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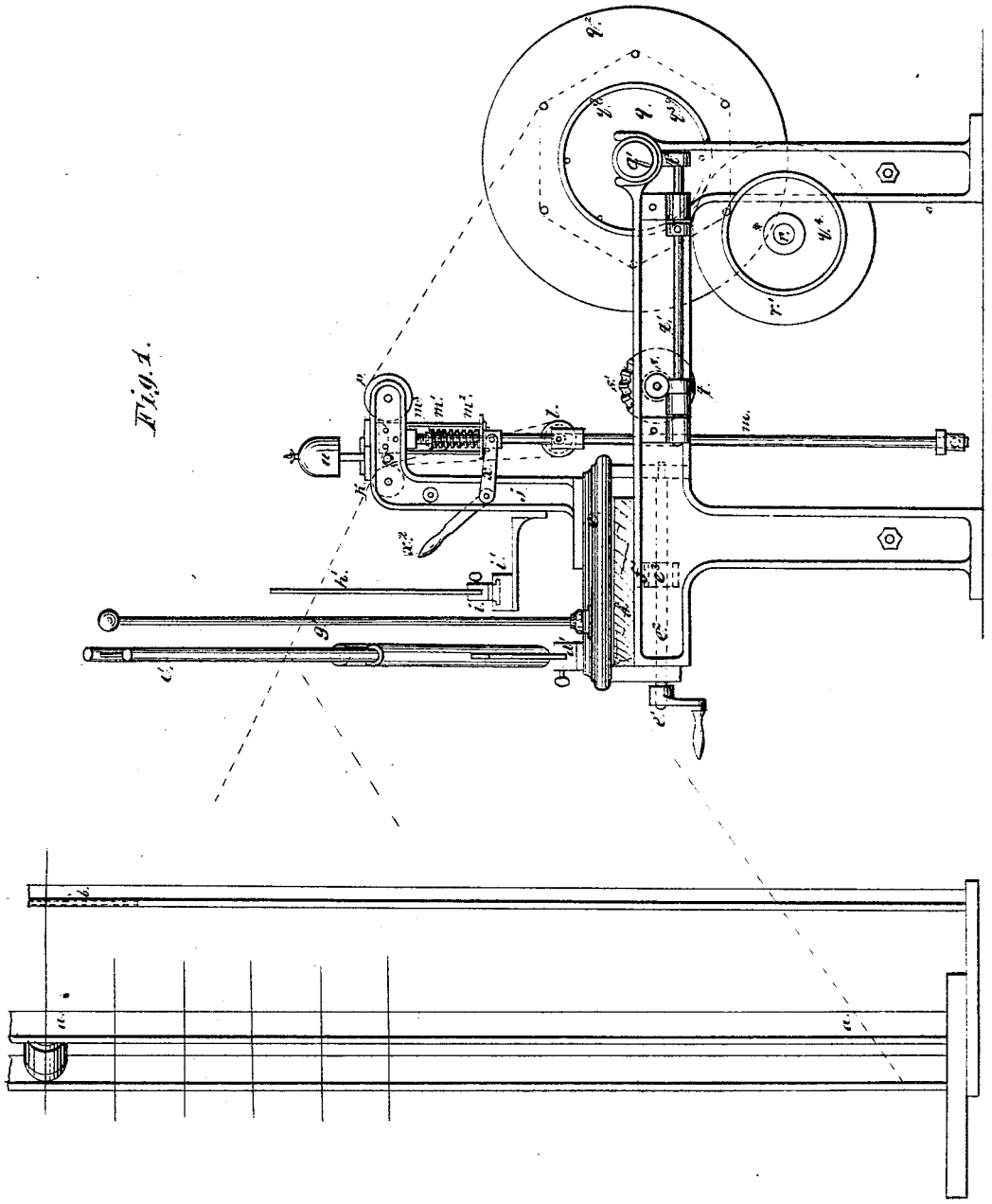
J. J. & G. ASHWORTH.

WARPING-MACHINE.

No. 183,619. Patented Oct. 24, 1876.

Fig. 1.



