My invention relates to a loom and method of weaving double pile fabrics, face to face, and more particularly to a loom weaving such fabrics in which each fabric is provided with a face having both looped pile and cut pile. These fabrics may be friezes, woven Astrachans or other fabrics, woven in accordance with this invention.

In accordance with my invention, I provide two sets of ribbons, one set arranged beyond or above the other, so as to space apart the fabrics being woven, each ribbon extending warwise of the loom, each fabric being woven about its set of ribbons, so as to provide fabrics with looped pile faces. In the best embodiment of the invention, I also provide means for supplying and interlacing an additional set of pile warp threads to the fabrics being woven about the two sets of ribbons, so as to interlace predetermined ground wefts of both fabrics and also provide means for cutting the interlacing sets of warp threads, thereby producing two fabrics each having a face with looped and cut pile.

In accordance with the invention, two fabrics are rapidly woven and the pile threads may be woven so as to form any desired design, certain of the pile threads being woven about loose pick pile wefts thrown by the lower shuttle, thereafter forming loops for the top fabric, other pile threads being woven about other loose pick pile wefts thrown by the upper shuttle, thereafter forming loops for the bottom fabric, the loose pick pile wefts being subsequently withdrawn, after the fabrics leave the loom. While these weaving steps are taking place an additional set of pile threads is supplied and woven so that it interlaces with predetermined ground wefts in the top and bottom fabrics, without interlacing the loose pick pile wefts, and is subsequently cut to provide a cut pile face in each fabric.

My invention may be applied to and the structure attached to various types of looms now in use such as looms having two shuttles and operated by cam and harness, Jacquard looms or dobby looms and the like, or the loom may be especially built in accordance with my invention.

One of the objects of my invention is to weave double pile fabrics of any desired design, face to face, about two sets of ribbons extending warwise of the loom, so as to space apart the fabrics being woven, thus increasing the speed of production of the fabrics.

Another object of the invention is to weave such fabrics about two sets of warpwise extending ribbons so as to provide two fabrics each having a face provided with both looped and cut pile threads, the design formed by the looped and cut pile threads being capable of any desired variation.

Another object of the invention is to provide means for varying the height of the cut pile in each fabric.

With the above and other objects in view, my invention consists in the parts, improvements and combinations more fully pointed out hereinafter.

Referring now to the drawings, which illustrate one embodiment of the invention, especially as applied to cam and harness operated looms:

Figure 1, is a side elevation of the loom.

Figure 2, is a diagrammatic view, partly in perspective, showing the cams for operating, through levers and jacks, the harness and heddles and the means for setting the harness.

Figure 3, is a cross-section through the link harness showing the link and ribbon mounted in the harness and the adjustable turnbuckle for setting the harness.

Figure 4, is a perspective view of the crossbar, link and ribbon.

Figures 5 and 6, illustrate the cams for controlling and shedding the ground warp threads for the upper fabric.

Figures 7 and 8, illustrate the cams for controlling and shedding the ground warp threads for the lower fabric.

Figures 9 and 10, illustrate the cams for controlling and shedding the loop pile warp threads for the lower and upper fabrics, respectively.

Figure 11, illustrates the cam for controlling the interlacing pile warp, which forms the cut pile in the face of each fabric.

Figure 12, illustrates the cam for controlling the links for the upper set of ribbons, and

Figure 13, illustrates the cam for controlling the links for the lower set of ribbons.

Figures 14 and 15, illustrate the relative positions of the ribbons, links and shuttles, enabling the shuttles to throw tight pick ground wefts and loose pick pile wefts, above and below the respective links, so that they...
may be guided above and below the ribbons. Figures 16 and 17, are diagrammatic views illustrating the weaving of two fabrics face to face, about the two sets of ribbons and links, each fabric having a looped pile face.

Figure 18, is a diagrammatic view, showing the introduction of the additional interlacing pile thread, which is subsequently cut to form cut pile in the face of each fabric.

Figure 19, is a diagrammatic view showing the cutting operation, thus producing both looped and cut pile in the face of each fabric.

Figure 20, is a diagrammatic view showing the position of the upper and lower set of ribbons and links, shuttles and heddles when weaving a ground weft for both fabrics.

