3. Sheets. Sheet. 1.

J. Furrer,

Warping Mach.

No. 110,225. Patented Dec. 20. 1870

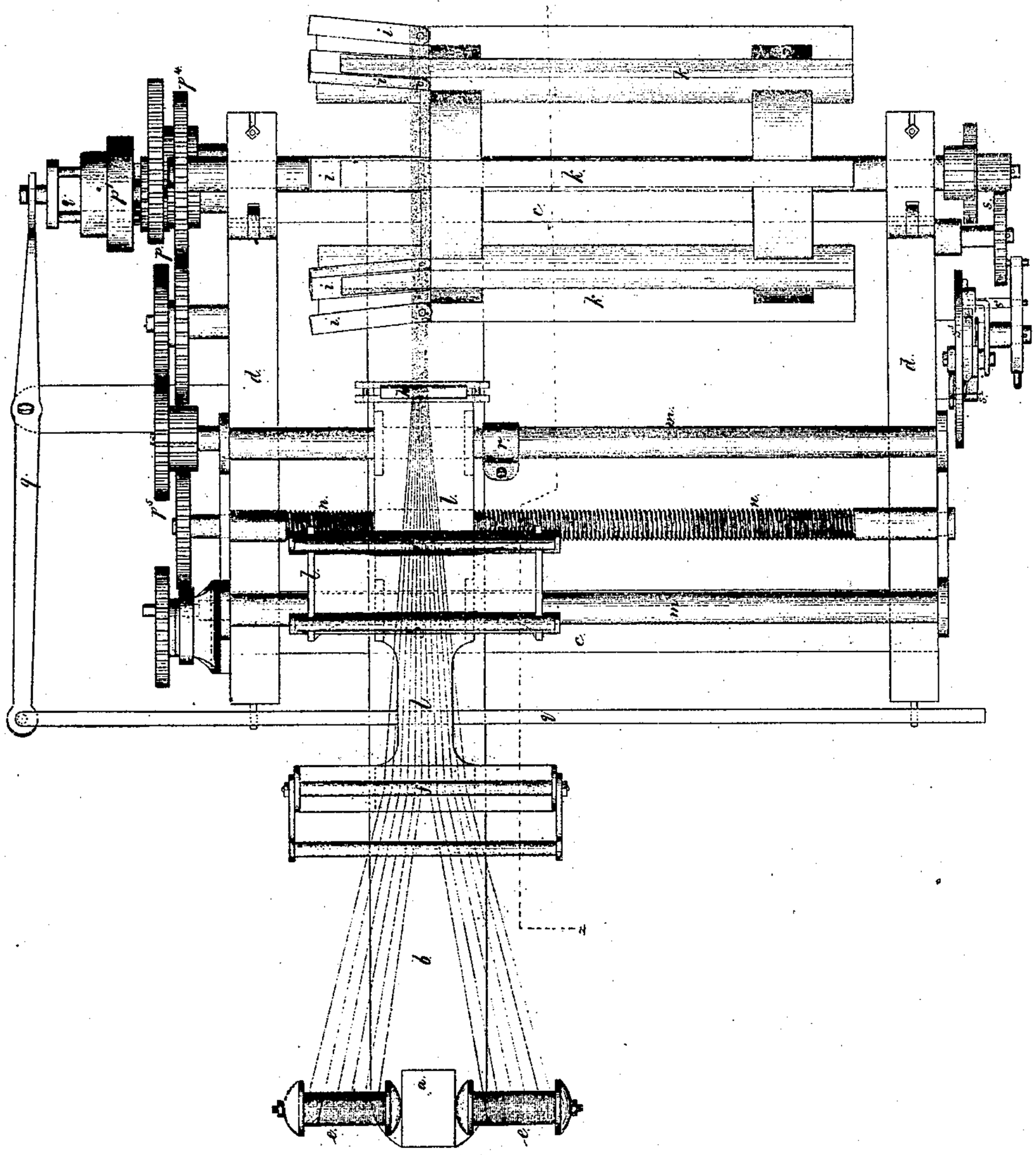


Fig. 1.

Witnesses

Chas. H. Smith

Geo. B. Waeber.

Jacob Furrer

per L. W. Serrell atty.

3. Sheets. Sheet. 2.

J. Furrer,

Warping Mach.

No. 110,225. Patented Dec. 20. 1870.

Fig. 4.

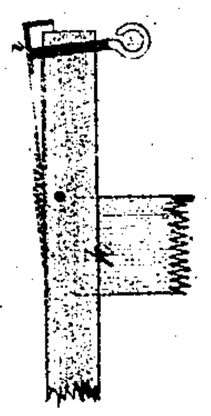


Fig. 5.

