N. A. HOVER.

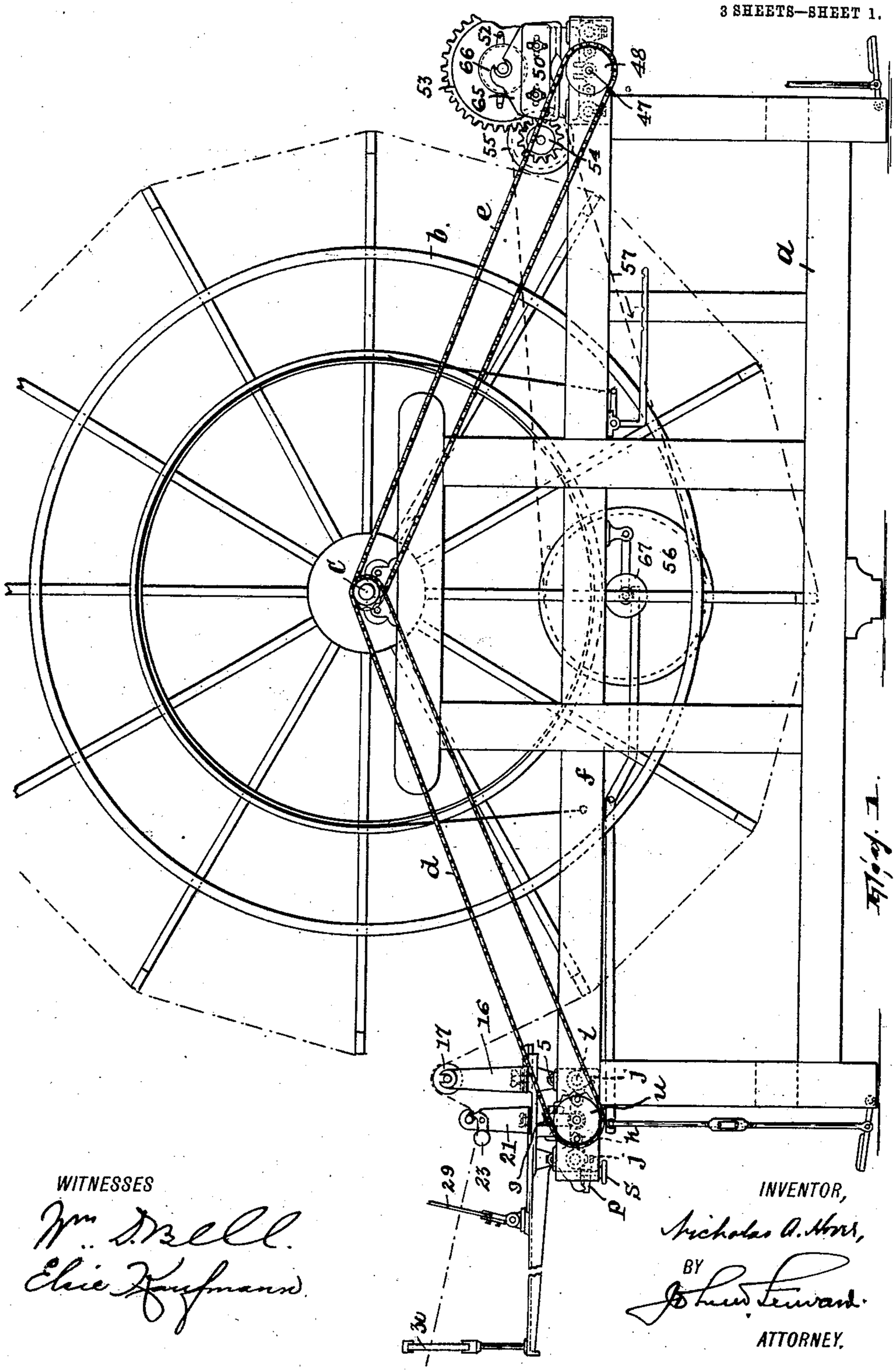
WARPING AND BEAMING MACHINE.

APPLICATION FILED JUNE 5, 1908.

922,144.

Patented May 18, 1909.

