

Jan. 1, 1929.

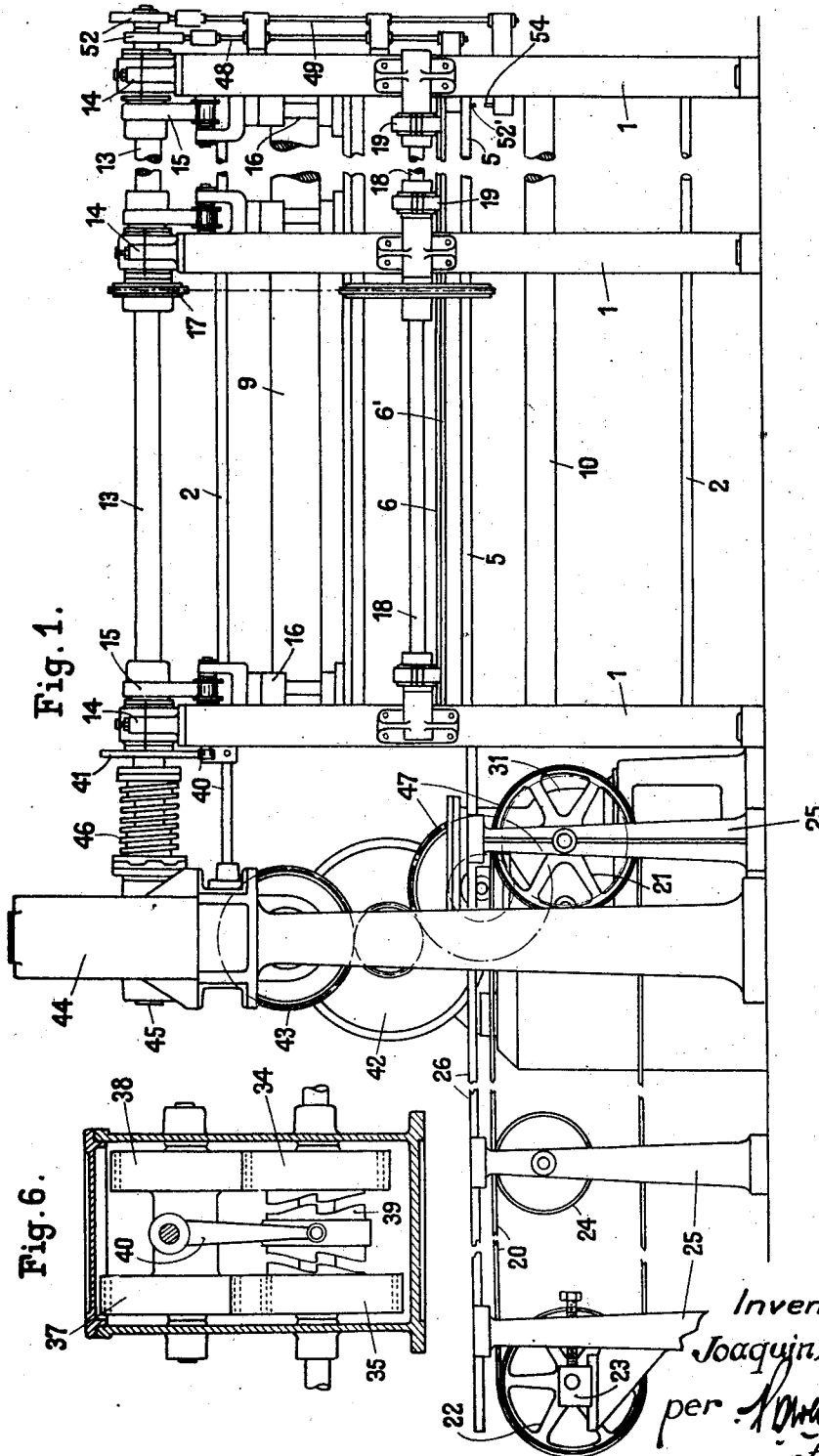
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J. ZULUETA

