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H. HARDWICK.

MEANS FOR CORRECTING IMPROPER REGISTRY OF PARTY-COLORED WARP THREADS.

(Application filed Apr. 25, 1900.)

(No Model.)

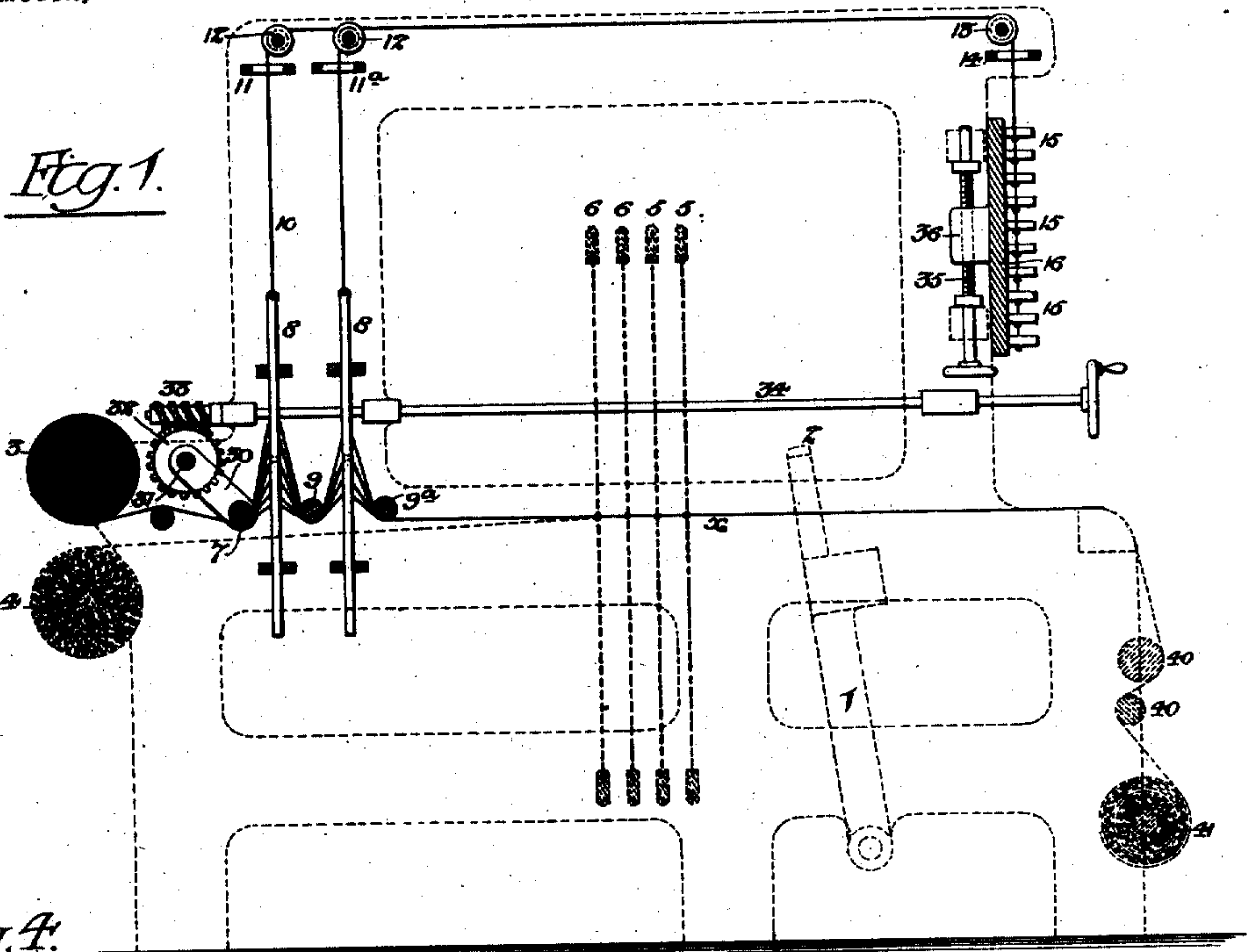
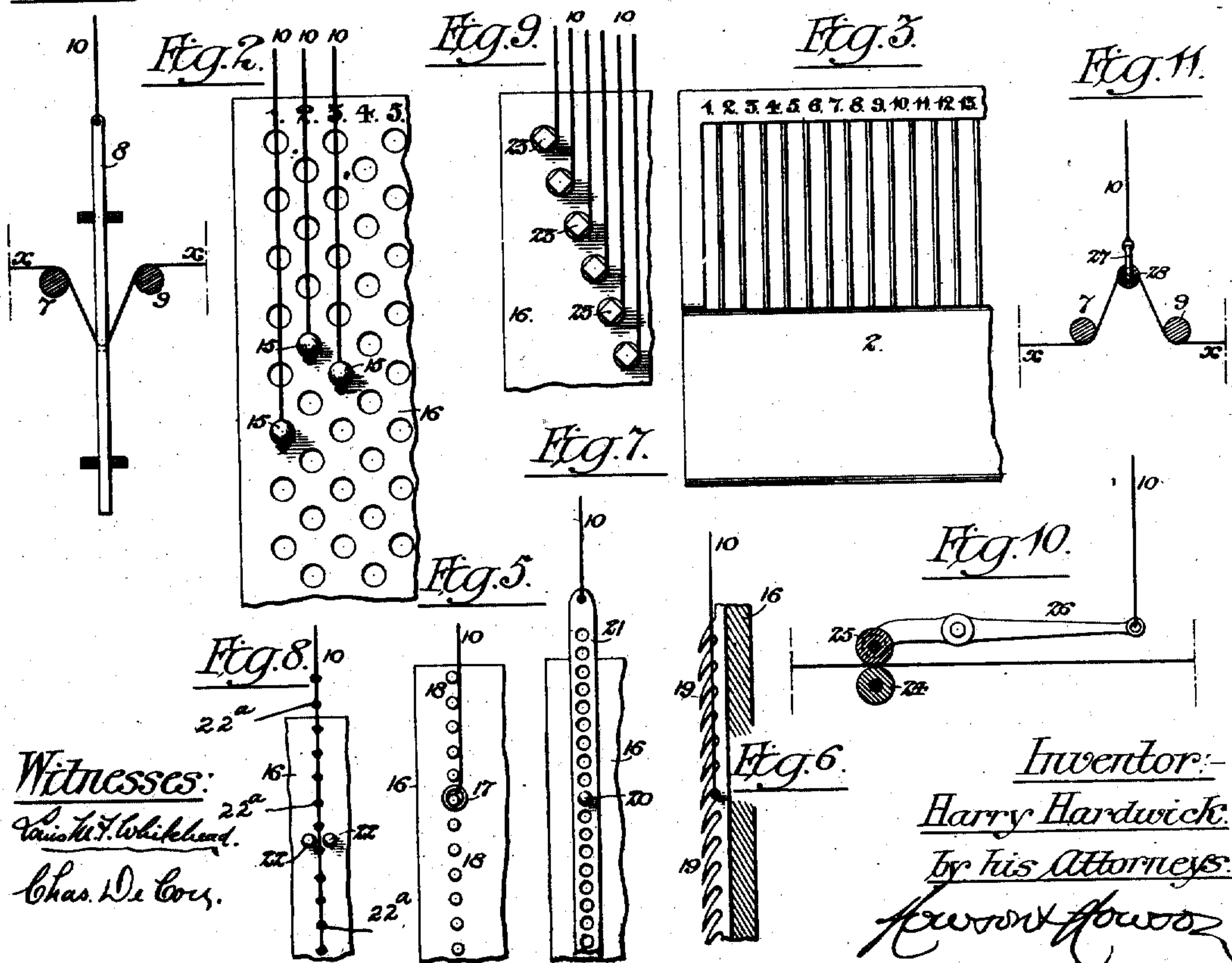


Fig. 4.