Figure 21, is a similar diagrammatic view when throwing the lower ground weft by the lower shuttle and the pile weft for the lower fabric by the upper shuttle.

Figure 22, is a similar diagrammatic view when weaving the upper ground weft and the upper pile weft.

Figure 23, is a diagrammatic view when weaving the grounds for the two fabrics, following the pile weft weaving steps.

Turning now to the drawings, two pile fabrics are shown being woven face to face, at the same time. For convenience and simplicity, the drawings merely show two series of ground warp threads and one series of pile warp threads for each fabric and an additional set of interlacing pile warp threads for both fabrics. The number of pile or ground warp threads and the movements of the harness may be varied so that any desired design or figure may be woven. The threads used in the weaving are designated by reference letters and reference numerals are applied to the various parts of the loom illustrated.

The loom is provided with a frame 1, in which are mounted ground warp beams 2, 3, and pile warp beams 4, 5. Ground warp beam 2, supplied ground warp thread A for the upper fabric and ground warp thread D for the lower fabric. Ground warp beam 3, supplies ground warp thread B for the upper fabric and ground warp C for the lower fabric. Pile warp beam 4, supplies pile warp E for the upper fabric and pile warp F for the lower fabric. These pile threads form the looped pile in the face of each fabric. The beams thus supply the ground warps and pile warp threads for the two fabrics. Pile beam 5, supplies the interlacing pile warp G, which interlaces predetermined ground warps of both fabrics and is subsequently cut to form cut pile in the face of each fabric. Creels may be used for supplying individual pile threads instead of beams, if desired.

Shuttles 6 and 7, supply the wefts for the ground warps and for the looped pile of the respective fabrics. These wefts are beaten up by the reciprocating reed 8. The shuttles travel on the underlying warp threads, and, when certain picks are being thrown, the respective links form the raceway for the shuttles.

In the embodiment of the invention illustrated, the ground warp and pile warp are shed by suitable heddles provided with eyes through which the threads pass. The heddles are mounted on steel rods in harness frames, reciprocated by cams, operating levers, wires and jacks connected to the harness frames. It will be understood, however, that a Jacquard or dobby mechanism may be used to reciprocate the heddles, if desired.

As shown in the drawings (see Figures 1 and 20 to 23) the ground warp thread A from beam 2, passes through eye 9 in heddle 10, ground warp thread B, from beam 3, through eye 11 in heddle 12, ground warp C from beam 3, passes through eye 13 in heddle 14 and ground warp D, from beam 2, through eye 15 in heddle 16. The shedding of the ground warp A, B, and C, D, for the upper and lower fabrics respectively, is thus controlled by heddles 10, 12, 13 and 16, respectively. Pile warp E, coming from beam 4, for the upper fabric, passes through eye 17 in heddle 18, and pile warp F, from beam 4, for the lower fabric, through eye 19 in heddle 20. The heddles 18 and 20, thus control the shedding of the pile warp threads which form the loop pile in the faces of their respective fabrics. The interlacing pile warp G, forming the cut pile in both fabrics, passes from beam 5, through eye 21, in heddle 22.

The harnesses and cams for operating the heddles will be described below.

In accordance with my invention, means are provided for spacing apart the two fabrics being woven and for guiding the weft picks to their proper position.

As illustrated, (see Figures 14 and 15), these means comprise two sets of warpwise extending ribbons 23, 24, preferably made of wire, one set arranged beyond or above the other, the upper set of ribbons for the upper fabric being offset with relation to the lower set of ribbons for the lower fabric. Pivotedly connected to the near end of each ribbon of the upper set is a movable link 26, and to the near end of each ribbon of the lower set a movable link 27, the distal end of each ribbon extending into the fabric. The ribbons space the fabrics apart and the fabrics are woven about the respective sets of ribbons. The height, i.e. the breath of these ribbons determines the height of the pile loops. The movable links 26, 27, guide the respective wefts to their proper positions, the ground warps being guided to the outer side of each set of ribbons and the pile wefts to the inner side, respectively below and above, the two sets of ribbons.

Means are provided for moving the links, so as to guide the weft picks.
As shown (see Figures 1, 14, 15), each link 26, whose distal end is connected to one of the upper set of ribbons 23, is pivotally connected at its near end to a crossbar 28, carried by a harness. Each link 27, whose distal end is connected to one of the lower set of ribbons 24, is pivotally connected at its near end to the crossbar 29, carried by another harness.

