April 18, 1944. E. WELTI 2,346,803

LOOM

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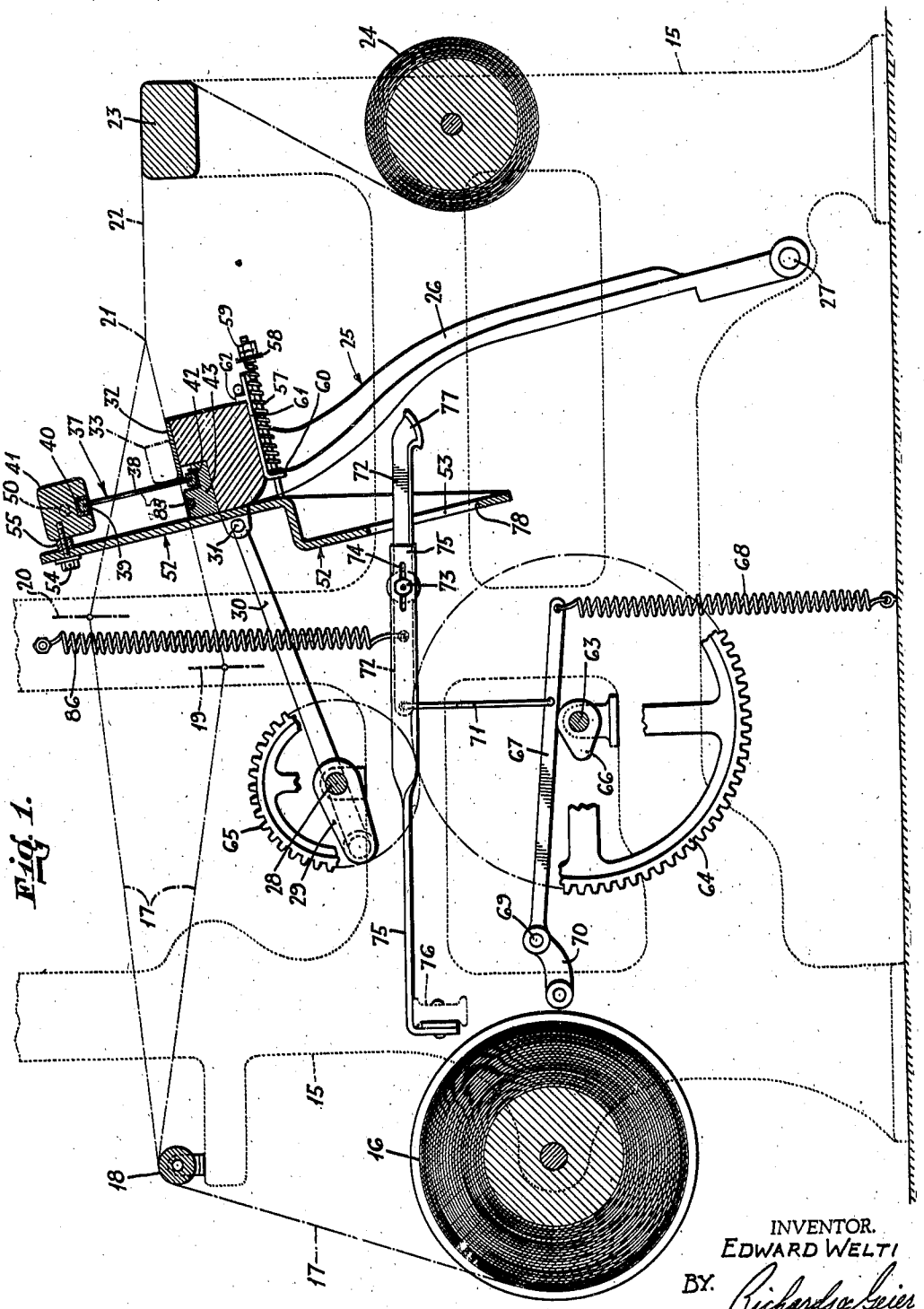


Fig. 1.

