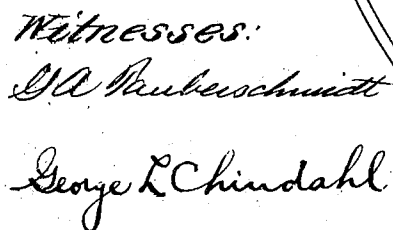


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3 SHEETS--SHEET 1.



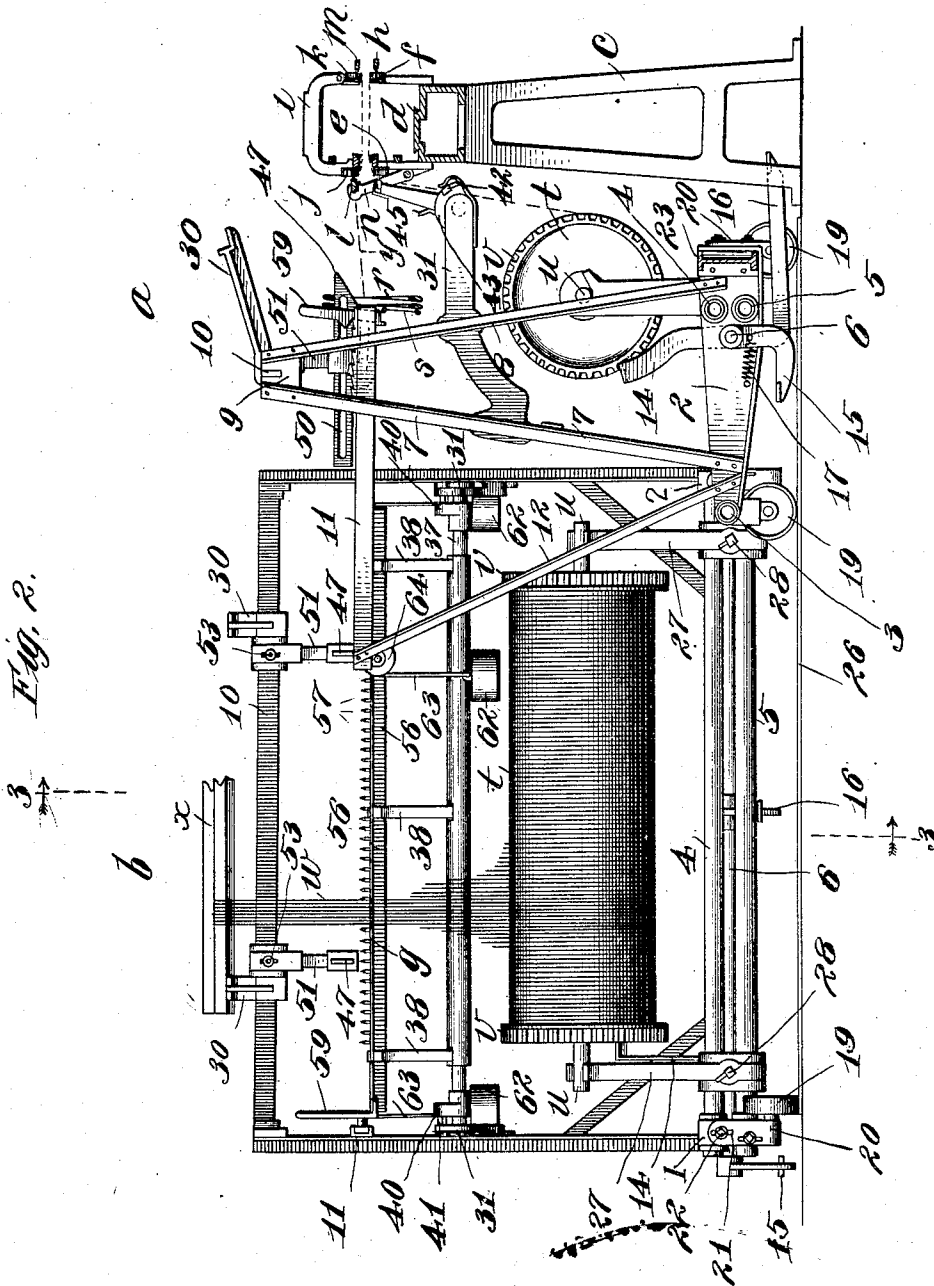
Howard S. Colman
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H. D. COLMAN.
WARP HANDLING APPARATUS.
APPLICATION FILED MAR. 12, 1906.

