

(No Model.)

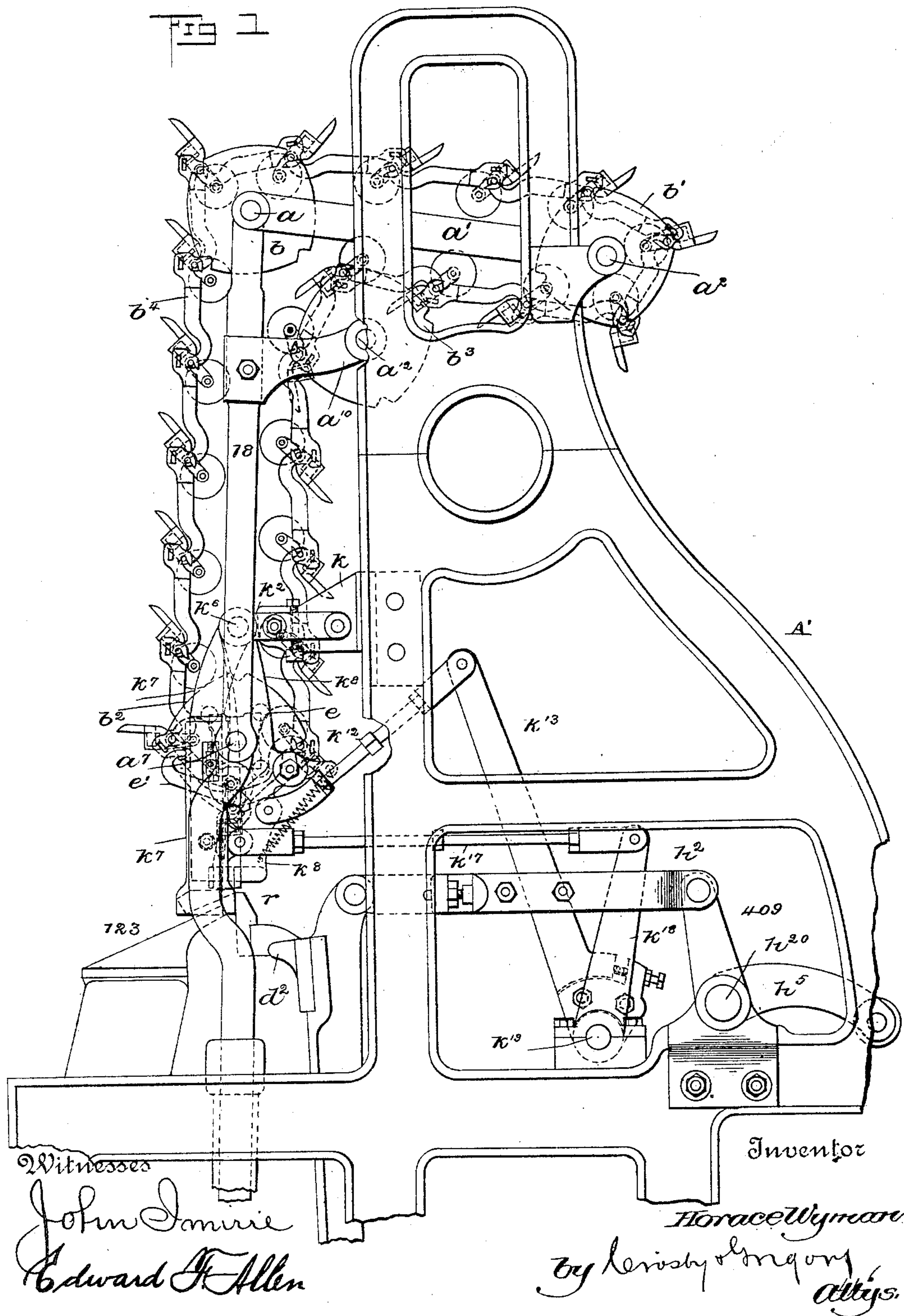
3 Sheets—Sheet 1.

H. WYMAN.

LOOM FOR WEAVING TUFTED PILE FABRICS.

No. 454,414.

