(No Model.) 2 Sheets—Sheet 1.

N. HICKS.

REGULATING DEVICE FOR WARPING MACHINES.

No. 488,432. Patented Dec. 20, 1892.

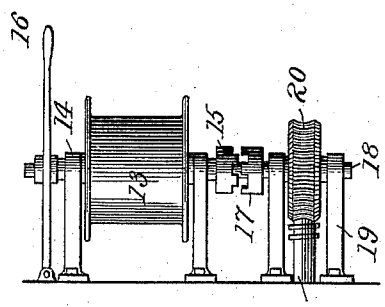

Fig. 2.

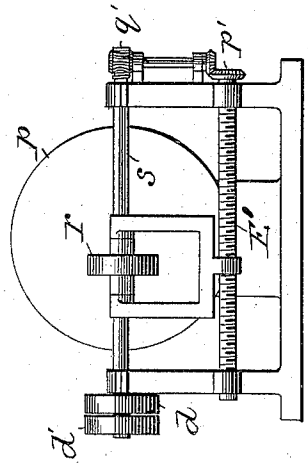

Fig. 5.

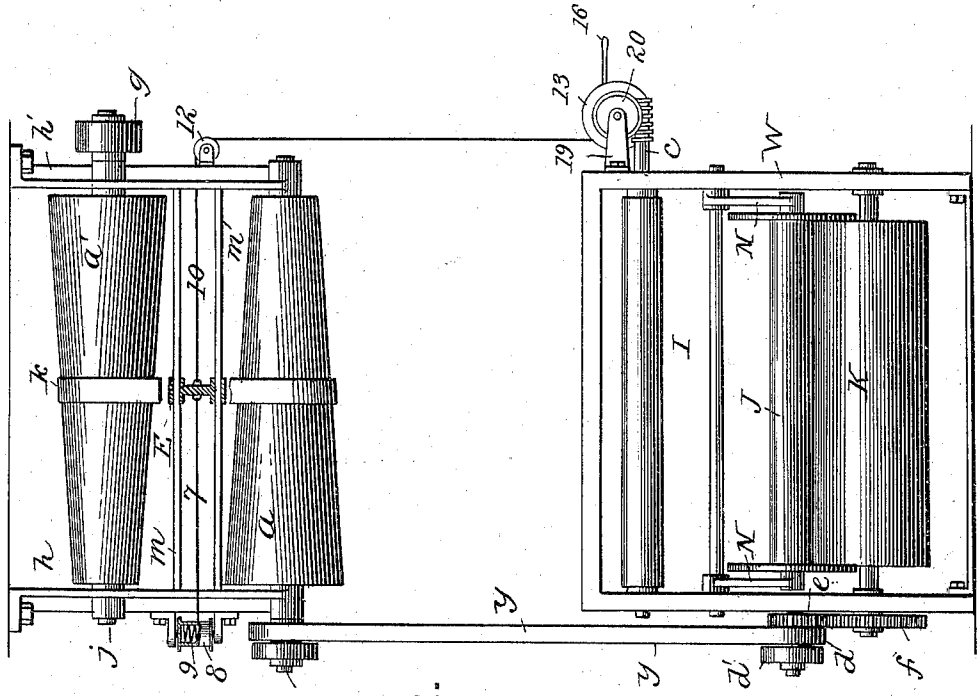

Fig. 1.

WITNESSES

Jno. G. Hinkel

H. S. McArthur

INVENTOR

Nehemiah Hicks

By Foster & Freeman

Attorneys.

(No Model.) 2 Sheets—Sheet 2.

N. HICKS.

REGULATING DEVICE FOR WARPING MACHINES.

No. 488,432. Patented Dec. 20, 1892.

