

(No Model.)

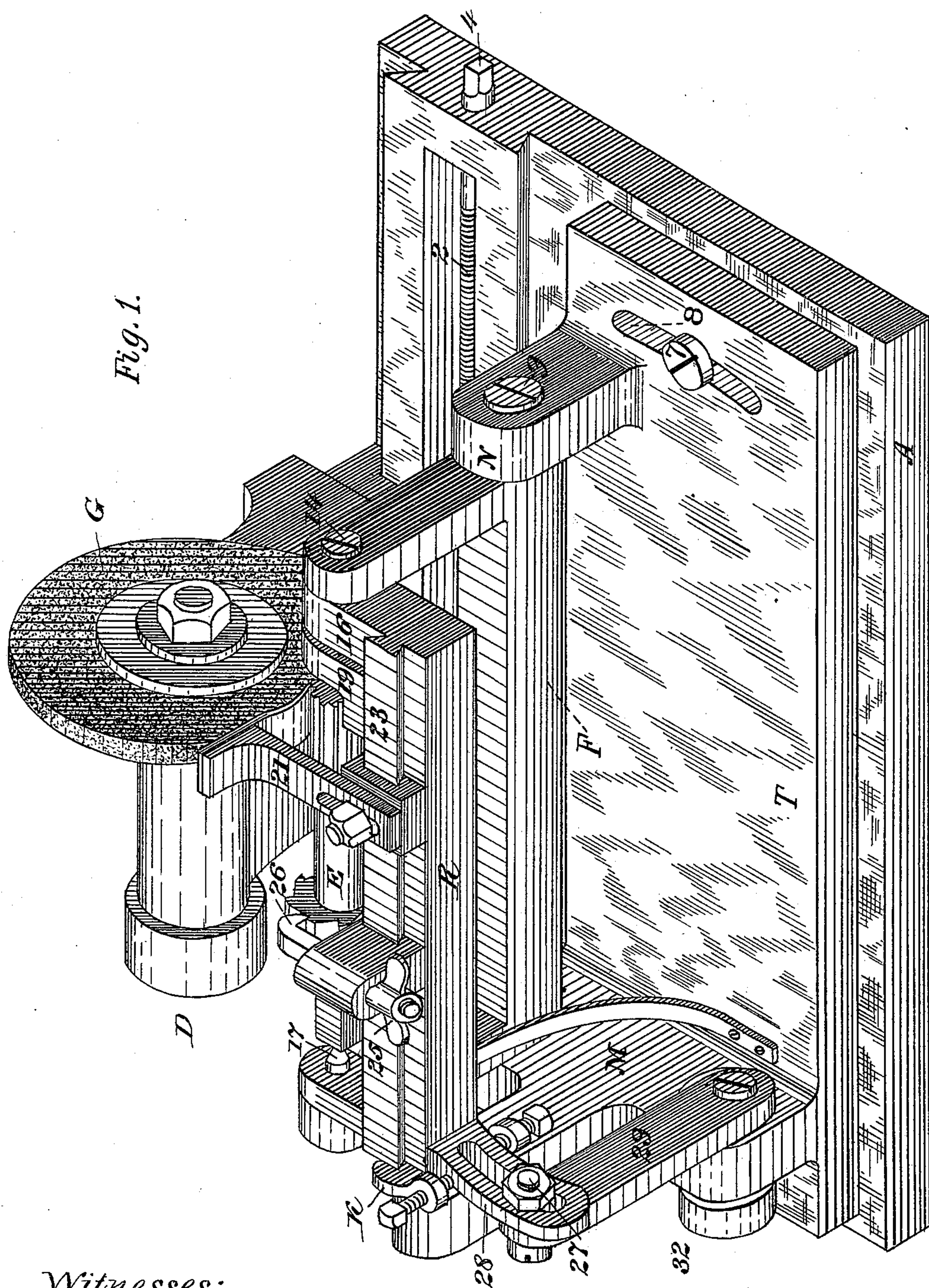
3 Sheets—Sheet 1.

F. H. RICHARDS.

REAMER RELIEVING MACHINE.

No. 336,066.

Patented Feb. 9, 1886.



Witnesses;

C. O. Palmer.

H. W. Faulkner.

Inventor;

Francis H. Richards.

