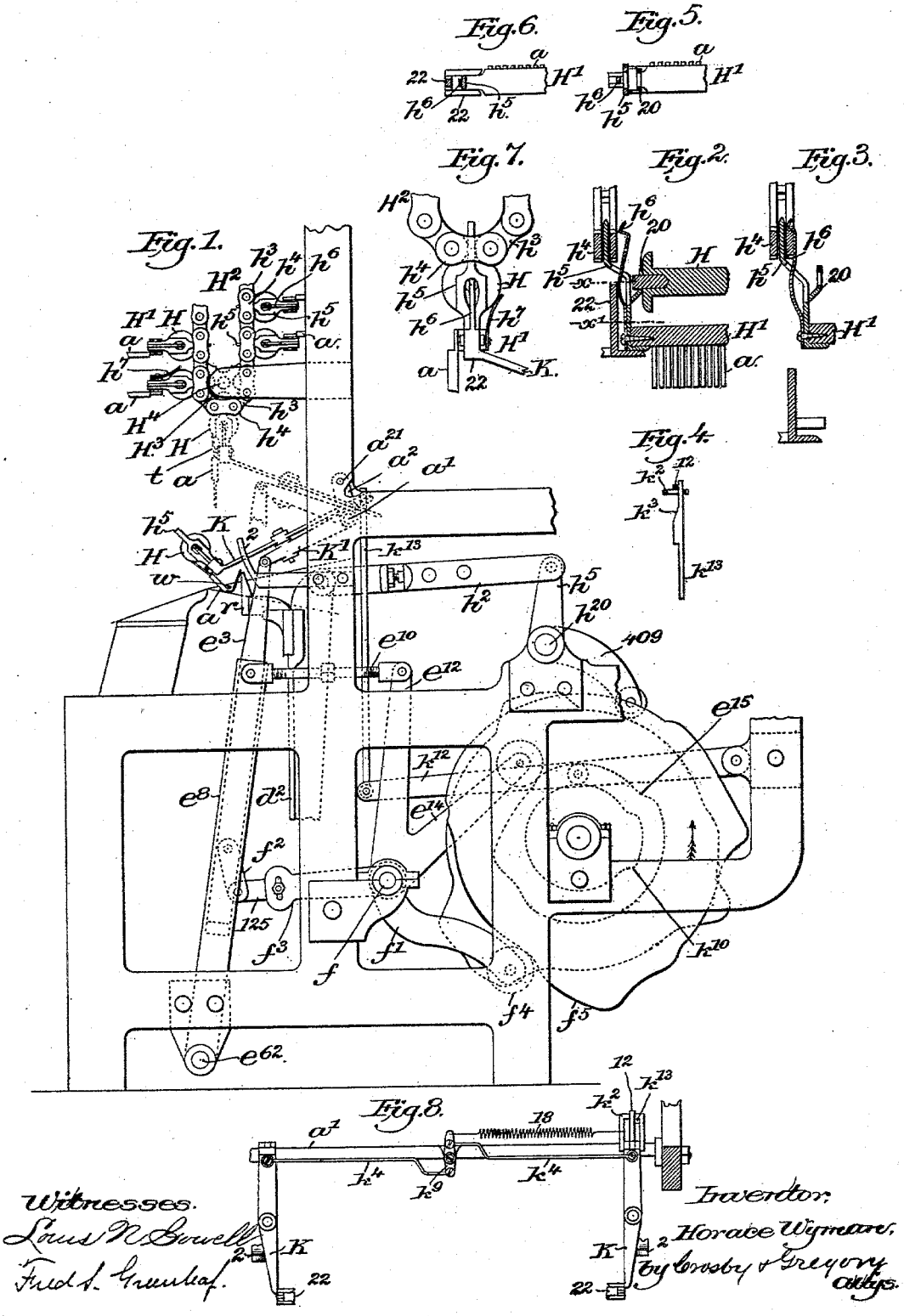
(No Model.)

H. WYMAN.

LOOM.

No. 490,239. Patented Jan. 17, 1893.



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UNITED STATES PATENT OFFICE.

HORACE WYMAN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE CROMPTON LOOM WORKS, OF SAME PLACE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 490,239, dated January 17, 1893.

Application filed September 1, 1892. Serial No. 444,743. (No model.)

To all whom it may concern:

Be it known that I, HORACE WYMAN, of Worcester, county of Worcester, State of Massachusetts, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve and simplify that class of loom employed in the manufacture of tufted fabrics, among which may be classed carpets.