Means are provided for carrying and operating the heddles through which the threads pass, so as to shed the warp threads and for carrying, holding and operating the crossbars and movable links, attached to the harnesses, which guide the weft threads.

In the best embodiment of the invention, these means comprise a plurality of harness frames, operated through sets of jacks 31, 32, by wires 33. The jacks of one set are mounted on standard 34, and the jacks of the other set are mounted on standard 35. Each jack 32, of one set, through linkage 36, 37, 38, is operated by its associated jack 31, of the other set, which is, in turn, operated by its associated wire 39, each of which is actuated by a lever 40 (see Figure 2). Each lever 40, by its roller end is connected to one of a series of grooved cams mounted on one side of the loom, on a cam shaft 41, driven by a motor (not shown).

The cams for operating the levers, wires, jacks, and harnesses, in the form of the invention illustrated are shown in Figures 5 to 13. Cams 42, 43 (see Figures 5 and 6) operate harness frames 51, 52 (see Figure 2) which carry heddles 10, 12, respectively through which passes ground warp A, B, for the upper fabric. Cams 44, 45 (see Figures 7 and 8) operate harness frames 53, 54 through associated levers, wires and jacks (see Figure 2), which carry heddles 14 and 16, through which ground warp C, D, passes. The above four cams thus control the shedding of the ground warp for the respective fabrics. Cam 46 (see Figure 9) through its lever, wires and jacks, operates harness frame 55, carrying heddle 18, through which pile warp E, for the upper fabric passes. Cam 47 (see Figure 10), operates harness frame 56, carrying heddle 20, through which passes pile warp F for the lower fabric. Cams 46, 47, thus control the shedding of the pile warp threads used to form the looped pile in the face of each fabric. Cam 48 (Figure 11) operates harness frame 57, carrying heddles 22, through which the interlacing pile warp G passes, and thus controls the movements of the interlacing warp.

Cam 49 (Figure 12) operates harness frame 58 and crossbar 28, operating the movable links 26, for the upper set of ribbons 23. Cam 50, operates harness frame 59 and crossbar 29, carrying movable links 27 for the lower set of ribbons 24. Cams 49 and 50, thus control the movable links for guiding the weft picks above and below the respective sets of ribbons.

The series of cams and their lever thru wires 39, also operate similarly constructed and arranged sets of jacks (not shown), which operate wires 39", connected to the bottoms of the harness frames for returning the frames.

It will be observed in Figures 5 to 13, that the cams are shown as they are mounted on their shaft at the side of the loom. Cam 46 (Figure 9) is constructed to control pile warp E, of the upper fabric so that the pile warp will carry the loose pick pile wefts, thrown by the lower shuttle, from the lower set of ribbons to the upper set of ribbons. Cam 47 (Figure 10) is constructed to control pile warp F, for the lower fabric, so that this pile warp will carry the loose pick pile wefts, thrown by the upper shuttle, from the upper set of ribbons to the lower set of ribbons.

Cam 48, (Figure 11) controls the interlacing pile warp G, so as to carry it from one fabric to the other interlace the pile warp with predetermine ground wefts in each fabric. This cam so controls the interlacing thread with relation to the control of the looped pile warps that it will move the interlacing warp upward in advance of the upper pile warp as the latter carries its pile wefts from the lower ribbons to the upper ribbons and behind the lower pile warp as the latter carries its pile wefts from the upper to the lower set of ribbons.

Cam 49, controlling the movable links for the upper set of ribbons and cam 50 controlling the links for the lower set of ribbons are so constructed that the links and their respective sets of ribbons are maintained in the same position, without movement, while the ground wefts for the respective fabrics are being thrown. The near ends of the sets of ribbons are thus held their predetermined fixed distance apart. The distal ends of the sets of ribbons are held this predetermined, fixed distance apart by the tension of the threads and the pull of the fabrics against breast beams 77, 78 when delivered to the respective pin rolls 77, 78, (hereinafter described).

Means are provided whereby the harness may be set so as to vary the height of the cut pile with respect to the height of the looped pile, it being possible to preserve the height of the looped pile woven about the respective sets of ribbons while providing different heights of cut pile for the respective fabrics.

