

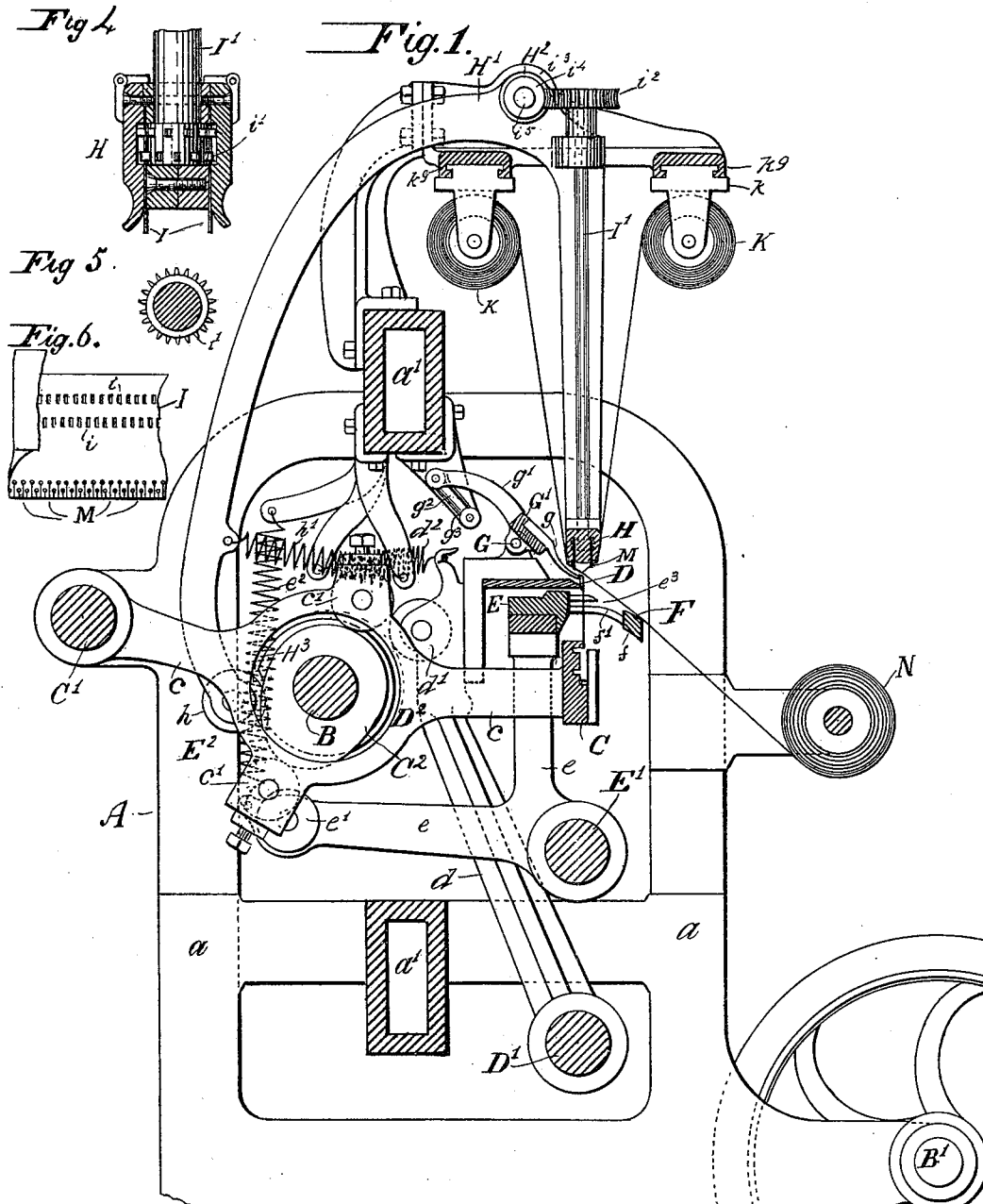
(No Model.)