MULTIPLE SHED LOOM

Filed June 26, 1925

3 Sheets-Sheet 1



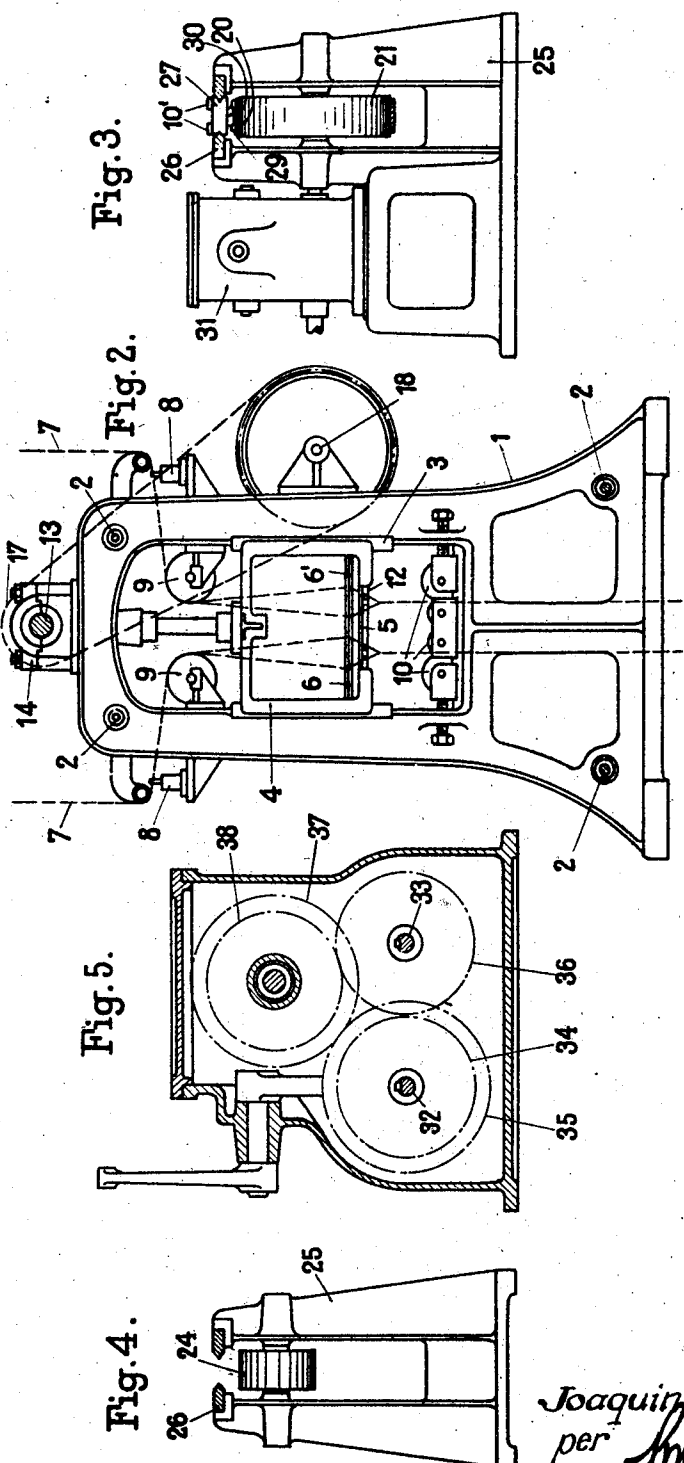
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

