

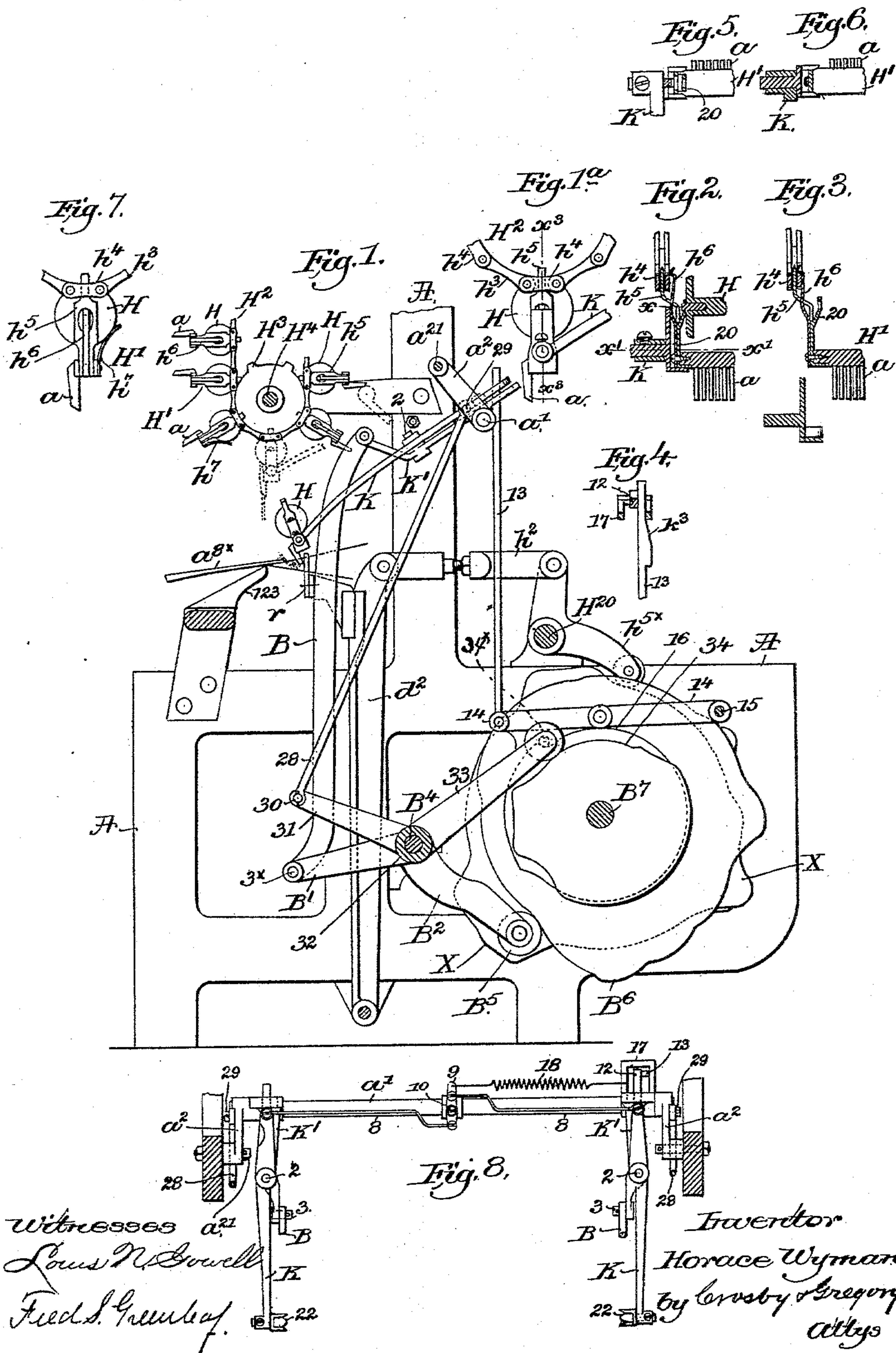
(No Model.)

3 Sheets—Sheet 1.

H. WYMAN.  
LOOM.

No. 490,238.

Patented Jan. 17, 1893.



