May 1, 1928. 1,668,126

W. W. ROBERTSON

WIRE MOTION FOR PILE WIRE LOOMS

Filed June 3, 1927 2 Sheets-Sheet 1

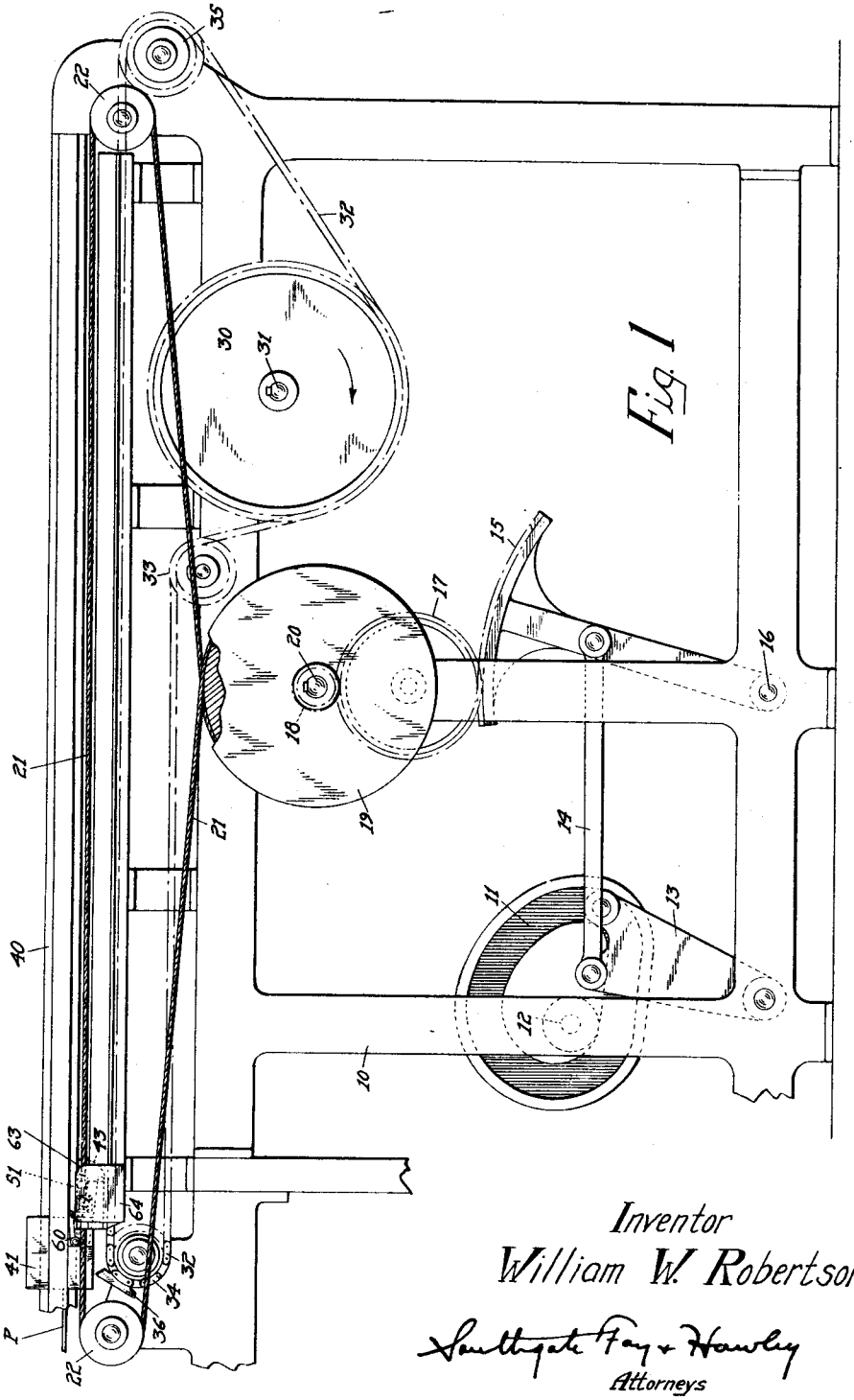


Fig. 1

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2 Sheets-Sheet 2

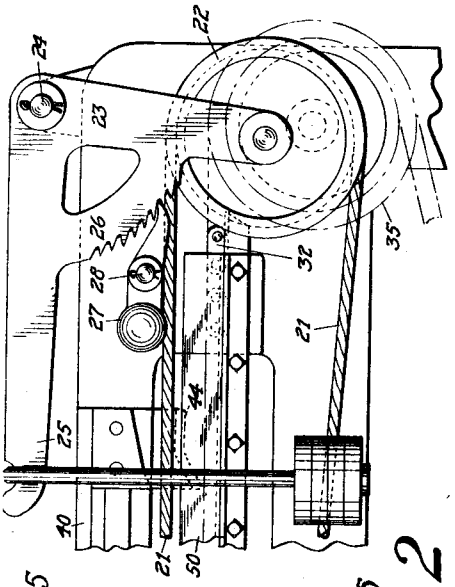
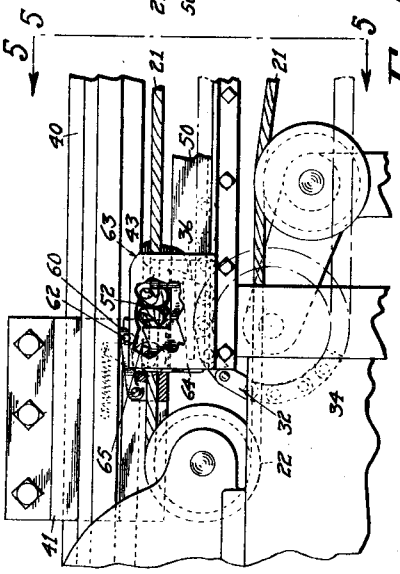


Fig. 2



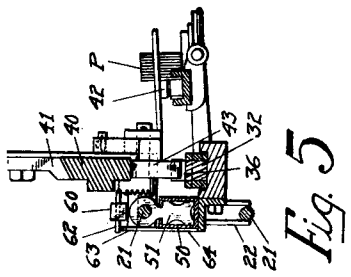


Fig. 5

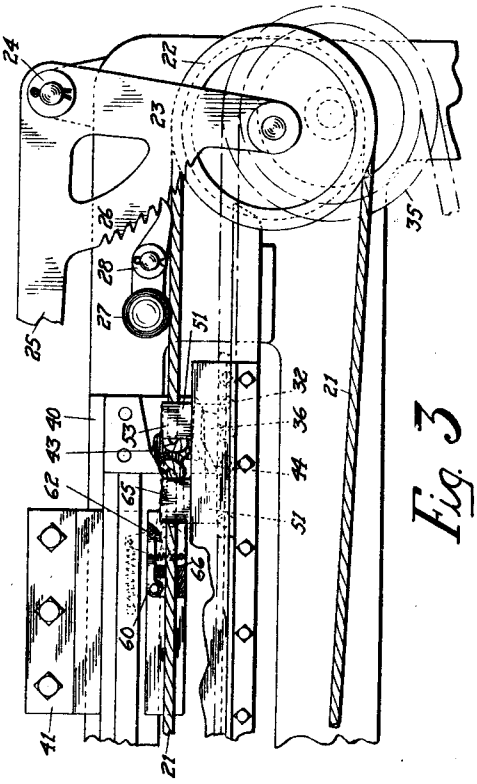


Fig. 3

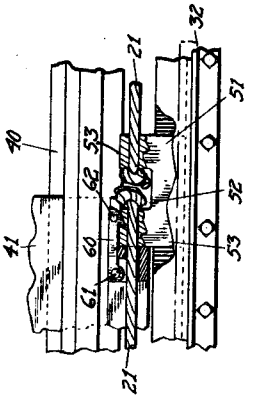


Fig. 4

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Patented May 1, 1928. 1,668,126

UNITED STATES PATENT OFFICE.

WILLIAM W. ROBERTSON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

WIRE MOTION FOR PILE-WIRE LOOMS.

Application filed June 3, 1927. Serial No. 196,373.

This invention relates to pile wire motions for looms wherein the surface yarn is woven over pile wires, such for instance as in Wilton, Brussels or tapestry looms.

