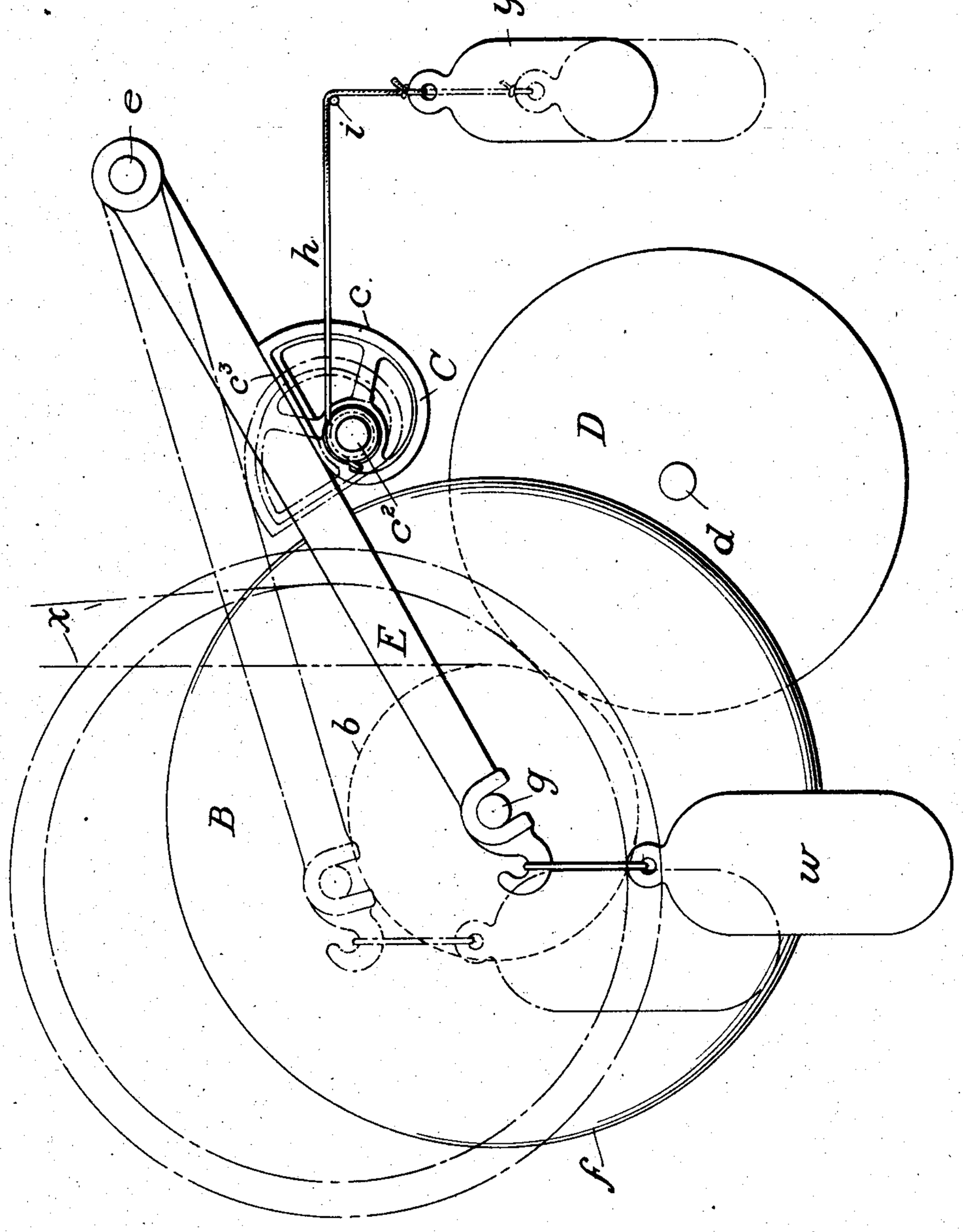
No. 833,989. PATENTED OCT. 23, 1906.

S. W. WARDWELL.

WARPING MACHINE.

APPLICATION FILED SEPT. 18, 1905.



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SIMON W. WARDWELL, OF PROVIDENCE, RHODE ISLAND.