955,383.

Patented Apr. 19, 1910.

3 SHEETS—SHEET 2.



Witnesses:

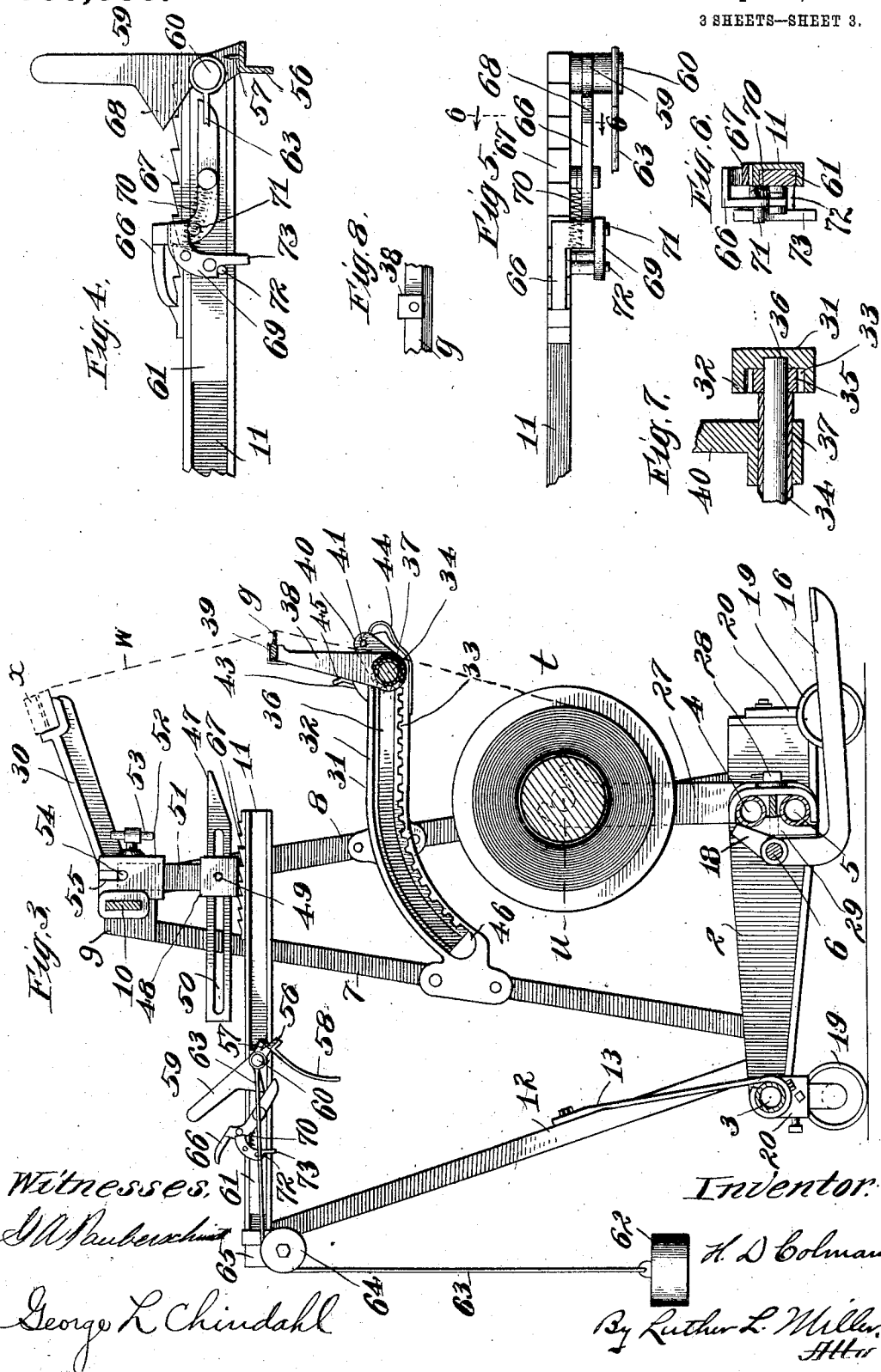
G. A. Faudenschmidt
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955,383.

