No. 648,692. Patented May 1, 1900.

W. C. KEYWORTH & T. A. ROBINSON.

WARPING AND BEAMING MACHINE.

(Application filed Sept. 26, 1899.)

(No Model.) 2 Sheets—Sheet 1.

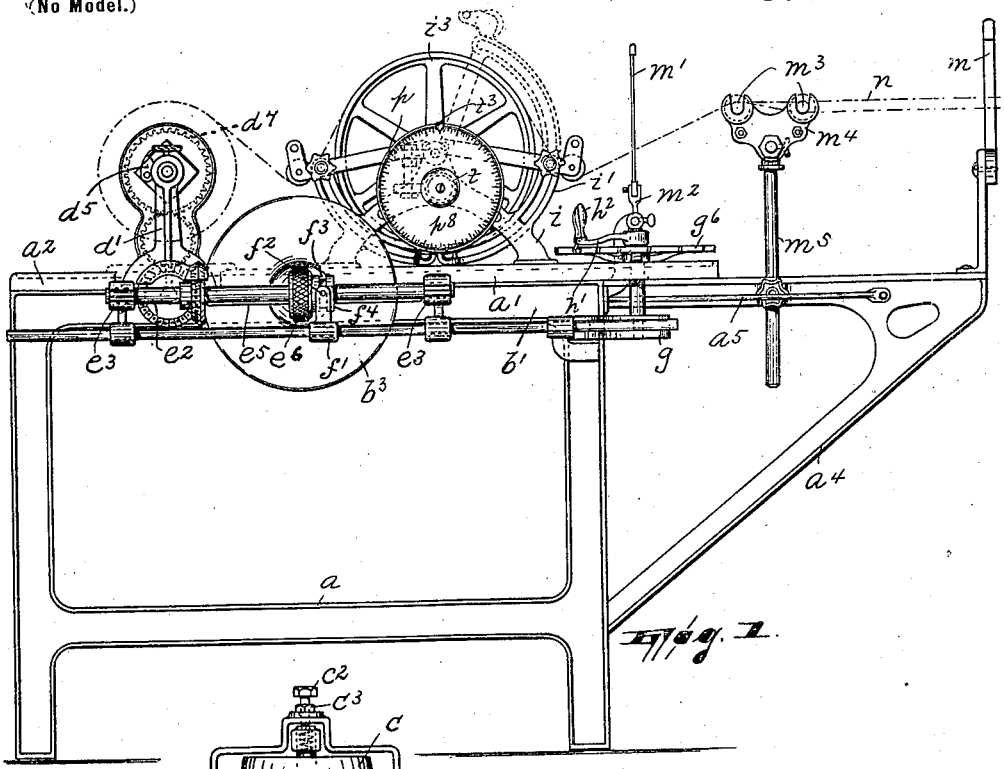


Fig. 1.