3 SHEETS—SHEET 1.



WITNESSES

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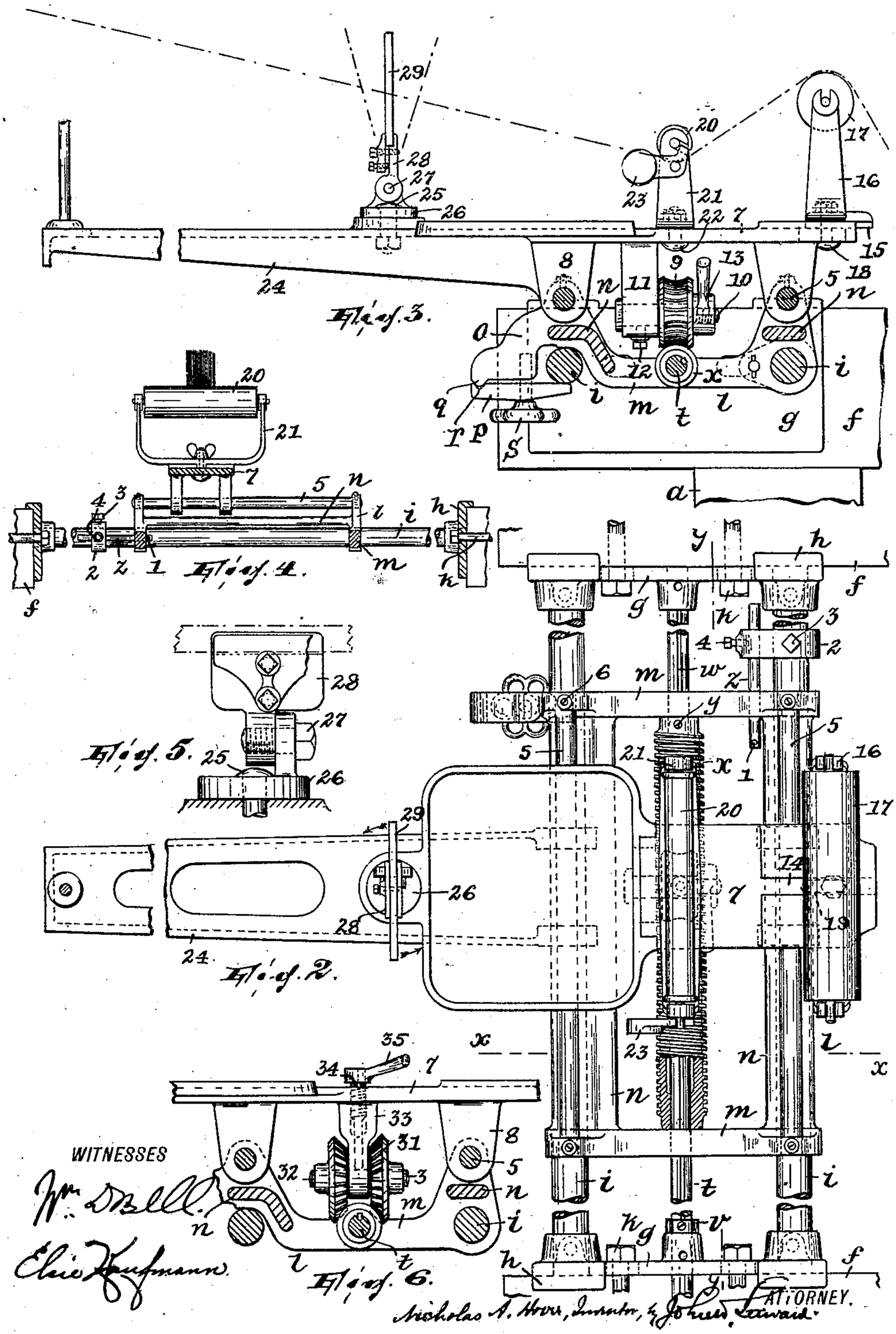

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 2.

Fig. 6.

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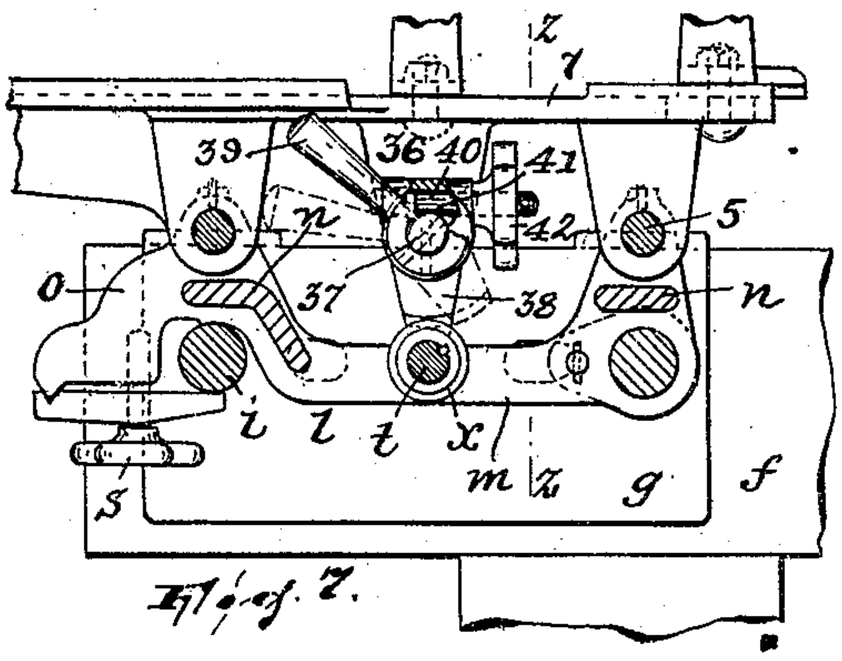


Fig. 7.