3 SHEETS--SHEET 3.



UNITED STATES PATENT OFFICE.

HOWARD D. COLMAN, OF ROCKFORD, ILLINOIS, ASSIGNOR TO BARBER-COLMAN COMPANY, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

WARP-HANDLING APPARATUS.

955,383.

Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed March 12, 1906. Serial No. 305,538.

To all whom it may concern:

Be it known that I, HOWARD D. COLMAN, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Warp-Handling Apparatus, of which the following is a specification.

This invention relates to apparatus for handling warps preparatory to the tying-in or twisting-in operation, and refers particularly to a beam truck for serving the warp-tying machine shown and described in my pending application Serial No. 208,779 filed May 19, 1904. For the convenience of the operator and to facilitate the operation of such warp-tying machine I provide two beam trucks, herein indicated as *a* and *b*, which beam trucks are so arranged that they may alternately be brought into position to serve the warp-tying machine. While the warp-tying machine is operating upon the warp in one truck the operator removes from the other truck the tied-in warp and puts in its place a new loom beam, arranging the new warp in position to be placed in the warp-tying machine as soon as the warp in the other truck has been tied in.

In the accompanying drawings, Figure 1 is a top plan view, somewhat diagrammatical, showing a warp-tying machine and two beam trucks *a* and *b* in position alternately to serve said machine. Fig. 2 is a view showing said beam trucks and said warp-tying machine in elevation. In this figure the truck *a* is serving the warp tying machine and is illustrated in end elevation, while the truck *b* is swung back into its reserve position and is shown in front elevation. Fig. 3 is a transverse vertical section through the truck *b* on dotted line 3 3 of Fig. 1. Fig. 4 is a detail view showing the pawl and ratchet locking device for holding in its forward position the bar for holding the old warp. Fig. 5 is a top plan view of the mechanism illustrated in the last preceding figure. Fig. 6 is a transverse sectional view on dotted line 6 6 of Fig. 5. Fig. 7 is a detail view of a portion of the means for supporting the insertion bar. Fig. 8 illustrates the pivotal mounting for said insertion bar.

The warp-tying machine is supported above the floor by means of legs *c* upon

which is secured a bed *d*. Clamps *e* and *f* for the new warp are supported above said bed, said clamps being provided with insertion bars *g* and *h* respectively. The old warp that is to be tied to the new warp is supported in a warp-carriage *i*, said carriage being removable from the machine for convenience in securing the old warp in said carriage and the new warp in clamps *e* and *f*. The warp carriage *i* is supported above the bed in any suitable manner and is provided with clamps *j* and *k*, which clamps, like those upon the bed *d*, are provided with insertion bars *l* and *m*. The insertion bar of the clamp *k* is withdrawn, for convenience, by means of arms *n* fixed upon a rock shaft *o* supported at the rear side of the bed *d* and rotated by means of a crank *p*. At the upper end of each of the arms *n* is a spring clamp for receiving said insertion bar *m*.

The harnesses and the reed, of usual construction, are indicated respectively by the letters *r* and *s*.

t refers to a loom beam, of common construction, having the supporting shaft *u* and the usual peripheral gear teeth *v* upon its heads.

w refers to the new warp wound upon the loom beam *t*, and *x* to a plush clamp in which one end of said warp is held.

y refers to an old warp secured in the clamps *g* and *h* of the warp carriage *i* of the warp-tying machine, its ends passing through the eyes of the heddles and between the dents of the reed, and terminating in a small piece of fabric (not shown) cut from the cloth last woven in the loom from which the old warp was removed.

As the beam trucks *a* and *b* are identical, a description of one of them will suffice.