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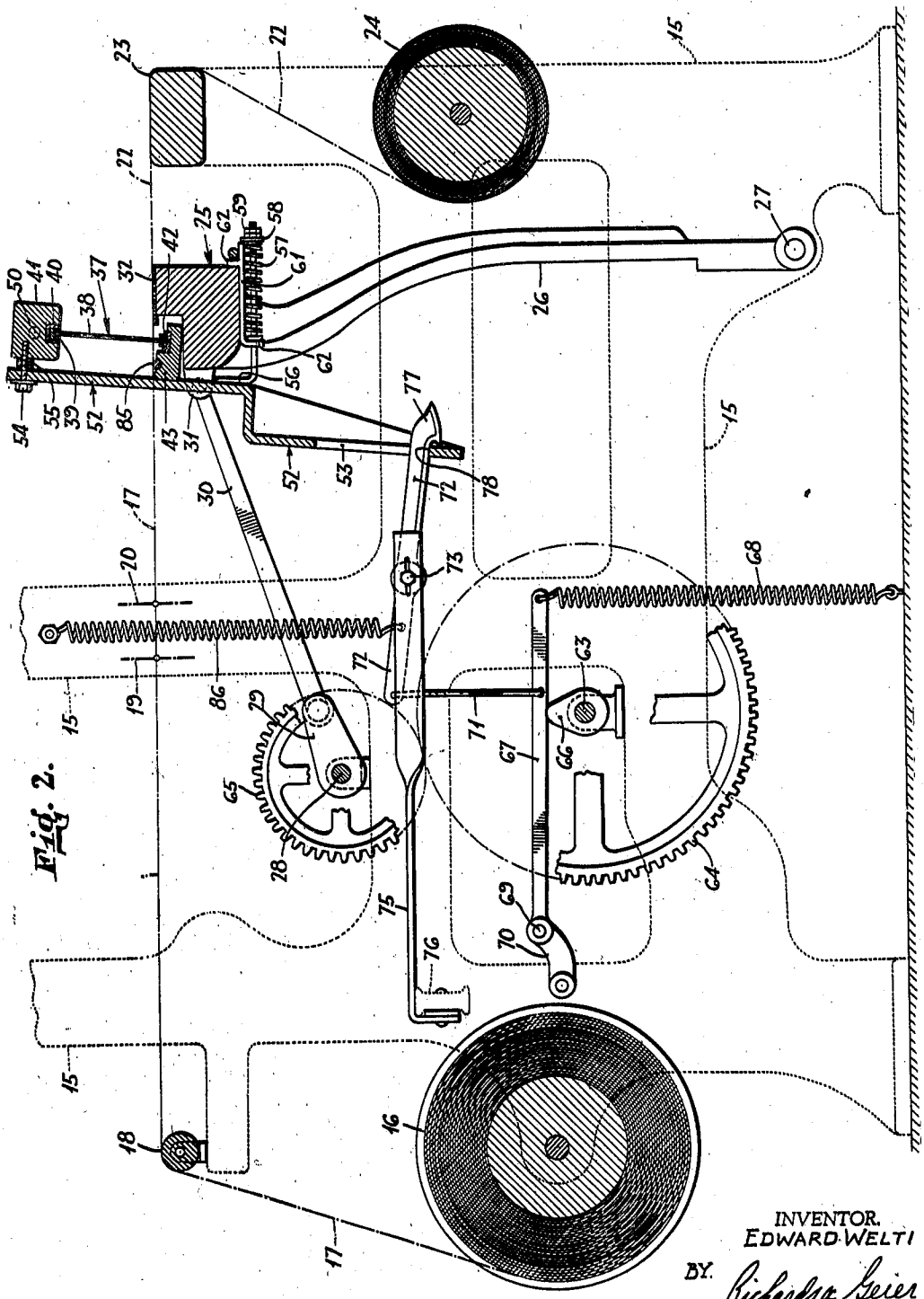


Fig. 2.

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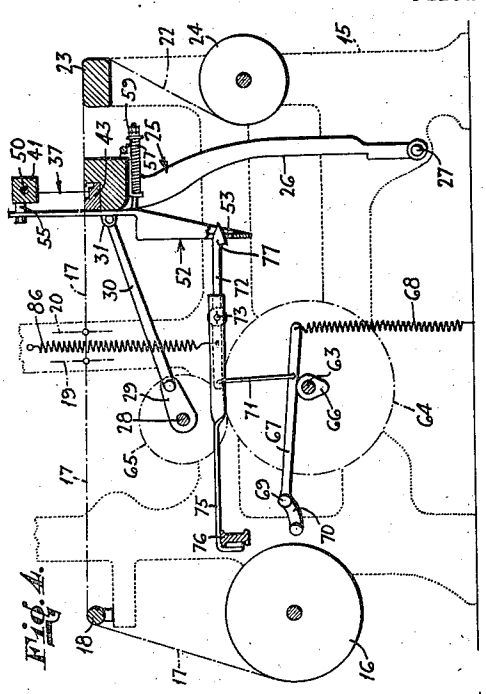


Fig. 4.