WARPING-MACHINE.

No. 833,989. Specification of Letters Patent. Patented Oct. 23, 1906.

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To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Warping-Machines, of which the following is a specification.

My invention relates to improvements in warping or beaming machines, and has for its object to increase the speed of operation of the machine and produce a perfect warp-beam with the yarn mass disposed concentrically about the bearing-points or gudgeons of the beam.

My invention consists, essentially, of means to regulate the pressure of the warp mass on its driving-roll whereby the beam can be rotated at increased speed without vibration or pounding of the beam on the roll.

My invention is fully set forth in the following specification, illustrated by the accompanying drawing, which shows a side elevation of a portion of a warping-machine with my improvement applied.

The warping-machine comprises particularly the warp-beam B, formed with a barrel *b* and heads *f*, having gudgeons *g*, on which the beam rotates, and a driving-roll D, rotated on its axis *d* by any suitable means. (Not here shown.) The beam is held in a yielding contact with the driving-roll by two swinging arms E, pivoted at *e* and having bearings at the opposite ends for the gudgeons *g*. The beam is removable from the warping-machine by raising the arms E and releasing the gudgeons from the bearings of the arms. The weight of the beam keeps it in contact with the driving-roll, and the weights *w*, suspended on the ends of the arms E, serve to keep the arms bearing on the gudgeons and give additional pressure to the beam. The warp *x* is led onto the beam, as shown in the drawing, and as it is wound onto the barrel the beam rises and the arms swing upward, as indicated by the dot-and-dash lines, which illustrate the beam as nearly filled.

The beam B resembles a huge spool in form, and it is a well-known fact that in such a construction it is difficult to make all of the parts concentric about a common axis. The barrel and heads are generally eccentric to the gudgeons, and the latter are always bent out of alinement, owing to their projecting so far beyond the ends and receiving such hard usage in shipment and handling. Owing to these causes the beam seldom, if ever, runs true with the gudgeons, so that when it is rotated by contact with the driving-roll the gudgeons will approach or recede from the center of the roll to compensate for the eccentricity of the barrel. In other words, there is a raising and lowering of the gudgeons when the beam is rotating corresponding to the eccentricity of the barrel. If the beam is rotating very slowly, this rise and fall will not materially affect the laying of the warp; but when the machine is running at any considerable speed the beam will jump and pound, so that the yarn is matted down and depressed in places, making the mass eccentric. This action occurs as follows: As the driving-roll passes from contact with a low point on the periphery of the yarn mass (that is, a point nearer the center of the beam than some other point) to a high point the beam is impelled upward, carrying with it the arms E and their weights *w*. The momentum of these heavy parts carries them so far that all pressure is removed from the yarn mass, and this always occurs when the high point of the mass is in contact with the driving-roll. Therefore the yarn will be wound on with very little, if any, pressure at these points, and the mass will be very soft, thereby increasing its eccentricity. When the arms E, with their weights, swing back with the beam, the high point on the periphery of the mass has passed the driving-roll, and the beam will bear on the roll at a low point. The momentum of the heavy parts will give an increased pressure at this point, and the yarn will be depressed on the beam. In this way the high points on the periphery are progressively softened, while the low points receive the greatest pressure and are consequently progressively hardened. This action increases the eccentricity of the yarn mass so rapidly that even if the barrel only ran out an eighth of an inch at the beginning the yarn mass would run out an inch or more before the beam was completed if the beam could be run at the required speed; but a high speed is impossible, because the jumping and pounding of the beam would wreck the machine. Even a slight eccentricity of the yarn mass is objectionable, however, for when the beam delivers to the slasher it causes an abnormal strain on the warp in unwinding and frequently breaks the yarn.

Heretofore it has not been required to run the warping-machine at a high rate of speed, because the speed at which the yarn can be taken off the ordinary spool-creel is limited. With the improved creels shown in my application for patents, Serial No. 251,485, filed March 22, 1905, and Serial No. 266,654, filed June 21, 1905, however, it is possible to take the yarn off at from six to eight times the speed at which it can be delivered from previously-known devices, so that to meet this new condition it is necessary to adapt the warping-machine to a greatly-increased speed. To provide for this, I make use of the devices now described.