Patented June 16, 1891.



(No Model.)

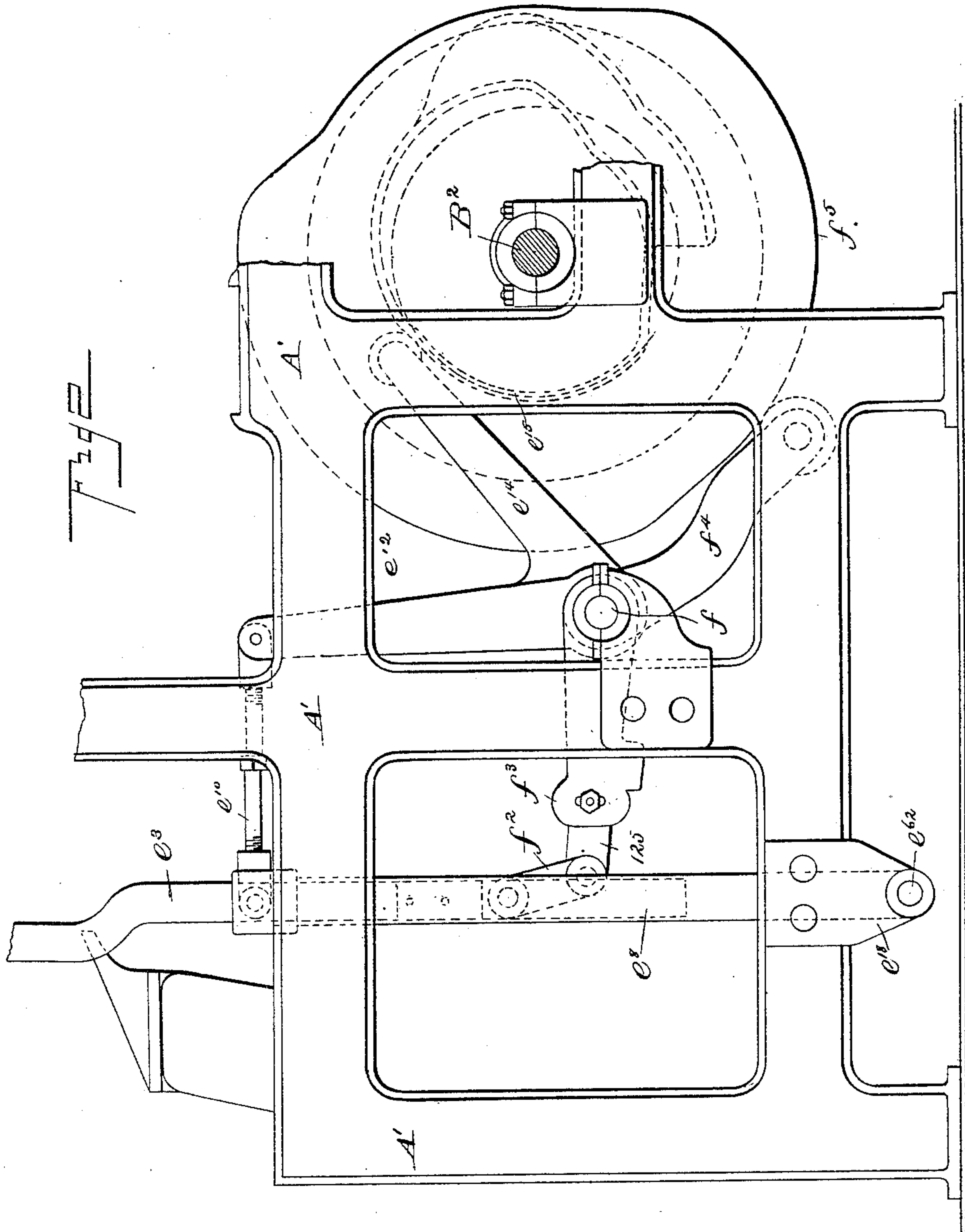
3 Sheets—Sheet 2.

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Witnesses

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(No Model.)