The truck base in this instance comprises two end pieces 1 and 2 rigidly secured together by means of tubular longitudinal bars 3, 4 and 5. A shaft 6 extends longitudinally of the frame a little rearward of the bars 4 and 5, and is rotatably supported in suitable bearings in the end pieces 1 and 2. At opposite ends of the frame, bars 7 and 8 extend upwardly, said bars being secured to the end pieces 1 and 2 at their lower ends and to the cap pieces 9 at their upper ends. A bar 10 lying within suitable openings in said cap pieces and secured rigidly thereto extends across and constitutes the upper transverse

bar of the truck frame. Upon the inner side of the bars 7 and 8 a piece of channel iron 11 is secured, the rear ends of said channel irons being supported by upwardly-extending brace arms 12. Diagonal braces 13 extend between the transverse tubular bar 3 and the rear braces 12. A dog 14, rigidly fixed upon the transverse shaft 6 extends upward beside the gear teeth *v* on one of the heads of the loom beam, and has an intumed upper end adapted to engage said gear teeth. Upon one end of the shaft 6 outside of the end piece 2 is rigidly fixed a rearwardly extending pedal 15, and to the middle portion of said shaft is secured a forwardly extending pedal 16. A coiled spring 17 attached at its opposite ends to the end piece 2 and the pedal 15 tends to rock the shaft 6 in the direction to throw the dog 14 in engagement with the gear teeth *v* on the adjacent head of the loom beam *t*. The oscillatory movement of the shaft 6 is limited by fingers 18 fixed by collars near the opposite ends of said shaft, said fingers engaging the tubular bar 4.

The beam truck is supported upon caster wheels 19 rotatably mounted in brackets 20, which brackets are secured at three corners of the truck frame. The brackets 20 are made adjustable in height by providing elongated openings 21 in said brackets, through which openings the attaching set-screws 22 extend. The remaining corner of the beam truck is supported by an arm 23 extending sidewise and slightly forward from one end of the truck, which arm has a pivotal connection with an upwardly extending stud 24 fixed in a bracket 25 secured to the floor near one end of the warp-tying machine. It will thus be seen that the truck moves in a curved path concentric with said stud 24, the caster wheels 19 running upon rails 26 secured to the floor.

The loom beam *t* is supported in the truck upon two arms 27, the upper ends of said arms being forked to receive the ends of the shaft *u* of said beam. Each of the arms 27 is adjustably secured to the tubular bars 4 and 5 of the truck frame by means of a clamping screw 28 and a clamp block 29. The position of the arms 27 may be changed, to adapt them to support beams of various lengths, by loosening the clamping screws 28 and sliding said arms to the desired points upon the bars 4 and 5. While the truck is in reserve, the clamp *x* containing the end of the new warp is supported upon the notched outer ends of the arms 30, said arms being slidably mounted upon the bar 10 of the truck frame, in order that their position may be adjusted to correspond with the width of the warp being handled.

The means for securing the new warp in the clamp *e* of the warp-tying machine *c* will next be described.

A bracket 31 is rigidly secured at each end of the truck frame upon the bars 7 and 8. Upon its inner side each of the brackets 31 is provided with a flange 32 and a rack 33. Upon a shaft 34 and near the ends thereof, are fixed pinions 35, each adapted to run upon the rack 33 of one of the brackets 31. The ends of said shaft 34 lie in grooves 36 formed in the brackets 31. A tubular shaft 37 surrounds the shaft 34, said shafts being free to rotate with relation to each other. Three arms 38 are fixed to the tubular shaft 37 and support at their upper ends the insertion bar *g* for placing the new warp in the clamp *e* of the warp-tying machine. Said insertion bar is pivotally mounted upon the middle arm 38 (Fig. 8), its ends being free to move slightly within housings 39 fixed to the upper ends of the outer arms 38. The arms 38 are held in position to press the insertion bar *g* against the sheet of warp threads extending between the loom beam *t* and the clamp *x*, by means of crank arms 40 fixed to the tubular shaft 37, said arms being provided with studs 41 adapted to lie in openings 42 formed in hubs 43 fixed to the brackets 31. Curved springs 44 fixed to said brackets releasably hold the studs 41 in their openings 42. Upon the rear side of each of the arms 38 is rigidly fixed a finger 45 for a purpose to appear later herein. Being movably supported upon the brackets 31, the devices carrying the insertion bar *g* may be pushed rearwardly in the truck frame so as to be out of the way when a loom beam is to be placed in said truck. The rear ends of the brackets 31 are curved downwardly and at the lower ends of the racks 33 are placed buffers 46 for cushioning the rearward movement of the insertion-bar supporting means.