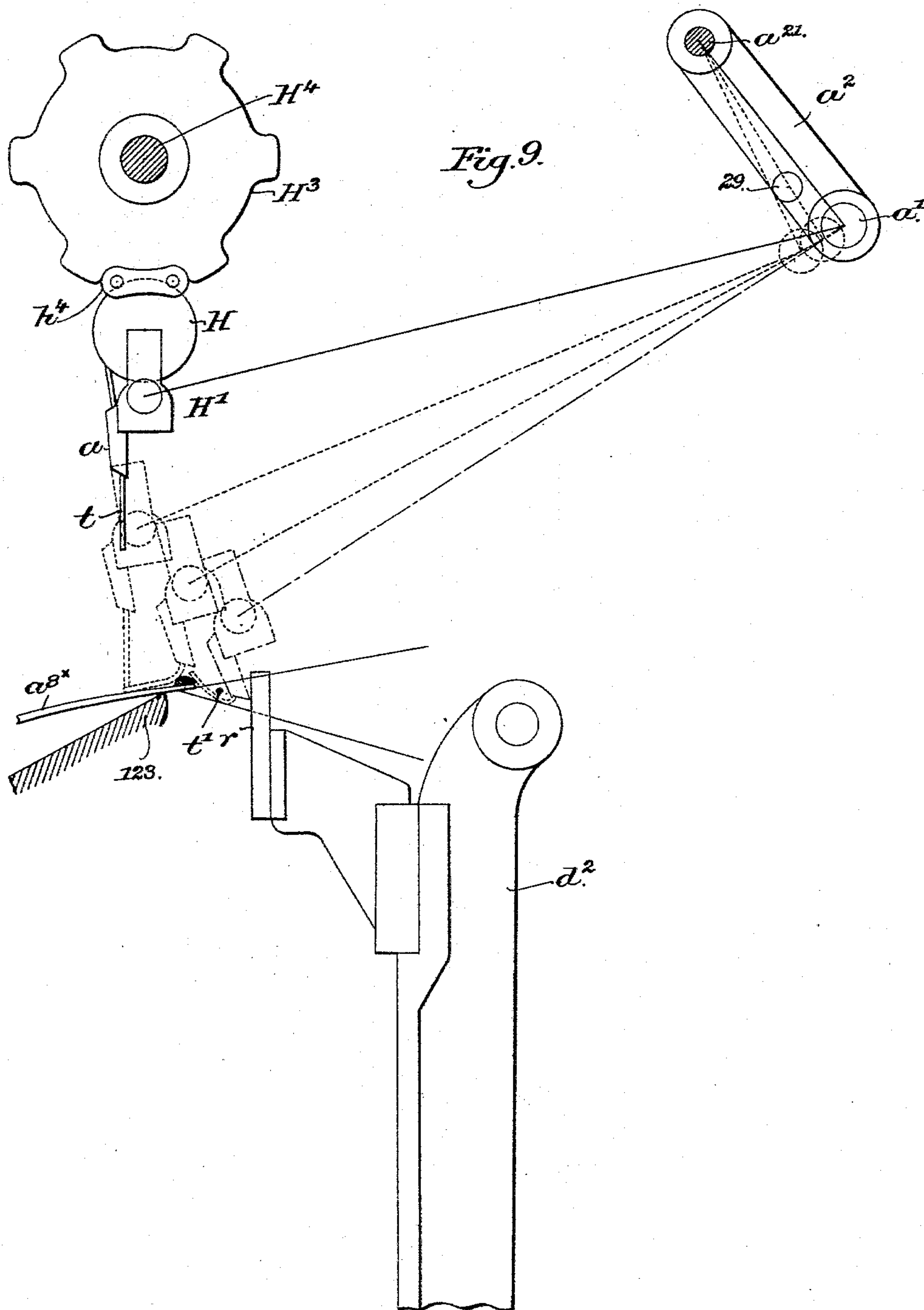
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3 Sheets—Sheet 2.

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LOOM.

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Witnesses.

Louis N. Howell  
Fred S. Grunkaf.

Inventor:

Horace Wyman,  
by Crosby & Gregory attys.