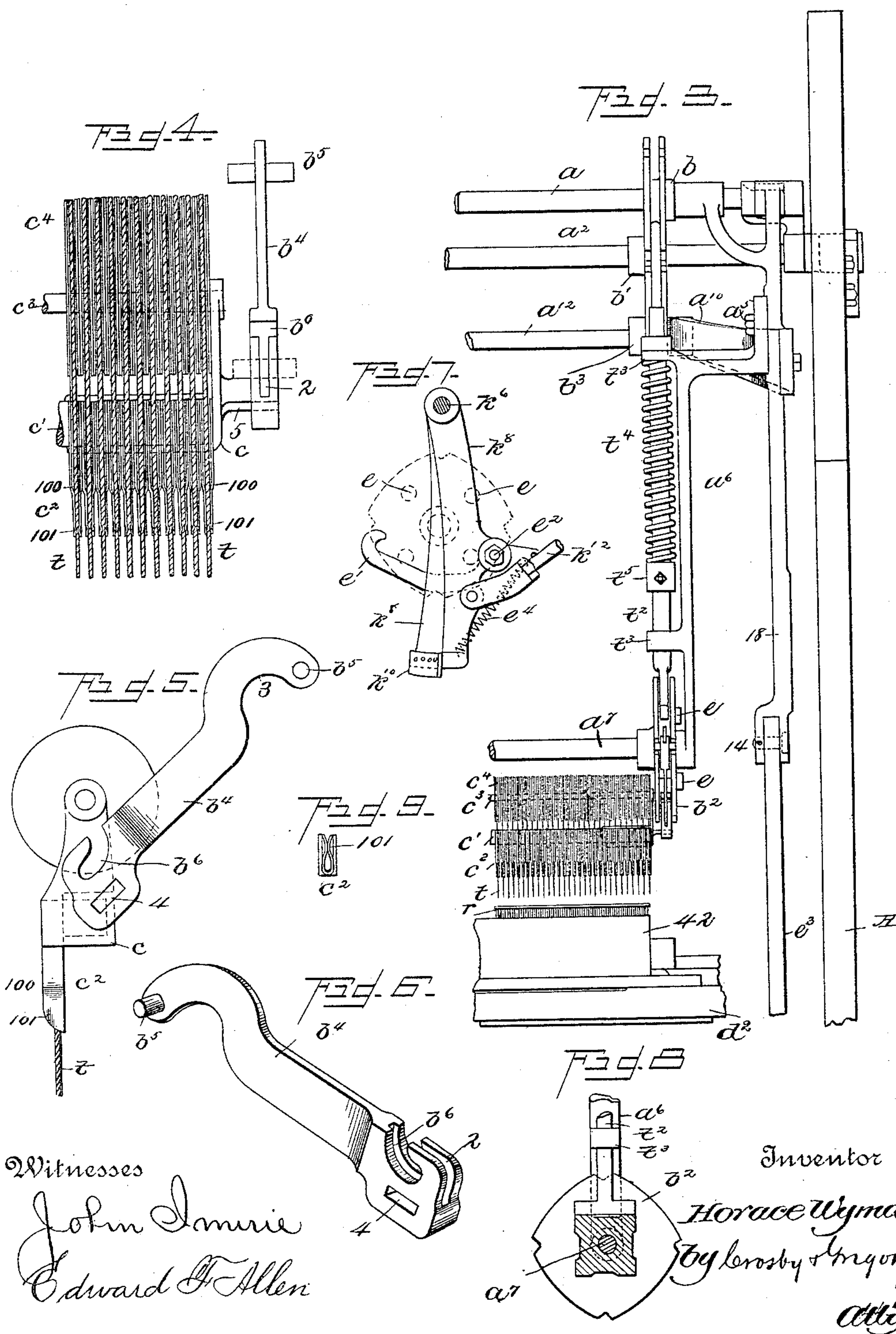
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Patented June 16, 1891.





# UNITED STATES PATENT OFFICE.

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

## LOOM FOR WEAVING TUFTED PILE FABRICS.

SPECIFICATION forming part of Letters Patent No. 454,414, dated June 16, 1891.