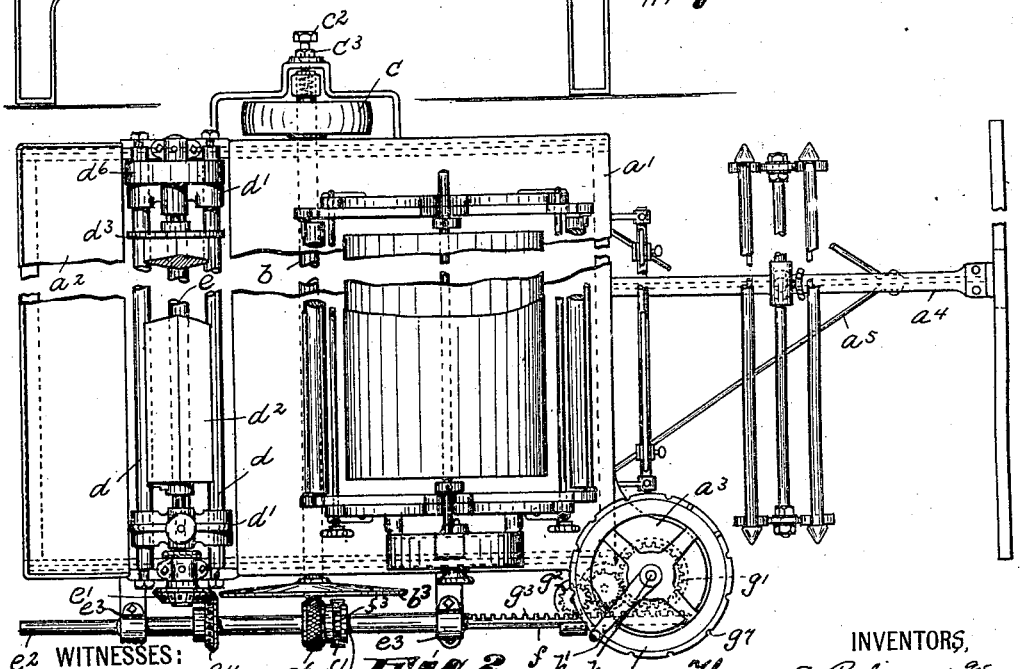


Fig. 2.

WITNESSES:

Wm. D. Bell.

Robert F. Pollitt

INVENTORS,

Thomas A. Robinson, and

William C. Keyworth,

BY

Gartner & Stewart,

ATTORNEYS.

No. 648,692. Patented May 1, 1900.

W. C. KEYWORTH & T. A. ROBINSON.

WARPING AND BEAMING MACHINE.

(Application filed Sept. 26, 1899.)

(No Model.) 2 Sheets—Sheet 2.

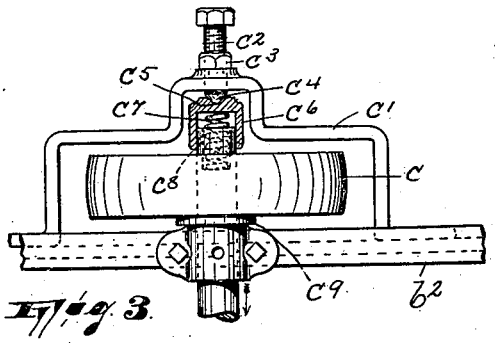


Fig. 3.

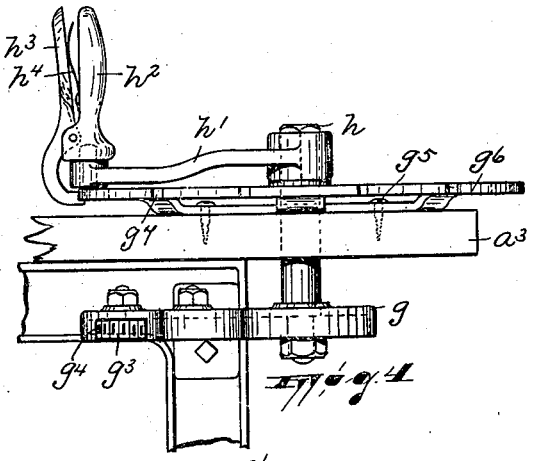
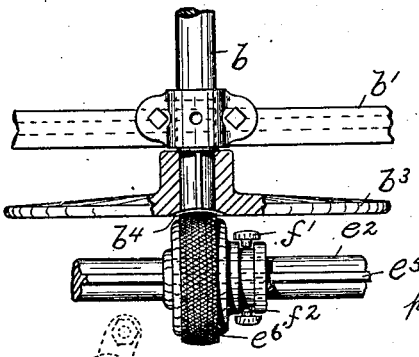


Fig. 4.



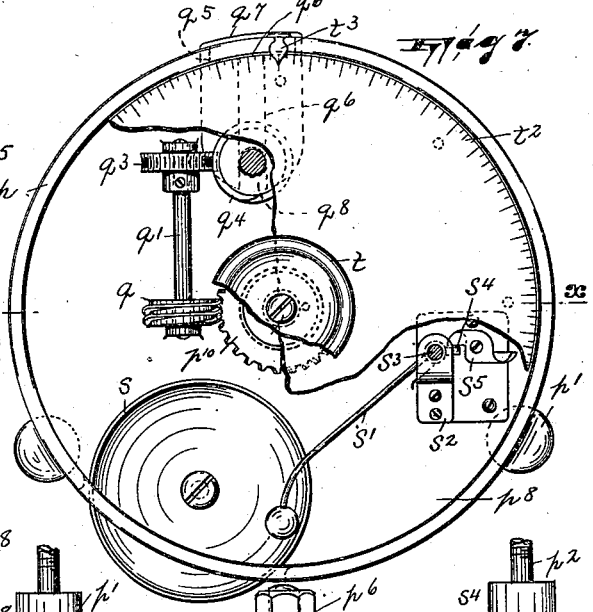


Fig. 7.