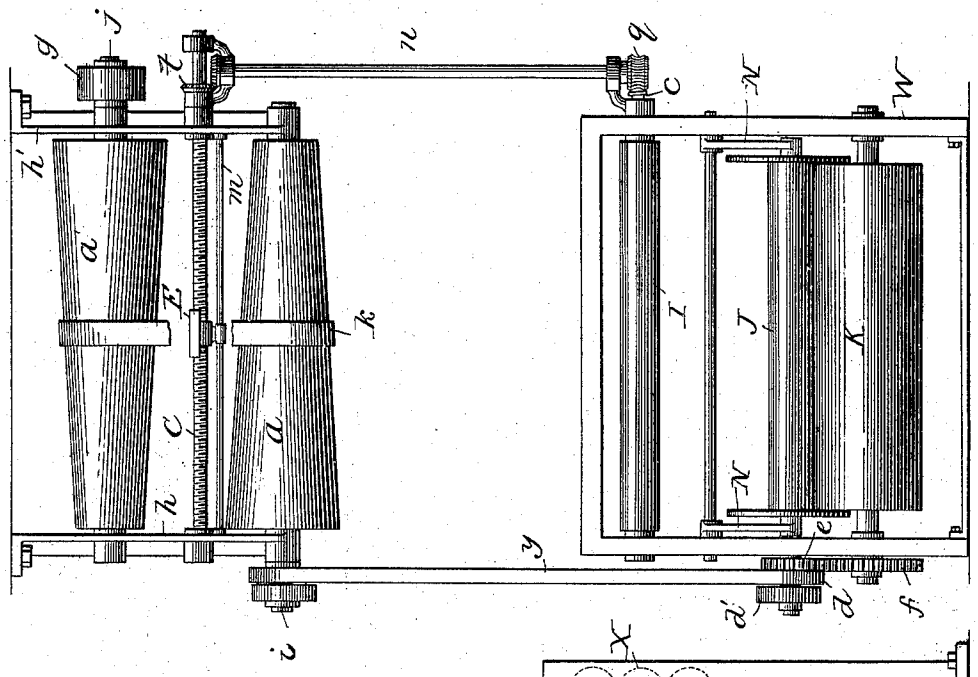

Fig. 4.

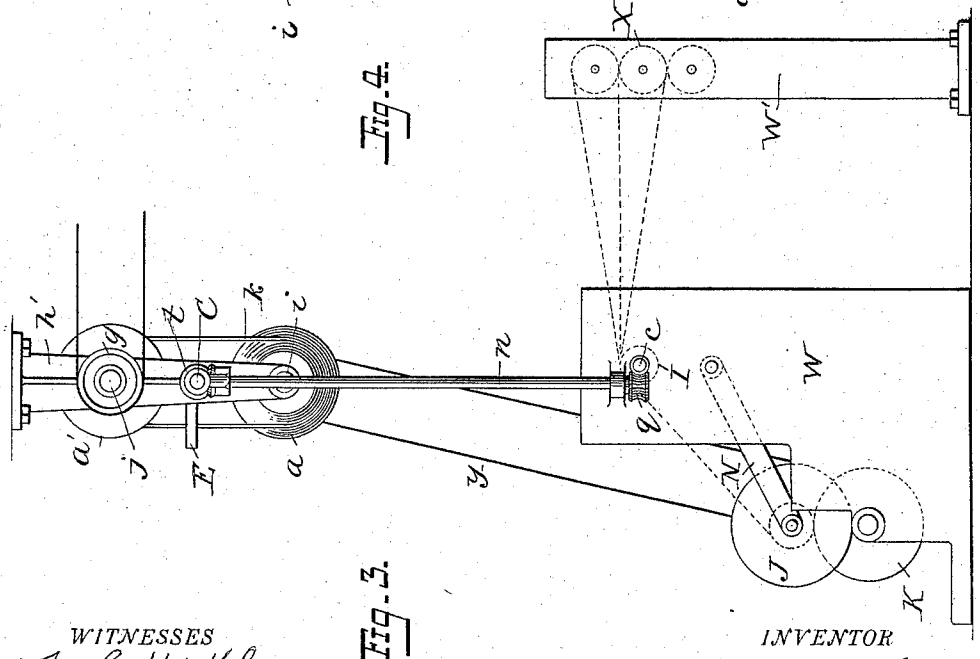

Fig. 3.