Application filed May 5, 1891. Serial No. 391,626. (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 for Weaving Tufted Pile Fabrics, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

In the manufacture of tufted fabrics in looms it is customary to wind the tuft-yarns side by side upon tuft-yarn warp-beams carried by chains, the colors of the yarns on each beam according with the color of the row of tufts to be made by the yarns taken from each beam, there being as many beams having different colors or windings as there are different rows of transverse tufts in the pattern. These beams are usually taken from the chains and presented in proper relation to the warps at or near the fell to have the tuft-yarns incorporated with the warp, which has been done in various ways. These tuft-yarn beams have been provided with a series of needle-like guides for the tuft-yarns, and when the beams have been removed from the chains the ends of the tuft-yarns extending from the guides have been passed downward between the warp-threads, where devices co-operating therewith have engaged the tuft-yarns and turned them upwardly around a weft-thread, so that the tufts are secured upon the said weft-thread or filling, as in United States Patent No. 186,374. In other instances the warp-beams have been left in the chain and have been brought intermittently into position to have the ends of the tuft-yarns held in guides seized by nippers, which pull from the beam a proper amount of each tuft-yarn for a row of tufts, after which the tuft-yarns are cut off and the nippers reversed in position to present the ends of the short lengths of tuft-yarns held by them to the warps to be incorporated therewith in the form of loops, as in United States Patent No. 330,069; and so, also, tuft-yarns have been wound singly upon bobbins and led through needles arranged in banks, each needle being placed under the control of a jacquard, as in United States Patent No. 343,110, wherein the needles, each having a yarn of the color de-

sired to be supplied by it in a particular spot in the transverse row of tufts next to be made, may be selected and placed in a row transversely across the warps, the selected needles, after having been evened or brought into line, being lowered together, so that their points pass into the shed, where the tuft-yarns depending from the needles are caught and locked into the fabric.

In my efforts to improve and simplify tuft-fabric looms I have devised a loom containing a series of warp-beams mounted in carriages carried by chains, the carriages having attached yarn-guides through which the tuft-yarns are led to be delivered, and I have so mounted the said chains that the beams carried by them have given to them not only a rising and falling motion to thus enable the yarn-guides to descend to and then be lifted above the warp, but also so that the beam then supplying the tuft-yarns may be swung forward and backward with relation to the cloth-making point and the usual tuft-cutting mechanism. Each tuft-yarn may be and is shown as wound upon a small disk bobbin, and a series of such disk bobbins placed on a shaft common to the said series will form a tuft-yarn beam, each disk bobbin having a yarn of any desired color, and such beam forms one part or feature of my invention; but in a combination of elements otherwise novel in itself, instead of making the beam up from small bobbins, it may be of any usual construction.

Another part of my invention consists in a chain having a series of carriages having tuft-yarn beams and a series of co-operating yarn-guides, one for each tuft-yarn, combined with a rising and falling lift-frame and a series of sprocket-wheels for the said chains, whereby when the said lift-frame descends in the forward position the yarn-guides co-operating with the lowermost beam then in operative position will pass the tuft-yarns carried by them down to the shed near the cloth-making point, the downward and backward movement of the lift-frame enabling loops to be formed in the tuft-yarns to be crossed by the usual weft, inserted double by a weft-carrier, the upward movement of the lift-frame and guides enabling the reed to be



5 moved forward to beat in the filling and set up in usual manner the tuft-yarn loops upon the weft-thread, this being done while the yarn-guides yet hold the tuft-yarns ready to be cut off.

Other features of my invention will be described and made subject of claim at the end of this specification.

