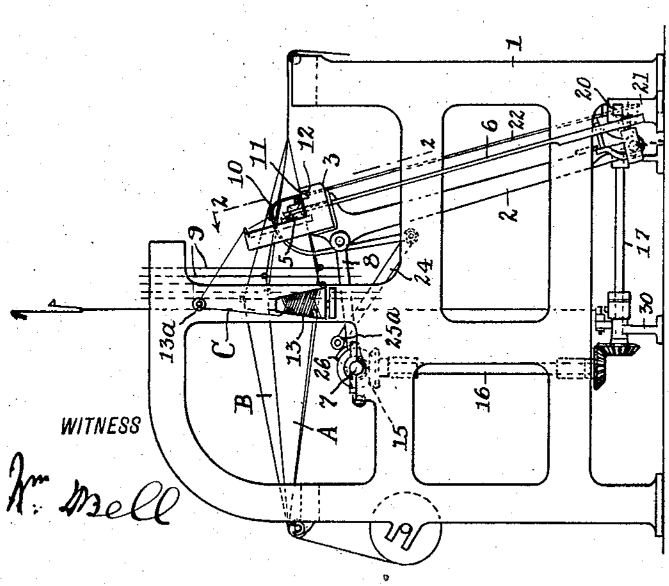

Fig. 1.

WITNESS

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LOOM

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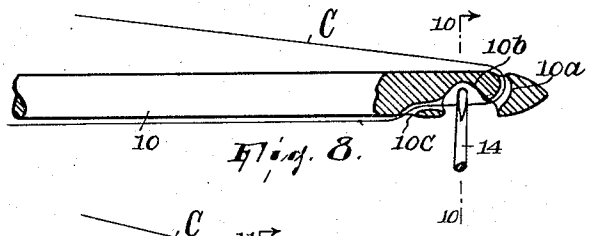

Fig. 8.

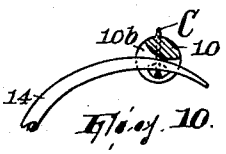

Fig. 10.

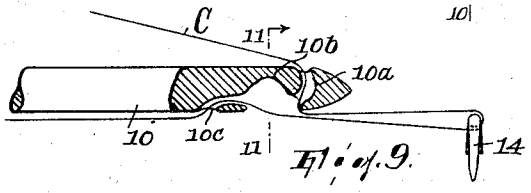

Fig. 9.

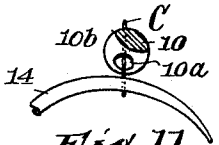

Fig. 11.

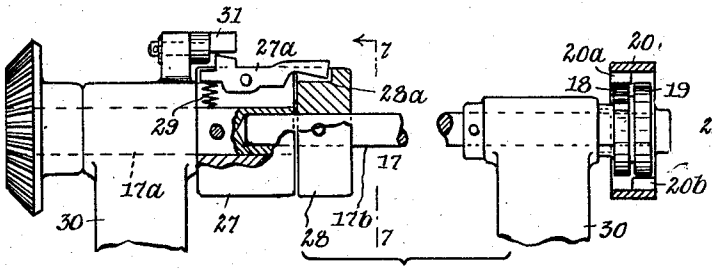

Fig. 6.

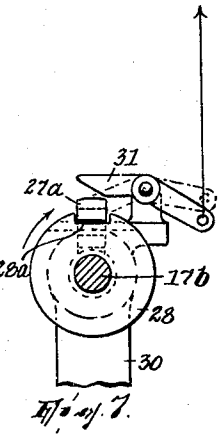

Fig. 7.

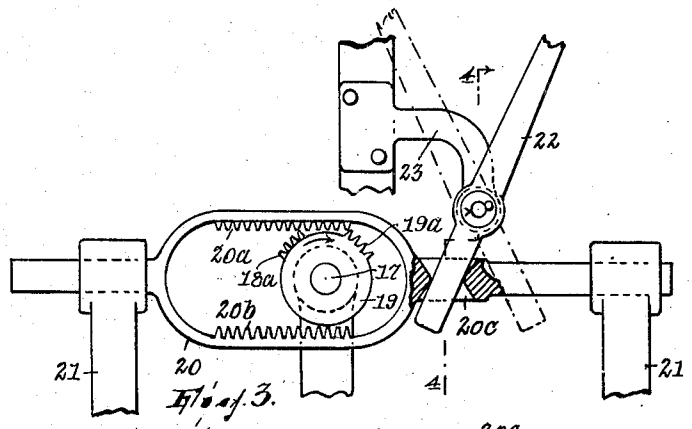

Fig. 3.