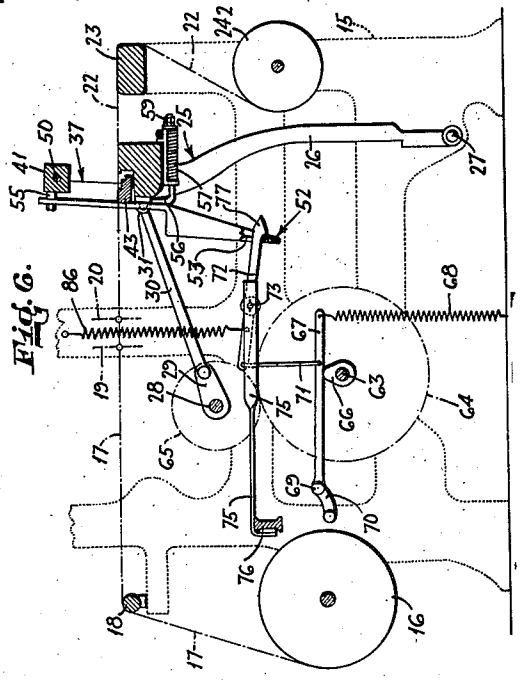


Fig. 6.

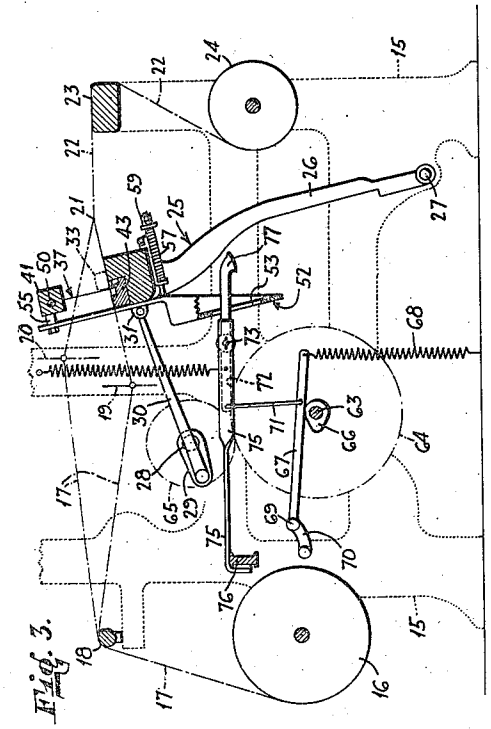


Fig. 3.

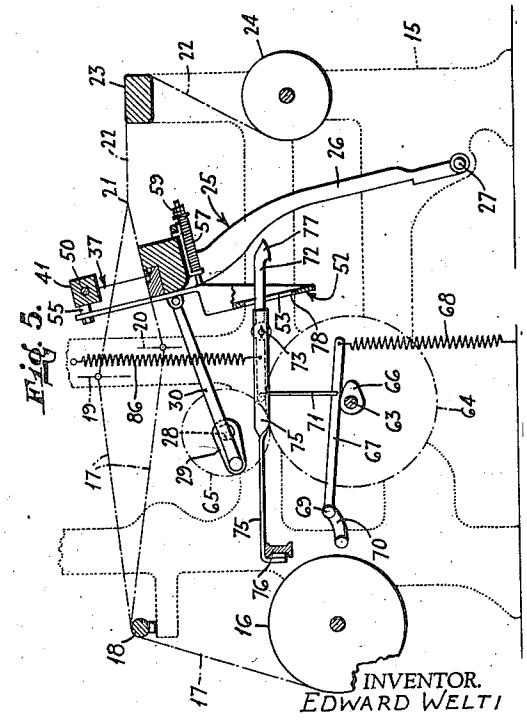


Fig. 5.