Figure 1 is a partial end elevation of a loom 10 embodying my invention, Fig. 2 being a view of part of the same end of the loom lower down; Fig. 3, a partial front elevation of the right-hand end of the loom shown in Fig. 1, with the greater portion of the chain omitted, 15 the said figure showing, however, part of one tuft-yarn beam and its yarn-guides, the tuft-yarns being shown as depending therefrom, the parts at the left-hand side of the loom being omitted because they are mere dupli- 20 cates of the parts shown, the lay having been omitted, as it is shown in part in Fig. 1. Fig. 4, on an enlarged scale, shows part of one end of one tuft-yarn beam, the carriage for holding it, and the yarn-guides and tuft-yarns, 25 and one link of the chain; Fig. 5, a right-hand end elevation of the parts shown in Fig. 3; Fig. 6, a perspective view of one of the links detached. Fig. 7 is a partial vertical section taken just inside the arm  $k^2$ , cutting 30 off the pivot  $k^6$ , and showing in elevation that pair of arms  $k^8$  to the lower ends of which are secured the opposite ends of the back shear or blade, which overlaps the front shear or blade carried by the arms  $k^7$ , the arms  $k^8$  being 35 set one ahead of the other and near opposite sides of the loom, so as to give to the blade carried by them an angular position; Fig. 8, a detail to show one sprocket-wheel and one form of locking device to keep it in 40 the position in which it is left by the pawl which actuates the sprocket-wheel to move the chain, and Fig. 9 a lower end view of one of the yarn-guides.

I have omitted from the loom herein to be 45 described many actuating parts, because they may be such as common to other looms in use, and I have elected at this present time to illustrate my invention as applied to a form of loom substantially such as shown in United 50 States Patent No. 446,402, and to facilitate the description of the invention herein contained without unnecessarily complex drawings I shall, in reference to some of the parts, use designating-letters such as are used in the 55 said Patent No. 446,402, and inasmuch as each half or side of the rising and falling lift-frame is alike and fully shown and described in said Patent No. 446,402, I have deemed it unnecessary in the drawings of this application to 60 show more than one side, it being understood that the parts shown—such as the guide  $e^8$ , slide  $e^3$ , bars 18, and arms or levers  $a'$ —are duplicated at the other side of the loom.

65  $A'$  represents the frame-work;  $e^8$ , a grooved guide-bar pivoted at  $e^{62}$  on stand  $e^{18}$ ;  $e^3$ , a slide mounted to slide in the grooves of said guide-bar  $e^8$  and jointed at 14 to the arms 18, the

said slide and arms forming the chief parts of a vertically-movable and swinging frame called the "lift-frame." The arms  $e^8$  derive 70 their backward and forward movement once during the insertion of each three double picks of filling, as provided for in said Patent No. 446,402 as well as in Patent No. 343,110, by or through a tubular rock-shaft surround- 75 ing the rock-shaft  $f$ , the said tubular shaft having near each end like arms  $e^{12}$ , each connected at its upper end by rods  $e^{10}$  with the upper end of one of the guide-bars  $e^8$ . The tubular rock-shaft has a third arm  $e^{14}$ , pro- 80 vided with a roller or other stud, which is acted upon by a cam  $e^{15}$ . (Shown by dotted lines.) The slide-bars  $e^3$  have jointed to them links  $f^2$ , in turn jointed to arms 125, adjust- 85 ably attached to arms  $f^3$  of the rock-shaft  $f$ , the said rock-shaft having an arm  $f^4$  provided with a roll and acted upon by a cam  $f^5$ , the latter cam and rock-shaft  $f$  raising and lowering the slide-bars  $e^3$  of the swing-frame in the guide-arms  $e^8$ . 90

$d^2$  is the lay;  $r$ , the reed;  $h^2$ , a link, and 409 an arm fast on the rock-shaft  $h^{20}$ , having an arm  $h^5$ , provided with a suitable roll to be acted upon by a suitable cam on shaft  $B^2$ , as in said Patent No. 446,402. 95

123 shows the work-support or breast-beam;  $k$ , a stand;  $k^2$ , an adjustable arm;  $k^7$   $k^8$ , levers pivoted thereon at  $k^6$ ;  $k^{13}$  and  $k^{18}$ , levers, the former connected to a sleeve on a rock-shaft  $k^{19}$  and the latter connected to the said 100 rock-shaft, the said connecting-rods  $k^{12}$  and  $k^{17}$  being jointed, respectively, to the said levers  $k^{13}$  and  $k^{18}$ , and also connected, respectively, to the shear-leaves  $k^8$  and  $k^7$ , Fig. 7 showing the two arms  $k^8$  at opposite sides of 105 the loom and the blade  $k^{10}$  carried thereby.

