964,366.

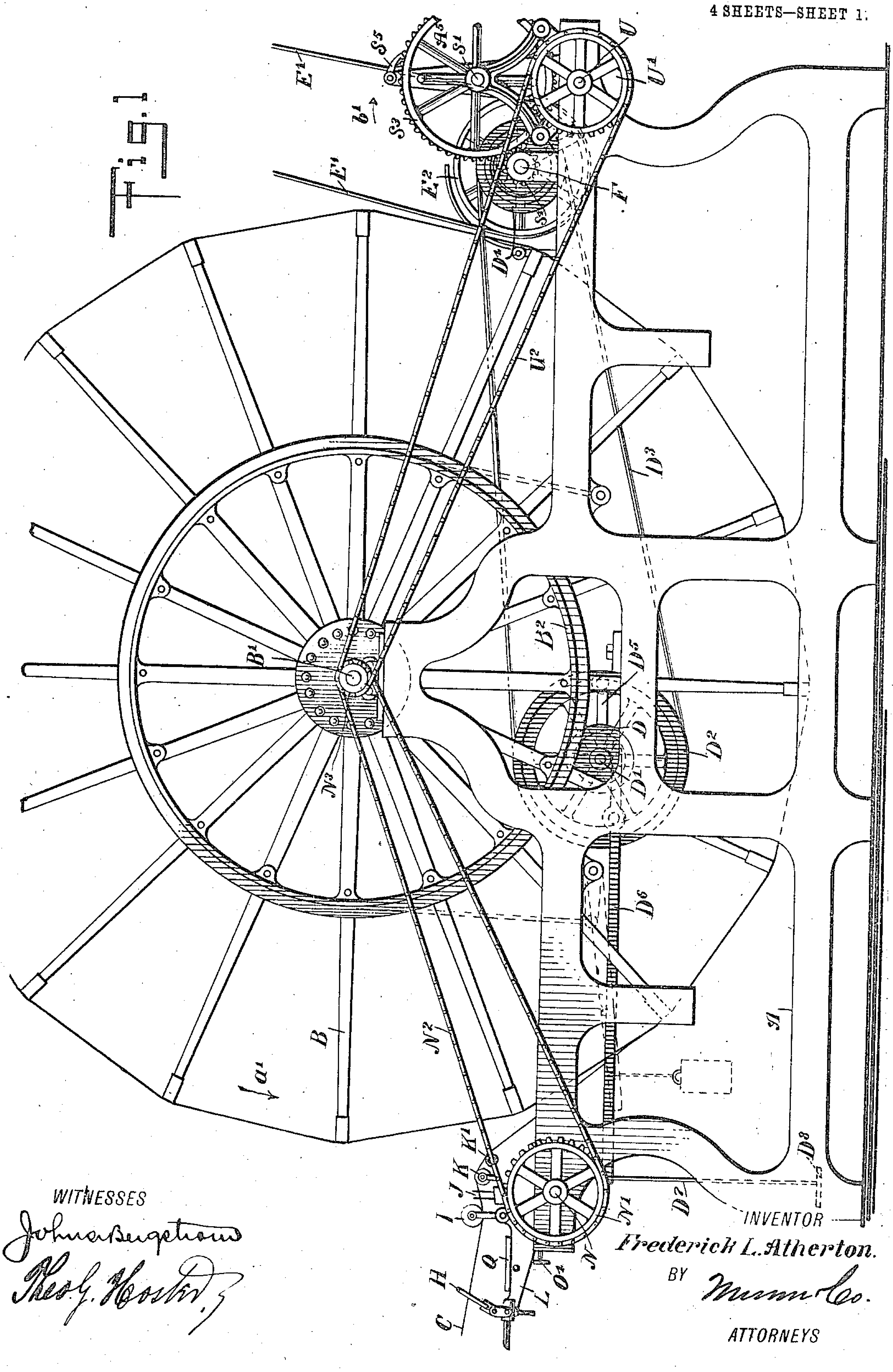
F. L. ATHERTON.

WARPING MACHINE.

APPLICATION FILED APR. 24, 1909.

Patented July 12, 1910.

4 SHEETS—SHEET 1.



WITNESSES

John A. Bergstrom

Theo. G. Hoster

INVENTOR

Frederick L. Atherton.