3 Sheets—Sheet 1.

H. MAXFIELD.
WARP KNITTING MACHINE.

No. 582,589.

Patented May 11, 1897.



WITNESSES:

Piercy L. Wells.
Walter A. Pauling.

BY

INVENTOR
Henri Maxfield
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Edmund H. Brown
HIS ATTORNEY

(No Model.)

3 Sheets—Sheet 2.

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Fig. 2

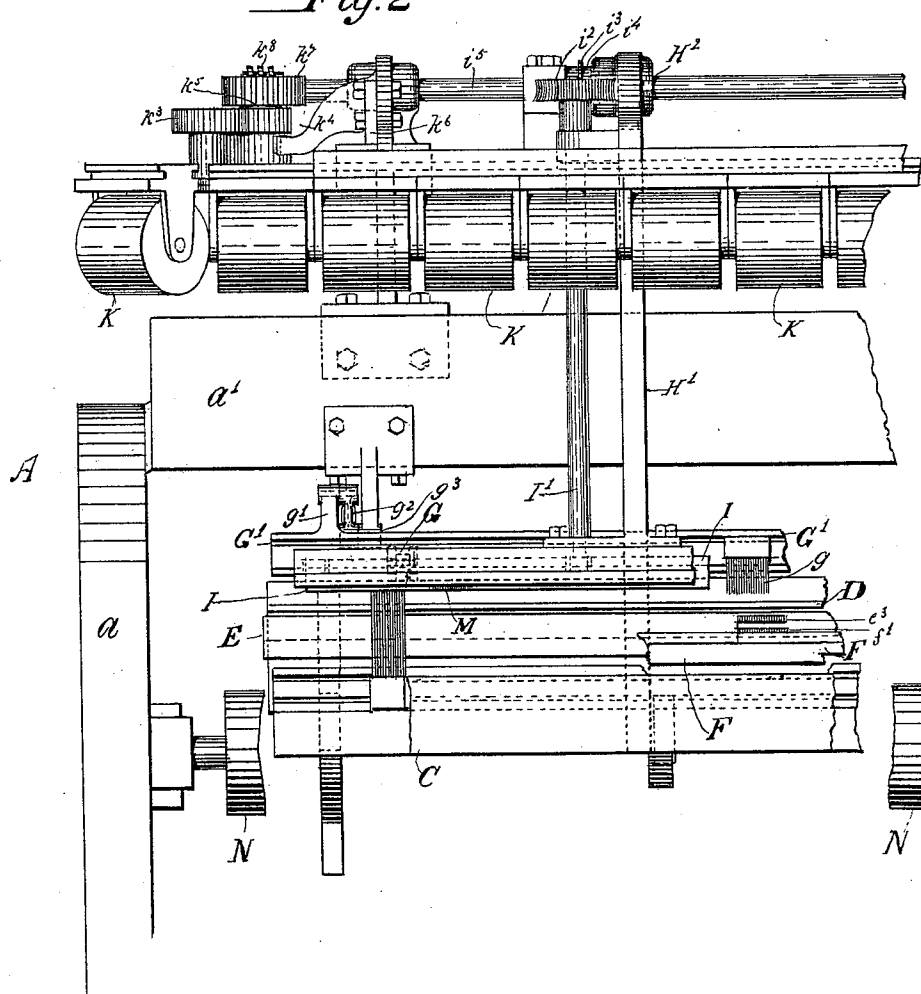
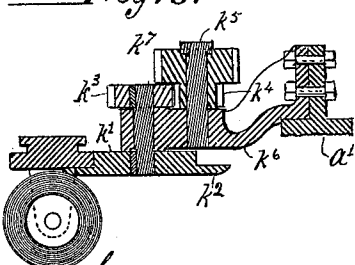


Fig. 8.