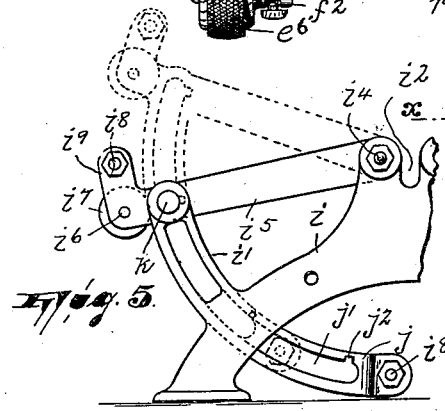


Fig. 5.

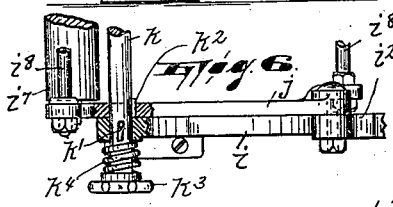


Fig. 6.

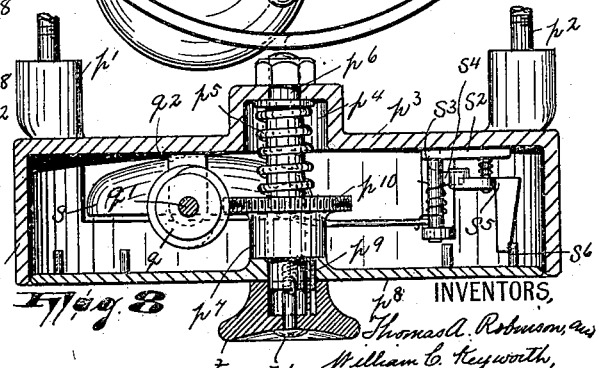


Fig. 8.

WITNESSES:

Wm. D. Bell.

Robert J. Pollitt

INVENTORS,

Thomas A. Robinson, and

William C. Keyworth,

BY

Gartner & Howard,

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM C. KEYWORTH AND THOMAS A. ROBINSON, OF PATERSON, NEW JERSEY, ASSIGNORS TO THE BENJAMIN EASTWOOD COMPANY, OF SAME PLACE.

WARPING AND BEAMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 648,692, dated May 1, 1900.

Application filed September 26, 1899. Serial No. 731,757. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM C. KEYWORTH and THOMAS A. ROBINSON, citizens of the United States, residing in Paterson, county of Passaic, and State of New Jersey, have invented Improvements in Warping and Beaming Machines; and we 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.

This invention relates to warping-machines; and it involves certain improvements in this class of machines which result in the production of a warping-machine whereby the warping operation is considerably simplified and which, furthermore, render the mechanisms or groups of elements to which they are directed highly efficient for the performance of their several functions.

One of the mechanisms or sets of elements above referred to is that means whereby the tendency of the beam of the warping-machine to draw with increasing tension on the threads as the material is wound with constantly-increasing thickness upon it is compensated for, and another of said mechanisms is that for effecting the proper tension upon the threads.

The invention consists in a warping-machine improved especially along the lines indicated above and hereinafter particularly pointed out and in the combination and arrangement of its various parts.

The invention is fully illustrated in the accompanying drawings, wherein—

Figure 1 is a view in side elevation of our improved machine. Fig. 2 is a top plan view of said machine. Fig. 3 is a top plan view of the main drive-shaft and accessory parts, showing a portion of the mechanism whereby power is transmitted from this shaft to the beam. Fig. 4 is a view in side elevation of a portion of the machine, illustrating a certain mechanism whereby said power-transmitting mechanism is controlled. Fig. 5 is a side view of a portion of the tension mechanism. Fig. 6 is a top plan view of what is shown in Fig. 5, portions of the mechanism illustrated appearing in section; and Figs. 7 and 8 are respectively a view in front elevation and a sectional view of a certain indicating mechanism employed in connection with our warping-machine, parts of some of the elements of this mechanism as shown in Fig. 1 being broken away and the section in Fig. 8 being taken on the line x x in Fig. 7.

