

I. L. G. RICE.
MACHINE FOR TYING WARP-THREADS.
No. 176,194. Patented April 18, 1876.

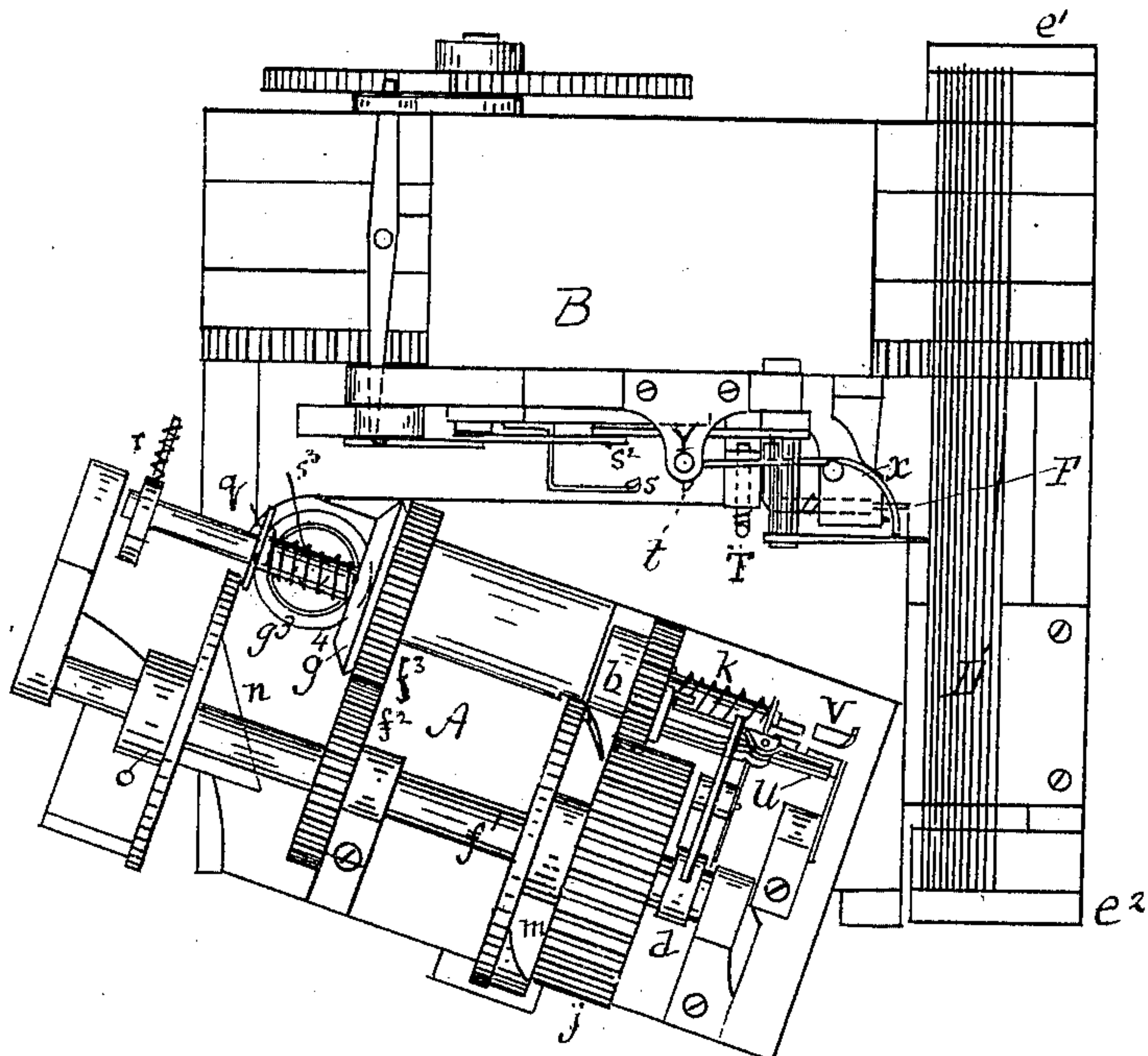


Fig. 1.