BY *Munn & Co.*

ATTORNEYS

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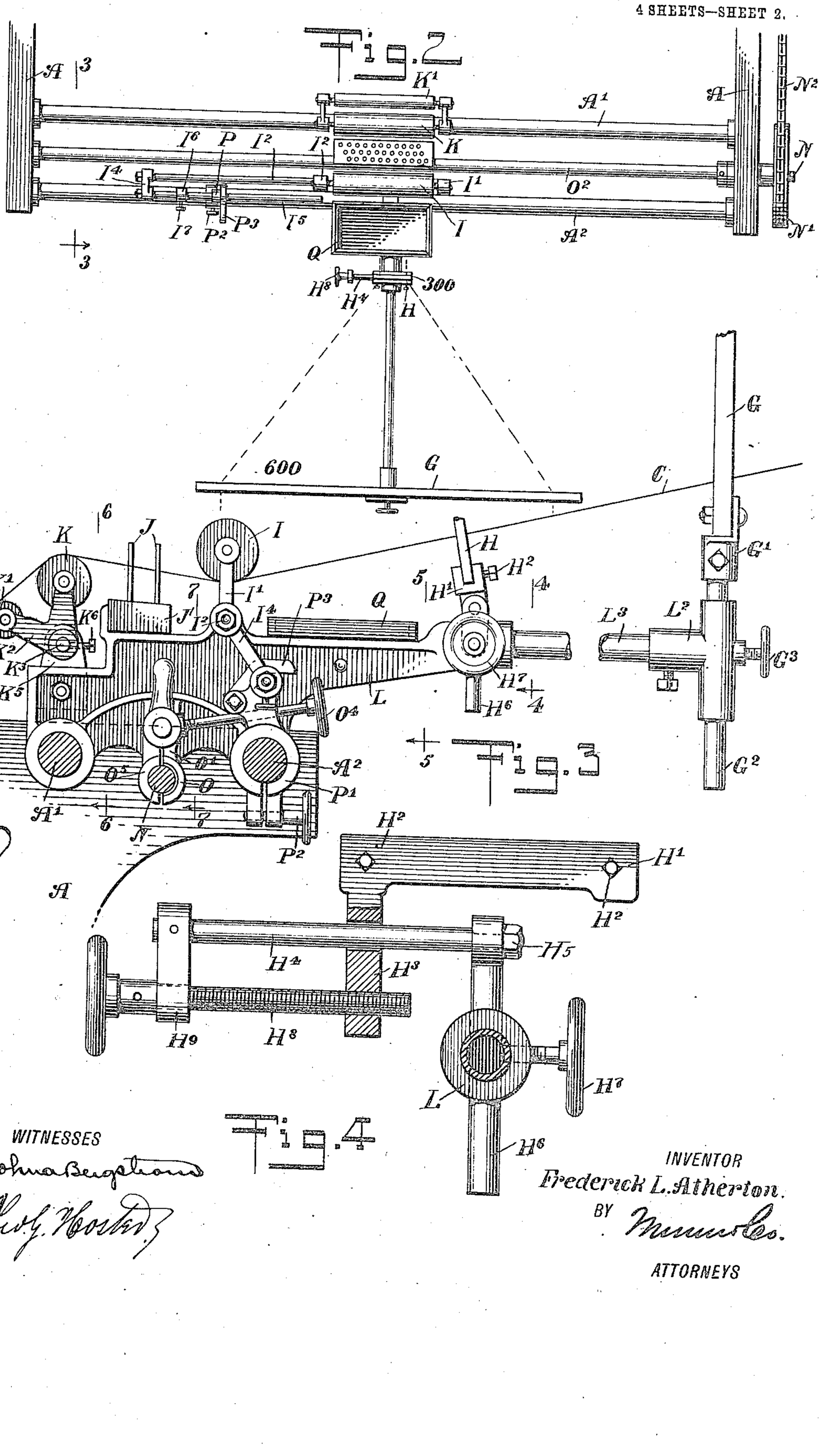

Fig. 2

Fig. 3

Fig. 4

WITNESSES

John A. Berglund

Alvy. Hoosier

INVENTOR

Frederick L. Atherton.

BY Munn & Co.