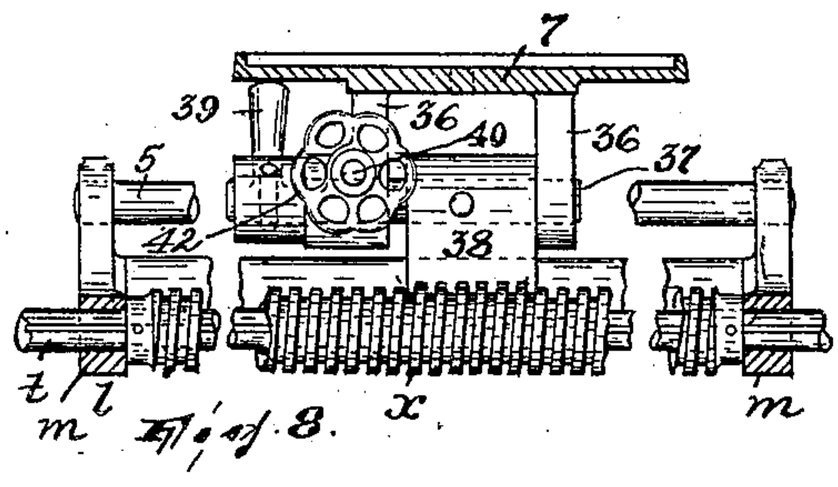


Fig. 8.

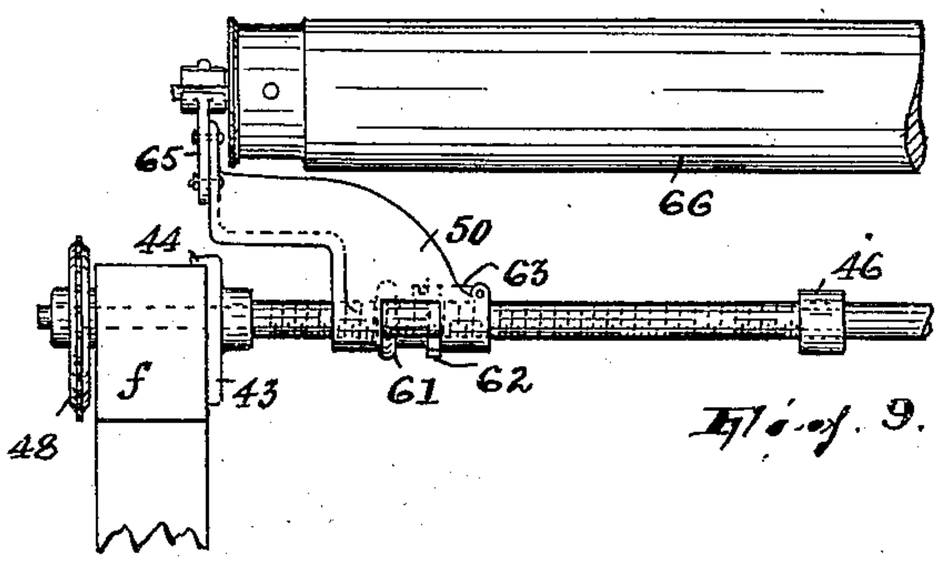
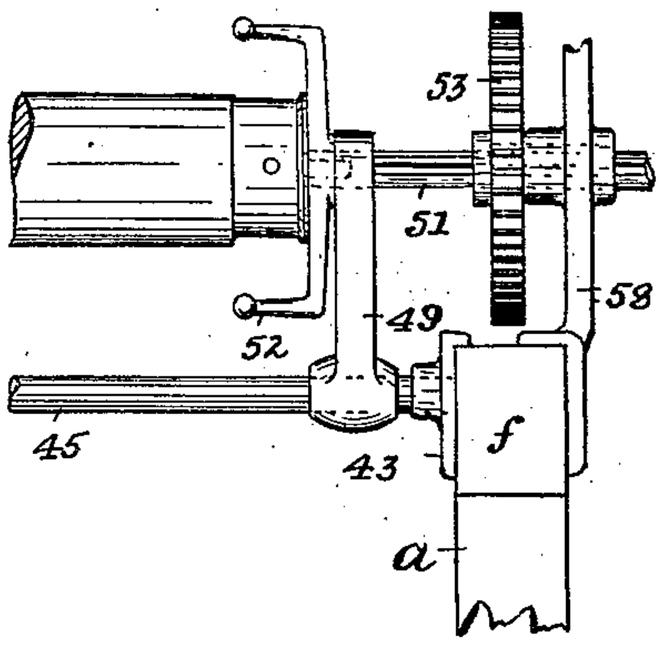


Fig. 9.



