E. K. GEIER.

LOOM FOR WEAVING GAUZE.

APPLICATION FILED AUG. 31, 1910.

1,040,184.

Patented Oct. 1, 1912.

3 SHEETS—SHEET 1.

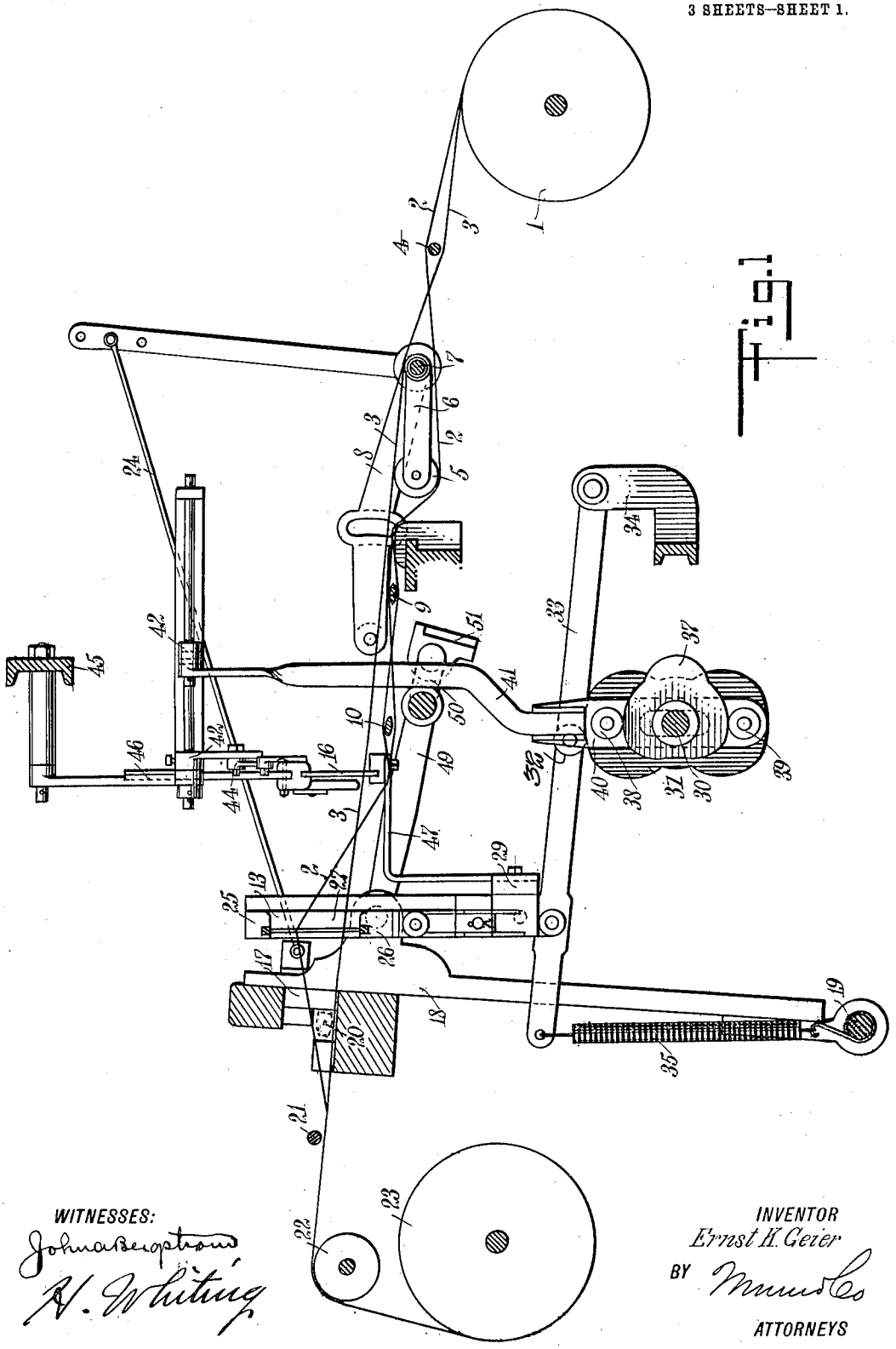

