H. D. COLMAN.

WARP HANDLING APPARATUS.

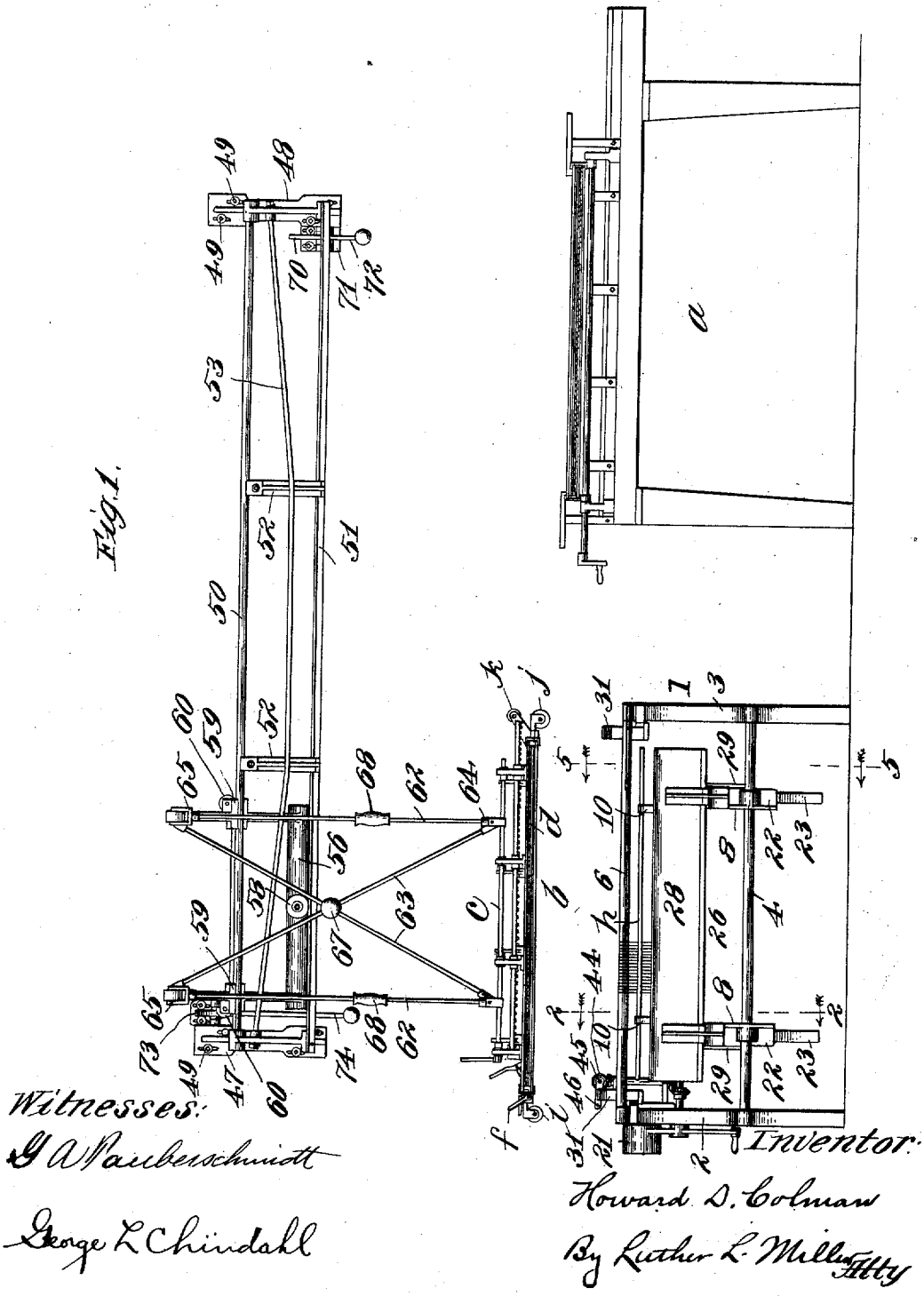
APPLICATION FILED MAR. 12, 1906.

962,400.

Patented June 21, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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3 SHEETS—SHEET 2.

Fig. 2.