In practice the devices so far referred to by letter and common to said Patent No. 446,402 may be actuated in the same manner as there- 110 in provided for.

The bars 18, one at each side of the lift-frame, instead of being connected at their upper ends, as in the Patent No. 446,402 referred to, are pivoted by a shaft  $a$  to like arms  $a'$ , pivoted on a rod or shaft  $a^2$ , mounted on a 115 suitable stand in the loom-frame. Each arm 18 has connected to it by suitable bolt  $a^5$  (see Fig. 2,) a depending leg or guide  $a^6$ , in the lower end of which is mounted a cross-shaft  $a^7$ . The lift-frame at each side has an attached 120 stand  $a^{10}$ , which forms a bearing for a shaft or rod  $a^{12}$ . Each rod or shaft  $a$ ,  $a^2$ ,  $a^7$ , and  $a^{12}$  has upon it near each end, respectively, a sprocket or chain wheel, as  $b$   $b'$   $b^2$   $b^3$ , over which are extended the sprocket-chains to be 125 described, the said chains, as herein shown, consisting of a series of like links  $b^4$ , each having at one end a pin  $b^5$  extended from opposite sides, as best shown in Figs. 4, 5, and 6, the opposite end of each link having a notch, as 130  $b^6$ , the notched end of each link also being slitted or split at 2, as best shown in Fig. 6, to receive the part 3 of the link to be joined with it. Each link has also a mortise, as at



4, to receive a tenon 5 at the end of a carriage *c*, carrying a board *c'*, provided with a series of yarn-guides *c<sup>2</sup>*, which in this invention take the place of the independently-movable tuft-yarn-carrying needles shown in the Patent No. 446,402. These guides *c<sup>2</sup>*, which receive the tuft-yarns *t*, are shown as composed of pieces of sheet metal bent centrally to form troughs, and viewing Figs. 4 and 9 it will be seen that the sides of the guides are contracted from the point 100 to produce sufficient friction on the tuft-yarn to keep it straight when being manipulated to leave a loop in the shed, the extreme lower ends of the guides being further pinched, contracted, or indented, as at 101, to leave inturned lips or projections to keep the tuft-yarns back in the guides and prevent the said yarn from being drawn out laterally from the open sides of the troughs.

Each carriage *c* of the series of carriages in the chain has a beam, shown as composed of a series of disk bobbins *c<sup>4</sup>*, mounted upon a rod *c<sup>3</sup>*, having bearings in said carriages, each bobbin having wound upon it a tuft-yarn *t* of a proper color, that depending on the colors required in the particular row of tufts to be formed from the bobbins on that particular beam.

The sprocket-wheel *b<sup>2</sup>* on the shaft *a<sup>1</sup>* has a series of pins *e*, supposed to be four in number, three of the said pins being shown distinctly in Fig. 1, the said pins being engaged intermittingly by a hook *e'*, herein shown as pivoted at *e<sup>2</sup>* (see Figs. 1 and 7) upon the shear-carrying lever or arm *k<sup>3</sup>*, a spring *e<sup>4</sup>* normally acting to keep the hook engaged with the pins, and as a result thereof as the shears are opened and the bar *k<sup>3</sup>* is moved toward the rear of the loom the hook rotates the sprocket-wheel, and consequently moves the chain intermittingly. In this way one beam after another is brought into operative position with its yarn-guides extended vertically toward the warp, the ends of the tuft-yarns depending therefrom, so that when the described lift-frame is lowered by its actuating devices (shown in Fig. 2) and as provided for in the said Patent No. 446,402 the yarn-guides *c<sup>2</sup>* will be lowered to the shed to deliver their tuft-yarns to the warps to be crossed by a shot of filling inserted double and locked into the warp by the filling, all as provided for in the said Patent No. 446,402. After the tuft-yarn has been looped about the filling and beat in the shears are operated to cut off the tuft-yarns, leaving the tufts in the fabric, all as provided for in the said Patent No. 446,402.