Fig. 1

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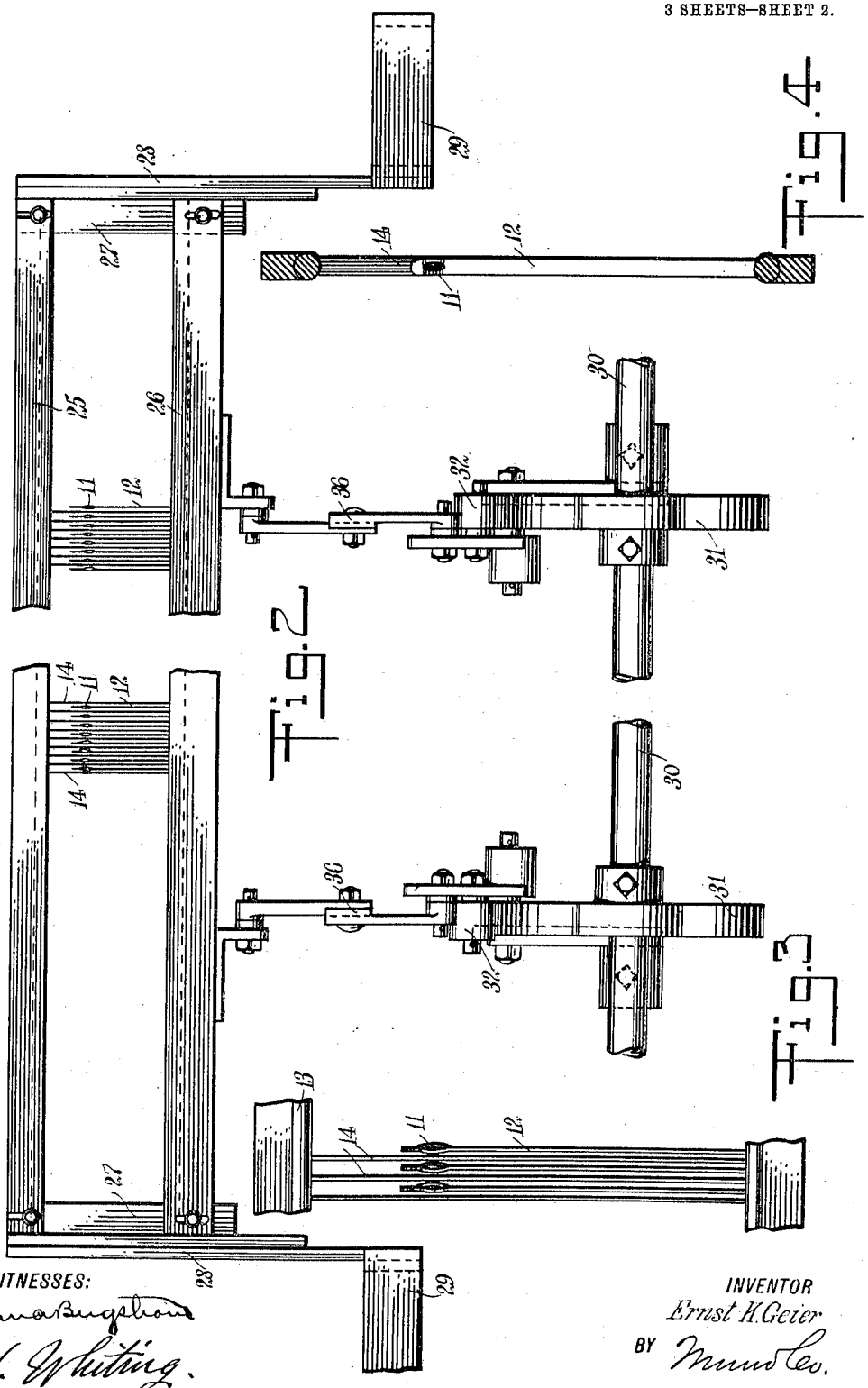

Fig. 4.

Fig. 2.

Fig. 3.