WITNESSES

Jno. G. Hinkel

H. S. McArthur

INVENTOR

Nehemiah Hicks.

By Foster & Freeman

Attorneys.

UNITED STATES PATENT OFFICE.

NEHEMIAH HICKS, OF WILKINSONVILLE, MASSACHUSETTS.

REGULATING DEVICE FOR WARPING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 488,432, dated December 20, 1892.

Application filed January 9, 1892. Serial No. 380,377. (No model.)

To all whom it may concern:

Be it known that I, NEHEMIAH HICKS, a citizen of the United States, residing at Wilkinsonville, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Regulating Devices for Warping-Machines, of which the following is a specification.

In warping machines as usually constructed the beam upon which the warp yarns are to be wound, is placed in contact with a revolving drum or cylinder moving at a uniform speed, whereby the beam is revolved by friction and the yarn drawn off from the spools at a uniform rate of speed. When the spools are full, at the starting of the operations, they are turned at their minimum speed, but as the yarn is drawn from them the speed of rotation of the spools increases with a detrimental increase of the friction toward the end of the operation, which can only be prevented by running the apparatus at such a uniform slow speed as to greatly reduce its capacity. In order to overcome this defect and further improve the apparatus I construct the same as fully set forth hereinafter, and as illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation of a warping machine embodying my improvements. Fig. 2, is a plan showing the winding drum and connection, Fig. 1. Fig. 3 is a side elevation illustrating a modification. Fig. 4 is a front elevation of Fig. 3. Fig. 5 is a side elevation showing another modification.

The frame W, of the machine, Figs. 1 to 4 is constructed in any suitable manner to support the parts including the spools or bobbins X, or the latter may be supported by an independent frame W′. In fixed bearings upon the frame turns the driving cylinder K, and in a swinging frame N, pivoted to the frame W, turns the journals of the warping beam J, the heads of the latter being beyond the end of the cylinder K; and in the frame W, above the frame N, turns the shaft *c*, of the measuring roll I, over which the yarns pass to the warping beam. Movement is imparted to the warping cylinder K, from a driving pulley *d*, through the medium of a pinion *e*, and gear wheel *f*, the latter secured to the shaft of the warping cylinder, the pulley *d*, being driven by a belt *y*, which may be shifted on to the idler pulley *d′*, when it is desired to arrest the rotation of the cylinder and beam.

The parts above described are of any ordinary or suitable construction combined with any of the usual auxiliary appliances for driving the yarn, measuring the quantity beamed, stopping the machine in case of breaking of the yarns, &c., and which need not be illustrated as they constitute no part of my invention.

Assuming that the cylinder K, is driven at a uniform rate of speed the yarn will be drawn at a uniform rate from the spools, but the latter travels at a low speed at the beginning of operations when they are full and will revolve with increased rapidity as the diameter of the body of yarn upon each is reduced, and I therefore combine with the features already described, means whereby the speed at which the yarns are carried forward and beamed is varied so as to run the spools at a substantially uniform speed which is such as to secure the highest efficiency of the machine.

Different means may be employed for varying the speed at which the yarns are drawn or fed from the spools to the warping beam. Thus I may make use of reverse cone pulleys and a driving strap shifted upon the same and interposed between the main driving belt pulley *g*, and the pulley *d*, in such manner as to vary the speed at which the pulley *d*, is driven as the belt is shifted, which shifting may be effected automatically or by hand.

In the construction shown in Figs. 1 to 4, the shafts *i*, *j*, of two cone pulleys *a*, *a′*, arranged reversely are supported by hangers *h*, *h′*, the main driving pulley *g*, being upon the shaft *j*, of the upper pulley *a′*, and round both pulleys passes the driving belt *k*, which when at one end of the pulleys drives the pulley *a*, at its maximum speed, the shifting of the belts to the other end gradually reducing the speed of rotation.