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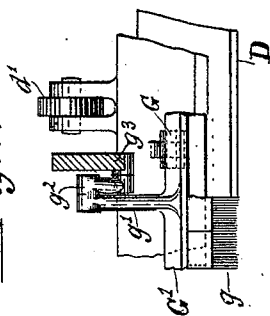
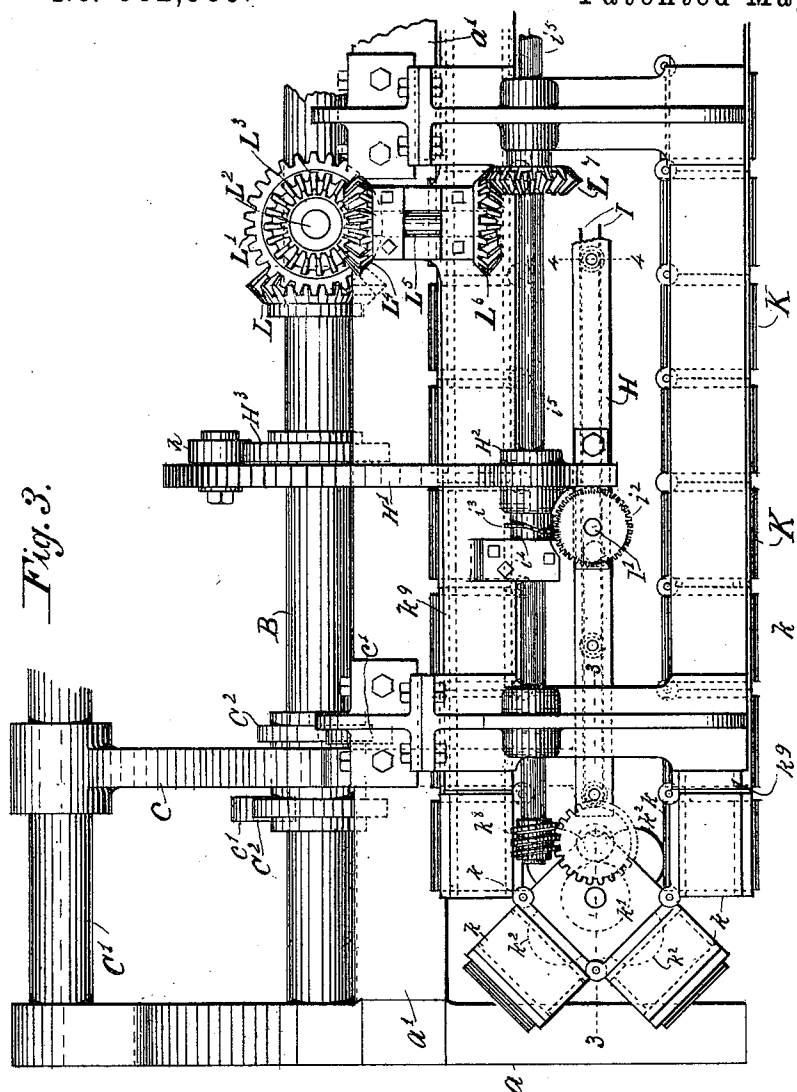
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3 Sheets—Sheet 3.

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WITNESSES:

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Fig. 7.

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UNITED STATES PATENT OFFICE.

HENRI MAXFIELD, OF JERSEY CITY, NEW JERSEY.

WARP-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 582,589, dated May 11, 1897.

Application filed March 4, 1895. Serial No. 540,452. (No model.)

To all whom it may concern:

Be it known that I, HENRI MAXFIELD, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain
5 new and useful Improvements in Warp-Knitting Machines, of which the following is a specification.

With respect to the direction of the warp in knitted warp fabrics, there may be said to
10 be two distinct styles of fabrics—namely, fabrics in which the warp extends substantially parallel to the sides of the fabric from end to end of the same, and fabrics in which the warp likewise extends from end to end, but
15 crosses the fabric diagonally from side to side throughout its length. Warp-knitting machines for producing these two styles of knitting are of two distinct types, the product of the so-called “fast-knitting” machines being
20 of the first style, while the product of the so-called “Milanese” machines is of the second style. The speed of the latter class of machines is comparatively much slower than that of the first class.