ATTORNEYS

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Fig. 5

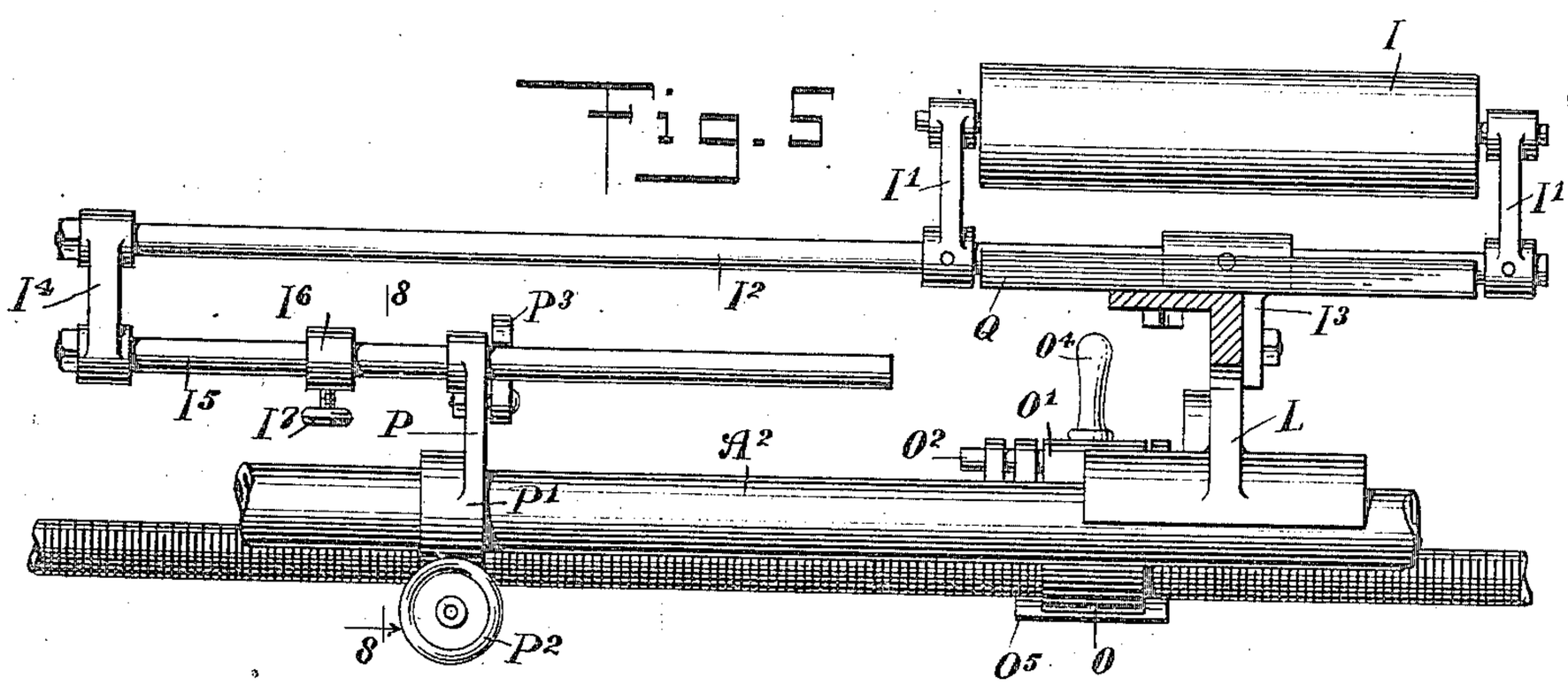


Fig. 6

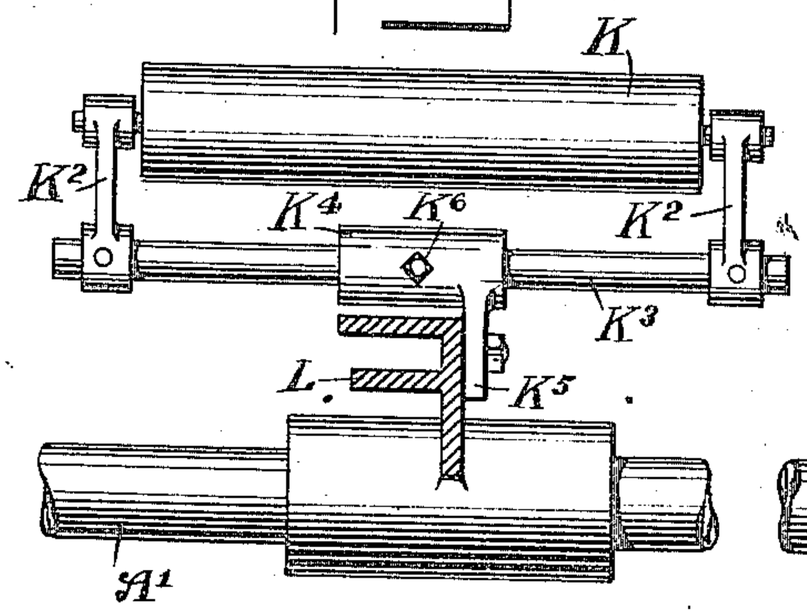
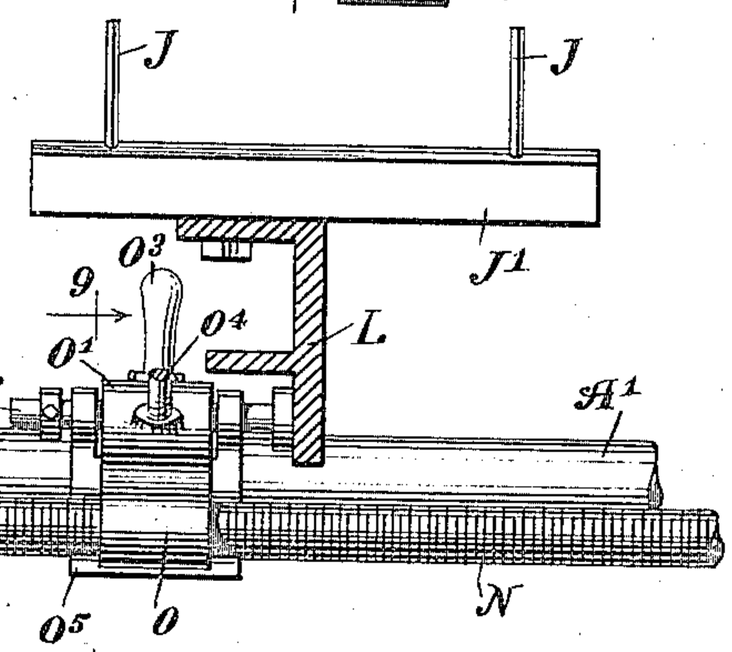


Fig. 7



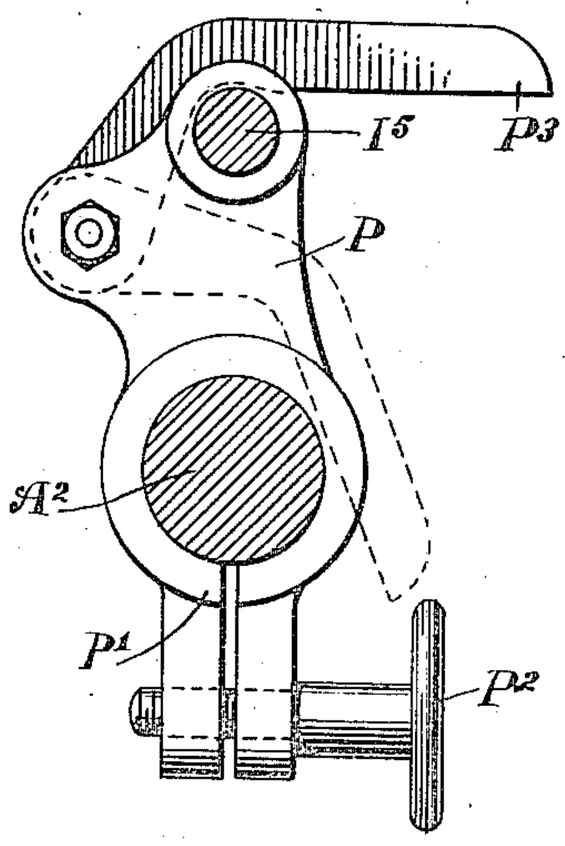


Fig. 8

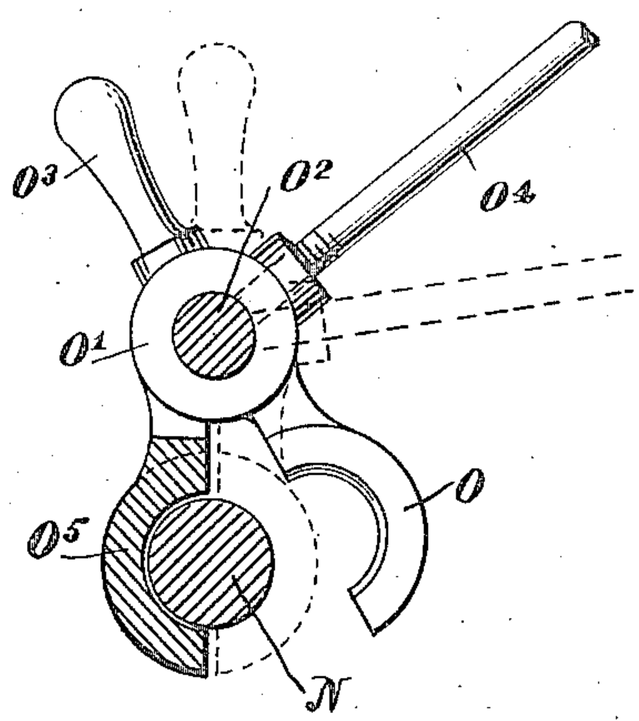


Fig. 9

WITNESSES

John A. Brighton

Rud. F. Hoster Jr.