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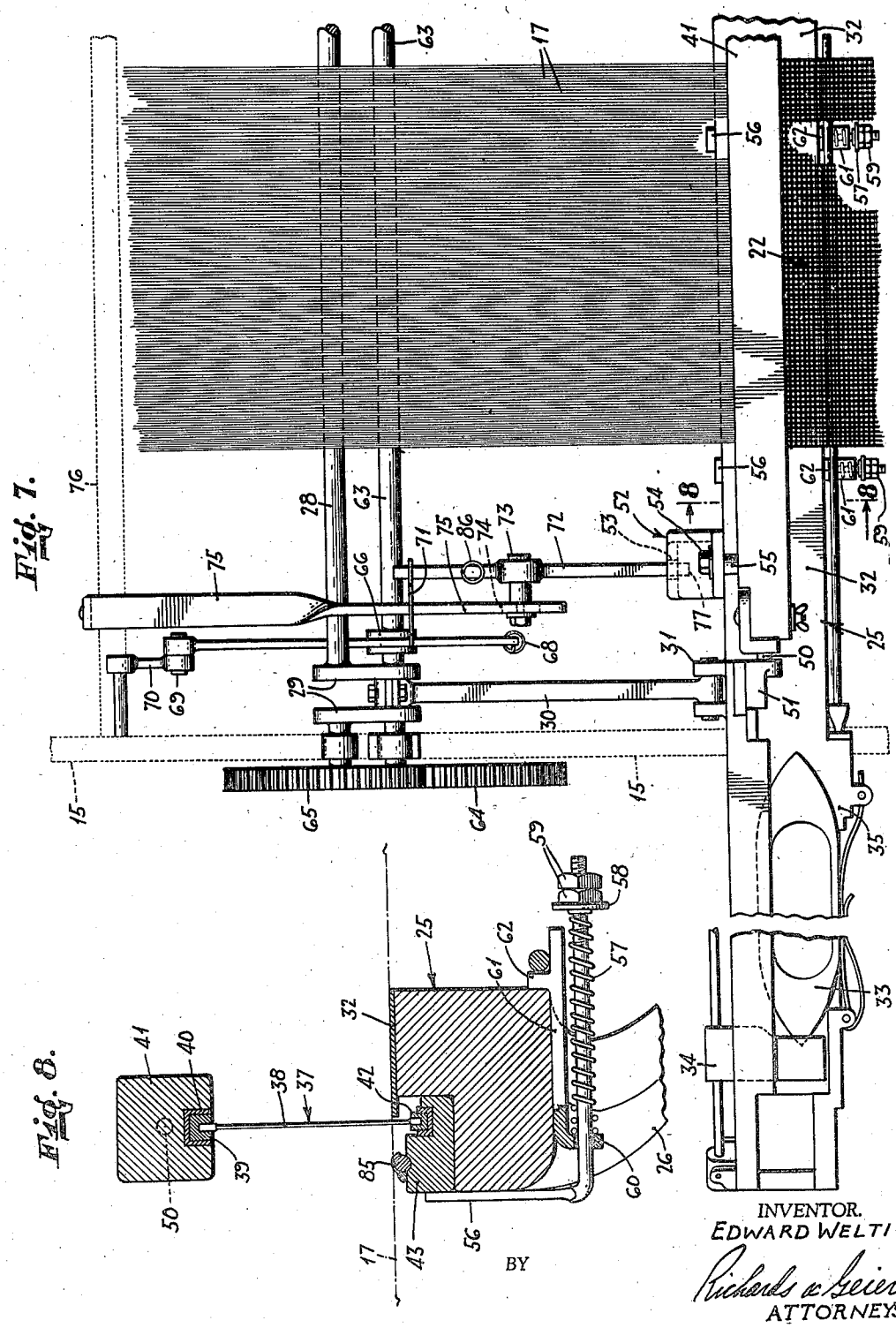


Fig. 7.

Fig. 8.

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LOOM.

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Fig. 9.