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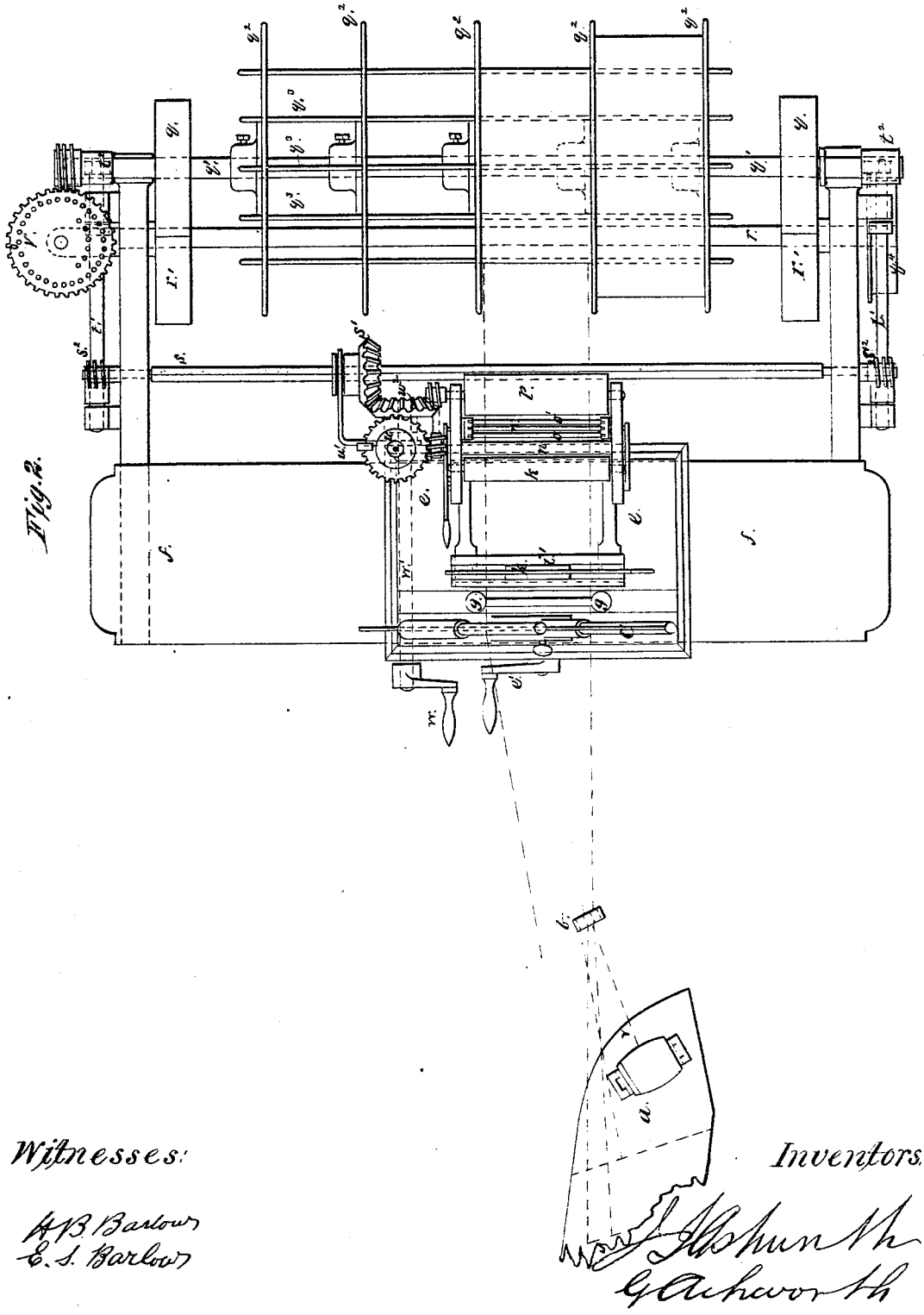

Fig. 2.

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Fig. 4.