In the ordinary so-called side wire loom such as that on which Wilton carpets are woven there is provided means for inserting pile wires in each successive shed, the pile forming warps being held up over these wires by the jacquard mechanism during the time of insertion and then being lowered to form loops around the wire. At a later time in the operation of the loom these wires are withdrawn, either leaving the loops uncut or severing the same, depending upon the character of fabric being woven.

Heretofore it has been common practice to provide the wire motion with a wire inserting and withdrawing device movable back and forth along a track and having means which acts to withdraw the foremost wire from the fabric and move it rearwardly for insertion in the open shed. The insertion of the wire in an open shed is a comparatively simple operation, the only work done being to move the wire freely between separated planes of warp threads and it has been customary to accomplish this inserting movement of the pile wires by means of a comparatively light actuator such as a cable or rope. It requires considerably more power to withdraw the pile wire, however, due to the fact that the same is bound to the fabric by pile forming warp threads and in order to withdraw the wire it has been customary to employ a relatively stronger endless actuator such as a chain.

It has been common practice to fasten the rope or inserting actuator to the reciprocating wire inserting and withdrawing member so that whenever the latter moved the cable or cord would move with it and it has further been customary to provide for periodic engagement between the chain and the member. In looms of considerable width the stretch of the chain and the rope or cable introduce inaccuracies in the relative settings of these parts which result in undesirable strains. The chain is moved constantly and has one or more abutments which are operatively related to the block to give the same a wire withdrawing movement during certain periods in the operation of the loom. In former constructions the chain caused a movement of the rope which subjected the latter to the strain of turning its driving mechanism in a reverse direction. In considering the relation between the rope cable for inserting the wire and the heavier withdrawing chain it will be seen that three conditions may exist in the previously used motions. If these parts are timed exactly the rope will start in its reverse movement at the same instant that the chain begins to move the member on a withdrawing stroke and the rope will therefore move without strain. Under ordinary mill conditions it is practically impossible to maintain such conditions because either the rope or the chain will stretch or they will both stretch but in unlike degree and whereas the parts may be set to operate as described yet this setting will not continue for very long. Another condition which might exist is that the rope could start its reverse movement slightly in advance of the chain, but obviously such a timing would submit the rope to excess strain beyond that which it can safely withstand as it would have to assist the chain in withdrawing the wire. The third condition, namely the one previously mentioned, is that in which the chain begins to move the member on a withdrawing movement before the rope drum starts to move the rope, but in this condition the chain acts through the rope to move the driving mechanism for the drum reversely before the rack and pinion actuated mechanism for the drum are ready to give this movement and the rope must therefore either drive the drum or stretch.

It is the principal object of my present invention to avoid the necessity for having one or another of the above mentioned undesirable conditions by providing inserting and withdrawing mechanisms for the wire so related that the cable or rope which inserts the wire may be disconnected from the wire inserting and withdrawing member and start on its reverse or outbound movement before the chain starts to withdraw the wire. As shown herein I accomplish this result by a rope which is not connected directly to the member but is operatively connected thereto during the wire inserting movements only of the loom.

I accomplish this result by providing the rope with an auxiliary block which is effective to move the main member or block on a

wire inserting movement but is disconnected from the main block at the end of the wire inserting stroke so that said auxiliary block and rope will be free to move outwardly in advance of the wire withdrawing movement of the block. I find in the practical operation of a loom that if the wire is not running properly the weaver will stop the loom with the wire partly inserted in the shed. The manner of stopping the loom is to arrest rotation of the drum which moves the rope and if the member or main block were not in some way connected with the auxiliary block the wire might continue its inserting movement after the rope had come to rest. It is a further object of my invention to provide means for preventing movement of the member or main block away from the auxiliary block on a wire inserting movement of the loom due to the momentum of the wire moving parts should the weaver stop the loom with a wire partly inserted in the shed.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

In the accompanying drawings, wherein I have shown a convenient embodiment of my invention,

Fig. 1 is a front elevation of a wire motion of a loom,

Fig. 2 is an enlarged view of a portion of the wire motion, parts being removed for the sake of clearness, with the parts shown at the end of the wire inserting stroke just preparatory to withdrawing the foremost wire bound into the fabric by the pile forming yarns,

Fig. 3 is a view similar to Fig. 2 but with the parts shown in the position they assume at the end of the wire withdrawing stroke and with the parts in position to start the insertion of another wire,

Fig. 4 is a view similar to a portion of Fig. 3 showing the main and auxiliary blocks in an intermediate position, showing said blocks hooked together to prevent movement of the wire into the shed should the weaver stop the loom, and,

Fig. 5 is a vertical section on line 5—5 of Fig. 2.