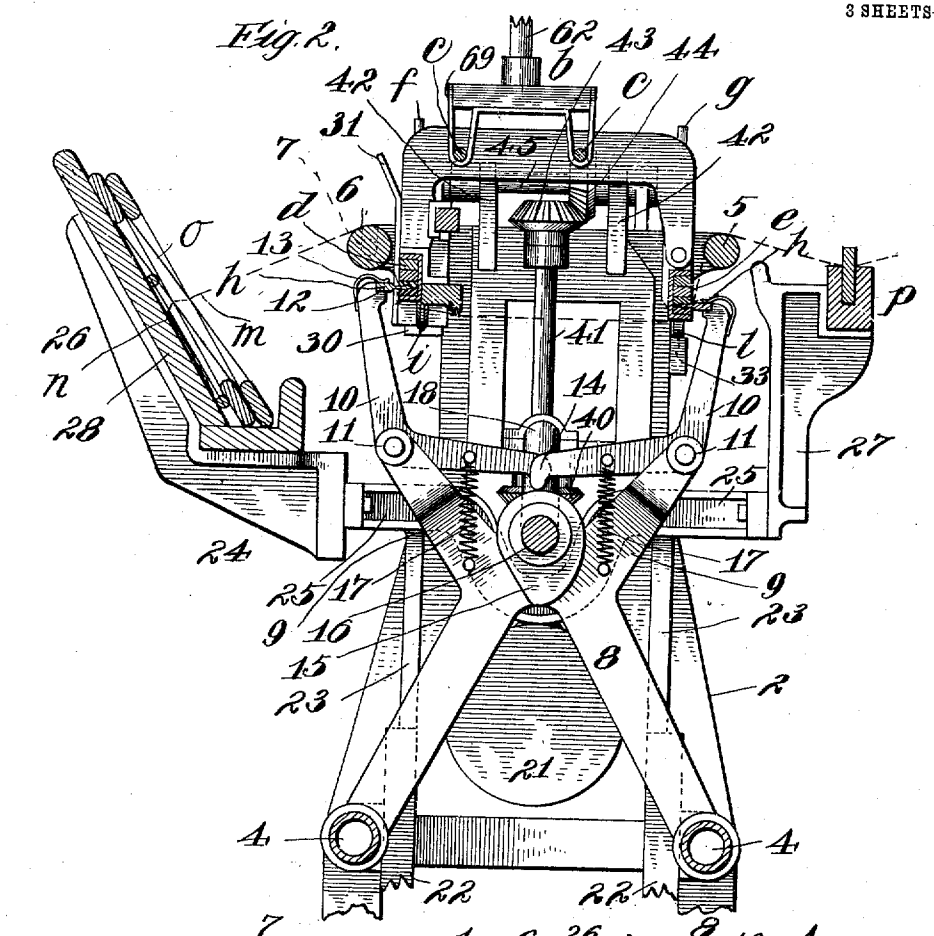
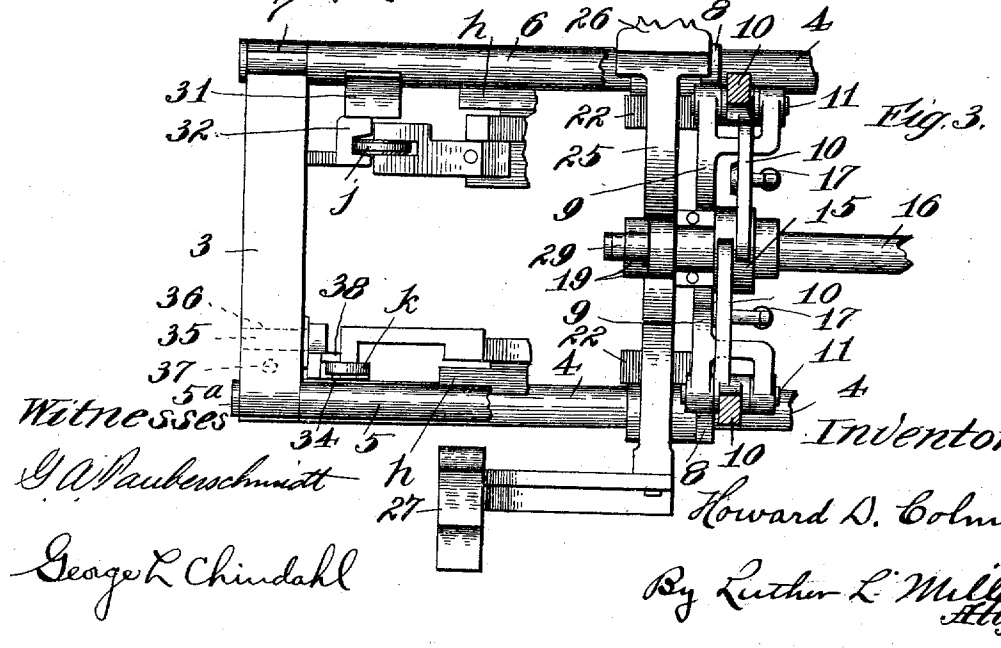


Fig. 3.



