No. 626,478. Patented June 6, 1899.

# F. L. ATHERTON.

## WARPING MACHINE.

(Application filed Aug. 17, 1898.)

(No Model.) 2 Sheets—Sheet 1.

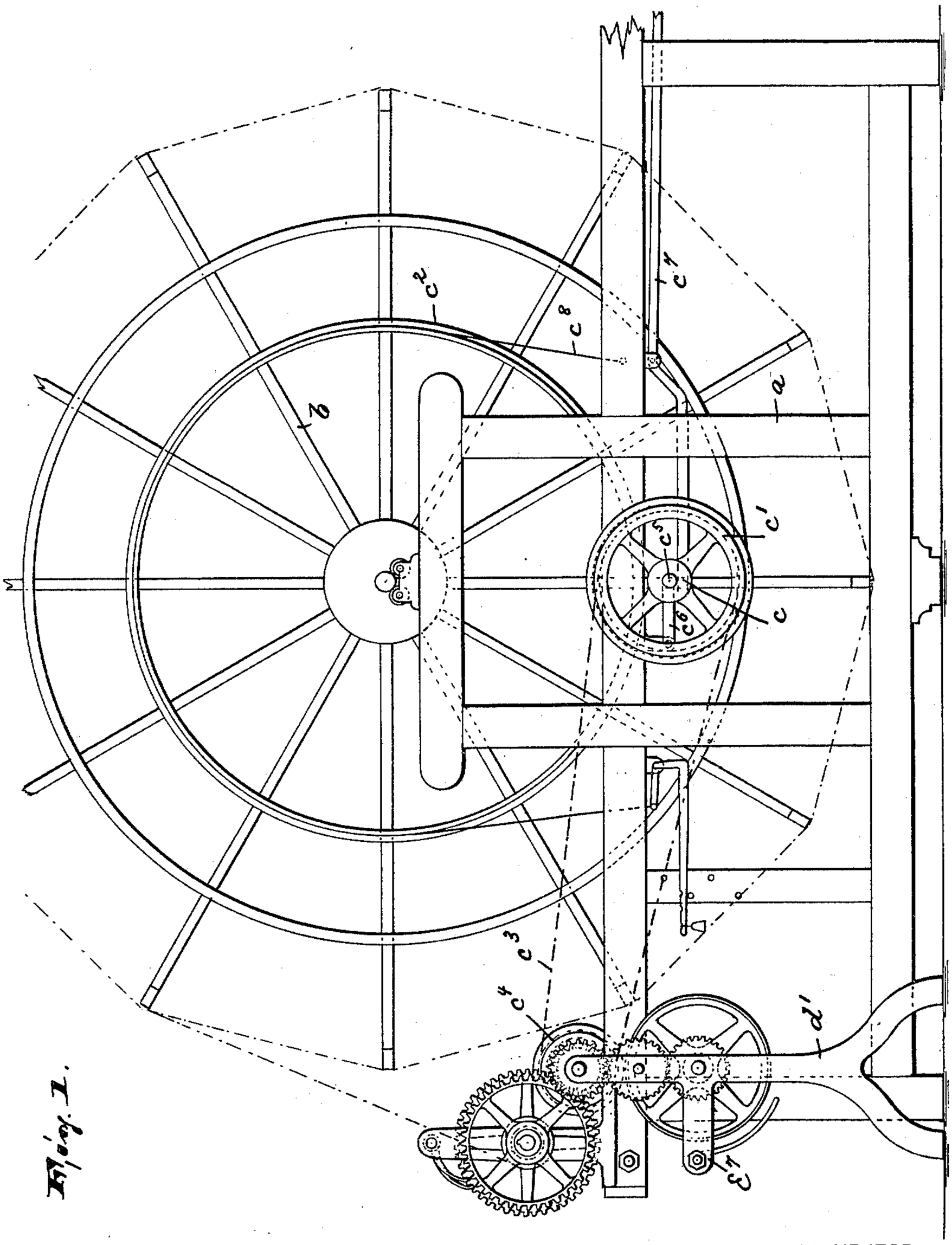


Fig. 1.