As shown (see Figure 3) adjustable turnbuckles 60, are connected to each of the harness frames and to the wires operated by the jacks, so that by adjusting the turnbuckles, the position of the harness may be raised or lowered. This permits setting the harness frames for weaving the ground warps so that the fabrics will be woven a predetermined distance apart, permits setting the harness for looped pile threads in accordance therewith, and permits the setting of the cross bars, links and ribbons, so that they will be a pre-
determined distance apart. The loom may thus be set, so that the midway position for the harness frame for the interlacing threads remains midway between the fabrics being woven. The height of the cut pile may thus be varied with respect to that of the looped pile. The travel of the harness may be correspondingly adjusted by changing the position of the wires 30, 39, along the notched jacks, and along the levers 40, with which they are connected.

Means are provided for feeding the interlacing pile threads so as to supply the proper length of thread for the different heights of cut pile being woven, at the same time preserving the tension on the interlacing threads.

As illustrated (see Figure 1) the interlacing pile warp G, which comes from warp beam 5, passes around guide rod 62, and about and between feed rollers 63, 64, over tension rod 65, tensioned by spring 66, on its way through eye 21 of heddle 22, mounted in harness 57, on the way to the fabric being woven. Lower feed roller 63, may be vertically adjusted by set screw 67.

The upper feed roller 64, is driven from the motor shaft by gears 68, 69, worm 71, worm gear 71a on shaft 71a, bevel gears 72, 73a, and gears 73, 74, 75, 76, the lower feed roller 63, being driven by frictional contact with the upper feed roller 64. The rate at which the upper feed roller is driven from the motor shaft may be varied by changing the intermediate driving gears.

At the delivery end of the loom, after the fabrics have been woven and have passed breast beams 77a, 78a, and are then cut apart as hereinbefore described, the fabrics are delivered to the respective pin rolls 77, 78, which are driven from the motor shaft by gears 68, 69, 70 and 79, bevel gears 80, 81 on shaft 82, worm 83, gears 84, 84a 85, 86 87, 88, 89. The worm 83, is mounted on a sleeve 90, the outer end of which carries hand wheel 91. The sleeve is loosely mounted on the shoulder end of shaft 82, but can be secured thereto in order that the above driving action may occur, by tightening the nut 92, against the hand wheel. This tightens the sleeve against the shoulder on the shaft 82. By loosening the nut the sleeve is loosened and works freely on the shaft. The hand wheel can thus be turned and the worm will drive the gears 84, 85, etc., and the pin rolls 77, 78, may be turned forward or backward, as desired.

It will be observed that by changing the gearing for driving the feed rolls 63, 64, as above described, the rate of feed of the interlacing pile threads G, may be varied, with relation to the rate of delivery speed of the fabrics.

When it is desired to vary the height of the cut pile as, for example, to increase it, the harness is set so that the two sets of ribbons are spaced a further distance apart and the other harnesses, controlling the threads, are set to correspond, and the gearing for the feed rolls 63, 64, is changed so that the rolls will feed more thread to the fabrics, the speed of the delivery pin rolls 77, 78, remaining the same, as does the tension on the threads. The additional amount of thread being fed by the increased speed of the feed rolls is taken up by the height of the cut pile.

Means are provided whereby the tension of the pile warp for the upper fabric and the pile warp for the lower fabric, is maintained, as is the tension of the interlacing pile thread, so that there will be no undue strain or slack in the pile threads. As shown in Figure 1, the tension on the interlacing pile warp G is maintained by tension rod 65 and coacting spring 66. The tension on loop pile warp E, is preserved by tension rod 65a and spring 66a, and the tension on loop pile warp F, by tension rod 65a and spring 66a.

It will be observed by means of the two sets of ribbons two face to face fabrics may be woven so that each fabric is provided with uncured pile loops, or, if desired, each fabric may be provided with a face having both cut and uncured pile, and that the height of the cut pile with relation to the height of the uncured pile, may be varied.

Figures 14 to 17, illustrate diagrammatically the method of weaving loop pile fabrics face to face, and Figures 18 to 23, show the method of weaving two fabrics with loop and cut pile in the face of each fabric, Figures 20 to 23, showing the weaving steps when weaving cut and uncured pile.