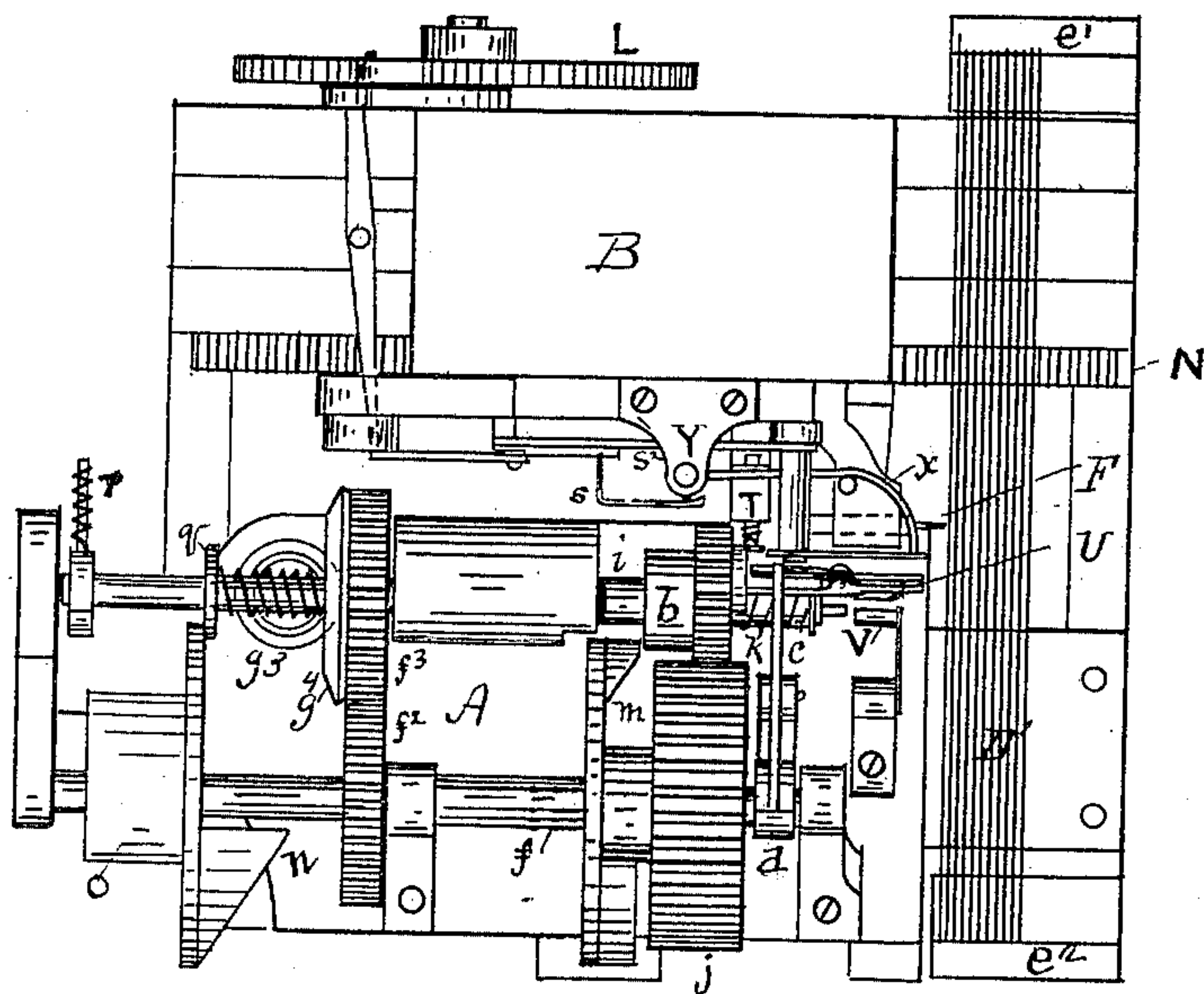


Fig. 2

WITNESSES