This present invention is intended as an improvement on that described in United States Patent No. 186,374, dated January 16, 1877. The patent referred to shows and describes a series of tuft-yarn beams, mounted in bearings on a pair of chains in such manner that the said beams may be taken bodily from the chains and lowered to the warps. The warp beams have each an attached bar provided with a series of tubes through which the weft-yarns are led, the free ends of said tubes, when the beam is taken from the chains and brought down, being made to enter the spaces between and pass below the lowermost warp threads and thus leave the free projecting ends of the weft-yarns below the lower half of the shed, and thereafter a pick or shot of weft is inserted and the lower ends of the tuft-yarns are turned upwardly in said spaces about the said weft and back through to and above the upper part of the shed, and the row of tufts so formed is beaten in by the reed and the tuft-yarns are cut off, the beams being thereafter lifted and put back into the chains and the latter moved to bring a new beam into working position.

One part of my improvement in this class of loom using an endless chain carrying tuft-yarn beams which are removed from the chains when the tuft-yarns of any one beam are to be used to produce a row of tufts, consists in so constructing the tuft-yarn beams and their attached tuft-yarn carriers, and so moving the same that the necessity of "wiping" or turning the free ends of the tuft-yarns from the lower part of the shed to and above the upper part of the shed, and also the use of mechanism for such purpose, is avoided.

In accordance with my invention as herein contained, the frames having the tuft-yarn beams and attached tuft-yarn carriers are removed from the chains, and carried down to the warp, and the ends of the carriers are made to enter the shed from the upper plane thereof, at a point between the fell of the fabric and the reed, the movement of the carriers into the shed being always, however, terminated before the free ends of the tuft-yarns are drawn below the warp threads in the upper plane of the shed, the friction of the free ends of the tuft-yarns against adjacent warp threads aiding in keeping them above the shed, the reed also aiding in this operation of keeping up the ends, as will be described.

The transferring arms or devices, as here shown, are so mounted and moved in such path and direction, toward and with relation to the warp threads, that the carriers are made to occupy in the shed a position inclined from their free ends or points upwardly and forwardly toward the fell of the fabric, so as to leave between the ends of the tuft-yarns, the under side of the threads in the upper plane of the shed, and the said carriers, a space for the introduction of a weft-carrying needle such as is commonly used in the patent referred to, and in other regular tuft-fabric looms, to thus leave a shot of weft in the shed, the weft crossing the tuft-yarns between their free ends (yet above the warp threads) and the ends of the said carriers. This done, the carriers begin to ascend and the reed to move forward, and the carriers in their ascent draw the loops of tuft-yarn up to and bend them about the weft, and the reed acts directly against the ends of the tuft-yarns, to push them up to the fell, the ends of the carriers in their ascent traveling at the same time toward the fell, the reed and carriers in their longitudinal movement substantially in unison, co-operating to slide the row of bent loop-like ends of the tuft-yarns up to the fell. The free looped ends of the tuft-yarns always above the upper plane of the warp having been beaten or carried up to the fell, as described, with the shot of weft crossing them, a second shot of filling is introduced in usual manner

and is beaten up to the said looped tuft-yarns and thereafter the tuft-yarn carriers and beam are lifted sufficiently to pull off enough length of yarn for a succeeding row of tufts, and the tuft-yarns are cut off, leaving a completed row of tuft-loops, and the beam carrying the main body of the said yarns is then further lifted and put back into the chain, and the latter moved to bring another tuft-yarn beam into working position.

The particular feature in which my invention consists is in the use of two cams with connections therefrom to actuate the ends of the tuft-yarn carriers to place the tuft-yarns in the warps, and afterward above the fell, as described and defined in the claim at the end of this specification.

Figure 1, of the drawings shows a sufficient portion of a loom for weaving tufted fabrics to enable this invention to be understood, the dotted lines showing the transferring devices elevated to take a tuft-yarn beam from the chain. Figs. 2 and 3, show in section parts of the frames and chains to represent the manner of connection between the frames and chains, Fig. 3, showing the parts of Fig. 2, separated but without the beam and tuft-yarn carriers. Fig. 4, is a detail of the cam-bar k^{13} and parts moved by it, as will be hereinafter referred to; Fig. 5, is a section in the line x, Fig. 2, with the beam journal omitted; Fig. 6, is a section in the line x', Fig. 2; Fig. 7, on an enlarged scale shows part of a chain, one of the frames with the tuft-yarn beams and carriers, and the end of one of the transferring arms; and Fig. 8, shows in plan view the transferring arms to engage the frames and take them from and put them back into the chains, the support for one end of the shaft a' shown in said figure being omitted to save space upon the drawings.