In the construction shown in Figs. 1 and 2, the belt shifter E, is carried upon guides *m*, *m*, and is moved in one direction by a cord or chain 7, wound upon a hollow drum 8, supported by one of the hangers and containing a spring 9, which tends to wind the cord upon the drum, so as to carry the shifter E, to the left, and another cord 10, passes over a guide

pulley 12, to a drum 13, driven from a moving portion of the working machine, so as to wind up the drum, and carry the belt-shifter in the opposite direction.

In the construction shown, the drum 13, turns with a shaft which is movable longitudinally in bearings 14, by means of a lever 16, and carries one section of a clutch 15, the other section 17, being upon a shaft 18, turning in bearings 19, which shaft 18, carries a worm-wheel 20, that gears with a worm upon the shaft c, of the measuring roll. By moving the lever 16, the drum 13, may be connected so as to be turned by the rotation of the shaft c, to move the shifter E, to the right, and by reversing the position of the lever 16, the clutch may be uncoupled when the spring 9, will turn the drum 8, and carry the shifter E, to the left, unwinding the cord from the drum 13.

In the construction shown in Figs. 3 and 4, the belt is shifted automatically by means of a belt shifter E, carried by a revolving screw C, and guide rod m, said screw being driven from the measuring roll I, through the medium of a shaft n, beveled gears t, and worm gears q. At the beginning of operations the belt k, is at one end of the cones whereby when the spools X, are full the yarns will be drawn off at their maximum speed but as the operations continue the belt shifter E, travels toward the other end of the cones whereby the speed of rotation of the cylinder K, and beam J, are reduced, and the feed of the yarns gradually lowers in speed thereby maintaining a practically uniform speed of revolution of the spools. I am thus able to start the machine at a speed which will permit the maximum speed of revolution of the spools and to maintain the latter throughout the entire operation so as to secure the highest general efficiency of the apparatus, without at any time driving any of the parts so as to result in undue friction or other detrimental action.

While I have described certain means for securing the above set forth results it will be evident to those skilled in the art that these means may be changed without departing from the main features of my invention. Thus, instead of the reverse cones any other suitable speed reducing appliances may be used, as for instance a frictional driving pulley r, Fig. 5 rotating with and sliding on a shaft s, so as to set to different positions upon the face of a driving disk p, secured to the pinion e. In this case the pulley r, may be shifted by hand or by means of a revolving screw shaft E′, to which movement is imparted from any suitable moving part of the machines, as for instance through the medium of worm gears q', and bevel gears p'.

It will of course be understood that while the spools are run at a uniform speed in filling any one beam, the speed at which they may be run in filling another beam, will if necessary be varied according to the quality of the yarn.

Without limiting myself to the precise construction and arrangement of parts shown I claim:—

1. The combination of a warping machine, a driving shaft, and variable gearing and means substantially as described to shift said gearing to gradually reduce the speed of travel of the thread as it is drawn from the spools, substantially as set forth.

2. The combination with the warping machine and the spools and a driving shaft, of the reverse cones, the belt connecting the cones, the belt shifting device, and means including a spring for moving the belt shifter with a gradual movement as the beam is being filled, substantially as described.

3. The combination in a warping machine and with the beam thereof, of supports for the spools, mechanism for turning the beam, and automatic variable driving devices and means for shifting the latter to gradually reduce the speed of travel of the thread as the diameter of the load on the spools decreases, substantially as set forth.

4. The combination with the warping beam, of a driving cylinder, in frictional contact with and driving the beam, a driving shaft, and variable gearing disposed between the driving shaft and the cylinder and arranged substantially as described to gradually reduce the speed of the yarn from the spools to the beam as the yarn load on the spools decreases by winding off the yarn.

5. The combination with the warping beam, of a driving cylinder having frictional contact with and driving the warping beam, a driving shaft, and variable gearing disposed between the driving shaft and cylinder arranged substantially as described to gradually reduce the speed of the cylinder as the yarn load on the spools decreases by winding off the yarn.

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

NEHEMIAH HICKS.

Witnesses:
B. W. RUSHWORTH,
AMOS HOLT.