While the shears are being opened after having cut off the tufts, the chain is again rotated, bringing a new beam in position to be lowered to deliver its tuft-yarns to the shed, as just described, each beam making a row of tufts corresponding in color with the color of the yarns used in making up the beam.

The employment of disk bobbins results in

very considerable reduction in cost of preparation of yarn-beams and in setting up for the production of a carpet of any particular pattern and yarn is saved, for all the yarn on any disk bobbin may be used, as each bobbin may be put on any rod in the making up of any beam.

The sprocket-wheel is slotted at its periphery to leave a square section, (see Fig. 8,) which is acted upon by the T-shaped head of a slide-bar *t<sup>2</sup>*, sliding in guides *t<sup>3</sup>* and having a collar *t<sup>5</sup>* acted upon by a spring *t<sup>4</sup>*, the said slide-bar serving to hold the sprocket-wheel *b<sup>3</sup>* in the position in which it is left by the pawl *e'*.

The beam provided with disk bobbins may be used with any carriage provided with any well-known form of needles or tuft-yarn guides.

I have shown the tuft-yarn guides as adapted to receive the tuft-yarns in slots at their front sides; but although the said yarn-guides have an advantage over other forms of guides known to me, yet this invention is not intended to be limited to the exact form of tuft-yarn guides shown, as the same may be of any other usual or suitable construction.

I claim—

1. A chain provided with a series of carriages and a series of tuft-yarn guides on each carriage, combined with a tuft-yarn beam for each carriage, said beams being composed each of a series of disk bobbins placed side by side, and means to move said chain to bring the carriages consecutively into operative position, substantially as described.

2. A carriage provided with bearings at each end thereof, a series of yarn-guides attached thereto, a rod supported in said bearings, and a series of disk bobbins placed side by side on said rod and adapted to receive the tuft-yarns to be led to said yarn-guides, substantially as described.

3. A carriage provided with bearings at each end thereof, combined with a series of trough-like guides of U shape in cross-section to receive the tuft-yarns, the front edges of the trough being contracted for a portion of their length to produce friction upon the tuft-yarns, substantially as described.

4. A carriage provided with bearings at each end thereof, combined with a series of trough-like guides of U shape in cross-section to receive the tuft-yarns, the open front edges of the troughs being contracted for a portion of their length to produce friction upon the tuft-yarns, and having their lower ends still more contracted to retain the tuft-yarn at the back of the guide, substantially as described.

5. In a loom for weaving tufted fabric, a chain having a series of carriages provided with tuft-yarn beams, and a series of cooperating yarn-guides, one for each tuft-yarn, combined with a rising and falling lift-frame



and a series of sprocket-wheels for the said chains, whereby when the said lift-frame descends in its forward position the yarn-guides co-operating with the lowermost tuft-yarn beam then in operative position will present the tuft-yarns carried by them to the shed near the cloth-making point, substantially as described.

6. In a loom for weaving tufted fabric, the rising and falling lift-frame provided with a series of sprocket-wheels and chains on the said sprocket-wheels, combined with a series of carriages mounted upon the said chains, a tuft-yarn beam on each of the said carriages, and a series of yarn-guides on said carriages, substantially as described.

7. In a loom for weaving tufted fabric, the rising and falling lift-frame provided with a series of sprocket-wheels, chains on the said sprocket-wheels, and means to actuate the said sprocket-wheels intermittingly, combined with a series of carriages mounted upon the said chains, each carriage having a yarn-

beam and a series of yarn-guides, to operate substantially as described.

8. A movable frame provided with sprocket-wheels and means to move the said frame, combined with chains composed of links, and carriages carried by said chains, said carriages having each a series of yarn-guides and a tuft-yarn beam, to operate substantially as described.

9. A rising and falling lift-frame provided with sprocket-wheels and means to move the said frame, combined with chains composed of links  $b^4$ , having notches, slots, and pins  $b^5$ , and carriages carried by said chains, said carriages having each a tuft-yarn beam, to operate substantially as described.

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

HORACE WYMAN.

Witnesses:

JUSTIN A. WARE,

SAMUEL B. SCHOFIELD.