No. 868,452. PATENTED OCT. 15, 1907.

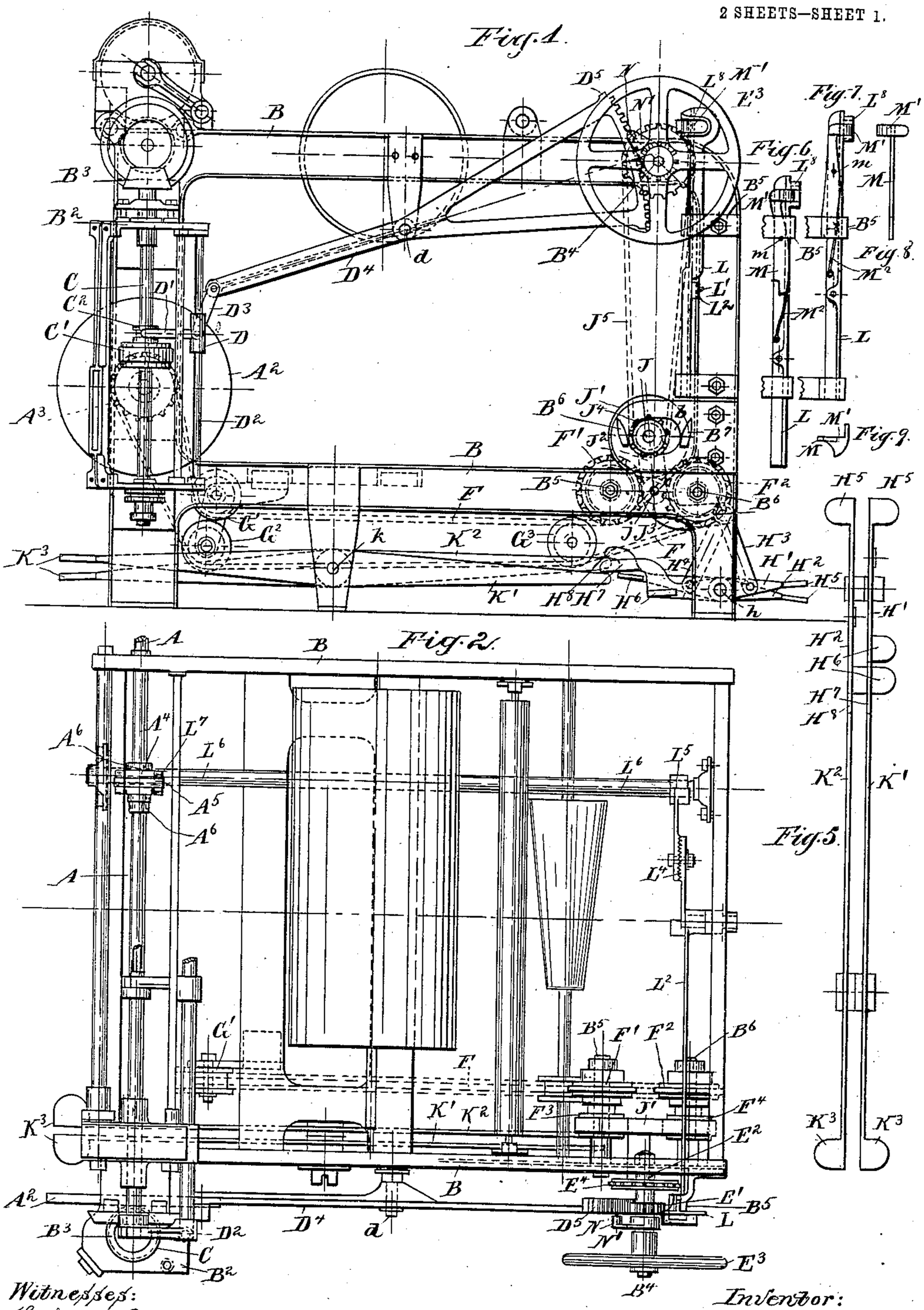
C. H. KNAPP.

WARPING MACHINE.

APPLICATION FILED AUG. 17, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



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Charles H. Knapp,
by his attorney,
Charles R. Searle.

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2 SHEETS—SHEET 2.

Fig. 3.