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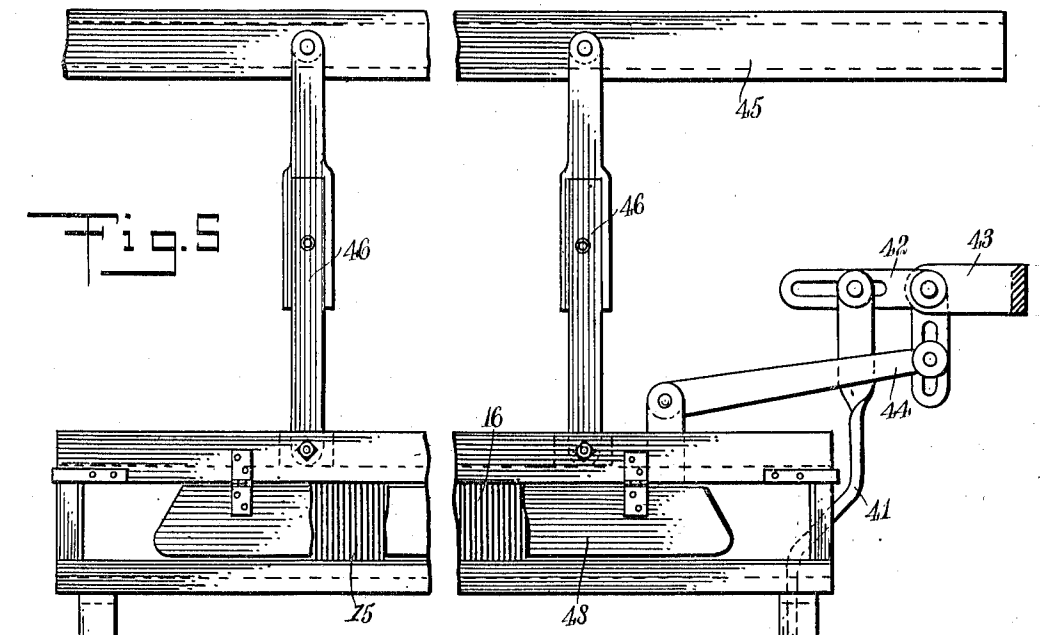
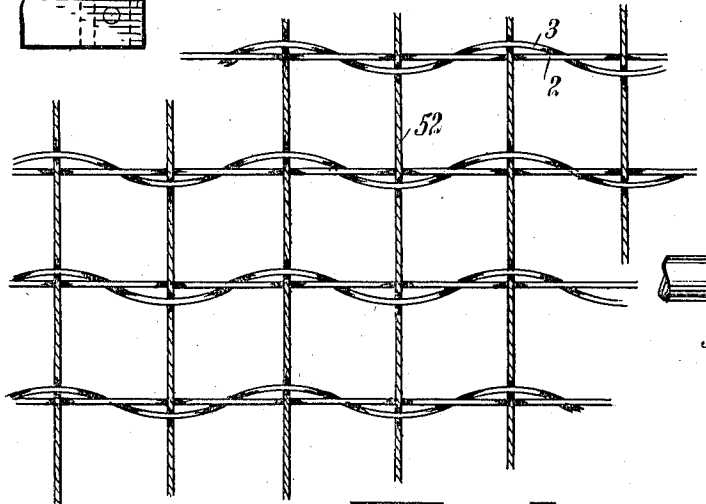
3 SHEETS—SHEET 3.

Fig. 5





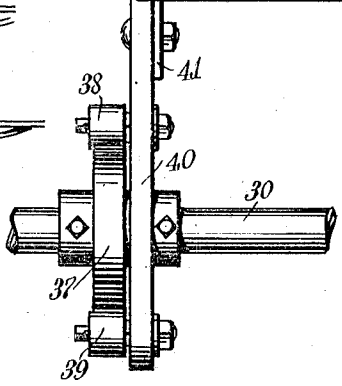


Fig. 6

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UNITED STATES PATENT OFFICE.

ERNST K. GEIER, OF HAZLETON, PENNSYLVANIA, ASSIGNOR TO DUPLAN SILK COMPANY, OF HAZLETON, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

LOOM FOR WEAVING GAUZE.

1,040,184. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed August 31, 1910. Serial No. 579,806.

To all whom it may concern:

Be it known that I, ERNST K. GEIER, a citizen of Switzerland, and a resident of Hazleton, in the county of Luzerne and State of Pennsylvania, have invented a new and Improved Loom for Weaving Gauze, of which the following is a full, clear, and exact description.