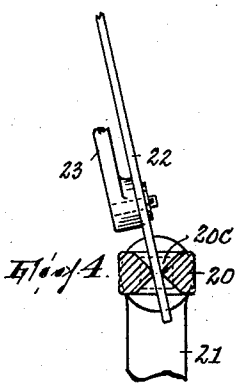

Fig. 4.

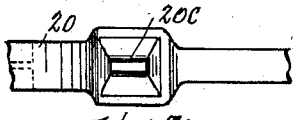

Fig. 5.

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Patented Feb. 4, 1930 1,745,543

UNITED STATES PATENT OFFICE

WILLIAM KAHRE, OF UNION CITY, NEW JERSEY, ASSIGNOR TO JAMES McCURRACH & BROTHER, OF NEW YORK, N. Y., A FIRM COMPOSED OF MABEL C. McCURRACH AND JAMES C. McCURRACH

LOOM

Application filed September 11, 1928. Serial No, 305,235.

The principal object of this invention is to provide a loom with novel means whereby while weaving is being carried on in the regular way with the use of a shuttle weaving is also being carried on with the use of a looper or needle, the two webs produced being connected or not by proper shedding operations of the warp threads so as to produce a double-faced fabric or a fabric with a lining attached thereto at suitable points throughout its length and breadth. The invention is also applicable to the weaving of fabrics consisting of only a single web or ply and in which the filling constituent shall be in the form of loops. In the preferred construction said looper has coacting with it a loop-retainer which, in the retracting movements of the looper, holds the loop which has been incorporated in the shed, and there is also means whereby the action of the looper may at times be suspended, as when in weaving two-ply fabrics the two webs are then to be merged as one.

In the drawings,

Fig. 1 is a side elevation of a loom embodying the invention;

Fig. 2 is a front elevation thereof, the frame being in section on line 2—2, Fig. 1;

Fig. 3 is a front elevation of a fragment of the means for operating the needle or looper;

Fig. 4 a section on line 4—4, Fig. 3;

Fig. 5 a fragmentary plan of the rack-slide shown in Fig. 3;

Fig. 6 a side elevation, partly in section, of what is shown in Fig. 3;

Fig. 7 a section on line 7—7, Fig. 6;

Figs. 8 and 9 show in front elevation, partly in section, the looper and loop-retainer in two different positions in the forming of a loop; and

Figs. 10 and 11 are sections on line 10—10 and 11—11 in Figs. 8 and 9, respectively.

In the loom frame 1 is fulcrumed the lay structure 2 having the lay or batten 3 equipped with boxes 4 for the shuttle 5 which is adapted to be impelled back and forth from one to the other box by the picker sticks 6 actuated by any well known means (not shown). The lay structure is moved back and forward on its fulcrum 2^a from the crank shaft 7 by pitmen 8, as usual, and in the usual way the shuttle is caused to traverse the lay in one direction on each forward movement of said structure to beat up by its reed (not shown) the filling from the shuttle. The warp is controlled by harness 9 so that in addition to the forming of sheds A for the shuttle and concerned in the production of the main web there will be the forming of sheds B, here above the sheds A, and so that, whereas these sheds A and B will be independent of each other, threads of one, B, in the forming of another web may if it is desired to connect the two webs together occasionally be components of the other, A; that is to say, while weaving goes on generally as to each (sheds A with the coaction of the shuttle and sheds B with the coaction of the looper) at times threads of one, B, may be shifted to an extent to be crossed by the filling normal to the other, A, whereby two webs, main and supplemental, will be produced but bound together at more or less spaced intervals. The invention is not concerned with the means for nor the particular manner of manipulating the warp threads to obtain any desired weave in either web, nor in fact is it limited to the forming of more than one web, as B, as will appear.