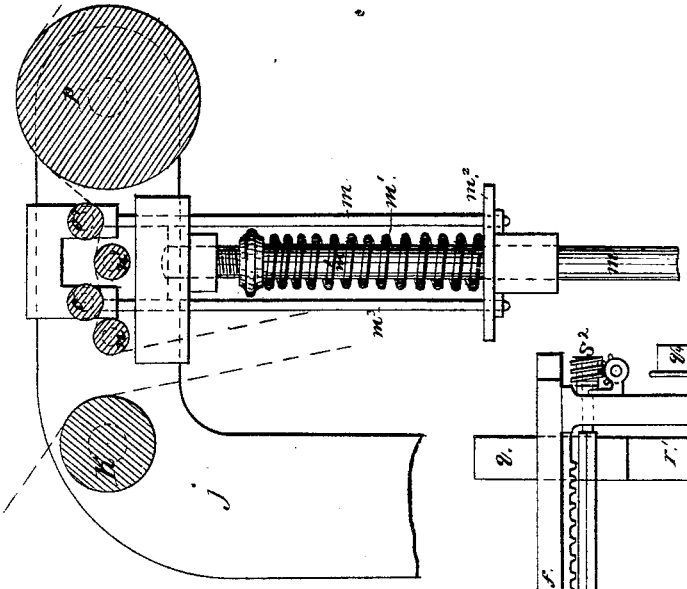
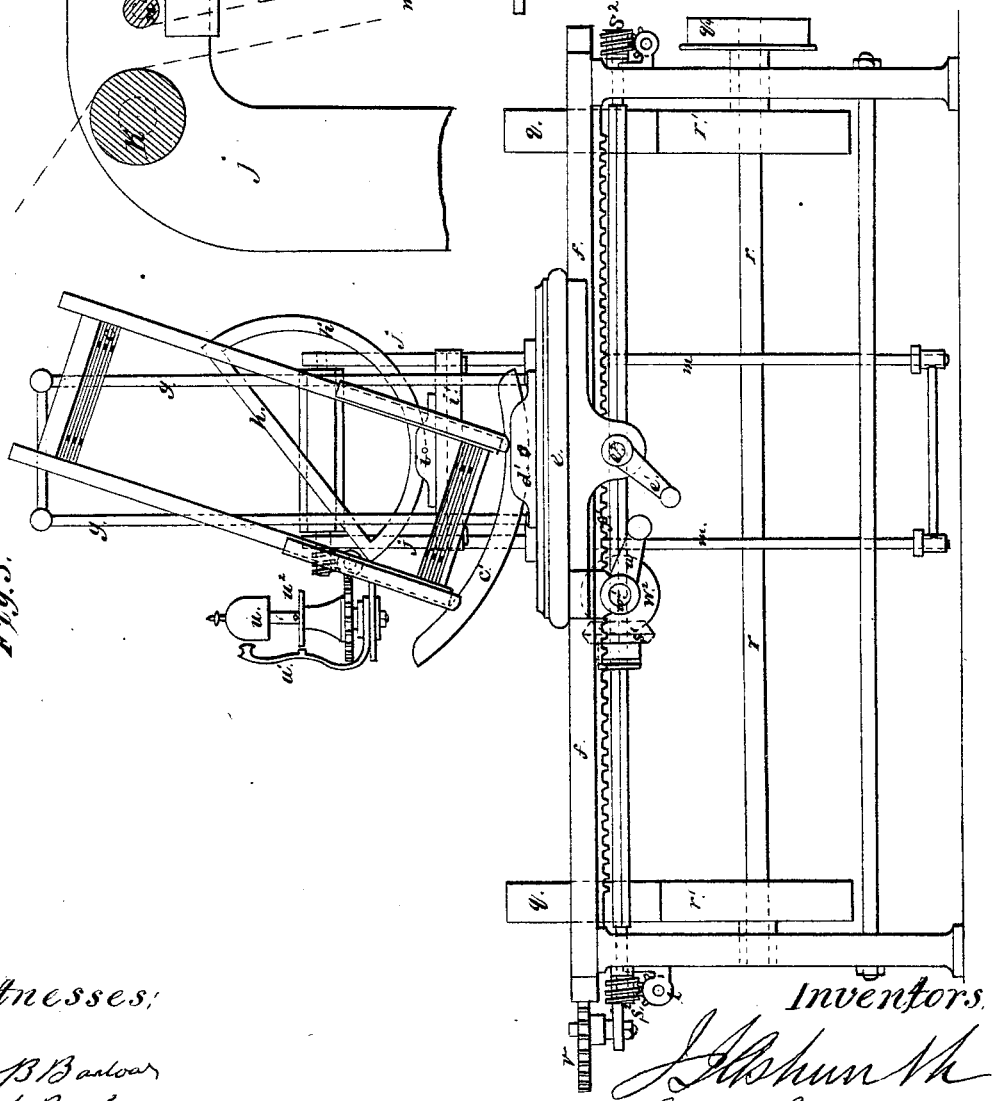


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN J. ASHWORTH AND GEORGE ASHWORTH, OF PENDLETON, ENGLAND.

IMPROVEMENT IN WARPING-MACHINES.

Specification forming part of Letters Patent No. **183,619**, dated October 24, 1876; application filed July 13, 1876.

To all whom it may concern:

Be it known that we, JOHN JACKSON ASHWORTH and GEORGE ASHWORTH, both of Pendleton, in the county of Lancaster, England, manufacturers, have invented certain new and useful Improvements in Machinery for Warping, (patented in Great Britain, No. 1,618 of 1875;) and we hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, forming part of this specification.