WITNESSES:

Wm. D. Bell

Jas. B. Newton

INVENTOR:

Frederick L. Atherton

BY

Partridge & Steward

ATTORNEYS

No. 626,478. Patented June 6, 1899.

# F. L. ATHERTON.

## WARPING MACHINE.

(Application filed Aug. 17, 1898.)

(No Model.) 2 Sheets—Sheet 2.

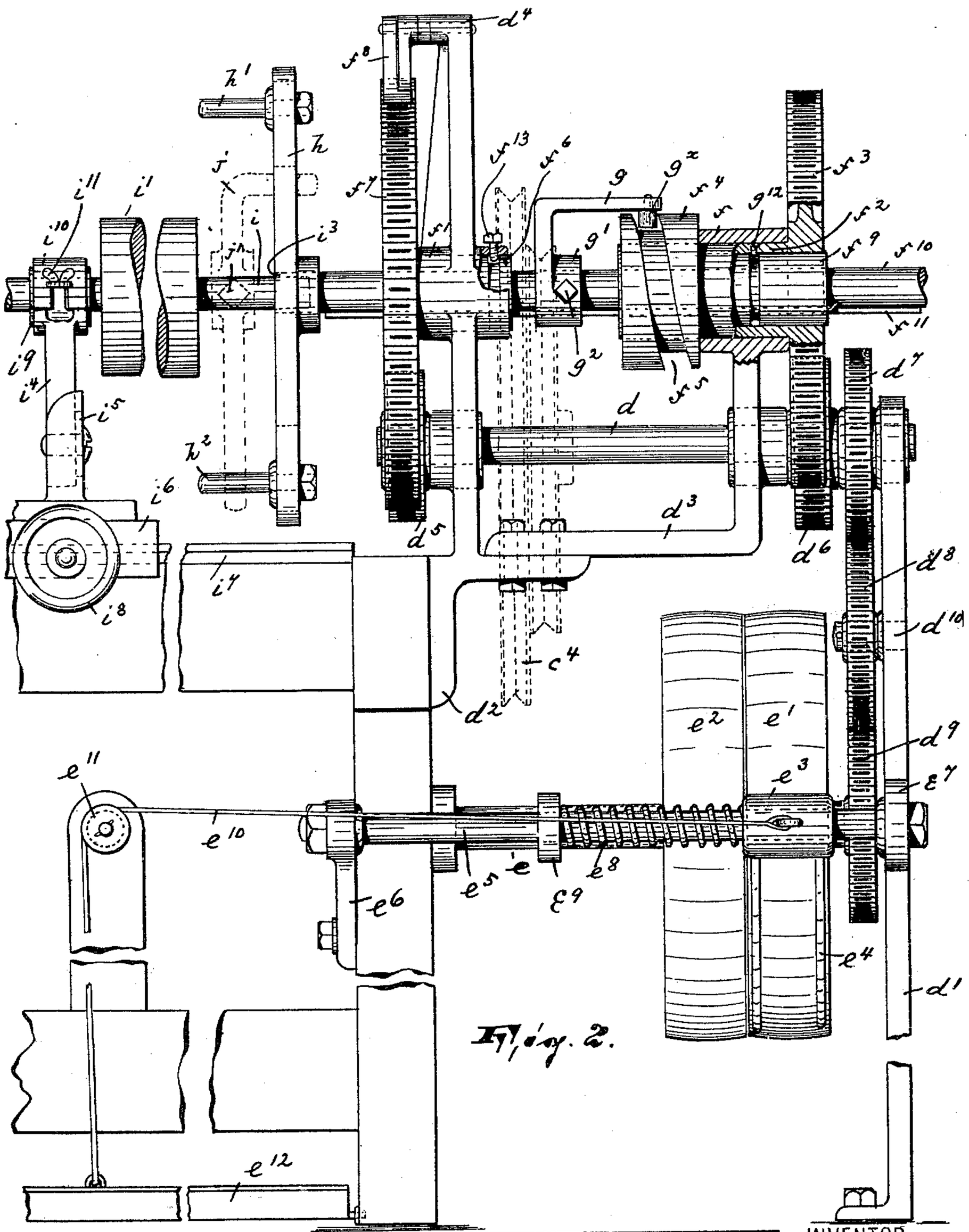

Fig. 2.