The frame a of the machine is substantially rectangular and comprises as parts of its structure two surmounting and spaced bed-plates a' a^2, the one of which, a', is considerably larger than the other and is provided at one corner with a projection a^3.

a^4 designates a support that projects from and may also be considered as a portion of the frame of the machine and is steadied by braces a^5.

b is the main drive-shaft. It is journaled transversely of the frame and beneath the bed-plate a' in the upper side rails b' b^2 of said frame and is movable to a slight extent longitudinally in its bearings. At one of its ends it carries a friction-disk b^3, which is keyed or otherwise secured in place, so as to revolve with the shaft, and which has the central portion of its outer or acting face dished out or recessed, as at b^4. At the other of its ends it carries a pulley c, adapted to receive a drive-belt. (Not shown.)

c' is a substantially arch-shaped bracket that projects outwardly from the side rail b^2 of the frame and carries a set-screw c^2, provided with a lock-nut c^3 and having its inner end tapered, as at c^4, and projecting into a correspondingly-shaped recess c^5 in the bottom of a cup c^6, which receives the end of the shaft and also a spring c^7, that is seated in a tubular recess or socket c^8 in said shaft. When the set-screw is properly adjusted, it will be seen that it is the tendency of the spring c^7 to force the shaft in the direction of the arrow in Fig. 3. Its action, however, is limited by a collar c^9, that is disposed between the pulley and the rail b^2 and may be either integral with or separate from said pulley.

Connecting the side rails b' b^2 of the frame is a pair of parallel rods d, upon which are mounted, so as to be adjusted to and from each other, a pair of brackets d', which are adapted to provide bearings for the trunnions,

of the beam-carrying mandrel d^2. One end of this beam-carrying mandrel is provided with a disk d^3, against which one end of the beam which the mandrel receives is adapted to impinge, said beam being held in place on the mandrel by means of a pivoted clip d^5 upon the other end of the mandrel and adapted to be swung about its pivot to engage the corresponding end of the beam. One of the brackets d' is integrally formed with a gear-casing d^6, in which is journaled a train of intermeshing gears d^7, one of said gears being mounted on a shaft e, which is journaled in the side rails b' b^2 and at the end thereof adjacent the friction-disk b^3 carries a bevel-gear e'.

e^2 is a shaft which is journaled parallel to the side rail a in brackets e^3, projecting therefrom and which carries a bevel-gear e^4, in mesh with the bevel-gear e'. This shaft has a feather e^5, and it carries a friction-wheel e^6, provided with a keyway which receives the feather e^5, so that, while the friction-wheel may rotate with the shaft e^5, it may also be moved longitudinally thereon. The brackets e^3 also constitute supports for a longitudinally-movable rack-bar f, that is disposed beneath the shaft e^2 and carries a fork f', provided in its bifurcations with oppositely-disposed pins f^2, that work in a circumferential groove f^3 of a collar f^4, that forms a part of the friction-wheel e^6.

g is a gear-casing that extends horizontally and outwardly from the frame near the projection a^3 of the bed-plate a' and in which is journaled a train of gearing g', one of the pinions g^2, which comprise this train of gearing, having its teeth in mesh with the teeth g^3 of the rack-bar f, a portion of the gear-casing being removed, as shown at g^4 in Fig. 4, for this purpose. Secured upon the projection a^3 by means of screws g^5 or in any other desired manner is a disk g^6, which has its periphery provided with notches g^7, disposed at suitable intervals. Penetrating the center of this disk and also the projection a^3, the gear-casing g, and one of the gears of the train of gearing g' is a vertical revoluble shaft h. Said shaft is secured to the gear, which it penetrates, so as to rotate the same, and it carries at its upper end a crank h', having a two-part handle h^2, one part of said handle constituting a lever h^3, which is fulcrumed in the other part and which is actuated by a spring h^4, disposed between the parts of said handle, so as to normally force its lower end against the periphery of the disk.