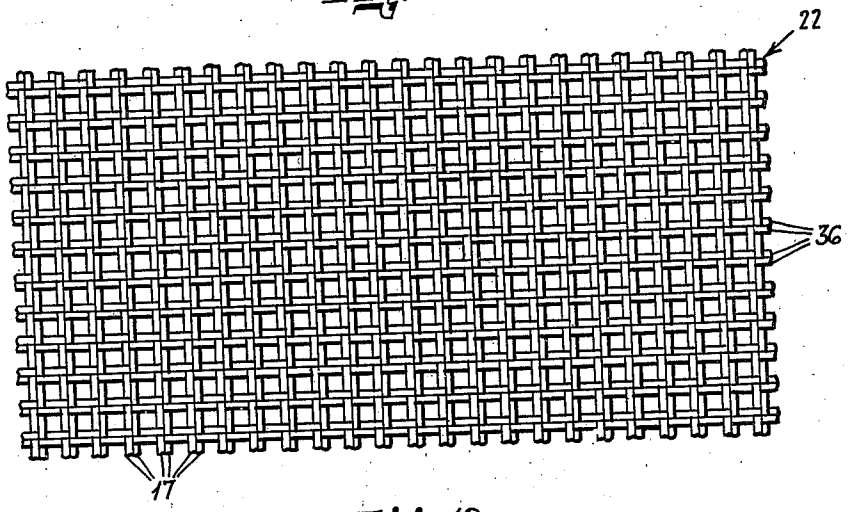


Fig. 10.

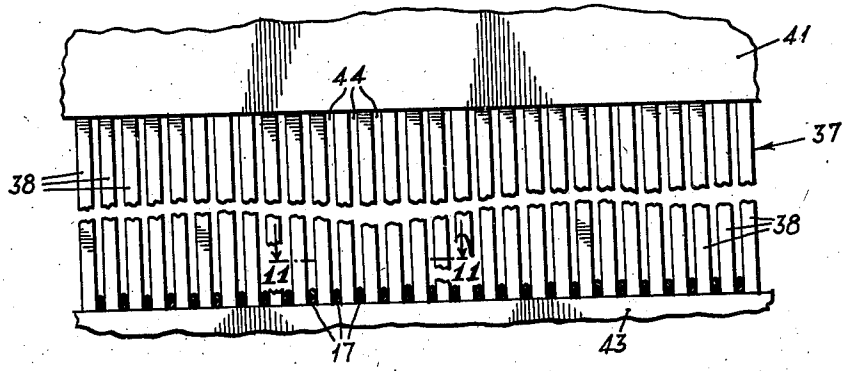


Fig. 11.

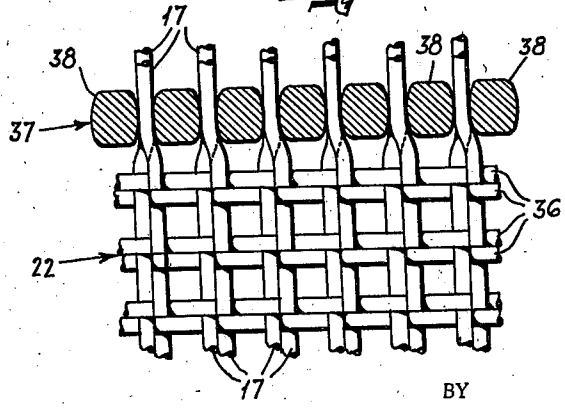
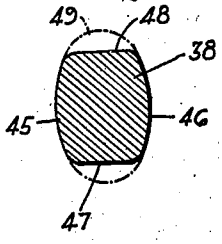


Fig. 12.



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UNITED STATES PATENT OFFICE

2,346,803

LOOM

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Application April 9, 1941, Serial No. 387,617

5 Claims. (Cl. 139—188)

This invention relates to improvements in looms and refers more particularly to looms used for the manufacture of petit point fabrics.

Petit point cloth is constituted by spaced woven threads forming uniform meshes. Heretofore, this cloth was manufactured on ordinary looms by providing an accelerated step-wise motion of the take-up roll. It was found impossible to utilize this method for the manufacture of a cloth both the warp and weft threads of which are maintained at equal distances from each other, particularly if the meshes of the petit point cloth are to be constituted on all sides by double threads.

An object of the present invention is the provision of an inexpensive and effectively operating loom for the manufacture of petit point fabrics.

Another object is to improve a loom structure by providing therein means enabling the loom to be used for the manufacture of petit point fabrics of various types.

A further object of the present invention is the provision of a loom attachment for manufacturing petit point fabrics formed by double weft and warp threads.

Other objects of the present invention will become apparent in the course of the following specification.

In accomplishing the objects of the present invention, it was found advisable to employ a reed the teeth of which have a width corresponding to the required space between the warp threads of the petit point cloth to be manufactured.