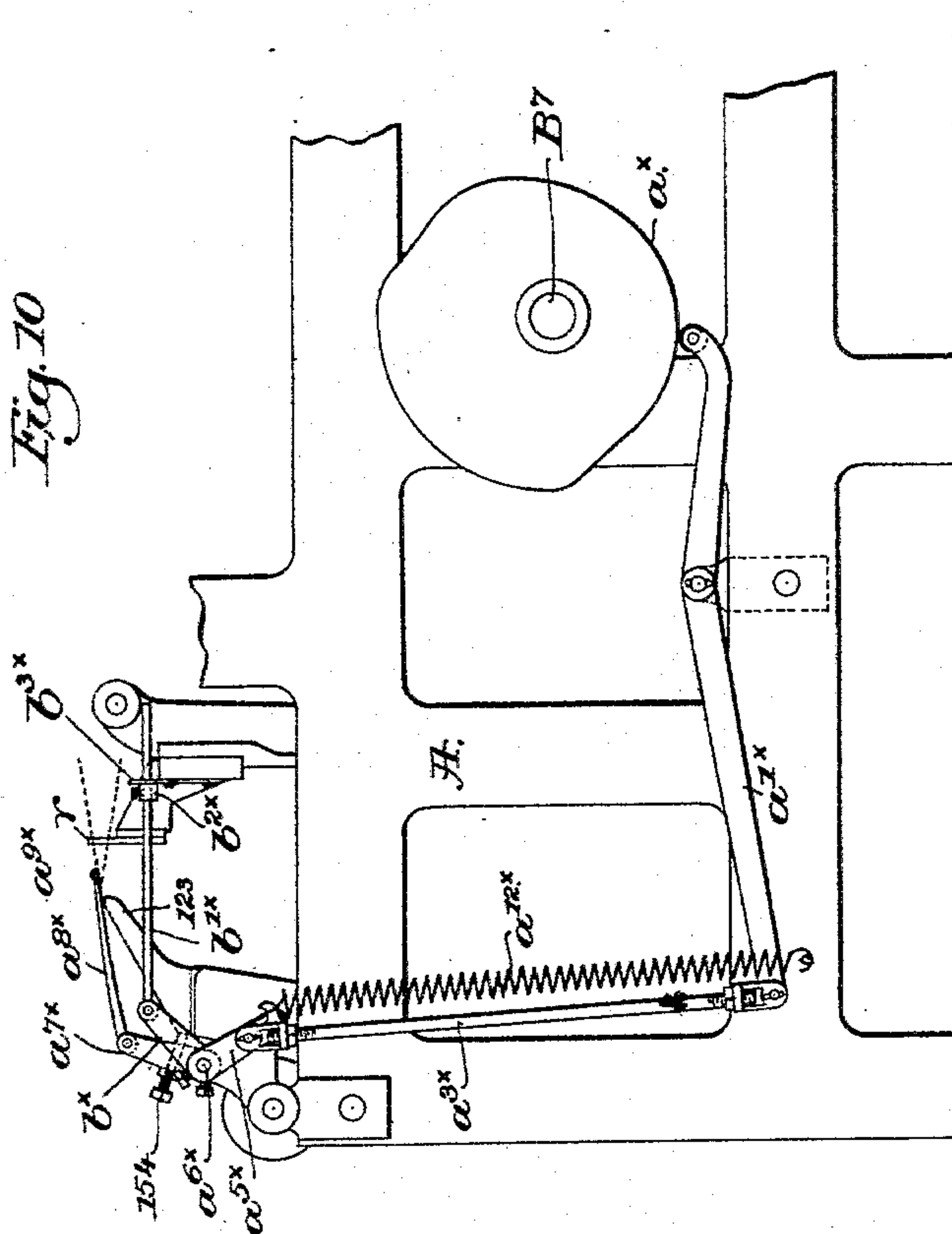
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3 Sheets—Sheet 3.

H. WYMAN.  
LOOM.

No. 490,238.

Patented Jan. 17, 1893.



*Witnesses.*

Louis N. Gould

Fred S. Grunleaf.

*Inventor:*

Horace Wymann

By Crosby & Gregory attys.