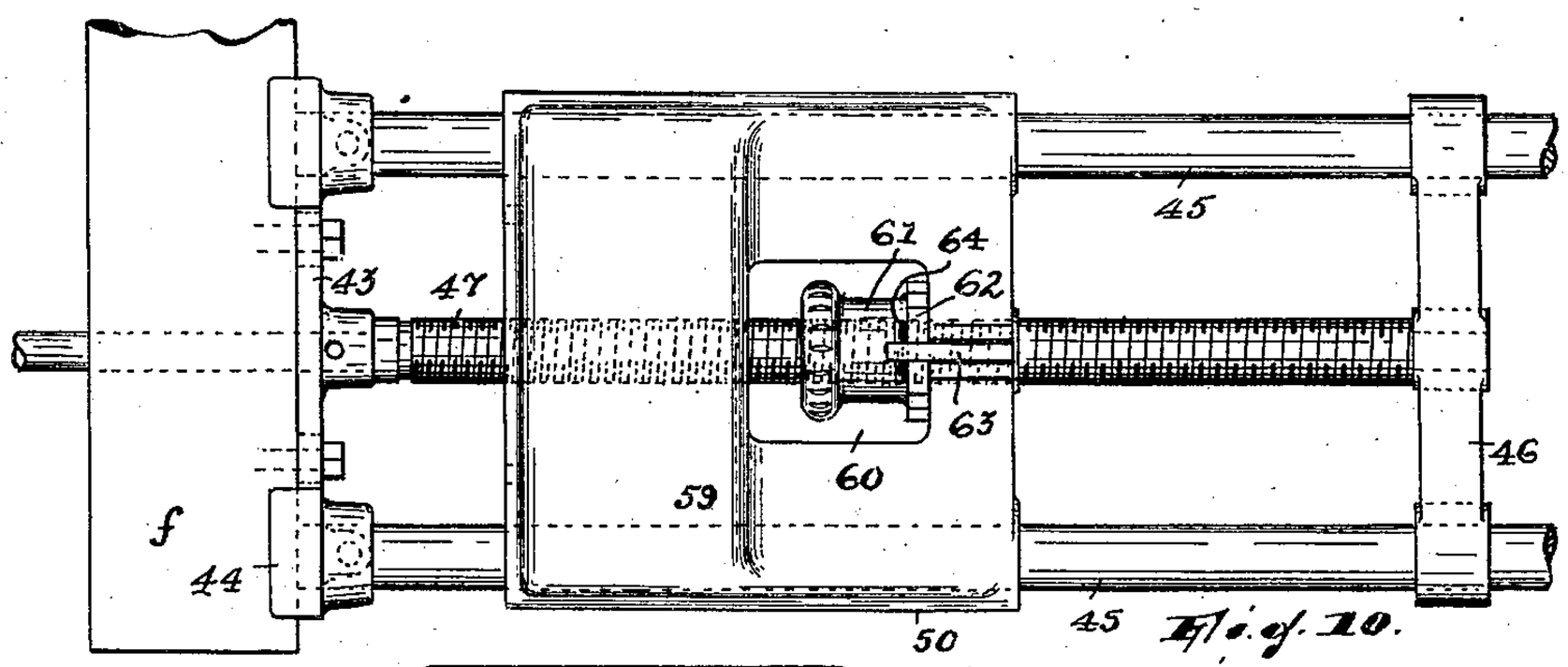


Fig. 10.

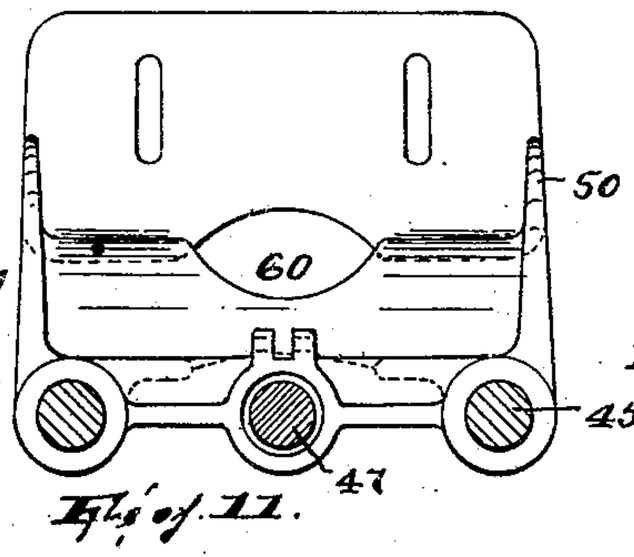


Fig. 11.