The number of ground wefts thrown with relation to pile wefts may be varied. In the form of the invention illustrated, I have shown the weaving of three ground wefts for each fabric, followed by a pile weft for the opposite fabric. As shown in Figure 15, two ground wefts X and Y, thrown by the upper shuttle, are guided by links 26, to the outer side of the upper set of ribbons 23, simultaneously with the throwing of two ground wefts P, Q, by the lower shuttle, for the lower cloth, guided by links 27, to the outer side of the lower set of ribbons 24. The upper shuttle then throws a loose pick pile weft Z, for the lower fabric which is guided by links 26, below the upper set of ribbons, while the lower shuttle throws another ground weft R, for the lower fabric. The lower shuttle then throws a loose pick pile weft S, for the upper fabric guided by links 27, above ribbons 24, while the upper shuttle throws a ground weft W, for the upper fabric. These four operations are then repeated. As illustrated, the respective ground wefts are interwoven by their respective warp threads. The loose pick pile wefts Z, thrown by the upper shuttle are carried by the pile warp F, for the lower fabric, down to the lower fabric, while the pile wefts S, thrown by the
lower shuttle, are carried by pile warp \( E \), for the upper fabric, up to the upper fabric, see Figures 16 and 17. The respective sets of ribbons thus determine the height of the pile loops in the face of the fabrics. By varying the height of the ribbons, i.e. their thickness, the height of the pile loops may be varied.

The interlacing pile warp \( G \), is so controlled that it will pass from one fabric to the other and interlace with particular tight pick ground weft \( X \) of the upper fabric and \( Q \) of the lower fabric (see Figure 18), without interfering with the respective up and down movements of the loose pick pile wefts \( S \) and \( Z \), and without weaving the pile wefts into the respective fabrics. In accordance with my invention, I move the interlacing thread \( G \) in advance of the upward movement of the pile weft \( S \), for the upper fabric, and behind the pile weft \( Z \), for the lower fabric, in its downward travel. The severing of the interlacing threads (hereafter described) midway between the fabrics (see Figure 19) provides the cut pile in the face of each fabric. The cut pile, it will be observed, is made higher than the loop pile so that it may be sheared off and finished, producing smooth-faced fabrics.

The step of throwing the ground weft \( Y \), for the upper fabric and the ground weft \( Q \), for the lower fabric, is shown in Figure 20. Ground warp threads \( A, B \), of the upper fabric, controlled by their harnesses, form the shed through which the upper shuttle \( 6 \) throws the ground weft \( Y \); the link \( 26 \), is positioned by its harness and cam so that the weft may be guided above the upper ribbons and beaten up in the ground of the upper fabric. In this position, the shed for the lower shuttle \( 7 \), is formed of the ground warp threads \( C, D \), of the lower fabric, lower pile warp \( F \) and the interlacing pile thread \( G \), controlled by their respective harnesses. In this view the threads are illustrated diagrammatically, it being understood that lower ground warp thread \( C \), pile warp \( F \) and interlacing warp \( G \), lie substantially in the same plane below the shuttle \( G \). The link \( 27 \), is in position to guide the weft \( Q \), to the under side of the lower set of ribbons where it will be beaten up with the ground of the lower fabric and form a tight pick ground weft about which the pile thread \( G \) is interlaced and held tightly in place.

The pile thread \( F \) for the lower fabric is also woven about the tight pick ground weft \( Q \). This is illustrated in Figure 21, where the positions of the harnesses and the threads controlled thereby, have changed as has also the harness controlling the upper threads. The position of the lower harness and its links remains unchanged. The upper shuttle is here shown throwing a loose pick pile weft \( Z \), through the shed made up of pile warp \( F \) of the lower fabric and the interlacing thread \( G \), and the links of the lower set of ribbons. The links of the upper set of ribbons are in raised position to guide the pile weft \( Z \), below the upper ribbons, so that it may be carried down, after the shuttle pick, by the loose pile warp \( F \), passing above and about it. The interlacing thread \( G \), is controlled so that it will not interfere with this weft as it is carried down to the lower fabric by pile warp \( F \). The lower shuttle at this time is throwing tight pick ground weft \( R \), for the lower fabric, through a shed formed by ground warp threads \( C, D \).