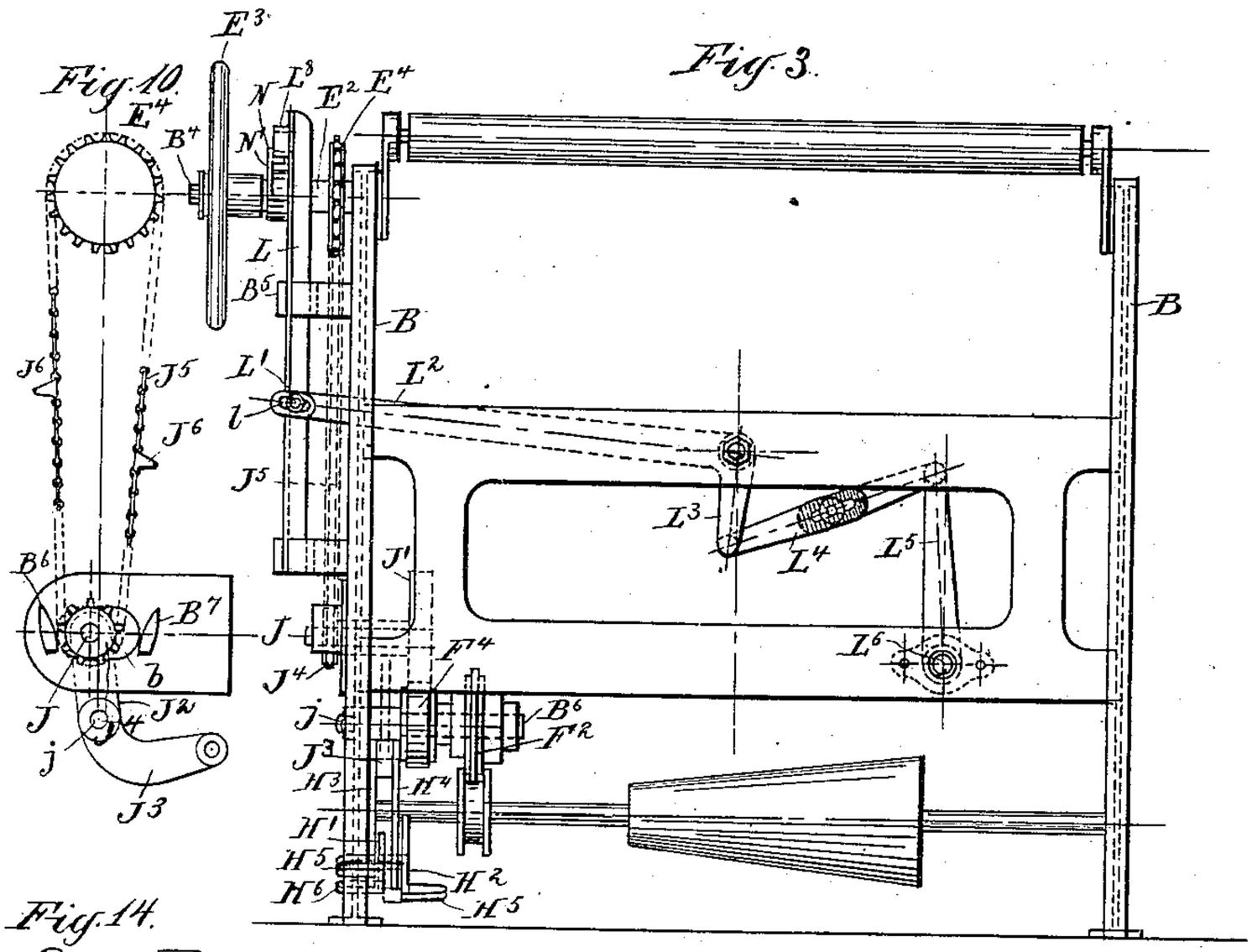


Fig. 10.

Fig. 14.

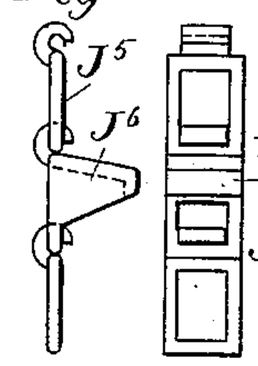


Fig. 13.

Fig. 4.