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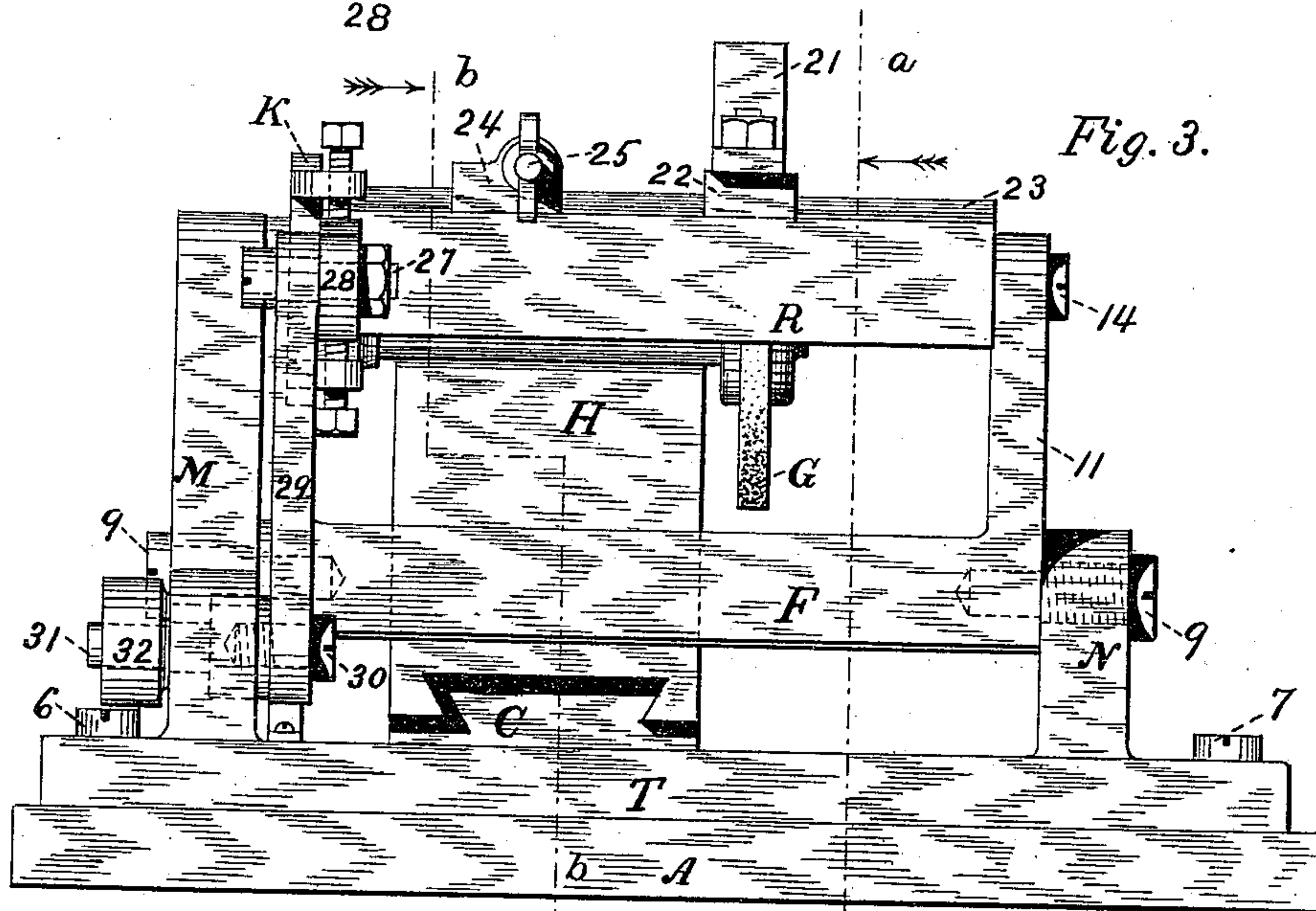
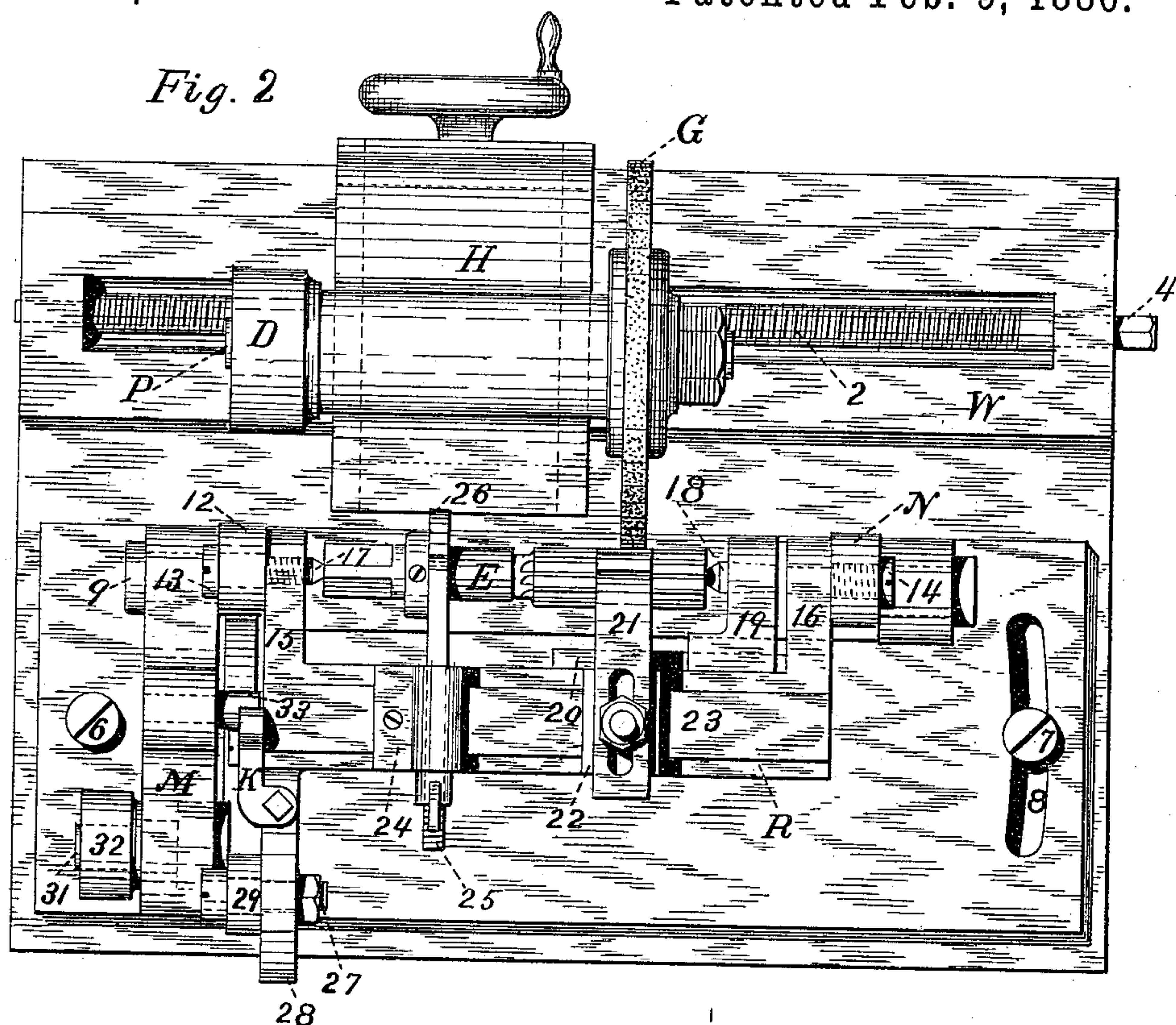