The present invention is directed toward an improvement in machines of the Milanese type, and has for its object the construction of a machine which will permit the latter to be run at a much higher speed than heretofore. The invention further embodies a construction which will permit of the conversion of a fast-knitting machine into one of the Milanese type, and permitting at the same time the reconstructed machine to be run at the
35 ordinary speed of the fast-knitting machine.

I will describe a warp-knitting machine embodying my improvement and then point out the novel features in the claim.

In the accompanying drawings, Figure 1 is a transverse cross-section of a warp-knitting machine embodying my improvement. Fig. 2 is a front elevation of a portion of the machine shown in Fig. 1. Fig. 3 is a plan view. Fig. 4 is an enlarged sectional view on the
40 plane of the line 4 4, Fig. 3. Fig. 5 is a top view of Fig. 4, showing only the driving-shaft and its engaging teeth, however. Fig. 6 is a side elevation of a guide comprised in the invention. Fig. 7 is an enlarged view of a portion of the front of the machine, showing the
50 points or comb-piece for carrying the laps

down upon the needles. Fig. 8 is a section on the line 3 3 of Fig. 3.

Similar letters of reference designate corresponding parts in all figures.

In the drawings, A represents the supporting-frame of the machine, comprising two or more standards *a a* and longitudinal tie-bars *a' a'*, which connect the end and intermediate
55 standards.

The driving-shaft B of the machine is suitably journaled in bearings in the supporting-frame, and is provided with a series of cams for actuating the various operative parts. The shaft B may be driven by a belt from a
60 supplemental driven shaft B'.

The needle-bar C is connected with a needle-bar rock-shaft C', suitably journaled in the frame by means of levers *c*, the latter being preferably supplied with openings
65 through which the shaft C' extends. Each lever *c* is provided with rollers or suitable contact-pieces *c'*, that contact with a suitably-shaped cam C², secured to the shaft B. By this means a vertically-reciprocating motion
70 is imparted to the needle-bar C during the rotation of the shaft B.

The presser-bar D is arranged to come in contact with and press the beards of the needles, and it is supported by levers *d*, which are
75 fastened to the presser-bar rock-shaft D', the latter being journaled in the frame A. The levers *d* each carry a roller or contact-piece *d'*, that bears upon a properly-shaped cam D², carried by the shaft B, there being one cam
80 D² for each lever *d*. The rollers *d'* are pressed against their respective cams D² by means of springs *d²*, that are secured at one end to the lever *d* and at their opposite ends to the frame or appurtenance thereof. As the cams
85 D² rotate the presser-bar D will be alternately pressed against the beards of the needles by said cams and then drawn away from said needles by the springs *d²*.

E is the sinker-bar, secured to the upwardly-
90 extending arms of elbow-levers *e*, that are attached to the rock-shaft E', which is journaled in the frame A. In the ends of the lower arms of the levers *e* are mounted rollers or contact-pieces *e'*, that bear upon suitable
100 cams that are carried by the shaft B, there being one such cam for each lever *e*. The

rollers or contact-pieces e' are pressed against their respective cams by means of springs e^2 , that are secured at one end to the levers e and at their opposite ends to the framing of the machine. The action of the springs e^2 and cams is such as to give to the sinker-bar E and connecting levers e a short reciprocating motion nearly horizontal. The sinkers e^3 project forward from the sinker-bar E between the needles in the form of comb-teeth.

F is the slay, comprising a slay-bar f , and comb-teeth f' , projecting inward from the slay-bar f and secured at their opposite ends to the sinker-bar E. The needles pass through the slay F between the comb-teeth f' thereof and between the sinker-bar E and the slay-bar f . The comb-teeth f' are preferably curved downward at their outer ends, and together with the slay-bar f form a rest or bed upon which the work rests.