The object of this invention is to place all the warp-threads perfectly straight on the beam, to prevent twisting, to facilitate the weaving, to simplify the machinery, to reduce labor, and to economize space in the mill.

Figure 1 is an elevation, Fig. 2 a plan, and Fig. 3 a front view, of our improved machinery, which consists of a creel, *a*, mounted on wheels, and capable of being moved to and fro on rails fixed to the floor. This creel contains the bobbins of yarn to be formed into a warp. *b* is an upright staff, with one or more rows of pot-eyes, through which the ends of yarn are drawn. This staff is fixed to the creel, and moves with it. *c* is a reed, with the alternate dents closed, or of a shorter length, for taking the lease, as usual. This reed is fixed to the segment *c'*, which fits in a groove in the block *d'*, fixed to the plate *e*, which is moved to and fro on the table *f* by means of the handle e^1, shaft e^2, and pinion e^3 gearing into the rack *f'*, fixed to the under side of the table *f*. The segment *c'* is for varying the angle of the reed *c*.

The warp-threads, when drawn through the reed, are taken between the two pillars *g*, which are fixed to a slide in the plate *e*, and this slide, with the pillars, is moved to and fro for taking the lease. This taking of the lease is effected in detail in the following manner: When the pillars *g* are moved sidewise, which is effected by hand or otherwise, one of them comes in contact with the series of threads, and carries them to one side with it in the dents of the reed. Now, every alternate one of the dents being made of shorter length, it will be seen that one series of threads will stop at the limit of the shorter dents, while the alternate series move a little farther with the pillars, thus separating the alternate threads, so as to form an angular opening, into which a piece of string or other suitable material is inserted. The pillars are then moved in the opposite direction, and the opposite pillar then takes the threads in the opposite direction, and separates the threads by reason of the varying lengths of the dents, but in a manner the reverse of the first. A second piece of string is then inserted in between the alternate threads, which, together with the first, holds the alternate threads when wound upon the beam in a separated position for the convenience of the weaver, the said taking of the lease being only necessary at the ends of the warp-threads.

The warp, after passing between the pillars *g*, passes over the angle-rod *h*, forming part of the sector *h'*, which latter fits in a groove in the block *i*, sliding in the plate *i'*, which plate is fixed to brackets attached to the frames *j*, bolted to the plate *e*. The position of the angle-rod *h* can be varied to vary the distance between the threads, and so distribute any required number of warp-threads per inch in width.

The warp-threads, after leaving the angle-rod *h*, pass over the roller K, (shown on an enlarged scale in Fig. 4,) which revolves in bearings in the frame *j;* then under a falling-roller, *l*, which is supported in sockets fitting on the rods *m*, secured to the under side of the frames *j*. The warp-threads, after passing under the roller *l*, are taken over the roller *n*, then under the roller *o*, then over the second roller *n'*, and under the second roller *o'*. These rollers *o o'* are supported in blocks, and are pressed down onto the warp-threads by springs m^1, coiled around the upper ends of the rods *m*, and these springs bear upon the plates m^2, which are secured, by the small rods m^3, into the bearings of the rollers *o o'*. The tension of the springs m^1 can be varied by a milled screw-nut, as shown in Fig. 4, or otherwise.

In order to lift the tension-rollers *o o'* completely off the warp-threads and simultaneously at both ends, we apply the levers *x* to the bosses of the plates m^2, both levers being fixed to a cross-shaft passing through the standards *j*. The handle x^2 is attached to one

of the levers, x, and in this handle may be formed a notch for a catch to hold the rollers o o' when raised to allow the warp-threads to be drawn back from off the warp-beam. The warp-threads, after leaving the roller o', are then taken over the indicating-roller p, and thence to the warp-beam, on which they are wound.

The warp-beam consists of a center shaft, q^1, and of five or other convenient number of flanges, q^2, which can be fixed at any distance apart by set screws through the bosses of the flanges. There are also rods q^3 passing through holes above the bosses of the flanges q^2, to form the core of the beam, and the warp is wound on these rods. There are other holes in the flanges q^2, through which the rods q^3 can be passed to vary the circumference of the core, as may be convenient.

The warp-beam is driven by friction in the following manner: To the driving-shaft r are fixed the pulleys r', on which the pulleys q rest when the machine is in motion; but as soon as the warp-beam has to be stopped the attendant turns round the handle w on the shaft w^1, on which is a miter-pinion, w^2, gearing into a similar pinion, s^1, on the square shaft s, on which it slides. The worms s^2, fixed on the shaft s, gear into the pinions t, fixed to the shafts t^1, on which are keyed the eccentrics or cams t^2, acting on bushes loose on the shaft q^1. By this arrangement the shaft q^1 can be raised or lowered slowly or instantly to stop or start the machine.