The looper must perform a forward and back movement during a cycle (forward and back movement) of the lay structure specifically, while said structure is back; and it must remain substantially at dwell when back in order to give the lay structure opportunity to beat up the filling and loop and return. It should further be subject to such control that if it is desired to bind in all the threads of the warp B in the main web the looper will remain at rest at that time in order not to continue forming loops. With these considerations in view the construction is as follows:

The looper 10 is an elongated needle-like member having an eye or guide 10^a near its free end for the loop-filling C, an underneath notch 10^b inward of the eye, and an underneath longitudinally extending eye or guide 10^c also for the filling C, this latter eye and eye 10^a coacting at a certain time to keep the

filling in bridging relation to the notch as shown in Figs. 8 and 10. Its eye- and notch-including portion is its major part, extending horizontally lengthwise of the lay, its remaining portion forming a standard which upstands from a bar or rail 11 arranged to slide in a groove 12 in the top of the lay. The loop-filling C is taken from any supply 13, as a cone package, and may be guided as at 13[a] and subject to any means (not shown) for keeping this filling in proper tension at all times.

The loop-retainer is here an elongated slender curved needle 14 which, each time the looper introduces a loop into a shed B, enters such loop at the relatively far side of the warp (to wit, the looper notch 10[b] and thereby said loop) and holds the loop until the looper has substantially cleared the shed B in retreating.

The movements of the looper are obtained as follows: Geared at 15 with the crank shaft 7 is a transmission-shaft 16, with which in turn is geared another shaft 17, so that the ratio of shafts 7—17 is (here) 1—1, to the end that on each cycle of the lay structure there will be a cycle of the looper. Shaft 17 has a pair of mutilated gears 18 and 19 thereon and the teeth 18[a], 19[a] of these gears constitute (here toothed) abutments offset from each other circumferentially but arranged within the same half-segment of the driving member formed by the shaft and gears. 20 is a rack loop forming a driven member arranged to reciprocate in brackets 21 transversely of the axis of the driving member and having a pair of tooth-sets or toothed abutments 20[a] and 20[b] opposite each other and arranged on opposite sides of said axis. The abutments in both pairs (18[a]—19[a] and 20[a]—20[b]) are arranged in two planes substantially parallel to each other and penetrated by said axis and those of the second pair are relatively inward of opposite tangents of the orbits of the first pair. As a consequence, when the driving member rotates, as in the direction of the arrow in Fig. 3 the abutments 18[a] and 19[a] will in each cycle respectively encounter abutments 20[a] and 20[b] and move the rack loop to the right and then to the left and between such two right and left movements the rack loop will stand at a dwell.

The rack-loop 20 may be guided for movement in brackets 21, confined to a plane, as vertical. For imparting motion therefrom to the looper-carrying bar or rail 11 a lever 22 fulcrumed in a bracket 23 on the lay structure extends through a slot 3[a] in the lay and a hole 11[a] in said bar and below its fulcrum is engaged in a hole 20[c] in the rack-loop, which hole is double-convergent as viewed in cross-section (Fig. 4) to permit the lever to oscillate with the batten notwithstanding the rack-loop is confined to a plane.

The loop-retainer 14 is the forwardly curved upper end of a bell-crank lever 24 fulcrumed on a bracket 25 extending inwardly from the loom frame (Fig. 2), its curve being one whose center is forward of the fulcrum of the lever for a reason to appear. On the crank-shaft 7 is a cam 26 adapted to engage a roller 25[a] on this lever (which is normally held toward the cam by gravity) and swing the lever forwardly to cause the needle to coact with the looper.

For stopping the operation of the looper at times the shaft 17 is formed in two sections 17[a] 17[b] with clutch members 27 28 thereon, respectively. Clutch member 28 has a notch 28[a] to receive a dog 27[a] normally held in peripheral engagement with the clutch-member 28, and to fall into its notch 28[a] when present, by a spring 29. In one of the brackets 30 in which shaft 17 is journaled is a lever 31 which when pulled from any pattern mechanism, as the dobby of the loom, shifts the dog from clutch member 28. When the lever is freed by the pattern mechanism the dog interlocks the clutch members and the looper remains in action; when the lever is held by the pattern mechanism in position to be engaged by the dog then the latter on each revolution is shifted from the clutch member 28 and the looper remains idle.