There may be arranged on the presser-bar D and pivoted in brackets extending from the top thereof a shaft G, to which is secured a block G'. On the block G' there is secured a series of points or fingers g , which extend outwardly and are arranged to enter the spaces between the needles and move downward when so positioned to carry the laps formed on the needles downward away from the free ends thereof. Arms G' are secured to the shaft G and extend rearwardly of the shaft, where they are pivoted to radius bars or links g^2 . The opposite ends of the links g^2 are pivoted to brackets g^3 , secured to the framing of the machine. It is evident from this construction that as the presser-bar D is moved forward the fingers g , by the connection with the links g^2 , will be carried downward at their outer or free ends.

H is the support for the movable thread or yarn guides. These latter have a motion compounded of a movement lengthwise of the machine and a transverse backward-and-forward movement. A convenient construction for obtaining this movement of the guides is shown in which the support H is confined to a backward-and-forward vibratory movement, while the guides are mounted upon said support to have a motion at right angles to the motion of the latter.

The lateral motion of the support H is in the present instance provided for as follows: The support H is secured to the ends of the arms of bent levers II'. The bent levers II' are fulcrumed to a shaft II² at the upper portion of the framing. The opposite arms of the levers II' extend rearwardly of the machine and terminate adjacent to the shaft B, where they are provided with contact pieces or rollers h . Suitable cams II³ are affixed to the shaft B and adapted to coact with the rollers h . Springs h' are attached at one end to bent levers II', adjacent the rollers h , while their opposite ends are secured to the framing A. It is evident, therefore, that when the shaft B is rotated the support H will have a to-and-

fro lateral motion through the action of the cams II³.

The guides from which the threads or yarns pass directly to the needles are shown as being formed in an endless tape or ribbon having openings for the passage of the thread or yarn and fitted to travel in slots in the supports II. In using the "term" guides I wish to include, however, not only guides of the particular form and mounting shown, but all equivalents of the same.

If a band or ribbon, as shown, is employed to form the thread-guides, it may conveniently be moved upon the support II by providing the ribbon with a series of notches i , with which engage the teeth i' on the lower peripheral portion of the driving-shaft I'. The shaft I' is journaled in suitable bearings on one of the bent levers II'. At its upper portion it is provided with a worm-wheel i^2 , which engages with curved flanges i^3 , secured to a wheel i^4 . The wheel i^4 is secured to a shaft i^5 , the axis of which is concentric with the pivotal axis of the bent levers II'. The flanges i^3 on the wheel i^4 are so formed that upon rotating the shaft i^5 the worm-wheel i^2 will be driven first in one direction and then in the opposite. Consequently the guides will be given an intermittent motion first in one direction and then in the opposite, the relative magnitudes of which motions will be dependent upon the form given to the flanges i^3 , and these in turn will again be dependent upon the number of needles it is desired to lap with the yarn at each motion. There will, however, be a progressive forward motion of the thread-guides, since the distance that they are moved backward is less than the distance they are moved forward. Suitable idlers will be placed in the bights of the ribbon I, around which it may turn. These idlers will preferably be supplied with teeth engaging with the notches i in the ribbon. Intermediate idlers may be supplied to support the ribbon at suitable points.

At the upper portion of the machine a series of spools K are provided for carrying the yarn delivered to the machine. These are severally secured to supports or links k , which are arranged to travel around wheels k' at opposite ends of the machine, being suitably connected or pivoted together to permit of such motion. Each wheel k' may be provided with keepers or plates k^2 , attached to the lower surface of the wheel, extending outward beyond the edge thereof.

It is designed that the motion of the spools K will correspond to the motion of the thread-guides. To this end the shaft of a wheel k' may be provided with a spur-wheel k^3 , which meshes with a pinion k^4 , carried on a stud k^5 , the latter being supported in a suitable bracket k^6 , attached to the frame of the machine. The worm-wheel k^7 is arranged concentric with the spur-wheel k^4 and secured to the latter. The shaft i^5 is provided with a

worm-wheel k^8 , which drives the supports forward at a speed equal to the resultant forward speed of the guides.