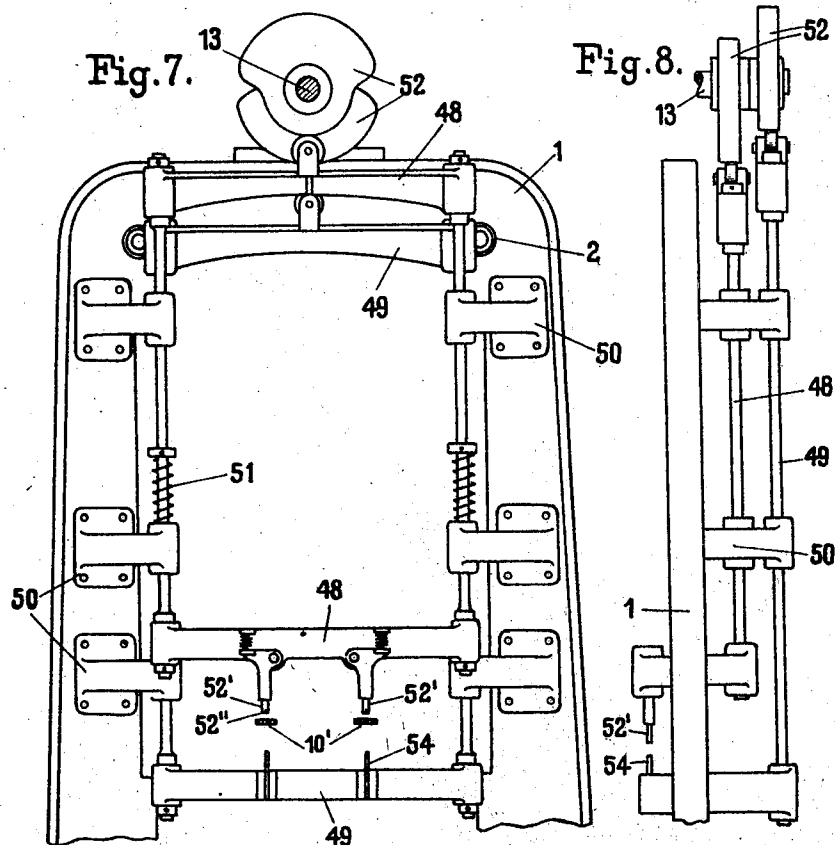
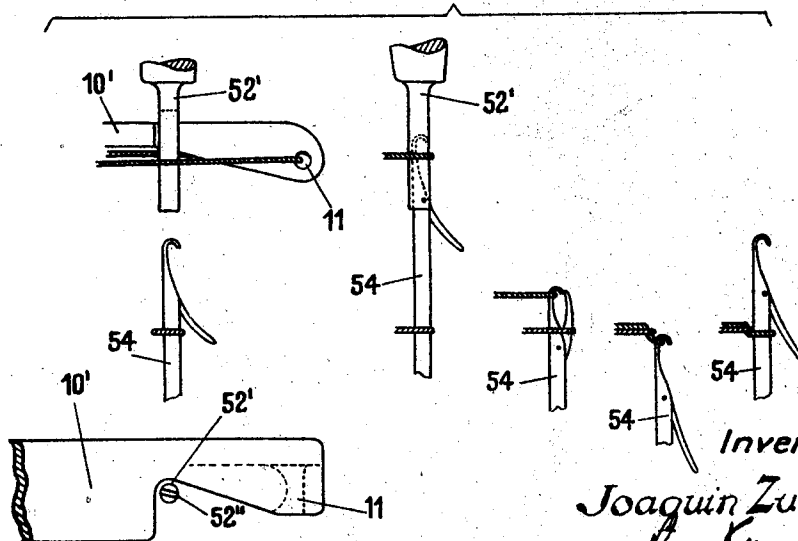


Fig. 9.



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UNITED STATES PATENT OFFICE.

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MULTIPLE SHED LOOM.

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The present invention refers to a new continuous double power loom without shuttle for weaving two pieces of cloth at the same time in any breadth.

Down to the present day many innovations have been introduced in looms with the object of counteracting as far as possible the constant increase of the cost of labour; these innovations consist, some in the application of special appliances enabling a greater number of looms to be allotted to one weaver, and others in increasing the speed of the mechanisms of the loom, and in both these cases an increase in output is obtained that compensates in part the higher wages paid to labour.

A satisfactory solution of this economic difficulty is provided by the loom forming the subject of the present invention, as it is possible by its means for one weaver to take charge of a considerable number of looms and also because it eliminates, or at any rate very greatly lessens, the causes of the interruptions that are constantly experienced in the looms now in use upon the formation of the weft.

The outstanding characteristics of the loom in question are: that no shuttle is used; that its weft is continuous without any break; that the fabric woven on it may be of great breadth; and that it weaves two cloths at the same time; and the combination of these conditions or characteristics is precisely what enables the economy in the production of woven cloths, above referred to, to be achieved.

This loom effects a great saving in factory space, combined with a smaller consumption of power, oil, tools and belting; as in addition it may be fitted with a mechanism for automatic stoppage upon any thread of the warp or woof becoming broken, it will be understood that this circumstance enables one weaver to attend to several looms at one and the same time.