In mounting a warp upon the truck preparatory to placing it in the warp-tying machine, a loom beam *t* is placed upon the arms 27, and the warp ends, held in the clamp *x*, are suspended from the arms 30 at the upper part of the truck. To obtain the necessary length of warp threads the beam is turned slightly, and to permit of this movement the dog 14 is withdrawn from its engagement with the gear teeth *v* of the loom beam by raising the foot lever 16 or by depressing the lever 15. When the warp ends have been thus suspended the tubular shaft 37 is grasped by the operator and the insertion bar *g* supported upon the arms 38 of said shaft is brought forward. By reason of the racks 33 and the interconnected pinions 35 at opposite ends of the shaft 34, said shaft and the shaft 37 are always parallel with the axis of the warp beam. The insertion bar *g* when in its forward position bows the sheet of warp threads outwardly, said bar being held in this forward position by the engagement of the

studs 41 with the walls of the locking notches 42. As hereinbefore stated, the carriage *i* for the old warp is removable from the warp-tying machine for convenience in placing the old warp in said carriage and the new warp in the clamps *e* and *f* of said machine. The new warp having been placed upon the truck as just described and the warp carriage *i* removed from the warp-tying machine, the new warp is secured in said machine by swinging the truck up to the machine, said truck moving in an arc described from the stud 24 as a center, and the insertion bar *g* pushing the sheet of warp threads into the clamp *e* of the warp-tying machine. As will be remembered, the insertion bar *g* is pivoted at its middle so that in swinging forward it may enter said clamp squarely. When the beam truck is in the position described, the clamp *e* is closed (by means not herein shown) to clamp the insertion bar *g* and the new warp therein. The operator then takes the clamp *x* and lays the sheet of new warp threads over the clamp *f*. The insertion bar *h* is then pressed by hand into the clamp *f* and said clamp closed. The new warp is now in position to be operated upon. When the old warp is removed from the loom to be tied to a new warp, the reed, harnesses and drop wires are in position upon said old warp. A piece of the cloth last woven is cut off in front of the reed to prevent the threads from pulling through the reed, the opposite end of the warp being held in a suitable clamp (not shown herein). The old warp is secured in the clamps *j* and *k* of the warp carriage *i*, and when the new warp is in place upon the warp-tying machine the carriage *i*, with the old warp clamped therein, is placed in position in the warp-tying machine. To relieve the warp carriage *i* of the weight of the harnesses and drop wires, means is provided upon the beam truck for supporting said harnesses and drop wires; said means comprising arms 47 supported in brackets 48. Each of the arms 47 is longitudinally movable in its bracket 48; the longitudinal movement of the arm being limited by a rivet 49 fixed in the bracket 48 and extending through an elongated opening 50 in said arm. To permit of a vertical adjustment of the arms 47 the brackets 48 are provided with stems 51 lying within socket members 52 and clamped in any desired position by means of a clamping screw 53. A pin 54 extending through the stem 51, its ends lying in a vertical groove 55 in said socket member, prevents the bracket from falling from said socket. The socket members 52 are slidably mounted upon the bar 10 of the truck frame, whereby the arms 47 may be adjusted laterally, as well as vertically and forward and back.