The present invention relates to that type of loom in which the warp threads are divided into two leases, each lease being formed of parallel threads alternating with similar threads, and which leases, by suitable reeds, are spaced apart for the passage of the shuttle carrying the weft thread and by which the warp threads are crossed or twisted during the intervals between the lateral reciprocations of the shuttle carrying the weft thread, so that the resultant fabric consists of parallel weft threads and intertwisted warp threads, in which the warp threads always cross the weft threads at the same side of the weft threads, one of the warp threads, which may be called the straight warp thread, being at one side of the weft threads, and the other warp thread, which may be termed the twisted warp thread, at the opposite side of the weft threads. The fabric thus produced, if made of relatively fine thread and mesh, is known as gauze, and it is for the purpose of producing a machine for weaving gauze of fine mesh that the present invention has been evolved. In such machines as heretofore constructed, there has been embodied a needle reed having a plurality of plain dents and interposed needle dents, the needle dents being shorter than the plain dents and having in their free ends eyes, through which the threads of one of the leases of warp threads are passed, the other threads of the other lease passing through the plain dents of the needle reed. Coöperating with the needle reed, there is a supplemental guide for the threads of that lease of warp threads which pass through the plain dents of the needle reed, and the desired twist in the warp threads is produced by imparting to the reed and guide relative lateral movements between the picks, or at the intervals when the needle reed is at such a point as to cause the threads constituting the lease which is controlled by the auxiliary guide, to pass from one side to the other of the free ends of the needle dents. It has also been proposed to guide and laterally flex one of the leases of warp threads by means of a comb, and also by means of a sliding plate having a line of perforations near its lower edge, the first construction requiring the use of a harness to keep the threads in engagement with the comb, and the second requiring the careful threading of the threads in a guide which is hard to reach in the loom, because of its location therein. It has also been proposed to employ two banks of heddle needles reciprocating laterally with relation to each other and having eyes through which the leases of warp threads are passed, thus imparting a twist to the threads of both leases of warp threads; and in nearly all of the gauze looms as heretofore constructed, the main or needle reed has been connected to, and imparts movement to, the auxiliary flexing guide for the warp threads which flexing guide moves in the direction opposite to that in which the needle reed moves. Much difficulty has been experienced in producing a machine of this type which will be certain and positive in operation, and by means of which a gauze fabric of fine mesh may be with certainty produced, and this has arisen from the fact that in most of these machines as heretofore constructed, the needle reed has been loosely suspended and dependent in part for its movements on uncertain and non-positive operating mechanism.

The object of the present invention is to produce a loom for weaving gauze, in which the needle reed is positively moved in fixed guides, and in which the auxiliary or flexing reed is located between the needle reed and the warp beam, and is positively reciprocated in a fixed guide in parallel relation to the needle reed; and a further object is to so construct the machine as to do away entirely with the necessity of using any harness to manipulate and guide the threads.

In the present invention, the needle reed is positively guided and actuated in fixed guides in its movements, and the auxiliary reed, which will be called the flexing reed, is positively guided in its movements, and adjustable connections between said reeds and their actuating mechanisms are provided whereby the movements and the relative movements may be adjusted to an extreme nicety to secure the desired results.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a diagrammatic sectional view in side elevation; Fig. 2 is a fragmentary view in front elevation, showing the needle reed and the mechanism for operating the same; Fig. 3 is an enlarged fragmentary view in elevation, of the needle reed, showing the form of the dents; Fig. 4 is an enlarged transverse vertical section of the needle reed; Fig. 5 is a fragmentary front view in elevation of the transversely-moving reed, with parts broken away to show the underlying structure; and Fig. 6 is a magnified view of the gauze constructed by this loom, showing the relation of the warp and weft threads.