Witnesses

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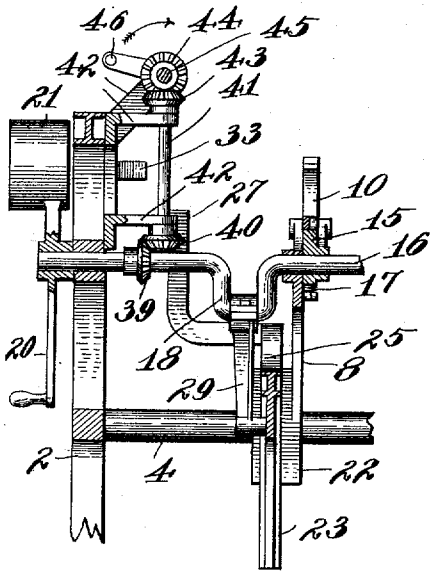
3 SHEETS—SHEET 3.

Fig. 4.



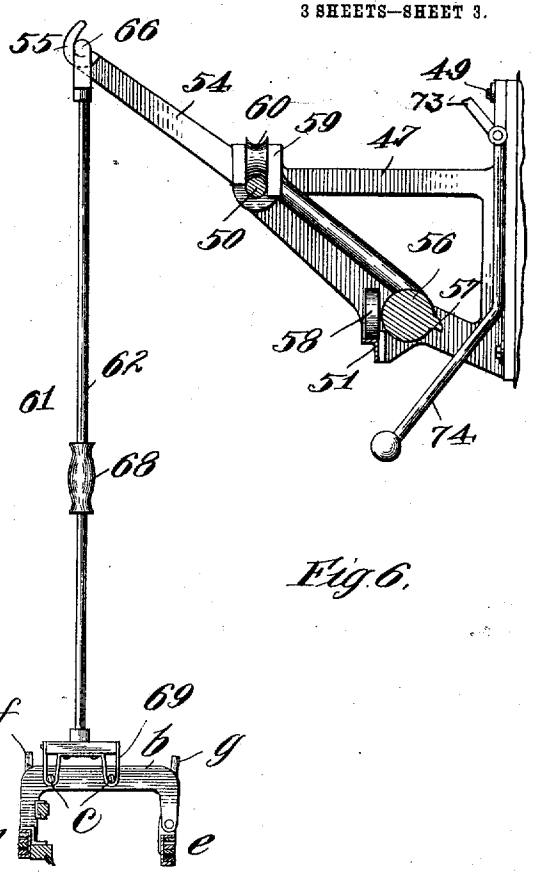


Fig. 6.

Fig. 8.

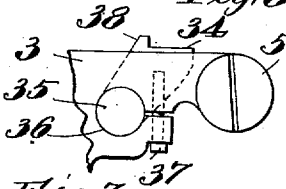


Fig. 7.

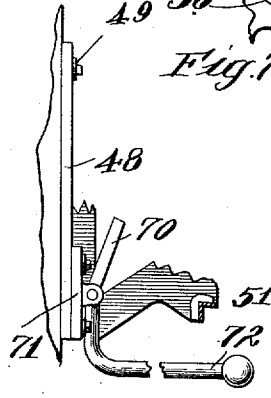
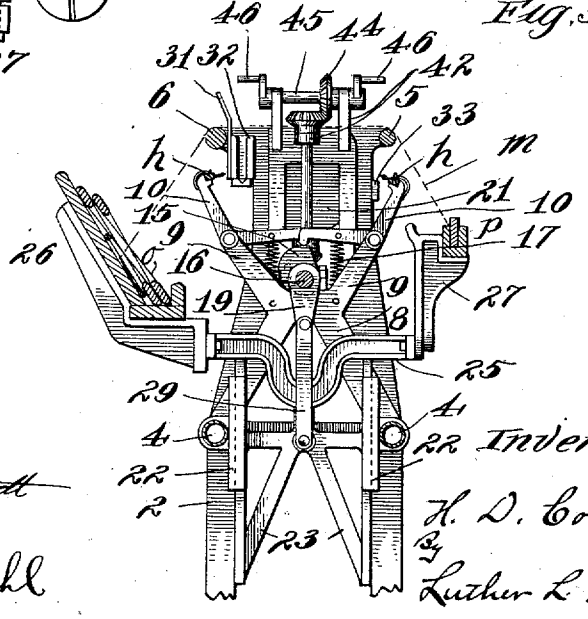