It will be seen that by rotating the crank h', the lever being kept from engagement with the notches of the disk g^6, the rack-bar f will be moved longitudinally, and consequently the position of the friction-wheel relatively to the center of the friction-disk will be altered. Hence as the material winds on the beam during the warping operation all that it is necessary for the operator to do in order to prevent an undue increase of the pull upon the warp-threads by the beam and to keep the tension uniform throughout the operation is to manipulate the crank h', thus altering the position of the friction-wheel with reference to the center of the friction-disk, as above described, and so altering the speed at which said friction-disk, and consequently the beam, will be revolved.

It should be remarked at this point that so long as the friction-wheel is in approximately-direct alinement with the shaft b—that is to say, is opposite the dished-out or recessed portion of the disk—it will not be in contact with said disk, because the collar c^9 prevents the spring c^7 from effecting this. The spring c^7 is provided so that the shaft will offer some resiliency to the friction-wheel, and thus the contact between the friction-wheel and the friction-disk will be preserved uniform. By virtue of the dished-out or recessed portion b^4 of the disk the operator can, furthermore, immediately stop the motion of the beam by breaking the connection at this point between the drive-shaft and the mechanism whereby power is transmitted therefrom to the beam.

Upon the bed-plate a' and near each side thereof are mounted two standards i, each having a pair of integral and arc-shaped arms i' and each having a recess i^2 in its most elevated portion, which affords a seat for one of the trunnions of a roller or beam i^3. In these standards are fulcrumed upon bolts i^4, disposed each side of the recess i^2, two pairs of levers i^5, the members of each pair of said levers being connected by a rod i^6, upon which is journaled a roller i^7, and also by a bracing-rod i^8, disposed in projections i^9 of said levers. Extending downwardly from each lever i^5 is an integral arc-shaped guide j, which is provided with a longitudinal slot j', at each end of which there is formed in the guide a notch j^2. The slots of each pair of guides receive a rod k, that penetrates the arms i' and is guided for longitudinal movement in the latter by a pin k', and that is provided with one or more keys k^2 near its ends, which are adapted to engage the notches j^3 of the guides j. One end of each rod is provided with a knob or handle k^3, between which and the arm is a spring k^4, coiled about the rod and tending to force the knob, and consequently the rod, outwardly.

m and m' are two reeds that are mounted on the frame, the one being sustained upon the extremity of the support a^4 and the other being mounted upon an adjustable bracket m^2. Between these reeds are disposed the parting-bars m^3, said parting-bars being mounted in a suitable bracket m^4, that is adjustably sustained upon the vertical and adjustable upright m^5 carried by the support.

The warp-threads n extend first through the reed m, thence are parted and laid even by the parting-bars m^3, then extend through the reed m', then under the nearer of the pair of rollers i^7, then over the beam i^3, then under the other roller i^7, and then upon the

receiving-beam. It will be seen that by pushing inwardly on the knob k^3 of either rod k, so as to disengage its key from one of the notches j^2, the corresponding roller i^7 may be moved, so as to either tighten or release the tension upon the threads. An extreme and positive tension may be maintained by effecting an engagement between each key k^2 and the upper one of the two notches j^2 in each guide; but, if desired, the levers i^5, carrying the rollers, need not be locked down, but the tension can be maintained simply by the weight of the rollers and the several parts movable with them. It will be seen that the two rollers i^7 when in action tend to spread the warp-threads over a considerable portion of the surface of the beam i^3, and thus they are prevented from slipping thereon.

p is a circular box or case having its front wall removed and provided on its rear face with projections p', from which extend threaded pins p^2, that are adapted to penetrate one of the standards i and receive nuts for securing the casing in position to said standard. In the rear wall p^3 of this case is formed a recess p^4, in which is disposed a spiral spring p^5, that is coiled about a shaft p^6. Near its outer end and within the casing this shaft carries a collar p^7 and also a disk p^8, which takes the place of the front wall of the casing and which is kept from rotating relatively to said collar by means of a pin p^9, that projects from the collar and penetrates said disk. The collar has an integral worm-wheel p^{10} formed with it, whose teeth engage the threads of a worm q, that is mounted upon a shaft q', journaled in arms q^2, projecting from the rear wall of the case, said shaft q' also carrying another worm-wheel q^3, that engages a worm q^4, mounted upon the end of the adjoining trunnion of the beam i^3. The trunnion of course projects into the casing, and in order to get the worm and trunnion in place the circular wall of the case is provided with an opening q^5 and the rear wall with a communicating slot q^6. The slot and the opening are covered by an angle-plate q^7, having a recess q^8 in its lower end, whereby it fits over the shaft, being secured over the opening upon the top of the case in any desired manner.