The shaft H^4; the sprocket wheel H^3; the endless chains H^2, (but one shown) composed of single and double links h^3, h^4; the tuft-yarn spools H, mounted in bearings 20 of a spool-frame H', provided with end pins h^5 to enter the slots or spaces between the double links of the chains; spring catches h^6, co-operating with the end pins and acting to engage the rear sides of the links of the chains to retain the frames in position on the chains as in Fig. 3; the spring brakes h^7 (only one being shown in Figs. 1 and 7) to bear on and prevent the tuft-yarn beams or spools from rotating improperly; the pivoted transferring arms K one having a toe 12; arms K'; cam k^{10}; lever k^{12}; rod k^{13}; having wedge k^3; rods k^4; guide k^2; and lever k^9, and spring 18, are and may be all substantially as in said patent, the rod k^{13} being suitably moved by its cam to act on toe 12 and separate said arms K to enable a tuft-yarn beam or spool to be disengaged from the spool frame when the latter having been put back into the chains is to be left there. The chains H^2 in practice may be supported and moved intermittingly, as provided for in the said patent.

The tube-like tuft-yarn carriers a in this my invention are attached to each spool-frame H', and depend vertically there-from.

In my invention, as herein shown and preferred, the hubs of the arms K' on which the transferring arms K are pivoted are mounted on a shaft a', supported by links a^2, pivoted at some suitable point, as at a^{21} (see Fig. 1), so that both of said arms K and K' may move back and forth in unison by virtue of the links a^2, said links constituting supports for the transferring arms during the operation of introducing the carriers containing the tuft-yarns between the warp-threads in the shed, and between the reed and the breast-beam, or the fell, the construction of the operative parts being such as to insure the movement of the delivery-ends of the tuft-yarn carriers backward and forward with relation to the length of the warps during the operation of inserting parts of the tuft-yarns, as between their free ends and the ends of the carriers, into the shed to form loops and have said loops finally compacted together at the fell, the free ends of the tuft-yarns remaining above the warps in the upper plane of the shed.

The forward ends of the arms K' are jointed, as herein shown, to upper ends of slide-bars e^8, mounted on guide-bars e^8, pivoted at e^{62}, there being one such slide-bar and guide-bar near the inner side of the loom frame at each side thereof; the links f^2; arms 125, adjustably attached to arms f^3 of a rock-shaft f, having other arms f', having rolls f^4 each acted on by a like cam f^5; the arms e^{12}, e^{14}, attached to a tubular rock-shaft surrounding the shaft f; the cam e^{15} for acting on a roll carried by the arm e^{14}; the link e^{10} connecting the end of the arm e^{12} with the upper end of the guide e^8; reed r, and lay d^2 but partially shown; link h^2; shaft h^{26}; and arms h^5 and 409, are and may be all substantially as provided for in United States Patent No. 446,402, dated February 10, 1891.

In operation let it be assumed that the chains containing the tuft-yarn beams or spools are being moved intermittingly, as provided for in the Patent No. 186,374. As the chains brings a tuft-yarn beam or spool into the position shown by the beam represented by dotted lines (Fig. 1) the arm K' and with it the transferring arms are raised by or through the vertical movement of the slides e^8 to which they are attached, so that the clutch devices 22, carried by the transferring arms engage the ends of the frame H' for the tuft-yarn beam, disengage spring h^6, and take the beam from the chain. As the slides e^8 descend, they bring the arms K and K' and said frame and beam down so that the vertically-depending tuft-yarn carriers a, below which hang the free ends of the tuft-yarns t, enter between the warps of the more or less open or formed shed at a point substantially close to the reed r, the free ends of the tuft-yarns, by their friction against the warp-threads in the upper half or plane of the shed

and also preferably by contact with the reed, being kept above the upper part of the shed throughout the entire operation of forming the row of tufts.