Referring more particularly to the separate parts of the device, the warp threads come from a warp beam 1, and are divided into two sets 2 and 3 by a lease rod 4. These sets are arranged in groups of threads. In this case, each group consists of a single thread, so that the alternate threads are in the same group. If desired, however, more than one thread might be placed in each group of one or both sets. The set of warp threads 2 pass under a slackener roller 5 on a slackener 6, which is pivotally connected to a shaft 7 on a bracket 8. From the roller 5, the sets of threads 2 are separated by lease rods 9 and 10, so that the alternate threads are arranged in groups. These threads of the set 2 come back again beyond the lease rod 10 and pass under the guide of the flexing reed 16 and thence through eyes 11, formed in dents 12 of a reed 13. The eyes 11 are formed by stamping openings in the dents 12 and offsetting the metal at the sides of the openings in opposite directions, so that the threads may be more readily passed therethrough. It will be noted that the dents 12 are interposed between dents 14 formed without eyes and extending the full depth of the reed, whereas the dents 12, which may be termed the needle dents, extend only a part of the depth of the reed. The other set of warp threads 3 pass over the slackener roller 5 and through slits formed between dents 15 on a reed 16, from whence they pass through slits formed between the dents 12 and 14 on the reed 13, in this case one thread being allowed for each slit formed between the juxtaposed eyeless dents 14. The purpose of these reeds is to do away with all harnessing, and by a relative movement thereof, obtain a twisting of the warp threads 3 around the warp threads 2, with the form of a shed therebetween, whereby the weft thread or filling may be interposed between them. In this case, the relative movement is obtained by a transverse movement of the reed 16 and a vertical movement of the reed 13. However, the former reed might be omitted and the same result obtained by a combined vertical and transverse movement of the reed 13. From the reed 13, both of the sets of warp threads 2 and 3 pass through a sword 17 on a lay sword 18, which is mounted on a shaft 19. This lay sword 18 may be operated in any suitable manner, as by means of links 49, which are connected to a crank shaft 50 rotatably supported on a bracket 51 and driven from any suitable source. When the warp threads are spread apart, as indicated in Fig. 1, to form a shed, a shuttle 20 is adapted to shunt therebetween and carry therebetween the weft or filling thread. From the lay, the finished cloth passes under a cloth rod 21 and over a breast roller 22 and onto a cloth beam 23. The motion of the slackener 6 is obtained by connecting it to the lay 18 by means of an adjustable link 24.

In order to obtain the vertical motion of the needle reed 13, there is provided a reed frame, comprising a cap 25 and a base 26, secured to slide plates 27, which slide in guides 28 supported on brackets 29. For the purpose of imparting the desired motion to the reed 13, there is provided a drive shaft 30, which receives its power from any suitable source, and is provided with a plurality of double cams 31, against which rest following rollers 32 on levers 33. The latter are pivotally connected at one end to brackets 34, and at their opposite ends are held so that the rollers 32 intimately contact with the cams 31 by means of springs 35, which are connected to the shaft 19. The vertical motion of the levers 33 is transmitted by means of adjustable connecting rods 36, to the reed frame and thus to the reed. For the purpose of obtaining the transverse motion of the reed 16, there is also provided on the shaft 30 a simple cam 37, which is engaged on opposite sides by rollers 38 and 39 on a rod 40, whereby the eccentricity of the cam 37 is positively transferred to the rod 40 in each direction. This rod 40 is connected by an extension 41 to one arm of a bell crank lever 42, by means of a pin-and-slot connection, which is adapted to allow for relative angular motion of the connected parts. The bell crank lever 42 is pivotally connected to a bracket 43, and transmits its motion to the frame of the reed 16 by means of a link 44, which also has a pin-and-slot connection with it. The reed 16 is suspended from a supporting beam 45 by means of adjustable link connections 46 and also rests at its lower edge on angle bars 47, which are secured to the brackets 29. For the purpose of holding the other ends down in the reed 16, there is provided a board 48, which is hinged to the frame of the reed, leaving sufficient opening

at the bottom for the threads to pass therethrough.

The structure of the gauze woven by this machine will be seen by reference to Fig. 6, the twist warp threads being indicated by the numeral 3, and the straight warp threads by the numeral 2. The weft or filling threads, which are carried through by the shuttle, are indicated by the numeral 52. It will be noted in this cloth, that the warp threads 2 always remain on the same side of the weft or filling threads 52, and do not interweave between them. It will be further noted that the twist warp threads 3 twine in around the warp threads 2, and the weft threads 52, so that, viewing the cloth from the side shown uppermost in Fig. 6, these warp threads 3 always pass over the weft or filling threads 52, but always pass under the other warp threads 2, turning first to the right and then to the left of the stationary warp threads 2. It will be noted that in this cloth, the juxtaposed twist warp threads 3 are twisted in unison throughout.