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

HOWARD D. COLMAN, OF ROCKFORD, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HOWARD D. COLMAN, LUTHER L. MILLER, AND HARRY A. SEVERSON, COPARTNERS, DOING BUSINESS AS BARBER-COLMAN COMPANY, OF ROCKFORD, ILLINOIS.

WARP-HANDLING APPARATUS.

962,400. Specification of Letters Patent. **Patented June 21, 1910.**

Application filed March 12, 1906. Serial No. 305,537.

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, and refers particularly to mechanism used in or preparatory to the tying-in or twisting-in operation. I have herein shown said apparatus in its application to the warp-tying machine described in an application for patent filed by me in the United States Patent Office as of May 19, 1904, and bearing Serial No. 208,779 therein. In the accompanying drawings, Figure 1 is a side elevation of the herein described warp-handling apparatus in operative position with relation to a warp-tying machine, said warp-tying machine being shown herein merely in outline. Fig. 2 is a sectional view of that part of the warp-handling apparatus hereinafter designated as the loader, taken on dotted line 2 2 of Fig. 1. Fig. 3 is a fragmental top plan view of one end of said loader. Fig. 4 is a fragmental, longitudinal, vertical, central sectional view through the opposite end of said loader. Fig. 5 is a sectional view on dotted line 5 5 of Fig. 1 showing the loader with warp and harness in position ready to receive the warp carriage from the warp-tying machine. Fig. 6 is an end view of the overhead carrier for the warp carriage, showing said warp carriage supported by said carrier. Fig. 7 is a fragmental view of the opposite end of the overhead carrier, showing the detent for locking the warp-suspending elements of said carriage in the lowered position. Fig. 8 is a detail view of one of the wheel rests.

As hereinbefore stated, the present embodiment of my said invention is adapted for use with the warp-tying machine shown and described in my said earlier application.

In the drawings, *a* refers to said warp-tying machine. It comprises the upper warp carriage *b* having carrying rods *c*, warp clamps *d* and *e*, clamping levers *f* and *g* for actuating said clamps, insertion bars *h* by means of which warp threads are pushed into said clamps, and rollers *i*, *j*, *k*, and *l* for supporting said carriage upon the bed of the machine, all as shown and described in said earlier application.

In the operation of said warp-tying machine the ends of two warps are tied together, and, in practice, a portion of the old warp, with the reed, harnesses and drop wires in position thereon, is removed from the loom to the warp-tying machine to be tied to the new warp. In removing the old warp from the loom a strip of cloth is cut off in front of the reed to prevent the ends of the old warp from slipping through the reed and the harnesses, and the opposite ends of the warp threads are temporarily held in a sheet and prevented from tangling by any suitable means, as a common plush-clamp. The old warp is indicated in the drawings by the letter *m*, the reed and harnesses by *n* and *o*, respectively, and the clamp for the thread-ends by *p*.

When being tied to the new warp, the old warp is supported in the upper warp carriage of the warp-tying machine, and for convenience in securing the old warp in the clamps *d* and *e* of the warp carriage, said carriage is made removable from the machine. The present invention comprises the loader for automatically securing the old warp in the clamps of the warp carriage *b*, and means for transferring said carriage from the warp-tying machine to the loader and returning it to said machine.

The loader comprises a supporting frame 1, consisting of end members 2 and 3, the longitudinal tubular bars 4, and a side rail 5, the latter being secured in place by screws 5ª. Upon the side of the frame opposite the side rail 5 a roller 6 is rotatably supported in suitable pockets 7 in the end members 2 and 3.