This weaving of the loose pick pile weft for the lower fabric by the upper shuttle and the tight pick ground weft for the lower fabric by the lower shuttle, shown in Figure 21, is followed by the weaving of a loose pick pile weft \( S \) for the upper fabric, by the lower shuttle, and a tight pick ground weft \( W \), for the upper fabric, by the upper shuttle. This is illustrated in Figure 22. Here loop pile warp \( W \), for the lower fabric, has been returned downward by its harness from the position shown in Figure 21, and has carried with it the loose pick pile weft \( Z \) for the lower fabric. The pile warp \( E \), for the upper fabric, has also been brought down, by its harness, to its lowermost position, below the lower shuttle. The interlacing thread \( G \) has been brought down and held in midposition, so as to allow pile warp \( F \) to carry pile weft \( Z \) to the lower fabric without interference, and so that it will not be associated with the loose pick pile weft for the upper fabric about to be thrown. The lower shuttle \( 7 \), throws loose pick pile weft \( S \), through the shed formed of ground threads \( C, D \), and pile warp threads \( E, F \), below the shuttle and the interlacing thread \( G \), above the shuttle. The upper shuttle is at this time throwing a tight pick ground weft for the upper fabric through the shed formed of upper ground warps \( A, B \).

As the harnesses are moved into position for the fourth weaving step, as shown in Figure 23, the interlacing warp \( G \), will be carried from its midway position of Figure 22, to its uppermost position again (as in Figure 21), so that it will not interfere with the upward movement of the loose pick pile weft \( S \), as it is carried to the upper fabric by pile warp \( E \). As shown in Figure 23, the threads and links controlled by their respective harnesses andcams have been brought into position where the throwing of the ground wefts for the fabrics is resumed. The interlacing pile warp \( G \) and loop pile warp \( E \) and ground threads \( A, B \), form the shed through which the upper shuttle throws tight pick ground weft \( X \), while the ground threads \( C, D \), form the shed through which the lower shuttle throws tight pick ground weft \( P \).

In the particular embodiment of the invention illustrated, the loose pick pile wefts are...
thrown in consecutive, adjacent steps and the interlacing pile warp is controlled so as to avoid interference with them. This simplifies the movement of the interlacing thread. The above described four steps are then repeated. It will be observed that the upper shuttle 6, throws ground wefts W, X, Y, for the upper fabric and the loose pick pile wefts Z, which latter are carried to the lower fabric. The lower shuttle 7, throws ground wefts P, Q, R for the lower fabric and loose pick pile wefts S, the latter being carried to the upper fabric. The pile wefts for one fabric, when woven, will thus still be connected to the ground wefts of the opposite fabric, at the selvages of the fabrics, thus preventing the fabrics from separating. Means are provided whereby the connections between the ground wefts of each fabric and the pile wefts of the opposite fabric, are formed in the selvages of the fabrics in loops transverse to the plane of weaving of the warp threads, and means are also provided for severing the loops so formed, so that the loose pick pile wefts Z, for the pile loops of the lower fabric, and S, for the pile loops of the upper fabric, may thereafter be readily withdrawn. One embodiment of such means is illustrated in my copending application, Serial No. 188,492. Means are provided for cutting the interlacing pile warp, G, so as to provide cut pile in the face of each woven fabric. As illustrated, (see Figures 1 and 19), a cutting blade 93, is mounted in a carriage 94, and reciprocates in a track 95, which extends transversely of the loom between the fabrics. Means are provided for reciprocating the cutter. As shown a cord 96, is attached to opposite ends of the cutter carriage. The cord is wound around a drum 97, and passes around guide pulley 98, on one side of the loom and continues to the other side of the loom, about suitable guide pulleys and is attached to the cutter carriage at its other end. The gear segment 99, pivoted at 100, rocks gears 101, 102, the latter being attached to a shaft carrying the drum 97. The gear segment 99, is oscillated from the shaft 103, carrying gear 79, a disc 104, being connected to the segment by connecting rod 105. The motor thus reciprocates the cutter knife to cut the interlacing thread G, and provides cut pile in the face of each fabric.