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MEANS FOR CORRECTING IMPROPER REGISTRY OF PARTY-COLORED WARP-THREADS.

SPECIFICATION forming part of Letters Patent No. 689,184, dated December 17, 1901.

Application filed April 25, 1900. Serial No. 14,285. (No model.)

To all whom it may concern:

Be it known that I, HARRY HARDWICK, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Means for Correcting Improper Registry of Party-Colored Warp-Threads in Textile Machinery, of which the following is a specification.

My invention relates to textile machinery,
10 such as warping-machines for winding or looms for weaving fabrics in which are employed party-colored warp-threads having the colors so disposed upon the different threads that when the latter are woven into a fabric
15 a predetermined pattern will be produced, the ordinary tapestry carpet being a common example of the fabric woven in this way.

The object of my invention is to provide
20 for the control of the warp-threads during the winding or weaving operation, so that the colors of the different threads may be kept in closer registry than usual, whereby the figures in the pattern of the fabric produced will have sharper or more well defined outlines
25 than it is possible to obtain with the present methods of winding and weaving. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

30 Figure 1 is a diagrammatic view, in side elevation, illustrating sufficient of a loom equipped in accordance with my invention to impart a proper understanding of the latter. Fig. 2 is an enlarged view of part of an index-
35 board constituting one element of the mechanism employed. Fig. 3 is a front view of part of the loom-reed, and Figs. 4 to 11 are views illustrating modifications of certain features of the invention.

40 In weaving in the ordinary way fabrics with party-colored warp-threads it is practically impossible to produce a pattern having figures with sharp or well-defined outlines, this defect being due in part to the impossibility
45 of taking up precisely the same amount of each warp-thread for each turn of the beam in winding said warp-threads upon the latter and in part to a lack of uniformity in the stretch of the warp-threads while beaming or
50 in the draft upon the threads during the operation of weaving. I overcome the objection in great measure by using in connec-

tion with each warp-thread, preferably both in beaming and weaving, means for graduating the tension upon said warp-thread, the
55 preferable plan being to deflect each warp-thread and to provide said thread with means whereby the extent of such deflection may be varied. By this means I am enabled to take
60 up the slack in any thread which may exist at the beginning of the winding or weaving operation and to gradually give out that slack as the winding or weaving progresses, and I
65 am also enabled to vary the tension upon each warp-thread independently during the winding or weaving and by thus tightening or slackening the thread can so govern the
70 position of the party-colored portions of the same as to correct improper registry of colors in adjoining warp-threads. Each warp-thread may be composed of two or more strands operated as a unit.

I have illustrated my invention in connection with a loom, which, so far as regards the appliances for weaving, may be constructed
75 in any ordinary manner. In the drawings, however, I have only shown the loom-frame, the swinging lay 1, with its reed 2, the beam 3 for the party-colored face or pattern forming warp-threads, the beam 4 for the
80 ground or backing warp-threads, the face warp-heddles 5, the ground warp-heddles 6, the take-up rolls 40, and the cloth-winding roll 41. At some point between the warp-beam 3 and the heddles I pass each
85 party-colored patterning warp-thread α around a guide-bar 7, preferably circular in cross-section and composed wholly or in part of glass or other material around which the thread will pass freely, thence through an
90 eye in a vertically-guided rod 8, and thence to and around another guide-bar 9, similar to the bar 7. The upper end of the rod 8 is attached to a cord, chain, wire, or other flexible connection 10, (hereinafter for convenience termed simply a "wire,") which passes
95 through one of the spaces in a reed or grating 11 and thence around a guide-bar 12, similar to the bars 7 and 9, the wire being then carried forwardly to another similar
100 guide-bar 13, after passing around which it passes through one of the spaces of a reed or grating 14 and thence to a pin 15, which can be adapted to any one of a number of open-

ings in an index-board 16, secured to the frame of the loom, so as to be within convenient sight and reach of the loom attendant.