Two intermediate frames 8 are fixed upon the longitudinal tubular bars 4. At their upper ends each of said frames 8 is provided with two diverging integral arms 9 and at the upper ends of these arms, tappet levers 10 are pivotally mounted upon studs 11. The upper arms of the tappet levers 10 are provided with clamps 12 for the insertion bars *h*, the yielding or movable member of each clamp consisting of a curved spring 13 secured to the tappet lever. The horizontal arms of the tappet levers 10 extend inwardly and at their inner ends have bearing points

14, which bearing points are adapted to rest upon cams 15 fixed to a longitudinal crank shaft 16 suitably journaled in the intermediate frames 8 and in the end member 2. Coiled springs 17, one for each of the tappet levers 10, tend to hold the bearing points 14 of said tappet levers in contact with the cams 15.

The crank shaft 16 is provided with an integral crank 18 near one end of the loader frame and with a crank arm 19 at the extremity of the crank shaft and near the opposite end of the loader frame. One end of the crank shaft 16 extends outwardly from the end member 2 and has fixed thereon a crank handle 20, which crank handle is provided with a counterbalance 21 fixed with relation to said crank handle. Each of the intermediate frames 8 has two vertical inwardly-facing channel-guides 22 within which channel guides the guide-frame 23 of the warp carrier 24 is adapted to move. The warp carrier 24 comprises two horizontally extending arms 25 rigidly connected with said guide frame 23, which arms at their outer ends, at one side of the loader, carry a harness-and-reed carrier 26 and upon the other side of the loader a warp-clamp carrier 27. The harness-and-reed carrier 26 comprises a rack or trough 28 within which the harnesses and the reed may be laid, and the warp-clamp carrier 27 comprises merely two upwardly-extending arms having two or more "steps" at their upper ends for supporting the warp clamp *p*. The warp carrier 24 is adapted to be vertically reciprocated by means of the cranks 18 and 19, said cranks being connected with the warp carrier by means of connecting rods 29. Upon the side of the loader frame adjacent to the roller 6 and secured to the end members 2 and 3 are two wheel rests 30 for receiving the supporting wheels *i* and *j* upon one side of the warp carriage. Each of the rests 30 is provided upon its outer side with a guide flange 31 and at one end with a grooved guide 32 by means of which flange and guide the wheel is guided to the rest. Upon the opposite side of the loader frame are two wheel rests 33 and 34, the rest 33 being secured to the end member 2 and the rest 34 having a stem 35 clamped in an opening 36 in the end member 3 by means of the clamping screw 37 (Fig. 8.) The wheel-rest 34 is somewhat higher than the wheel-rest 33 in order to be in position to receive the correspondingly raised wheel *k* upon the warp carriage. The rest 34 is provided with an inner raised flange 38 rising above its bearing surface, the purpose of which flange is to hold the bearing wheel *k* outward and thus hold inward the pivoted thread-clamp *e* upon which said wheel is carried.

The crank shaft 16 near the end member 2 carries a bevel pinion 39 fixed upon said shaft, and a corresponding bevel pinion 40 fixed upon the lower end of a vertical shaft 41 meshes with the pinion 39. The vertical shaft 41 is rotatably supported in a bracket 42 fixed upon the inner face and at the upper end of the end member 2, and at its upper end has a bevel pinion 43, which in turn meshes with a similar bevel pinion 44 fixed upon a transverse shaft 45, which latter shaft has bearings in said bracket 42. The shaft 45 at its end carries two crank arms 46, which crank arms are rotated once for each rotation of the crank shaft 16, the purpose of said crank arms being to engage and move the clamping levers *f* and *g* of the warp carriage to close the clamps *d* and *e* of the warp carriage after the insertion bars *h* have been put in place.

As hereinbefore stated, the loader is placed at one end of the warp-tying machine *a*, and in operation the warp carriage of said machine is placed in the loader to receive its warp. In order to transfer the warp carriage from the warp-tying machine to the loader easily and quickly, I provide an overhead carrier adapted to run upon an elevated track secured to a wall or other suitable support (not shown) slightly rearward of the warp-tying machine and loader. The carrier track comprises two brackets 47 and 48 secured to the wall or proper supports by means of lag screws 49 and at their forward ends carrying a rail 50 in the form of a round rod, and below said rail and slightly rearward therefrom a second rail 51 in the form of an angle iron. The rails 50 and 51 are rigidly fixed at their ends to the brackets 47 and 48 and intermediate said brackets are connected by means of brace arms 52, which arms form supports over which a truss rod 53 extending between the brackets 47 and 48 bears.