To facilitate the handling of the united

warps, I provide means comprising a pin bar 56 extending across the beam truck, said pin bar in this instance being of angle iron and having a series of cloth-holding pins 57 projecting upwardly from the outer edge of one of its webs. Midway between its ends the pin bar 56 has fixed to it a rearwardly extending handle 58. The pin bar 56 is supported at its ends by two hand levers 59, being rigidly secured to the curved lower ends of said levers. The levers 59 are pivotally mounted upon studs 60 extending from slide bars 61, said slide bars being slidably mounted within the channel irons 11. To exert a rearward pull upon the pin bar 56 I provide weights 62 connected to the studs 60 upon the slide bars 61 by means of cords 63, said cords running over sheaves 64 rotatably supported in brackets 65 upon the rear ends of the channel irons 11. The pin bar 56 is arranged to be held from movement by the weights 62, by means of a pawl 66 pivoted to each of the slide bars 61, one end of said pawl being adapted to engage inclined locking teeth 67 upon the channel iron 11 and the other end of said pawl lying in position to be engaged by a projection 68 upon the hand lever 59. When the hand lever is rocked rearwardly, the projection 68 engages the forward end of the pawl 66 and raises the rear end of said pawl out of engagement with the locking teeth 67. To hold the pawl 66 in such elevated position I provide a detent 69 pivotally mounted upon the slide bar 61 and held forward by a coiled spring 70 connected at its ends to said detent and said slide bar, said detent being adapted to engage a pin 71 upon the side of the pawl 66 and hold said pawl elevated as shown in Fig. 3. The forward movement of the detent 69 is limited by the engagement of a stop pin 72 on the slide bar with the tail 73 of said detent. The pawl 66 is disengaged from the detent 69 by rocking the hand lever 59 forward, the impingement of the lower end of said lever upon the forward end of the pawl 66 forcing the rear end of said pawl into the position shown in Fig. 4, against the force exerted by the spring 70.

The operation of mounting a new warp upon the truck and of securing said warp in the clamps of the warp-tying machine has already been explained. The next step in the operation of the apparatus herein described is to place the warp carriage *i*, with an old warp secured thereto, in operative position in the warp-tying machine. The harnesses *r* are suspended from the arms 47, and the warp-tying machine set in operation. When the tying-in operation is completed the ends of the united warps are held within the clamps *e* and *j*. The warps are then freed from said clamps by opening the clamps, and the insertion bar *l* is taken from

the clamp *j* by rotating the insertion-bar remover-arms *n* upwardly to grasp said insertion bar, whereupon said bar is lowered onto the fingers 45 at the rear sides of the arms 38. The strip of cloth attached to the old warp having been engaged with the pins 57 of the pin bar 56, the hand levers 59 are moved sharply rearward upon their pivots, the integral projections 68 of said levers depressing the forward ends of the pivoted pawls 66, and thus raising said pawls from engagement with the locking teeth 67. The pin bar 56 is thereby released to the action of the weights 62, which weights draw said bar rearwardly, its slide bars 61 being guided in the channel bars 11. The slack formed in the warps by the opening of the clamps *e* and *j* is thus taken up and the warp drawn into a horizontal plane between the insertion bar *g* and the pin bar 56, the transverse row of knots lying just in front of the harnesses *n*. The action of the weights 62 in thus drawing the warp into a plane jerks the threads into substantial parallelism and helps to separate any knots that may have become tangled. The truck is now swung rearwardly into its reserve position, and the reserve truck containing another new warp is moved up to the tying-in machine. The new warp thus presented is clamped in the clamps *e* and *f*, an old warp secured in the warp carriage *i*, said carriage put into its place in the warp-tying machine, and said machine again started in operation. When the machine has been started the operator is at liberty to draw the harness eyes and the reed over the knots in the warp just tied in (and which is held in the reserve beam truck.) When this has been done, the arms 38 supporting the insertion bar *g* are pushed rearwardly in the truck, the ends of the warp secured in a suitable clamp, said clamp with the reed and the harnesses fastened to the beam in the usual manner, and the beam removed from the truck. Another new warp may now be mounted upon the reserve truck in readiness to be tied in.

The foregoing detailed description has been given for the sake of clearness only, and is not intended as a definition or limitation of the invention, the embodiment selected for illustration being susceptible of considerable modification.

I claim as my invention.

55 1. A warp-handling apparatus having a beam-support thereon, means for supporting the free end of the warp, and means for inserting the warp in a warp clamp.

60 2. A warp-handling apparatus having a beam-support thereon, means above said beam-support for supporting the free end of the warp, and means between said beam-support and the means for supporting the free end of the warp, for inserting the warp
65 in a warp clamp.