Owing to the fact that this loom is double, the output thereof for any given speed is also double, and accordingly the looms can run at a lesser number of revolutions, with the result that the threads very rarely get broken and the loom is able to produce continuously, the loss in speed being made up by the double amount of work it can accomplish at the number of revolutions at which it works.

An important factor in the output of looms as known at present is the frequent stopping owing to breakage of the thread of the warp, and it is well known that, as the breadth of

the loom increases, so the size of the shuttle requires to be increased, especially in the case of stout cloths, and as a consequence the healds and reeds have to run over a greater distance and this, in turn, increases the friction of the warp threads with the prongs and nets, subjecting these threads to a more severe strain and rendering them more apt to break, which in the long run means an important reduction in the output of the loom.

This serious difficulty is overcome by the present invention, for there being no shuttle the distance over which the reeds travel is reduced to a third or fourth of the course they are accustomed to run in shuttle looms and friction is therefore very slight, with the result that the threads of the warp are not subjected to strain and are better able to stand the work they are put to and, though the number of revolutions may be less, as a result the loom produces far more work owing to the fact that there are no stoppages.

In order to be able to weave on the loom in question, it has been given a vertical design and thus the two pieces of cloth can be attended to on either side of the loom. By this double arrangement the loom occupies very little space and by placing an intermediary passage between these double looms, a girl will be able to attend to two cloths at one and the same time, viz, one cloth on each loom without leaving the passage formed by the two double looms.

Owing to the design of the loom being vertical, the girl will have the warp threads coming to the beam and the cloth that is woven in front of her, and she will not be obliged to move to the rear part of the machine in order to tie the threads, as is the case in looms in which the beam is situated towards the back.

The fact that the double loom can be vertically arranged and can produce two pieces of cloth at the same time in a limited space is due to the system of weaving by means of a needle and dispensing with a shuttle, which system, besides causing the thread of the woof to be endless, enables cloths to be woven of whatever breadth is desired, without any limit, a result that has hitherto not been obtainable on machines.

In the following pages a detailed description of the loom in question will be given with reference to the drawings on the sheet attached hereto.

Fig. 1 is a general front view of the loom;

Fig. 2 is an elevation of one of the transverse frames of the same; Figs. 3 and 4 are front views respectively, of the frame holding the mechanism of the guide for the woof thread—which frame is provided with a speed reduction gear—and of a normal frame of the same mechanism; Figures 5 and 6 show, on a larger scale, the reversing mechanism for the forward and reverse movement of the guide of the woof thread; Figures 7 and 8 show the mechanism for forming the list; and the group of Figures 9 are detail views showing the manner in which the formation of the selvage is carried out.

The loom comprises four main groups or units, viz, the loom proper; the mechanism for the working of the two needles or guide of the woof threads; the mechanism for the formation of the selvage, and the apparatus for the distribution of power and movement among the groups or units just referred to.

The first group is composed of the transverse frames 1 (Figs. 1 and 2), which are set at proper distance the one from the other and are connected by means of the stays 2. These frames are formed in their central part with vertical guides 3 for frames 4, which latter contain the reed 5, and on these are arranged the two harnesses 6, 6', duly sustained, and through which pass the threads of the two warps 7; these threads enter the machine passing through the devices 8, which automatically stop the machine in the event of one of the threads being broken, and then pass over the guide cylinders 9 (Fig. 2). Underneath the reed 5, the guide rollers 10 are provided for the woven cloths, these cloths, as has already been mentioned, being formed vertically. The mechanism for the transmission of movement will be referred to later. The needles or guides 10' (Fig. 3) of the threads of the woof, one for each piece of cloth woven, have a rectangular section and are formed with an eye or loop 11 at one of the ends, to allow the thread to pass. These needles or guides have an alternative movement along the loom underneath the reed 5, to which are joined the guides 12 that sustain the needles; these guides 12 have notches suitably arranged so as to admit of the warp threads passing without difficulty.

This group or unit is completed by the mechanism for advancing the woven cloths, which is neither described nor shown in the drawing as any one of the suitable mechanisms already known may be employed.