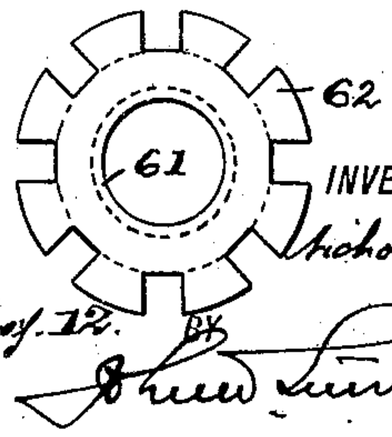


Fig. 12.

WITNESSES

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WARPING AND BEAMING MACHINE.

No. 922,144. Specification of Letters Patent. Patented May 18, 1909.

Application filed June 5, 1908. Serial No. 436,851.

To all whom it may concern:

Be it known that I, NICHOLAS A. HOVER, a citizen of the United States, residing in Paterson, Passaic county, New Jersey, have invented certain new and useful Improvements in Warping and Beaming Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

My invention relates to warping and beaming machines, and it has reference particularly to warping and beaming machines of the kind wherein sections of the warp are successively laid side by side on the reel, in the warping operation, and, in the beaming operation, are taken from the reel onto a beam all in one operation.

My present invention involves certain improvements on a warping machine described and claimed in an application for U. S. Letters Patent bearing the Serial No. 401,200. In that application a warping mechanism is disclosed which comprises as its essential feature a carriage adapted to be moved by hand transversely with reference to the reel to a new position each time the laying on of one section of warp has been completed and the laying on of a fresh section of warp is to begin, another carriage arranged to slide traversely of the reel in the first-named carriage for the purpose of imparting a traverse to each section of warp as it is laid on the reel, and means for moving the second carriage on the first. One of the novel features of my improved warping mechanism as presented in the present application is a means whereby the manual movements of the first carriage may be gaged with precision, so that the spacings between the several sections of warp laid on the reel will be accurate and substantially identical; others involve the adjustability of various parts to meet varying conditions and the rendering of the mechanism generally more reliable in operation, convenient to handle and substantial in construction.

My improved beaming mechanism involves a novel means for effecting the proper traverse of the beam.

In devising both the warping and beaming mechanisms I have had in mind particularly so to construct the same that they may be applied to any warping machine of the type above indicated at present in use with the minimum loss of time and labor.

Referring to the accompanying drawings, Figure 1 is a side view of a Swiss warping and beaming machine embodying my improvements; Figs. 2 to 8 show the warping mechanism in detail, Fig. 2 being a plan view, certain parts appearing in section and others broken away; Fig. 3 a sectional view on the line *x*—*x* of Fig. 2; Fig. 4 a somewhat smaller view on the line *y*—*y* of Fig. 2; Fig. 5 an enlarged detail view of the reed supporting means; Fig. 6 a view illustrating a modification of the means for effecting the traverse of the second carriage; Fig. 7 is a side view and Fig. 8 a sectional view, line *z*—*z* of Fig. 7, of another modified form of traverse mechanism for the second carriage; Figs. 9, 10, 11 and 12 show the beaming mechanism, Fig. 9 being a front view; Fig. 10 a plan; Fig. 11 an end view; and, Fig. 12 illustrates a detail.

In the drawings *a* designates the frame and *b* the reel of a Swiss warping and beaming machine; from the reel shaft *c* power is adapted to be transmitted to the warping and beaming mechanisms as hereinafter described by means of the sprocket chains *d* and *e*. The frame *a* comprises the usual parallel side rails *f*.

Referring, first, to the warping mechanism, *g* designates two plates each having the outward overhangs *h* and said plates being connected by the guide rods *i*, the plates and rods being secured together by the set screws *j* (Fig. 1). The framework thus formed is adapted to be supported on the frame *a* by the overhangs *h* resting on the rails *f*, the plates *g* being held against the inside faces of rails *f* by the bolts *k;* it will be understood that the framework comprising the plates and rods may be adapted to fit varying widths of frames *a* by simply altering the length of the rods *i*.

What I have heretofore designated the "first" carriage will be hereinafter designated the "main" carriage; the "second" carriage, I shall designate the "auxiliary" carriage.