INVENTOR

Frederick L. Atherton.

BY Munn & Co.

ATTORNEYS

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4 SHEETS—SHEET 4.

Fig. 10

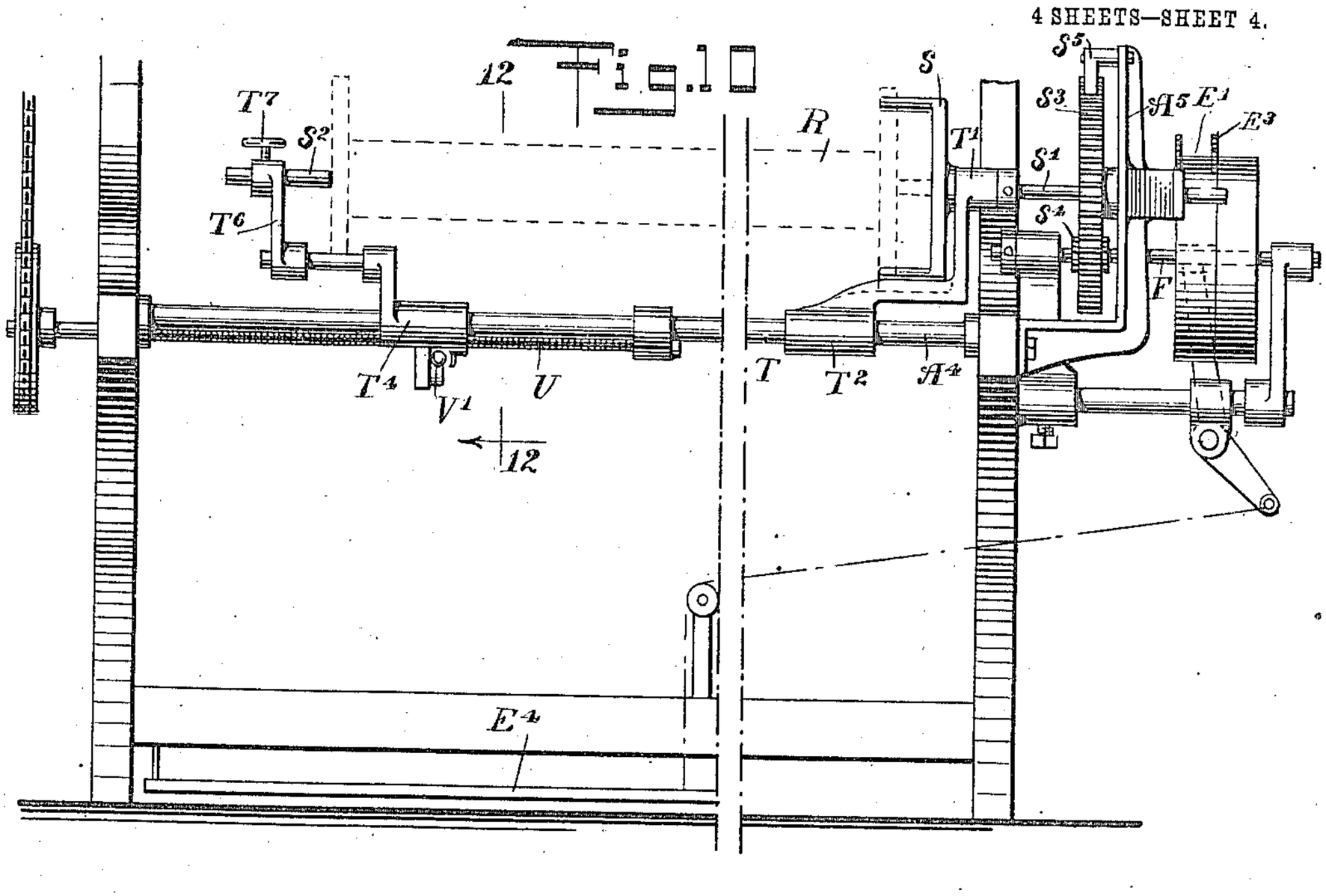


Fig. 11

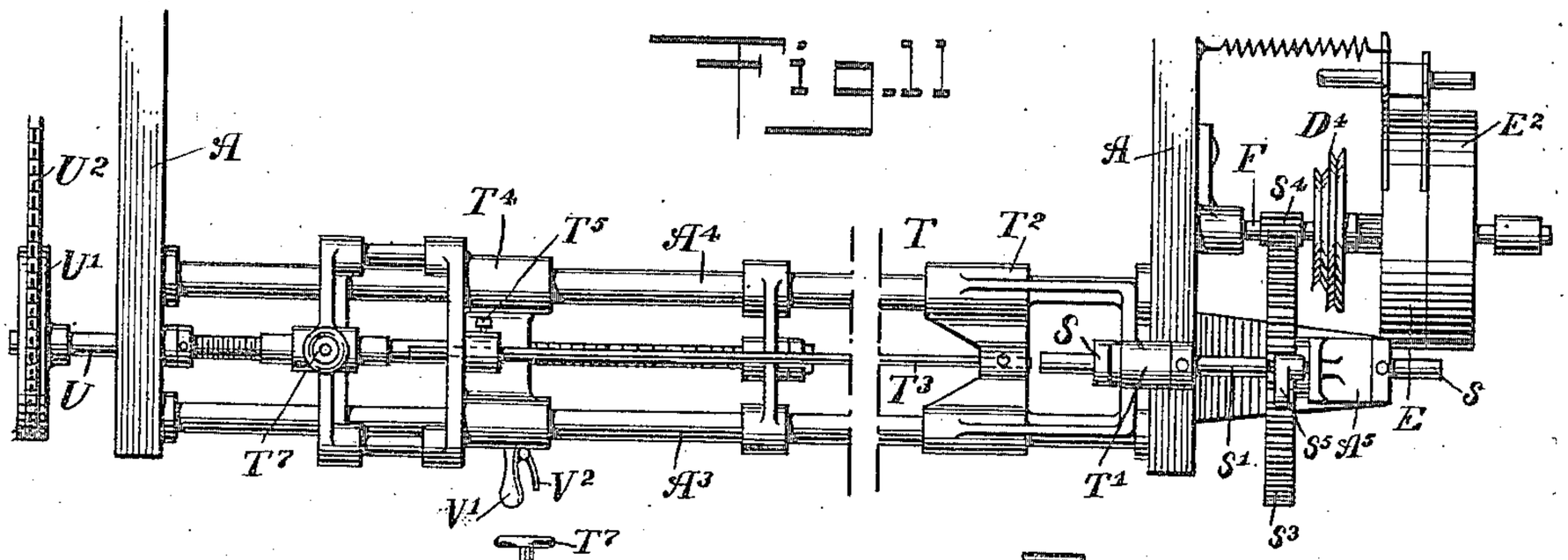


Fig. 12

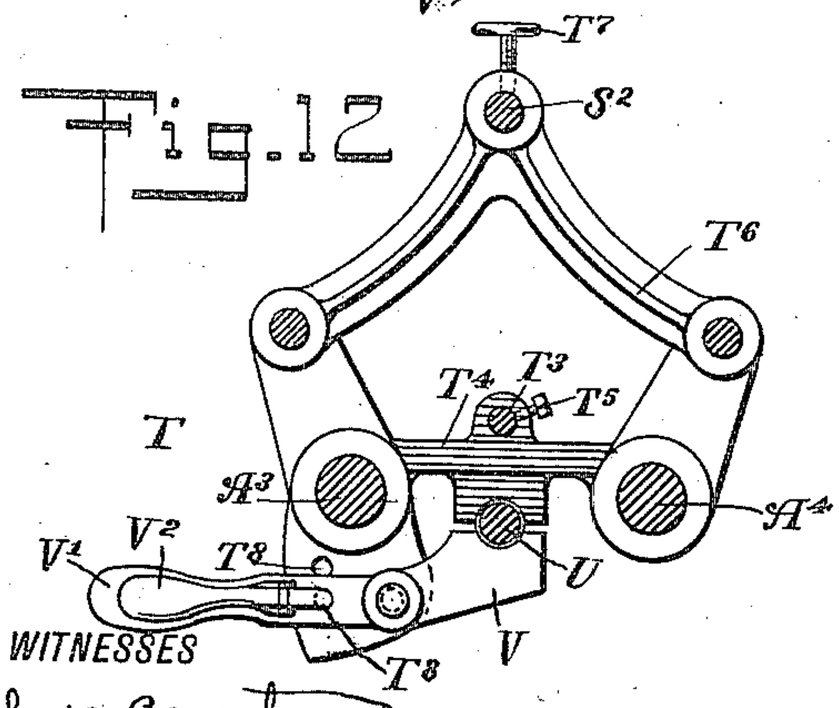
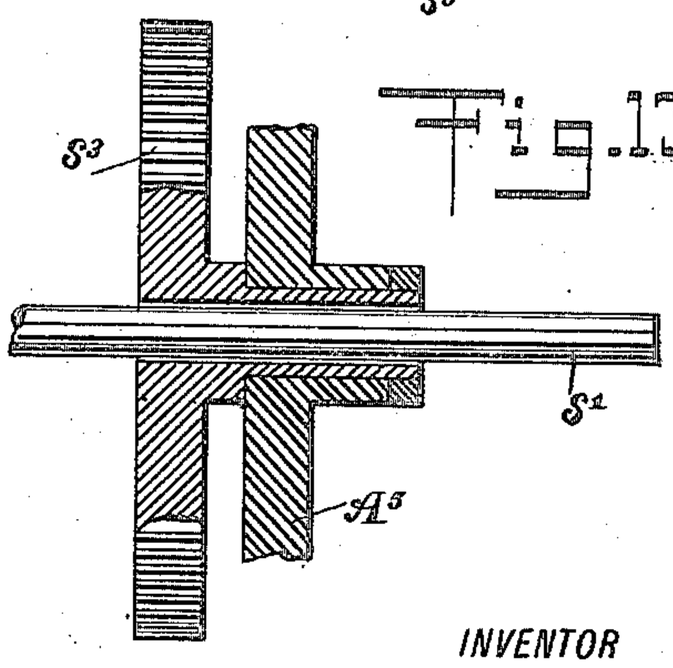


Fig. 13



WITNESSES

John A. Bergstrom

Rud. J. Hoerdt

INVENTOR

Frederick L. Atherton

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

FREDERICK L. ATHERTON, OF PATERSON, NEW JERSEY.

WARPING-MACHINE.

964,366. Specification of Letters Patent. Patented July 12, 1910.

Application filed April 24, 1909. Serial No. 491,876.

To all whom it may concern:

Be it known that I, FREDERICK L. ATHERTON, a citizen of the United States, and a resident of Paterson, in the county of Passaic and State of New Jersey, have invented a new and Improved Warping-Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved warping machine, more especially designed for the preparation of warps for silk and other goods, and arranged to insure the formation of even warp sections, in which the threads are not liable to creep one on the other and leave section marks in the final weave.

A further object is to prevent the formation of irregular warp sections, by giving a signal to the attendant as soon as a warp section is completed.