# 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. 490,238, dated January 17, 1893.

Application filed September 1, 1892. Serial No. 444,742. (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  
5 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  
10 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  
15 States Patent granted to A. Smith and H. Skinner, 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 man-  
20 ner that they may be taken bodily from the chains and lowered to the warps. The tuft-yarn beams have each an attached bar provided with a series of tubes through which the tuft-yarns are led, the tubes, when the  
25 beam is taken from the chains and brought down to the warp, being made to enter the spaces between the warp threads sufficiently to leave the free ends of the tuft-yarns projecting below the lower half of the shed, and  
30 thereafter a pick or shot of weft is inserted and the lower ends of the tuft-yarns are "wiped" or turned upwardly about the said weft and back through to and above the upper part of the shed, the row of tufts so formed  
35 being then beaten-in by the reed, and the tuft-yarns having been cut off, the beams are thereafter lifted and put back into the chains and the latter moved to bring a new beam into working position.

40 One part of my improvement in this class of loom using an endless chain for carrying the tuft-yarn beams adapted to be removed from the chains as the tuft-yarns carried by each beam are to be used to produce a trans-  
45 verse row of tufts, consists in so constructing the tuft-yarn beams and their attached tuft-yarn carriers, and moving the same in such manner while detached from the chains, that the necessity of carrying the free ends  
50 of the tuft-yarns below the warp threads

and then 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 automatically removed from the chains and lowered sufficiently to enable the ends of the  
60 carriers to pass between the warp threads in the upper plane of and enter the shed at a point between the fell of the fabric and the reed, the direction and extent of movement of the carriers being such, however, that the  
65 tuft-yarns hanging from the descending carriers are trailed into the shed diagonally by the movements of the ends of the carriers to thus form a space between the carriers, the  
70 under sides of the warps in the upper plane of the shed, and the free ends of the tuft yarns held or arrested above the upper plane of the shed, the space so formed being for the reception of a shot of weft preferably laid double,  
75 to lock the tuft-yarns in place in the shed.

As one manner of keeping the free ends of the tuft yarns always above the warp threads in the upper plane of the shed, I have shown a tuft-yarn end-arrester located between the  
80 reed and the fell of the fabric, it crossing the warp transversely, but this invention is not limited in this respect to such an arresting device.

The movement imparted to the tuft-yarn frame and its attached carriers on its way  
85 from the chains to the warp to enter the shed is such that the ends of the carriers are moved from above toward the fell so as to somewhat lay out or trail above the warps the free ends of the tuft-yarns depending from the carriers,  
90 and the carriers having been brought near the warps, the ends of the carriers at about the time they begin to enter the shed are moved toward the reed, and as the ends of the carriers descend to the lower plane of the  
95 shed the tuft-yarns are trailed into the shed behind the ends of the carriers so as to occupy a diagonal position in the shed, but with their free ends above the upper plane of the shed, where they are crossed at a point 100



between their arrested or free ends, yet above the upper plane of the shed, the under side of the upper warps and the ends of the carriers the latter being yet in the shed.

5 In the form in which I have herein illustrated my invention, the carriers in their approach to the shed have their ends inclined forwardly toward the fell, and the tuft-yarns at a point near the ends of the carriers while  
10 the latter are yet above the shed are suitably arrested, and the free ends of the carriers in their descent into the shed are carried backwardly toward the reed. After the weft has been laid across the tuft-yarns, the ends of  
15 the tuft-yarn carriers are lifted out of its shed and as they rise the ends of the carriers are moved forward toward the fell, thus drawing the tuft-yarns up about the weft, the free ends of the tuft-yarns yet occupying a posi-  
20 tion above the upper plane of the warps, and the ends of the carriers having been lifted sufficiently to be clear of the reed, the latter in its forward motion following the ends of the carriers in their movement toward the  
25 fell, acts on the tuft-yarns partially wrapped about the weft and carries them with the weft inclosed by them forward to the fell, and a second shot of weft having been inserted into a second shed made in the warp while the  
30 carriers are above the warp, and having been beaten in to aid in holding the tuft-yarns in place, and the tuft-yarn frame having been lifted sufficiently to draw off from the tuft-yarn beam enough yarn for the next row of  
35 loops to be made from them, the tuft-yarns are cut off to form a row of tufts or loops, the frame is returned to the chains, and the latter are moved to bring a new frame and beam into position.