The main carriage *l* comprises the side bars *m* and the integral connecting bars *n*. Through the rear end of each side bar *m* extends the rear guide-rod *i*, the forward end of each side bar being arched over and resting upon the front guide rod *i*, as at *o*. Hereto-

fore the carriage has been penetrated both front and rear by the guide rods, so that if the front guide rod became buckled through undue strain thereon, as by the operator leaning against it, the carriage would not move freely. My present arrangement permits the carriage to move freely although the front guide rod becomes bent, and allows the carriage to be raised on the rear guide rod as a fulcrum for the purpose of access to any of the parts for repairs, etc. The main carriage is adapted to be secured against lateral movement while a section of warp is being laid on the reel by the clamp *p* which bears at one end against the under side of the front guide rod *i* and at the other end against a toe *q* on the end of one of the side bars, said toe being received by a notch *r* in the clamp, and between its ends the clamp is penetrated by a handscrew *s* arranged in the side bar *m*. A splined shaft *t* is journaled in the plates *g* and extends at one end through the rail *f*, having thereon the sprocket wheel *u* over which extends the chain *d* and which coöperates with a collar *v* to prevent lengthwise movement of the shaft. The shaft *t* penetrates the side-bars *m* of the carriage *l* and its spline *w* extends approximately from one plate *g* to the other, the shaft receiving a screw-sleeve *x* which is arranged between and abuts at its ends against the side-bars *m* of the carriage *l*. This screw-sleeve may carry one or more keys *y* engaging the spline *w*. The arrangement just described allows the main carriage to be shifted laterally by hand, the screw-sleeve moving with it; on rotating the shaft the screw-sleeve, being splined thereto, rotates therewith. As will be indicated later, the screw-sleeve operates automatically to effect the traverse of the auxiliary carriage as a warp section is being laid on the reel.

In order that, as often as it becomes necessary to start to lay on a fresh warp section, the spacings between the several warp sections may be maintained uniform, I provide the gage shown in Fig. 2, the same consisting of a short rod *z* which slides freely in one of the side-bars *m* and has a stop-pin 1 in one end, its other end penetrating a collar 2 which is adapted to be fixed to the rear guide-rod *i*, on which it is arranged, by the set-screw 3; the rod *z* is adjustably secured in the collar 2 by the set-screw 4. Assuming that the spacings are each to be a given number of inches or fraction of an inch, the rod *z* is moved lengthwise until the stop-pin abuts against the inside of the side-bar *m*, whereupon the collar 2, by manipulating the set-screw 4, is set so that the distance between the side-bar and the collar will correspond with the desired spacing between warp sections. The manner of utilizing this gage will be explained later.

The side-bars *m* are connected by the parallel guide-rods 5 secured therein by the set-screws 6. On these guide-rods is adapted to move the auxiliary carriage 7, its downwardly projecting lugs 8 being penetrated by the guide-rods 5. When the screw-sleeve *x* is rotating the traverse of the auxiliary carriage is effected therefrom through the worm-wheel 9 which is arranged on the stub-shaft 10 secured on a downward portion 11 of the carriage 7 by a set-screw 12, the free end of the stub-shaft 10 being threaded and receiving a nut 13 adapted to bind the worm-wheel in fixed relation to the carriage; upon releasing the nut, the carriage 7 may be moved laterally by hand, the worm-wheel then rotating idly. The rear end of the carriage 7 has a longitudinal groove 14 receiving the feather 15 of a bracket 16 in the upper end of which is journaled a roller 17, the bracket being secured to the carriage 7 by a bolt 18 penetrating a slot 19 in the carriage. The roller 17 may thus be adjusted to and from the reel, as the conditions require. The warp extends over the roller 17 but under another roller 20 which is journaled in a forked bracket 21 secured to the carriage 7 by the bolt 22, one bearing for the roller 20 in bracket 21 opening downwardly and the trunnion of the roller being adapted to be removably held therein by a weighted pawl 23. The carriage has a forwardly extending arm 24, on which, by means of a belt 25 forming a vertical swivel, is arranged the stand 26; on the horizontal screw 27 arranged in this stand is pivotally mounted the two-part clamp 28 for the reed 29. This reed may be adjusted, to widen or contract the warp sections, on the bolt 25 as a pivot, as indicated by the arrows in Fig. 2, or it may be adjusted on the screw 27 as a pivot, as indicated by the dot-and-dash lines in Fig. 3, to change the position of the reed according to the angle of approach of the warp sections. 30 is a fixed reed arranged on the end of arm 24.

In lieu of the disconnective traverse means between the carriage 7 and the screw sleeve already described, I may employ that shown in Fig. 6, where 31 designates reverse bevel pinions fixed on a shaft 32 which rotates freely in a downward projection 33 of the carriage or which may be held against rotation by the binding screw 34 having the handle 35. Or I may employ the disconnective traverse means shown in Figs. 7 and 8. Here the carriage 7 has the depending lugs 36 in which is journaled the short rock-shaft 37 on which is pinned the segmental nut 38, one end of said rock-shaft carrying a handle 39 which is pinned thereto. When the handle is turned, the nut is thrown into or out of engagement with the worm-sleeve *x*. It will be observed that the nut 38 is slightly narrower than the space between the lugs 36; this is to allow the nut to have movement lengthwise of the worm-sleeve in order that the teeth of the nut may "find" the spaces between the

threads of the worm sleeve. In order to hold the nut against rotation when engaged with the worm-sleeve and also prevent its movement at such time longitudinally of the worm-sleeve, I provide the clamping pin 40 which has some slight longitudinal movement in one of the lugs 36 and is formed with a recess 41 receiving the rock-shaft 37, its free end being threaded and carrying a nut 42. On screwing nut 42 tight against the lug 36, the pin 40 binds against the rock-shaft and holds it against movement.