The invention consists of novel features and parts and combinations of the same, which will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement; Fig. 2 is an enlarged plan view of the improvement at the reeling side of the machine; Fig. 3 is an enlarged sectional side elevation of the same, on the line 3—3 of Fig. 2; Fig. 4 is an enlarged cross section of the adjustable support for the second reed, the section being on the line 4—4 of Fig. 3; Fig. 5 is a cross section of the improvement on the line 5—5 of Fig. 3; Fig. 6 is a similar view of the same on the line 6—6 of Fig. 3; Fig. 7 is a similar view of the same on the line 7—7 of Fig. 3; Fig. 8 is an enlarged sectional side elevation of the alarm device, the section being on the line 8—8 of Fig. 5; Fig. 9 is an enlarged sectional side elevation of the feed screw and half nut on the carriage for engaging the feed screw, the screw being on the line 9—9 of Fig. 7; Fig. 10 is an elevation of the beam end of the warping machine; Fig. 11 is a plan view of the same; Fig. 12 is a transverse section of the same on the line 12—12 of Fig. 10; Fig. 13 is an enlarged cross section of the driving gear for the beam.

On the main frame A of the warping machine is journaled the shaft B′ of the reel B, on which are wound the warp threads C in sections, the reel being rotated for this purpose in the direction of the arrow *a′* by the use of a pulley B^2, secured on the reel and in frictional contact with a pulley D, secured on a shaft D′, provided with a pulley D^2, connected by a belt D^3 with a pulley D^4 (see Figs. 1 and 11), attached to a pulley E, mounted to rotate loosely on the main driving shaft F journaled in the main frame A at the beam side of the machine, and the said pulley E is adapted to be engaged by a belt E′ connected with other machinery, and also adapted to engage a pulley E^2 fastened on the shaft F. The belt E′ is adapted to be shifted from one pulley E to the other pulley E^2 by a suitable belt shifter E^3, actuated from a treadle E^4, under the control of the operator (see Fig. 10.)

When the belt E′ engages the pulley E and rotates the same, then a like motion is given to the pulley D^4, which by the belt D^3 rotates the pulleys D^2, D, so that the pulley D imparts a rotary motion to the pulley B^2, to rotate the reel B in the direction of the arrow *a′*. The shaft D′ carrying the pulleys D and D^2 is journaled on an arm D^5, fulcrumed on the main frame A, and engaged by a lever D^6 connected by a link D^7 with a treadle D^8 under the control of the operator, to enable the latter to hold the pulley D in contact with the pulley D^2, or to allow the pulley D to swing out of engagement with the pulley B^2, whenever it is desired to stop the rotation of the reel B.

The warp threads C of a warp section pass from the spools (not shown) successively through the reeds G and H (see Figs. 2 and 3), and then the warp threads pass under a guide roller I, then between properly spaced pins J and over the delivery rollers K and K′, of which the roller K′ is located adjacent to the peripheral face of the reel. The reeds G and H, the rollers I, pins J and delivery rollers K and K′ are all supported on a carriage L mounted to slide transversely on guideways A′ and A^2, forming part of the main frame A, and a transverse sliding movement is given to the carriage L by the use of a feed screw N and a half-nut O, of which the feed screw N is journaled in the main frame A, and is provided at one outer end with a sprocket wheel N′ connected by a sprocket chain N^2 with a sprocket wheel N^3 attached to the reel shaft

B'. Thus when the reel B is rotated, as previously explained, then a rotary motion is given to the feed screw N, which by the half-nut O imparts a transverse sliding movement to the carriage L.

The half-nut O is provided with an arm O', mounted to turn and to slide transversely on a stud O^2 (see Figs. 7 and 9), attached to the carriage L, and on the said arm O' is formed a handle O^3, under the control of the operator, for throwing the half-nut O in or out of engagement with the feed screw N. Now when the feed screw N is running and the operator throws the half-nut O down against the feed screw N, the threads of the half-nut O readily engage the threads of the feed screw N, as the half-nut O has a limited sliding movement on the stud O^2, and hence the threads move readily and easily into mesh.

In the hub of the arm O' screws a handled screw O^4, under the control of the operator, for securing the arm O' in place on the stud O^2, to hold the half-nut O locked when in engagement with the feed screw N. On the stud O^2 is held a bearing O^5, extending close to the feed screw N, directly opposite the half-nut O, to prevent the feed screw N from bending when swinging the half-nut O into engagement with the feed screw N (see Fig. 9).

The delivery rollers K, K' are journaled in a roller frame K^2, having a transverse rod K^3, extending through a bearing K^4, formed on a bracket K^5, bolted or otherwise secured to the carriage L. In the bearing K^4 screws a set screw K^6 against the rod K^3, to fasten the roller frame K^2 in place. When the set screw K^6 is loosened, the roller frame K^2 can be shifted transversely on the bracket K^5, to bring the rollers K, K' in proper alinement with the guide roller I and reeds H and G, and the said roller frame can be swung on the bracket K^5, to bring the roller K nearer to or farther from the peripheral face of the reel B, according to the thickness of the warp section to be wound on the reel. Thus if the warp is, say, 600 yards long, and is to be built up on the reel B in sections of three-eighths inch thickness, then the roller K is set within a half inch of the peripheral face of the reel, and if the warp is eighteen hundred yards long and is to be built up on the reel in sections of, say, five-eighths of an inch thickness, then the roller K is set within three-fourths of an inch from the peripheral face of the reel B. In other words, the roller K is set as near the peripheral face of the reel B as possible to reduce the distance between the peripheral face of the roller K and the reel B to a minimum, with a view to prevent the warp threads, during the passage from the roller K to the reed B from creeping one upon the other, and thus prevent the formation of an irregular warp section. It is understood that such irregularity in the warp leaves section marks in the final weave.