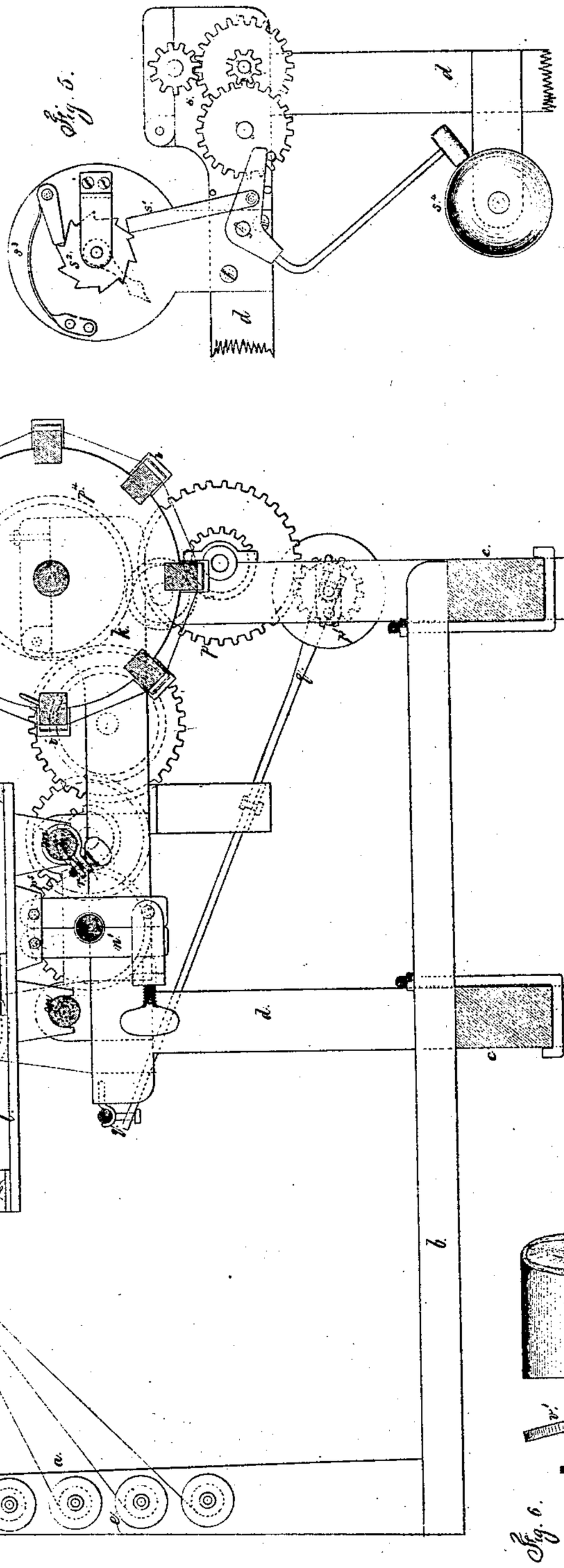
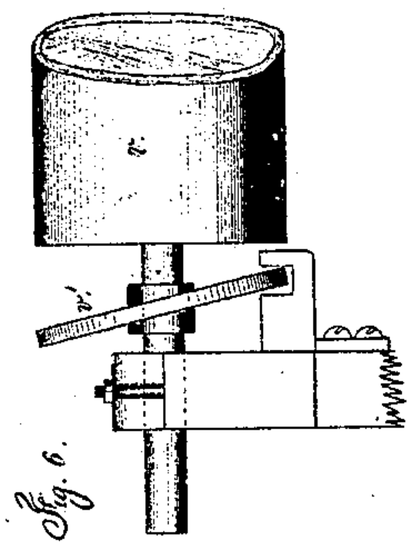


Fig. 2.

Fig. 6.



Witnesses
Chas. H. Smith
Geo. D. Walker.

Jacob Furrer
per L. W. Serrell Atty.