Referring, now, to the beaming mechanism, 43 designates plates bolted to the side-rails *f* and having overhangs 44 resting thereon, said plates being connected by the parallel guide-rods 45. In one of the plates 43 and a brace 46 connecting the guide-rods is journaled a screw 47 on which is fixed the sprocket-wheel 48, around which extends the chain *e*. 49 and 50 are brackets arranged to slide on the guide-rods 45, the bracket 49 forming a journal for the shaft 51 which carries the chain-clutch 52 and the gear-wheel 53 which is splined thereto and is driven by a pinion 54 carrying a pulley 55 around which and another pulley 56 driven by the reel *b* extends a belt 57; the shaft 51 has additional support in the bracket 58 carried by one of the side-rails *f*. The bracket 50 is formed with a stepped portion 59 in the lower part of which is an opening 60 above a nut 61 having the toothed portion 62 and arranged on the screw 47. In the bracket 50 is pivoted a detent 63 which may be engaged with the teeth of the nut to hold the same against rotation and whose free end may carry a pin 64. The bracket 50 also carries an open bearing 65 for the beam 66 which is supported at its other end in the chain clutch 52.

The operation of my improved warping and beaming mechanism is as follows: In warping the reel is rotated from 55 through 57 and 56, a friction wheel 67 on the pulley 56 being at this time held in engagement with the reel in the usual manner. As the reel draws the warp and winds it the auxiliary carriage moves to the right in the main carriage. Previously to starting the warping operation, the main carriage is moved to the right as far as it will go and the auxiliary carriage to the left as far as it will go in the main carriage. The auxiliary carriage will be fed to the right by the worm-sleeve *x*, and when a predetermined length of the particular warp section then being laid on the reel has run out, the carriages are reset. The gage for the main carriage is moved to the left until the pin 1 abuts against the left hand side bar of said carriage and there clamped by means of hand screws, whereupon said carriage is moved against the collar 2; this determines the spacing which is required between the warp section already laid on and the warp section about to be laid on the reel. Then the disconnective connecting means between the auxiliary carriage and the worm sleeve is released and the auxiliary carriage again set as far as it will go to the left in the main carriage. The reel is now started up again and the second warp section laid thereon. This operation continues until the reel is full. In beaming, the power is transmitted through pinion 54 and gear wheel 53 to shaft 51 whereby to rotate the beam; the pull of the warp in this instance rotates the reel, which through the sprocket chain *e* and sprocket wheel 48 rotates the screw 47, the nut 61 being held against rotation in bracket 50 by the detent 63, which causes the bracket 50 to feed to the right, so that as the beam rotates and draws the warp off the reel the beam moves to the right to accommodate itself to the spiral winding of the warp sections which has been effected in the warping operation.

It sometimes becomes necessary to stop the warping operation for one kind of warp for the purpose of placing another kind of warp on the reel; in that case, so much of the warp as is already on the reel may be beamed and the beam laid aside. Then, as soon as the machine is available again for completing the warping operation partly finished, the beam is replaced in the machine so that the warp thereon may be re-established on the reel. In this instance, the reel rotates in the same direction as for warping and as it is necessary for the beam now to traverse to the left, it rotates the screw 46 in a direction opposite to that in which it rotates for beaming (the gear 5 and pinion 54 being now disconnected); as the nut 61 now tends to move to the left independently of the bracket 50, in order to prevent it from clearing the detent 63, the pin 64 is provided to keep the detent interlocked with the nut.

My means for adjusting the screw or screw-sleeve *x* laterally with respect to the reel and also determining the new starting point for the carriage 7 each time a new warp-section is to be laid on the reel comprises, as its essential elements, two members, one being the main carriage or its equivalent, acting to confine said screw against lateral movement therein, and the other having limited lateral movement in the first, herein being illustrated in the preferred form by the parts *c*, 1, 2 and 3.

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

1. The combination of a supporting means, a rotary screw, a carriage movable longitudinally of the screw, a nut movable in the carriage into and out of engagement with the screw and also longitudinally thereof, and means for securing the nut when en-

gaged with the screw against movement in the carriage longitudinally of the screw, substantially as described.