Operation.—In the present example looper 10 performs a loop-forming (forward and backward) movement on each cycle of the lay, coming to dwell (retracted) when the lay is beating up. As the looper approaches its forward limit the loop-retainer is advanced by cam 26 and enters notch 10[b] in the looper, thus catching and holding the loop when the looper recedes and until it is fully retracted, when the loop-retainer is allowed by said cam also to retract. The looper in retracting does not interfere with the loop-retainer on account of the latter entering notch 10[b] because, since as stated the center of curvature of the loop-retainer is forward of the latter's fulcrum in bracket 25, the retainer proceeds forward, clear of the notch (Fig. 11), before such interference can occur; in other words, on account of the curvature of the retainer it moves, not lengthwise or progressively of itself through the notch, but rather laterally of itself, only its point passing through the notch, so that in its extreme-forward position it clears the looper and leaves it unencumbered. After each incorporation of filling loop the shed B is of course changed to form the web.

If at the same time another web is being formed by the shuttle filling and warp for the shed A and if the warp threads of the two warps are properly manipulated by the harness the resulting two webs may be connected together as already indicated, for instance, to form the body and lining webs of a two-ply fabric, in which one ply will have its filling arranged in the ordinary way and the other

have its filling as loops each extending between two crossings of the warp.

Having thus fully described my invention, what I claim is:

1. A loom including, in combination, means to establish a filling loop in a shed formed in the warp of a sheet of warp and fabric comprising an elongated filling looper enterable lengthwise of itself into each shed from one side thereof and having means at its entering end to guide the filling and also maintain the same in bridging relation to a part of the looper, a loop-retainer enterable between the bridging portion of the filling and the looper, and means to enter the looper into the shed and thereupon retract the same and while it is in the shed move the loop-retainer to a position where it stands between the bridging portion of the filling and the looper and thereupon hold it in said position while the looper is retracted and thereafter shift the loop-retainer from said position.

2. A loom including, in combinaton, means to establish a filling loop in a shed formed in the warp of a sheet of warp and fabric comprising an elongated filling looper enterable lengthwise of itself into such shed from one side thereof and having means at its entering end to guide the filling and a transverse notch adapted to be bridged by a part of the filling, a loop-retainer movable transversely of the looper and enterable into said notch, and means to enter the looper into the shed and thereupon retract the same and while it is in the shed move the loop-retainer to a position where it stands in the notch and thus in catching relation to the filling loop and thereupon hold it in such position while the looper is retracted and thereafter shift the loop-retainer from said position.

3. Means to establish a filling loop in a shed formed in the warp of a sheet of warp and fabric comprising an elongated filling looper enterable lengthwise of itself into such shed from one side thereof and having means at its entering end to guide the filling and a transverse notch adapted to be bridged by a part of the filling, an elongated loop-retainer movable transversely of the looper and laterally of itself and having its forward end adapted in such movement to pass through said notch, and means to enter the looper into the shed and thereupon retract the same and while it is in the shed move said loop-retainer transversely of the looper and laterally of itself and so that its said free end passes through the notch, whereby the loop-retainer will catch and hold the filling while the looper is retracted.

4. In a loom, the combination, with the frame and a forwardly and rearwardly moving lay structure, a filling looper movable lengthwise of the lay into a shed formed in the warp of the sheet of warp and fabric in the loom, a filling loop-retainer fulcrumed on a transverse axis in the frame, and means to move the filling looper into such shed and back therefrom and while it is in the shed move the loop-retainer into catching engagement with the filling-loop and maintain it so positioned while the looper is retracted and thereupon retract the loop-retainer.

5. In a loom, the combination of fixed structure and a forwardly and rearwardly rocking lay structure fulcrumed at its lower portion therein, a filling carrier movable along the lay, a lever to drive said carrier fulcrumed in the lay structure to move in an upright plane extending lengthwise of the lay and also confined to move with the lay structure forwardly and rearwardly, and reciprocating means to shift said lever back and forth slidable in the fixed structure and held thereby against rocking with the lay, said means having an opening receiving the lever and confining said means and lever to move together lengthwise of the lay but permitting the lever to move with the lay independently of said means.

6. Means to impart a succession of back-and-forth movements alternating with dwells to a filling carrier in a loom including a support, a driving member rotating therein and having a pair of abutments offset from each other circumferentially of said member but arranged within the same half-segment thereof, and a driven member arranged to reciprocate in said support transversely of the axis of said member and having a pair of substantially opposite abutments arranged on opposite sides of said axis, the abutments in each pair being arranged in two planes substantially parallel to each other and penetrated by said axis and those of the second pair being relatively inward of opposite tangents of the orbits of the first pair.

In testimony whereof I affix my signature.

WILLIAM KAHRE.