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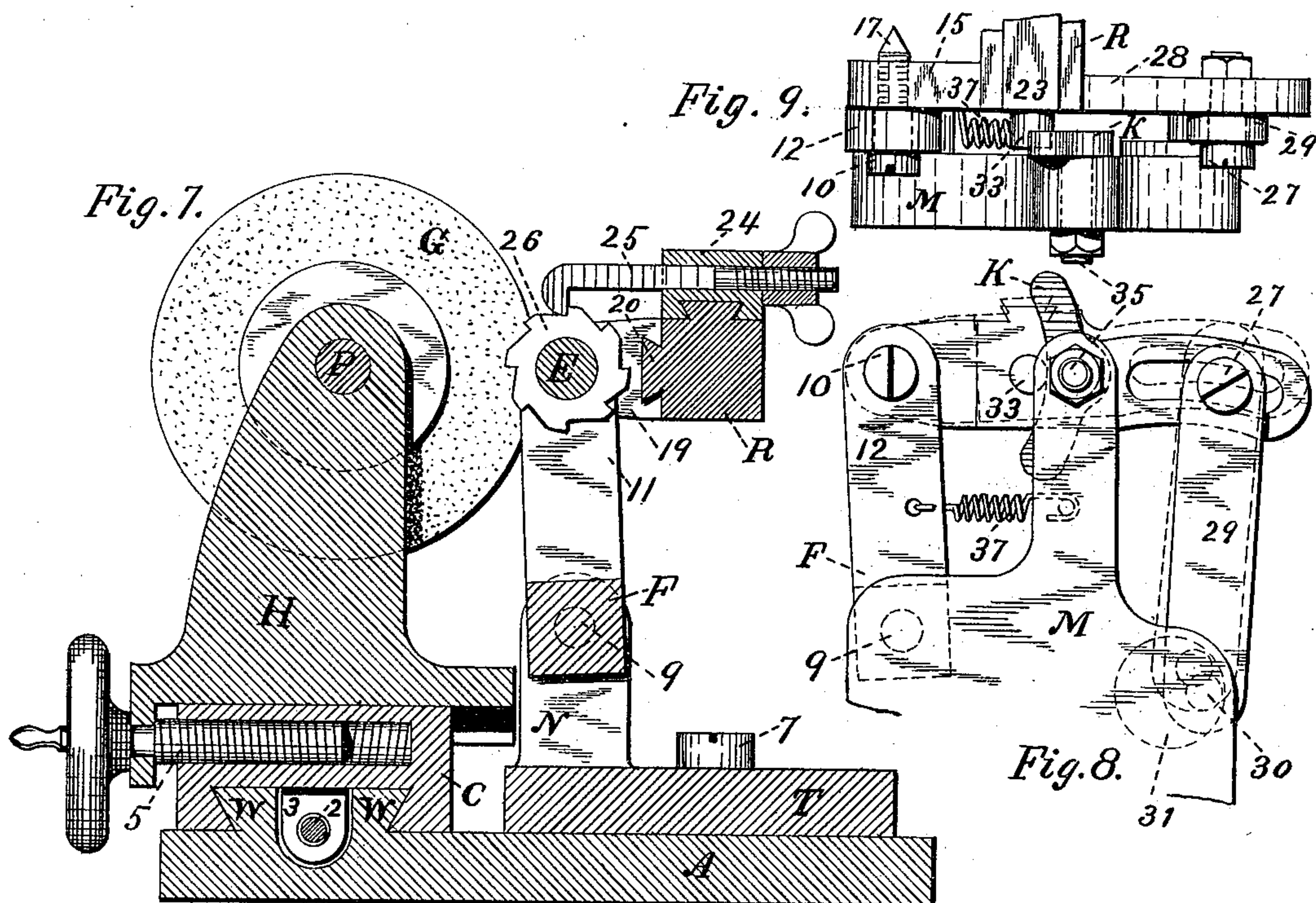
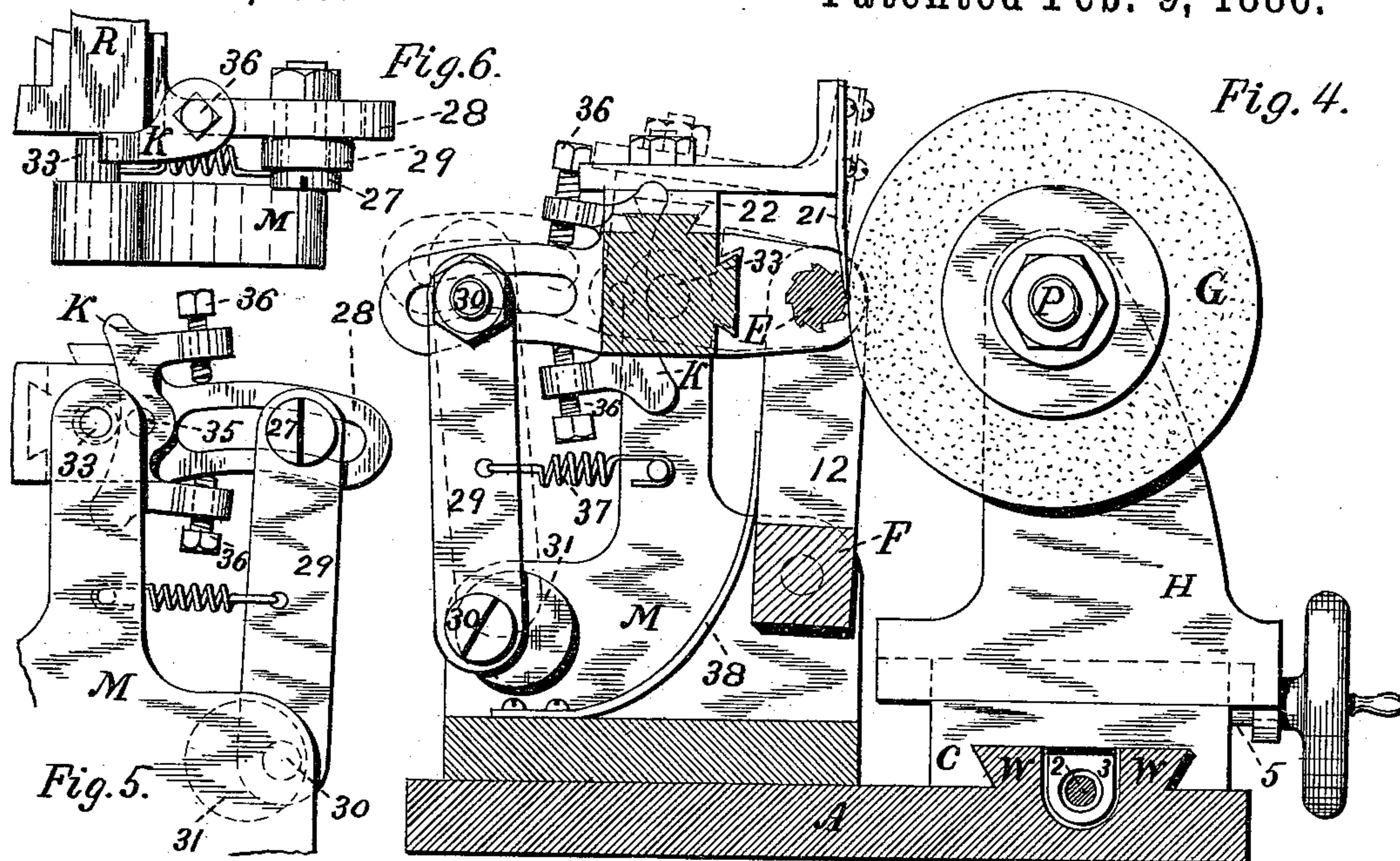
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO
THE PRATT & WHITNEY COMPANY, OF HARTFORD, CONNECTICUT.