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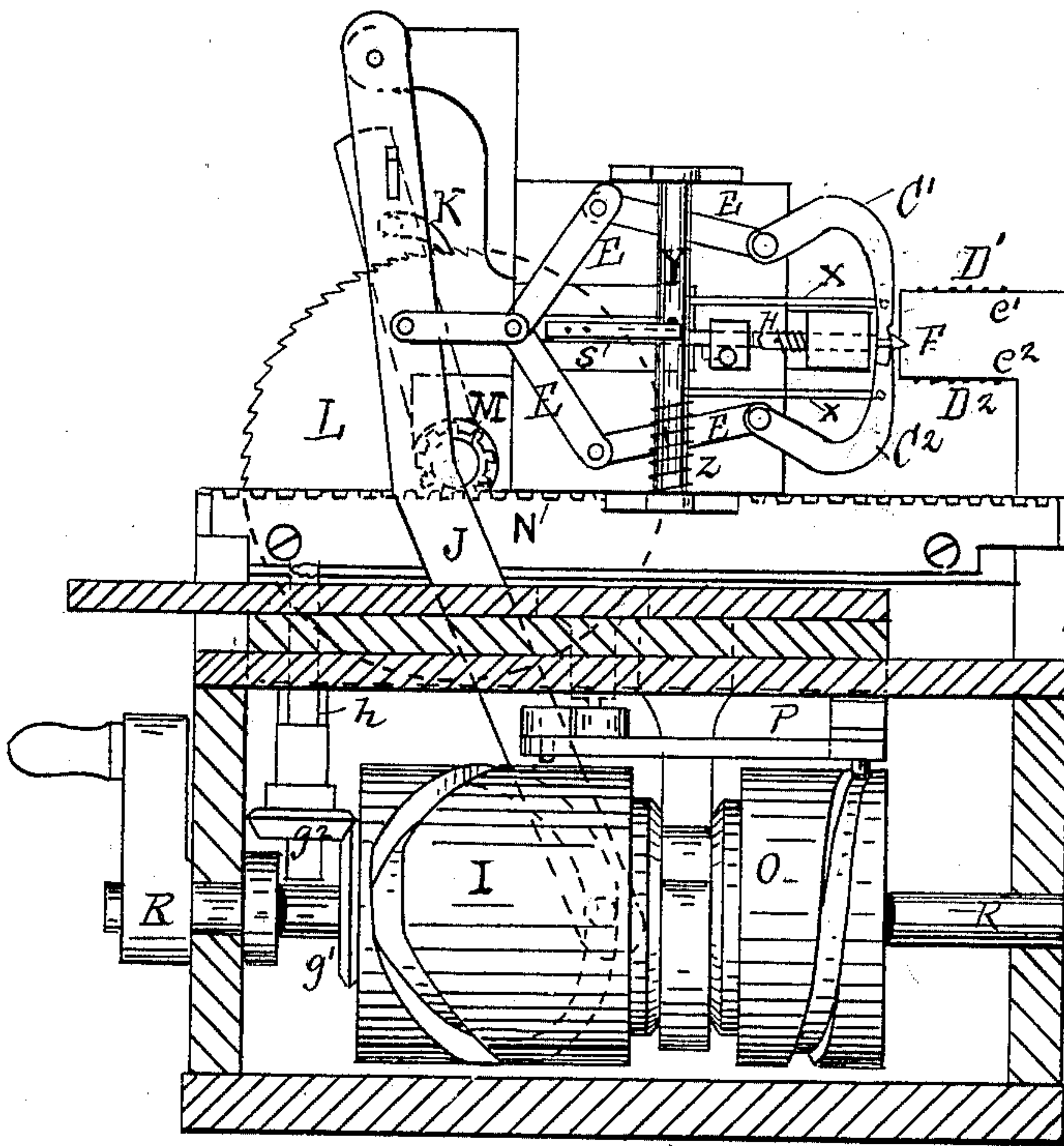