As shown in Fig. 1, the normal position of the guide-eye in the rod 8 is some distance above the guide-bars 7 and 9, and the normal position of the pin 15, connected to said rod, is about the center of the vertical row of openings formed in the index-board 16 for the reception of said pin. Hence by moving the pin to a lower opening an upward pull will be exerted upon the deflected portion of the warp-thread, and by moving the pin to a higher opening said deflected portion will be slackened. Levers and cords or other equivalent means of connecting the rods 8 and pins 15 may of course be substituted for the pulleys and wires. Any slack which may exist in either warp-thread at the beginning of the weaving operation can be taken up, and during the weaving the tension upon one of the party-colored warp-threads can be increased or diminished, and said thread can be woven tightly or loosely in order to bring any particular portion of said thread into proper registry with the portion of an adjoining thread which is intended to register therewith. Hence the attendant by closely observing the fabric during the operation of weaving and by properly manipulating the pins 15 can maintain the colors of the adjoining warp-threads in substantially correct registry. If, for instance, a particular portion of a warp-thread is in advance of the portion of an adjoining thread with which it should register, said first thread may be subjected to increased tension, and thus woven more tightly than the other, until the greater take-up of the latter, due to its slacker weave, brings the two threads into register again, a reverse action attending reverse conditions. In beaming the warp each thread being under separate control can be likewise tightened or slackened to compensate for irregularity in the winding. Hence the warp as delivered from the beam will approximate correct registry more closely than usual.

Where the warp is fine, I may, in order to avoid crowding, duplicate the guide-bar 9, as shown at 9^a, and the reed or grating 11, as shown at 11^a, disposing the rods 8 of certain of the warp-threads—say the first, third, fifth, seventh, and so on—between the bars 7 and 9 and the rods 8 of the alternate threads—say the second, fourth, sixth, eighth, and so on—between the bars 9 and 9^a, this duplication of the parts being represented in Fig. 1, or where the amount of slack in a particular warp-thread is excessive I may use in connection therewith two rods 8, so as to deflect it twice. I may also deflect the warp-thread downwardly instead of upwardly from its normal line, as shown in Fig. 4; but in this case the tension upon the warp-thread will be dependent upon the weight of the rod 8. Hence the plan shown in Fig. 1 is to be preferred. Various means may also be used to adjust and

retain the front end of the wire 10. Thus, as shown in Fig. 5, a ring 17 at the end of the wire can be adapted to any one of a row of pins 18 on the index-board, or, as shown in Fig. 6, a ring or loop at the end of the wire can be adapted to any one of the teeth of a ratchet-bar 19 on said board, or a reverse construction may be adopted—that is to say, a single pin 20 on the index-board may be adapted to any one of a number of openings in a bar 21 attached to the wire, as shown in Fig. 7, or a pair of pins 22 may serve as a catch or retainer for any one of a series of knots or protuberances 22^a on the wire, as shown in Fig. 8, or in other cases I may use a rotatable pin 23, similar to the tuning-pin of a musical instrument, the forward end of the wire being wrapped around said pin, so that the turning of the pin in one direction will tighten the wire, while the turning of the pin in the other direction will slacken it, such construction being shown in Fig. 9. My invention may also be carried out by imparting tension to the warp-threads without deflecting the same. Thus, as shown in Fig. 10, each warp-thread may be caused to pass between a pair of rollers 24 and 25, the latter being carried by a lever 26, to which is connected the wire 10, so that said roller 25 may be caused to press upon the roller 24 with any desired degree of force, and thus cause the warp-thread which passes between the rollers to be woven either tight or slack, as desired, either or both of the rollers being provided with an elastic or semi-elastic covering. This embodiment of my invention, however, necessitates the use of a pair of rollers for each warp-thread.

In order to enable the weaver to readily correlate each of the warp-adjusting or tension-regulating devices and its corresponding warp-thread x , I prefer to provide each of the spaces of the reed with a number or other indicating-mark, as shown in Fig. 3, and to correspondingly number each of the adjusting devices. For instance, in Fig. 2 I have shown each row of openings in the index-board as numbered to accord with the number of the corresponding space of the reed.