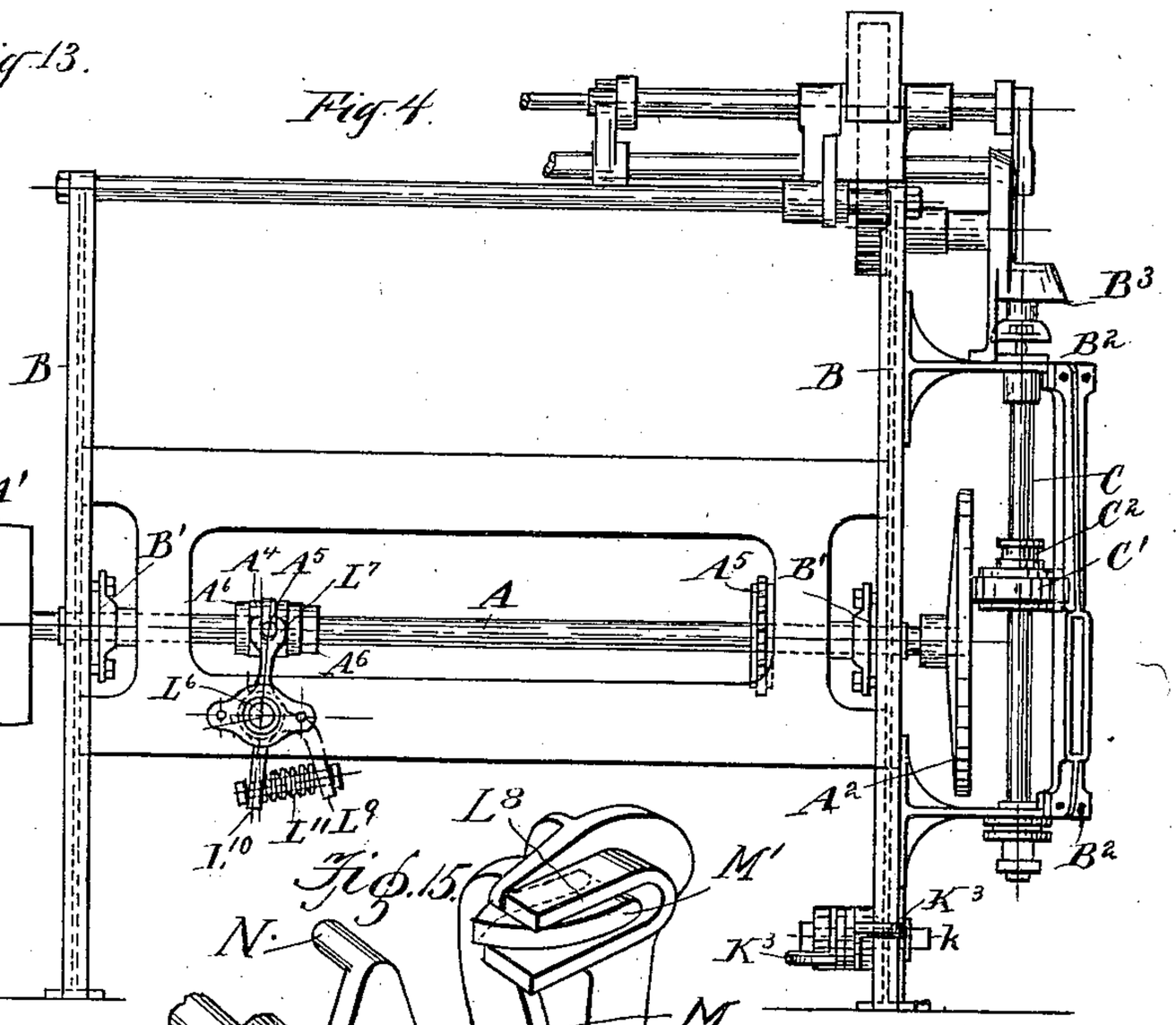


Fig. 11.