Fig. 3

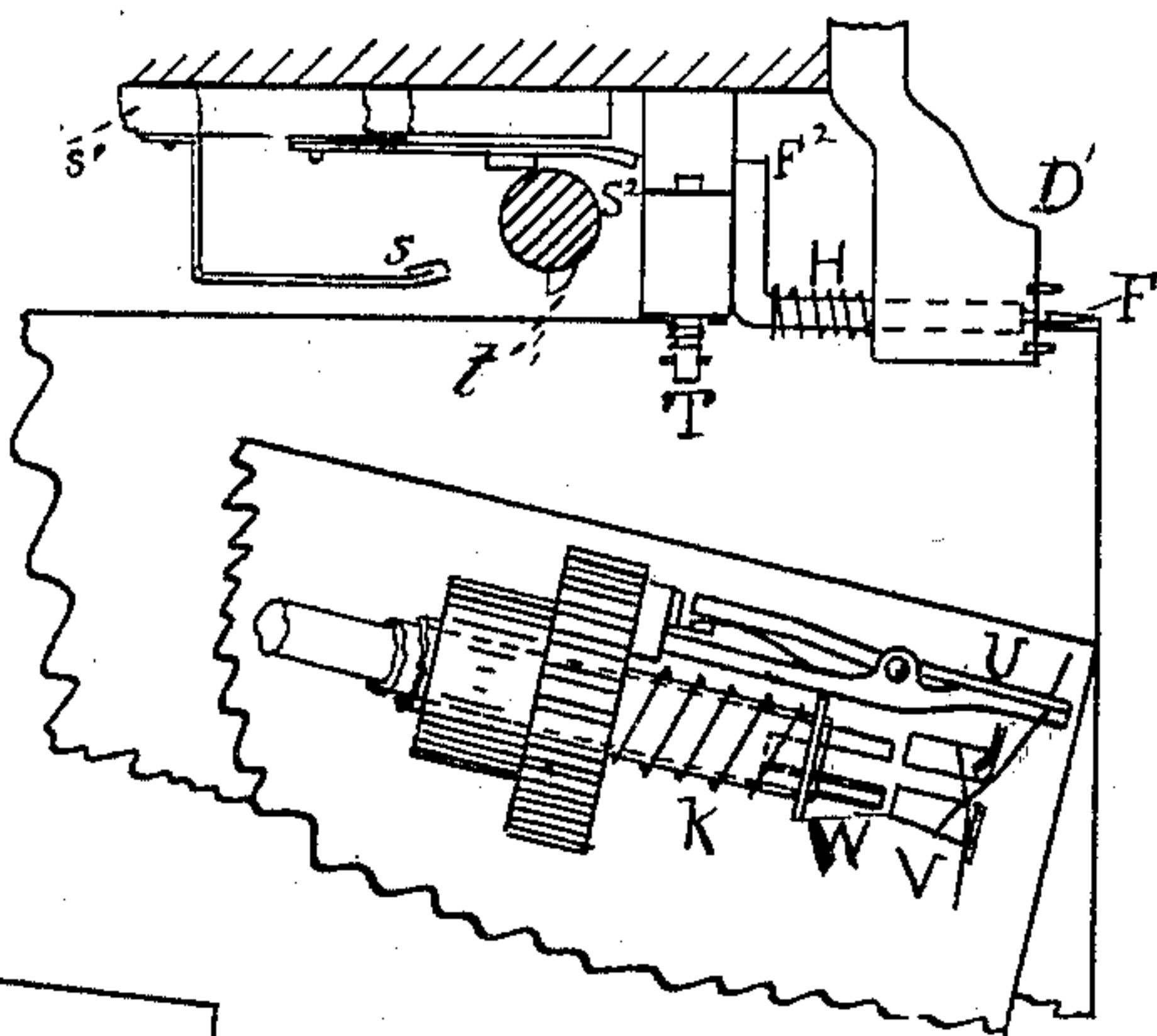


Fig. 4

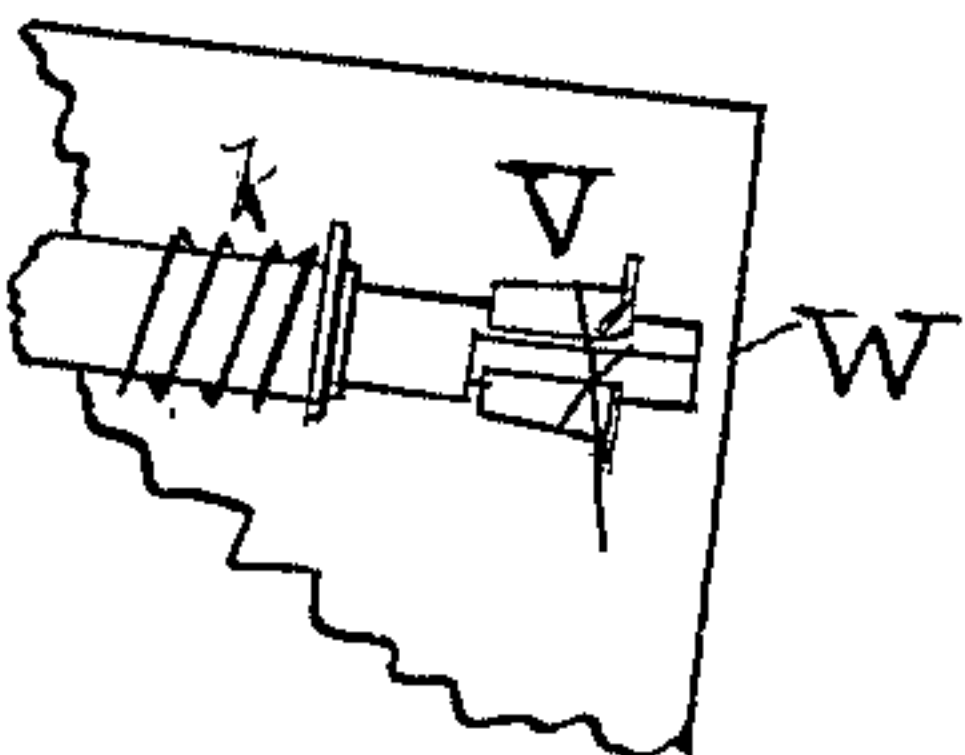