The carrier proper comprises two arms 54 having at their forward ends upwardly extending hooks 55 and at their rearward ends being connected by means of a counter balance bar 56. Upon its rear side the counterbalance bar has a longitudinal rib 57 and upon its forward side said counterbalance bar carries a wheel 58 adapted to travel upon the rail 51. Between the hooks 55 and the counterbalance bar 56 the arms 54 are provided with housings 59 within which are two grooved bearing wheels 60, one upon each of said arms. These grooved bearing wheels are adapted to rest upon the rail 50. A suspension frame 61 connects the warp carriage with the arms 54, said suspension frame in this instance comprising side rods 62 and diagonal brace rods 63, said side rods and brace rods being connected at their lower ends by foot brackets 64 and at their upper ends by stirrup brackets 65, said foot brackets and stirrup brack-

ets being of cast metal and secured to the ends of said rods by being cast thereon. The stirrup brackets 65 have pins 66 extending through them with which pins the hooks 55 of the arms 54 are adapted to engage. The diagonal brace rods 63 are united at their points of crossing by means of a piece of metal 67 cast thereon, and said side rods are provided with hand grips 68 within the reach of the operator of the machine. The foot brackets 64 are connected with the carrying rods *c* of the warp carriage *b* by means of loops 69, in this instance, of sheet metal extending downward from and secured to said foot brackets, said loops inclosing the carrying rods *c*, but being sufficiently large to permit a considerable amount of vertical movement of the frame with reference to the warp carriage.

The carrier track is of sufficient length to permit the carrier to transfer the warp carriage from the warp tying machine to the loader. When the carrier is over the warp-tying machine and the carriage has been lowered upon its supports in said machine the weight of the carrier is removed from the warp carriage *b* by supporting the counterbalance bar 56 upon a detent 70, the holding end of which is adapted to extend underneath the rib 57 of said counterbalance bar. The detent 70 is pivotally supported upon a bracket 71 adjustably secured upon the wall, and is provided with an operating arm 72 by means of which it may be manually operated, said arm being weighted in order automatically to place the detent 70 in operative position. At the opposite end of the carrier track a detent 73, similarly supported and provided with an operating arm 74, is adapted to engage the rib 57 when the warp-carriage *b* is in the loader.

In operation a warp *m* is stretched over the upper rod 5 and the roller 6 of the loader frame, the clamp *p* holding the loose end of said warp being laid upon the arms 27, and the harness and the reed being placed in the rack 28. The warp threads between the harnesses and the clamp *p* are thus stretched across the top of the loader as represented in Fig. 5. Assuming that a warp has been tied in at the warp-tying machine *a* and the clamps *d* and *e* of the warp carriage *b* opened for the removal of the tied-in warp, said carriage *b* is transferred, by means of the overhead carrier, from the warp-tying machine *a* to the loader to receive another old warp. The counterbalance bar 56 of the carrier is slightly heavier than the warp carriage so that the hand of the operator is necessary to hold said carriage down. In transferring the carriage from the warp-tying machine to the loader the operator disengages the detent 70 from the counterbalance bar 56 by means of the operating arm 72. The counterbalance bar when thus released raises the warp carriage *b* until the wheel 58 rests upon the rail 51. In this position the carrier, with the warp carriage suspended therefrom, is moved to its position over the loader as shown in Fig. 1. An old warp *m* having been stretched over the loader, as hereinbefore described, the warp carriage is depressed by the operator until its supporting wheels rest on the supports 30, 30, 33, 34 of the loader frame, the carriage moving downward before it the sheet of threads lying across the top of the loader. The slack to permit of thus depressing the warp comes from both sides of the loader, the clamp *p* and the harnesses and the reed being drawn inward toward the carriage as the latter is lowered. When the carriage has been lowered onto its supports the overhead carrier is locked in position by the engagement of the rib 57 with the detent 73. The crank 20 is then given a half turn, rotating the crank shaft 16 and moving the cams 15 into a position immediately to permit the tappet levers 10 to be rocked inward upon their pivotal bearings by the action of the springs 17.