The movement of the machine elements—with the exception of the needles 10', for which a special set of gears is provided—is effected by a shaft 13, which is mounted in bearings 14 and is carried on the frames 1 along the machines. On this shaft are fitted the cams 15, which act upon arms 16 on the frames 4, whereby the alternate ver-

tical movement of the reed 5 is obtained. On the same shaft 13 are also fitted the chain wheels 17 having sprocket gear for driving the shaft 18, on which are fitted cams 19 that impart by suitable connections (not shown) an alternate horizontal movement to the harnesses 6 and 6' precisely at the suitable moments as determined by the profiles of said cams.

The second group is composed of the mechanism moving the two needles 10' of the woof threads.

This mechanism consists simply of an endless belt 20 passing over pulleys 21 and 22, the former of which is the driving pulley, whereas the latter is provided with a suitable tension regulating device 23 for keeping the belt at the right tension. In addition, intermediate pulleys 24 serve to keep the upper stretch of the said belt as far as possible horizontal.

Both the pulleys 21 and 22, as well as the intermediate guide-pulleys 24, are mounted on frames 25 which are arranged at suitable distances from each other end at the same time serve as supports for the guides 26 for a movable piece 27 (Fig. 3) to which are fitted the needles 10' of the threads of the woof, and the said piece 27, and with it the guide-needles just mentioned, is carried along in one or the other direction by the belt 20, which for this purpose carries a projection 29 acting against a projection 30 that forms part of the said piece 27. As will be readily understood, belt 20 moves in either direction, and for this purpose the driving pulley 21 receives movement from a gear for changing the direction of movement, as shown in Figures 5 and 6. This gear is contained in a casing 31 and may be varied in many different ways, but the form shown by way of example comprises a shaft 32 that receives the movement and always rotates in the same direction; a shaft 33, which is also the shaft of pulley 21 and rotates in the one or the other direction according as one or other of the wheels 34 and 35 are geared to the receiving shaft 32; for in the former case wheel 34 engages directly with wheel 36, connected to shaft 33, whereas by connecting wheel 35, the latter will move the intermediate system composed of the wheels 37 and 38, and 38 will engage with the same wheel 36 mentioned before, which in this latter case will rotate in a direction opposite to that in which it rotated in the first case.

The engaging or disengaging of clutch collar 39, which causes one or other of the wheels 34—35 to mesh, is controlled by a system of levers 40, which in turn is controlled by an eccentric 41 (Fig. 1) of suitable shape fixed on the same shaft 13, so that the needles 10' are made to move forwards, and backwards and to stop at the precise moments required.

The group or set of mechanisms that transmits movement to the two groups just described consists of an electric motor 42 that drives wheel 43 and thereby a shaft leading 5 to a speed-reduction gear 44 (Fig. 1) whose external shaft 45 drives shaft 13 mentioned above, to which it is coupled by means of an automatic release clutch 46; this clutch enables the reduction gear to continue to rotate 10 without any danger to its component parts in the event of the loom ceasing to work for any unforeseen reason.

The same motor 42, by means of wheels 47, transmits movement to the gear-box 31 for 15 reversing the movement.

The last group, viz, the group of mechanisms for the formation of the selvage of the cloths is arranged at the extreme end of the loom, opposite to the end carrying the driving mechanism and the mechanism of the needles 10'. This group is formed of two 20 frames 48—49, arranged vertically and sustained and guided by the bracket supports 50, which are mounted on the frame 1 of the loom, they can move vertically in either direction by the combined action of springs 51 and eccentrics 52 carried on shaft 13, (Fig. 7).

Frame 48 is provided at the bottom with 30 projections 52' which enter the notches or slits 53 on the needles 10' when the latter reach the end of their run, so that when the needles are withdrawn they retain the respective woof threads during the backward 35 movement of the said needles 10', as shown in Fig. 9.

The other frame, 49, is fitted with needles 54, similar to those used on machines for the manufacture of knitted goods. In their upward 40 movement these needles present the openings 52'' of the projections 52' of the frame 48 and by picking up the woof thread, when the said projections 52' are withdrawn, cause the plaited selvage to be formed, as is 45 clearly shown in the group of detail drawings under Fig. 9.

The working of this machine takes place in the following manner:—

Let us suppose, for the purpose of demonstration, that the machine is running at full 50 speed and is at the stage when the forward movement of needles 10' is about to begin, that is to say, when the part 27 conducting the needles is at the end of the mechanism 55 that imparts movement to it, or towards the part of belt 20 where the tension device 23 is located. The part 27 will then move towards the right (according to Fig. 1) and in the same direction will carry the needles 10', 60 which will pass along the loom through the guides 12 that are joined up to the reed 5, and the said needles will conduct the thread drawn from a spool or pirn arranged in suitable position on the machine and not shown 65 on the drawings for the sake of clearness.