WITNESSES:

Wm. D. Bell.

Jas. B. Newton

INVENTOR:

Frederick L. Atherton

BY

Partner & Steward

ATTORNEYS

# UNITED STATES PATENT OFFICE.

FREDERICK L. ATHERTON, OF PATERSON, NEW JERSEY.

## WARPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 626,478, dated June 6, 1899.

Application filed August 17, 1898. Serial No. 688,788. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK L. ATHERTON, a citizen of the United States, residing in Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Warping-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 letters of reference marked thereon, which form a part of this specification.

My invention relates to beaming mechanism for warping-machines, and it has reference particularly to means for transferring the warp from the reel of the warping-machine to its beam in such manner as to secure a winding of the warp on the beam which shall be more even, uniform, and compact than has been heretofore secured.

My invention consists in the improved beam, its operating mechanism, the combination and arrangement of said beam and its operating means with a warping-machine, and the combination and arrangement of the various parts substantially as will be hereinafter set forth.

In the accompanying drawings, in which like letters of reference indicate corresponding parts, Figure 1 is a view in side elevation of a warping-machine provided with my improved beaming mechanism; and Fig. 2 is an enlarged view, in front elevation and in detail, of the improved beaming mechanism.

In the accompanying drawings, $a$ represents the frame of the machine, carrying the reel $b$, journaled upon the same and operated in the usual manner by a roller $c$ and a pulley $c'$, rigidly connected together on the same shaft, the former having its periphery in frictional contact with a ring or flange $c^2$, carried by the reel, and the latter being connected by a belt $c^3$, passing over one of a pair of pulleys $c^4$, mounted on a shaft $d$, hereinafter to be more particularly referred to. The roller $c$ and the pulley $c'$ are journaled upon a shaft $c^5$, which is carried at its ends in a pair of arms $c^6$, suitably pivoted to the frame $a$, and said shaft is adapted to be moved up or down to bring the roller $c$ in frictional contact with the ring or flange $c^2$ by means of an operating-lever $c^7$, fulcrumed to the frame between its ends and having one end projecting beneath and sustaining the shaft. A strap or band $c^8$ passes over the ring or flange $c^2$, being secured to the frame at one end and controlled by a weighted lever at its other end in the well-known and usual manner.

Mounted alongside of the main frame $a$ and near one end is a standard $d'$, and carried on the frame near said standard is a bracket $d^2$, consisting of an angular arm $d^3$, projecting laterally therefrom, and a vertical arm $d^4$. The arms of the bracket and the upper end of the standard provide bearings for the shaft $d$, carrying the pinions $d^5$ and $d^6$ of different sizes.

Motion is imparted to the shaft $d$ through a system of gearing consisting of pinions $d^7$, $d^8$, and $d^9$. The pinion $d^7$ is carried near the outer end of the shaft $d$, the pinion $d^9$ is carried on a shaft $e$, connecting the standard and the frame, and the pinion $d^8$ is situated between pinions $d^7$ and $d^9$ and is revolubly mounted on a stub-shaft $d^{10}$, projecting inwardly from the standard.

On the shaft $e$ are mounted a loose and fast pulley $e'$ and $e^2$, which carry the belt for operating the machine. The belt is adapted to be shifted from the one to the other of said pulleys by means of a belt-shifter consisting of a sleeve $e^3$, carrying arms $e^4$ substantially concentric with the pulleys and adapted to be arranged one on each side of the belt, said sleeve being reciprocally mounted on a rod $e^5$, supported in arms $e^6$ and $e^7$, the former being carried by the frame and the latter projecting from the standard. Said belt-shifter is held in normal position opposite either the fast or the loose pulley, as may be desired, by a spiral spring $e^8$, disposed between the sleeve $e^3$ and a collar $e^9$, provided on the rod $e^5$, and said belt-shifter is adapted to be operated by a rope or cord $e^{10}$, passing over a pulley $e^{11}$, journaled on the frame and connected at one end to the sleeve $e^3$ and at the other end to a treadle $e^{12}$.