The operation of the device will be readily understood when taken in connection with the above description. The warp threads pass from the warp beam, over opposite sides of the lease rod 4, where they are separated into what may be termed the straight warp threads 2 and the twist warp threads 3. The former, after passing under the slackener 6 and around the lease rods 9 and 10, and under the guide for the reed 16, pass to the vertically-moving needle reed 13, where they are threaded through the eyes 11, so that they positively move up and down with the reed 13. The other set of warp threads 3 pass over the slackener 6 through the transversely-movable reed 16, and thence through the vertically-moving reed 13 but not through the eyes 11 but between the juxtaposed fully-extending dents 14. When the machine starts, the threads 3 are all on one side of the needle dents 12. If we start with these threads 3 to the left of the needle dents 12, when the reed 13 moves downwardly, bringing the threads 3 above the upper ends of the dents 12, then the reed 16 will have moved to the right, so that, when the reed 13 passes upwardly again, carrying the threads 2 in their upper position to form a shed between the threads 2 and 3, the threads 3 will have passed to the right of the dents 12, forming a twist between the threads 2 and 3. While the threads are in this position, the shuttle 20 passes through, carrying the weft or filling thread between the sets of threads 2 and 3. The reed 13 then moves downwardly again, bringing the warp threads 3 above the threads 2 and above the top of the needle dents 12. The reed 16 then moves back to the left, bringing the threads 3 in such a position that when the reed 13 moves upwardly again, the threads 3 will be on the left hand side of the dents 12, forming another twist of the threads 3 around the threads 2 back of the weft or filling thread, which has been previously carried between them by the shuttle. When spread apart in this position, the shuttle returns to its previous position, carrying with it the weft or filling thread between the warp threads 2 and 3. This action is continued, the lay being operated at the proper moment, and the completed cloth, after having passed over the cloth rod 9 and over the breast roller 22, is wound on the cloth beam 23.

It will be noted that the double cam 31 imparts a complete reciprocation to the needle reed while the flexing reed 16 is moved in one direction only. That is to say, the needle reed will be moved down and up each time the flexing reed is moved laterally in one direction, and after the lateral movement of the flexing reed in either direction takes place, the needle reed has a complete reciprocation, so that the warp threads 3 will be passed across the upper ends of the needle dents of the needle reed while the needle reed is in its lowermost position and before it begins its upward movement, and thus the warp threads 3 will be twisted from side to side of the warp threads 2, as shown clearly in Fig. 6 of the drawings.

While I have shown one embodiment of my invention, I do not wish to be limited to the specific details thereof, but desire to be protected in various changes, modifications and alterations which may come within the scope of the appended claims.

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

1. In combination, a needle reed comprising needle dents and plain dents, fixed vertical guides for said reed, means for positively imparting to said reed vertical reciprocations, said means comprising a rotary cam and adjustable connecting devices between said cam and said reed, a flexing reed located in parallel relation to the needle reed and between said needle reed and the warp beam, means for positively imparting to said flexing reed horizontal lateral reciprocations, said means comprising a cam and adjustable connections between said cam and said flexing reed, and a lease bar beneath the flexing reed, the operating means imparting a lateral movement to the flexing reed at the time of the downward movement of the needle reed and before it begins its upward movement.

2. In combination, a needle reed comprising needle dents and plain dents, fixed vertical guides for said reed, a flexing reed located in parallel relation to the needle reed, a cam shaft, associated cams thereon, a pivoted lever operated by one of said cams and

pivotally connected to the needle reed to impart thereto vertical reciprocations, means for adjustably connecting the said lever and the needle reed, a vertically moving rod operated by the other of said cams, a bell crank lever to which said reed is adjustably connected, a link adjustably connected to said bell crank lever and pivotally connected to the flexing reed, the whole combined and arranged to operate the needle reed and flexing reeds with relation to each other and to adjust the movements thereof.

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

ERNST K. GEIER.

Witnesses:
CONSTANT SCHOLER,
WALTER C. MUGGLE.