The general mode of operation is as follows: When the machine is at work the space between any two flanges, q^2, is filled with warp, and when this space is full the reed c, with all the parts connected to the plate e, is moved sidewise by turning the handle e^1 so as to bring the warp-threads opposite the next pair of flanges, the creel also being moved to the same extent. The space between the second pair of flanges is now supposed to be partly filled, as shown in Fig. 2. When this space is filled, the creel and all the parts are again moved to fill the third space, and these operations are repeated until all the beam is full. The full beam is then taken to the beaming-frame, and there wound direct onto the weaver's beam. The pulley q^4 is for the driving-strap.

In winding the yarn on the different sections of the beam it is necessary that the same length of yarn should be wound upon each section, and that, also, the yarn of each section should be of the same tension or wound with the same number of revolutions. To secure this result, we have devised a special registering or indicating apparatus. An indicating-bell, u, is arranged upon a suitable support, to be struck by a spring-hammer, u^1, by the operation of a cam, u^2, which is slowly revolved through a diminishing gear actuated by the roller p, which latter is revolved by the frictional contact of the yarns passing over the same. This apparatus is so arranged as to strike when the first section of the beam is full of yarn. Now, when the remaining sections are to be filled, if reliance were placed in the striking apparatus, it is obvious that, if the tension of the threads were from any cause increased, the increased frictional contact giving more positive motion to roller p, the bell would strike before the same number of revolutions of the beam was made, and before the same length of thread was wound thereupon.

To remedy this defect, we have connected with the beam a positive registering apparatus, which always gives the exact number of revolutions of the beam, while the bell-striking apparatus gives the tension. This positive registering apparatus consists of a disk or wheel, v, perforated with graduated holes about its periphery to receive a peg, the distance of which peg from the zero-point indicates the number of revolutions of the beam required to fill a section at a given tension. This wheel is operated by the beam through a diminishing gear, and co-operates with the striking apparatus. Now, with these two systems of registering apparatus—one regulating the tension of thread, and the other the number of revolutions of the beam—it will be seen that one verifies the other to secure the same amount of thread on each section of the beam wound with the same tension or number of revolutions, for if the bell strikes before the given point indicated by the pin of the beam-register has been reached the operator knows that the tension is too great, which he is enabled at once to correct by adjusting the tension-regulating devices shown in Fig. 4.

By means of the two registering devices, therefore, the same length of yarn is wound at the same tension; or, in other words, in the same number of revolutions upon each of the succeeding sections of the beam that there is on the first.

Having thus stated the nature of our invention, and described the manner of performing the same, we declare that what we claim herein as new, and desire to secure by Letters Patent of the United States of America, is—

1. The combination, with a warp-beam having different sections q^2 q^2, of the frame e, carrying the warping devices, substantially as described, and made longitudinally adjustable with respect to the said warp-beam through rack f' and pinion e^3, as and for the purpose described.

2. The warp-beam, having pulleys q, that rest upon and revolve with the drive-pulleys r' from frictional contact produced by the gravity of the beam, in combination with the shaft w^1, having a crank, the miter-gears w^2 s^1, the shaft s, worm s^2, pinion t, and shaft t^1, carrying cams t^2, as and for the purpose set forth.

3. The warp-beam consisting of continuous shaft q^1, combined with adjustable flanges q^2, fastened to the beam by set-screws, together with rods q^3, substantially as and for the purpose described.

4. The reed *c*, having a curved segment, *c'*, combined with grooved block *d'*, and adjusted therein by means of a set-screw, as and for the purpose described.

5. The combination, with reed *c*, of the pillars *g*, located upon a slide in the base-piece *e*, as and for the purpose described.

6. The angle-rod *h* and sector *h'*, made adjustable in a grooved block, *i*, combined with and located between the reed and the roller *k*, substantially as and for the purpose described.

7. The combination, with rollers *k p n n'*, of rollers *o o'*, rods m^3, plates m^2, levers *x*, and falling-roller *l*, substantially as and for the purpose described.

8. The combination of the indicators *u* and *v*, the one being actuated by the roller *p*, and the other by the warp-beam, substantially as and for the purpose described.

In testimony whereof we have hereunto set our hands before two subscribing witnesses.

J. J. ASHWORTH.
G. ASHWORTH.

Witnesses:
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