If desired, the rods 8 may be discarded and the warp-threads passed through eyes connected directly to the wires 10, as shown, for instance, at 27 in Fig. 11; but the use of the guided rods is preferred, for the reason that they serve to prevent entanglement of the warp-threads or their adjusting devices. The eyes may be provided with antifriction-rollers to ease the movement of the threads therethrough, one of such rollers being shown at 28 in Fig. 11.

It will be advisable in many cases to provide for the advance or retraction to a limited extent of the entire party-colored warp—as, for instance, when it is desired to bring a particular portion of each warp-thread directly on top of the inserted pile-wire at the beginning or other part of the weaving operation. This may be accomplished in different ways, two

different means for its accomplishment being shown in Fig. 1, on reference to which it will be observed that the guide-bar 7 is carried by a rock-shaft 31 through the medium of any
 5 desired number of arms 30, said shaft having a worm-wheel 32, meshing with a worm 33 on a shaft 34 at the side of the loom, so that by turning this shaft in one direction or the other the guide-bar 7 may either be raised to
 10 slacken the warp and permit it to be drawn forward or may be lowered, so as to tighten the warp and draw it rearward, or the same result may be accomplished by vertical movement of the index-board 16, so as to simultaneously
 15 lengthen or shorten to the same extent the deflected portions of the warp α , the means shown in the drawings for accomplishing this movement comprising a vertical screw-shaft 35, vertically confined to suitable bearings
 20 on the loom-frame and engaging with a nut 36 on the back of the index-board.

Having thus described my invention, I claim and desire to secure by Letters Patent—

25 1. As a means of correcting improper registry of party-colored warp-threads in textile machinery, independent and separately-controllable tension devices for each of the threads to be governed, substantially as specified.
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2. The combination in means for correcting improper registry of party-colored warp-threads in textile machinery, of guides for deflecting said warp-threads from a straight
 35 course, and provision for varying the extent of deflection of each thread, substantially as specified.

3. The combination in means for correcting improper registry of party-colored warp-threads in textile machinery, of guides for deflecting said threads from a straight course,
 40 provision for varying the extent of deflection of each thread, and other guides for causing the deflecting devices to maintain their proper lateral relation to each other, substantially
 45 as specified.

4. The combination in means for correcting improper registry of party-colored warp-threads in textile machinery, of a pair of
 50 guides around which the warp-threads pass, a series of rods movable between said guides in a plane at right angles or thereabout to the line of the warp, and each having an eye for the passage of a warp-thread, and means

for adjusting each of said rods to any desired 55 extent independently of the others, substantially as specified.

5. The combination in means for correcting improper registry of party-colored warp-threads in textile machinery, of independent
 60 tension devices, one for each of the threads, and an index-board having means for adjusting said tension devices, substantially as specified.

6. The combination in means for correcting improper registry of party-colored warp-threads in textile machinery, of guides for deflecting each of said threads from a straight
 65 course, one of the guiding elements being movable to vary the extent of deflection, an index-board having adjusting devices thereon, and connections between each of said adjusting devices and a corresponding movable
 70 guide, substantially as specified.

7. The combination in means for correcting improper registry of party-colored warp-threads in textile machinery, of guides for deflecting each of said threads from a straight
 75 course, and means for moving one of the guides to vary the extent of deflection, said movable guide being so disposed that a pull
 80 upon it is resisted by the tension of the warp, substantially as specified.

8. The combination in means for correcting improper registry of party-colored warp-threads in textile machinery, of devices for taking up and letting out slack in each warp-
 85 thread independently of the others, and means for slackening or tightening the entire body of warp-threads simultaneously, substantially as specified.
 90

9. The combination in means for correcting improper registry of party-colored warp-threads in textile machinery, of independent
 95 tension devices one for each thread, a guide grating or reed, an index-board having means for adjusting said tension devices, and indicating-marks for the reed-spaces and adjusting devices, whereby their correlation is facilitated, substantially as specified.
 100

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HARRY HARDWICK.

Witnesses:

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