40 The particular features in which my invention consists will be hereinafter fully described and defined in the claim at the end of this specification.

Figure 1, is a partial vertical section of a  
45 loom from just within the right-hand side frame thereof, said figure showing a sufficient portion of the loom with my improvements added to enable my invention to be understood. Fig. 1<sup>a</sup>, shows a portion of a chain  
50 with a tuft-yarn frame in place therein and as engaged by a clutch on a transferring arm. Fig. 2, is a section in the line  $x^3$ , Fig. 1<sup>a</sup>. Fig. 3, is a similar section, but with the clutch of the transferring device disengaged from the  
55 tuft-yarn frame, the beam being omitted. Fig. 4, a detail to be 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  
60 shows a tuft-yarn frame, its carriers, and a beam in the chain. Fig. 8, shows the transferring arms in top or plan view, and the guides or clutch devices 22. Fig. 9, an enlarged detail of some of the parts drawn more  
65 especially to illustrate the movements of the tuft-yarn carriers between the chain and in the shed; and Fig. 10 in side elevation shows

part of the lay, the reed, and devices for actuating the form of tuft-yarn arrester, partially shown in Fig. 1.

The shaft  $H^4$ ; the sprocket wheel  $H^3$ ; the endless chains  $H^2$ , composed of single and double links  $h^3$ ,  $h^4$ ; the tuft-yarn spools  $H$ , mounted in bearings 20 of a tuft-yarn or spool frame  $H'$ , composed of a longitudinal  
75 bar provided with end pins  $h^5$  to enter the slots or spaces between the double links  $h^4$  of the chains; the spring catches  $h^6$ , co-operating with the end pins and acting to engage the rear sides of the said double links to connect the frames to the chains; the spring  
80 brakes  $h^7$ , one for each beam, (only one being shown in Fig. 1) to bear on and prevent a tuft-yarn beam or spool from rotating improperly, are and may be all substantially as  
85 in said patent.

The chains in practice may be supported and moved intermittingly, as provided for in the said patent.

The tuft-yarn carriers  $a$ , in this invention  
90 are attached to each spool-frame  $H'$ , and depend vertically from the said frames.

In the drawings  $a'$  is a rod located above the warps and carried by arms or links  $a^2$  pivoted at  $a^{21}$  as herein shown on the loom frame.  
95 The rod  $a'$ , as best shown in Figs. 1 and 8, has mounted on it two like arms  $K'$ , provided each with a suitable fulcrum as 2 for the transferring arms  $K$  having suitable clutches 22. Each arm  $K'$  has jointed to it at 3 the upper  
100 end of a link  $B$  jointed at  $3^x$  to one arm  $B'$  of a lever  $B'$ ,  $B^2$ , fast on a rock shaft  $B^4$  mounted in suitable bearings in the loom sides or frame  $A$ , the arm  $B^2$  being shown as provided with a roll  $B^5$  which is acted upon by a cam  $B^6$  on  
105 the main cam shaft  $B^7$ , said cam moving the arms  $K'$  up and down and with them their attached parts as will be described, so as to take a frame from the chains, lower it and put it  
110 back into the chains. The arms  $K'$  herein shown, are shaped somewhat differently from the arms having like sign in said patent. The upper end of the clutch 22 as the latter is raised opposite the end of a frame, engages  
115 the spring hook  $h^6$  as in Fig. 2, and removes its upper shouldered end from the double link  $h^4$ .