3. A truck having a beam-support thereon, means for supporting the free end of the warp, an insertion bar, and means for supporting the insertion bar.

4. A beam truck having a warp-thread-inserting bar and means for supporting said bar.

5. A beam truck having a warp-thread-inserting bar and movable means for supporting said bar.

6. A beam truck having a support thereon for a warp beam, a warp-thread-inserting bar, and means above said beam-support for supporting said bar.

7. A beam truck having a support thereon for a warp beam, a warp-thread-inserting bar, and slidably mounted means above said beam-support for supporting said bar.

8. A device for placing threads in a clamp, comprising a pivotally mounted insertion
85 bar.

9. A beam truck provided with a pivotally mounted warp-thread-inserting bar.

10. A beam truck provided with a warp-thread-inserting bar, and means for slidably
90 and pivotally supporting said bar.

11. In a means for supporting an insertion bar, in combination, two racks; a shaft provided with pinions adapted to engage said racks; means for holding said pinions in proper relation to said racks; and means
95 connected with said shaft for supporting an insertion bar.

12. In a means for supporting an insertion bar, in combination, two racks; a shaft provided with pinions adapted to engage said racks; means for holding said pinions in proper relation to said racks; insertion-bar-supporting arms rotatably connected with said shaft; and means for locking said
100 arms in position.

13. The combination, with mechanism for uniting two sheets of threads, of means for taking up slack in the united sheets.

14. The combination with a machine for uniting two warps, of means for jerking the threads of the united warps into substantial parallelism.

15. The combination, with a machine for uniting two warps, of means adapted to be connected with one of said warps, and means for moving the first mentioned means to move the said warp with relation to the warp-uniting machine.

16. The combination, with a machine for uniting two warps, of means adapted to be connected with one of said warps, means tending to move the first mentioned means, and means for locking the first mentioned means against movement.

17. The combination, with a machine for uniting two warps, of a pin-bar adapted to be connected with one of said warps, and means for moving said pin-bar.

18. The combination, with a machine for
130

uniting two warps, of means adapted to be connected with the old warp, means for moving the first mentioned means to move the old warp with relation to the warp uniting machine, and means for supporting the harnesses on said old warp.

19. The combination, with a machine for uniting two warps, of a structure arranged to be moved to and away from said machine, said structure having means for supporting one of the warps and means adapted to be connected with the other warp.

20. The combination, with a machine for uniting two warps, of means for supporting one of the warps, means for engaging the other warp, means tending to move said last-mentioned means, and means for locking the second mentioned means from movement.

21. The combination, with a machine for uniting two warps, of a truck for supporting one of the warps, and a pin bar on said truck adapted to be connected with the other warp.

22. The combination, with a machine for uniting two warps, of means for supporting one of the warps, a pin bar adapted to be connected with the other warp, means for moving said pin bar, and means for locking said pin bar from movement.

23. The combination, with a machine for uniting two warps, of means for supporting one of the warps, means adapted to be connected with the other warp, means for moving the second mentioned means, and means located between the warp-supporting means and the second mentioned means adapted to support the sheet of warp threads.

24. The combination, with a machine for uniting two warps, of a truck having a beam-support thereon, means on said truck adapted to be connected with the other warp, means for moving the first mentioned means, and a bar located between the beam-support and the first mentioned means, for supporting the sheet of warp threads.

25. The combination, with a machine for uniting two warps, of two beam trucks for serving said machine, said trucks being pivoted one at each end of said machine, and arranged to be swung in front of said machine.

26. A warp-tying machine in combination with a truck having a warp-end supporting means and movable toward and away from said warp-tying machine.

27. A carriage adapted to serve a warp-uniting machine, said carriage having means for supporting a warp beam, and means for supporting a harness.

28. A carriage adapted to serve a warp-uniting machine, said carriage having means for supporting a warp beam, and means for holding the end of the warp extended free from the beam.

29. A carriage adapted to serve a warp-uniting machine, said carriage having means for supporting a warp beam, means for holding the end of the warp extended free from the beam, and means for inserting the warp in a clamp of the uniting machine.

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Witnesses:

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