REAMER-RELIEVING MACHINE.

SPECIFICATION forming part of Letters Patent No. 336,066, dated February 9, 1886.

Application filed January 31, 1885. Serial No. 154,579. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Reamer-Relieving Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to machines for relieving the cutting-edges of reamers, or those of other similar tools, either before or after hardening, by means of any suitable grinding devices.

It has for its object to furnish such a machine, which shall be adapted to relieve the cutting-edges of a tool by reducing each "land" or surface between the grooves of the same to a shape conforming to a pattern that constitutes a part of said machine.

For the attainment of this object, my invention consists in certain combinations of mechanism, which are hereinafter first described in connection with the drawings, and afterward pointed out in the claims.

Referring to the drawings, Figure 1 is a perspective view of a machine embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is an elevation of the front side, which is below in Fig. 2. Fig. 4 is a transverse vertical section in line *a a*, Fig. 3. Fig. 5 is an elevation of the pattern mechanism, as seen from the left hand of Fig. 3. Fig. 6 is a top view of what is shown in Fig. 5. Fig. 7 is a transverse vertical section in line *b b*, Fig. 3. Fig. 8 is a view similar to Fig. 5, showing a modification in the pattern mechanism. Fig. 9 is a top view of what is shown in Fig. 8. Fig. 6 is in projection to Fig. 5, Fig. 3 to Fig. 2, and Fig. 9 to Fig. 8.

Similar characters designate the same parts in all the figures.

A designates the bed-plate of the machine, having formed thereon ways W for the carriage C. This carriage is provided with means for sliding it on said ways, which means consists, in the present instance, of a screw, 2, supported in suitable bearings formed on the bed-plate, and working in nut 3, connected to said carriage. Said screw may be turned by hand-

power by means of a handle applied to head 4; or it may be operated automatically by any of the devices usually employed for such purposes.

H designates the head for carrying the grinding-wheel spindle P. This head is fitted to slide transversely on carriage C, being so moved by means of screw 5, as fully shown in Fig. 7. This is a usual device for sliding such parts of a machine; but others may be employed, if desired. Spindle P has its bearing, as aforesaid, in head H, and carries a grinding-wheel, G, and a driving-pulley, D, each secured thereto in the usual manner.