The transferring arms  $K$  are connected at their rear ends by rods 8 with the opposite ends of a lever 9 pivoted at 10 on a suitable  
120 collar on the rod  $a'$ . One of the transferring arms  $K$  has a toe or extension 12 which is acted upon by the upper end of a cam bar 13 connected to a lever 14 pivoted at 15 and acted upon by a suitable cam 16, the upper end of  
125 said bar working in a loop-like frame 17 forming part of one of the rigid arms  $K'$  and by the action of the cam part  $h^3$  of the bar 13 between the toe 12 and loop 17 turns the said transferring arms in a direction to move them  
130 and their connected clutches 22 in a direction laterally away from the ends of the frame as when the frame is to be left in the chains. A spring 18, Fig. 8, connected to lever 9 and to



the loop 17 acts normally to keep the toe 12 pressed against the upper end of the bar 13, as in Fig. 4. The links or supports  $a^2$  have jointed to them at 29 a rod 28 in turn pivoted to an arm 31 extended from a sleeve 32 surrounding the rock shaft  $B^4$ , said sleeve having a second arm 33 provided with a suitable roll  $34^x$  acted upon by a cam 34, said cam being of such shape as to co-operate with the cam  $B^6$  and impart to the ends of the carriers the to and fro motion hereinbefore described in and above the shed, as the transferring arms are lowered and raised, the cam 34 being chiefly instrumental in trailing the tuft-yarn into the shed that they may be crossed as described between the carriers and the free ends of the tuft-yarn above the shed.

In the diagram, Fig. 9, I have shown four different positions of the tuft-yarn carriers and frame  $H'$ , between the chain link  $h^4$  and the shed,  $t'$  showing a shot of weft inserted double. The lay  $d^2$  having the comb-like reed  $r$  is operated by the cam  $X$ , it acting on a roller of an arm  $h^{5x}$  of a rock shaft  $H^{20}$ , said rock shaft having a second arm jointed by a rod  $h^2$  to a projection of the lay. The reed and its actuating devices are and may be all substantially as in United States Patent No. 446,402, February 10, 1891, granted to H. Wyman and J. A. Clark.

In practice, the loom will contain suitable mechanism for forming sheds in the warps, and for cutting off the tuft-yarns as provided for in said United States Patent No. 446,402.

The weft carrying mechanism may be of the form described in United States Patent No. 183,374, or in United States Patent No. 446,177 February 10, 1891, granted to H. Wyman and F. S. Webb.

The tuft-yarn arresting device herein shown, consists of a bar  $a^{9x}$  extended across the loom above the warp threads, said bar being carried by like arms  $a^{8x}$  jointed to like arms  $a^{7x}$  of a rock shaft  $a^{6x}$  extended across the loom frame in bearings near the breast beam 123. The rock shaft has a second arm  $a^{5x}$  which is jointed to a rod  $a^{3x}$  connected to a lever  $a'^x$  acted upon by a cam  $a^x$  on the shaft  $B^7$ , said arm  $a^{5x}$  having connected to it a spring  $a^{12x}$ , the opposite end of which is fixed to the loom frame or otherwise. The spring  $a^{12x}$  acts to move the tuft-yarn arresting device forward as the lay is moved back from the fell, an adjusting screw 154 carried by arm  $a^{7x}$  limiting the movement of the bar  $a^{9x}$  beyond the inner edge of the breast beam. A rod  $b'^x$  jointed to an arm  $b^x$  on the rock shaft  $a^{6x}$  has a collar  $b^{2x}$  to act against a stop  $b^{8x}$  of the lay to cause the bar  $b^{9x}$  to be moved in unison with the reed  $r$  while the latter is aiding the carriers in moving the tuft-yarns up to the fell. The cam  $a^x$  retracts the bar  $b^{9x}$  from the fell in order that the tuft-yarn cutting mechanism, not shown, may have a chance to act and cut the tuft-yarns to leave completed loops thereof in the cloth.

The tuft-yarn arrester is not herein claimed

broadly, as it is shown in United States application Serial No. 436,418, filed June 13, 1892, and while its use herein is of very material advantage, yet it may be dispensed with, and the free ends of the tuft-yarns may be effectually arrested above the upper plane of the shed by their friction against the pairs of warps between which the ends of the carriers are passed to enter the shed.

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 threads in the upper plane 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, as is liable to happen when the free ends of tuft-yarns are 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 a minimum amount of tuft-yarn.

This invention is not limited to the particular point between the reed and the fell which the tuft-yarn carriers enter the open shed so long as the free ends of the tuft-yarns are left above the warp threads in the upper plane of the shed, and the tuft-yarn carriers prior to beating up the tuft-yarns at the fell are brought substantially above the fell so as not to interfere with the action of the reed in beating the said tuft-yarns into line at the fell.