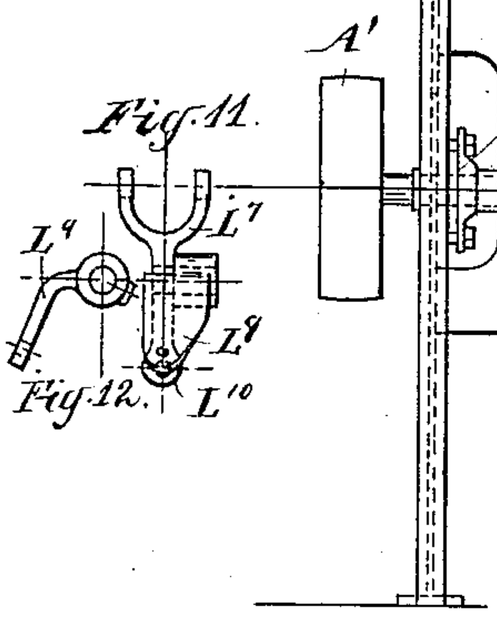
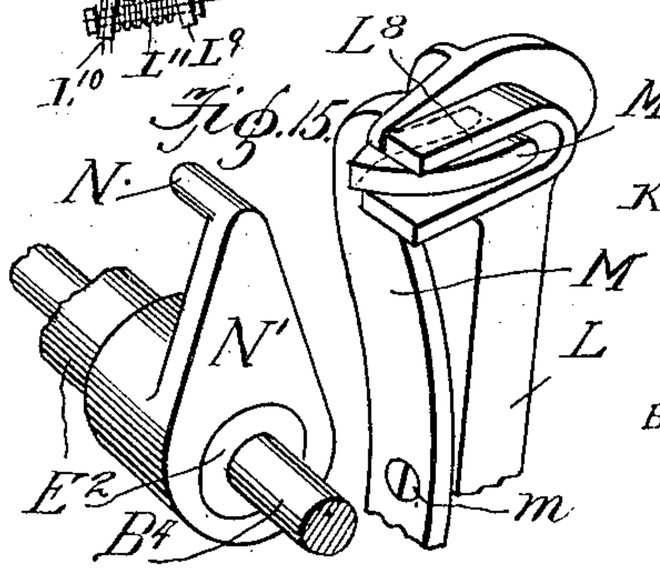


Fig. 12.

Fig. 15.



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CHARLES H. KNAPP, OF PATERSON, NEW JERSEY.

WARPING-MACHINE.

No. 868,452. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed August 17, 1906. Serial No. 330,950.

To all whom it may concern:

Be it known that I, CHARLES H. KNAPP, a citizen of the United States, residing in Paterson, in the county of Passaic and State of New Jersey, have invented a certain new and useful Improvement in Warping-Machines, of which the following is a specification.

The invention relates to machines for winding warp-threads upon a beam or spools, and more particularly to means for starting, stopping, and controlling the speed of such machines.

The object of the invention is to provide means conveniently located whereby the machine can be easily and quickly started or stopped and its speed increased or diminished at will, and which shall be simple in construction, positive in operation, and quickly responsive to the touch of the operator.

The invention consists in certain novel features, arrangements of parts and details of construction by which the above objects are attained, to be hereinafter described and pointed out in the claims.

The accompanying drawings form a part of this specification and show the invention as it has been carried out in practice.

Figure 1 is a side view of a machine embodying my invention and showing only so much of the warping mechanism as is necessary to understand the relation of the present improvements thereto. Fig. 2 is a corresponding plan view. Fig. 3 is a rear view, and Fig. 4 a front view of the same. Fig. 5 is a plan view of the foot-levers for operating the controlling mechanism. Figs. 6 and 7 are elevations of the slide and latch forming part of such mechanism. Fig. 8 is a side view of the latch alone, and Fig. 9 is an end view of the same. Fig. 10 is an elevation of a portion of the controlling mechanism. Fig. 11 is an elevation of certain parts of the same on a larger scale, and Fig. 12 is an elevation showing a detail of the same. Fig. 13 is a face view of a portion of the sprocket-chain employed in the controlling mechanism, and Fig. 14 is a side view of the same. Fig. 15 is a perspective detail of the slide, its latch, and the coöperating pin.

Similar letters of reference indicate the same parts in all the figures.

The general construction of the machine in respect to the winding mechanism is similar to that shown in a patent to me dated Jan. 5, 1904, No. 748,750, and need not be specifically described. The present invention relates, as before stated, more especially to the controlling means.

A is the main shaft driven by a belt, not shown, running on a pulley A^1, supported in bearings B^1 B^1 in the side-frames B B of the machine and arranged to be moved longitudinally therein by means to be described; the end opposite the pulley carries a friction-disk or face-plate A^2 thus moved into and out of frictional contact with a horizontal friction-wheel C^1 splined on a vertical shaft C journaled in a portion B^2 of the frame and carrying at its upper end a beveled gear-wheel, not shown, inclosed in a casing B^3, through which rotary motion is imparted to the beam or spools, not shown, by mechanism similar to that shown in the patent referred to above.