The pins J are inserted in apertures formed in an apertured plate J' secured to the carriage L, it being understood that the pins are spaced apart according to the width of the warp section run onto the reel B at the time. The guide roller I is journaled in a frame I', having a transversely-extending rod I^2 attached to a bracket I^3 secured to the carriage L. On the rear end of the rod I^2 is secured an arm I^4 carrying a transversely-extending rod I^5, slidingly engaging a bracket P having a split hub P', slidably fitting the guideway A^2 (see Figs. 5 and 8) and engaged by a clamping screw P^2, to secure the bracket P in place on the guideway A^2, after the bracket has been shifted to proper position. On the bracket P is fulcrumed an L-shaped alarm arm P^3, normally resting with its free end on the rod I^5, moving transversely with the carriage L, so that the alarm arm P^3 finally drops off the free or unsupported end of the rod I^5 and swings downward by its own weight, the alarm arm P^3 finally striking the guideway A^2, thus sounding the alarm and thereby notifying the operator in charge that the carriage L has traveled the desired distance according to the width of the warp section to be wound on the reel B. When this takes place the operator unlocks the half-nut O and swings the same out of engagement with the feed screw N, and then shifts the carriage L transversely in an opposite direction to its previous travel, until an adjustable stop collar I^6 on the rod I^5 abuts against the bracket P and thus stops further movement of the carriage L in this direction. The operator now again reëngages the half-nut O with the feed screw N, and locks the same in place on the rod O^2 by the screw O^4, so that the feed screw N again imparts a transverse traveling motion to the carriage L. From the foregoing it will be seen that by the arrangement described, an alarm is sounded after the carriage L has traveled a predetermined distance corresponding to the width of the warp section. The stop collar I^6 is adjustably secured to the rod I^5, by a set screw I^7, and by adjusting the stop collar I^6 nearer to or farther from the free end of the rod I^5, the alarm is sounded sooner or later according to the width of the warp section.

The frame of the reed H is adjustably secured with its bottom bar in a support H' by set screws H^2, and from the support H' depends a lug H^3, mounted to slide on a transverse rod H^4, secured by a nut H^5 to a rod H^6, vertically adjustable in the carriage L, and secured thereto by a set screw H^7 after the rod H^6 is adjusted. A screw rod H^8 screws in the lugs H^3 and is mounted to

turn on an arm H^9 held on the rod H^4, so that when the screw rod H^8 is turned by the operator, the reed H is transversely adjusted, to bring the reed into the desired position relative to the guide roller I, pins J, J and roller K, K'.

The first or gathering reed G is attached to a head G', having a rod G^2 vertically adjustable in a bearing L^2, held on a rod L^3, forming a part of the carriage L, and the said rod G^2 is secured in place on the bearing L^2 by a set screw G^3. On loosening the set screws H^7 and G^3, the reeds G and H can be raised or lowered, to suit existing conditions. A tool or other tray Q is mounted on the carriage L, preferably between the gathering reed H and the guide roller I, as shown in the drawings.

On the right-hand side of the machine is arranged the beaming mechanism for winding the warp sections on the beam R, engaged at one end by the clutch S (see Figs. 10 and 11), secured at the inner end of a transverse shaft S', mounted to turn in a bearing T' formed on the head T^2 of a beam carriage T, adjustably connected by a connecting rod T^3 with a head T^4 (see Figs. 11 and 12), the said heads T^2 and T^4 being mounted to slide transversely on the guideways A^3, A^4, forming parts of the main frame A. The connecting rod T^3 is secured by a set screw T^5 in the head T^4, so that when the set screw T^5 is loosened the heads T^2, T^4 can be adjusted toward or from each other, to suit the length of the beam R.

The rear end of the beam R is engaged by a center S^2, held adjustable in the bracket T^6, forming part of the head T^4. The center S^2 is secured in place on the bracket T^6 by a set screw T^7, and when the latter is loosened a minute adjustment of the center S^2 can be made to suit slight variations in the length of different beams R, without resorting to adjustment of the heads T^2 and T^4, toward or from each other, as above explained.

The clutch shaft S' for turning the clutch S and the beam R is mounted to slide in and to turn with a gear wheel S^3, journaled in a bracket A^5, attached to the main frame A (see Figs. 1, 10, 11 and 13), and the gear wheel S^3 is in mesh with a pinion S^4, secured on the main driving shaft F, so that when the latter is driven at the time the belt E' is on the fast pulley E^2, then a rotary motion is given by the pinion S^4 and gear wheel S^3 to the clutch shaft S', to rotate the beam R in the direction of the arrow *b'*, to wind up the warp. Return movement of the gear wheel S^3 is prevented by a pawl S^5 fulcrumed on the bracket A^5.

A transverse sliding movement is given to the carriage T and the beam R carried by the same, by the use of a feed screw U, journaled in the main frame A, and connected by sprocket wheels U' and sprocket chains U^2 with the reel shaft B' of the reel B, so that when the latter is rotated on the warp unwinding from the reel B and winding upon the beam R, then a rotary motion is given to the feed screw U. The latter is engaged by a half-nut V held on a hand lever V', fulcrumed on the head T^4 of the carriage T (see Figs. 10, 11 and 12), and the said lever V' is adapted to be locked in place on the head T^4 by a locking lever V^2 mounted on the hand lever V', and engaging one of two apertures T^8 on the head T^4, to hold the half-nut V locked in open or closed position.

The reel B is provided with the usual brake mechanism to hold the reel B against turning too fast when unwinding the warp from the reel B and winding it up on the beam R. As this brake mechanism is of the usual construction a detail description of the same is not deemed necessary.