In another application Serial No. 444,743, filed September 1, 1892, I have shown tuft-yarn carriers, such as herein shown, as adapted to be put into the shed, but with the free ends of the tuft-yarns directed toward the reed, the reed in its forward movement, as provided for in said application, acting on the tuft-yarns near their free ends and in connection with the movement of the ends of the carriers in the direction of the length of the warps toward the fell serving to keep the free ends of the tuft-yarns above the upper warps of 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 ends of the carriers are being inserted between the warp threads and into the shed, and the ends of the carriers are being moved back and forth in the shed.

By imparting to the carriers the movements herein described, it is possible to leave the reed quite close to the fell, see Figs. 1 and 9, just at the time that the carriers are introduced into the shed, and yet correctly form the ends of the tuft-yarns into loops between the reed and the fell, the introduction being



effected while the reed guides and positions some of the warp threads.

It is not intended to limit this invention to the exact form of transferring arms shown 5 for taking the frames H' from the chains and lowering them until the tuft-yarn carriers enter the shed; but, in whatever form of transferring mechanism employed, the said transferring arms and parts supporting the tuft- 10 yarn beams and carriers will have such movement imparted to them as to place the ends of the carriers in the shed of the warp and move the ends of the carriers back and forth in the shed and above the warp, so as to leave 15 between the tuft-yarns and the upper threads of the shed, as represented in Fig. 9, a sufficient space for the passage of the filling introduced as stated, preferably by a needle such as employed in either of the looms re- 20 ferred to, and afterward to move the ends of the carriers to above the warp and substantially to the fell, and at the same time the reed beats to the fell the looped tuft-yarns yet in the carriers.

25 The gist of this present invention lies in providing devices whereby the ends of the tuft-yarn carriers may be made to pass between the warp threads at the upper plane of the shed and into the shed near the reed and 30 leave the free ends of the tuft-yarns above the warp threads in the upper plane of the shed at that point, the carriers being put in such position as to form a sufficient space or opening between their free ends in the shed 35 and the free ends of the tuft-yarns for the insertion of a shot of weft or filling, after which the ends of the carriers are elevated out of the way of the reed and moved toward the fell, the reed, in its forward movement 40 with the carriers, acting against the free ends of the tuft-yarns previously crossed by the filling, and aiding not only in folding the said yarns about the filling, but also to follow the ends of the carriers in their forward move- 45 ment and cause the said free ends of the tuft-yarns to remain bent about the shot of weft and be beat with the weft into the fell.

This invention is not limited to the exact means shown for arresting the free ends of

the tuft-yarns frictionally at, and so as to 50 leave said ends projecting above the upper plane of the warp.

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

55 A lay provided with a reed; two movable chains; a series of frames mounted therein and provided each with a series of tuft-yarn carriers and a beam or spool to supply the said carriers with tuft-yarns; transferring 60 arms; two cams; and two sets of connections between the said cams and the transferring arms, each set actuated by one of said cams, one cam controlling the up and down motions of the transferring arms to place the ends of 65 the carriers in or between the warps, and the other cam the back and forth movements to move the ends of the carriers in and above the warps, the shape of the said cams being such as to enable the transferring arms to 70 engage a frame, take it from the chains and place the ends of the tuft-yarn carriers in the open shed between the warp threads leaving the free ends of the tuft-yarns above the warp threads in the upper plane of the shed 75 and with a space between the ends of the tuft-yarn carriers and the upturned free ends of the tuft-yarns and the under sides of the warps in the upper plane of the shed for the introduction of a thread of weft, and then to 80 raise the frame and move the ends of the tuft-yarn carriers forward above the fell, means to move the reed and cause it to act against the tuft-yarns then bent about the weft and move 85 said tuft-yarns and weft up to the fell to be locked there by an additional weft thread preparatory to cutting off the tuft-yarns to form a row of tuft loops, the transferring arms being then moved to put the frame back into the chains. 90

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

HORACE WYMAN.

Witnesses:

GEO. W. GREGORY,

EMMA J. BENNETT.