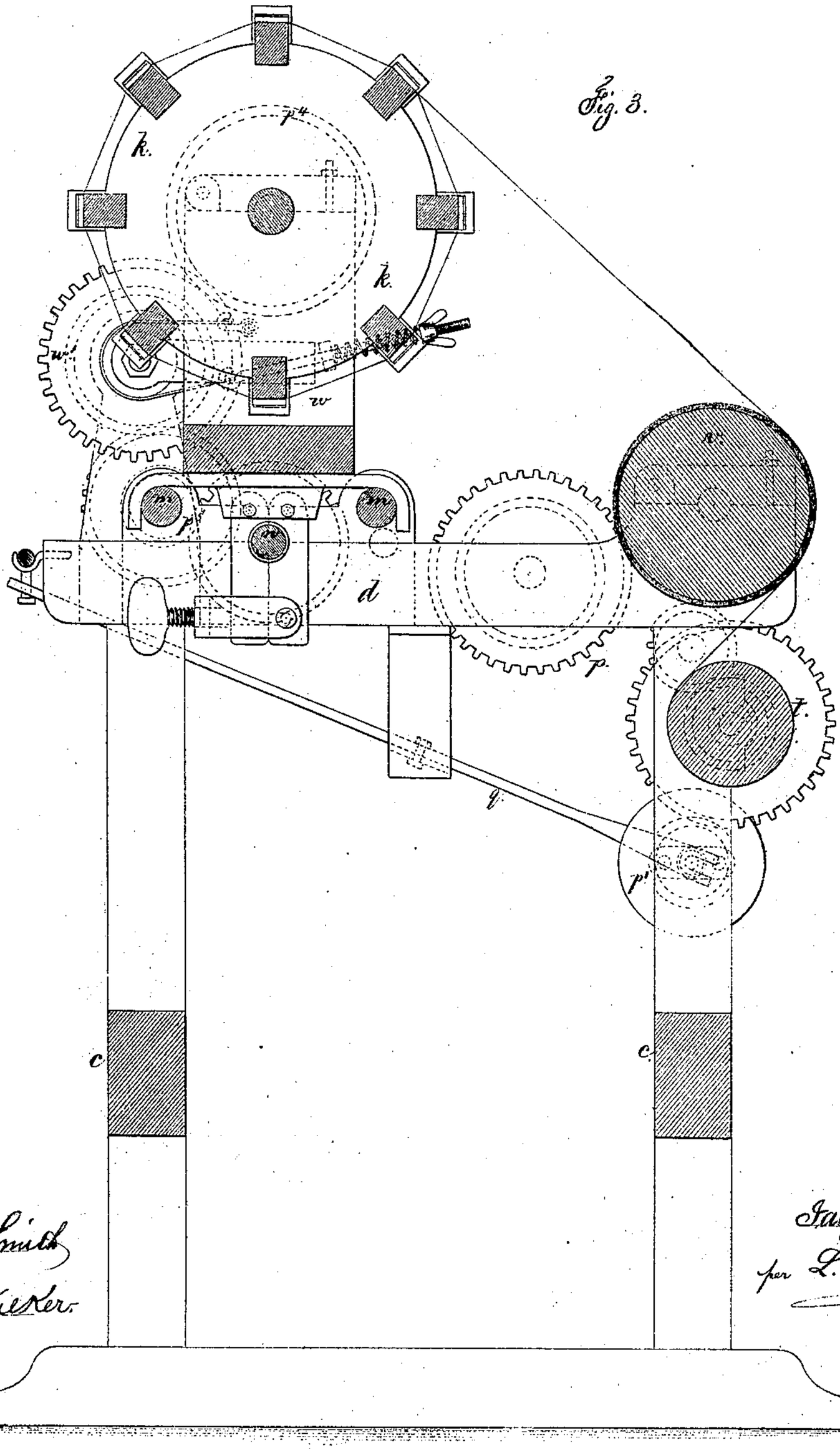
3. Sheets. Sheet. 3

J. Furrer,

Warping Mach.

No. 110,225. Patented Dec. 20. 1870.

Fig. 3.



Witnesses.

Chas. H. Smith

Geo. D. Walker.

Jacob Furrer

per L. W. Serrell

atty.

United States Patent Office.

JACOB FURRER, OF NEW YORK, N. Y.

Letters Patent No. 110,225, dated December 20, 1870; antedated December 9, 1870.

IMPROVEMENT IN WARPING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JACOB FURRER, of the city and State of New York, have invented an Improvement in Warping-Machine; and I do hereby declare the following to be a correct description of the same.

This invention is especially intended for winding silk and similar warps, wherein great accuracy and uniformity of length are required.

In the drawing—

Figure 1 is a plan, and

Figure 2 is a section at the line *x x* of the warp-winding mechanism, as arranged for taking the warp from the spools; and

Figure 3 is a vertical section of the parts, as placed in the machine for winding the warps from the reel upon the beam.

The spool-carrier *a* is attached to a rail, *b*, that is supported upon the cross-bars *c* of the frame *d* of the machine, and can be moved along from one end of the machine to the other as the winding progresses.

The warps from the spools *e* pass through the swinging separating-comb *f*, and under and over the guide-bars *g g*, and through the reed *h* to the winding-reel *k*.