Fig 5

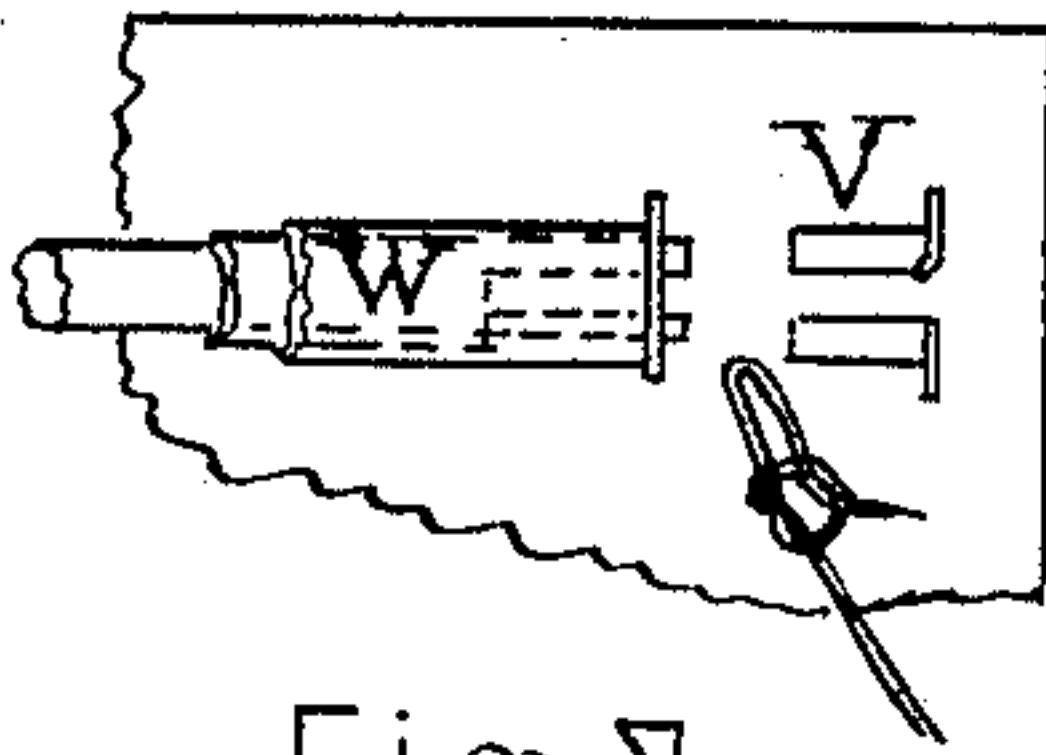


Fig. 7.