The reel and lay for beating up the fabrics is operated in the usual manner, a crankshaft 106, having crank 106', geared by gears 69, 68, to the motor shaft, being suitably connected to the lay. Each revolution of the crankshaft will send the lay forward and back in its beating up operation. Means (not shown) are provided, on both sides of the loom for operating the pickers and shuttles, the shuttle operating driving shaft 108 being geared to the crankshaft by 1 to 2 gears 79, 70, so that the shuttle operating shaft will make one complete revolution and throw the shuttles across the loom, back and forth, for every two revolutions of the crankshaft and two operations of the lay. In the embodiment of the invention illustrated, the cams on shaft 41, make one complete revolution for every eight shuttle picks and one complete revolution of the lay. The crankshaft drives the camshaft by 1 to 8 gearing (not shown). The camshaft and cams will make one complete revolution during eight picks of the shuttle, while the crankshaft makes eight revolutions and the shuttle operating shaft makes four revolutions.

It will be understood that one embodiment of the invention has been shown and described and that changes may be made in the loom and method without departing from the principles of the invention.

What I claim is:

1. A loom for weaving double pile fabrics face to face, comprising in combination two sets of ribbons, one set arranged beyond the other, so as to space apart the fabrics being woven, each ribbon extending warpwise of the loom, means for supplying ground warps for the respective fabrics woven about each of the two sets of ribbons, and means for supplying wefts to the ground warps.

2. A loom for weaving double pile fabrics face to face, comprising in combination two sets of ribbons, one set arranged beyond the other, so as to space apart the fabrics being woven, each ribbon extending warpwise of the loom, means for supplying ground warps for the respective fabrics and means for supplying pile warps for the respective fabrics, woven about each of the two sets of ribbons, and means for supplying wefts to the ground warps, and to the pile warps.

3. A loom for weaving double pile fabrics face to face comprising in combination, two sets of ribbons, one set arranged beyond the other, so as to space apart the two fabrics being woven, each ribbon extending warpwise of the loom, means for supplying ground warps for the respective fabrics, means for supplying ground warps to the fabrics, and means for supplying a set of interlacing pile warps to the two sets of ribbons so as to interlace predetermined ground wefts of both fabrics.

4. A loom for weaving double pile fabrics face to face comprising in combination, two sets of ribbons, one set arranged beyond the other, so as to space apart the fabrics being woven, each ribbon extending warpwise of the loom, means for supplying ground warps for the respective fabrics, means for supplying a set of pile warps to each of the sets of ribbons, means for supplying ground wefts and pile wefts to the fabrics, and means for supplying a third set of interlacing pile warps to the two sets of ribbons so as to inter-
A loom for weaving double pile fabrics, face to face, comprising in combination, two sets of warps, one set arranged above the other, so as to space apart the two fabrics being woven, each ribbon extending warpwise of the loom, means for supplying ground warps and means for supplying pile warps to the fabrics woven about each of the two sets of ribbons, and means for supplying ground wefts and pile wefts on opposite sides of each set of ribbons.

A loom for weaving double pile fabrics, face to face, comprising in combination, two sets of warps, one set arranged above the other, so as to space apart the two fabrics being woven, each ribbon extending warpwise of the loom, means for supplying ground warps and means for supplying pile warps to the fabrics woven about each of the two sets of ribbons, and means for supplying ground wefts and pile wefts on opposite sides of each set of ribbons.

A loom for weaving double pile fabrics, face to face, comprising in combination, two sets of warps, one set arranged above the other, so as to space apart the two fabrics being woven, each ribbon extending warpwise of the loom, means for supplying ground warps and means for supplying pile warps to the fabrics woven about each of the two sets of ribbons, and means for supplying ground wefts and pile wefts on opposite sides of each set of ribbons.

A loom for weaving double pile fabrics, face to face, comprising in combination, two sets of warps, one set arranged above the other, so as to space apart the two fabrics being woven, each ribbon extending warpwise of the loom, means for supplying ground warps and means for supplying pile warps to the fabrics woven about each of the two sets of ribbons, and means for supplying ground wefts and pile wefts on opposite sides of each set of ribbons.
tive fabrics, in accordance therewith, and
and the link harnesses, so as to vary the dis-
tance apart of the two fabrics being woven and
thus vary the length of the interlacing warp.