The needle reaches the end of its run, that is to say when the ends of the needle through which the thread passes is opposite the mechanism for the formation of the selvage, and immediately the projections 52' are lowered 70 by means of the corresponding eccentric; at this moment the eccentric 41 acts upon the system of levers 40 and the position of the clutch collar 39 is shifted so that the direction of movement of belt 20 is changed and 75 it moves backwards carrying with it the needles 10' until they are carried beyond the loom.

Thereupon, by the action of the same eccentric 41, belt 20 is stopped and immediately 80 reed 5 drops with the two woof threads left in the turn of the needles 10', the healds 6 and 6' change position and reed 5 moves back, whilst the cloth simultaneously moves forward. During this alteration, the needles 85 54 have acted in the manner described above, forming a new laced chain of selvage to the cloths themselves.

The machine is now ready to begin a new turn and will do so as soon as the eccentric 41 90 causes the corresponding wheels to engage so as to obtain the forward movement of the needles 10'.

The machine described—and the description, as already mentioned, has been given by 95 way of example—may vary as regards its accessory forms and its dimensions as well as in the materials of which it is built, in the quality and widths of the cloth to be woven and in all other circumstances that cannot di- 100 rectly or indirectly affect its essential character.

What I claim is:

1. A double vertical loom for weaving two cloths of double weft, comprising a series of 105 frames spaced from each other, a horizontally arranged vertically movable reed carried by such frames, horizontally movable harness carried by said frames, healds arranged on the said reed and also arranged horizontally, 110 a guide needle for conducting the woof thread of each cloth and adapted to run along the machine underneath the reed and between the two sections of threads into which each warp is divided by the healds, mechanism 115 for the formation of the selvage, guide cylinders for the two warps, fitted to the upper part of the machine and other rollers placed in the lower part thereof for drawing and leading the woven cloth. 120

2. A double vertical loom according to claim 1, comprising means for effecting the vertical movement of the reed at the right 125 moments comprising eccentrics, a shaft running the length of the machine and carrying said eccentrics, and bearings mounted in the upper part of the frames and carrying said shaft.

3. A double vertical loom according to claim 1, comprising means for effecting the 130

movement of the healds, comprising eccentrics, a shaft arranged at one side of the machine and carrying said eccentrics, and means for driving said shaft.

5 4. A double vertical loom according to claim 1, in which two guide needles for the woof are each provided at one end with a hole through which passes the thread, means connecting the two said needles, and means, en-
10 gaging such connecting means, and comprising an endless reciprocating belt whereby the needles are carried along, either towards the interior of the machine or outside it.

15 5. A double vertical loom according to claim 1, comprising guide supports attached to the said reed and adapted to hold the said needles.

20 6. A double vertical loom according to claim 1, comprising connecting means between the needles, means mounted on the frames to serve as guides for the needles, pulleys mounted on the same frames, an endless reciprocating belt mounted on the pulleys, and means on the said belt to engage the said
25 connecting means and reciprocate the needles.

7. A double vertical loom according to claim 1, comprising an endless belt, pulleys carrying the belt, means on the belt for reciprocating the needles, a source of power

for driving one of the pulleys, and an auto- 30
matic reversing gear for transmitting the reciprocating motion to the belt through the said driven pulley.

8. A double vertical loom according to claim 1, in which the mechanism for the 35
formation of the selvage comprises two frames vertically arranged at one end of the machine, means for imparting alternate vertical movement to the frames, projections mounted on one of the frames and serving to 40
retain the thread of the woof during the backward movement of the needles leading the thread, and needles fitted to the other frame to form the plaiting of the selvage.

9. A double vertical loom according to 45
claim 1, in which the mechanism for the formation of the selvage comprises vertically movable frames, spring and eccentric mechanism for imparting the vertical movement to said frames, and means, carried by said 50
frames, for forming the plaiting of the selvage.

10. A double vertical loom according to claim 1, comprising a driving motor, speed reduction gear, and a suitable automatic re- 55
lease clutch.

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