The spacing of the weft threads is achieved by a pivotal mounting of the reed upon the lay and by the use of a reed-retarding device operated by the main drive of the loom and engaging the reed at predetermined intervals to maintain the furthest beating-up point at a distance from the normal fell of the cloth.

Petit point fabrics having meshes formed by double weft and warp threads are manufactured by passing two threads through each space formed between the teeth of the reed and by so constructing the reed-retarding device that the retarding of the reed takes place at each alternate pick.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing, by way of example, a preferred embodiment of the inventive idea.

In the drawings:

Figure 1 is a diagram illustrating partly in side elevation and partly in section a loom constructed in accordance with the principles of the present invention.

Figure 2 is similar to Figure 1 and shows various parts of the loom in a different position.

Figures 3 to 6 are diagrams illustrating the operation of the loom: Figures 3 and 4 show the loom in the shedding and beating up positions, respectively, while Figures 5 and 6 show the shedding position and the beating-up position in the following pick, the reed being retarded in Figure 6.

Figure 7 shows a portion of the loom in plan view.

Figure 8 is a section along the line 8—8 of Figure 7, on an enlarged scale.

Figure 9 is a plan view of a petit point fabric.

Figure 10 shows a portion of the reed in front elevation.

Figure 11 is a section along the line 11—11 of Figure 10, on an enlarged scale; and

Figure 12 illustrates diagrammatically the cross section of a reed tooth.

The standard parts of the illustrated loom include a frame 15 which is indicated by broken lines in Figures 1 to 7 and which carries the warp beam 16 upon which the warp threads 17 are wound (Figs. 1 and 2).

The warp threads 17 pass over the whip roll 18 and form a shed by means of the diagrammatically indicated heddles 19 and 20.

The fell of the cloth is indicated at 21 in Figures 1, 3 and 5. The finished cloth 22 passes over the breast beam 23 and is wound upon the take-up roll 24.

The lay 25 of the loom includes the lay sword 26 which is pivoted at 27 to the frame 15 and which is reciprocated by a crankshaft 28. The crank 29 of the crankshaft 28 is connected with one end of a pitman arm 30, the opposite end of which is pivotally connected at 31 with the lay 25.

The lay 25 carries a race plate 32 for the shuttle 33 which is reciprocated by pickers 34, one of which is illustrated in Figure 7.

The shuttle 33 is received in shuttle boxes 35 which are carried by the lay 25.

In accordance with the present invention, the described loom structure is provided with means which will be described hereinafter and which enable the loom to manufacture a petit point fabric 22 (Fig. 9) having double warp and weft threads 17 and 36, respectively.

The reed 37 shown best in Figures 1, 2, 8 and 10, includes a plurality of teeth 38 carried by a frame 39. The upper portion of the frame 39 is enclosed in a channeled support 40 and is firmly connected with a reed cap 41. The lower portion of the frame 39 is enclosed in a similar support 42 which is firmly connected with the lay cradle 43.

The lay cradle 43 is provided with a thread guide 85 and is situated within a suitable recess formed in the lay 25.

As shown in Figure 10, the reed teeth 38 are all of uniform width and are considerably wider than the spaces 44 between the teeth.

The cross-sectional form of the teeth 38 is shown on an enlarged scale in Figure 12. Each of the teeth 38 is provided with opposed curved surfaces 45 and 46, which are adapted to engage the warp threads 17.

The front and rear surfaces 47 and 48 are substantially straight and are joined by means of round edges with the curved surfaces 45 and 46. The deviation of the cross-sectional outline of a tooth 38 from the normal oval outline 49 is diagrammatically illustrated in Figure 12.

Figure 11 shows that two warp threads 17 extend substantially one over the other in each of the spaces 44 and that due to the described specific form of the teeth 38, the two threads 17 extend side by side in front of the reed teeth, without diverging or bending around the teeth.

Although the size and number of reed teeth may vary considerably it has been found to be most advantageous to employ approximately 530 teeth in a reed width of 55 inches. The width of the teeth is preferably 0.078 inch, although this dimension may be considerably varied.

As best shown in Figure 7, the reed cap 41 is mounted upon a pivot 50 carried by brackets 51 which are firmly mounted upon the lay 25. Due to this arrangement, the reed cap 41 and the reed 37 connected therewith, may swing relatively to the lay 25.