Referring particularly to Fig. 1 it will be seen that I have provided an end frame 10 which may project from the right of the loom proper, said end frame affording support for the two actuators which serve respectively to insert and withdraw the wires. The wire inserting mechanism includes a cam 11 receiving a constant rotation around a shaft 12 and imparting movement to a cam lever 13 which is connected by means of link 14 to a segment gear 15 pivoted as at 16 to the frame 10. A gear 17 meshes with the segment 15 and in turn meshes with a pinion 18 fast with a drum 19 carried by shaft 20. A cable or rope 21 is secured to the drum and is led around guide sheaves 22 at their end of the wire motion. As the shaft 12 rotates the segment 15 will reciprocate so as to give the drum 19 a definite angular movement in one direction and then an equal angular movement in the opposite direction, the effect of this being to move the rope or cable actuator 21 first in one direction and then in the other. This part of the mechanism may be of usual construction.

In Figs. 2 and 3 I show a mechanism for taking up slack in the cable or rope 21, such mechanism including a lever 23 pivoted at 24 and having a horizontal weighted arm 25. A segment ratchet 26 cooperates with a hold pawl 27 pivoted to the end frame at 28. One of the guide sheaves 22 is rotatably mounted on the lower end of the lever 23 and by reason of the weighted lever 25 will tend to move to the right as viewed in Figs. 2 and 3 to take up any slack which may result from the stretching of the cable 21. The hold pawl prevents movement of the guide sheaves to the left and therefore insures retention of the slack taking up movements of the sheaves.

The wire withdrawing mechanism comprises a sprocket 30 secured to the shaft 31 which is given a constant rotation by mechanism not shown, said sprocket turning always in the direction indicated by the arrow. The chain 32 is driven by the sprocket and moves over a guide sprocket 33 and also over other guide sprockets 35 and 34 located respectively at the right and left hand ends of the motion. Said chain is provided with one or more abutments 36 which act to withdraw the wire by means of mechanism about to be described. The wire withdrawing devices may also be of common construction and for a further description of the same reference may be had to patent to Ryon No. 1,517,464.

Supported on the end frame 10 is a track 40 along which slides the main block or wire inserting and withdrawing member 41 having a hook 42 adapted for engagement with the pile wires P.

It is not necessary to go into details as to the connection between the member 41 and the wires as this is well understood and may be as set forth in my prior Patent No. 1,516,686. It is sufficient for my present purposes to state that said block or member 41 must move back and forth along the track 40, movement to the left as shown in the drawings corresponding to a wire inserting movement and movement to the right corresponding to a wire withdrawing movement.

Said member has pivoted thereto a hook 43 which when said members is at the left hand end of the track 40 is in position to

be engaged by one of the abutments 36 carried by the chain. The right hand end of the end frame is provided with a cam 44 which engages said hook 43 to raise the same out of operative relation with respect to the driving chain abutment as the withdrawing of the wire is completed. For a further description of the operation of the hook 43 with respect to the chain reference may be had to the aforesaid patent to Ryon.

My improvements relate more particularly to the manner of establishing connection between the member or block 41 and the cable or rope 21 and in carrying my invention into effect I provide a fixed guide trough 50 secured in any approved manner to the end frame 10 and having slidably mounted therein an auxiliary block 51 having a recess 52 and a pair of arms 53 through which the ends of the rope 21 extend into said recess. The ends of said rope may be knotted as set forth in Figs. 2, 3 and 4 or said rope may be secured to the auxiliary block 51 in any other manner.