The operation is as follows: When winding the warp sections onto the reel B, the belt E' is in engagement with the loose pulley E, so that the beaming mechanism is at a standstill while the reel B is driven by power, to wind up the warp sections and to move the carriage L transversely for feeding the warp C in sections on the reel B. When a warp section is completed an alarm is given by the alarm arm P^3 dropping off the end of the rod I^5, so that the operator in charge can stop the feeding movement of the carriage L, and quickly return the same to starting position, with the collar I^6 abutting against the bracket P, and then the carriage L is again fed forward by the action of the feed screw O, as above explained. When the winding of the warp sections on the reel B is completed, the reel B is stopped by dropping the pulley D, and the belt E' is shifted from the loose pulley E onto the fast pulley E^2, to start the beaming mechanism, for winding the warp on the beam R. It is understood that the beam R is power driven to wind up the warp and to rotate the reel B held against too fast turning by the brake mechanism.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A warping machine, comprising a reel, and a yarn delivery device for delivering the warp threads to the said reel, means for shifting the said delivery device transversely, and an alarm actuated by the said delivery device on the latter reaching the end of a predetermined distance of travel corresponding to the width of the warp section to be wound on the reel.

2. A warping machine, comprising a reel, a carriage mounted to travel transversely, a delivery device on the said carriage for delivering the warp threads to the peripheral

face of the reel, and an alarm device controlled by the said carriage for giving an alarm at the time the carriage has traveled a predetermined distance corresponding to the width of the warp section to be wound on the reel.

3. A warping machine, comprising a reel, a carriage mounted to travel transversely, a delivery device on the said carriage for delivering the warp threads to the peripheral face of the reel, a rod on the said carriage, a drop arm for sounding an alarm and adapted to be held in raised position by the said rod, and a bracket fixed relative to the said carriage and carrying the said drop arm for the latter to drop off the end of the said rod on the carriage traveling a predetermined distance.

4. A warping machine, comprising a reel, a carriage mounted to travel transversely, a delivery device on the said carriage for delivering the warp threads to the peripheral face of the reel, a rod on the said carriage, a drop arm for sounding an alarm and adapted to be held in raised position by the said rod, a bracket fixed relative to the said carriage and carrying the said drop arm for the latter to drop off the end of the said rod on the carriage traveling a predetermined distance, and a stop collar on the said rod for engagement with the said bracket for limiting the return movement of the carriage.

5. A warping machine, comprising a reel, a carriage mounted to travel transversely, a delivery device on the said carriage for delivering the warp threads to the peripheral face of the reel, an alarm device controlled by the said carriage for giving an alarm at the time the carriage has traveled a predetermined distance, and means for adjusting the alarm device according to the width of the warp section to be wound on the reel.

6. A warping machine, comprising a reel, a carriage mounted to travel transversely, a delivery device on the said carriage for delivering the warp threads to the peripheral face of the reel, an alarm device controlled by the said carriage for giving an alarm at the time the carriage has traveled a predetermined distance, a bracket carrying the alarm device a fixed support for the said bracket, and means for adjustably securing the said bracket on the said fixed support.

7. A warping machine, comprising a main frame, a reel journaled on the said frame, a carriage mounted to slide transversely on the said main frame, delivery devices on the said carriage for delivering the warp threads to the said reel, a fixed screw journaled in the said main frame and driven from the said reel, a half-nut mounted to swing on the said carriage and provided with a handle for manipulating the said half-nut, to swing the same into and out of engagement with the said fixed screw, a bearing opposite the half-nut, and means for locking the half-nut in engagement with the screw.

8. A warping machine, comprising a main frame having transverse guideways, a reel journaled on the said main frame, a carriage mounted to travel on the said guideways, a feed screw journaled on the said frame and driven from the said reel, a half-nut mounted on the said carriage and adapted to be thrown in and out of engagement with the said feed screw, a roller frame mounted to swing and slide on the said carriage and carrying delivery rollers for delivering the warp threads to the said reel, reeds mounted on the said carriage for the passage of the warp threads to the said delivery rollers, a guide roller, and pins mounted on the said carriage between the said guide rollers and the next adjacent reed.

9. A warping machine, comprising a main frame having transverse guideways, a reel journaled on the said main frame, a carriage mounted to travel on the said guideways, a feed screw journaled on the said frame and driven from the said reel, a half-nut mounted on the said carriage and adapted to be thrown in and out of engagement with the said feed screw, a roller frame adjustably secured on the said carriage and carrying delivery rollers for delivering the warp threads to the said reel, reeds mounted on the said carriage for the passage of the warp threads to the said delivery rollers, a guide roller mounted on the said carriage at a point between the delivery rollers and the next adjacent reed, a perforated plate on the said carriage, and pins adjustably held on the said plate and extending between the said guide roller and the said delivery rollers.

10. A warping machine provided with a reel, a carriage mounted to travel transversely, a delivery device on the said carriage for delivering the warp threads to the peripheral face of the reel, a reed for the passage of the warp threads to the said delivery device, the said reed having a depending lug, a transverse rod on the said carriage and extending through the said lug, and an adjusting screw mounted to turn on the said rod and screwing in the said lug.

11. A warping machine provided with a main frame, a reel journaled on the said main frame, a carriage mounted to travel transversely on the said frame, a bracket attached to the said carriage and having a bearing, a roller frame having a transverse rod extending through the said bearing, delivery rollers journaled on the said roller frame for delivering the warp threads to the said reel, and a set screw screwing in the said bearing against the said rod.

12. A warping machine provided with a main frame, a reel journaled in the said

frame, a beam carriage mounted to slide transversely on the said main frame, and formed of heads and a rod fixedly secured to one head and adjustably secured to the other head, a feed screw driven from the reel and journaled on the said main frame, and a lever carrying a half-nut and mounted to swing on the said beam frame, the said half-nut being adapted to engage the said feed screw.

13. A warping machine provided with a main frame, a reel journaled in the said frame, a beam carriage mounted to slide transversely on the said main frame and formed of heads and an adjustable connection with the said heads, a feed screw driven from the reel and journaled on the said main frame, a lever carrying a half-nut and mounted to swing on the said beam frame, the said half-nut being adapted to engage the said feed screw, a driven shaft journaled in one of the said heads, a clutch on the said shaft for engaging one end of the beam, and an adjustable center on the other head for engaging the other end of the said beam.

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

FREDERICK L. ATHERTON.

Witnesses:

THEO. G. HOSTER,

PHILIP D. ROLLHAUS.