The reed cap 41 is actuated by a reed retarding member 52 having the form of a bent bracket, the lower end of which is provided with an opening 53 (Figures 1 and 2).

The bracket 52 is connected with the reed cap 41 by means of a bolt 54 which carries a distancing bushing 55. The bracket 52 extends downwardly along the rear surfaces of the lay cradle 43 and the lay 25, but is not attached to the lay, so that it can swing along with the reed cap 41 and the reed 37, as best shown in Figure 2.

The reed cradle 43 is held in place within the recess formed in the lay 25 by a plurality of clamping devices, one of which is shown on a larger scale in Figure 8 of the drawings.

Each of these clamping devices includes an angular spring clip 56 one end of which presses against the reed cradle 43. The clip 56 carries a coil spring 57 pressing with one end against the washer 58 held by nuts 59 which are screwed upon the other end of the clip 56. The opposite end of the spring 57 is pressed against the end 60 of a clip support 61. The end 60 is mounted upon the clip 56. The clip support 61 is provided with a projection 62 cooperating with a parallel portion of the clip 56 to clamp the lay 25 and to hold the reed cradle 43 in the position shown in Figure 8.

The main drive of the loom includes a drive shaft 63 (Fig. 7) which is rotated by any suitable motor, not shown in the drawings. The shaft 63 carries the main gear 64 which is keyed upon the shaft 63 and which meshes with the pinion 65 keyed upon the crankshaft 28.

For reasons, which will be apparent hereinafter, it is important that the gear ratio of the gears 64, 65 be two to one.

The drive shaft 63 carries a cam 66 (Fig. 1) which is rotatable along with the shaft 63. A cam follower 67 is pressed against the cam 66 by a spring 68, one end of which is connected to an end of the cam follower 67, while the opposite end of the spring 68 is attached to the frame or the floor. The cam follower 67 has the form of an elongated lever, the opposite end of which is pivoted at 69 to a bracket 70 which is carried by the frame 15 of the loom.

The movements of the cam follower 67 are transmitted by a tie rod 71 to a trigger lever or hooking member 72. The lever 72 is mounted intermediate its ends upon a pivot 73 which is carried in a slot 74 of an elongated support lever 75. A spring 86 is connected to the frame 15 and to the trigger lever 72.

The rear end of the support lever 75 is riveted to a cross bar 76 constituting a part of the frame 15.

The lever 72 extends through the opening 53 of the bracket 52 and has a hook shaped front end 77 adapted to engage the edge 78 of the bracket 52.

In order to manufacture the petit point fabric 22, shown in Figure 9, it is advisable to subject the warp threads 17 and the weft threads 36 to a preliminary sizing with a starch compound.

The warp threads 17 are wound upon the beam 16 and pass over the whip-roll 18 (Fig. 1); they are divided by the heddles 19 and 20, to form a shed and extend through the teeth 38 of the reed 37.

The take-up roll 24 is continuously rotated and the heddles 19 and 20 are reciprocated by the usual means not shown in the drawings. The shuttle 33 is reciprocated by the pickers 34 in the usual manner.

Figure 3 shows the loom in a pick position, for instance, an even pick position. In this position, the cam follower 67 is in engagement with the round lowermost portion of the cam 66. The lever 72 extends through the opening 53 of the bracket 52 without engaging the bracket. The heddle 20 is in its uppermost position and is ready to begin its downward movement, while the heddle 19 is in its lowermost position and is about to move upwardly. The shuttle 33 is thrown through the shed by a picker 34 and then the crankshaft 28 and the pitman arm 30 move the lay 25 from the pick position shown in Figure 3 to the beating up position shown in Figure 4. There is no relative movement between the reed 37 and the lay 25.

Thereafter, the lay 25 is moved back by the pitman arm 30 to the pick position, for instance, an odd pick position shown in Figure 5. The shuttle is thrown again through the shed. However, the projecting portion of the cam 66 is now situated close to the cam follower 67 so that it will raise the cam follower in the course of the movement of the lay 25 from the position shown in Figure 5 to the position shown in Figure 6.

The cam follower 67 will transmit its upward movement by means of the tie rod 71 to the rear end of the trigger lever 72, so that the end 77 of this lever will move downwardly and will engage the edge 78 of the bracket 52.

The lever 72 will hold the bracket 52 while the

lay 25 is moving to the position shown in Figure 6, and since the bracket 52 is firmly connected with the reed cap 41, the latter will swing about its pivot 50.