The essential element of the device is a rotatable dog or cam C, having the involute face *c*, adapted to follow and impinge against the under side of the arm E. The dog C is pivoted at c^2, and at the start of the winding, with the arm E in its lowermost position, the under side of the arm rests on the low point of the cam, which is formed in a straight face c^3. The cam C may be rotated by any suitable means—as, for instance, through a cord *h* wound around the hub of the cam and passed over the pin *i*, with the weight *y* attached to its end. Two of these devices are provided—one for each arm E—and as the arms move upward the cams are rotated by their weights, so that the involute faces *c* follow and engage the arms E during all of their movement. The effect of this is to prevent the arms E from swinging back after they have once been raised by the gudgeons of the beam. While the beam will still have a vibratory or rising-and-falling motion to some extent to keep the warp-surface in constant contact with the driving-roll, the arms E and their weights will only have a steady upward movement. In this way the weights *w* are prevented from forcing the arms E down on the gudgeons to press the beam back against the roll after it has once been raised by a high point on the periphery of the yarn mass. Therefore when the low point on the periphery of the mass is bearing on the driving-roll all of the pressure of the weights *w* is removed, so that the yarn is wound on with only the pressure of the beam, and consequently the mass will be soft at this point. It will be seen that by winding the yarn soft at these low points the mass will be filled out gradually to the diameter of the high points and eventually it will be disposed concentrically about the beam. In this way the beam is built up perfectly concentric and will deliver evenly in unwinding. Besides this improvement there is another advantage in the increased speed at which the machine can be run. The dogs prevent the jumping and pounding of the arms E on the gudgeons, and as the beam is wound more nearly true peripherally its speed of rotation can be maintained more constant, so that the machine can be run at a maximum rate without jar or vibration.

The operation of the device is very simple. The empty beam is placed in the machine with the gudgeons in the bearings of the arms E, and as the warp is wound on the arms E rise, followed by their cams C. When the beam is full, it is removed and replaced by a new beam by simply turning back the cams and allowing the arms to fall into position to engage the gudgeons at their lowest position.

Various other mechanisms might also be applied for the purpose described. Therefore I do not limit my invention to the precise construction and arrangement herein shown; but

What I claim is—

1. The combination in a warping-machine with the yarn-beam and a driving-roll therefor, of pivoted arms adapted to support the beam to swing away from the roll and means to prevent the arms swinging toward the roll.

2. The combination in a warping-machine with the yarn-beam and a driving-roll therefor, of means to apply pressure to the beam to cause resistance to its movement away from the roll, and means to prevent the pressure from forcing the beam toward the roll.

3. The combination in a warping-machine with the yarn-beam and a driving-roll therefor, of swinging arms adapted to support the beam to move away from the roll, weights on said arms to resist said movement of the beam, and means to prevent the arms from swinging toward the roll after they have been forced away by the beam.

4. The combination in a warping-machine with the yarn-beam and driving-roll, arranged to separate one from the other, of means to cause resistance to their separation and devices to prevent said means from forcing the yarn-beam and driving-roll toward each other.

5. The combination of a warp-beam to receive yarn wound thereon, a driving-roll to rotate said warp-beam by contact with the yarn, the warp-beam and roll adapted to separate one from the other as the yarn is wound on, means to cause resistance to their separation, and devices to prevent said means from forcing the warp-beam and roll toward each other.

6. The combination in a warping-machine with the yarn-beam and driving-roll, of means to apply pressure to the beam to resist its movement away from the roll, and a dog engaging said means to prevent the pressure from forcing the beam toward the roll, after it has once been carried away.

7. The combination in a warping-machine with the warp-beam and driving-roll therefor, of arms to support the beam to move away from the roll, weights on said arms and cams having involute faces adapted to engage and follow the arms to prevent the weights forcing the beam toward the roll.

8. The combination in a warping-machine with the yarn-beam and driving-roll therefor, of swinging arms for supporting the beam, rotatable cams adapted to engage the arms to prevent them swinging toward the roll after being raised by the beam and means to rotate said cams.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON W. WARDWELL.

Witnesses:

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