2. The combination of a supporting means, a reel, a carriage movable laterally of the reel, means for effecting lateral movement of the carriage, means for determining the successive starting points of the carriage comprising two members one of which is also movable laterally of the reel and the other of which has limited movement relatively to the first member also laterally of the reel, and means for securing the first member against movement, substantially as described.

3. The combination of a supporting means, a reel, a carriage movable laterally of the reel, means for effecting lateral movement of the carriage, a gage for the carriage having limited movement relatively to said carriage and laterally of the reel, and means for securing the gage against movement after each lateral movement thereof, substantially as described.

4. The combination of a supporting means, the reel, a carriage movable laterally of the reel, a rotary screw also movable laterally of the reel, means, connecting the screw with the carriage, whereby to transmit lateral movement to the carriage upon rotation of the screw, and means for gaging the movement of the screw in the supporting means laterally of the reel comprising two members, one of said members confining the screw against lateral movement in said member and the other having limited movement relatively to the first member on the supporting means, substantially as described.

5. The combination of a supporting means, the reel, a carriage movable laterally of the reel, a rotary screw also movable laterally of the reel, means, connecting the screw with the carriage, whereby to transmit lateral movement to the carriage upon rotation of the screw, and means for gaging the movement of the screw in the supporting means laterally of the reel comprising two members, one of said members confining the screw against lateral movement in said member and the other being adjustably secured to said supporting means and having limited movement relatively to the first member, substantially as described.

6. The combination of a supporting means, the reel, a carriage movable laterally of the reel, a rotary screw also movable laterally of the reel, means, connecting the screw with the carriage, whereby to transmit lateral movement to the carriage upon rotation of the screw, and means for gaging the movement of the screw in the supporting means laterally of the reel comprising two members, one of said members confining the screw against lateral movement in said member and the other comprising a rod penetrating the first-named member, and stops on said rod adapted to limit its movement in said first-named member and one of said stops being adjustably secured to the supporting means, substantially as described.

7. The combination of a supporting means, the reel, a carriage movable laterally of the reel in the supporting means, means for gaging the movement of said carriage in the supporting means comprising a part having limited movement in the carriage laterally of the reel and adjustably secured to said supporting means, another carriage arranged in said first named carriage and movable laterally thereof and means for effecting the lateral movement of the second carriage, a part of said last-named means being movable with the first-named carriage, substantially as described.

8. In a warping machine, the combination of a rotary screw, a carriage, means for supporting the carriage for movement parallel with the screw, a nut pivoted on the carriage on an axis parallel with the screw and movable on said axis into and out of engagement with the screw, and means, engaging the pivotal portion of said nut, for securing the nut in engagement with the screw, substantially as described.

9. In a warping machine, the combination of a rotary screw, a carriage, means for supporting the carriage for movement parallel with the screw, a nut pivoted on the carriage on an axis parallel with the screw and movable on said axis into and out of engagement with the screw and also longitudinally of its axis, and means for securing the nut in engagement with the screw and against movement longitudinally of its axis, substantially as described.

10. In a warping machine, the combination of a rotary screw, a carriage, means for supporting the carriage for movement parallel with the screw, a rock shaft journaled in the carriage parallel with the screw, a nut fixed on said rock shaft, said nut and rock shaft having limited movement parallel with the screw in said carriage, a threaded pin arranged in the carriage and movable longitudinally, said pin having a recess receiving the rock shaft, and a nut arranged on the threaded portion of the pin and adapted to bear against the carriage, substantially as described.

11. In a warping machine, the combination of the frame and a supporting and guiding structure for a rectilineally movable mechanism comprising plates bolted to the adjoining faces of opposite parts of said frame and having overhangs resting upon said parts and parallel guide rods connecting said plates, substantially as described.

12. In a warping machine, the combination of a movable support, the warp beam, means for sustaining the beam having rectilineal movement in the support and com-

prising a bracket, a rotary screw journaled in the support, a nut having a toothed portion and arranged on the screw and a detent pivoted in the bracket and engageable with the toothed portion of the nut, substantially as described.

13. In a warping machine, the combination of a movable support, the warp beam, means for sustaining the beam having rectilineal movement in the support and comprising a bracket, a rotary screw journaled in the support, a nut having a toothed portion and arranged on the screw, a detent pivoted in the bracket and engageable with the toothed portion of the nut, and a pin arranged in the detent and coöperating with the bracket to confine the nut against movement relatively to the bracket longitudinally of the screw, substantially as described.

14. In a warping machine, the combination of a suitable support, the warp beam, means for supporting the beam having rectilineal movement in the support and comprising a bracket, a rotary screw journaled in the support, a nut on the screw and means for locking the nut to the bracket against rotation on the screw, substantially as described.

In testimony that I claim the foregoing, I have hereunto set my hand this 3rd day of June, 1908.

NICHOLAS A. HOVER.

Witnesses:

WM. D. BELL,

JOHN W. STEWARD.