The arms $d^3$ and $d^4$ are provided, the former at its upper end and the latter midway its ends, with integral sleeves $f$ and $f'$, respectively. The sleeve $f$ forms the bearings for a bushing $f^2$, which carries at its outer end a gear $f^3$, integrally or, at least, rigidly connect-

ed thereto, and at its inner end a cam $f^4$, having a cam-groove $f^5$ and also rigidly connected to said bushing. The gear $f^3$ meshes with the pinion $d^6$, carried on the shaft $d$. The sleeve $f'$ forms bearings for a bushing $f^6$, carrying a gear $f^7$, controlled by a pair of pawls $f^8$, pivoted to the vertical arm $d^4$. In the bushing $f^2$ is contained a collar $f^9$. Both the bushing $f^6$ and the collar $f^9$ are penetrated by a shaft $f^{10}$, having a longitudinal key $f^{11}$ engaging a corresponding groove in the bushing and the collar, and said collar and the bushing are prevented from lateral movement by set-screws $g^{12}$ and $f^{13}$, the former being set in the bushing $f^2$ before the parts are put together and the latter being set in the sleeve $f'$. From the foregoing it will be seen that the shaft is susceptible of a longitudinal movement within the collar $f^9$ and the bushing $f^6$.

The means for reciprocating the shaft consist of an angular arm $g$, integrally formed with an annulus $g'$, penetrated by and adjustably secured to the shaft $f^{10}$ by a set-screw $g^2$ and carrying at its free end a roller engaging the cam-groove $f^5$. The shaft $f^{10}$ carries at its inner end a clutch consisting of a cross-bar $h$, secured at its center to the end of said shaft and carrying at its ends pins or projections $h'$ and $h^2$. Said clutch is adapted to support one end of and to operate the spindle $i$ of the beam $i'$. The end of the spindle fits in a centrally-situated socket $i^3$ in the cross-bar $h$, and its other end is supported upon a standard consisting of members $i^4$ and $i^5$, adjustably connected for vertical adjustment by a slot and set-screw arrangement. The standard is supported on a carriage $i^6$, reciprocally mounted on a substantially T-shaped rail $i^7$, secured to the frame beneath the spindle, the carriage being therefore movable in the direction of the length of the spindle. The carriage is secured at any desired point on said rail by means of a hand-screw $i^8$, which is adapted to bind against the rail in an obvious manner. The bushing $i^9$, forming bearings for the spindle, is removably secured between the top of the standard and a clamp $i^{10}$, held in place upon said standard by thumb-screws $i^{11}$.

The beam-spindle takes its motion from the clutch through a cross-arm $j$, adjustably mounted upon the spindle by means of a set-screw $j'$, one of its ends being in engagement with one of the projections $h'$ $h^2$ and the other of its ends being arranged at right angles and projecting into the path of the cross-bar $h$. (The construction last described is shown in dotted lines in the drawings, Fig. 2.)

The belt for driving the machine having been put in motion it is shifted from the loose to the fast pulley by the belt-shifter and the shaft $d$ is rotated by means of the system of gearing which connects said shaft with the fast pulley. Said shaft communicates its motion to the beam through the pinion $d^5$, the gear $f^7$, the shaft $f^{10}$, and the beam-spindle. The cam $f^4$ being held against lateral movement and being in engagement with the shaft $f^{10}$ through the angular arm $g$ and its roller $g^\times$ engaging the groove in said cam imparts in an obvious manner a longitudinal reciprocatory movement to said shaft, and consequently to the beam-carrying spindle. At the same time the cam is caused to revolve independently of the shaft $d^{10}$ by means of the pinion $d^6$ and the gear $f^3$. Since said cam revolves independently of the shaft $f^{10}$, and according as the gears $f^3$ and $f^7$ and pinions $d^5$ and $d^6$ are relatively larger or smaller, the number of reciprocations imparted to said shaft in a given period is susceptible of being controlled.