Consequently, the lay cradle 43 and the lower end of the reed 37 will carry out a relative swinging movement away from the shuttle race 32, as shown in Figure 2. Therefore, the reed 37 will not beat up the weft thread drawn by the shuttle directly up to the fell of the cloth but will lay the thread at a distance of 3/8 to 1/2 of an inch from the fell.

Then the lay 25 is moved by the crankshaft 28 from the retarded beating up position shown in Figure 6 back to the pick position shown in Figure 3.

Then the shuttle causes another weft thread to extend across the shed and this thread is beaten up jointly with the preceding weft thread during the movement of the reed 37 from the position shown in Figure 3 to the position shown in Figure 4.

It is apparent that two weft threads are always beaten up jointly by the reed 37. Since the roll 24 is moved continuously, the fell of the cloth will recede by the time the reed 37 has reached the beating up position shown in Figure 4. Consequently, two weft threads 36 will be always situated, one next to the other, at a distance from the previously beaten up pair of weft threads, the distance between these pairs of threads depending upon the extent of the retarding movement of the reed 37, caused by the trigger lever 72.

The fabric is passed over the breast beam 23 and is wound upon the take-up roll 24.

The woven fabric 22 is preferably subjected to a steam bath and then is heated rapidly by calenders or the like, to cause a congelation of the starch.

It is apparent that the specific illustrations shown above have been given by way of illustration and not by way of limitation, and that the structures above described are subject to wide modification and variation without departing from the scope or intent of the invention, all of which modifications and variations are to be included within the scope of the present invention.

What is claimed is:

1. In a loom having a drive shaft, a lay, means connecting said drive shaft with said lay for reciprocating said lay, and a reed; means carried by said lay and pivotally supporting said reed, a bracket carried by the second-mentioned means and having an opening formed therein, a trigger lever having an end extending through said opening, means pivotally supporting said trigger lever intermediate its ends, and means connected with the other end of said trigger lever and intermittently actuated by said drive shaft to cause the first-mentioned end of the trigger lever to engage an edge of said opening during a movement of said lay and thereby cause said reed to swing away from said lay.

2. In a loom having a drive shaft, a lay, means connecting said drive shaft with said lay for reciprocating said lay, and a reed; means carried by said lay and pivotally supporting said reed, a bracket carried by the second-mentioned means and having an opening formed therein, a trigger lever having an end extending through said opening, means pivotally supporting said trigger lever intermediate its ends, a cam keyed upon said drive shaft, a cam follower contacting said cam, and a rod connected with the other end of said trigger lever and with said cam follower, said cam being of such form that the first-mentioned end of the trigger lever is caused intermittently to engage an edge of said opening during a forward movement of said lay and thereby cause said reed to swing away from said lay.

3. In a loom having a drive shaft, a gear keyed upon said drive shaft, a crankshaft, another gear keyed upon said crankshaft, the ratio of the two gears being two to one, a lay, a pitman arm connecting said crankshaft with said lay, a reed and a reed cap carrying said reed; means carried by said lay and pivotally supporting said reed cap, a bracket carried by said reed cap and having an opening formed therein, a trigger lever having an end extending through said opening, means pivotally supporting said trigger lever intermediate its ends, a cam keyed upon said drive shaft, a cam follower contacting said cam, and a rod connected with the other end of said trigger lever and with said cam follower, said cam being of such form that the first-mentioned end of the trigger lever is caused to engage an edge of said opening during every second forward movement of said lay and thereby cause said reed to swing away from said lay in the course of said every second forward movement.

4. In a loom, a reed comprising a frame and a plurality of spaced teeth carried by said frame, each of said teeth being wider than the space between that tooth and an adjacent tooth, and having a cross-sectional outline consisting of two curved sides, a straight front and a straight back, and rounded edges joining said straight back with said curved sides.

5. A loom for weaving petit point fabric comprising a lay, means for reciprocating said lay, a reed pivotally mounted on said lay and normally held stationary relative thereto, said reed having spaced teeth which are wider than the spaces therebetween and each space being designed to receive two warp threads one above the other, a shuttle for laying a pick of weft on each reciprocation of the lay, and means to cause relative movement between the lay and the reed on each alternate forward beat of the lay whereby the reed is retarded relative to the lay.

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