s is a gong that is secured in the casing and slightly protrudes therefrom. The hammer s' for this gong is fulcrumed in a bracket s^2, that is secured inside of the casing and to the rear wall thereof, the pivot s^3, from which the arm of the hammer projects, being provided with a tappet s^4, that is adapted to be engaged by one end of a double-pointed pawl s^5, the free end of said pawl being so disposed as to be engaged by pins s^6, projecting inwardly from the disk p^8 and disposed at uniform intervals about the center of said disk.

t is a knob that is loosely secured to the shaft p^6, outside of the disk p^8, by means of a screw t', penetrating it and extending into the shaft, being prevented from rotation relatively to the disk by the pin p^9, which projects into it.

The outer face of the disk p^8 may be marked off in graduations, which constitute a scale t^2, which may be read by means of a pointer t^3, that projects from the angle-plate q^7.

It will be seen that as the beam i^3 rotates its trunnion will impart, through the worm q^4, the worm q^3, the shaft q', the worm q, and the worm-wheel p^{10}, a rotary movement to the disk p^8. As often as one of the pins s^6 is brought into engagement with the pawl s^5 the hammer will be actuated and the gong sounded. The amount of material that has been passed over the beam i^3 can be determined at any time by reference to that mark upon the disk to which the pointer refers. If at any time it is desirable or necessary to manually operate the indicator, so as to set it back, for instance, it is only necessary to press the knob against the action of the spring p^5 until engagement between the worm-wheel p^{10} and worm q' is broken, whereupon the disk may be turned without reference to the means which automatically rotates it.

Referring again to the mechanism whereby power is transmitted to the beam from the main drive-shaft, it is to be remarked that by virtue of the arrangement and construction of parts which we have described, with reference especially to the friction-disk, the beam can be thrown into operation very gradually, and so the undue and sudden strain that would otherwise be exerted on the threads and that is, in fact, exerted on them by warping-machines at present in use is obviated.

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

1. In a warping-machine, the combination of a suitable frame, a drive-shaft journaled therein, mechanism to be driven, a friction-disk carried by said shaft, a suitably-journaled friction-wheel adapted to bear against one face of said friction-disk, operative connection between said friction-wheel and said mechanism, a cup suitably sustained on the other side of said disk and receiving the end of the shaft, and a spring in the cup interposed between, and bearing against, the same and the shaft, substantially as described.

2. In a warping-machine, the combination of a suitable frame, a drive-shaft journaled therein, mechanism to be driven, a friction-disk carried by said shaft, a suitably-journaled friction-wheel adapted to bear against one face of said friction-disk, operative connection between said friction-wheel and said mechanism, a cup suitably sustained on the other side of said disk and receiving the end of the shaft, a spring in the cup interposed between, and bearing against, the same and the shaft, and means for adjusting said cup relatively to said shaft, substantially as described.

3. In a warping-machine, the combination of a suitable frame, a drive-shaft journaled

therein, mechanism to be driven, a friction-disk carried by said shaft, a suitably-journaled friction-wheel adapted to bear against one face of said friction-disk, operative connection between said friction-wheel and said mechanism, a bracket projecting from said frame on the other side of said disk, a set-screw mounted in said bracket in alinement with the shaft, a cup receiving the end of said shaft, said end of the shaft having a socket, and a spring disposed in the cup and the socket, said set-screw taking against the cup, substantially as described.

4. In a warping-machine, the combination, with the frame and the main drive-shaft journaled therein, of a beam-carrying mandrel or other similar device journaled in said frame, a friction-disk carried by said drive-shaft and having the central portion of one of its faces dished out or recessed, another shaft journaled in said frame, operatively connected to said mandrel and disposed parallel to said friction-disk and opposite the recess therein, a friction-wheel keyed onto said last-named shaft and adapted to bear against said face of the friction-disk, a bracket projecting from said frame on the other side of said disk, a set-screw mounted in said bracket in alinement with said drive-shaft, a cup receiving the end of said shaft, said end of the shaft having a socket, and a spring disposed in the cup and the socket, said set-screw taking against the cup, substantially as described.