Fig. 1, of the drawings, by dotted lines, shows in elevated position the transferring arms or devices which are to take a tuft-yarn beam and frame from the chain, the full lines showing the tuft-yarn frame and beam brought down with its carriers passed into the shed between the warp threads: This, as here shown, is the position occupied by the carriers in the shed when the weft-carrier, a needle or other equivalent device, is passed into the shed to leave a weft *w* therein it lying across the tuft-yarns in the space between their free ends, the under sides of the warps in the upper plane of the shed, and the ends of the carriers from which the said tuft-yarns protrude. The shape of the cam f^5 is such that after the weft has been laid as stated, the transferring arms are made to move forward and upward, moving the ends of the carriers toward the fell, the ends of the carriers at such time traveling in the spaces between the warp threads, and above them as the tuft-yarns are drawn up against and about the weft thread. As the tuft-yarn frame and beam are being moved upward each of the carriers will be lifted from the warps so that the reed can move freely forward and acting against the free ends of the tuft-yarns yet above the upper plane of the warp, aid in keeping said ends in loop-form, and the ends of the carriers having been elevated sufficiently from between the warp threads to not interfere with the reed, the latter in its continued motion by acting against the free ends of the tuft-yarns bent about the filling, carries such looped-ends and filling to the fell where they are beat in and left, while a second shot of weft or filling is put into a shed of the warp, the reed having again receded for such purpose, and the reed then comes forward again, beating the second shot of filling in place so that it aids in retaining the bent or looped portions of tuft-yarns about the filling previously inserted, and thereafter the transferring arms are further elevated to draw off sufficient length of yarn for a succeeding row of tufts, and the tuft-yarns are cut off between the upper side of the warp threads and the lower ends of the carriers, and the tuft-yarn beam is lifted and put back into the chain from which it was taken, and the chain is moved to bring another tuft-yarn beam in place. During these operations the warp will be opened and closed in proper manner to secure the picks, as practiced in the weaving of Moquette carpets or tufted fabrics. By manipulating the tuft-yarn beams as stated, and inserting the tuft-yarns by means of carriers so introduced into the shed from above that the free ends of the tuft-yarns will not at any time be carried below the upper side of the warp, and inserting the shot of filling across the tuft-yarns while the latter are laid partially into the open shed, the liability of the tuft-yarns getting on the wrong side of the warp-threads, which is liable to happen when the free ends of a tuft-yarn is wiped upwardly, as in the patent first referred to, is obviated; and I have found in practice that the introduction and manipulation of the tuft-yarns in the manner herein described results in the production of a more compact fabric with the minimum of tuft-yarn, and at a much more rapid rate.

I have omitted from the drawings the cutting mechanism for the tuft-yarns, as well as the needle carrying the weft or filling; but said parts in practice may be all substantially as in United States Patent No. 446,402 before referred to.

In case of any tendency of the tuft-yarn carriers to enter incorrectly the spaces between the pairs of warp-threads as the carriers or frames to which they are attached are being inserted into the shed, I have provided the loom with centering or positioning devices whereby, when the frame containing the carriers and tuft-yarn beam is being lowered to bring the carriers into the shed, some part of the said mechanism in its approach to the warps will be acted upon so as to place the said tuft-yarn carriers in line with the proper spaces between the warp threads.

The positioning device herein shown consists essentially of inclined arms or prongs 2, connected preferably with some part of the rigid frame-work of the loom. It will be understood however, that my invention, in so far as it relates to the positioning device, would not be departed from by causing this said device to act on some other part than the transferring arms K, as the said positioning device might act on any of the parts approaching the warps and the shed.

In a loom of the class herein described, wherein the ends of a great number of tuft-yarns are to be formed into tufts, the certainty of the correct operation of the parts is insured by making the shed as small as possible and by keeping the reed as near as possible to the fell when the carriers are being inserted between the warp-threads and into the shed, the reed at such time acting as a guide for some of the warp threads.

In another application Serial No. 444,742, filed September 1, 1892, I have shown an apparatus very similar to that herein shown and described but in that application the reed does not act on the free ends of the tuft-yarn loops and help to keep them up and carry them forward to the fell. The co-operation of the reed as herein described with the free ends of the tuft-yarns is of the gist of this present invention.

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

In a loom for weaving tufted fabrics the following instrumentalities, viz: two movable chains; a series of tuft-yarn frames mounted

therein and having a series of tuft-yarn carriers; transferring arms adapted to engage the said tuft-yarn frames; a lay having a reed; and two cams and two sets of connections between said cams and the transferring arms, each set actuated by one of said cams, one cam controlling the up and down motion of the transferring arms and the other the back and forth movements of the ends of the tuft-yarn carriers with relation to the warp and reed, the shape of said cams being such as to enable the ends of the tuft-yarn carriers to be placed in next the reed, the carriers being then moved downward and their ends forward to form loops between their free ends then above the warps, the under side of the upper warps of the shed and the carriers to be crossed by a shot of weft, and means to move the reed during the upward and forward movement of the ends of the carriers, to act against the free ends of the tuft-yarns, the reed co-operating with the carriers to keep the tuft-yarns doubled about the weft while the tuft-yarns bent about the weft are being carried forward to the fell, substantially as described.

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

HORACE WYMAN.

Witnesses:
GEO. W. GREGORY,
LAURA MANIX.