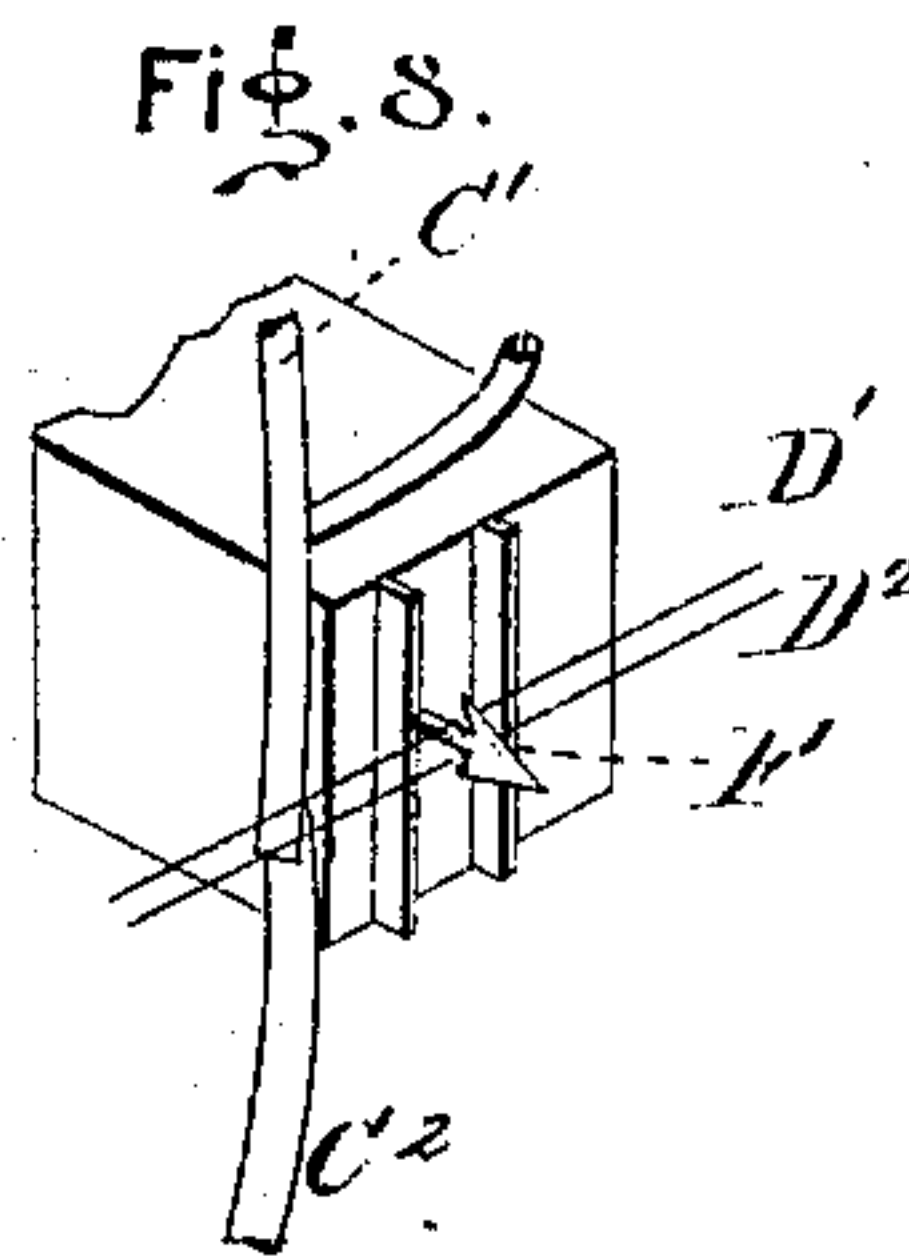


Fig. 8.