12. A loom for weaving double pile fabrics
face to face comprising in combination, two
sets of warwise extending ribbons, one set
arranged beyond the other, so as to space
apart the two fabrics being woven, means for
supplying ground warp and pile warp for
each fabric, means for supplying ground
wefts and pile wefts for each fabric, feed rolls
for supplying an interlacing pile warp for
both fabrics, a pair of pin rolls to which the
woven fabrics are delivered, a plurality of
harnesses for controlling the warp threads
and links, adjustable turnbuckles connected
to the harnesses for setting the link harnesses
so as to vary the distance apart of the rib-
bons, for setting the harnesses controlling the
ground warp and pile warp for the respective
fabrics, in accordance therewith, means for
varying the length of travel of the harnesses
controlling the pile warp for each fabric, the
interlacing pile warp and the links so as to
vary the distance apart of the two fabrics
being woven, and means for varying the rate
of speed of the feed rolls for the interlacing
pile warp with respect to the rate of speed of
the pin rolls to which the fabrics are deliv-
ered, so as to vary the supply and thus the
height of the interlacing pile warp in ac-
cordance with the harness setting.

13. A loom for weaving double pile fabrics
face to face comprising in combination, two
sets of warwise extending ribbons, one set
arranged above the other, so as to space apart
the two fabrics being woven, means for sup-
plying ground warp for the respective fab-
rics, means for supplying pile warp to form
looped pile in the face of each fabric, means
for supplying an interlacing pile warp for
both fabrics, a cutter, and means for operat-
ing the cutter transversely across the loom
so as to cut the interlacing pile warp midway
of the fabrics, so as to provide cut pile in
the face of each finished fabric.

14. The process of weaving two fabrics
face to face so as to provide the face of each
fabric with both cut and looped pile, which
consists in throwing the loose pick pile wefts
across warwise extending ribbons, throw-
ing the tight pick ground wefts across the
same ribbons, weaving the pile warp to be
looped about the loose pick pile wefts and
weaving the pile warp to be cut about pre-
determined tight pick ground wefts of both
fabrics.

15. The process of weaving two fabrics
face to face so as to provide the face of each
fabric with both cut and looped pile, which
consists in delivering the loose pick pile wefts
across the inside faces of two sets of war-
wise extending ribbons, delivering the ground
wefts across the outside faces of the set of
ribbons, weaving the pile warp to be looped
about the respective loose pile pile wefts and
weaving the pile warp to be cut about pre-
determined tight pick ground wefts of both
fabrics.

16. The process of weaving two fabrics
face to face about an upper and lower set of
warwise extending ribbons, so as to provide
the face of each fabric with both cut and
looped pile, which consists in delivering a
set of loose pick pile wefts for the lower
fabric across and below the inside faces of
the upper set of ribbons, delivering a set of
loose pick pile wefts for the upper fabric
across and above the inside faces of the lower
set of ribbons, and delivering ground wefts
across the outside faces of the two sets of
ribbons, and weaving the loop pile warp
about ground wefts in the lower fabric and
about the first set of pile wefts so as to draw
the latter down against the inside faces of
the lower set of ribs, and weaving other
loop pile warp about ground wefts of the
upper fabric and about the second set of pile
wefts so as to draw them up against the inside
faces of the upper set of ribbons.

17. The process of weaving two fabrics
face to face about an upper and a lower set
of warwise extending ribbons, so as to pro-
vide the face of each fabric with both cut
and looped pile, which consists in delivering
a set of loose pick pile wefts for the lower
fabric across and below the inside faces of
the upper set of ribbons, delivering a set of
loose pick pile wefts for the upper fabric
across and above the inside faces of the lower
set of ribbons, delivering ground wefts across
the outside faces of the two sets of ribbons,
and weaving loop pile warp about ground
wefts in the lower fabric and about the first
set of pile wefts so as to draw the latter down
against the inside faces of the lower set of
ribbons, weaving other pile warp about
ground wefts in the upper fabric and about
the second set of pile wefts so as to draw them
up against the inside faces of the upper set
of ribbons and weaving an interlacing pile
warp about predetermined ground wefts in
both fabrics and in advance and behind the
respective pile wefts so as not to interweave
with them.

In testimony whereof, I have signed my
name to this specification.

HENRY HOWARD.