A pawl 60 is pivoted to the member or main block at 61 and has a pin 62 projecting laterally therefrom to be engaged by a cam 63 formed on the upper part of a fixed plate 64 secured to the guide trough 50. Said pawl is adapted for cooperation with a notch 65 formed in one of the arms 53. As shown more clearly in Fig. 3 the left hand arm 53 engages a shoulder 66 formed on the member 41, the engagement between said arm and shoulder being such that the pawl 60 can fall into the notch 65.

Under normal conditions on a wire inserting loom the cam 11 will move the segment 15 in such a way as to move the auxiliary block 51 to the left from the position shown in Fig. 3 by means of the rope 21. The shoulder 66 of the main block will be engaged by the adjacent arm 53 and as the rope moves the auxiliary block to the left the member 41 will also be moved in the same direction, said member being disconnected from the chain at this time. As the blocks near the end of their movement to the left the pin 62 will rise on the cam 63 so that pawl 60 will move out of the notch 65 in the auxiliary block. The main and auxiliary blocks will therefore be disconnected when they reach the extreme limit of their left hand movement.

On the wire withdrawing stroke the cam 11 will operate to move the auxiliary block 51 away from the main block 41 before one of the abutments 36 engages the hook 43 on the main block. This movement on the part of the auxiliary block is possible because of the fact that the hook 60 pivoted to the main block is held in raised position out of engagement with said auxiliary block. A short time after said auxiliary block starts to move on the outbound movement one of the abutments on the chain will act to move the member 41 on the wire withdrawing stroke and said member will move to the right as viewed in the drawings until the hook 43 rises on inclined cam 44 to move said hook out of the path of the active abutment. The parts will then be in position to start another wire inserting movement.

As previously stated the wires do not always enter the shed properly with a result that the weaver must stop the loom with the wire in an intermediate position. When this is done the drum 19 comes to rest as do also the rope 21 and the auxiliary block 51. The wire, however, is connected at this time to the main block or member 41, but because of the pawl 60 movement of said member and consequently the wire away from the auxiliary block is prevented and the wire as well as the blocks come to rest practically as soon as does the drum 19.

From the foregoing it will be seen that I have provided two independent actuator mechanisms for the wire inserting and withdrawing member or block, one for inserting and the other for withdrawing the wire of a pile wire loom and have connected the same so that the wire inserting actuator may have its reverse movement without being placed under strain by the heavier wire withdrawing chain actuator. It will further be seen that by means of the detachable connection between the member and the auxiliary block I am able not only to start the auxiliary block on its reverse movement before the member starts the wire withdrawing movement but also I am able to stop movement of the member and the wire as soon as the auxiliary block is brought to rest when the loom is stopped by the weaver with the needle partly inserted in the shed.

Having thus described my invention it will be apparent that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a pile wire inserting and withdrawing member, a regularly moving actuator to withdraw the wire, a regularly moving actuator to insert the wire, and means to effect operative contact of one of said actuators only at a time with the member.

2. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a pile wire inserting and withdrawing member, a pair of actuators to act alternately on the block, one of said actuators to give the member a wire inserting movement and the other actuator to give said member a wire

withdrawing movement, and means to establish connection of one only of said actuators and the member at a time.

3. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a reciprocable member to insert and withdraw pile wires, a withdrawing actuator movable always in the same direction, a wire inserting actuator movable first in one direction and then in the other, and means to establish connection between one of said actuators only and the member at a time, the actuator not operatively related to the member being free to move independently thereof.

4. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a pile wire inserting and withdrawing member adapted to be reciprocated, a wire withdrawing actuator moving constantly always in the same direction, a pile wire inserting member movable first in one direction and then in the other, spaced abutments on the wire withdrawing actuator to be periodically operatively related to the member to give the latter a wire withdrawing movement, and means to connect the wire inserting actuator to the member while the wire withdrawing actuator is out of operative relation with respect to the member, and additional means to disconnect the wire inserting actuator from the member while the latter is operatively connected to one of the abutments.

5. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a pile wire inserting and withdrawing member mounted to have reciprocating movements, a pile wire withdrawing actuator, a pile wire inserting actuator, a device to establish operative engagement between the wire withdrawing actuator and the member during a portion of the operation of the loom only, means to establish operative relation between the wire inserting member and the member at other times in the operation of the loom, and additional means to disconnect the wire inserting actuator from the member during such time as the wire withdrawing actuator is operatively related to the member.

6. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a pile wire inserting and withdrawing member mounted for reciprocating movements, a pile wire withdrawing actuator movable always in the same direction, a pile wire inserting actuator movable first in one direction and then in the other, devices to establish operative connection between the wire withdrawing actuator and the member at certain periods in the operation of the loom, means to establish operative relations between the member and the pile wire inserting actuator when the latter is moving in one direction during other periods in the operation of the loom, and additional means to disconnect the member from the pile wire inserting actuator when the latter is moving in the opposite direction during the periods when the wire withdrawing actuator is operatively related to the member.

7. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a pile wire inserting and withdrawing member mounted for reciprocating movements, a pile wire withdrawing actuator to have operative relationship with the member during certain periods in the operation of the loom, a pile wire inserting actuator to have operative relationship with the member during other periods in the operation of the loom, and means to disconnect the wire inserting actuator from operative relationship with respect to the member when the latter is operatively connected to the wire withdrawing actuator.

8. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a pile wire inserting and withdrawing member mounted for reciprocating movements, a pile wire withdrawing actuator moving constantly in the same direction and having spaced abutments to be operatively related to the member during certain periods in the operation of the loom, a pile wire inserting actuator moving first in one direction and then in the other, an auxiliary block moving with the pile wire inserting actuator to have operative engagement with the member during other periods in the operation of the loom when the wire inserting actuator is moving in one direction, and means to disengage the auxiliary block from the member prior to the movement of said inserting actuator in the other direction.

9. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a reciprocable pile wire inserting and withdrawing member, a pile wire withdrawing actuator to be operatively connected to the member during certain periods in the operation of the loom to withdraw a wire, a pile wire inserting actuator to be operatively related to the member during other periods in the operation of the loom and said wire inserting actuator moving first in one direction to insert a pile wire when operatively related to the member, and then having an idle movement in the other direction, and means to disconnect the pile wire inserting actuator from the member prior to the change in direction of movement of said

wire inserting actuator at the completion of the wire inserting movement of the member.

10. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a horizontally extending guide, a main pile wire inserting and withdrawing member mounted for reciprocation on the guide, an auxiliary block also mounted for reciprocation with respect to the guide, and a pair of actuators, one to have operative engagement with the member to withdraw a pile wire during certain periods in the operation of the loom and the other actuator being permanently connected to the auxiliary block to establish operative connection between the member and block during other periods in the operation of the loom, and means to disconnect the member and block before the auxiliary block starts to move on a non-inserting movement.

11. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a horizontally extending guide frame, a main pile wire inserting and withdrawing member mounted on the frame for reciprocating, an auxiliary block also mounted on the frame for reciprocating, a pair of actuators one of which is operatively related to the member to give the latter a pile wire withdrawing movement during certain periods only in the operation of the loom and the other actuator being permanently connected to the auxiliary block, said member and block being operatively related on a wire inserting movement of the loom, and means to disconnect said block and member prior to a wire withdrawing movement of the member.

12. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a pile wire inserting and withdrawing member, an auxiliary block member, a guide frame on which said member and block are mounted for reciprocating movement, an actuator for giving the member a pile wire withdrawing movement to be operatively connected to said member during certain periods only in the operation of the loom, a pile wire inserting actuator permanently connected to the auxiliary block member to move the latter positively in opposite directions on the guide frame, and attaching means carried by one member to have operative engagement with the other member during a wire inserting movement of the inserting and withdrawing member and to have a movement to disconnect said member on a wire withdrawing movement.

13. In a wire motion for a pile wire loom having pile wires to be inserted and withdrawn relatively to the fabric being woven, a guide frame, main and auxiliary block members mounted on said guide frame for reciprocating movements, a pile wire withdrawing actuator to be operatively connected to the main member during certain periods in the operation of the loom, a pile wire inserting actuator to be moved first in one direction and then in the other and being permanently connected to the auxiliary block member, a hook carried by one of said members and adapted for engagement by the other member to cause said members to move together during a wire inserting movement, and means to move said hook so as to disconnect the members on a wire withdrawing movement of the main member.

In testimony whereof I have hereunto affixed my signature.

WILLIAM W. ROBERTSON.