The shaft A revolves continuously and the winding mechanism is started by moving the shaft and face-plate longitudinally into strong frictional engagement with the friction wheel C^1; it is stopped by moving the shaft and face-plate out of such engagement; and the speed is controlled by the radial movement of the friction-wheel C' toward or from the center of the face-plate.

The friction-wheel has an annularly grooved sleeve C^2 in which are engaged the arms of a fork D^1 on a hollow slide D arranged to be moved vertically on a guide-rod D^2, and connected by a link D^3 to one end of a lever D^4 fulcrumed at *d* to a portion of the frame. The other end of the lever carries a length of segmental gear D^5 in mesh with a pinion E^1 on a sleeve E^2 mounted to revolve on an outwardly projecting stud B^4 firmly fixed to the side-frame B.

By means of a hand-wheel E^3 on the sleeve E^2 the latter with its pinion may be rotated by hand and the lever D^4 swung on its pivot *d* to raise or lower the friction-wheel C^1 and thus increase or lessen the rate of revolution of the shaft C and its connections. In order that the sleeve E^2 may be revolved in either direction and the machine started, stopped, and controlled without thus grasping the hand-wheel, the present improvement provides a system of levers and connected mechanism for performing these operations by the pressure of the foot of the operator or attendant, applied at the front, rear, or working-side of the machine in addition to the hand-wheel, thus permitting instant control from various positions while the hands of the operator may be otherwise employed.

A^3 is a sprocket-wheel on the main-shaft and F^1 F^2 are sprocket-wheels mounted on studs B^5 B^6, both at the same height within the frame B and in the same vertical plane. A sprocket-chain F running on the sprocket-wheel A^3 is led by means of idlers G^1, G^2 and G^3, to and partially around the sprocket-wheels F^1 F^2, the upper limb of the chain passing under the wheel F^1 and over the wheel F^2 causing them to revolve continuously in opposite directions. Each carries a friction-drum, marked F^3 and F^4 respectively, and above the drums is a swinging friction-wheel J^1 on a short shaft J carried in a fork J^2 on an L-shaped lever J^3 fulcrumed on the frame B at *j* so that by swinging the lever J^3 the wheel or drum J^1 carried thereby may be made to contact with one or the other of the drums F^3 F^4 and thus cause the short shaft J to rotate in either direction as desired. On this short shaft outside the frame B is a sprocket-wheel J^4 on which runs a sprocket-

chain J^5 in mesh with a sprocket-wheel E^4 on the sleeve E^2 and the latter may thus be caused correspondingly to revolve in either direction inducing through the lever D^4 the desired change of speed.

Below the free horizontal arm of the lever J^3 are two short foot-levers H^1 H^2 both fulcrumed on the same stud *h* near the floor, and each has a link, marked respectively H^3 H^4 connected to the end of the free arm of the lever J^3 but extending thereto from opposite sides of the fulcrum *h*. The short foot-levers H^1 H^2 terminate in foot-plates H^5 H^5 at the rear of the machine and each carries a foot-plate H^6 extending to the side of the machine. On the inner ends are overhung portions H^7 H^8 adapted to be struck from below by the ends of the long foot-levers K^1 K^2 respectively which are fulcrumed at *k* and extend to the front of the machine where they terminate in foot-plates K^3. Thus connected the lever J^3 may be swung to bring its friction-wheel J^1 into contact with either of the friction-drums F^3 F^4 by the foot of the operator applied to the foot-plates H^5 H^5 at the rear of the machine, or H^6 H^6 at the side, or K^3 K^3 at the front.

The machine is stopped and started by the movements of a vertical slide L through lever connections to the main-shaft A. The slide carries a pin L^1 engaged in a slot *l* in the long arm L^2 of a bell-crank lever fulcrumed within the frame at the rear; the short arm L^3 is connected through an adjustable link L^4 with an arm L^5 on a rock-shaft L^6 extending to the front of the machine where it carries a forked arm L^7 partially inclosing a sleeve A^4 on the main-shaft and receiving pins A^5 on such sleeve, the latter being held longitudinally between collars A^6 A^6 on the shaft so that the rising movement of the slide L moves the face-plate A^2 toward the friction-wheel C^1 to start the machine, and a reverse movement draws the face-plate from the friction-wheel and stops the machine.