The pivotal movement of the levers 10 places the insertion bars *h* in the clamps at the upper ends of said tappet levers in contact with the sheet of warp threads upon opposite sides of the warp carriage and forces the threads and the insertion bars *h* into the clamps *d* and *e*. The rotation of the shaft 16 also rotates the cranks 18 and 19 and raises the warp carrier 24, providing slack thread for the clamping operation. The insertion bars are fully inserted into the clamps during the half turn of the crank handle just mentioned, and after a very slight pause the operator continues the rotation of the crank handle 20, giving it another half turn, thus completing the full rotation of the crank shaft 16, bringing the cranks 46 into engagement with the locking levers *f* and *g* of the clamps upon the warp carriage and pivotally moving said levers downward to close said clamps. This second half-rotation of the crank handle also lowers the warp carrier 24 into its original position, ready for the next operation of the loader, and throws the tappet levers 10 outward into the position shown in Fig. 5. The clamps *d* and *e* having been closed by the cranks 46, as described, the outward movement of the tappet levers 10 leaves the insertion bars within the clamps. The old warp being thus clamped in the warp carriage, said carriage is ready to be returned to the warp-tying machine. The detent 73 having been operated to release the overhead carrier, the carriage *b* with the warp *m*, harnesses, reed and tongue clamp attached thereto is lifted out of the loader by

the weight of the counter-balance bar 56. The carrier is then moved to the opposite end of its track, bringing the warp carriage *b* in position over the warp tying machine. When in this position the carriage *b* is lowered onto the warp-tying machine by pulling down on the suspension frame 61, and the weight 56 of the overhead carrier held elevated by engaging the detent 70 with said weight. Instead of laying the old warp across the side rail 5 and the roller 6, said side rail and roller may be removed from the machine and the warp laid over the insertion bars *h*. The latter method obviously permits of the use of a shorter warp. The operation of the machine is the same whether or not the members 5 and 6 are used. The roller 6 is removed from the machine by lifting it out of its bearing pockets 7 and the side rail 5 by withdrawing the screws 5^a.

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:

1. In a warp handling mechanism, in combination, means for placing warp threads across a thread-clamp; and means for moving said threads into the clamp.

2. In a warp handling mechanism, in combination, means for supporting a thread clamp; and means for placing an insertion bar in said clamp.

3. In a warp handling mechanism, in combination, means for supporting a thread clamp; an insertion bar holder; and means for moving said holder toward and away from said thread clamp.

4. In a warp handling mechanism, in combination, means for supporting a thread clamp; means for supporting an insertion bar, comprising a pivoted lever; and means for pivotally moving said lever.

5. In a warp handling mechanism, in combination, means for supporting a thread clamp; means for supporting an insertion bar, comprising a pivoted lever; a spring for moving said lever in one direction; and a cam for moving said lever in the opposite direction.

6. In a warp handling mechanism, in combination, means for supporting two thread clamps; means for supporting two insertion bars, comprising two tappet levers; a rotatable shaft; and a cam on said shaft for moving said levers.

7. In a warp handling mechanism, in combination, means for supporting two thread clamps; means for supporting two insertion bars, comprising two tappet levers; a rotatable shaft; a cam on said shaft for moving said levers in one direction; and a spring for moving each of said levers in the opposite direction.

8. In a warp handling mechanism, in combination, means for supporting a thread-clamp; and means frictionally engaging an insertion bar for placing said bar in the thread-clamp.

9. In a warp handling mechanism, in combination, means for supporting a thread clamp; a member having a spring clamp for supporting an insertion bar; and means for moving said member toward and away from said thread clamp.

10. In a warp handling mechanism, in combination, means for supporting a thread clamp; means for placing an insertion bar in said thread clamp; and a movable support for a warp.

11. In a warp handling mechanism, in combination, means for supporting a thread clamp; means for placing an insertion bar in said clamp; a movable support for a warp; and means for simultaneously operating said insertion-bar placing means and moving said warp support.

12. In a warp handling mechanism, in combination, a thread-clamp support; a warp carrier; an insertion-bar placer; a shaft bearing a cam for operating said insertion-bar placer; and a crank on said shaft for moving said warp carrier.

13. In a warp handling mechanism, in combination, means for supporting a warp carriage; means for placing insertion bars in the clamps of said carriage; and a warp carrier movable toward and away from the warp-carriage supporting-means.

14. In a warp-handling mechanism, in combination, means for supporting a warp carriage provided with two thread clamps; mechanism for placing a warp in said clamps; and mechanism for operating said clamps.

15. A warp-handling mechanism comprising two substantially parallel members to support a warp and to receive between them a warp carriage.

16. A warp-handling mechanism comprising a fixed rail and a roller extending substantially parallel, to support a warp and to receive between them a warp carriage.

17. A warp carriage-loading mechanism comprising supports for a warp carriage and means for guiding the carriage to said supports.