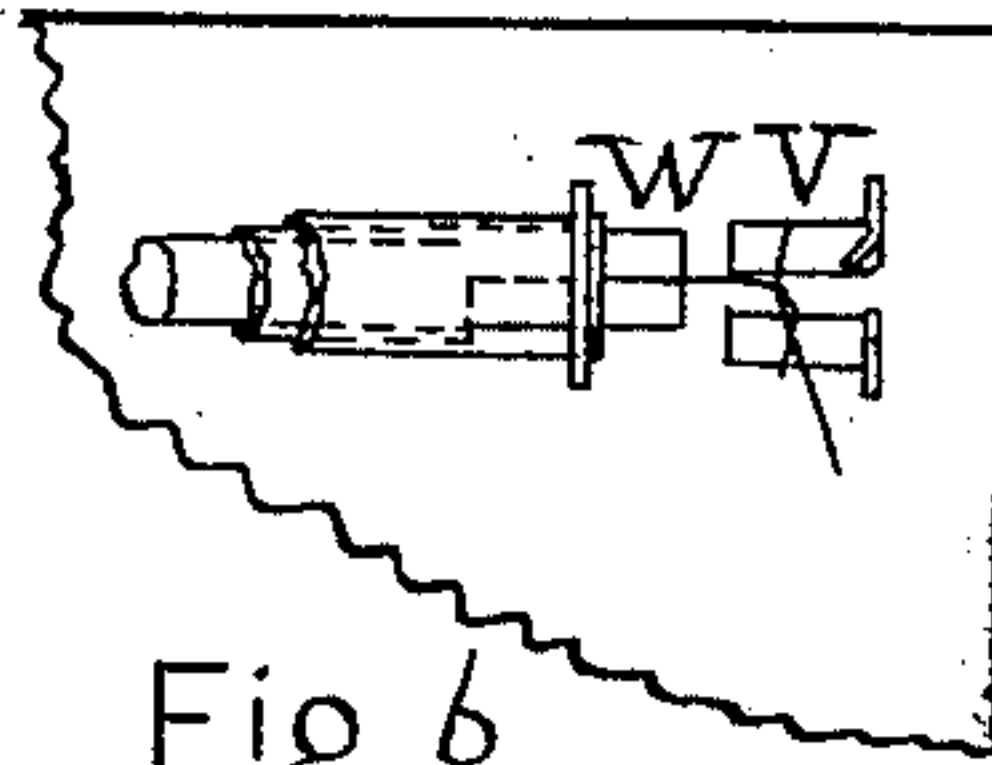


Fig 6

WITNESSES

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ISRAEL L. G. RICE, OF CAMBRIDGE, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR TYING WARP-THREADS.

Specification forming part of Letters Patent No. **176,194**, dated April 18, 1876; application filed July 15, 1875.

To all whom it may concern:

Be it known that I, ISRAEL L. G. RICE, of Cambridge, Massachusetts, have invented a certain machine for automatically selecting, picking up, and tying warp-threads, for doing the work ordinarily termed "twisting in," of which the following is a specification:

The first part of my invention relates to mechanism for selecting one of the old warp-threads and one of the new warp-threads, corresponding to one another, and bringing these two threads to a point where they can be seized by the pinchers.

The second part of the invention is the tying mechanism. This consists of the pinchers, adapted to seize the two threads that have been selected, and, after they have been cut by the knife, carry the ends around a former and deliver the ends to a pair of grippers, that take hold and complete the tying of the knot.

The warps are stretched and clamped in parallel lines, one above the other. The old warp in the harness is placed about an inch below the new warp on the full beam. The mechanism for selecting, cutting, and tying the threads is placed upon a carriage and moved up to the warp automatically as fast as required. The particular mechanism for tying the threads is placed upon a frame made to swing toward the warps to give the slack yarn required in tying the knot.

Figure 1 is a plan view, showing the swinging frame in the position when the hooks take up the threads. Fig. 2 is a plan view, showing the swinging frame, with the tying mechanism upon it, moved up to take the two threads. Fig. 3 is a sectional view of the machine, showing the hooks, knife, and mechanism for moving the carriage. Fig. 4 is a detail view of the knife and the fingers when tying the threads together. Fig. 5 is a view of the inside fingers when taking hold of the two ends to tie the knot. Fig. 6 shows the knot when in position to be drawn tight. Fig. 7 shows the knot complete. Fig. 8 is a view of the knife, and shows the position of the old and new warp-threads when about to be cut.