The reed *h* is to correspond to the reed to be used in the loom, and the warps are threaded in a similar manner, either two or four to the dent.

The reed *h*, bars *g*, and comb *f* are mounted upon a frame, *l*, that slides transversely of the machine upon the bars *m m*, and

n is a screw that takes a sectional nut, *n'*, upon *l*.

The screw *n* and reel *k* are revolved at the desired speed by the train *p p* of gearing, driven by power applied to the pulley *p'* or otherwise; and

q represents a stop-motion lever and clutch.

The warps are wound upon the reel *k*, one layer lapping upon the next, and, therefore, the size of the outer coil is larger than the inner coil.

To compensate this increased size of the second layer, as it is wound upon the first, I employ inclined ends *i i* to the bars of the reel *k*, so that the first layer of warps shall be the same length as the subsequent layers. This is effected by commencing to wind the first layer of warps at the junction of the inclined ends *i* and the bars of the reel, and directing the warps toward the ends of the inclines, so that the winding progresses gradually up the inclines, and then the next layer of warps is commenced on the bars of the reel, and wound upon the previous layer of warps, as illustrated in Figure 4.

In this operation the screw *n*, being revolved simultaneously with the reel, the warps are laid in a gradual spiral line by the screw *n* drawing the reed *h*, and other parts carried by the frame *l*, along toward the gearing *p*. The inclines *i* may be adjusted by screws applied beneath their outer ends, as seen in fig. 4.

It is now to be understood that when a certain number of revolutions of the reel *k* has been made, the warps are cut, and their loose ends secured upon the reel by a pin or clamp; then the operator takes a little gauge or measure of a width corresponding to the space occupied by the warps as they pass through the reed *h*, and with this gauge determines the distance that the frame *l* has to be set along in order to commence the winding of the next layer. This is effected by a collar, *r*, that is clamped to one of the rods *m* at the proper distance from the edge of the frame *l*; then the divided nut *n'* is opened, and the frame *l* slipped along to that point, or the screw *n* revolved back independently by a crank and ratchet connection to the gearing.

The reel and parts are set in motion after the ends of the warps have again been attached to the reel, and thus the successive layers are wound upon the reel, and occupy the same width as the warps do in the reed of the loom, the warps, therefore, when wound upon the beam or roller, will be in their correct position and of uniform length, the parts being moved along after winding each layer until the necessary width of warps is obtained.

In order to facilitate the winding of given lengths upon the reel, I employ a train of gears, *s*, pawl s^1, ratchet-wheel s^2, and dial s^3, to keep count of the number of revolutions of the reel, and to indicate, by a blow upon the bell s^4, each movement of the pawl s^1. These parts are shown detached in Figure 5.

When this apparatus is used for winding the warp off the reel *k* upon the warp-beam or roller *t*, said beam is mounted in the position shown in fig. 3, and receives motion from the gears *p*.

The reel *k* is taken out of its bearings, and, in place thereof, the cloth-covered roller *v* is inserted, and over this the warps pass to the beam *t*, and give to such roller, *v*, revolution as the winding progresses, and a disk, *v'*, (see Figure 6,) set at an inclination on the axis of this roller *v* and taking a standing notch, gives end motion to the roller *v* as it revolves, so that the warps are crossed upon each other and laid with uniformity upon the beam.

The reel *k* is mounted upon a frame, *w*, that sets upon the bars *m m*, and connects with the screw *n* by a divided nut.

Friction is applied to the hub of the wheel *w'*, with which the wheel p^4 of the reel *k* gears, so as to apply the necessary detaining force to the warps, and a motion is given to the screw *n* through the gears p^5, as the reel revolves, to move the reel endwise the dis-

tance corresponding to the spiral in which the layers of warps are wound upon the reel, so that all the warps of the different layers unwind simultaneously from the reel and with uniformity, each thread of the warp being wound in a spiral conical position on the reel.

I do not claim the warp-winding mechanism shown in the English patent No. 169, granted A. D. 1861.

What I claim, and desire to secure by Letters Patent, is—

1. The movable collar *r*, clamped to the rod *m*, and forming a gauge to set the parts, in combination with the frame *l*, reed *h*, screw *n*, and reel *k*, as and for the purposes set forth.

2. The friction-strap applied to the wheel *w'*, to give a uniform tension to the warps as they unwind from the reel *k*, in combination with the screw *n*, roller *v*, and warp-beam *t*, the parts being arranged as specified, so that the reel *k* can be removed without affecting the tension-strap, as set forth.

In witness whereof I have hereunto set my signature this 22d day of October, A. D. 1869.

J. FURRER.

Witnesses:

CHAS. H. SMITH,

GEO. T. PINCKNEY.