T designates an adjustable table carrying the reamer-holding fixture and the pattern mechanism, and the device for operating them. This table is pivoted at one end to the bed-plate at 6, and at the other end is clamped in the desired position by screw 7, which passes through slot 8 and into plate A. Said table is provided with two uprights, N N, between which the rotary reciprocating frame F is carried on pivot-screws 9. This frame has two upwardly-projecting parts or arms, 11 and 12, between which the oscillating reamer-holding fixture R is pivoted on screws 13 and 14, which are similar to pivot-screws 9. Pivot 13 (see Fig. 2) projects through the arm 15 of fixture R, and terminates in the center 17, for supporting one end of the reamer E. The other end of said reamer is supported by a similar center, 18, fixed in a head, 19, which is adapted to be adjustably fixed according to the length of the reamer on a way, 20, that is formed on said fixture. The reamer is secured in proper position by means of a stop, 21, fixed to block 22, which block is adjustably fixed on a way, 23, formed on the fixture, and by means of a tension device consisting of block 24, tension-rod 25, and ratchet-wheel 26. The stop and tension-rod just described and the parts immediately associated with them are the same in construction and operation as the similar parts shown and described in United States Patent No. 308,669, dated December 2, 1884, to which reference may be had.

At the end next to upright M the fixture R is provided with a pin, 27, (it having in this case an arm, 28, for receiving said pin,) where-

by it is oscillated on pivots 13 and 14 by means of a connecting-rod, 29, crank 30, shaft 31, and pulley 32, or by some equivalent device. These parts constitute what I call the "oscillating mechanism," its function being to oscillate the fixture through the required arc.

In Figs. 1 to 6, K is a cam or pattern, that is adjustably secured by a pivot, 35, and set-screws 36 to one end of the fixture, and arranged to work against a pin or roller, 33, fixed in the higher part of upright M. One or more springs, as 37 or 38, or suitably-connected weights, are employed to hold the cam against pin 33, and thereby govern the position of frame F and the fixture carried by this frame.

In Figs. 8 and 9 the positions of cam K and pin 33 are reversed, the cam being in this case secured to the upright M. It is immaterial to my invention which of these arrangements is used; nor is it necessary that either shall be used unmodified. The shape of the bearing-surface of cam K determines the form of relief given to the reamer-teeth, and hence said shape must be suitably made in each particular case, to produce the required relief, having regard to the size and precise arrangement of the several parts of the machine. The proper methods for making said cam will be understood by mechanics familiar with machinery in which forms are reproduced from a model or pattern, so that a particular description of the same is here unnecessary.

The operation of my improved reamer-relieving machine is as follows: The reamer to be relieved is placed and adjusted in the fixture in the same manner as described in the aforesaid Letters Patent No. 308,669, substantially as shown in the drawings. The oscillating mechanism is adjusted to oscillate the fixture through the required arc, so as to present the whole width of the reamer-tooth to the action of wheel G, the cam K being so set as to impart to the fixture a slight movement toward and from said wheel, corresponding to

the amount of relief to be given said tooth. The grinding-wheel and the oscillating mechanism being now put in operation by belts on pulleys D and 32, head H is adjusted to bring said wheel against a reamer-tooth, and the carriage C traveled to and fro on ways W until that tooth is properly relieved, these operations being repeated as required.

Having thus described my invention, I claim—

1. The combination of a grinding device, a laterally-movable frame, an oscillating reamer-holding fixture carried by said frame, mechanism, substantially as described, for oscillating said fixture, and a pattern for controlling the motion of said frame and fixture toward and from said grinding device, substantially as set forth.

2. The combination of a bed-plate having ways for a carriage, a carriage adapted to be traveled on said ways, a grinding-wheel supported on said carriage, a laterally-adjustable table placed at one side of said carriage on said bed-plate, a laterally-movable frame carried on said table, an oscillating tool-holding fixture carried by said frame, means, substantially as described, for oscillating said fixture, and a pattern for controlling the motion of said frame and fixture toward and from said grinding-wheel, substantially as set forth.

3. The combination of frame F, fixture R, cam K, pin 33, and mechanism, substantially as described, for operating said frame and fixture, substantially as set forth.

4. The combination, in a relieving-machine, of a grinding device, a reamer-holding fixture, and means, substantially as described, for imparting to said fixture an oscillating movement and a movement to and from said grinding device, substantially as set forth.

FRANCIS H. RICHARDS.

Witnesses:

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C. O. PALMER.