The rising and sinking movements of the slide L are induced by the engagement of a pin N on an arm N^1 attached to the sleeve E^2, with the jaws L^8 at the upper end of the slide. The latter is held in the elevated position by the vertical latch M resting at the lower end on the lug B^5 on the frame and is released by the action of the pin N upon the upper end or head M^1 of the latch in the act of entering the jaws L^8. The latch is pivoted at *m* and its head is beveled so that the action of the pin N swings the latch against the force of a spring M^2 sufficiently to disengage its lower end from the lug B^5, conditioning the slide to descend with the further downward movement of the arm N^1. The forked arm L^7 is loosely mounted on the rock-shaft L^6 and is moved by the latter through an arm L^9 thereon, connected to a lug L^{10} on the forked arm by an expansion spring L^{11} serving to soften the movement and hold the friction-disk or face-plate A^2 yieldingly to the friction-wheel C^1.

From the above it will be evident that when the sleeve E^2 is actuated through the operation of the swinging friction drum that the pin N is brought around so as to engage the catch M and release the slide L at the same time that the friction wheel C' is brought to the center of the friction disk A^2. The depression of a foot-lever throws the friction wheel J' into contact with the friction-drum F^4 and through the sprocket-chain J^5 and sprocket-wheel E^4 revolves the sleeve E^2 and causes the pin N to enter the jaws L^8 and swing the latch M on its pivot *m* to release the slide L which by the further movement of the pin N on the arm N' is forced downward and carrying with it the long arm of the bell-crank lever L^2. From the short arm L^3 of this lever extends an adjustable link L^4, above described, which through the arm L^5 partially rotates the shaft L^6 and by means of the forked-arm L^7 and pin A^5 the shaft A and its friction-disk A^2 is moved endwise to bring the latter into frictional contact with the friction-wheel C'. The lifting of the slide by the reëngagement of the pin N with the jaws L^8 reverses the movement, throws the friction wheel C' to or near the center of the friction disk A^2 and at the same time moves the shaft A and disk A^2 axially out of contact with the friction-wheel C'.

Lugs B^6 and B^7 on the framing, one at each end of the slot *b* in which the shaft J swings, are so shaped and located as to be struck by spur-links J^6 in the chain J^5 and limit the extent of motion of the friction-wheel C^1 by automatically throwing the friction-wheel J^1 out of contact with its driver F^3 or F^4.

Thus arranged the machine may be started, stopped and controlled by the hand-wheel E^3 or by the foot of the attendant on the foot-plates; a light touch of the foot is sufficient to induce a slight change in speed, and as the friction-wheel J^1 tends naturally to a middle position between the friction-drums F^3 and F^4, the parts automatically maintain their relative positions and the machine continues to run at that speed until again changed or stopped. The jaws L^8 of the slide L are engaged by the pin N of the arm N^1 through only a short arc of its circumferential sweep, sufficient to operate the slide in stopping and starting, during the remainder of its sweep the arm N^1 swings idly with the sleeve E^2 as the latter is partially rotated to vary the speed. Continued pressure on either of one set of foot-plates stops the machine, while similar action upon either of the other set starts it again.

The spur-links J^6 are so set as to engage the lugs B^6 B^7 and reverse the movement before the segment D^5 has traveled in either direction out of mesh with the pinion E^1; and the arm N^1 is so located relatively to the pinion E^1 as to engage the jaws of the slide L and stop the machine at the time when the friction-wheel C^1 is at its nearest approach to the center of the disk A^2 and the speed correspondingly reduced. This is of course the starting position also.

Modifications may be made in the forms and proportions of the parts. The construction and arrangement of the foot-levers may be varied to present their foot-plates at other points than here shown, and a greater or less number of such operative points may be provided.

I claim:—

1. In a machine of the character set forth, a shaft, a friction-disk thereon, a friction-wheel rotated by said disk and movable radially thereof, a lever connected to said friction-wheel and having gear-teeth thereon, a pinion in mesh with said teeth, and means constructed to be operated by the foot for rotating said pinion in either direction to vary the speed of said friction-wheel.