Intermediate the wheels k' , at opposite ends of the machine, the links k travel through suitable guides k^9 .

The shaft i^3 may be driven from the shaft B through a series of gear-wheels comprising the bevel-wheel L, attached to the shaft B, and an engaging bevel-wheel L', secured to an upright shaft L². The upper extremity of the upright shaft L² is provided with bevel-wheel L³, which meshes with the bevel-wheel L⁴, carried at the extremity of a horizontal shaft L⁵, to the opposite extremity of which there is secured a bevel-wheel L⁶. The latter wheel meshes with a bevel-wheel L⁷, rigidly secured to the shaft i^5 . The yarn or thread passing from the spools K is led through the thread-guides, in this instance consisting of the openings or slots M in the lower edge of the ribbon I. (See Fig. 6.) By the latter the several yarns are wrapped around the needle in consequence of the motions of the operative parts of the machine.

N is a take-up roller upon which the completed fabric is wound.

The several movements of the parts may be described as follows: The needle-bar C rises vertically for a portion of its motion and the yarns or threads are wrapped around the needles by the thread-guides. The needles now rise to their full extent to pass the loops under the beards of the needles. They then descend, but just before the beards of the needle enter the sinkers the presser-bar D presses the beards into the eyes of the needles and the work is then knocked over. The sinkers then move back and forward in order to secure the last loops made. The thread-guides continue their onward movement, moving forward a greater distance than they move backward in the movement immediately preceding. A short reverse movement now occurs, the needles are lapped as before, and the work is similarly knocked over. Consequently the warp of the fabric instead of passing longitudinally from end to end, parallel to its sides, will as a result of the progressive movement of the guides assume a diagonal direction from side to side.

Having described my invention, what I consider as new, and desire to secure by Letters Patent, is—

1. The combination of longitudinally-reciprocating needles, and thread-guides having a vibratory movement transversely to the direction of reciprocation of the needles and an intermittent progressive movement transversely to the direction of their said vibratory movement, substantially as specified.

2. The combination of longitudinally-reciprocating needles, thread-guides having a vibratory movement transversely to the direction of reciprocation of the needles and an intermittent progressive movement transversely to the direction of their said vibratory movement, and thread-supports having a movement corresponding with the progressive movement of the thread-guides, substantially as specified.

3. The combination of a needle-bar, a presser-bar, thread-guides, means for imparting thereto an intermittent backward-and-forward longitudinal movement, one movement being in excess of the other, a support for the guides and means for giving this support a lateral to-and-fro motion, substantially as specified.

4. The combination of a needle-bar, a support, guides mounted upon said support, means for imparting to the guides an intermittent forward-and-backward motion, one of said motions being in excess of the other, means for imparting to the aforementioned support a to-and-fro lateral motion, supports for the yarn or thread, and means for imparting to said yarn or thread supports a movement corresponding to that of the guides, substantially as specified.

5. The combination of a needle-bar, a presser-bar, a support, guides mounted upon said support, means for imparting to said guides an intermittent forward-and-backward movement, the movement in one direction being in excess of that in the opposite direction, means for imparting to the support for the guides a to-and-fro lateral movement, supports for the yarn or thread and means for imparting to said supports a movement corresponding to that of the guides, substantially as specified.

6. The combination of a needle-bar, a presser-bar, a support, pivoted levers to which said support is secured, cams for rocking said levers, guides mounted upon said support and means for imparting to the guides an intermittent backward-and-forward movement, the movement in one direction being in excess of that in the opposite direction, substantially as specified.

7. The combination of a needle-bar, a presser-bar, a block provided with fingers or points arranged adjacent to the needles and a pivotal connection for said block whereby when the presser-bar is moved inward, said points or fingers will be carried downwardly, substantially as specified.

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

HENRI MAXFIELD.

Witnesses:

W. LAIRD GOLDSBOROUGH,
PIERSON L. WELLS.