5. In a warping-machine, the combination, with the frame and the main drive-shaft journaled therein, of mechanism to be driven, a friction-disk carried by said shaft, brackets projecting from the frame, another shaft journaled in said brackets, operatively connected to said mechanism and disposed substantially parallel to said friction-disk, a friction-wheel keyed onto said last-named shaft and adapted to bear against said friction-disk, a rack-bar disposed parallel to said last-named shaft and guided in said brackets, a fork carried by said rack-bar and connected to the friction-wheel, and means for moving said rack-bar to shift the friction-wheel, substantially as described.

6. In a warping-machine, the combination, with the frame and the main drive-shaft journaled therein, of a beam-carrying mandrel or other similar device journaled in said frame, a friction-disk carried by said shaft and having the central portion of its acting face dished out or recessed, brackets projecting from said frame, another shaft journaled in said brackets, operatively connected to said mandrel and disposed parallel to the acting face of said friction-disk and in alinement with the center thereof, a friction-wheel keyed onto said last-named shaft and adapted to bear against said friction-disk, a rack-bar disposed parallel to said last-named shaft and guided in said brackets, a fork carried by said rack-bar and connected to the friction-wheel, a train of gearing, one of the gears thereof engaging said rack-bar, a crank connected to another of said gears, and means for adjusting said crank to various positions, substantially as described.

7. The combination, with the frame having a projection and mechanism to be driven, of a suitably-journaled friction-disk, a shaft journaled parallel to one face of said friction-disk and operatively connected to said mechanism, a friction-wheel keyed onto said shaft and bearing against said friction-disk, a suitably-guided rack-bar operatively connected to said friction-wheel, a vertical shaft journaled in said projection, a notched disk, mounted on said projection and penetrated by said vertical shaft, a crank movable concentrically with reference to the notched disk and carrying a pawl adapted to engage the same, said crank being secured upon the upper end of the vertical shaft, and a train of gearing, one of the gears thereof engaging said rack-bar and another being secured to said shaft below the projection, substantially as described.

8. In a warping-machine, the combination, with the frame, a beam-carrying mandrel journaled near one end of said frame and parting-bars disposed near the other end of said frame, of a suitably-journaled beam disposed between said mandrel and the parting-bars, and levers fulcrumed approximately concentric with said beam and normally projecting the one in the direction of said mandrel and the other in the direction of the parting-bars, the warp, between said parting-bars and the mandrel, having an over and under engagement with said beam and the free ends of the levers, respectively, substantially as described.

9. In a warping-machine, the combination, with the frame, a beam-carrying mandrel journaled near one end of said frame and parting-bars disposed near the other end of said frame, of a suitably-journaled beam disposed between said mandrel and the parting-bars, levers fulcrumed approximately concentric with said beam and normally projecting the one in the direction of said mandrel and the other in the direction of the parting-bars, and rollers carried in the extremities of said levers, the warp, between said parting-bars and the mandrel, having an over and under engagement with said beam and the rollers, respectively, substantially as described.

10. In a warping-machine, the combination, with the frame, of standards mounted thereon, a beam journaled in said standards, pairs of levers fulcrumed in said standards adjacent the journals of said beam and normally projecting in substantially-opposite directions, rollers carried in the extremities of said levers, said levers being provided with downwardly-extending curved guides, and lever-sustaining means mounted in said standards and operatively engaging said guides, substantially as described.

11. In a warping-machine, the combination, with the frame, of standards mounted thereon, a beam journaled in said standards, pairs of levers fulcrumed in said standards adjacent the journals of said beam and normally projecting in substantially-opposite directions, rollers carried in the extremities of said levers, said levers being provided with downwardly-extending curved guides, and said guides being provided with longitudinal slots having communicating notches, and spring-actuated rods mounted in said standards, penetrating the slots of said guides and provided with keys adapted to engage the notches thereof, substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands this 2d day of September, 1899.

WILLIAM C. KEYWORTH.
THOMAS A. ROBINSON.

Witnesses:
JOHN W. STEWARD,
JAMES EASTWOOD.