2. In a machine of the character set forth, a shaft, a friction-disk thereon, a friction-wheel rotated by said disk and movable radially thereof, a lever connected to said friction-wheel and having gear-teeth thereon, a pinion in mesh with said teeth, a swinging friction-wheel, oppositely revolving friction-drums adjacent to said swinging friction-

wheel, means operated by the foot for causing said swinging friction-wheel to engage either of said friction-drums, and means for communicating the rotary movement of said swinging friction-wheel to said pinion.

3. In a machine of the character set forth, a shaft, a friction-disk thereon, a friction-wheel rotated by said disk and movable radially thereof; a lever connected to said friction-wheel and having gear-teeth thereon, a pinion in mesh with said gear-teeth, a sprocket-wheel revolving with said pinion, a swinging friction-wheel below said pinion, a sprocket-wheel revolving with said swinging friction-wheel, a sprocket-chain running on said sprocket-wheels, oppositely revolving friction-drums adjacent to said swinging friction-wheel, and a foot-lever arranged to move said swinging friction-wheel into or out of engagement with either of said friction-drums.

4. In a machine of the character set forth, a shaft, a friction-disk thereon, a friction-wheel rotated by said friction-disk and movable radially thereof, a lever connected to said friction-wheel and having gear-teeth thereon, a pinion in mesh with said gear-teeth, a sprocket-wheel revolving with said pinion, a swinging friction-wheel below said pinion, a sprocket-wheel revolving with said swinging friction-wheel, a sprocket-chain running on said sprocket-wheels, a rocking-lever in which said swinging friction-wheel is mounted, oppositely revolving friction-drums adjacent to said swinging friction-wheel, and foot-levers connected to said rocking-lever for moving said swinging friction-wheel into and out of engagement with either of said friction-drums.

5. In a machine of the character set forth, a shaft arranged to be moved axially, a friction-disk thereon, a friction-wheel rotated by said disk and movable radially thereof, a lever connected to said friction-wheel and having gear-teeth thereon, a pinion in mesh with said gear-teeth, a sleeve carrying said pinion, an arm on said sleeve, a slide arranged to be engaged by said arm, and connections from said slide to said shaft for moving said disk axially into and out of frictional contact with said friction-wheel.

6. In a machine of the character set forth, a shaft arranged to be moved axially, a friction-disk thereon, a friction-wheel rotated by said disk and movable radially thereof, a lever connected to said friction-wheel and having gear-teeth thereon, a pinion in mesh with said gear-teeth, an arm moving with said pinion, a slide arranged to be engaged by said arm, a rock-shaft oscillated by said slide, and a yielding connection from said rock-shaft to said friction-disk for moving the latter yieldingly into and out of frictional contact with said friction-wheel.

7. In a machine of the character set forth, a shaft arranged to be moved axially, a friction-disk thereon, a friction-wheel rotated by contact with said disk and movable radially thereof, means for inducing such radial movement, a slide and connections therefrom for inducing such axial movements of said shaft and disk, and an arm actuated by said means and arranged to engage said slide and move said disk into or out of frictional engagement with said friction-wheel when the latter is at the extreme of its inward radial movement and means on said slide and arm respectively for holding and releasing the slide.

8. In a machine of the character set forth, a shaft arranged to be moved axially, a friction-disk thereon, a friction-wheel rotated by contact with said disk and movable radially thereof, a lever connected to said friction-wheel and having gear-teeth thereon, a pinion in mesh with said gear-teeth, an arm moving with said pinion, a slide arranged to be moved by said arm, connections from said slide to said shaft for inducing axial movements thereof, a latch carried by said slide for holding the latter when at one extreme of its motion, and a pin carried by said arm for moving said latch and thereby releasing said slide.

9. In a machine of the character set forth, a shaft arranged to be moved axially, a friction-disk thereon, a friction-wheel rotated by contact with said disk and movable radially thereof, a lever connected to said friction-wheel and having gear-teeth thereon, a pinion in mesh with said gear-teeth, a sprocket-wheel revolving with said pinion, a swinging friction-wheel below said pinion, a sprocket-wheel revolving with said swinging friction-wheel, a sprocket-chain running on said sprocket-wheels, spur-links on said sprocket-chain, and lugs arranged to be struck by said spur-links and thereby shift the position of said swinging-friction-wheel.

In testimony that I claim the invention above set forth I affix my signature, in presence of two witnesses.

CHARLES H. KNAPP.

Witnesses:
CORNELIUS A. KERSHACK,
JACOB POELSTRA.