18. A warp handling mechanism comprising supports for the wheels of a warp carriage and guide members for guiding the wheels to said supports.

19. A warp-carriage-loading mechanism having a harness-and-warp-support comprising a holder for the harness and a support for a clamp for engaging the warp.

20. In a warp handling mechanism, in combination, a pair of substantially parallel

rails; a harness support at one side of said pair of rails; and a thread clamp support at the opposite side of said rails.

21. In a warp handling mechanism, in combination, a pair of substantially parallel rails; a harness support at one side of said pair of rails; and a warp clamp support at the opposite side of said rails, said harness support and thread-clamp support being movable together toward and away from said pair of rails.

22. In a clamp-handling mechanism, in combination, means for operating a thread-clamp and means for receiving a thread-clamp to be operated.

23. The combination, with a thread clamp having an operating lever for opening and closing said clamp, of a rotatable member adapted to engage and move said lever to close said clamp.

24. The combination, with a warp carriage having a thread clamp at each side thereof, and a lever for each of said clamps for operating it, of two cranks arranged to rotate together and to engage and move said levers.

25. In a warp handling mechanism, in combination, a track; a tiltable carriage on said track; and a warp carriage supported by said tiltable carriage.

26. In a warp handling mechanism, in combination, a way comprising two rails, and a carriage adapted to bear upon said rails and to be tilted free of one of said rails.

27. In a warp handling mechanism, in combination, a way comprising two rails supported in different horizontal planes; and a carriage adapted normally to rest upon both of said rails, but adapted to be tilted free of the lower rail.

28. In a warp handling mechanism, in combination, a rail; and a carrier tiltable upon and traversable along said rail, said carrier being provided at one side of said rail with carrying means and at the other side with a counterbalance weight.

29. In a warp handling mechanism, in combination, a way comprising two rails supported in different horizontal planes; a carrier adapted to run upon both of said rails; carrying means on said carrier at one side of the higher rail; and a counterbalance weight on the other side of said rail.

30. In a warp handling mechanism, in combination, a rail having a convex bearing surface; a carriage having a grooved supporting wheel adapted to run on said rail, said carriage being tiltable on said rail; and a warp carriage supported by the first mentioned carriage.

31. In a warp handling mechanism, in combination, a track; a tiltable carriage on said track; and means at one end of said track for locking said carriage in tilted position.

32. In a warp handling mechanism, in combination, two operating mechanisms; a member common to both of said mechanisms; a carrier to which said member is attached; and a track for said carrier extending from one of said operating mechanisms to the other.

33. Portable means for holding warp threads in a sheet; supporting means for said holding means; and means carried by the supporting means for attaching the sheet of threads to the holding means.

34. Portable thread-holding means; a support for said thread-holding means; and means carried by the support and having movement in virtue of which the threads may be attached to the thread-holding means.

35. A thread-holding means having thread-engaging devices; and means independent of the thread holding means for causing said devices and threads to be attached one to another.

36. The combination of a warp-carriage-loading mechanism, means for suspending a warp carriage to move vertically toward and away from said mechanism, supports for the carriage when in its lower position, and means for guiding the carriage to said supports.

37. A warp-carriage loader comprising means for supporting a warp carriage, means for supporting a sheet of warp threads, and means for moving said sheet of threads into engagement with the carriage.

38. A warp-carriage loader comprising means for supporting a warp carriage, means at each side of the carriage-supporting means for supporting an insertion-bar, and means for operating said insertion-bar supports to place them in the carriage.

39. A warp-carriage loader comprising means for supporting a warp carriage, means at each side of the carriage-supporting means for supporting one end of a sheet of warp threads, and means for moving the sheet of warp threads into engagement with the carriage.

40. A bar for placing threads in a clamp, and means for moving said bar into the clamp in combination with means for operating the clamp.

HOWARD D. COLMAN.

Witnesses:
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GEORGE L. CHINDAHL.

Correction in Letters Patent No. 962,400.

It is hereby certified that in Letters Patent No. 962,400, granted June 21, 1910, upon the application of Howard D. Colman, of Rockford, Illinois, for an improvement in "Warp-Handling Apparatus," an error appears in the grant requiring correction as follows: In the granting clause, line 3, strike out the words "their successors or assigns" and insert the words *copartners, doing business as Barber-Colman Company, of Rockford, Illinois, their heirs or assigns;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of March, A. D., 1913.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.