The reciprocations imparted to the shaft produce a winding of the warp on the beam which is similar to that of a ball of cord—that is to say, the threads of the warp are caused to wind on the beam, crossing each other in lines which are more or less oblique to the axis of the beam. The angle at which said lines cross each other depends upon the amount of reciprocatory movement given to the shaft, and this in turn obviously depends upon the pitch of the cam-groove $f^5$.

The distance which the beam is from the point where the threads leave the reel also has much to do with the degree of the angles of the crossing threads, and if this is great and it is found desirable a comb or other guiding means may be provided and so mounted in proximity to the beam as to produce the desired result.

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

1. In a beaming mechanism, the combination, with a support, of a beam-carrying spindle, a shaft journaled in said support and connected to and constituting a longitudinal extension of said spindle, driving means, and a gear carried by the shaft, adapted to rotate the same and the spindle and operatively connected to the driving means, and a cam movement, situated in the axial line of said shaft and the spindle for reciprocating the same simultaneously with the rotation thereof, and operatively connecting said shaft with said driving means, substantially as described.

2. In a beaming mechanism, the combination, with a support, of a beam-carrying spindle, a pair of operatively-connected shafts journaled in said support one of which is connected to and constitutes a longitudinal projection of said spindle, means for rotating the other of said shafts, and a cam movement operatively connecting said shafts and situated in the axial line of, and adapted to reciprocate, the first-named shaft and the beam-carrying spindle simultaneously with the rotation thereof, substantially as described.

3. In a beaming mechanism, the combination with a support, of a beam-carrying spindle, a pair of operatively-connected shafts journaled in said support one of which is connected to and constitutes a longitudinal pro-

jection of said spindle, means for rotating the other of said shafts, a cam having a surrounding cam-groove, carried by said support and penetrated by said first-named shaft, and an arm carried by said shaft and provided with a projection engaging said groove, substantially as described.

4. In a beaming mechanism, the combination with a support, of a beam-carrying spindle, a pair of operatively-connected shafts journaled in said support one of which is connected to and constitutes a longitudinal projection of said spindle, means for rotating the other of said shafts, a cam having a surrounding cam-groove and revolubly mounted on said first-named shaft, means for rotating said cam operatively connected with the other of said shafts and an arm carried by the first-named shaft and having a projection engaging said groove, substantially as described.

5. In a beaming mechanism, the combination with a support, of a beam-carrying spindle, a collar and sleeve journaled in said support in alinement with each other, a pair of revoluble shafts one of which penetrates, and has a key-and-groove connection with said sleeve and collar, a gear carried by said sleeve and operatively connecting the shafts, a sleeve $f^2$ revolubly mounted in said collar, a gear $f^3$ and a cam having a surrounding cam-groove, secured to said sleeve $f^2$, said gear $f^3$ being operatively connected to the other of said shafts, and an arm carried on said first-named shaft and provided with a projection engaging said cam-groove, substantially as described.

6. In a warping-machine, the combination with the frame and the reel journaled therein, a shaft $d$ and a beam-carrying spindle also journaled in said frame, a revoluble shaft $f^{10}$ constituting a longitudinal projection of and connected to said spindle and arranged parallel to said shaft $d$, means for operatively connecting said shaft $f^{10}$ and the reel with the shaft $d$, driving means for said shaft $d$, a revoluble cam having bearings in said frame and penetrated by said shaft $f^{10}$, means operatively connecting said cam with the shaft $d$ for rotating the former independently of the shaft $f^{10}$ and an arm mounted on said last-named shaft and provided with a projection engaging said cam, substantially as described.

7. In a beaming mechanism, the combination with a frame and a beam-carrying spindle, of a support for the spindle mounted on said frame and consisting of a rail arranged on said frame parallel to and beneath said spindle, a carriage adapted to reciprocate on said rail and provided with a binding-screw engaging the latter, a standard comprising vertically-adjustable members and carried by said carriage, a bushing carried by said standard and forming bearings for said spindle and a clamp for said bushing, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 5th day of August, 1898.

FREDERICK L. ATHERTON.

Witnesses:
ALFRED GARTNER,
JOHN W. STEWARD.