In the drawings, R is the main shaft; g, the gear which drives the tying mechanism; I, the cam for operating the arms C¹ C², which take

up the threads by means of small hooks or dents, adapted to hold but a single thread. These arms are worked by the joint-levers E E, (see Fig. 3,) connected to the long lever J, which also works the feed-motion of the carriage B by means of the pawl K working in the ratchet L, fast on a shaft provided with the gear M, that works in the stationary rack N, fixed to the long bed of the machine. This rack is at right angles with the warp D¹ D², and is as long as the warp is wide. The lever J operates the knife F by means of suitable connections, and also the hammers x x, for striking the arms C¹ C², so as to vibrate them, and thereby shake off any superfluous threads that may adhere to the hooks. This is clearly shown in Figs. 1 and 3. x x are the hammers, fastened to the movable upright stud Y, which has a spiral spring, z, around it. The spring-finger s is connected to a sliding piece, s¹, secured to the arms E E, Fig. 3, and is adapted to strike a projection, t, on the stud Y, and thereby partially turn it round; and when, in its continued forward movement, the finger s passes the projection t, it allows the stud Y to suddenly fly back, which causes the hammers to strike the arms C¹ C². The knife F is operated by means of the spring-finger s² on the slide s¹, which finger is adapted to strike the bent arm F² of the knife F and push it forward. When the arms C¹ C² come together they bring their threads so as to rest on the inner blades of the barbed knife F, (see Figs. 4, upper part, and 8,) the warp-thread D¹ being brought against the knife F, and the warp-thread D² being parallel to it. When the finger s² has pushed the knife forward it remains until the tying-frame A has moved into the position shown at Fig. 2, and the pinchers U have seized the threads, when a projection on the gear b presses back the plunger T, Fig. 4, causing it to strike the finger s² and release it from the end of the knife-arm F², when the knife-flies back and cuts the threads. The cam o on the main shaft R gives a swinging motion to the frame A by means of the bell-crank lever P, to enable the frame A and its tying device to move nearer to the ends of the warp, so as to obtain the slack required for the knot.

The operation of the tying mechanism is as

follows: The cam-shaft f^1 is turned by means of the gears f^2 and f^3 , worked by the bevel-gears g^4 and g^3 on the upright shaft h . The gear on shaft f^1 drives the gear b , to which the pinchers U are attached. When the hooked arms C^1 and C^2 have selected their threads and brought them together, these pinchers are moved forward by the cam m on the shaft f^1 , and when forward they are struck by the lever or arm c , Fig. 2, which is operated by the projection d on the shaft f^1 , which causes the fingers to open, and as the shaft continues to turn round the projection d ceases to act on c , and the fingers close upon the two threads, the pinchers being actuated by a stiff spring, Fig. 4. These pinchers may be covered with leather, so as to enable them to grasp the threads better. As the pinchers hold the threads the knife F flies back and cuts them off, and as the cam m revolves it allows the gear b and the pinchers to return back, in which movement they also revolve and carry the threads around the former V , stationary upon the frame A . While this is taking place the frame A is swung off toward the ends of the warp-threads that are in the clamp e^2 , as shown in Fig. 1. This gives slack yarn to tie the knot. The cam n now shoves the inside grippers W , Fig. 4, toward the ends of the yarns held by the fingers U , in position opposite the slot in the former V , and the grippers W then seize the yarns, being operated by the cam o . (See Figs. 2 and 5.) The pinchers U then release the ends of the yarn as they strike on a projection placed under them, and the grippers W pull back by means of the spiral spring s^3 shown, pressing against the disk q , the disk q being connected with the grippers W . The

spring r keeps the grippers W open except when closed by the cam o . In Fig. 6 are seen the grippers pulling back the threads, the ends being drawn through, and the loop over, the former V . Fig. 7 shows the knot complete. Meanwhile the arms C^1 and C^2 have been returning to their positions, and the carriage has been moved forward the distance of the diameter of a thread. These operations are automatically repeated until the whole warp has been connected.

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

1. In a warp-tying machine, the reciprocating hooked arms C^1 C^2 , each adapted to select a single thread and to act upon the parallel warps D^1 D^2 , as set forth.
2. The pinchers U , in combination with the arms C^1 and C^2 , constructed and operated as described, substantially as and for the purpose set forth.
3. The combination of the arms C^1 and C^2 , constructed and operated as described, and pinchers U , with the knife F , substantially as and for the purpose set forth.
4. The combination of the pinchers U with the former V and the inner grippers W , for the purpose of tying a knot.
5. The combination of the arms C^1 C^2 , constructed and operated as described, with the pinchers U , and knife F , and grippers W , and the rack N , and pinion M , ratchet L , and pawl K , and carriage B , substantially as and for the purpose set forth.

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Witnesses:

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